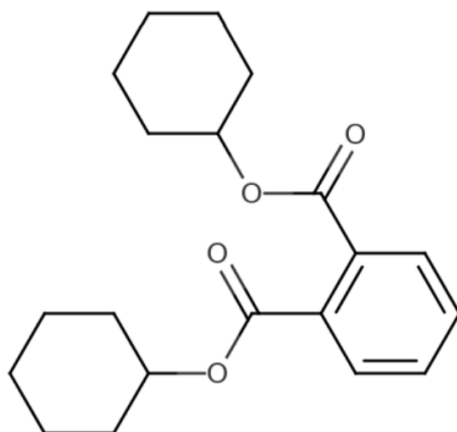


**Data Quality Evaluation and Data Extraction Information for  
Environmental Release and Occupational Exposure for  
Dicyclohexyl Phthalate (DCHP)  
(1,2- Benzenedicarboxylic acid, 1,2-dicyclohexyl ester)**

**Systematic Review Support Document for the Risk Evaluation**

**CASRN: 84-61-7**



*December 2025*

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This supplemental file contains information regarding the data extraction and quality evaluation results for data sources that were considered for the *Risk Evaluation for Dicyclohexyl Phthalate (DCHP)* 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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<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Processing into formulation			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	Oral, Inhalation.			
Area sampling data:	PEC during processing: 1.52E-04 [mg/m^3]			
Comments:	Local daily intake: 0.0257 [mg/kg-day]			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	The results are predicted not measured.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Report is less than 10 years old but methods used are from 2003.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., personal breathing zone) but no other meta-data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.
Overall Quality Determination			Low	

<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	Oral, Inhalation.			
Area sampling data:	PEC during manufacturing: 3.46E-07 [mg/m^3]			
Comments:	Local daily intake: 0.0123 [mg/kg-day]			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Results are not measured but predicted.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Report is less than 10 years old but methods used are from 2003.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., personal breathing zone) but no other meta-data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.
Overall Quality Determination		Low		

<b>Study Citation:</b>	Daniels, W. J., Donohue, M. T., Singal, M. (1985). Health Hazard Evaluation Report No. HETA-84-239-1586, Ashland Super Valu, Ashland, Wisconsin.			
<b>HERO ID:</b>	NIOSH(HETA-84-239-1586):84-239.			
<b>Conditions of Use:</b>	812650			
	Adhesive and Sealants - labels			
EXTRACTION				
Parameter	Data			
Worker activity description:	Meat labeling, meat wrapping			
Exposure route:	Inhalation			
Physical form:	vapor			
Personal sampling data:	DCHP levels were either not detected or below the limit of detection of 20 mg/m^3			
Area sampling data:	DCHP levels were either not detected or below the limit of detection of 20 mg/m^3			
Exposure duration:	Sample Duration: 130 to 270 minutes			
Number of workers:	5			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Study conducted by NIOSH (NIOSH HHE).
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is from 1984, so more than 20 years old.
	Metric 5:	Sample Size	Medium	Only 1 personal sample and 2 area samples collected.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data include most critical metadata, such as sample type, exposure type, and sample durations, but not exposure frequency and exposure duration.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by taking both personal and area samples but uncertainty is not addressed.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.
<b>HERO ID:</b>	4168432
<b>Conditions of Use:</b>	Disposal of plastics

EXTRACTION	
Parameter	Data
Area sampling data:	He et al. [182] analyzed the VOC emission characteristics, health risks, and indoor microenvironment exposure during the melting/extrusion stages of the recycling processes at seven different types of plastic solid waste (PSW). The first group, consisted of both ABS and PS, contained the same monomer; styrene. The total concentration of VOCs (TVOC) with a mean value of $1.0 \pm 0.4 \times 10^3 \text{ mg m}^{-3}$ in the ABS recycling workshop was much higher than that in the PS workshop ( $4.7 \pm 1.0 \times 10^2 \text{ mg m}^{-3}$ ). Nevertheless, mono-aromatics was the predominant group in both workshops ( $\geq 84.7\%$ ). The second group of PSW included PE and PP, whose monomers were aliphatic olefins. Results indicated that alkanes are the most abundant VOCs for polyolefins, contributing 50.8% and 37.5% to the PE and PP recycling VOC emissions, respectively. The third group of PSW included PVC, PA and PC, whose monomers contained heteroatoms. During the extrusion of these three types of PSW, the TVOC emissions were also much lower than those of the ABS and PS recycling processes, but not so much different from the PP and PE recycling processes. // Huang et al. [183] demonstrated that the exhaust gases emitted from plastic waste recycling granulation have an effect on the ambient environment in Xingtian, Guangdong, China [183]. Also, PAHs were detected inside and outside of the recycling granulation plants in the area. In the same study, PAEs were largely distributed in the particle-phase. High levels of DBP and DEHP could be detected inside the plants. The detected DiBP, DnBP and DEHP inside the Huachang plant were 30, 20 and 5 times greater than background concentrations of the area, respectively.

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Sampling and Analytical Methodology	Low	Sampling or analytical methodology is not specified.
Domain 2: Representativeness				
	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure limits, industry/ process technologies) may impact exposures relative to the U.S., or the country of origin is not specified.
	Metric 3:	Applicability	Medium	The data are for an occupational scenario within the scope of the risk evaluation, but data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data are expected to be representative of current operations, equipment, and activities. The monitoring data were collected after the most recent permissible exposure limit (PEL) establishment or update or are generally, no more than 10 years old, whichever is shorter. If no PEL is established, the data are no more than 10 years old. Metadata on the operations, equipment, and worker activities associated with the data show that the data should be representative of current operations, equipment, and activities.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity				
	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., personal breathing zone) but no other metadata.

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<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.		
<b>HERO ID:</b>	4168432		
<b>Conditions of Use:</b>	Disposal of plastics		
Domain	Metric	<b>EVALUATION</b> Rating	Comments
Domain 4: Variability and Uncertainty			
Metric 7:	Metadata Completeness	Medium	The monitoring study provides only limited discussion of the variability in the determinants of exposure for the sampled site or sector. The monitoring study provides only limited discussion of the uncertainty in the exposure estimates.
<b>Overall Quality Determination</b>		<b>Low</b>	

<b>Study Citation:</b>	Radian Corp, (1989). Environmental analysis for the Shell Martinez RM-17 incinerator, with cover letter dated 3/15/1991 (sanitized).			
<b>HERO ID:</b>	1335691			
<b>Conditions of Use:</b>	Disposal - Waste incineration			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	inhalation, ingestion			
Physical form:	vapor			
Personal sampling data:	Estimated ingestion dose of general phthalates was 1.54x10^-7 mg/kg/day.			
Area sampling data:	Estimated inhalation dose of general phthalates was 2.25x10^-8 mg/kg/day			
Engineering control:	air pollution control equipment used for incinerator: quench column, venturi scrubber, packed bed wet scrubber, mist eliminator			
<b>EVALUATION</b>				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Report uses high quality data, techniques and methods that are from the EPA and do not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from the US
	Metric 3:	Applicability	Medium	Data contains general phthalate emissions and exposures but does not contain information specific to DCHP. Data could possibly be used as analogous data
	Metric 4:	Temporal Representativeness	Low	Assessment is more than 20 years old.
	Metric 5:	Sample Size	Low	Characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Provides results but the underlying methods, data sources and assumptions are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
<b>Overall Quality Determination</b>			<b>Low</b>	

<b>Study Citation:</b>	Vandervort, R., Brooks, S. M. (1977). Polyvinyl chloride film thermal decomposition products as an occupational illness: I. Environmental exposures and toxicology. Journal of Occupational and Environmental Medicine 19(3):188-191.			
<b>HERO ID:</b>	59547			
<b>Conditions of Use:</b>	PVC film and label adhesive in meat packing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Meat wrapper in supermarkets, rest are in butchershops and packing houses.			
Exposure route:	vapor			
Physical form:	film and label adhesive - upon heating turns into vapor			
Number of workers:	Between 75,000 and 100,000 persons employed as meat wrappers in the US.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US
	Metric 3:	Applicability	Medium	Data is applicable to commercial use of PVC film and adhesives. No DCHP specific data
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old (1977).
	Metric 5:	Sample Size	Low	Not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Contains worker activity, exposure route, physical form, emissions, chemical concentration.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	U.S. EPA, (2023). Consumer Exposure Model (CEM) Version 3.2 User’s Guide.			
<b>HERO ID:</b>	11374403			
<b>Conditions of Use:</b>	All COUs			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	Dermal exposure data			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	The model is free of mathematical errors and is based on scientifically sound approaches or methods. However, equations and choice of parameter values are not fully described and some equations and/or parameter values may not be appropriate for the model’s application.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The model was developed by an OECD country other than the U.S.	
	Metric 3: Applicability	High	The model can be appropriately applied to an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The model is based on data that are generally more than 10 years but no more than 20 years old.	
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	Medium	Model approach, equations, and choice of parameter values are transparent. However, rationale for selection of approach, equations, and parameter values is not provided.	
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	Medium	The source has limited discussion of variability and uncertainty of the model.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	EC/HC, (2015). State of the science report: Phthalate substance grouping: Medium-chain phthalate esters: Chemical Abstracts Service Registry Numbers: 84-61-7; 84-64-0; 84-69-5; 523-31-9; 5334-09-8;16883-83-3; 27215-22-1; 27987-25-3; 68515-40-2; 71888-89-6.		
<b>HERO ID:</b>	3688160		
<b>Conditions of Use:</b>	Ambient air concentration, indoor air and dust concentration		
EXTRACTION			
<b>Parameter</b>	<b>Data</b>		
Area sampling data:	In ambient air, DCHP was not detected at industrial and rural sites in California (MDL: 1 ng/m3) (p. 101). DCHP has been detected in indoor air (both volatile and particulate matter) in one survey of homes conducted in Cape Cod, USA (21% of 102 homes; arithmetic mean: 3.4; median: ND; 90th percentile14: 210; range: ND–280 ng/m3) (Rudel et al. 2003) (p. 102).		
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 a frequently used source (e.g., European Union or OECD reports, NIOSH HHEs, journal articles, 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	The data are from an OECD country other than the U.S. (Canada).
	Metric 3: Applicability	Low	The assessment is 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	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	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	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

<b>Study Citation:</b>	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
<b>HERO ID:</b>	5353181			
<b>Conditions of Use:</b>	Indoor air, food and consumer products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	oral, inhalation, dermal			
Physical form:	dust			
<b>EVALUATION</b>				
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	Medium	Data are from Canada, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer uses, which may be similar to commercial uses.
	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	No sample 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	N/A	No scope to address variability and scope.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Marquart, H., Franken, R., Goede, H., Fransman, W., Schinkel, J. (2017). Validation of the dermal exposure model in ECETOC TRA. Annals of Work Exposures and Health 61(7):854-871.			
<b>HERO ID:</b>	5080455			
<b>Conditions of Use:</b>	All COUs			
EXTRACTION				
Parameter		Data		
Dermal exposure data:		Dermal exposure data		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The 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	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	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	No sample size data applicable for protection factor.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	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 in protection factors.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.		
<b>HERO ID:</b>	3808976		
<b>Conditions of Use:</b>	Use - Automotive Coating Application		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	transferring and mixing liquid products, container/equipment cleaning, transferring mixed coating to application equipment, overspray		
Exposure route:	dermal and inhalation. dermal: Provides methods for modeling exposures to non-volatile liquids Inhalation: Provides methods for modeling exposures to mists.		
Exposure frequency:	dermal: surrogate measured skin loading conditions inhalation: 8-hr TWA surrogate data		
Number of workers:	Exposure frequency: 250 days/yr		
Personal protective equipment:	8 workers/site		
	air-purifying respirators or air-supplied respirators, Gloves (typically latex or nitrile), paint suits, and face masks/eye protection		
<b>EVALUATION</b>			
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	Low	Assessment is based on data greater than 20 years old.
	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.
<b>Overall Quality Determination</b>		<b>Medium</b>	



<b>Study Citation:</b>	OECD, (2009). Emission scenario document on adhesive formulation.		
<b>HERO ID:</b>	3827299		
<b>Conditions of Use:</b>	Processing: Adhesives and sealants		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	Unloading, container cleaning, mixing operations, sampling, equipment cleaning, packaging		
Exposure route:	dermal and inhalation. 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:	Exposure frequency: days/yr equal to number of bt/yr		
Number of workers:	22 workers/site		
<b>EVALUATION</b>			
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	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	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.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.		
<b>HERO ID:</b>	3827300		
<b>Conditions of Use:</b>	Use of adhesives for substrate bonding		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	unloading, container cleaning, adhesive application, equipment cleaning, curing/drying		
Exposure route:	dermal and inhalation. dermal: Provides methods for modeling exposures to solids and non-volatile liquids Inhalation: Provides methods for modeling exposures to mists, vapor and volatile liquids		
Exposure frequency:	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		
<b>EVALUATION</b>			
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.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.		
<b>HERO ID:</b>	3840003		
<b>Conditions of Use:</b>	Processing: Paints and Coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	Unloading, container cleaning, sampling, equipment cleaning, filter media changeout, packaging		
Exposure route:	dermal and inhalation. 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:	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		
<b>EVALUATION</b>			
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	Low	Assessment is based on data greater 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	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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.			
<b>HERO ID:</b>	6311222			
<b>Conditions of Use:</b>	Automotive Coating Application			
EXTRACTION				
Parameter	Data			
Worker activity description:	Auto OEM: robotics operations, paint mixing, paint booth cleaning, inspection, and manual "touch-up" painting. Autorefinish: wat sanding, car washing, stripping (paint removal), machine sanding, blowing, buffing, polishing, paint spraying, paint and primer mixing, and inspection.			
Exposure route:	dermal and inhalation			
Personal sampling data:	Provides methods for modeling exposures to mists			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	Auto OEM: 250 days/yr. Autorefinish: 170 days/yr.			
Number of workers:	Auto OEM: 17 workers/site. Autorefinish: 4-10 workers/site.			
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 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	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 OEM and refinish applications.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
<b>HERO ID:</b>	10480466			
<b>Conditions of Use:</b>	Use - Laboratory Chemicals			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Container unloading (liquids and solids), container cleaning, equipment cleaning, laboratory analyses, disposal of laboratory chemicals			
Exposure route:	Dermal, Inhalation; 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			
Physical form:	Liquid or solid			
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			
<b>EVALUATION</b>				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	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.
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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
<b>HERO ID:</b>	11182966			
<b>Conditions of Use:</b>	Repackaging			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Unloading transport containers, container cleaning, equipment cleaning, loading of transport containers.			
Exposure route:	Dermal, Inhalation			
Physical form:	Liquid or solid			
Area 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.			
<b>EVALUATION</b>				
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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2014). Generic scenario draft on the use of additives in plastic compounding.			
<b>HERO ID:</b>	3827195			
<b>Conditions of Use:</b>	Plastics Compounding			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation			
Personal sampling data:	Provides methods for modeling exposures to both solids and volatile liquids			
Dermal exposure data:	nan			
Exposure frequency:	148-264 days/yr			
Number of workers:	24 workers/site			
Engineering control:	Forced ventilation			
<b>EVALUATION</b>				
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	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 multiple plastic and additive types.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
<b>HERO ID:</b>	6304171			
<b>Conditions of Use:</b>	Flexible and Rigid Polyurethane Foam Manufacture			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	transfer from shipping containers, operation/supervision of the foam mix head/dispenser, foam production, transfer/handling of foamed articles (see page 14 of 19 for more details on each)			
Exposure route:	dermal and inhalation (page 14 of 19)			
Physical form:	liquid, vapor, possibly powders (page 14 of 19)			
Exposure duration:	data suggests 8 hr/day on average (page 12 of 19)			
Exposure frequency:	250 days/yr (assumption, page 12 of 19)			
Number of workers:	polystyrene foam production sites employ a total of 27,479 production workers. Polyurethane and other plastic foam production sites employ a total of 27,884 production workers. In both cases <50 workers/site. (Page 12 of 19)			
<b>EVALUATION</b>				
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	High	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	Number of workers 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 foam types.	
<b>Overall Quality Determination</b>		<b>High</b>		



<b>Study Citation:</b>	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
<b>HERO ID:</b>	6311218
<b>Conditions of Use:</b>	Processing as a reactant as a process regulator for Plastic material and resin manufacturing; incorporation into formulation, mixture, or reaction product as a plasticizer for Plastics product manufacturing; incorporation into article as a plasticizer for Plastics product manufacturing

EXTRACTION	
Parameter	Data
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes
Exposure route:	dermal and inhalation
Personal sampling data:	Provides methods for modeling exposures to both solids and volatile liquids
Dermal exposure data:	Dermal exposure data
Exposure duration:	8 hr/day
Exposure frequency:	250 days/yr
Number of workers:	24 workers/site
Comments:	QC Note: This is an early draft of the Plastic Compounding GS and may not provide the most up to data info

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	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 multiple plastic types, additive types, and worker activities.

<b>Overall Quality Determination</b>	<b>Medium</b>
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<b>Study Citation:</b>	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
<b>HERO ID:</b>	6311221		
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	PROC: unloading, cleaning, packagingUSE: Printing operations, unloading		
Exposure route:	dermal and inhalation		
Personal sampling data:	PROC: Inhalation: Provides methods for modeling exposures to volatile liquids and solidsUSE: Inhalation: Provides methods for modeling exposures to volatile liquids and solids		
Dermal exposure data:	Dermal exposure data		
Exposure frequency:	PROC: 250 days/yrUSE: 250 days/yr		
Number of workers:	PROC: 13-22 workers/siteUSE: 16-43 workers/site		
Comments:	QC Note: This is an early draft of the Printing Ink GS and may not provide the most up to data info		
<b>EVALUATION</b>			
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	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 printing applications, and multiple chemical functions
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385709			
<b>Conditions of Use:</b>	Flexographic Printing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Transferring and mixing inks, adjusting ink cans at the press, operating the press.			
Exposure route:	dermal and inhalation.			
Area sampling data:	Inhalation: Provides methods for modeling exposures to volatile liquids.			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	4-7.5 hrs/shift.			
Exposure frequency:	300 days/yr.			
Number of workers:	27 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 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	Low	Assessment is based on data greater 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	Low	The assessment does not address variability or uncertainty.	
Overall Quality Determination		Medium		

<b>Study Citation:</b>	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385710			
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	PROC: Unloading, formulation (dispersion and milling), equipment cleaning, packaging. Workers are likely to encounter both inhalation and dermal exposure during handling of raw materials and ink products as well as equipment cleaning.USE: Unloading, printing operations and ink drying, equipment cleaning. Inhalation exposure among production workers is likely to occur as a result of potential emissions with major contributions coming from ink handling and ink mist generation from printing equipment. Dermal exposure to inks and cleaning solvents are expected during material unloading and cleaning of the printing equipment.			
Exposure route:	Inhalation and dermal			
Physical form:	PROC: Liquid, solid particulateUSE: Liquid, mist			
Number of workers:	See Table 2-2: Total number of workers is 64,973, with the number of workers for each printing type varying from ~13,000 to ~225,000			
<b>EVALUATION</b>				
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	The GS is more than 10 years but no more 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	Low	Uncertainty not addressed. Variability not addressed.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.			
<b>HERO ID:</b>	6385711			
<b>Conditions of Use:</b>	Plastics Converting			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Unloading and charging compounded resins to process, converting processes, converting equipment cleaning, trimming processes			
Exposure route:	Dermal and inhalation. Provides inhalation methods for modeling exposures to solids.			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	137-254 days/yr			
Number of workers:	30-69 workers/site			
<b>EVALUATION</b>				
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	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	Uncertainty not addressed. Variability addressed by considering multiple plastic types, additive types, and worker activities.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385719			
<b>Conditions of Use:</b>	Commercial Use: Furniture Coating Application			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	unloading, spray application, equipment cleaning			
Exposure route:	dermal and inhalation			
Physical form:	liquid			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to mists.			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	250 days/yr			
Number of workers:	12-98 workers/site			
Personal protective equipment:	Air-supplied full face piece respirator; Disposable overalls and head covering; Gloves specific to the chemicals used; and boots and boot coverings			
Engineering control:	Spray booths			
<b>EVALUATION</b>				
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	Low	Assessment is based on data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range.
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 wood vs metal furniture uses.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385748			
<b>Conditions of Use:</b>	Processing - Additive in Plastic Compounding			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation. 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:	Exposure Frequency: 148-264 days/yr			
Number of workers:	24 workers/site			
Engineering control:	Forced ventilation			
<b>EVALUATION</b>				
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 reasonably representative of current industry conditions.
	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	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 plastic types, additive types, and worker activities.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (1994). Generic scenario: Formulation of latex/emulsion coatings.			
<b>HERO ID:</b>	8726956			
<b>Conditions of Use:</b>	Processing – incorporation into formulation, mixture, or reaction product for Paint and coating manufacturing (specifically latex/emulsion coatings)			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	component loading and transfer operations, addition of mix tanks, final transfer of the latex formulation into cans or other containers, and disposal and handling of the solid and liquid wastes			
Exposure route:	Dermal, Inhalation			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to volatile liquids and solids			
Dermal exposure data:	nan			
Number of workers:	1 worker/site			
<b>EVALUATION</b>				
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	Low	Assessment is based on data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distributions characterized by ranges/estimations 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	Medium	Uncertainty not addressed. Variability addressed by considering different chemical physical forms.
<b>Overall Quality Determination</b>		<b>Medium</b>		



<b>Study Citation:</b>	AkzoNobel, (2018). Taskforce executive summary for dicyclohexyl phthalate (TF2).			
<b>HERO ID:</b>	11182954			
<b>Conditions of Use:</b>	Manufacture			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Manufacture, chemical production, transfer of manufactured chemical into small containers, mixing or blending.			
Physical form:	solid			
Exposure duration:	<= 8 hours/day			
Personal protective equipment:	Respirator with type A/P2 filter or better, eye protection or face shield, and chemical resistant gloves, coveralls.			
Engineering control:	Enhanced general ventilation, handle substance in closed system with extract ventilation, fill and transfer materials with extract ventilation present.			
<b>EVALUATION</b>				
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 China, a non-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	N/A - No sample data.	
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	N/A - No sample data.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Bao, J., Wang, M., Ning, X., Zhou, Y., He, Y., Yang, J., Gao, X., Li, S., Ding, Z., Chen, B. (2015). Phthalate concentrations in personal care products and the cumulative exposure to female adults and infants in Shanghai. Journal of Toxicology and Environmental Health, Part A: Current Issues 78(5):325-341.			
<b>HERO ID:</b>	2816857			
<b>Conditions of Use:</b>	Use of Personal care products			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	nan			
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., European Union or OECD reports, NIOSH HHES, journal articles, 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	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not specified.
	Metric 3:	Applicability	Uninformative	The report is from an occupational or non-occupationalscenario that does not apply to any 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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Uninformative		

<b>Study Citation:</b>	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.			
<b>HERO ID:</b>	1267867			
<b>Conditions of Use:</b>	Painting and manufacturing and processing of rubber products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Workers involved in painting and manufacturing and processing of rubber products			
Exposure route:	Inhalation			
Area sampling data:	In a review of solvent exposures in Danish manufacturing and service industries, a series of 72 air sampling measurements were conducted during spray painting (W) . 38 percent of the mixed solvent exposures exceeded 0.25 of the ACGIH Threshold Limit value, 29% were between 0.25 and 1.0 of the ACGIH TLV-TWA and 33% exceeded the combined ACGIH TLV-TWA.			
Personal protective equipment:	Respiratory protection for painters			
Engineering control:	Painting: Control techniques include replacement of solvent-based paints with water-based paints, altering the application techniques, modifying workplace design, work practice, and medical surveillance, ventilation, and providing respiratory protection to the workers. Rubber products: Control techniques include use of low dusting forms of the chemicals, use of coarser form of the material to reduce dust, dipping the stock in water slurry, replacement of benzene with white gasoline, providing adequate local ventilation.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	report uses high quality data	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States	
	Metric 3: Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. Doesn't mention DCHP specifically	
	Metric 4: Temporal Representativeness	Low	Article is from 1991	
	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	Assessment or report clearly documents its data sources	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	This metric is not applicable to the data being extracted	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Canada,, G.o. (2020). Phthalate substance grouping – Information sheet.			
<b>HERO ID:</b>	7349060			
<b>Conditions of Use:</b>	Plastic and rubber products not covered elsewhere			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	Canadians may be exposed to these substances from food, including breast milk, environmental sources (for example, dust and for certain phthalates, indoor air), and contact with plastic items. Canadians may also be exposed to some of these substances as a result of using certain cosmetics and natural health care products (for example, diaper creams, body lotions, and hairsprays) (p. 4 of 10).			
Comments:	DCHP specifically mentioned as one of the substances of concern.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	The data, data sources, and/or techniques or methods used in the assessment or report are not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Report is from Canada.	
	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 (exposure to plastic products)	
	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	N/A	Data is qualitative.	
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	The report does not address variability or uncertainty.	
<b>Overall Quality Determination</b>		<b>Low</b>		

<b>Study Citation:</b>	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
<b>HERO ID:</b>	664488			
<b>Conditions of Use:</b>	Use of consumer articles			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	People are exposed through ingestion, inhalation, and, to a lesser extent, dermal contact with products that contain phthalates. workers may be exposed to higher air phthalate concentrations than the general population.			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	High	The data are from the United States and are representative of the industry being evaluated.
	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, such as a consumer DIY scenario that is similar to a worker scenario.
	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	N/A	Information is qualitative
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	

<b>Study Citation:</b>	Cherrie, J. W., Semple, S., Brouwer, D. (2004). Gloves and dermal exposure to chemicals: Proposals for evaluating workplace effectiveness. Annals of Occupational Hygiene 48(7):607-615.			
<b>HERO ID:</b>	5080435			
<b>Conditions of Use:</b>	All COUs			
EXTRACTION				
<b>Parameter</b>		<b>Data</b>		
Dermal exposure data:		Dermal exposure data		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The 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	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	The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample size applicable to the proposed conceptual model.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty and variability of glove protection factors are covered in the study.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Giuliani, A., Zuccarini, M., Cichelli, A., Khan, H., Reale, M. (2020). Critical Review on the Presence of Phthalates in Food and Evidence of Their Biological Impact. International Journal of Environmental Research and Public Health 17(16):1-43.			
<b>HERO ID:</b>	8338316			
<b>Conditions of Use:</b>	General			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	different routes (i.e., ingestion, inhalation, dermal, or iatrogenicexposure)			
Physical form:	almost colorless, odorless oily liquids			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Peer reviewed and published journal article.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data from a OECD country, Italy.	
	Metric 3: Applicability	High	The 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 are expected to be representative of current operations, equipment, and activities. The data are no more than 10 years old.	
	Metric 5: Sample Size	N/A	N/A- no sampling data	
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		High		

<b>Study Citation:</b>	Guo, Y., Wang, L., Kannan, K. (2014). Phthalates and parabens in personal care products from China: Concentrations and human exposure. Archives of Environmental Contamination and Toxicology 66(1):113-119.			
<b>HERO ID:</b>	1987638			
<b>Conditions of Use:</b>	commercial use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dietary intake, and dermal absorption			
Physical form:	mixed with personal care products			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-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
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	report clearly documents its data sources
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		



<b>Study Citation:</b>	Heitbrink, W. (1993). In-depth survey report: Control technology for autobody repair and painting shops at Team Chevrolet, Colorado Springs, Colorado.			
<b>HERO ID:</b>	6558535			
<b>Conditions of Use:</b>	Commercial use - spray painting			
EXTRACTION				
Parameter	Data			
Worker activity description:	sanding, grinding, welding, spray painting.			
Number of workers:	13			
Personal protective equipment:	Half face piece air purifying respirators are used to reduce worker exposure to paint overspray in spray painting booths. NIOSH study recommends use of supplied-air respirators operated in a positive pressure mode. Eye and skin protection to be worn - rubber gloves should be worn, presently in the study they wear uniforms.			
Engineering control:	Spray painting booths have air entering the booth through filters in the door or through a supply air plenum. Air flows parallel to the ground, around the car and toward exit filters located in the back of the car. Car remains in booth until dry. Two booths operate at a flow rate of 9500 cfm, one booth had flow rate of 3000 cfm and increased to 7000 cfm when adjusted. At the time 12,000 cfm is specified by OSHA standard for spray painting.			
Comments:	Sampling data but none for DCHP or any phthalates.			
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	General PPE and engineering control information for spray painting. No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	Heitbrink, W., Cooper, T., Edmonds, M., Bryant, C., Ruch, W. (1993). In-depth survey report: control technology for autobody repair and painting shops at Valley Paint and Body Shop, Amelia, Ohio.			
<b>HERO ID:</b>	6558536			
<b>Conditions of Use:</b>	Commercial use - Paint and Coatings			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	inhalation			
Physical form:	vapor/mist			
Personal protective equipment:	Half-facepiece, air-purifying respirators are used to control worker exposure to airborne particles during some sanding and welding operations. During abrasive blasting operations with crystalline-silica containing sand, a positive pressure air-supplied, half-facepiece respirator is used. Butyl Rubber gloves during painting.			
Engineering control:	Air flow measurements on Spray Painting Booths - airflow into entry duct: 8200 cfm; airflow from top of booth: 13000 cfm; airflow from bottom of booth: 11400 cfm; airflow at exhaust stack: 11600 cfm; leakage into exhaust air plenum: 1300 cfm; recirculation around damper: 750 cfm.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The document is a survey conducted by NIOSH.
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 but data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	No scope to address variability and uncertainty.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. Environmental Science and Pollution Research 25(21):20550-20561.			
<b>HERO ID:</b>	4728432			
<b>Conditions of Use:</b>	Consumer use of plastic products			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	Populations are exposed to environmental phthalates from routes of ingestion, inhalation, derma, and intravenous contact throughout life, including intrauterine development.			
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., European Union or OECD reports, NIOSH HHES, journal articles, 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	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not specified.
	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 (consumer use of plastic products similar to industrial/commercial use of plastic products).
	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	N/A	Information is qualitative.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	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.			
<b>HERO ID:</b>	3222353			
<b>Conditions of Use:</b>	Applies to more than 1 COUs			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	dermal to oral route (hand to mouth)			
Physical form:	liquid, solid			
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	The report is for an occupational scenario within the scope of the risk evaluation, but information is not chemical specific.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Medium	Mean, standard deviation, and p-value provided but individual data points not provided.	
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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	NICNAS, (2016). C4-6 side chain transitional phthalates: Human health tier II assessment.			
<b>HERO ID:</b>	5155535			
<b>Conditions of Use:</b>	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Transfer and blending activities, quality control analysis, and cleaning and maintenance of equipment. Worker exposure to the chemicals at lower concentrations may also occur while using formulated products containing the chemicals.			
Exposure route:	dermal, inhalation			
Physical form:	vapor, solid			
Comments:	Tagged for multiple chemicals. Does not contain any worker activity description data specific for DCHP.			
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	Medium	Data is from Australia (OECD country)
	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 DCHP.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	OECD, (2004). Test No. 428: Skin absorption: In vitro method.			
<b>HERO ID:</b>	11147625			
<b>Conditions of Use:</b>	All COUs			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	Dermal exposure data			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The guideline 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 guideline was developed by the OECD with involvement 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 guideline was created over 10 years ago, but less than 20 years ago, and it is still relevant to occupational exposure conditions today.	
	Metric 5: Sample Size	Low	There are no sample statistics to support the value of 10 uL/cm2 or 1-5 mg/cm2 for finite dose dermal loading.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Guideline clearly documents assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The guideline provides only limited discussion of the variability and uncertainty of finite dose dermal loading.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. American Association of Occupational Health Nurses Journal 55(1):12-17.			
<b>HERO ID:</b>	1598544			
<b>Conditions of Use:</b>	Commercial use			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Worker activity description:	Workers in beauty salon, occupational health nurses.			
Exposure route:	Phthalates can be ingested, inhaled, or absorbed through the skin.			
Number of workers:	407000 people employed in beauty salons around the country			
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	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation (commercial use of inks, toner, colorant products similar to products in beauty salons).
	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	No sample 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	N/A	Factual data, no scope to address variability and uncertainty.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.			
<b>HERO ID:</b>	10472417			
<b>Conditions of Use:</b>	Vinyl flooring installation			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Exposure route:	Inhalation, Dermal, Ingestion			
Exposure duration:	Lifespan of vinyl flooring is provided as 30-50 years but exposure duration is not specified.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Frequently used sources were used to identify routes of exposure.	
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 but information is not chemical specific.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	N/A	Sample size not applicable to qualitative data relating to exposure route.	
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	N/A	Variability and uncertainty not applicable to qualitative data relating to exposure route.	
Overall Quality Determination		High		



<b>Study Citation:</b>	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.			
<b>HERO ID:</b>	11138808			
<b>Conditions of Use:</b>	All			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Number of workers:	Used to develop a method to estimate number of sites and 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 ( <a href="https://www.bls.gov/oes/current/oes_research_estimates.htm">https://www.bls.gov/oes/current/oes_research_estimates.htm</a> ).	
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		

<b>Study Citation:</b>	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.		
<b>HERO ID:</b>	10293388		
<b>Conditions of Use:</b>	Industrial and commercial use in ink, toner and colorant products		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Worker activity description:	Transferring and mixing inks from 55-gallon drums to 5-gallon cans in the ink preparation room and handling ink cans and press operation in the press room during a print run.		
Exposure route:	inhalation and dermal exposure		
Area sampling data:	source presents an excerpt from modeled inhalation exposure on pdf page 154. HERO source does not include Appendix 3-F where full data is included.		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	Transferring and mixing inks : 48 minutes per formulation per shiftOperating press: 7.5 hour shiftAdjusting inks in the 5-gallon cans in press room: 1-2.5 hours		
Exposure frequency:	250 days/year		
Number of workers:	9 workers exposed per shift (1 worker transferring and mixing inks, 8 workers during printing process), 3 shifts per day. 27 total workers exposed per day		
Personal protective equipment:	eye, face and hand protection as well as goggles, aprons, or other impervious clothing and gloves. In loud facilities, hearing protection may also be recommended.		
Engineering control:	equipment guards		
Comments:	The inhalation exposure data was modeled data, not monitoring data. Therefore, it was not evaluated as monitoring data.		
<b>EVALUATION</b>			
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	Medium	Data are for use in ink during printing, an in-scope occupational scenario. However, data is general and not specific to this 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	High	Variability is addressed by including different tasks. Uncertainty is also addressed in the source.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2013). Updating CEB’s method for screening-level estimates of dermal exposure.			
<b>HERO ID:</b>	11224653			
<b>Conditions of Use:</b>	All			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	Dermal exposure data			
<b>EVALUATION</b>				
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	Medium	Discrete distribution of samples available from referenced studies, but individual sample data is not provided in guideline memo.
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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (1991). Chemical engineering branch manual for the preparation of engineering assessments.			
<b>HERO ID:</b>	4532330			
<b>Conditions of Use:</b>	All COUs			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The CEB manual 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	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.
	Metric 5:	Sample Size	N/A	No data samples for potential dermal exposure time.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	The CEB Manual clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty regarding the number of contacts is explained, but there are no explanations of variability among dermal exposure times.
Overall Quality Determination			High	

<b>Study Citation:</b>	U.S. EPA, (2012). Phthalates action plan.		
<b>HERO ID:</b>	4565597		
<b>Conditions of Use:</b>	General industrial manufacturing, processing, or use		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Exposure route:	Available information indicates that workers may be exposed to phthalates by inhalation and dermal routes, with the dermal route seeming to be more prevalent.		
Number of workers:	According to the IUR data, industrial workers exposed to these phthalates number in the thousands.		
<b>EVALUATION</b>			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	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 but data is general and not specific to DCHP.
	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	N/A	No sample data.
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	N/A	No scope to address variability or uncertainty.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.			
<b>HERO ID:</b>	7315971			
<b>Conditions of Use:</b>	Formulation of asphalt			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Particle size characterization:	Emissions from HMA plants may be divided into ducted production emissions, pre-production fugitive dust emissions, and other production-related fugitive emissions. Pre-production fugitive dust sources associated with HMA plants include vehicular traffic generating fugitive dust on paved and unpaved roads, aggregate material handling, and other aggregate processing operations. Fugitive dust may range from 0.1 um to more than 300 um in aerodynamic diameter. On average, 5 percent of cold aggregate feed is less than 74 um (minus 200 mesh). Fugitive dust that may escape collection before primary control generally consists of PM with 50 to 70 percent of the total mass less than 74 um.			
<b>EVALUATION</b>				
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 source.
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 but data is not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	No scope to address variability and uncertainty.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	U.S. EPA, (2011). Exposure factors handbook: 2011 edition.			
<b>HERO ID:</b>	786546			
<b>Conditions of Use:</b>	All COUs			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Dermal exposure data:	Dermal exposure data			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The Exposure Factors Handbook uses high quality data and/or thatare 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 evalu- ated.	
	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 captures data that are expected to be reasonably representative of current conditions. The Exposure Factors Handbook 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 rep- resentative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	The Exposure Factors Handbook clearly documents its data sources, assessment meth- ods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well char- acterized.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2002). An evaluation of flexographic inks on wide-web film: Summary booklet.			
<b>HERO ID:</b>	9102546			
<b>Conditions of Use:</b>	Inks, toner and colorant products			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal and Inhalation			
Exposure duration:	Pressroom and prep-room workers would work a 7.5 hour shift.			
Exposure frequency:	Pressroom and prep-room workers would work 250 days/year.			
Number of workers:	30,000 people; More than 80% of all flexo firms have fewer than 50 employees. pg. 9			
Personal protective equipment:	Ensure that all workers who handle inks wear appropriate personal protective gear (e.g., butyl or nitrile gloves and respirators as needed) to minimize exposure to chemicals.			
Engineering control:	Maximize good ventilation, particularly in ink prep-rooms and pressrooms.			
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not chemical specific.	
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.	
	Metric 5: Sample Size	N/A	No sample data.	
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 is not addressed.	
Overall Quality Determination		Medium		



<b>Study Citation:</b>	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.		
<b>HERO ID:</b>	5547263		
<b>Conditions of Use:</b>	Use of Plastic Products		
EXTRACTION			
<b>Parameter</b>	<b>Data</b>		
Exposure route:	Human exposure to phthalates arises mainly from ingestion, inhalation, and dermal absorption.		
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 (e.g., European Union or OECD reports, NIOSH HHEs, journal articles, 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	High	The data are from the United States and are representative of the industry being evaluated.
	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, such as a consumer DIY scenario that is similar to a worker 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	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	

<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Processing into formulation			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Release or emission factors:	Release or emission factors			
Release frequency:	300 days/year			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data is predicted not actual.
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	Low	Report is less than 10 years old but methods are from 2003.
	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 data include release media 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			Low	

<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Release or emission factors:	Release or emission factors			
Release frequency:	300 days/year			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data is not actual but predicted.
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	Low	Report is less than 10 years old but methods used are from 2003.
	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 data include release media 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			Low	

**Study Citation:** ECCC/HC, (2020). Science assessment of plastic pollution.  
**HERO ID:** 7330238  
**Conditions of Use:** Disposal

**EXTRACTION**

Parameter	Data
Description of release source:	Road traffic-related releases of particles from tire wear and tear are a source of microplastics to outdoor air. Additional sources of microplastics in outdoor air are thought to include airplane tires, artificial turf, thermoplastic road markings, waste incineration, construction, landfills, industrial emissions, and tumble dryer exhaust. Deposition and dispersion of all airborne plastic particles from the air may result in accumulations of microplastics in water. The primary source of microplastic particles in indoor air is thought to be the shedding of polymeric textile fibers from clothing, furniture, carpeting, and household goods due to wear and tear or abrasion.
Release quantity:	Of the 4,667 kt of plastics that entered the Canadian market in 2016, an estimated 3,268 kt were discarded as waste. Of that plastic waste, an estimated 29 kt (or 1%) were discarded outside of the normal waste stream (i.e., not landfilled, recycled or incinerated) in 2016, through direct release to the environment or through dumps or leaks. An estimated 9% of the remaining plastic waste was recycled, 86% was landfilled, and 4% was incinerated for energy recovery. In a global context, it is estimated that only 30% (2,500,000 kt) of all plastics ever produced are still in use. This means that 6,300,000 kt of global cumulative plastic waste was created between 1950 and 2015. If plastic manufacturing continues at its current pace, the accumulation of plastics will continue to accelerate. It is estimated that by 2050, 12,000,000 kt of plastic waste will have been discarded globally to landfills or the environment.
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 release data methodology is not specified.
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 release data are for an occupational scenario within the scope of the risk evaluation but data is general and not specific to DCHP.
	Metric 4: Temporal Representativeness	High	The data are 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	Release data include release media 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****Low**

<b>Study Citation:</b>	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.
<b>HERO ID:</b>	7349020
<b>Conditions of Use:</b>	Plastics Product 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. Emissions from plastic products manufacturing may be generally classified as follows: Volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions resulting from the volatilization of free monomer or solvent in the primary polymer blend during processing; & VOC and HAP emissions that result from secondary process materials, such as blowing agents, additives, and lubricants (mold release compounds); & VOC, HAP, and particulate matter (PM) emissions that result from byproducts formed by chemical reactions or formed during heating of resins; and & PM emissions generated during raw material handling and finishing operations. (Section 2.2). Additional description of specific pollutants (e.g., solvents, particulates) provided.
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 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, the data are general and not chemical specific.
	Metric 4: Temporal Representativeness	Low	The report is from 1998, which is more than 20 years old.
	Metric 5: Sample Size	Medium	The emission factor is provided as a single data point with unclear statistical representativeness.
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	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.

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<b>Study Citation:</b> ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.			
<b>HERO ID:</b> 7349020			
<b>Conditions of Use:</b> Plastics Product Manufacturing			
Domain	Metric	EVALUATION Rating	Comments
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Markiewicz, A., Björklund, K., Eriksson, E., Kalmykova, Y., Strömvall, A. M., Siopi, A. (2017). Emissions of organic pollutants from traffic and roads: Priority pollutants selection and substance flow analysis. Science of the Total Environment 580:1162-1174.			
<b>HERO ID:</b>	3867109			
<b>Conditions of Use:</b>	Emission from vehicle and traffic-related activities			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Tires, brake linings, integrated vehicle components, car care products, fuels, oils, and lubricants, asphalt, and road paint			
Release quantity:	Approximately 4.1 kg of four selected phthalates were emitted annually in the Garda catchment area.			
<b>EVALUATION</b>				
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	Report is from Sweden, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer use of automotive care products, paints and coatings, and plastic and rubber products, which can be compared to the commercial uses of these applications, which are in-scope
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	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	High	Most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed for the release estimation process. Variability is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. Science 46(4056):46-47.
<b>HERO ID:</b>	1335811
<b>Conditions of Use:</b>	Disposal

**EXTRACTION**

Parameter	Data
Description of release source:	Pesticides that contain phthalate carriers may release them directly into air, soil, and water; volatilization and leaching of plasticizers from PVC is another source of undetermined magnitude. In addition, some bacteria, fungi, and plants have the ability to synthesize phthalates.
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	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	Medium	The release data are for an occupational scenario within the scope of the risk evaluation but data is general to phthalates, not specific to DCHP.
	Metric 4: Temporal Representativeness	Low	Report is 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	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by discussing differences between studies. Uncertainty isn't addressed.

**Overall Quality Determination****Medium**



<b>Study Citation:</b>	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. Progress in Polymer Science 27(10):2227-2277.
<b>HERO ID:</b>	6826007
<b>Conditions of Use:</b>	Disposal

**EXTRACTION**

Parameter	Data
Description of release source:	Phthalates leach from consumer PVC products in landfills
Release quantity:	In Western Europe, 1,874,000 tons/year of PVC waste are disposed of. 29 ktons/year of phthalates are disposed of from cables, and 116 kton/year of phthalates are disposed of from floorings.
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

**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 Germany, an OECD country.
	Metric 3: Applicability	Low	Data are for the disposal of phthalate wastes, an in-scope occupational scenario, but data is not specific to DCHP and applies to Europe only.
	Metric 4: Temporal Representativeness	Low	Report is 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed in the life cycle assessment methods. Variability is not addressed.

**Overall Quality Determination****Low**

<b>Study Citation:</b>	Milbrandt, A., Coney, K., Badgett, A., Beckham, G. T. (2022). Quantification and evaluation of plastic waste in the United States. Resources, Conservation and Recycling 183:106363.
<b>HERO ID:</b>	11360398
<b>Conditions of Use:</b>	Disposal

**EXTRACTION**

Parameter	Data
Release quantity:	PDF PG. 4 "We estimate approximately 44 million tons (Mt) of plastic waste was managed through landfilling, combustion, and recycling in 2019."
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	High
	Metric 3:	Applicability	Medium
	Metric 4:	Temporal Representativeness	High
	Metric 5:	Sample Size	High
			Data are from the U.S. Data are for disposal, an in-scope occupational scenario; however, the data are not chemical specific. Data are no more than 10 years old. Statistical distribution of samples is fully characterized (discrete sampling data provided).
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	Medium
			Variability addressed by discussing multiple plastic waste types, but uncertainty is not addressed.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	Nunez, C., McMinn, B., Vitas, J. (1996). Barriers to the use of radiation-curable adhesives in the coated and laminated substrate manufacturing industry. Journal of Hazardous Materials 45(1):59-78.
<b>HERO ID:</b>	5466433
<b>Conditions of Use:</b>	Processing - Adhesive Manufacturing

**EXTRACTION**

Parameter	Data
Description of release source:	Release source of emissions is from the plant itself. For facilities operating under SIC 2671 and 2672, total emissions are mostly calculated based on raw materials consumption. Total emissions reflect solvent losses occurring during raw material mixing, coating processing, equipment cleaning, and material storage.
Release quantity:	In 1990, total air releases are 10.5 million pounds (does not state what chemicals specifically are in these releases)
Waste treatment methods and pollution control:	nan

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Low	The release data methodology is not specified.
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 is directly applicable to a condition of use however the source neglects to mention any information regarding DCHP or any phthalates.
	Metric 4: Temporal Representativeness	Low	Information from more than 10 years back.
	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 data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Information addresses variability by stating different processes that release emissions but uncertainty is not addressed.

**Overall Quality Determination****Low**

<b>Study Citation:</b>	OECD, (2011). Resource compendium of PRTR release estimation techniques, part 4: Summary of techniques for releases from products, version 1.0.			
<b>HERO ID:</b>	7348917			
<b>Conditions of Use:</b>	Commercial & Consumer Use			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Building and construction products, Electrical and electronic products, Furniture, Nanoproducts, Packages and plastic bags, personal care and cleaning products, Textile and leather products, Toys and low-cost jewelry (page 17/109). Releases typically occur during the first use of a product, when carrying out maintenance of the product, and due to wearing, exposure to heat or light or other ageing of the product (page 63/109).			
Release or emission factors:	Release or emission factors			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	OECD paper provides general methods and equations used to calculate emissions, but details aren’t provided.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are provided by the OECD.	
	Metric 3: Applicability	Medium	Data are for various consumer and commercial uses which are in scope of the risk evaluation but not chemical-specific (data is for DEHP).	
	Metric 4: Temporal Representativeness	Low	Paper was published in 2011, but most emission factor data is from 2002, which is greater than 20 years old.	
	Metric 5: Sample Size	Low	Emission factor data is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include release source and emission factors. Formulas for release quantity are provided. Data lacks release frequency and waste treatment methods.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The release data study does not address variability or uncertainty.	
<b>Overall Quality Determination</b>		<b>Low</b>		

**Study Citation:** programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.  
**HERO ID:** 6580284  
**Conditions of Use:** Processing: Formulation of paint and varnish

**EXTRACTION**

Parameter	Data
Description of release source:	Air pollutant emissions are primarily the fugitive type and consist of evaporation losses of the volatile portion of the vehicle from the milling operation and from various product holding tanks and packing stations. There are also some fugitive particulate emissions that result from handling and emptying of pigment or extender bags into the grinding and dispersion mills. In some plants these loading areas are hooded and bags and pigment dusts are passed to a central collection station. At this station bags are removed for refuse disposal and the pigment dust is collected in a fabric filter and recycled into primer or other dark paint mixes. // Waste materials constitute a major source of potential liquid pollutants. These include spoiled batches, residues and solvent and aqueous solutions for washing equipment. // Most solid waste, with the exception of that which can be considered part of an air pollution emission, is incorporated into the liquid wastes described in the previous section. These include pigment particulate and latex emulsion as well as the non-volatile portion of the film former which would be left if the paint or resin were allowed to dry.
Release quantity:	Source contains information on hydrocarbon, organics, and particulate emissions, and waste solvent, resin, and paint, but nothing specific to DCHP.
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 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 but information is not specific to DCHP.
	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 most critical metadata such as process and release media.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by including different processes but uncertainty is not addressed.

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<b>Study Citation:</b>	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.
<b>HERO ID:</b>	6580284
<b>Conditions of Use:</b>	Processing: Formulation of paint and varnish

EVALUATION	
Domain	Metric
Rating	
Comments	
Overall Quality Determination	Medium

<b>Study Citation:</b>	Radian Corp, (1989). Environmental analysis for the Shell Martinez RM-17 incinerator, with cover letter dated 3/15/1991 (sanitized).
<b>HERO ID:</b>	1335691
<b>Conditions of Use:</b>	Disposal - Waste incineration

**EXTRACTION**

Parameter	Data
Description of release source:	RM-17 incinerator to a 100-foot stack
Release quantity:	For phthalates in general, emissions were $1.4 \times 10^{-4}$ g/s
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data, techniques and methods that are from the EPA and do not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from the US
	Metric 3: Applicability	Medium	Data contains general phthalate emissions and exposures but does not contain information specific to DCHP. Data could possibly be used as analogous data
	Metric 4: Temporal Representativeness	Low	Assessment is more than 20 years old.
	Metric 5: Sample Size	Low	Characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Provides results but the underlying methods, data sources and assumptions are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty

**Overall Quality Determination****Low**

<b>Study Citation:</b>	Saeed, T., Al-Jandal, N., Abusam, A., Taqi, H., Al-Khabbaz, A., Zafar, J. (2017). Sources and levels of endocrine disrupting compounds (EDCs) in Kuwait's coastal areas. Marine Pollution Bulletin 118(1-2):407-412.
<b>HERO ID:</b>	3859095
<b>Conditions of Use:</b>	Disposal: Sewage treatment plant

**EXTRACTION**

Parameter	Data
Description of release source:	Products such as cosmetics, perfumes, detergents, aerosol sprays, and plastics
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 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	Low	The data are from a non-OECD country, and locality-specific factors may impact (e.g., potentially greater differences in regulatory emission limits, industry/ process technologies) releases relative to the U.S., or the country of origin is not specified.
	Metric 3: Applicability	Low	Data is for disposal of consumer products but it may apply to disposal of products used in commercial/industrial use. Also, data is general and not specific to DCHP.
	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 release data were collected after the most recent federal regulatory action (e.g., NE-SHAP for air release or effluent limit guideline (ELG) for water release) or update or are no more than 10 years old, whichever is shorter. If no federal regulation is established, the data are 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	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by comparing treatment plants but uncertainty is not discussed.

**Overall Quality Determination****Medium**



**Study Citation:** U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.  
**HERO ID:** 10293388  
**Conditions of Use:** Industrial and commercial use in ink, toner and colorant products

**EXTRACTION**

Parameter	Data
Description of release source:	Source estimates air releases from fugitive releases from ink chamber and the press process as well as stack releases from the oxidizer after the press process (pdf page 146)
Release quantity:	Calculated air release estimates provided for multiple types of inks (i.e. water-based, solvent-based, and UV-cured) on pdf page 148 and more in appendix 3-D (not included in the HERO file)
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	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	Medium	Data are for use in ink during printing, an in-scope occupational scenario. However, data is general and not specific to this chemical.
	Metric 4: Temporal Representativeness	Medium	Information is between 10 and 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	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	High	Variability is addressed by including different types of inks and uncertainty is addressed in the source.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	U.S. EPA, (2019). National Emissions Inventory (NEI) [database]: CASRNs 79-00-5, 75-34-3, 107-06-2, 78-87-5, 84-61-7, 106-99-0, 106-93-4, 50-00-0, 85-44-9, 106-46-7, 85-68-7, 84-74-2, and 115-86-6.
<b>HERO ID:</b>	6535959
<b>Conditions of Use:</b>	All

**EXTRACTION**

Parameter	Data
Description of release source:	Provides unit/process of release.
Release quantity:	Provides quantity released per release event.
Release or emission factors:	Release or emission factors
Release frequency:	Provides annual operating time.
Waste treatment methods and pollution control:	nan

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Submitters provide general method used to calculate emissions, but details not provided.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	NEI is U.S. based data.
	Metric 3: Applicability	High	NEI includes industries included in the scopes of multiple chemicals.
	Metric 4: Temporal Representativeness	High	NEI data is less than 10 years old.
	Metric 5: Sample Size	Medium	Universe is limited to units subject to NESHAP with threshold potential to emit, although states may have different requirements; statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	NEI includes release media and generally also includes daily and annual operating time, specific unit/process that is the source of release, and presence of engineering controls.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	NEI does not address variability or uncertainty in submitter provided data.

**Overall Quality Determination****High**

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
<b>HERO ID:</b>	7310513
<b>Conditions of Use:</b>	Paint and varnish manufacturing

**EXTRACTION**

Parameter	Data
Description of release source:	See page 29. The primary factors affecting emissions from paint manufacture are care in handling dry pigments, types of solvents used, and mixing temperature. About 1 or 2 percent of the solvent is lost even under well-controlled conditions. Particulate emissions amount to 0.5 to 1.0 percent of the pigment handled. Varnish cooking emissions <sup>7</sup> 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. Emissions from varnish cooking range from 1 to 6 percent of the raw material.
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	Low	The release data methodology is not specified.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	Metric 4: Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.

<b>Overall Quality Determination</b>	<b>Low</b>
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<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
<b>HERO ID:</b>	7310513
<b>Conditions of Use:</b>	plastics manufacturing

**EXTRACTION**

Parameter	Data
Description of release source:	See page 41-74. The major sources of air contamination in plastics manufacturing are the raw materials or monomers, solvents, or other volatile liquids emitted during the reaction; sublimed solids such as phthalic anhydride emitted in alkyd production; and solvents lost during storage and handling of thinned resins. Additional description provided.
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	Low	The release data methodology is not specified.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	Metric 4: Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.

**Overall Quality Determination****Low**

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	printing ink manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	See page 74. Varnish or vehicle preparation by heating is by far the largest source of ink manufacturing emissions. Cooling the varnish components - resins, drying oils, petroleum oils, and solvents produces odorous emissions. At about 350°F (175°C) the products begin to decompose, resulting in the emission of decomposition products from the cooking vessel. Emissions continue throughout the cooking process with the maximum rate of emissions occurring just after the maximum temperature has been reached. Additional description provided.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
<b>EVALUATION</b>				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data methodology is not specified.
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. However, DCHP not specifically mentioned.
	Metric 4:	Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Low</b>	

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	soap and detergent manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	See page 79-82. The main atmospheric pollution problem in soap manufacturing is odor. The storage and handling of liquid ingredients (including sulfonic acids and salts) and sulfates are some of the sources of this odor. Vent lines, vacuum exhausts, raw material and product storage, and waste streams are all potential odor sources. The exhaust air from detergent spray drying towers contains 2 types of air contaminants: (1) fine detergent particles and (2) organics vaporized in the higher temperature zones of the tower. Additional description provided.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	Uninformative	The occupational scenario is not within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.
<b>Overall Quality Determination</b>		<b>Uninformative</b>		

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
<b>HERO ID:</b>	7310513
<b>Conditions of Use:</b>	synthetic fiber manufacturing

**EXTRACTION**

Parameter	Data
Description of release source:	See page 89-101. Air pollution emission points in the wet spinning organic solvent process are similar to those of dry spinning. Wet spinning processes that use solutions of acids or salts to dissolve the polymer chips emit no solvent VOC, only unreacted monomer, and are, therefore, relatively clean from an air pollution standpoint. For those that require solvent, emissions occur as solvent evaporates from the spinning bath and from the fiber in post-spinning operations. Additional description provided.
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	Low	The release data methodology is not specified.
Domain 2: Representativeness			
	Metric 2: Geographic Scope	High	The data are from the United States.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	Metric 4: Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty			
	Metric 7: Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.

**Overall Quality Determination****Low**

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	synthetic rubber manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	See page 107. Because recovery of the unreacted monomers and their subsequent purification are essential to economical operation, unreacted butadiene and styrene from the emulsion crumb polymerization process normally are recovered. The latex emulsion is introduced to flash tanks where, using vacuum flashing, the unreacted butadiene is removed. The butldiene is then compressed, condensed, and pumped back to the tank farm storage area for subsequent reuse. The condenser tail gases and noncondensables pass through a butadiene adsorber/desorber unit, where more butadiene is recovered. Some noncondensables and VOC vapors pass to the atmosphere or, at some plants, to a flare system. The latex stream from the butadiene recovery area is then sent to the styrene recovery process, usually taking place in perforated plate steam stripping columns. Additional description provided.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
<b>EVALUATION</b>				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	Metric 4:	Temporal Representativeness	Low	Data are greater 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	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by multiple sources for emission factors, but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Low</b>	



<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 4.2: Introduction to surface coating. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.
<b>HERO ID:</b>	7315820
<b>Conditions of Use:</b>	Use (Paints and Coatings)

**EXTRACTION**

Parameter	Data
Description of release source:	Though DCHP is not specifically mentioned, the group of articles provide information on various types of coating on metal and non-metal surfaces. As for example, sources of can coating VOC emissions include the coating area and the oven area of the sheet base and lithographic coating lines, the 3-piece can side seam and interior spray coating processes, and the 2-piece can coating and end sealing compound lines. Emission rates vary with line speed, can or sheet size, and coating type. On sheet coating lines, where the coating is applied by rollers, most solvent evaporates in the oven. For other coating processes, the coating operation itself is the major source. The only pollutants emitted in significant quantities from solvent base coating using plasticizers are volatile organic compounds from solvent evaporation. In an uncontrolled facility, essentially all of the solvent used in the coating formulation is emitted to the atmosphere. Of these uncontrolled emissions, 80 to 95 percent are emitted with the drying oven exhaust. Some solvent (from zero to 5 percent) can remain in the final coated product, although this solvent will eventually evaporate into the atmosphere. The remainder of applied solvent is lost from a number of small sources as fugitive emissions. There are also VOC losses from solvent storage and handling, equipment cleaning, miscellaneous spills, and coating formulation mixing tanks. Fugitive solvent emissions during the coating process come from the evaporative loss of solvent around the coating head and from the exposed wet web prior to its entering the drying oven.
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 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	Medium	The release data are for an occupational scenario within the scope of the risk evaluation, but data is general and not specific to DCHP.
	Metric 4: Temporal Representativeness	Low	Data is 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	Release data includes most critical metadata, including release media and process but lacks additional metadata, such as chemical specific release information, release frequency and activity.
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 but no discussion of the uncertainty in the release results.

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<b>Study Citation:</b>		U.S. EPA, (1995). Chapter 4.2: Introduction to surface coating. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.		
<b>HERO ID:</b>		7315820		
<b>Conditions of Use:</b>		Use (Paints and Coatings)		
Domain	Metric	<b>EVALUATION</b>		Comments
		Rating		
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (1995). Ap-42: Chapter 4.12 - Manufacture of rubber products.			
<b>HERO ID:</b>	7315841			
<b>Conditions of Use:</b>	Processing: Rubber Product Manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	The mechanically created or externally added heat present during the six principal processes (mixing, milling, extrusion, calendaring, curing, and grinding) cause VOC and HAP to be emitted. Particulate matter is primarily emitted from the dry chemicals utilized in mixing and as a result of grinding. (pg 16 of 20)			
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
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation, however data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release data include most critical metadata, including release media and process, but lacks additional metadata, such as chemical specific emission factors and activity.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Variability is addressed by providing emission factors for different processes, and uncertainty is also discussed in the document.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.			
<b>HERO ID:</b>	7315971			
<b>Conditions of Use:</b>	Formulation of asphalt			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Releases from manufacturing of hot mix asphalt paving materials			
Release or emission factors:	Release or emission factors			
<b>EVALUATION</b>				
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	Data is for an in-scope occupational scenario; however, data is general and not specific to this chemical.
	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 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	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Vandervort, R., Brooks, S. M. (1977). Polyvinyl chloride film thermal decomposition products as an occupational illness: I. Environmental exposures and toxicology. Journal of Occupational and Environmental Medicine 19(3):188-191.			
<b>HERO ID:</b>	59547			
<b>Conditions of Use:</b>	PVC film and label adhesive in meat packing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Release comes from thermal degradation of PVC film upon being heated. Degradation can happen during hot wire cutting.			
Release quantity:	Table 1 - Thermal decomposition product of DCHP (sample heated at 200 to 210 C for 30 & 60 sec: Cyclohexanol - 90 ppm, 130 ppm; Cyclohexyl ether - 43 ppm, 92 ppm; Phthalic Anhydride - 10 ppm, 113 ppm; Cyclohexyl Benzoate - 5 ppm, 38 ppm.			
<b>EVALUATION</b>				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US
	Metric 3:	Applicability	Medium	Data is applicable to commercial use of PVC film and adhesives. No DCHP specific data
	Metric 4:	Temporal Representativeness	Medium	Data is over 20 years old (1977).
	Metric 5:	Sample Size	Low	Not characterized by 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	Does not address variability or uncertainty.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	EC/HC, (2015). State of the science report: Phthalate substance grouping: Medium-chain phthalate esters: Chemical Abstracts Service Registry Numbers: 84-61-7; 84-64-0; 84-69-5; 523-31-9; 5334-09-8;16883-83-3; 27215-22-1; 27987-25-3; 68515-40-2; 71888-89-6.			
<b>HERO ID:</b>	3688160			
<b>Conditions of Use:</b>	Production and life cycle			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Description of release source:		Medium-chain phthalates are expected to be released primarily to water through wastewater effluents from industrial sources and through disperse releases from consumer products. In products, medium-chain phthalates are not bound within the matrix and are therefore subject to migration and environmental release. Consumer products disposed to wastewater treatment systems are another potential source of environmental releases (p. 4).		
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, journal articles, 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	The data are from an OECD country other than the U.S. (Canada).
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	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	N/A	Not applicable to 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	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

<b>Study Citation:</b>	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
<b>HERO ID:</b>	5353181			
<b>Conditions of Use:</b>	Waste handling, treatment and disposal			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:		Releases may occur during the manufacture and processing of phthalates, including transportation and storage, as well as during production, use and disposal of products that contain phthalates (e.g., release of phthalates into wastewater systems from use of cosmetics).(29/228)		
<b>EVALUATION</b>				
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	Medium	Data are from Canada, an OECD country.
	Metric 3:	Applicability	Medium	Information is for phthalate waste handling, treatment, and disposal, an in-scope occupational scenario but is not specific to DEHP.
	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	No sample 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	N/A	No scope to address variability and uncertainty since information is just a description of release.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.
<b>HERO ID:</b>	3808976
<b>Conditions of Use:</b>	Use - Automotive Coating Application

**EXTRACTION**

Parameter	Data
Description of release source:	Container cleaning, equipment cleaning, coating application (overspray). Releases to air and land.
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	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 coating types.

**Overall Quality Determination****Medium**



**Study Citation:** OECD, (2009). Emission scenario documents on coating industry (paints, lacquers and varnishes).  
**HERO ID:** 3827298  
**Conditions of Use:** Processing and Use: Formulation of Coatings and Use of Coatings

**EXTRACTION**

Parameter	Data
Description of release source:	PROC: material loading, heat-up, surface evaporation, filling, miscellaneous operations, material storage, leaks, spills USE: Application losses, equipment residues, drum residues. Releases to water, air, land.
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	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 coating types

**Overall Quality Determination****Medium**

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

**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. Releases to water, air, land.
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:	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 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**

<b>Study Citation:</b>	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.
<b>HERO ID:</b>	3827300
<b>Conditions of Use:</b>	Use of adhesives for substrate bonding

**EXTRACTION**

Parameter	Data
Description of release source:	container cleaning, unloading, equipment cleaning, application losses, curing/drying, trimming. Release to water, air, land.
Release or emission factors:	nan
Release frequency:	50-365 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 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**

<b>Study Citation:</b>	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.
<b>HERO ID:</b>	3840003
<b>Conditions of Use:</b>	Processing: Paints and Coatings

**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. Releases to water, air, land.
Release quantity:	Provides models for estimating various releases
Release or emission factors:	Release or emission factors
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	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 various chemical functions and types of UV curable products.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	OECD, (2009). Emission scenario document on plastic additives.			
<b>HERO ID:</b>	5079084			
<b>Conditions of Use:</b>	Processing - Plastic Additives			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Raw material handling, compounding, converting, service life, disposal. Release to Air, water.			
Release or emission factors:	nan			
<b>EVALUATION</b>				
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 are for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment from 2011 but is based on data greater than 20 years old.
	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	Variability addressed by presenting emission factors for multiple scenarios/additive types but uncertainty is not addressed.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	OECD, (2011). Emission scenario document on the chemical industry.			
<b>HERO ID:</b>	6306753			
<b>Conditions of Use:</b>	Manufacture, processing, use			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Stack Air: Reactor vents, distillation column vents, absorber units, strippers, sumps/decanter, dryers, cooling vents Fugitive Air: Valves, pump seals, compressor seals, pressure-relief valves, flanges/connections, open-ended lines, sampling connections Water: Drum cleaning, equipment cleaning, aqueous distillation streams, extraction, reaction water, absorption, solids-liquids separation, adsorption, condensation. Releases to air, water.			
Release or emission factors:	nan			
<b>EVALUATION</b>				
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 are for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment from 2011 but is based on data greater than 20 years old.
	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	Variability addressed by presenting emission factors for multiple scenarios but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

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

**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

**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 chemical forms, containers and storage system types.

**Overall Quality Determination****Medium**

**Study Citation:** Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.  
**HERO ID:** 6311222  
**Conditions of Use:** Automotive Coating Application

**EXTRACTION**

Parameter	Data
Description of release source:	Auto OEM: blowdown, sludge processing, generated sludge, stack air releases. Autorefinish: air filter waste from overspray, stack air.
Release or emission factors:	Release or emission factors
Release frequency:	Auto OEM: sludge pit cleaning: 1 day/yr. All other releases: 250 days/yr. Autorefinish: 170 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	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 OEM and refinish applications.

**Overall Quality Determination****Medium**



<b>Study Citation:</b>	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
<b>HERO ID:</b>	10480466			
<b>Conditions of Use:</b>	Use - Laboratory Chemicals			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Container unloading, container cleaning, labware equipment cleaning, during laboratory analyses, waste disposal			
Release or emission factors:	Release media: Water, air, landfill			
Release frequency:	Release or emission factors			
Waste treatment methods and pollution control:	260 day/yr			
	Waste treatment methods and pollution control			
<b>EVALUATION</b>				
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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
<b>HERO ID:</b>	11182966			
<b>Conditions of Use:</b>	Repackaging			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
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			
<b>EVALUATION</b>				
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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2014). Generic scenario draft on the use of additives in plastic compounding.
<b>HERO ID:</b>	3827195
<b>Conditions of Use:</b>	Plastics Compounding

**EXTRACTION**

Parameter	Data
Description of release source:	Unloading containers, spillage, Container cleaning, dusts and fugitive emissions from compounding, equipment cleaning
Release quantity:	Provides models for estimating various fugitive air releases
Release or emission factors:	Release or emission factors
Release frequency:	148-264 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 multiple plastic and additive types.

**Overall Quality Determination****High**

<b>Study Citation:</b>	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
<b>HERO ID:</b>	6304171			
<b>Conditions of Use:</b>	Flexible and Rigid Polyurethane Foam Manufacture			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Container residues, equipment residues, release of auxiliary blowing agents (ABAs), scrap or off-spec product disposal (page 12 of 19)			
Release or emission factors:	Release or emission factors			
<b>EVALUATION</b>				
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	High	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 foam types.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
<b>HERO ID:</b>	6311218
<b>Conditions of Use:</b>	Processing as a reactant as a process regulator for Plastic material and resin manufacturing; incorporation into formulation, mixture, or reaction product as a plasticizer for Plastics product manufacturing; incorporation into article as a plasticizer for Plastics product manufacturing

**EXTRACTION**

Parameter	Data
Description of release source:	Unloading containers, spillage, Container cleaning, dusts and fugitive emissions from compounding, equipment cleaning
Release quantity:	Provides models for estimating various fugitive air releases
Release or emission factors:	Release or emission factors
Release frequency:	250 days/yr
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	QC Note: This is an early draft of the Plastic Compounding GS and may not provide the most up to data info

**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	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 multiple plastic types, and additive types.

**Overall Quality Determination****High**

<b>Study Citation:</b>	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).
<b>HERO ID:</b>	6311221
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks

**EXTRACTION**

Parameter	Data
Description of release source:	PROC: Packaging disposal, material transfer, ink processing, equipment cleaningUSE: disposal/cleaning of ink container, cleaning printing equipment, ink drying
Release or emission factors:	Release or emission factors
Release frequency:	PROC: 250 days/yrUSE: 250 days/yr
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	QC Note: This is an early draft of the Printing Ink GS and may not provide the most up to data info

**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	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 printing applications, and multiple chemical functions

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.
<b>HERO ID:</b>	6385709
<b>Conditions of Use:</b>	Flexographic Printing

**EXTRACTION**

Parameter	Data
Description of release source:	Equipment cleaning, fugitive air, stack air.
Release or emission factors:	Release or emission factors
Release frequency:	300 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	Low	Assessment is based on data greater 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	Low	Variability and uncertainty are not addressed.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.
<b>HERO ID:</b>	6385710
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks

**EXTRACTION**

Parameter	Data
Description of release source:	PROC: Packaging disposal, material transfer, ink processing, equipment cleaning. VOC and particulate emissions are expected from the unloading of raw materials into the dispersion tank. Additional VOC emissions are expected as a result of heat-up losses and surface evaporation during the dispersion and milling operations as well as during the loading of the final ink product into receiving containers. Additional environmental releases are expected from waste streams associated with container and equipment cleaning. USE: disposal/cleaning of ink container, cleaning printing equipment, ink drying. A large portion of the releases from the printing industry are associated with VOC emissions. These come from the volatile components in the printing inks as well as from various solvents that are used for equipment cleaning. Air emissions are likely to result from unloading inks into the ink reservoirs on the printing press, the generation of ink mist during high speed printing operations, and fugitive emissions from various source points in the printing process (e.g. ink reservoirs, drying ovens). Additional environmental releases of chemicals contained in printing inks can result from residual ink wastes from container cleaning, and disposal of rags and solvents used to wipe down and clean printing equipment.
Release quantity:	PROC: See Table 2-4 for 2007 TRI data. Air releases = 190,832 lb/yr, Surface water releases = 29 lb/yr, POTW/Wastewater releases = 823 lb/yr, Land releases = 5,561 lb/yr, Other disposal = 51,303 lb/yr. USE: See Table 2-5 for 2007 TRI data based on the type of printing. Depending on the type of printing, Air releases = 14,150 to 5,865,923 lb/yr, Surface water releases = 0 to 275 lb/yr, Wastewater releases = 0 to 3,200 lb/yr, Land releases = 11 to 18,619 lb/yr, Other disposal = 1,767 to 210,010 lb/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	The GS is more than 10 years but no more 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	Low	Uncertainty not addressed. Variability not addressed.

**Overall Quality Determination****Medium**



<b>Study Citation:</b>	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.
<b>HERO ID:</b>	6385711
<b>Conditions of Use:</b>	Plastics Converting

**EXTRACTION**

Parameter	Data
Description of release source:	Container cleaning, spillage, unloading, dusts and fugitive emissions from converting, equipment cleaning, trimming wastes
Release quantity:	Provides models for estimating various releases.
Release or emission factors:	Release or emission factors
Release frequency:	137-254 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 multiple plastic and additive types.

**Overall Quality Determination****High**

<b>Study Citation:</b>	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.
<b>HERO ID:</b>	6385719
<b>Conditions of Use:</b>	Commercial Use: Furniture Coating Application

**EXTRACTION**

Parameter	Data
Description of release source:	container cleaning, equipment cleaning, coating application (overspray), volatile air emissions
Release or emission factors:	nan
Release frequency:	250 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	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 various chemical functions and wood vs metal furniture uses.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.
<b>HERO ID:</b>	6385748
<b>Conditions of Use:</b>	Processing - Additive in Plastic Compounding

**EXTRACTION**

Parameter	Data
Description of release source:	Unloading containers, spillage, Container cleaning, dusts and fugitive emissions from compounding, equipment cleaning, loading. Releases to water, air, land.
Release quantity:	Provides models for estimating various releases to air, water, and land
Release or emission factors:	nan
Release frequency:	148-264 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 reasonably 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 multiple plastic types, and additive types.

**Overall Quality Determination****High**

<b>Study Citation:</b>	U.S. EPA, (1994). Generic scenario: Formulation of latex/emulsion coatings.
<b>HERO ID:</b>	8726956
<b>Conditions of Use:</b>	Processing – incorporation into formulation, mixture, or reaction product for Paint and coating manufacturing (specifically latex/emulsion coatings)

**EXTRACTION**

Parameter	Data
Description of release source:	equipment cleaning, drying of latex wastes, off-spec and QC samples, unused raw materials, filters, volatiles from mixing
Release or emission factors:	nan
Waste treatment methods and pollution control:	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 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 distributions characterized by ranges/estimations 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**

<b>Study Citation:</b>	Canada,, G.o. (2020). Phthalate substance grouping – Information sheet.			
<b>HERO ID:</b>	7349060			
<b>Conditions of Use:</b>	All			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	In Canada, these substances have the potential to be released to the environment, primarily to air and water. Releases may occur during their manufacturing and processing, including transportation and storage, and during the production, use and disposal of products containing them (for example, "down the drain" releases into wastewater systems from use in cosmetics). (p. 4 of 10).			
Comments:	DCHP specifically mentioned as one of the substances of concern.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	The data, data sources, and/or techniques or methods used in the assessment or report are not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Report is from Canada.	
	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 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	N/A	Data is qualitative.	
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	The report does not address variability or uncertainty.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Canada,, G.o. (2019). Page 5 - Fifth report on human biomonitoring of environmental chemicals in Canada.			
<b>HERO ID:</b>	9641570			
<b>Conditions of Use:</b>	All			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	PDF Pg. 5”Releases to the environment are associated with anthropogenic activities (Environment and Climate Change Canada and Health Canada, 2017). Releases may occur during the manufacture and processing of phthalates, including transportation and storage, as well as during the production, use, and disposal of products that contain phthalates (Environment and Climate Change Canada and Health Canada, 2017). Although release into air may occur, water is expected to be the primary receiving medium for phthalates, and occurs through wastewater effluents from industrial sources and disperse releases from consumer products (Environment and Climate Change Canada and Health Canada, 2017; Environment Canada and Health Canada 2015d).”			
<b>EVALUATION</b>				
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	Medium	Data are from Canada, an OECD country.	
	Metric 3: Applicability	High	Data are for many 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	N/A - Description of release source.	
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	N/A - Description of release source.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
<b>HERO ID:</b>	664488			
<b>Conditions of Use:</b>	Use of plastic articles			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Because they are not chemically bound to the plastics to which they are added, phthalates can be released into the environment during use or disposal of the product.			
<b>EVALUATION</b>				
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The report is 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. Does provide helpful information for occupational release analysis
	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	N/A	Information is qualitative
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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.
<b>HERO ID:</b>	10442901
<b>Conditions of Use:</b>	Paints and coatings

**EXTRACTION**

Parameter	Data
Description of release source:	Industrial application of coatings by spraying
Release or emission factors:	Release or emission factors
Release frequency:	Continuous release: 225 d/y. Typical industry situation (5 working days a week, shut down for vacation, no need for continuous shift).
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Emission factors and release frequency come from emission scenario documents (ESDs) and expert information.
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. However, DCHP is not mentioned.
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5: Sample Size	Low	Distribution of samples used to determine emission factors and release frequency are not provided.
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**



<b>Study Citation:</b>	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.
<b>HERO ID:</b>	10442902
<b>Conditions of Use:</b>	Paints and Coatings, Inks, 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 - CEPE SPERC 8a.3a.v2, CEPE SPERC 8c.3a.v2, 365 d/y Outdoor - CEPE SPERC 8d.3a.v2, CEPE SPERC 8f.3a.v2, 225 d/y
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Emission factors and release frequency come from emission scenario documents (ESDs) and expert information.
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. However, DCHP is not mentioned.
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5: Sample Size	Low	Distribution of samples used to determine emission factors and release frequency are not provided.
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:** Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.  
**HERO ID:** 10186827  
**Conditions of Use:** Plasticizer in adhesive manufacturing

**EXTRACTION**

**Parameter** **Data**

Waste treatment methods and pollution control: nan

**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	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but information is not chemical specific.
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	N/A	No sample data.
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	No scope to address variability and uncertainty.

**Overall Quality Determination****High**

<b>Study Citation:</b>	Giuliani, A., Zuccarini, M., Cichelli, A., Khan, H., Reale, M. (2020). Critical Review on the Presence of Phthalates in Food and Evidence of Their Biological Impact. International Journal of Environmental Research and Public Health 17(16):1-43.			
<b>HERO ID:</b>	8338316			
<b>Conditions of Use:</b>	industrial use of plastics to food contact applications			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	PAEs were presumably released from the plastic bags used during the plum picking and storing even before the beginning of the production process. (P. 5/45) These compounds can be easily released from plastics to water, food, soil, air, making them ubiquitous environmental contaminants. Accidental release from packaging materials. (P.1/45)			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Peer reviewed and published journal article.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data from a OECD country, Italy.	
	Metric 3: Applicability	Uninformative	The data are for an occupational scenario of food contact material, which is FDA regulated therefore outside of the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data are expected to be representative of current operations, equipment, and activities. The data are no more than 10 years old.	
	Metric 5: Sample Size	N/A	No sampling data	
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.	
<b>Overall Quality Determination</b>		<b>Uninformative</b>		

<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.			
<b>HERO ID:</b>	4168432			
<b>Conditions of Use:</b>	Disposal of plastics			
EXTRACTION				
Parameter	Data			
Description of release source:	Migration from the plastics (plasticizers are not bound to the polymer) to air or contact material, disposal of waste plastics to landfill, energy recovery, incineration, or recycling. In general, VOCs could be emitted from polymers and additive pyrolysis at recycling operating temperatures, and the types and concentrations of VOCs emitted mainly depended on the plastic composition during the extrusion process [182].			
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	Article is from an OECD country.
	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 DCHP.
	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	N/A	No sample data.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	

<b>Study Citation:</b>	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. Environmental Science and Pollution Research 25(21):20550-20561.			
<b>HERO ID:</b>	4728432			
<b>Conditions of Use:</b>	Consumer use of plastic products			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Description of release source:		Being not covalently bound with polyvinyl chloride, phthalates can leach, migrate, and volatilize over time into environmental media such as indoor air, atmosphere, and foodstuff (Ait Bamai et al. 2014).		
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not specified.
	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 (consumer use of plastic products similar to commercial/industrial use of plastic products).
	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	N/A	Information is qualitative
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.
<b>HERO ID:</b>	10472417
<b>Conditions of Use:</b>	Disposal of vinyl flooring

**EXTRACTION**

Parameter	Data
Description of release source:	Releases from disposal of vinyl flooring (landfills). Lifespan of vinyl flooring is 30 - 50 years.
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	Medium	The data reported references an RFCI product declaration report which is not a frequently used source, but 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, DCHP is not mentioned specifically.
	Metric 4: Temporal Representativeness	High	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	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 described through the various types of materials used for vinyl flooring. However, uncertainty related to the quantity released to landfills annually is not characterized.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	Schripp, T., Wensing, M. (2009). Emission of VOCs and SVOCs from electronic devices and office equipment. :405-430.			
<b>HERO ID:</b>	9493521			
<b>Conditions of Use:</b>	Commercial use: Plastic and Rubber Products/ Electronic Products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	DCHP is listed as a selected compound identified from emissions of television sets and VCRs. No emission data specified.			
Comments:	Emission factors are provided for other chemicals, but none specifically for phthalates.			
<b>EVALUATION</b>				
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. Published book chapter.	
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	Information is more than 10 years but no more than 20 years old	
	Metric 5: Sample Size	N/A	N/A- no sampling data extracted	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents sources, methods, and assumptions. Results 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.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2012). Phthalates action plan.			
<b>HERO ID:</b>	4565597			
<b>Conditions of Use:</b>	General industrial manufacturing, processing, or use			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Description of release source:		Phthalates are released to the environment from multiple sources including industrial releases, the disposal of manufacturing, processing and industrial wastes, municipal solid waste, land application of sewage sludge, and release from products containing phthalates. Only two (DBP and DEHP) of the 8 phthalates are listed on EPA’s Toxics Release Inventory (TRI) list of toxic chemicals. The available release data for these two phthalates indicate that releases of phthalates can be expected to all primary environmental media.		
<b>EVALUATION</b>				
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	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 but data is general and not specific to DCHP.
	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	N/A	No sample data.
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	N/A	No scope to address variability or uncertainty.
<b>Overall Quality Determination</b>			<b>High</b>	



<b>Study Citation:</b>	U.S. EPA, (2002). An evaluation of flexographic inks on wide-web film: Summary booklet.
<b>HERO ID:</b>	9102546
<b>Conditions of Use:</b>	Inks, toner and colorant products

**EXTRACTION****Parameter****Data**

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 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	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not chemical specific.
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5: Sample Size	N/A	No sample data.
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 different ink systems but uncertainty is not addressed.

**Overall Quality Determination****Medium**

<b>Study Citation:</b>	U.S. EPA, (1977). Industrial process profiles for environmental use: Chapter 13. Plasticizers industry.			
<b>HERO ID:</b>	9109783			
<b>Conditions of Use:</b>	Waste			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Description of release source:	Distillation of crude products, from condensate, from steam striping, from catalysts neutralization and crude product washing operations, and from filter backwash. (P. 25/86)			
Release or emission factors:	Release or emission factors			
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	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	Low	The report is 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	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		

<b>Study Citation:</b>	EC/HC, (2015). State of the science report: Phthalate substance grouping: Medium-chain phthalate esters: Chemical Abstracts Service Registry Numbers: 84-61-7; 84-64-0; 84-69-5; 523-31-9; 5334-09-8;16883-83-3; 27215-22-1; 27987-25-3; 68515-40-2; 71888-89-6.		
<b>HERO ID:</b>	3688160		
<b>Conditions of Use:</b>	Production and life cycle		
EXTRACTION			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	Production and use of DCHP in US estimated to be <227,000 kg in 2006 (Table 4-2).		
Life cycle description:	Major uses identified for DCHP are in adhesives and sealants used in construction and/or in the automotive sector. Other applications of medium-chain phthalates in the automotive industry include their addition to automotive paints and coatings or to resins that are then molded into automobile parts (p. 3 and Tab 5-1).		
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, journal articles, 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	The data are from an OECD country other than the U.S. (Canada).
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	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	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	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

<b>Study Citation:</b>	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. Science 46(4056):46-47.			
<b>HERO ID:</b>	1335811			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Approximately 1 billion pounds of phthalic acid esters were made in 1972.			
Chemical concentration:	Phthalate plasticizers may account for as much as 40 percent of the final weight of PVC.			
<b>EVALUATION</b>				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment 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	Medium	The data is for an occupational scenario within the scope of the risk evaluation but data is general to phthalates and not specific to DCHP.
	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	No sample data.
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	No scope to address variability and uncertainty.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.		
<b>HERO ID:</b>	3808976		
<b>Conditions of Use:</b>	Use - Automotive Coating Application		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
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)”		
Life cycle description:	Automotive Coating Application		
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:	Op days: 250 days/yr. 0.25-12 gal coating/site-day, depending on number of jobs Also provides method for adjusting the use rate based on the type of coating product used		
Number of sites:	32,296		
Chemical concentration:	15-25%		
<b>EVALUATION</b>			
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	Low	Assessment is based on data greater than 20 years old.
	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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	OECD, (2009). Emission scenario documents on coating industry (paints, lacquers and varnishes).		
<b>HERO ID:</b>	3827298		
<b>Conditions of Use:</b>	Processing and Use: Formulation of Coatings and Use of Coatings		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	3.2 million tonnes coating/yr		
Life cycle description:	Formulation of Coatings and Use of Coatings		
Process description:	PROC: Dispersion, milling, finishing, filling USE: Application via roller/brush, air spray systems, airless and air-assisted airless spray systems, electrostatic spray, electrodeposition/electrocoating and autodeposition, dip coating, flow and curtain coating, roll coating, and supercritical carbon dioxide coating systems		
Throughput:	0.62-9.0 l/vehicle (auto refinishing); 1.1-5.1 g coating/can (metal can coating sites)		
Number of sites:	In the UK and the EU: 60,330 automotive application sites; 33 metal coating application sites		
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 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 coating types.
Overall Quality Determination		Medium	

<b>Study Citation:</b>	OECD, (2009). Emission scenario document on adhesive formulation.		
<b>HERO ID:</b>	3827299		
<b>Conditions of Use:</b>	Processing: Adhesives and sealants		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
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:	Batch size: 4000 kg or 1,000 gallons of adhesive/bt. Op days and batches per day: Equal to the number of batches. 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.		
<b>EVALUATION</b>			
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.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.		
<b>HERO ID:</b>	3827300		
<b>Conditions of Use:</b>	Use of adhesives for substrate bonding		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	1,500 - 9,100,000 kg adhesive/site-yr		
Life cycle description:	Adhesive Application		
Process description:	unloading, dilute and mix (optional), application (roll, spray, curtain, bead/syringe), drying/curing, product finishing		
Throughput:	Op days: 50-365 days/yr. 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.		
<b>EVALUATION</b>			
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.
<b>Overall Quality Determination</b>		<b>High</b>	



<b>Study Citation:</b>	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.		
<b>HERO ID:</b>	3840003		
<b>Conditions of Use:</b>	Processing: Paints and Coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	0.7-69.87 million kg coating/ink/adhesive/yr		
Life cycle description:	Formulation of Coatings, inks, and adhesives		
Process description:	Preheating (optional), Unloading raw materials from containers into mixing kettle, mixing, filtering, packaging		
Throughput:	Op days: 250 days/yr. 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.		
<b>EVALUATION</b>			
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	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 various chemical functions and types of UV curable products.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	OECD, (2009). Emission scenario document on plastic additives.		
<b>HERO ID:</b>	5079084		
<b>Conditions of Use:</b>	Processing - Plastic Additives		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	Provides % of polymers used for various end-use applications		
Life cycle description:	Plastics Compounding and Converting		
Process description:	Provides descriptions for a variety of closed, partially open, and open compounding and converting processing. Including the following compounding processes: tumbling, ball blending, gravity mixers, paddle mixers, intensive vortex mixers, banbury mixers, two roll mills, and extruder mixing. And the following converting processes: extrusion, injection molding, compression mulding, extrusion blow molding, injection blow molding, film extrusion, extrusion coating, thermoforming, calendering, hand lay up, spray techniques, and filament winding. ESD also provides a break down of the % and volume of polymers used in each process in the UK.		
Throughput:	Provides methodology for estimating throughput of polymers and additives		
Number of sites:	4000 sites in UK		
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.		
<b>EVALUATION</b>			
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 2009 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 prevalence of various processing methods, additive functions, and plastics.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	OECD, (2011). Emission scenario document on the chemical industry.			
<b>HERO ID:</b>	6306753			
<b>Conditions of Use:</b>	Manufacture, processing, use			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	Manufacture, Formulation of processing aids, processing as a reactant, use of processing aids			
Process description:	General synthesis process consists of reaction, handling/transportation, isolation, handling/transportation, purification, handling/transportation, then either reaction to make another chemical or on to the next life cycle stage			
<b>EVALUATION</b>				
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 are for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment from 2011 but is based on data greater than 20 years old.
	Metric 5:	Sample Size	N/A	N/A - This metric is not applicable to the data being extracted (process description only)
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	N/A - This metric is not applicable to the data being extracted (process description only)
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	OECD, (2009). Emission scenario document on transport and storage of chemicals.		
<b>HERO ID:</b>	6393282		
<b>Conditions of Use:</b>	Transportation and Storage (Processing, distribution in commerce)		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
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		
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		
<b>EVALUATION</b>			
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 chemical forms, containers and storage system types.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.			
<b>HERO ID:</b>	6311222			
<b>Conditions of Use:</b>	Automotive Coating Application			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Auto OEM: 166,00 cars painted/yr. Autorefinish: 70-2,000 L paints/yr.			
Process description:	Pretreatment (wash) of car body, E-coat (dip), oven/cure, primer (spray), oven/cure, basecoat (spray), oven/cure, clearcoat (Spray), oven/cure			
Throughput:	Auto OEM: 250 days/yr. Autorefinish: 170 days/yr.			
Number of sites:	Auto OEM: 61 sites. Autorefinish: 1000’s of sites.			
<b>EVALUATION</b>				
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	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 OEM and refinish applications.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).			
<b>HERO ID:</b>	10480466			
<b>Conditions of Use:</b>	Use - Laboratory Chemicals			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Provides methodology to estimate annual use rate.			
Life cycle description:	Laboratory Chemicals			
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:	260 days/yr ; 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.			
<b>EVALUATION</b>				
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
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
<b>HERO ID:</b>	11182966			
<b>Conditions of Use:</b>	Repackaging			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Table B-1 presents PMN data on repackaging rate in kg chemical/site-yr.			
Process description:	<p>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.</p>			
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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<b>Study Citation:</b>		U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
<b>HERO ID:</b>		11182966		
<b>Conditions of Use:</b>		Repackaging		
		<b>EVALUATION</b>		
Domain	Metric	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.	
<b>Overall Quality Determination</b>		<b>High</b>		



<b>Study Citation:</b>	U.S. EPA, (2014). Generic scenario draft on the use of additives in plastic compounding.		
<b>HERO ID:</b>	3827195		
<b>Conditions of Use:</b>	Plastics Compounding		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging.		
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic. 148-264 days/yr.		
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic.		
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.		
<b>EVALUATION</b>			
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 multiple plastic and additive types.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
<b>HERO ID:</b>	6304171			
<b>Conditions of Use:</b>	Flexible and Rigid Polyurethane Foam Manufacture			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	2,365 million lbs polurethan foam/yr. 6,442 million lbs polysytrene/yr (page 5 of 19)			
Process description:	Converters mix plastic resins with additives, shaping/molding (page 7-11 has detailed description)			
Number of sites:	566 total polystyrene sites, 610 total polyurethane foam sites (page 12 of 19)			
<b>EVALUATION</b>				
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	High	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	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 not addressed. Variability addressed by considering multiple foam types.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
<b>HERO ID:</b>	6311218
<b>Conditions of Use:</b>	Processing as a reactant as a process regulator for Plastic material and resin manufacturing; incorporation into formulation, mixture, or reaction product as a plasticizer for Plastics product manufacturing; incorporation into article as a plasticizer for Plastics product manufacturing

EXTRACTION	
Parameter	Data
Production, import, or use volume:	provides the North American Production (lb/yr) of the types of Thermoplastics from 2003 -p. 3
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging
Throughput:	'Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic
Number of sites:	'Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic
Chemical concentration:	'Provides conc. estimates based on additive function in various plastics, not chemical specific.
Comments:	QC Note: This is an early draft of the Plastic Compounding GS and may not provide the most up to data info

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 multiple plastic and additive types.

<b>Overall Quality Determination</b>	<b>High</b>
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<b>Study Citation:</b>	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
<b>HERO ID:</b>	6311221		
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	11.9-373.8 million kg ink/yr (depending on printing application)		
Process description:	PROC: Vehicle consisting of resin, solvent, drying agents, and resin plasticizing oils is prepared, pigment blended into vehicle, fed to dispersing mill, raw ink let down with additional solvent and other additives, packaged for sale.USE: Provides descriptions for lithography, gravure, flexography, letterpress, digital printing, and screen printing.		
Throughput:	Provides methodology for estimating throughput based on the amount of ink produced, and the concentration of the chemical in the ink for both PROC and USE		
Number of sites:	PROC: 13-239 (depending on printing application)USE: 454-18,622 (depending on printing application)		
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.		
Comments:	QC Note: This is an early draft of the Printing Ink GS and may not provide the most up to data info		
<b>EVALUATION</b>			
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	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 printing applications, and multiple chemical functions
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385709			
<b>Conditions of Use:</b>	Flexographic Printing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	ink received in drums, charged to ink chamber, flexographic press, ink in substrate product.			
Throughput:	1,800 kg ink/site-day			
Number of sites:	Provides methodology to estimate number of sites based on ink use rate and concentration of chemical in ink.			
Chemical concentration:	1-10%, general additive concentration not chemical or function specific.			
<b>EVALUATION</b>				
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	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	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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385710			
<b>Conditions of Use:</b>	Formulation and Use of Printing Inks			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	It was estimated that approximately 97% of all industrial end use printing activities can be categorized within five different printing processes: lithography, flexography, gravure, letterpress and screen printing			
Process description:	PROC: Vehicle consisting of resin, solvent, drying agents, and resn plasticizing oils is prepared, pigment blended into vehicle, fed to dispersing mill, raw ink let down with additional solvent and other additives, packaged for sale.USE: Provides descriptions for lithography, gravure, flexography, letterpress, digital priting, and screen printing.			
Number of sites:	See Table 2-2: A total of 4,221 sites from 2007 data			
Chemical concentration:	Of the reviewed 15 chemicals, 8 chemicals were manufactured or imported in 100% concentration; 7 chemicals were manufactured or imported in concentrations < 100%.			
<b>EVALUATION</b>				
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	The GS is more than 10 years but no more 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	Low	Uncertainty not addressed. Variability not addressed.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.		
<b>HERO ID:</b>	6385711		
<b>Conditions of Use:</b>	Plastics Converting		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Process description:	Compounded resins received, unloaded, forming/molding/shaping, trimming, finishing (including coating operations)		
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic		
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic		
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.		
<b>EVALUATION</b>			
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 multiple plastic and additive types.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385719			
<b>Conditions of Use:</b>	Commercial Use: Furniture Coating Application			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Metal: 5,000-446,600 L coating/yrWood: 4,326-4,372 L coating/yr			
Process description:	Metal furniture: Metal cleaning, coating unloaded, coating mixing, coating application (manual or automatic), flash-off, drying oven Wood furniture: coating unloaded, coating mixing, coating application (manual or automatic), flash-off, drying oven, sanding and other finishing operations			
Throughput:	Metal: 20-1,786 L coating/dayWood: 17.3-17.4 L coating/day			
Number of sites:	152-8,176			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
<b>EVALUATION</b>				
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	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 various chemical functions and wood vs metal furniture uses.	
<b>Overall Quality Determination</b>		<b>Medium</b>		



<b>Study Citation:</b>	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.			
<b>HERO ID:</b>	6385748			
<b>Conditions of Use:</b>	Processing - Additive in Plastic Compounding			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	Plastics Compounding			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Op days: 148-264 days/yr. Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.			
<b>EVALUATION</b>				
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 multiple plastic and additive types.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (1994). Generic scenario: Formulation of latex/emulsion coatings.		
<b>HERO ID:</b>	8726956		
<b>Conditions of Use:</b>	Processing – incorporation into formulation, mixture, or reaction product for Paint and coating manufacturing (specifically latex/emulsion coatings)		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	450 MM gals of latex coatings/yr		
Process description:	Pigment dispoersion, mixing, add latex, QC check, hold and re-check QC, dispense and package		
Throughput:	1000-5000 gal/bt		
Number of sites:	1000		
Chemical concentration:	'Provides conc. estimates based on the chemical function, not chemical specific.		
<b>EVALUATION</b>			
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	Low	Assessment is based on data greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distributions characterized by ranges/estimations 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	Medium	Uncertainty not addressed. Variability addressed by considering different chemical functions
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	ACA, (2019). Comment submitted by Raleigh Davis, Assistant Director and Riaz Zaman, Counsel, Government Affairs, American Coatings Association (ACA) regarding the proposed 20 high priority candidates for chemical risk evaluation.			
<b>HERO ID:</b>	10369850			
<b>Conditions of Use:</b>	Adhesives			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	Plasticizer, additive and impurity in adhesives			
Chemical concentration:	The chemical is a plasticizer, additive and impurity in adhesives in amounts less then 1%.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The data and data sources used to determine concentration of DCHP as an impurity in adhesives are not provided.
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	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is not characterized.
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	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

<b>Study Citation:</b>	AG, H.D. (2017). HVU2 M8 - M30.		
<b>HERO ID:</b>	6303159		
<b>Conditions of Use:</b>	Use of adhesives and sealants		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	1-3%		
Physical form:	Powder		
<b>EVALUATION</b>			
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	AG, H.D. (2017). HVU2 M8 - M30.		
<b>HERO ID:</b>	6303159		
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	1-3%		
Physical form:	Powder		
<b>EVALUATION</b>			
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	AG,, Hilti (2022). HVU-TZ M10-M20: Sicherheitsdatenblatt.			
<b>HERO ID:</b>	11437783			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1-3%			
Physical form:	Powder			
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
	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 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	

<b>Study Citation:</b>	AG., Hilti (2022). HVU-TZ M10-M20: Sicherheitsdatenblatt.			
<b>HERO ID:</b>	11437783			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1-3%			
Physical form:	Powder			
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
	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 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		

<b>Study Citation:</b>	AkzoNobel, (2018). Taskforce executive summary for dicyclohexyl phthalate (TF2).			
<b>HERO ID:</b>	11182954			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	400 tons/year produced in Tianjin.			
Chemical concentration:	Chemical concentration in manufactured product is 100%.			
<b>EVALUATION</b>				
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 China, a non-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	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.
<b>Overall Quality Determination</b>		<b>Medium</b>		



<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Processing into formulation			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	800 tonnes per year of perkadox CH-50 is formulated of which 50% is DCHP.			
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 China, a non-OECD country.
	Metric 3:	Applicability	High	Data are for processing into 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	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	The report does not address variability or uncertainty.
Overall Quality Determination			Low	

<b>Study Citation:</b>	AkzoNobel, (2018). Priority substance program: Environmental risk assessment for dicyclohexyl phthalate, Akzo Nobel Functional Chemicals, Tianjin production and formulation.			
<b>HERO ID:</b>	11182955			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	”Dicyclohexylphthalate (DCHP) is manufactured and formulated at the Nouryon location in Tianjin. 400 tonnes of DCHP is produced in Tianjin.” PDF 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 China, a non-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	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	The report does not address variability or uncertainty.	
Overall Quality Determination		Low		

<b>Study Citation:</b>	American Hydrotech Inc (2016). HydroSeal® catalyst.			
<b>HERO ID:</b>	6303148			
<b>Conditions of Use:</b>	Use of paints and coatings			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	25-50%			
Physical form:	Powder			
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	Medium	More than 10 but less than 20 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	

<b>Study Citation:</b>		American Hydrotech Inc (2016). HydroSeal® catalyst.			
<b>HERO ID:</b>		6303148			
<b>Conditions of Use:</b>		Incorporation into paints and coatings			
<b>EXTRACTION</b>					
<b>Parameter</b>		<b>Data</b>			
Chemical concentration:		25-50%			
Physical form:		Powder			
<b>EVALUATION</b>					
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	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>			<b>Medium</b>		

<b>Study Citation:</b>	APR, (2020). U.S. post-consumer plastic recycling data.			
<b>HERO ID:</b>	11360400			
<b>Conditions of Use:</b>	Recycling			
<b>EXTRACTION</b>				
<b>Parameter</b>		<b>Data</b>		
Production, import, or use volume:		”In 2020, a minimum of 4,803.8 million pounds of post-consumer plastic material sources in the U.S. was recovered for recycling in the categories of Bottles (by resin), Non-bottle Rigid, Film, and Other Plastics (excluding foam).”		
Life cycle description:		% of total recovered for recycling: All bottles: 57.1%PET Bottles: 36.8%HDPE Bottles: 19.6% PP & Other Bottles: 0.7%Non-bottle Rigid: 22.0%Film: 20.5%Other Plastics: 0.3%		
<b>EVALUATION</b>				
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	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	Medium	Variability addressed by describing amounts of recycled products for several categories but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Bao, J., Wang, M., Ning, X., Zhou, Y., He, Y., Yang, J., Gao, X., Li, S., Ding, Z., Chen, B. (2015). Phthalate concentrations in personal care products and the cumulative exposure to female adults and infants in Shanghai. Journal of Toxicology and Environmental Health, Part A: Current Issues 78(5):325-341.			
<b>HERO ID:</b>	2816857			
<b>Conditions of Use:</b>	Use of Personal care products			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Process description:	PE are added to PCP as emollients, skin permeability enhancers, and stabilizers for color or fragrance (Parlett et al., 2013).			
Throughput:	Use rates and application frequency of personal care products in Table 1			
Chemical concentration:	Concentration in personal care products compiled in Table 3: ranges from 0 to 140 mg/kg			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not specified.
	Metric 3:	Applicability	Uninformative	The report is from an occupational or non-occupationalscenario that does not apply to any 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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Uninformative		

<b>Study Citation:</b>	BEIL (2019). Härterpulver 50.			
<b>HERO ID:</b>	6303144			
<b>Conditions of Use:</b>	Use of paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40-50%			
Physical form:	Solid powder			
		<b>EVALUATION</b>		
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	BEIL (2019). Härterpulver 50.			
<b>HERO ID:</b>	6303144			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40-50%			
Physical form:	Solid powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	



<b>Study Citation:</b>	Belgium, Beads (2016). Echostar 30 BCP tecno.			
<b>HERO ID:</b>	6303138			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0.56 - 0.77 %			
Physical form:	Solid			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Belgium, Beads (2016). Echostar 30 BCP techno.			
<b>HERO ID:</b>	6303138			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0.56 - 0.77 %			
Physical form:	Solid			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Buehler (2017). VariDur 200 powder.			
<b>HERO ID:</b>	6303137			
<b>Conditions of Use:</b>	Laboratory chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0 - 1%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Buehler (2018). VariDur 3003 powder.			
<b>HERO ID:</b>	6303142			
<b>Conditions of Use:</b>	Laboratory chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0 - 2.5%			
Physical form:	powder(s)			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

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

EXTRACTION	
Parameter	Data
Process description:	<p>Painting: Paints can be applied to parts by a myriad of processes including brush, roller, dip, flow, curtain, tumbling, spray, and powder coating. Spray painting by air atomization is the most common application method encountered in industry and presents the principal hazards. To a large degree the hazard in a given spray paint operation depends on the transfer efficiency of the paint application method. Transfer efficiency denotes the percentage of the paint that is deposited on the workpiece; the balance is lost by overspray and rebound. During painting using air atomization, 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. Low Pressure-Low Volume 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 high volume-low pressure system uses compressed air at 3-6 psig and air flows of approximately 20 cfm to atomize the paint. The electrostatic system places a negative charge on the paint particle by passing the paint mist through a corona discharge field. In the Powder Coating Application Methods, the fluidized powder is conveyed through a corona discharge (60-100KV) where the powder particles pick up a negative charge; they are then directed by the electrostatic field to the grounded workpiece and deposit as a uniform coating. Rubber products: 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. Since most of the compounds are in powder or granular form this usually is a dusty operation, and weigh stations must be exhausted. Where possible, small quantities of chemicals should be prepackaged in plastic bags that can be placed directly in the batch, thereby eliminating a dust exposure in emptying bag contents. The chemical additives are weighed out in plastic bags and placed on the charging conveyor with the rubber. 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. Such automatic, closed-pipe delivery systems have a major impact in reducing the exposure of workers to carbon black. Only the very small job shop will now manually dump bags of carbon black into the mixer with its resulting dust exposure. 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. This system requires a large powerful motor drive, reduction gears and a drive system and as a result the nearby work areas exceed the OSHA PEL of 85 dBA. The rubber processing steps in tire production involve all of the processes encountered in general rubber manufacturing except molding.</p>

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. Doesn't mention DCHP specifically
	Metric 4:	Temporal Representativeness	Low	Article is from 1991
	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	Assessment or report clearly documents its data sources
Domain 4: Variability and Uncertainty				

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<b>Study Citation:</b>		Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.	
<b>HERO ID:</b>		1267867	
<b>Conditions of Use:</b>		Painting	
		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 7: Metadata Completeness	N/A	This metric is not applicable to the data being extracted
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b>	Cao, X. L. (2010). Phthalate esters in foods: Sources, occurrence, and analytical methods. Comprehensive Reviews in Food Science and Food Safety 9(1):21-43.			
<b>HERO ID:</b>	1322045			
<b>Conditions of Use:</b>	Plasticizers			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	In PVC gaskets, DiNP was detected at 24.5% to 52.1%, DiDP was detected from 0.3% to 40.7%, and DCHP was detected at 0.1% to 10.5%. DBP and DCHP is present in printing ink formulations from 2-8%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality techniques 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 Canada, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer use of plastic products, which is similar to commercial use of plastic products, 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	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 reporting ranges of concentrations. Uncertainty is not addressed.
Overall Quality Determination		Medium		

<b>Study Citation:</b>		Carboline Company (2019). Thermaline 4900 Safety Data Sheet.		
<b>HERO ID:</b>		6311506		
<b>Conditions of Use:</b>		Use of Paints and Coatings		
<b>EXTRACTION</b>				
<b>Parameter</b>		<b>Data</b>		
Chemical concentration:		1-<2.5%		
<b>EVALUATION</b>				
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	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.
<b>Overall Quality Determination</b>			<b>High</b>	



<b>Study Citation:</b>	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
<b>HERO ID:</b>	664488			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Life cycle description: Dicyclohexyl phthalate (DCHP) is used to stabilize some rubbers, resins, and polymers, including nitrocellulose, polyvinyl acetate, and polyvinyl chloride.				
<b>EVALUATION</b>				
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	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	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	N/A	Information is qualitative	
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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.			
<b>HERO ID:</b>	10442901			
<b>Conditions of Use:</b>	Paints and Coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Throughput:	Typical maximum daily usage, for any one substance, based on sector knowledge 1000 kg product/day at any one location. Pigment/extender/filler: 100 kg/dayBinder: 100 kg/dayWater: 350 kg/dayOrganic solvent/coalescent: 450 kg/dayAdditives: 5 kg/day			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Data is from CEPE SpERC 8.3. The report uses high quality data 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.	
	Metric 3: Applicability	Medium	The release data are for an occupational scenario that is similar to 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	No distribution of samples provided for throughput	
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.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.			
<b>HERO ID:</b>	10442902			
<b>Conditions of Use:</b>	Paints and Coatings, Inks, toner and colorant products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Throughput:	Typical maximum daily usage, for any one substance, based on sector knowledge 100 kg product/day at any one location.Pigment/extender/filler: 10 kg/dayBinder: 10 kg/dayWater: 35 kg/dayOrganic solvent/coalescent: 45 kg/dayAdditives: 0.5 kg/day			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Data is from CEPE SpERC 8.3. The report uses high quality data 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.	
	Metric 3: Applicability	Medium	The release data are for an occupational scenario that is similar to 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	No distribution of samples provided for throughput.	
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.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	CertiPrep., SPEX (2017). Dicyclohexyl phthalate: Safety data sheet.			
<b>HERO ID:</b>	6303183			
<b>Conditions of Use:</b>	Laboratory chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0.10%			
Physical form:	Liquid			
<b>EVALUATION</b>				
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 2017, 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	ChemRex (2003). EMACO 2020 PART C.			
<b>HERO ID:</b>	6303123			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	45-60%			
Physical form:	solid (granules)			
<b>EVALUATION</b>				
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	Low	More than 20 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	ChemRex (2003). EMACO 2020 PART C.			
<b>HERO ID:</b>	6303123			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	45-60%			
Physical form:	solid (granules)			
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	Low	More than 20 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		

<b>Study Citation:</b>	Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.			
<b>HERO ID:</b>	10186827			
<b>Conditions of Use:</b>	Plasticizer in adhesive manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	Plasticizers are added to emulsion adhesives to modify several properties of both the emulsion and the finished adhesive film. By softening the polymer particles dispersed in the emulsion and increasing their mobility, plasticizers cause them to flow together more easily. This usually increases the viscosity of the emulsion and tends to destabilize it for faster breaking and setting speeds at the time it is applied. In addition, the increased softness and mobility help the emulsion to wet smooth, nonporous surfaces, eg, films, foils, and coated papers, thereby increasing its adhesion to them. Also, the softened polymer particles coalesce more rapidly and at a lower temperature than is possible with the unplasticized emulsion. This improved coalescence increases the water resistance of the adhesive film. Plasticizers are usually high boiling esters, eg, phthalates.			
<b>EVALUATION</b>				
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but information is not chemical specific.
	Metric 4:	Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	N/A - Life Cycle 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	No scope to address variability and uncertainty.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	CPSC, (2015). Exposure assessment: Composition, production, and use of phthalates.			
<b>HERO ID:</b>	5155508			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	PV in the US is 500,000 - 1,000,000 lb/yr in 2015. EPA (2015) reports 3 companies responded to production and use of DCHP manufactured or imported into the US in 2012. Production volumes from 1986 - 1994 ranged from 1,000,000-10,000,000 lbs/yr and from 1998 - 2011 it was reported to be 500,000 - 1,000,000 lbs/yr.			
Process description:	DCHP can be produced from an esterification reaction of phthalic anhydride with cyclohexanol in an inert solvent like toluene at approximately 130 C			
Number of sites:	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 is from US.
	Metric 3:	Applicability	High	Directly applicable to condition of use.
	Metric 4:	Temporal Representativeness	High	Reported data is from 2015
	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	Clearly documents results and sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by citing production volumes over multiple years but does not address uncertainty
Overall Quality Determination			High	



<b>Study Citation:</b>	CPSC, (2011). Toxicity review of dicyclohexyl phthalate (DCHP).			
<b>HERO ID:</b>	5155520			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Combination production of phthalate increased from 5,000 (1982) to 13,000 (2004) metric tons. Production volumes in HSDB for DCHP indicate production volume range was 500,000 to 1 million pounds in 2002.			
Process description:	DCHP can be manufactured commercially in a closed system by catalytically esterifying phthalic anhydride with cyclohexane ring alcohols (cyclohexanol). Purified by vacuum distillation or activated charcoal. Purity can achieve 99% or greater. Remaining fraction of DCHP may contain a maximum of 0.1% water and 0.15% phthalic acid.			
<b>EVALUATION</b>				
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 is from US.	
	Metric 3: Applicability	High	Directly applicable to conditions of use.	
	Metric 4: Temporal Representativeness	Medium	Data is from more than 10 years but no more than 20 years ago.	
	Metric 5: Sample Size	N/A	No sample data.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Clearly documents results and sources are generally described.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Process description and PV data. No scope to address variability and uncertainty.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Devcon/Versachem, I.C. (2008). Duco cement material safety data sheet.			
<b>HERO ID:</b>	6303170			
<b>Conditions of Use:</b>	Use of adhesives			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<5%			
Physical form:	Liquid			
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 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	Low	Does not address variability or uncertainty.	
Overall Quality Determination		Medium		

<b>Study Citation:</b>	Devcon/Versachem, I.C. (2008). Duco cement material safety data sheet.			
<b>HERO ID:</b>	6303170			
<b>Conditions of Use:</b>	Incorporation into formulation			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<5%			
Physical form:	Liquid			
<b>EVALUATION</b>				
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 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	Low	Does not address variability or uncertainty.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
<b>HERO ID:</b>	5353181			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Total import for DCHP in Canada in 2012 <10,000 kg			
<b>EVALUATION</b>				
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	Medium	Data are from Canada, an OECD country.	
	Metric 3: Applicability	Medium	Data are for manufacturing, an in-scope occupational scenario, but the information is not for U.S (for Canada).	
	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 (ranges) 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 below the reporting table but variability is not addressed.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Electron Microscopy Sciences (2016). JB-4 CATALYST.			
<b>HERO ID:</b>	6303131			
<b>Conditions of Use:</b>	Laboratory chemical			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>25-≤50%			
Physical form:	Granulate			
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 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		High		

<b>Study Citation:</b>	Electron Microscopy Sciences (2019). TECHNOVIT 3040 POWDER.			
<b>HERO ID:</b>	6303134			
<b>Conditions of Use:</b>	Laboratory chemicals			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>2.5-≤10%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Electron Microscopy Sciences (2018). (2018). MATFIX RESIN.			
<b>HERO ID:</b>	6303149			
<b>Conditions of Use:</b>	Laboratory chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	≤2.5%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	ENF, (2024). Plastic recycling plants in the United States.			
<b>HERO ID:</b>	11360395			
<b>Conditions of Use:</b>	Recycling			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Number of sites:	59 plants in the U.S. recycle plastics into various forms, including granules/pellets and flakes. The document lists all plants along with hyperlinks to their address and other metadata.			
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 recycling, 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	N/A - number of sites.	
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	N/A - number of sites.	
Overall Quality Determination		High		



<b>Study Citation:</b>	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.		
<b>HERO ID:</b>	7349020		
<b>Conditions of Use:</b>	Plastics Product Manufacturing		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Production, import, or use volume:	1995 volume (in millions of pounds) of plastic types is provided in Table 11.2-1: 25,097 mil lbs of polyethylene, 10,890 mil lbs of polypropylene, 5,656 mil lbs of polystyrene, 12,295 mil lbs of PVC, 3,785 mil lbs of saturated polyester, 632 mil lbs of epoxy, 3,204 mil lbs of phenolic, 4,269 mil lbs of polyurethanes, 1,577 mil lbs of unsaturated polyester, and 1,816 mil lbs of urea-formaldehyde.		
Process description:	Plastic products manufacturing involves molding, forming, shaping, or otherwise altering plastic resins or plastic materials to produce an intermediate or final product. Solid and foamed plastic products are manufactured using plastic resins or solid plastic chips as the starting material. Most plastic products are manufactured by mixing plastic resins with additives, applying heat or pressure to the mixture, and shaping the mixture to form the desired product. (Section 2.1). // Section 2.1.1 describes the different types of plastics used by plastic products manufacturing facilities in the United States. // 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 (Section 2.1.2). // Plasticizers are added to plastic materials to improve flexibility, workability, or extrudability. Most plasticizers are used in the manufacture of flexible polyvinyl chloride (PVC). Phthalates, adipates, and trimellitates are the most common plasticizers. (Section 2.1.3)		
<b>EVALUATION</b>			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	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, information is general and not chemical-specific.
	Metric 4: Temporal Representativeness	Low	The report is from 1998, which is more than 20 years old.
	Metric 5: Sample Size	Medium	Volumes are provided as discrete values, but the statistical representativeness and number of samples is unknown.
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			
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<b>Study Citation:</b>	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.			
<b>HERO ID:</b>	7349020			
<b>Conditions of Use:</b>	Plastics Product Manufacturing			
		<b>EVALUATION</b>		
Domain		Metric	Rating	Comments
	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Evonik Corporation USA (2012). Protectosil degadeck CSS BPO.			
<b>HERO ID:</b>	6303145			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40 - 55 %			
Physical form:	Powder			
<b>EVALUATION</b>				
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	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b> Evonik Corporation USA (2012). Protectosil degadeck CSS BPO.	
<b>HERO ID:</b> 6303145	
<b>Conditions of Use:</b> Incorporation into adhesives and sealants	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	40 - 55 %
Physical form:	Powder
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
<b>Rating</b>	<b>Comments</b>
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
Metric 3: Applicability	High
Metric 4: Temporal Representativeness	Medium
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.
<b>Overall Quality Determination</b>	<b>Medium</b>

<b>Study Citation:</b>	Ford Motor Company, (2015). Metal bonding adhesive.			
<b>HERO ID:</b>	6303132			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	3 - <5%			
Physical form:	Liquid			
<b>EVALUATION</b>				
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 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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Ford Motor Company, (2015). Metal bonding adhesive.			
<b>HERO ID:</b>	6303132			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	3 - <5%			
Physical form:	Liquid			
<b>EVALUATION</b>				
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 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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Giuliani, A., Zuccarini, M., Cichelli, A., Khan, H., Reale, M. (2020). Critical Review on the Presence of Phthalates in Food and Evidence of Their Biological Impact. International Journal of Environmental Research and Public Health 17(16):1-43.			
<b>HERO ID:</b>	8338316			
<b>Conditions of Use:</b>	Manufacture			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Process description:	They are manufactured by a reaction of phthalic anydride with various alcohols starting from methanol and ethanol for the smaller compounds, up to iso-decanol straight chain or with somebranching [20]. At room temperature, they are almost colorless, odorless oily liquids and are increasingly fat soluble (lipophilic) depending on how long their chain is.			
Chemical concentration:	No concentration data for DCHP. However, many concentration data provided for other phthalates.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Peer reviewed and published journal article.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data from a OECD country, Italy.
	Metric 3:	Applicability	High	The 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 are expected to be representative of current operations, equipment, and activities. The data are no more than 10 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	N/A	N/A- process description
Overall Quality Determination		High		

<b>Study Citation:</b>	GmbH, H.B. (2015). X60 - A.		
<b>HERO ID:</b>	6303160		
<b>Conditions of Use:</b>	Use of paints and coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	<2.5%		
Physical form:	Powder		
<b>EVALUATION</b>			
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
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	



<b>Study Citation:</b>	GmbH, H.B. (2015). X60 - A.			
<b>HERO ID:</b>	6303160			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<2.5%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	GmbH, Kulzer (2017). Technovit 4000 powder.			
<b>HERO ID:</b>	6303139			
<b>Conditions of Use:</b>	Laboratory chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>2.5-≤10%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	GmbH, Kulzer (2017). Technovit 7100 hardener 1.			
<b>HERO ID:</b>	6303146			
<b>Conditions of Use:</b>	Use of laboratory chemicals			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	25-50%			
Comments:	concentration of chemical in Technovit 7100 Hardener 1 from Manufacturer SDS			
<b>EVALUATION</b>				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Manufacturer SDS
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	High	Manufacturer SDS from 2016 (most recent version)
	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 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	Variability is addressed but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	GmbH, L.B. (2015). HistoResin M.M.Pulver.			
<b>HERO ID:</b>	6303153			
<b>Conditions of Use:</b>	PVC Plastic Converting			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0 - 5%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 an OECD country.
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	GmbH, L.B. (2015). HistoResin M.M.Pulver.		
<b>HERO ID:</b>	6303153		
<b>Conditions of Use:</b>	PVC Plastic Compounding		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	0 - 5%		
Physical form:	Powder		
<b>EVALUATION</b>			
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 an OECD country.
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	GmbH, PERGAN (2018). PEROXAN BP-Pulver 30 W.			
<b>HERO ID:</b>	6303151			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	25-30%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	GmbH, PERGAN (2018). PEROXAN BP-Pulver 30 W.			
<b>HERO ID:</b>	6303151			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	25-30%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	GmbH, U.I. (2018). BP-30-FT1.			
<b>HERO ID:</b>	6303197			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>= 45 - < 50%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
		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	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.
<b>Overall Quality Determination</b>			<b>Medium</b>	



<b>Study Citation:</b>	GmbH, U.I. (2018). BP-30-FT1.			
<b>HERO ID:</b>	6303197			
<b>Conditions of Use:</b>	Incorporation into formulation			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>= 45 - < 50%			
Physical form:	Powder			
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
	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	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	

<b>Study Citation:</b>	Guo, Y., Wang, L., Kannan, K. (2014). Phthalates and parabens in personal care products from China: Concentrations and human exposure. Archives of Environmental Contamination and Toxicology 66(1):113-119.			
<b>HERO ID:</b>	1987638			
<b>Conditions of Use:</b>	commercial use			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	In 2010, the global production of phthalates was estimated at 4.9 million tons, which accounts for 84 % of the total plasticizer production.			
Chemical concentration:	DCHP was not detected in the personal care products tested for this study.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	report uses high quality data	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	The data are from a non-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	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Low	characterized by no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	report clearly documents its data sources	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Medium		

<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.
<b>HERO ID:</b>	4168432
<b>Conditions of Use:</b>	Disposal of plastics

## EXTRACTION

Parameter	Data
Life cycle description:	See graphical abstract and Fig 1: Plasticizers and other additives are added at plastics processing and manufacturing sites -> plastic products used -> plastic products disposed of -> plastic waste collection -> sent to landfill, open burning, energy from waste, or material recovery facilities -> from material recovery facilities, material is reprocessed through mechanical/ chemical means -> sent back to plastics processing and manufacturing sites for integration into plastic articles
Process description:	Large volumes of plastic wastes are generated, mainly due to the short lifespan of many plastic products (it is estimated that approximately 40% of plastic products have a service life of less than 1 month). In Europe, which arguably with Japan has the most technically advanced and environmentally conscious waste and resource recovery systems deployed on the ground, approximately 50% of plastic waste is still directed to controlled landfill disposal [2]. Resource recovery alternatives to landfill are mechanical recycling (primary recycling substituting virgin materials and secondary recycling), chemical recovery (tertiary recycling) or energy recovery (quaternary recycling) [9,10]. In industrial countries a large share of plastic waste is used for energy recovery. In Europe, more plastics waste is destined for energy recovery (39.5%) (in EfW or via solid recovered fuels (SRF) recovered in cement kilns) than for recycling (29.7%) [27]. Primary recycling substituting virgin polymers in the same application is possible for some plastic types and fractions (e.g. for PET plastic bottles or car bumpers) [10]. Moulding and extrusion are key stages in the mechanical material recycling process of plastic waste that usually is operated at 200–300°C. However, among else, the great variability in plastics polymers and post-use contamination obstructs closed-loop recycling or makes it difficult [10,11]. For the vast majority of plastic waste fractions (e.g. most packaging, plastic from electronics, plastic and polymers from the transport and construction sectors) labour or technology intensive sorting is needed in order to get a high quality recyclate which can be used for substituting virgin materials [12]. Often, plastics are in most cases secondary recycling applies, in which used plastics are cascaded into material applications different than the original, and often of less demanding material specifications (e.g. PET bottles into fleece). Plastic waste for recycling could be transported overlong distances, for instance exported from the Global North to the developing countries, particularly to Asia [13]. It was shown that 46% wt. of the plastics collected for recycling in Europe were eventually exported, with 90% wt. of it directly or indirectly ending up in China [14,15]. Chemical recovery (tertiary recycling), involves chemicals, e.g., raw materials such as monomers, being recovered and/or con-verted from the plastic material [9]. This can potentially be done by catalytic depolymerisation or by controlled thermal degradation, such as thermolysis, which is a non-catalytic cracking process[16]. Pyrolysis is also considered to be a sustainable and efficient treatment that can produce a range of useful hydrocarbons, potentially used as a chemical feedstock or as energy, thereby minimizing the dependency on non-renewable fossil fuels, while solving the landfilling problem [17,18].

## 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 that are from frequently used sources (e.g., European Union or OECD reports, NIOSH HHES, journal articles, 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	The data are from an OECD country other than the U.S., and locality-specific factors (e.g., potential differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to 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 DCHP.
	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.

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<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.				
<b>HERO ID:</b>	4168432				
<b>Conditions of Use:</b>	Disposal of plastics				
		<b>EVALUATION</b>			
Domain		Metric	Rating	Comments	
	Metric 5:	Sample Size	N/A	No sample data.	
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	N/A	Process description.	
<b>Overall Quality Determination</b>			<b>High</b>		

<b>Study Citation:</b>	Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. Journal of Hazardous Materials 344:179-199.			
<b>HERO ID:</b>	4168432			
<b>Conditions of Use:</b>	Processing: Production of plastics			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	During the last 15 years, the global annual production of plastics has doubled, reaching approximately 299 million tonnes in 2013 [1,2]. Global plastic demand is dominated by thermoplastic types of polypropylene(PP) (21%), low -and linear low- density polyethylene (LDPE and LLDPE) (18%), polyvinyl chloride (PVC) (17%), and high-density polyethylene, (HDPE) (15%). Other plastic types with high demand are polystyrene (PS), and expandable PS (8%), polyethylene terephthalate (PET) (7%, excluding PET fibre) and the thermosetting plastic polyurethane [3].			
Life cycle description:	Plastic polymers are not only used for consumer products but also to make synthetic fibres, foams, coatings, adhesives and sealants, which are used in numerous applications [4]. In Europe, the use of plastics is mostly dominated by packaging (38%),followed by building and construction (21%), automotive (7%), electrical and electronic (6%), and other sectors (28%), such as medical and leisure [2]. // About 80% of plasticizers are used in PVC with the remaining 20% used in cellulose plastic.			
Chemical concentration:	Plasticizers are typically 10-70 wt% in plastics			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	The data are from an OECD country other than the U.S., and locality-specific factors (e.g., potential differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but data is not specific to DCHP.
	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	N/A	No sample data.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	

<b>Study Citation:</b>	Heitbrink, W. (1993). In-depth survey report: Control technology for autobody repair and painting shops at Team Chevrolet, Colorado Springs, Colorado.			
<b>HERO ID:</b>	6558535			
<b>Conditions of Use:</b>	Commercial use - spray painting			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	Autobody shop is located in a two-story building. Before the cars are painted, structural damage to the cars is repaired on the upper level of the shop which is illustrated in the article. This involves the repair and replacement of damaged parts. Workers may be exposed to aerosols from sanding, grinding, and welding. Shop does some restoration of automobiles. After structural damage repair, they are prepared for painting. This involves sanding, washing, and covering parts of the vehicle that are not being painted with either paper or plastic. After the car has been painted, defects in the paint job are removed by buffing. In the upper level of the shop, vehicle preparation is done next to the spray painting booth. Lower level is illustrated in the article. Spray painting booths in the upper level were Trimatic cross draft spray painting booths. Air is supplied and exhausted through filters that are mounted in plenums (described in article). Filters are changed every four to five weeks. Before some painting jobs, the filters are wetted down with water which likely reduces air flow until the filters dry off.			
Comments:	Sampling data but none for DCHP or any phthalates.			
<b>EVALUATION</b>				
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	Process description.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Heitbrink, W., Cooper, T., Edmonds, M., Bryant, C., Ruch, W. (1993). In-depth survey report: control technology for autobody repair and painting shops at Valley Paint and Body Shop, Amelia, Ohio.
<b>HERO ID:</b>	6558536
<b>Conditions of Use:</b>	Commercial use - Paint and Coatings

EXTRACTION	
Parameter	Data
Process description:	<p>Autobody shop. Before the cars are painted, structural damage to the cars is repaired elsewhere in the shop. This involves the repair and replacement of damaged parts. During these activities, the workers may be exposed to aerosols from sanding, grinding, and welding. For some jobs, abrasive blasting with sand that contains crystalline silica is used for paint removal. This abrasive blasting was conducted in the open. After the cars have been repaired, they are brought to the paint shop that is shown in the article. There is some sanding of areas to be painted. Parts of the car which are not to be painted are protected with masking. The car and autobody parts are painted in either the spray painting booth or in the vehicle preparation station. Generally, the vehicle preparation station is used only for small paint jobs or for primer painting. Both the vehicle preparation station and the spray painting booth were manufactured by Garomat Inc. Vehicle prep station shown in article has two bays. Bays are separated by moveable cloth curtains that were suspended from rods in the ceiling. Each bay exhausts air through 3 filters in the back of the vehicle preparation station. Spray painting booths have 2 painting cycles. During the painting cycle, outside air is passed through a series of filters. The final set of filters cover the entire ceiling of the spray painting booth. A nominal 12,000 cfm of air flows out of the ceiling around the car or object being painted and out of the booth through exhaust grates located in the floor of the booth. Booth is 23 ft long, 13 ft wide and 9 ft high. Air is exhausted through a 2 ft wide, rectangular slot in the floor that is 17 ft by 6 ft. After the car or body part has been painted, the worker leaves the booth and the paint is cured at a temp between 120 and 140 F. During this period, the airflow in the booth is reduced and about 80 percent of the air flow in the booth is recycled.</p>

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The document is a survey conducted by NIOSH.
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 but data is general and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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	Process description.

## Overall Quality Determination

**Medium**

<b>Study Citation:</b>	Henry Company (2018). PUMADEQ catalyst.			
<b>HERO ID:</b>	6303167			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	30-60%			
Physical form:	Solid powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	



<b>Study Citation:</b> Henry Company (2018). PUMADEQ catalyst.	
<b>HERO ID:</b> 6303167	
<b>Conditions of Use:</b> Incorporation into paints and coatings	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	30-60%
Physical form:	Solid powder
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
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
Metric 3:	Applicability
Metric 4:	Temporal Representativeness
Metric 5:	Sample Size
	High
	Product is from a US supplier.
	High
	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	High
	Source is from 2018, which is less than 10 years old.
	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.
<b>Overall Quality Determination</b>	
<b>High</b>	

<b>Study Citation:</b>	Hilti (Canada) Corp (2015). HVU M8 - M39.			
<b>HERO ID:</b>	6303171			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1-2.5%			
Physical form:	Solid			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Hilti (Canada) Corp (2015). HVU M8 - M39.			
<b>HERO ID:</b>	6303171			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1-2.5%			
Physical form:	Solid			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Inc, Dudick (2015). MH-1 hardener.			
<b>HERO ID:</b>	6303125			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40% to 60%			
Physical form:	Powdered crystalline solid			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Inc, Dudick (2015). MH-1 hardener.			
<b>HERO ID:</b>	6303125			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40% to 60%			
Physical form:	Powdered crystalline solid			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Inc, Duro-Last (2019). Duro-Last® liquid-applied flashing catalyst.			
<b>HERO ID:</b>	6303128			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	49.00 - 51.00%			
Physical form:	solid (granules)			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Inc, Duro-Last (2019). Duro-Last® liquid-applied flashing catalyst.			
<b>HERO ID:</b>	6303128			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
EXTRACTION				
Parameter		Data		
Chemical concentration:		49.00 - 51.00%		
Physical form:		solid (granules)		
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 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	

<b>Study Citation:</b>	Inc, P.F. (2011). Chem-Stud adhesive anchor capsules.			
<b>HERO ID:</b>	6303152			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	not established			
Physical form:	Part A: Mild-smelling amber liquid containing quartz sand in larger vial.Part B: Mild-smelling white paste in inner vial.			
<b>EVALUATION</b>				
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	Medium	More than 10 but less than 20 years old
	Metric 5:	Sample Size	Low	SDS states concentration not established
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	SDS states concentration not established
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty. SDS states concentration not established.
<b>Overall Quality Determination</b>		<b>Medium</b>		



<b>Study Citation:</b>	Inc, P.F. (2011). Chem-Stud adhesive anchor capsules.			
<b>HERO ID:</b>	6303152			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	not established			
Physical form:	Part A: Mild-smelling amber liquid containing quartz sand in larger vial.Part B: Mild-smelling white paste in inner vial.			
<b>EVALUATION</b>				
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	Medium	More than 10 but less than 20 years old
	Metric 5:	Sample Size	Low	SDS states concentration not established
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	SDS states concentration not established
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty. SDS states concentration not established.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Inc, P.F. (2011). Hammer-Capsule™ adhesive anchor capsule.			
<b>HERO ID:</b>	6303156			
<b>Conditions of Use:</b>	Use of adhesives and sealants			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1 - 2.5%			
Physical form:	Liquid in capsule			
		<b>EVALUATION</b>		
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 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Source just provides concentration and does not document how this value was obtained.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Characterized by a range with uncertain statistics.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b> Inc, P.F. (2011). Hammer-Capsule™ adhesive anchor capsule.	
<b>HERO ID:</b> 6303156	
<b>Conditions of Use:</b> Incorporation into adhesives and sealants	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	1 - 2.5%
Physical form:	Liquid in capsule
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
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
Metric 3:	Applicability
Metric 4:	Temporal Representativeness
Metric 5:	Sample Size
	High
	Product is from a US supplier.
	High
	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	High
	Source is from 2020, which is less than 10 years old.
	Low
	Source just provides concentration and does not document how this value was obtained.
Domain 3: Accessibility/ Clarity	
Metric 6:	Metadata Completeness
	Medium
	Characterized by a range with uncertain statistics.
Domain 4: Variability and Uncertainty	
Metric 7:	Metadata Completeness
	Medium
	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
<b>Overall Quality Determination</b>	
<b>High</b>	

<b>Study Citation:</b>	Inc, Siplast (2015). Pro catalyst.			
<b>HERO ID:</b>	6303190			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>=50 - <55%			
Physical form:	Powder			
		<b>EVALUATION</b>		
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Inc, Siplast (2015). Pro catalyst.			
<b>HERO ID:</b>	6303190			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>=50 - <55%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Inc, T.P. (2017). JB-4® plus catalyst: component of 18040 JB-4® plus. 2017.			
<b>HERO ID:</b>	6303173			
<b>Conditions of Use:</b>	Laboratory Chemical			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	51-60%			
Physical form:	white free flowing granules			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Inc, U.I. (2018). BENOX C-50.			
<b>HERO ID:</b>	6303189			
<b>Conditions of Use:</b>	Paints and Coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>= 50 - < 55			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Manufacturer SDS.	
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	Low	Distribution of samples is qualitative or 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	Medium	Variability is addressed but uncertainty is not addressed.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	KG, W.G. (2018). RK-1300 - RK-1500 Activator.			
<b>HERO ID:</b>	6303195			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	≥10 - ≤30%			
Physical form:	Liquid			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	



<b>Study Citation:</b>	KG, W.G. (2018). RK-1300 - RK-1500 Activator.		
<b>HERO ID:</b>	6303195		
<b>Conditions of Use:</b>	Incorporation into paints and coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	≥10 - ≤30%		
Physical form:	Liquid		
<b>EVALUATION</b>			
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Lerner, I. (2005). European plastics industry moves from 2-EH, DEHP. Chemical Market Reporter 267(26):26-27.
<b>HERO ID:</b>	7978846
<b>Conditions of Use:</b>	Plasticizers

EXTRACTION	
Parameter	Data
Production, import, or use volume:	About 70 percent of the plasticizer market volume is phthalates, and plasticizers make up about 60 percent of the plastic additives market. PVC accounts for 80 to 90 percent of global plasticizer consumption. In 2003, global sales of plasticizers were estimated to be roughly \$4.9 billion, and the global plastic additives industry was worth about \$14.8 billion, representing nearly 18 billion pounds. (page 1/2)
Comments:	DCHP not mentioned specifically

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment 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	Medium	Data are global, but EU and US data are the main focus of the article.
	Metric 3:	Applicability	High	Data are for the use of plasticizers in plastic and resin 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 (percentages, production values) 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**

<b>Study Citation:</b>	Limited, Sika (2017). Sikafloor® pronto hardener.		
<b>HERO ID:</b>	6303185		
<b>Conditions of Use:</b>	Use of paints and coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	>= 40 - < 60%		
Physical form:	Powder		
<b>EVALUATION</b>			
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Limited, Sika (2017). Sikafloor® pronto hardener.		
<b>HERO ID:</b>	6303185		
<b>Conditions of Use:</b>	Incorporation into paints and coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	>= 40 - < 60%		
Physical form:	Powder		
<b>EVALUATION</b>			
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	LLC, A.G. (2015). ALT catalyst powder.			
<b>HERO ID:</b>	6303141			
<b>Conditions of Use:</b>	Use of paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	25-50%			
Physical form:	Powder			
		<b>EVALUATION</b>		
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b> LLC, A.G. (2015). ALT catalyst powder.	
<b>HERO ID:</b> 6303141	
<b>Conditions of Use:</b> Incorporation into paints and coatings	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	25-50%
Physical form:	Powder
<b>EVALUATION</b>	
Domain	Metric
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
Metric 3:	Applicability
Metric 4:	Temporal Representativeness
Metric 5:	Sample Size
	High
	High
	High
	Medium
	Product is from a US supplier.
	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Source is from 2018, which is less than 10 years old.
	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.
<b>Overall Quality Determination</b>	
<b>High</b>	

<b>Study Citation:</b>	LLC, Hydro-Gard (2017). Gard-Deck ® hardener 500.			
<b>HERO ID:</b>	6303165			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	40-55%			
Physical form:	Solid, free flowing powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b> LLC, Hydro-Gard (2017). Gard-Deck ® hardener 500.	
<b>HERO ID:</b> 6303165	
<b>Conditions of Use:</b> Incorporation into paints and coatings	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	40-55%
Physical form:	Solid, free flowing powder
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
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
Metric 3:	Applicability
	High
Metric 4:	Temporal Representativeness
	High
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.
<b>Overall Quality Determination</b>	
<b>High</b>	



Study Citation:	LLC, Vertellus (2018). MORFLEX® 150 (DICYCLOHEXYL PHTHALATE, DCHP) BY VERTELLUS OFFERS PERFORMANCE, VALUE AND VERSATILITY ACROSS A BREADTH OF APPLICATIONS.			
HERO ID:	6303194			
Conditions of Use:	Plastic compounding			
EXTRACTION				
Parameter	Data			
Chemical concentration:	100%			
Physical form:	Solid			
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 2021, 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	

<b>Study Citation:</b>	Lord Corporation, (2017). Fusor 108B, 109B Metal Bonding ADH PT B.			
<b>HERO ID:</b>	6303150			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	1 - 5 %			
Physical form:	Paste			
		<b>EVALUATION</b>		
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Lord Corporation, (2017). Fusor 108B, 109B Metal Bonding ADH PT B.				
<b>HERO ID:</b>	6303150				
<b>Conditions of Use:</b>	Use of adhesives and sealants				
<b>Parameter</b>		<b>Data</b>		<b>EXTRACTION</b>	
Chemical concentration:		1 - 5 %			
Physical form:		Paste			
<b>Domain</b>		<b>Metric</b>		<b>EVALUATION</b>	
				<b>Rating</b>	<b>Comments</b>
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 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.
<b>Overall Quality Determination</b>				<b>High</b>	

<b>Study Citation:</b>	Ltd, D.C. (2019). MONOTEK® hardener powder.			
<b>HERO ID:</b>	6303129			
<b>Conditions of Use:</b>	Use of paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	30 - 60 %			
Physical form:	Powder			
		<b>EVALUATION</b>		
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Ltd, D.C. (2019). MONOTEK® hardener powder.			
<b>HERO ID:</b>	6303129			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	30 - 60 %			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	

<b>Study Citation:</b>	Ltd, H.T. (2018). MMA CATALYST.			
<b>HERO ID:</b>	6303168			
<b>Conditions of Use:</b>	Processing - incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	47.5 - 51%			
Physical form:	White solid.			
<b>EVALUATION</b>				
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	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3:	Applicability	High	Data are 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	Low	No sample size provided for determining chemical concentration.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides physical form and does not document how this was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed through range of concentration but uncertainty in measurements is not addressed.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Ltd, H.T. (2018). MMA CATALYST.			
<b>HERO ID:</b>	6303168			
<b>Conditions of Use:</b>	Application of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	47.5 - 51%			
Physical form:	White solid.			
<b>EVALUATION</b>				
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	Medium	Data are from the United Kingdom, an OECD country.
	Metric 3:	Applicability	High	Data are 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	Low	No sample size provided for determining chemical concentration.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides physical form and does not document how this was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed through range of concentration but uncertainty in measurements is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Ltd, T.I. (2018). TREMCO CP510.			
<b>HERO ID:</b>	6303178			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	30-<50%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	



<b>Study Citation:</b>	Ltd, T.I. (2018). TREMCO CP510.			
<b>HERO ID:</b>	6303178			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	30-<50%			
Physical form:	Powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Ltd, T.S. (2013). Polyethylene protection sheet No. 9430.			
<b>HERO ID:</b>	6303176			
<b>Conditions of Use:</b>	Plastic products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	SDS sheet confirms the presence of DCHP in the product but does not give a concentration.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	SDS information is primary data from the supplier; however, it appears to have quality issues (missing chemical composition information).
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	From an OECD country (Japan).
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 years old.
	Metric 5:	Sample Size	N/A	N/A - SDS does not give chemical composition, just confirms presence of chemical.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source does not document how presence of DCHP was confirmed in mixture.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	N/A - SDS does not give chemical composition, just confirms presence of chemical.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. Environmental Science and Pollution Research 25(21):20550-20561.			
<b>HERO ID:</b>	4728432			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
<b>Parameter</b>		<b>Data</b>		
Production, import, or use volume:		The global annual production of phthalates is estimated to be 11 billion pounds (Sirivarasai et al. 2013).		
Life cycle description:		Rubbers, resins, polymers, nitrocellulose, polyvinyl acetate, and PVC		
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not 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 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	N/A	No sample data.
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	N/A	Just PV data and lifecycle description. No scope to address variability and uncertainty.
Overall Quality Determination			High	

<b>Study Citation:</b>		Manville, Johns (2018). JM PMMA catalyst, SeamFree™ catalyst.	
<b>HERO ID:</b>		6303164	
<b>Conditions of Use:</b>		Incorporation into paints and coatings	
Parameter		EXTRACTION	
Chemical concentration:		>=30 - <=60%	
Physical form:		Granules	
Domain		EVALUATION	
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 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.
<b>Overall Quality Determination</b>		<b>High</b>	

<b>Study Citation:</b> Manville, Johns (2018). JM PMMA catalyst, SeamFree™ catalyst.	
<b>HERO ID:</b> 6303164	
<b>Conditions of Use:</b> Use of paints and coatings	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	>=30 - <=60%
Physical form:	Granules
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
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
Metric 3:	Applicability
Metric 4:	Temporal Representativeness
Metric 5:	Sample Size
	High
	Product is from a US supplier.
	High
	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	High
	Source is from 2020, which is less than 10 years old.
	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.
<b>Overall Quality Determination</b>	
<b>High</b>	

<b>Study Citation:</b>	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. Progress in Polymer Science 27(10):2227-2277.			
<b>HERO ID:</b>	6826007			
<b>Conditions of Use:</b>	Processing: Plastic Product Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	Phthalates make up 30% of generic PVC cable and 35% of generic PVC flooring.			
<b>EVALUATION</b>				
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 to phthalates and not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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 addressed between substances but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Milbrandt, A., Coney, K., Badgett, A., Beckham, G. T. (2022). Quantification and evaluation of plastic waste in the United States. Resources, Conservation and Recycling 183:106363.			
<b>HERO ID:</b>	11360398			
<b>Conditions of Use:</b>	Disposal			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Total Plastic Waste Managed in U.S. in 2019:PET: 5,986 ktHDPE: 7,910 ktPP: 8,189 ktLDPE/LLDPE: 15,139 ktPVC: 699 ktPS/EPS: 3,094 ktOther: 3,115 kt			
Life cycle description:	Percentage of total plastic waste managed by category:PET: 14%HDPE: 18%PP: 19%LDPE/LLDPE: 34%PVC: 2%PS/EPS: 7%Other: 7%			
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	Medium	Data are for disposal, an in-scope occupational scenario; however, the data are not chemical specific.
	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	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by discussing multiple types of plastic products but uncertainty is not addressed.
Overall Quality Determination		High		

<b>Study Citation:</b>		Nobel, Akzo (2017). Perkadox CH-50 safety data sheet.		
<b>HERO ID:</b>		6303143		
<b>Conditions of Use:</b>		Use of paints and coatings		
<b>EXTRACTION</b>				
<b>Parameter</b>		<b>Data</b>		
Chemical concentration:		40 - 55%		
Physical form:		Powder		
<b>EVALUATION</b>				
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	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	



<b>Study Citation:</b>	Nobel, Akzo (2017). Perkadox CH-50 safety data sheet.		
<b>HERO ID:</b>	6303143		
<b>Conditions of Use:</b>	Incorporation into paints and coatings		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	40 - 55%		
Physical form:	Powder		
<b>EVALUATION</b>			
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	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	Nobel, Akzo (2019). Cadox BFF-50 safety data sheet.			
<b>HERO ID:</b>	6303147			
<b>Conditions of Use:</b>	Use of paints and coatings			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	50.00%			
Physical form:	white granules			
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	Low	More than 20 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	

<b>Study Citation:</b>	Nobel, Akzo (2019). Cadox BFF-50 safety data sheet.			
<b>HERO ID:</b>	6303147			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	50.00%			
Physical form:	white granules			
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	Low	More than 20 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	

<b>Study Citation:</b>	Nunez, C., McMinn, B., Vitas, J. (1996). Barriers to the use of radiation-curable adhesives in the coated and laminated substrate manufacturing industry. Journal of Hazardous Materials 45(1):59-78.
<b>HERO ID:</b>	5466433
<b>Conditions of Use:</b>	Processing - Adhesive Manufacturing

**EXTRACTION**

Parameter	Data
Life cycle description:	Coated and laminated paper and plastic films have a wide variety of uses, including packaging, labelling, adhesive tapes, and decals. The industry spans two 4-digit SIC codes: 2671 (Paper and Plastic Films Coated and Laminated for Packaging), and 2672 (Paper and Plastic Films Coated and Laminated, Not Elsewhere Classified). Both of these SICs comprise the same industrial processes and consume many of the same materials. The primary differences are in the strict definition of the end uses of the products manufactured. Facilities within this industry tend to operate in one of two segments: one consists of large facilities operating coating lines dedicated to one type of product, such as label stock or masking tapes; and the other includes batch processors, or facilities that manufacture small batches of a wide variety of products (usually with a high value-added component).
Process description:	Both batch processing and dedicated-line facilities employ basically the same process flow. Incoming coating formulation raw materials are blended in mix tanks or drums with high- or variable-speed dispersers. The dedicated-line facilities typically formulate a coating from resins (e.g., natural or synthetic rubbers), solvents, and additives. Batch processors often mix purchased blends with performance enhancing additives or use and apply coatings premixed by a supplier. Only a small percentage of the coatings used by a batch processor is mixed from scratch. After the coatings have been mixed, they are pumped via a manifold system to the appropriate coating application system. Both industry segments use the same types of application equipment, including direct and reverse roll coaters and gravure cylinders. While a dedicated-line facility may have a cylinder library consisting of 10 gravure cylinders (one for each coating thickness), the batch processor might have a library consisting of several hundred gravure cylinders, each one dedicated to a certain coating thickness for a specific customer. Similarly, a dedicated-line facility limits itself to a single type of substrate (e.g., film) with varying thicknesses, weights, and/or widths. A batch processor uses a variety of substrates, often including films, papers, foils, and foams. The substrate webs are loaded onto an unwinder. The substrate is guided by idling rolls to a coating application station where the appropriate coating is applied. Once the coating has been applied, it enters an oven (typically zoned) for drying. The dried substrate is then ready for the second coating, laminating, or winding. Following its final rewind, the coated, and possibly laminated, web is slit according to customer specifications (if necessary), packaged, and shipped.

**EVALUATION**

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Source is peer reviewed so likely contains little to no errors in data quality.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Report is from US.
	Metric 3: Applicability	Medium	Data is directly applicable to a condition of use however the source neglects to mention any information regarding DCHP or any phthalates.
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5: Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results, methods and assumptions. Sources are generally described.
Domain 4: Variability and Uncertainty			

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<b>Study Citation:</b>		Nunez, C., McMinnn, B., Vitas, J. (1996). Barriers to the use of radiation-curable adhesives in the coated and laminated substrate manufacturing industry. Journal of Hazardous Materials 45(1):59-78.		
<b>HERO ID:</b>		5466433		
<b>Conditions of Use:</b>		Processing - Adhesive Manufacturing		
Domain		Metric	<b>EVALUATION</b>	
			Rating	Comments
Metric 7:		Metadata Completeness	Medium	Addresses variability by talking about different processing methods but does not address uncertainty.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	OECD, (2018). Socio-economic assessment of phthalates.			
<b>HERO ID:</b>	7681900			
<b>Conditions of Use:</b>	Plasticizers			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	The biggest market for phthalates globally is the People’s Republic of China, accounting for around 45% of all use. Europe and the United States together account for around 25% of use, with the remainder widely spread around the world. The phthalate plasticiser market currently stands at around 5.5 million tonnes per year. (page 15/90)			
Process description:	Phthalates are esters of phthalic acid, made by reacting phthalic anhydride with alcohols from methanol and ethanol to tridecyl (C13) alcohol. This chemistry leads to a large number of different phthalates with varying properties (such as DCHP) (page 15/90)			
Chemical concentration:	Phthalates can contribute as much as 50% of the weight of PVC materials. (page 15/90)			
<b>EVALUATION</b>				
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	Medium	Data is from an OECD report.
	Metric 3:	Applicability	High	Data are for plasticizers in plastic and resin 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	Low	Variability and uncertainty are not addressed.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. American Association of Occupational Health Nurses Journal 55(1):12-17.			
<b>HERO ID:</b>	1598544			
<b>Conditions of Use:</b>	Commercial Use			
EXTRACTION				
Parameter		Data		
Number of sites:		Approximately 81,000 beauty salons in the U.S.		
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	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation (commercial use of inks, toner, colorant products similar to products in beauty salons).
	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	No sample 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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.			
<b>HERO ID:</b>	6580284			
<b>Conditions of Use:</b>	Processing: Formulation of paint and varnish			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Trade sale finishes and industrial finishes are produced in almost equal volume with the production for 1972 estimated at 465 million gallons for trade sales and 485 million gallons for industrial finishes.			
Process description:	Mixing or dispersing pigment and vehicle to give the final product. The paint vehicle is defined as the liquid portion of the paint and consists of volatile solvent or dispersing medium and non-volatile binder such as oils and resins. The non-volatile portion is also called the vehicle solid or film former. The incorporation of the pigment in the paint vehicle is accomplished by a combination of grinding and dispersion or dispersion alone. When it is necessary to further grind the raw pigment, pebble or steel ball mills are normally used. With the advent of fine particle grades of pigment and extenders, as well as the wide spread use of wetting agents, the trend is toward milling methods that are based on dispersion without grinding. Dispersion consists of breaking up of the pigment clusters and agglomerates, followed by wetting of the individual particles with the binder or vehicle. Some of the more popular methods currently being used are high-speed disc impellers, high speed impingement mills and the sand mill. // There are two basic types of varnishes, spirit varnishes and oleoresinous varnishes. Spirit varnishes are formed by dissolving a resin in a solvent and they dry by evaporation of the solvent. The dry film formed undergoes no substantial change in the process of drying and is classified as non-convertible. Varnish is cooked in both portable kettles and large reactors. Kettles are used only to a limited extent and primarily by the smaller manufacturers. The very old, coke fired, 30 gallon capacity copper kettles are no longer used. The varnish kettles which are used, have capacities of 150 to 375 gallons. These are fabricated of stainless steel, have straight sides and are equipped with three or four-wheel trucks. Heating is done with natural gas or fuel oil for better temperature control. The kettles are fitted with retractable hoods and exhaust pipes, some of which may incorporate solvent condensers. Cooling and thinning is normally done in special rooms. // Source contains more information on raw materials, specific processes, and equipment.			
Number of sites:	The industry is made up of about 1,600 companies operating about 1,875 plants			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The report is developed by EPA.	
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, but information is general and not specific to DCHP.	
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.	
	Metric 5: Sample Size	N/A	No sample data.	
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	Information is process description and PV for 1972. No scope to address variability and uncertainty.	

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Study Citation:	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.		
HERO ID:	6580284		
Conditions of Use:	Processing: Formulation of paint and varnish		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

<b>Study Citation:</b>	Radian Corp, (1989). Environmental analysis for the Shell Martinez RM-17 incinerator, with cover letter dated 3/15/1991 (sanitized).			
<b>HERO ID:</b>	1335691			
<b>Conditions of Use:</b>	Disposal - Waste incineration			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	Figure 2-1 provides diagram of process. Shell incinerator contains a single combustion chamber with waste injection nozzles located at the base. The unit operates with a firebox temperature ranging between 1,400 to 1,800 F. The air pollution control equipment located downstream of the firebox includes a quench column to cool the hot combustion gases, a Venturi scrubber for control of particulate matter, a packed bed wet scrubber for acid gas control, and a mist eliminator to control liquid aerosol emissions. Combustion gases exit the incinerator system through a 100-foot stack.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data, techniques and methods that are from the EPA and do not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from the US
	Metric 3:	Applicability	Medium	Data contains general phthalate emissions and exposures but does not contain information specific to DCHP. Data could possibly be used as analogous data
	Metric 4:	Temporal Representativeness	Low	Assessment is more than 20 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	Low	Provides results but the underlying methods, data sources and assumptions are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Restek Corp, (2019). 33227/EPA Method 8061A Phthalate Esters Mixture.			
<b>HERO ID:</b>	6302566			
<b>Conditions of Use:</b>	Laboratory chemical			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0.10%			
Physical form:	Liquid			
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	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	

<b>Study Citation:</b>	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.			
<b>HERO ID:</b>	10472417			
<b>Conditions of Use:</b>	PVC Processing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Life cycle description:	Plasticizers, such as DINP, are widely used to make inherently rigid materials, such as PVC, soft and flexible. Indeed, 95% of DINP is used in PVC applications. DINP does not chemically bind to the PVC, but is incorporated into it during processing, to allow it to flex. Because DINP processes efficiently (it improves PVC melt viscosity), it takes less time and lower temperatures to incorporate it into the PVC, and to produce the finished product. Accordingly, manufacturing using the product-chemical combination is energy efficient.			
Chemical concentration:	OEHHA considered an “upper-end estimate” of exposure to DINP in vinyl flooring containing 18.9% or less DINP by weight.			
Comments:	Concentration and process description related to DCHP was not found in the document.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	OEHHA provided as reference for concentration of DINP in vinyl flooring. Data does not indicate quality issues, but methodology for determining chemical concentration is not transparent.
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 but data is not chemical specific.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample size was not provided for determination of chemical concentration.
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		

<b>Study Citation:</b>	Rodgers, B., Tallury, S. S., Klingensmith, W. (2016). Rubber compounding. :1-60.
<b>HERO ID:</b>	7324725
<b>Conditions of Use:</b>	Plasticizers in rubber product manufacturing

EXTRACTION	
Parameter	Data
Process description:	Softeners, extenders, and plasticizers can affect the properties of rubber. The term plasticizer is used to denote the ability to act as an internal lubricant for processing purposes as well as for improving low temperature flexibility in the vulcanized product. The synthetic phthalates are the most effective in meeting low temperature flexibility while also serving as softeners, but cost limits their application. The main benefits of processing aids are (1) improve incorporation of fillers, (2) reducing mixing energies, (3) reducing internal friction for ease of milling, extruding, and calendering, (4) compatibilizing the different rubbers for improved processing as well as for better adhesion of one compound to a different compound in the vulcanized tire (compatibilizers have gained markedly in usage because of polarity differences of blended polymers), and (5) providing improved green tack (tackifiers) for better tire building. There is a definite trend in the industry to develop multifunctional materials with value-added properties. (page 54-55/60)
Comments:	DCHP not specifically mentioned.

			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 plasticizers in rubber product 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

<b>Overall Quality Determination</b>	<b>High</b>
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<b>Study Citation:</b>	S.A., R. (2015). R-CAS-V.		
<b>HERO ID:</b>	6303184		
<b>Conditions of Use:</b>	Use of adhesives and sealants		
		<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>		
Chemical concentration:	<1.8%		
Physical form:	solid powder		
		<b>EVALUATION</b>	
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
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>		<b>Medium</b>	

<b>Study Citation:</b>	S.A., R. (2015). R-CAS-V.			
<b>HERO ID:</b>	6303184			
<b>Conditions of Use:</b>	Incorporation into adhesives and sealants			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<1.8%			
Physical form:	solid powder			
		<b>EVALUATION</b>		
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
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Sauereisen (2015). 400 Vinyl ester mortar (silica filled), powder.			
<b>HERO ID:</b>	6303188			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<0.005%			
Physical form:	Granular powder			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>			<b>High</b>	



<b>Study Citation:</b> Sauereisen (2015). 400 Vinyl ester mortar (silica filled), powder.	
<b>HERO ID:</b> 6303188	
<b>Conditions of Use:</b> Incorporation into paints and coatings	
<b>EXTRACTION</b>	
<b>Parameter</b>	<b>Data</b>
Chemical concentration:	<0.005%
Physical form:	Granular powder
<b>EVALUATION</b>	
<b>Domain</b>	<b>Metric</b>
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
Metric 3:	Applicability
	High
Metric 4:	Temporal Representativeness
	High
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.
<b>Overall Quality Determination</b>	
<b>High</b>	

<b>Study Citation:</b>	Shoof International Ltd (2019). Cowslips powder.			
<b>HERO ID:</b>	6303186			
<b>Conditions of Use:</b>	Use of paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<3%			
Physical form:	White powder			
		<b>EVALUATION</b>		
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
	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 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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Shoof International Ltd (2019). Cowslips powder.			
<b>HERO ID:</b>	6303186			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	<3%			
Physical form:	White powder			
<b>EVALUATION</b>				
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
	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 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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	Sika Corporation (2017). Sikagard® CRV-20 Part B.			
<b>HERO ID:</b>	6303191			
<b>Conditions of Use:</b>	Incorporation into paints and coatings			
		<b>EXTRACTION</b>		
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>=50 - <100%			
Physical form:	Powder			
		<b>EVALUATION</b>		
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Sika Corporation (2017). Sikagard® CRV-20 Part B.			
<b>HERO ID:</b>	6303191			
<b>Conditions of Use:</b>	Use of paints and coatings			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	>=50 - <100%			
Physical form:	Powder			
<b>EVALUATION</b>				
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 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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	Supply, G.I. (2018). X102452, X102822, X102839, X102840, L-3049.			
<b>HERO ID:</b>	6303157			
<b>Conditions of Use:</b>	Use of printing ink			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	0.8-4.1%			
Physical form:	Viscous liquid, clear to slightly opaque			
<b>EVALUATION</b>				
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 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.
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.			
<b>HERO ID:</b>	11138808			
<b>Conditions of Use:</b>	All			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Number of sites: Used to develop a method to estimate number of sites and workers.				
<b>EVALUATION</b>				
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 ( <a href="https://www.bls.gov/oes/current/oes_research_estimates.htm">https://www.bls.gov/oes/current/oes_research_estimates.htm</a> ).	
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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.			
<b>HERO ID:</b>	10293388			
<b>Conditions of Use:</b>	Industrial and commercial use in ink, toner and colorant products			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In 2000, the industry overall used more than 513 million pounds of ink. Water-based inks represent 65% of all inks used during flexographic printing, where the remaining 35% are solvent-based inks. The U.S. exported about 115 million pounds of printing ink in 1998. Page 78 of the pdf provides a table of the top 20 manufacturers of inks.			
Process description:	Source describes solvent-based ink process, water-based ink process, and UV cured ink process. The source also describes the type of substrates typically used during manufacturing which includes, corrugated and preprinted containers, flexible film packaging, folding cartons, labels and tag, and other (pdf pages 74-75). Source also lists typical components of inks (pdf pages 69-71)			
Number of sites:	914 commercial printing with flexographic printing as the primary print process but 2,300 facilities operate flexographic printing in addition to other printing. A total of 30,000 employees for facilities with flexographic printing as the primary print process and over 80% have fewer than 50 employees			
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 evalu-ated.
	Metric 3:	Applicability	Medium	Data are for use in ink during printing, an in-scope occupational scenario. However, data is general and not specific to this chemical.
	Metric 4:	Temporal Representativeness	Low	Most of the data is from more than 20 years back.
	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	High	Variability is addressed by looking at different years and uncertainty is also addressed.
Overall Quality Determination		High		



<b>Study Citation:</b>	U.S. EPA, (2020). 2020 CDR: Commercial and consumer use.			
<b>HERO ID:</b>	10366189			
<b>Conditions of Use:</b>	Commercial Use			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Provides U.S. domestic commercial use PV and %PV to downstream uses.			
Number of sites:	Provides number of commercial sites			
Chemical concentration:	Provides concentration.			
Physical form:	Provides physical form.			
Number of workers:	Provides number of workers.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Source is EPA.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	CDR is U.S. based data.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	EPA used data from the 2020 CDR.	
	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.	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2012). Phthalates action plan.			
<b>HERO ID:</b>	4565597			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Phthalates are produced in high volume, over 470 million pounds per year (EPA 2006).			
Life cycle description:	Based on a comparison of TRI releases to IUR data, production and import volumes indicate that the vast majority (likely between 95% and 99.9%) of phthalates can be expected to be incorporated into plastics and other products.			
<b>EVALUATION</b>				
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	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 but data is general and not specific to DCHP.	
	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	N/A	No sample data.	
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	N/A	No scope to address variability or uncertainty.	
<b>Overall Quality Determination</b>		<b>High</b>		

Study Citation:	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
HERO ID:	7310513			
Conditions of Use:	Paint and Varnish Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Process description on page 29. // 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. Only the physical processes of weighing, mixing, grinding, tinting, thinning, and packaging take place. No chemical reactions are involved. // 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 6500 P).			
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.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	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	Information is qualitative.
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		

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	Plastics Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Process description:	Process description on page 41. The manufacture of most resins or plastics begins with the polymerization or linking of the basic compound (monomer), usually a gas or liquid, into high molecular weight noncrystalline solids. The manufacture of the basic monomer is not considered part of the plastics industry and is usually accomplished at a chemical or petroleum plant. Additional description provided.			
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.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.	
	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	Information is qualitative.	
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		

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	Printing ink Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	Process description on page 75. There are 3 general processes in the manufacture of printing inks: (1) cooking the vehicle and adding dyes, (2) grinding of a pigment into the vehicle using a roller mill, and (3) replacing water in the wet pigment pulp by an ink vehicle (commonly known as the flushing process).3 The ink "varnish" or vehicle is generally cooked in large kettles at 200 to 600°F (93 to 315°C) for an average of 8 to 12 hours in much the same way that regular varnish is made. Mixing of the pigment and vehicle is done in dough mixers or in large agitated tanks. Grinding is most often carried out in 3-roller or 5-roller horizontal or vertical mills. Additional description provided.			
<b>EVALUATION</b>				
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.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	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	Information is qualitative.
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.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.		
<b>HERO ID:</b>	7310513		
<b>Conditions of Use:</b>	Soap and Detergent Manufacturing		
<b>EXTRACTION</b>			
<b>Parameter</b>	<b>Data</b>		
Process description:	Process description on page 77. The term "soap" refers to a particular type of detergent in which the water-solubilized group is carboxylate and the positive ion is usually sodium or potassium. The largest soap market is bar soap used for personal bathing. Synthetic detergents replaced soap powders for home laundering in the late 1940s, because the carboxylate ions of the soap react with the calcium and magnesium ions in the natural hard water to form insoluble materials called lime soap. Some commercial laundries that have soft water continue to use soap powders. Metallic soaps are alkali-earth or heavy-metal long-chain carboxylates that are insoluble in water but soluble in non-aqueous solvents. They are used as additives in lubricating oils, greases, rust inhibitors, and jellied fuels. The term "synthetic detergent products" applies broadly to cleaning and laundering compounds containing surface-active (surfactant) compounds along with other ingredients. Heavy-duty powders and liquids for home and commercial laundry detergent comprise 60 to 65 percent of the U. S. soap and detergent market and were estimated at 2.6 megagrams (Mg) (2.86 million tons) in 1990. Additional description provided.		
<b>EVALUATION</b>			
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.
	Metric 3: Applicability	Uninformative	Soap and detergent manufacturing is not an occupational scenario within the scope of the risk evaluation.
	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	Information is qualitative.
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.
<b>Overall Quality Determination</b>		<b>Uninformative</b>	

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	Synthetic fiber Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	Process description on page 85. Semi-synthetics are formed from natural polymeric materials such as cellulose. True synthetics are products of the polymerization of smaller chemical units into long-chain molecular polymers. Fibers are formed by forcing a viscous fluid or solution of the polymer through the small orifices of a spinnerette (see Figure 6.9-1) and immediately solidifying or precipitating the resulting filaments. This prepared polymer may also be used in the manufacture of other non-fiber products such as the enormous number of extruded plastic and synthetic rubber products. Additional description provided.			
<b>EVALUATION</b>				
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.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	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	Information is qualitative.
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.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 6: Organic chemical process industry. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7310513			
<b>Conditions of Use:</b>	Synthetic rubber Manufacturing			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Process description:	Process description on page 107. Two types of polymerization reaction are used to produce styrene-butadiene copolymers, the emulsion type and the solution type. This section addresses volatile organic compound (VOC) emissions from the manufacture of copolymers of styrene and butadiene made by emulsion polymerization processes. The emulsion products can be sold in either a granular solid form, known as crumb, or in a liquid form, known as latex. Additional description provided			
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.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation. However, DCHP not specifically mentioned.
	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	Information is qualitative.
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		



<b>Study Citation:</b>	U.S. EPA, (1995). Chapter 4.2: Introduction to surface coating. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
<b>HERO ID:</b>	7315820			
<b>Conditions of Use:</b>	Use (Paints and Coatings)			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Process description:		Though DCHP is not specifically mentioned, the group of articles provide information on various types of coating on metal and non-mental surfaces. As for example, process description for can coating includes description of sheet coating. Sheet coating includes base coating and printing or lithographing, followed by curing at temperatures of up to 220°C (425°F). When the sheets have been formed into cylinders, the seam is sprayed, usually with a lacquer, to protect the exposed metal. If they are to contain an edible product, the interiors are spray coated, and the cans baked at up to 220°C (425°F).		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is not specific to DCHP.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its data sources.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Process description.
Overall Quality Determination			High	

<b>Study Citation:</b>	U.S. EPA, (1995). Ap-42: Chapter 4.12 - Manufacture of rubber products.
<b>HERO ID:</b>	7315841
<b>Conditions of Use:</b>	Processing: Rubber Product Manufacturing

EXTRACTION	
Parameter	Data
Process description:	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 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 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.

EVALUATION		Rating	Comments
Domain	Metric		
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation, however data is general and not specific to DCHP.
	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	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Process description.

<b>Overall Quality Determination</b>	<b>High</b>
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<b>Study Citation:</b>	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.
<b>HERO ID:</b>	7315971
<b>Conditions of Use:</b>	Formulation of asphalt

EXTRACTION	
Parameter	Data
Production, import, or use volume:	In 1996, approximately 500 million tons of HMA were produced. The total 1996 HMA production from batch and drum mix plants is estimated at about 240 million tons and 260 million tons, respectively.
Process description:	Hot mix asphalt (HMA) paving materials are a mixture of size-graded, high quality aggregate (which can include reclaimed asphalt pavement [RAP]), and liquid asphalt cement, which is heated and mixed in measured quantities to produce HMA. Aggregate and RAP (if used) constitute over 92 percent by weight of the total mixture. Hot mix asphalt paving materials can be manufactured by: (1) batch mix plants, (2) continuous mix (mix outside dryer drum) plants, (3) parallel flow drum mix plants, and (4) counterflow drum mix plants. This order of listing generally reflects the chronological order of development and use within the HMA industry. Source contains a process description of each type of process.
Number of sites:	In 1996, approximately 500 million tons of HMA were produced at the 3,600 (estimated) active asphalt plants in the United States. Of these 3,600 plants, approximately 2,300 are batch plants, 1,000 are parallel flow drum mix plants, and 300 are counterflow drum mix plants.

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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to this chemical.
	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	No sample data.
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	PV, number of sites, and process description. No scope to address variability and uncertainty.

## Overall Quality Determination

**Medium**

<b>Study Citation:</b>	U.S. EPA, (2016). Federal research action plan on recycled tire crumb used on playing field and playgrounds. Status report.			
<b>HERO ID:</b>	9102524			
<b>Conditions of Use:</b>	Plastic and rubber products not covered elsewhere			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Process description:	Two tire recycling processes, (1) ambient and (2) cryogenic, are used to create tire crumb rubber in the 10- to 20-mesh (0.84- to 2.0-mm) size, which is generally the size used in synthetic turf infill. The ambient process uses granulation or cracker mills to produce tire crumb rubber at room temperature. Cracker mills use revolving rollers with serrations in them to size-reduce the tires. Once the granules are produced, they are fed through screens and sorted to the appropriate size. The cryogenic process uses liquid nitrogen to freeze partially shredded tires, which then are fed into a hammer mill to create tire crumb rubber. Fabric (i.e., polyester, nylon, or other fibers) and steel belt components of the scrap tire are separated in both processes. Fabric is removed from the rubber using air classifiers or vacuums, while the steel is removed using magnetic separators. Gravity separators also can be used to remove contaminant particles, such as rocks, and can aid in the sorting process. Likewise, water can be used for pre-washing to remove gravel and dirt and cooling during the ambient process; otherwise no chemicals are added to the original rubber composition during either process. Following processing, tire crumb rubber typically is placed into one-ton sacks and distributed to fields for spreading. (page 14/169)			
Number of sites:	Currently, there are between 12,000 and 13,000 synthetic turf recreational fields in the United States, with 1,200 – 1,500 new installations each year. (page 4/169) There are nine tire crumb rubber producers in the U.S. that produce 95% of the recycled rubber used in synthetic turf. (page 13/169) There are approximately eight major synthetic field installers in the United States. (page 15/169)			
<b>EVALUATION</b>				
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	Medium	Data are for phthalate use in toys, playground, and sporting equipment, which can be both a commercial or consumer use.	
	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 (ranges, number of sites) 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 explaining two turf production processes. Uncertainty isn’t addressed in terms of facility information..	
<b>Overall Quality Determination</b>		<b>High</b>		

<b>Study Citation:</b>	U.S. EPA, (2002). An evaluation of flexographic inks on wide-web film: Summary booklet.			
<b>HERO ID:</b>	9102546			
<b>Conditions of Use:</b>	Inks, toner and colorant products			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	Flexo printing consumed more than 513 million pounds of ink in 2000. pg. 9			
Life cycle description:	Flexible film packaging accounts for nearly 20% of the flexo market. pg. 9			
Throughput:	Materials Used (lb/6,000 ft2) Solvent-based: 8.53Water-based: 4.14UV-cured: 2.16			
<b>EVALUATION</b>				
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not chemical specific.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
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 different ink systems but uncertainty is not addressed.
<b>Overall Quality Determination</b>			<b>Medium</b>	

<b>Study Citation:</b>	U.S. EPA, (1977). Industrial process profiles for environmental use: Chapter 13. Plasticizers industry.			
<b>HERO ID:</b>	9109783			
<b>Conditions of Use:</b>	Manufacturing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	1.89 billion lbs in 1974.			
Process description:	Figure 1 shows the process flow. (P. 22/86)			
Throughput:	980 Gg/yr. (P. 9/86). Table 2.			
Number of sites:	17 manufacturing facilities. (P. 9/86)			
<b>EVALUATION</b>				
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	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	Low	The report is 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.	
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Vandervort, R., Brooks, S. M. (1977). Polyvinyl chloride film thermal decomposition products as an occupational illness: I. Environmental exposures and toxicology. Journal of Occupational and Environmental Medicine 19(3):188-191.			
<b>HERO ID:</b>	59547			
<b>Conditions of Use:</b>	PVC film and label adhesive in meat packing			
<b>EXTRACTION</b>				
<b>Parameter</b>	<b>Data</b>			
Production, import, or use volume:	About 80-90 million lbs of PVC film are used in the wrapping of meat each year. Another 30 to 35 million lbs are used to wrap produce and other products.			
Number of sites:	Majority of meat wrappers work in the US 40,000 to 45,000 supermarkets.			
Chemical concentration:	Plasticizers can constitute up to 30% of the PVC film. Label adhesives can contain up to 60% by weight DCHP.			
<b>EVALUATION</b>				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US
	Metric 3:	Applicability	Medium	Data is applicable to commercial use of PVC film and adhesives. No DCHP specific data
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old (1977).
	Metric 5:	Sample Size	Low	Not characterized by 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	Does not address variability or uncertainty.
<b>Overall Quality Determination</b>		<b>Medium</b>		

<b>Study Citation:</b>	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
<b>HERO ID:</b>	5547263			
<b>Conditions of Use:</b>	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The annual global production of phthalate was 4.7 million metric tons in 2006 [6,7] and ~8 million metric tons in 2015 [8].			
Life cycle description:	The high molecular weight phthalates are used primarily in PVC polymers and plastisol applications, plastics, food packaging, and food processing materials, vinyl toys and vinyl floor coverings, and building products. The low molecular weight phthalates are often used in non-PVC applications, such as personal care products, paints, adhesives, and enteric-coated tablets [44]. BzBP, DEHP, DiNP, DBP, and DiBP are used in toys, bags, gloves, and plastic tubing for improving flexibility and making the polymeric products soft and malleable [4]. DMP and DEP are widely used in cosmetics, such as perfumes, aftershaves, shampoos, makeup, and nail care products [4].			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	Article is published by an OECD country.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation, however data is general and not specific to DCHP.
	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	N/A	No sample data.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	



<b>Study Citation:</b>	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
<b>HERO ID:</b>	5547263			
<b>Conditions of Use:</b>	Use: Plastic Products			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	PVC products may contain up to 50% (by weight) phthalates. Food packaging plastic film contains phthalates (such as DBP and DEP) at levels of up to 10% by weight.			
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., European Union or OECD reports, NIOSH HHEs, journal articles, 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	Article is published by an OECD country.
	Metric 3:	Applicability	Medium	Data is general and not specific to DCHP although use of plastic products is in 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	N/A	No sample data.
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	

<b>Study Citation:</b>	Young, A. S., Allen, J. G., Kim, U. J., Seller, S., Webster, T. F., Kannan, K., Ceballos, D. M. (2018). Phthalate and Organophosphate Plasticizers in Nail Polish: Evaluation of Labels and Ingredients. Environmental Science & Technology 52(21):12841-12850. [Environmental science & technology].			
<b>HERO ID:</b>	5164231			
<b>Conditions of Use:</b>	Consumer use - nail polish			
EXTRACTION				
Parameter		Data		
Chemical concentration:		Table 4: DCHP not detected in nail polish products		
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 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 is from US.
	Metric 3:	Applicability	Low	The data is for consumer use of nail polish but data may be used for similar occupational scenario like commercial use of inks, toner and colorant product.
	Metric 4:	Temporal Representativeness	High	Report data from 2016-2018 so less 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	Medium	Report provides results and sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by using multiple samples but not uncertainty.
Overall Quality Determination			Medium	

<b>Study Citation:</b>	Zhang, L.,i, Su, W.,ei, Qian, Y., Zhao, Y., Zhu, Z., Wang, D. (2016). Quantitative detection and impact evaluation of phthalate plasticizers in insulating oil. IEEE Transactions on Dielectrics and Electrical Insulation 23(6):3429-3434.			
<b>HERO ID:</b>	5533553			
<b>Conditions of Use:</b>	Industrial Use: Plasticizer in insulating oil			
EXTRACTION				
<b>Parameter</b>	<b>Data</b>			
Chemical concentration:	Table 5 gives DCHP concentration in insulating oil samples (mg/L): ND, 2.20, 0.88, 1.43, 0.91, 0.90; Table 7 gives other concentrations of seven oil samples: 1.50, and the rest are NDs.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, a non-OECD country.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Report is from 2016, 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	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	Does not address variability or uncertainty.
Overall Quality Determination		Medium		