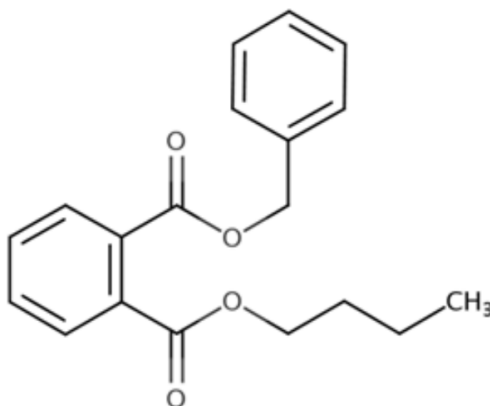


**Data Quality Evaluation and Data Extraction Information for
Environmental Release and Occupational Exposure for
Butyl benzyl phthalate (BBP)
(1,2-Benzenedicarboxylic acid, 1-butyl 2-(phenylmethyl) ester)**

Systematic Review Support Document for the Risk Evaluation

CASRN: 85-68-7



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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 Butyl benzyl phthalate (BBP)* 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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HERO ID	Reference	Page
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Environmental Releases

Environmental Release Data

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Study Citation:	Albar, H., Ali, N., Shahzad, K., Ismail, I., I.M., Rashid, M. I., Wang, W.,ei, Ali, L. N., Eqani, S. (2017). Phthalate esters in settled dust of different indoor microenvironments; Source of non-dietary human exposure. Microchemical Journal 132:227-232.			
HERO ID:	3859024			
Conditions of Use:	Household/consumer use			
EXTRACTION				
Parameter	Data			
Exposure route:	ingestion, inhalation			
Physical form:	dust			
Area sampling data:	Table 1 gives concentrations of indoor dust (ug/g) - min, max, mean, median: Saudi Floor dust - 0.37, 3.8, 1.5, 0.8; Saudi car dust - 0.26, 12.6, 1.7, 0.6; Saudi AC filter dust - 0.76, 8.5, 3.1, 2.4; Kuwaiti floor dust - 0.12, 4.8, 1.3, 0.8; Kuwaiti car dust - 0.23, 19.5, 4.2, 2.8. Dust samples from other countries in Table 2, does not mention if they are means, medians or maxes, etc (ug/g): Sweden - 16, 135, 79; Denmark - 3.7, 26; Germany - 30, 15; France - 6.1, 9.3; Another Kuwait study - 7.9; Bulgaria - 340; China - 1.6, 0.2; USA - 21, 45; Spain - 142; UK - 57. Figure 1 gives comparative profile of phthalates in indoor dust from different countries.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Source is peer reviewed so methodology is high quality.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is primarily for Saudi Arabia and Kuwait, both non-OECD countries.
	Metric 3:	Applicability	Uninformative	Data is gen pop house hold exposure and does not have to do with any occupational setting.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old.
	Metric 5:	Sample Size	Medium	Range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Includes sample type, exposure route, and physical form.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by looking at different indoor environments and comparing to other studies. Does not address uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Andaluri, G., Manickavachagam, M., Suri, R. (2018). Plastic toys as a source of exposure to bisphenol-A and phthalates at childcare facilities. Environmental Monitoring and Assessment 190(2):65.			
HERO ID:	4728733			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	solid plastics			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	1 hour/day estimated			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for childcare facilities, which is similar to the in-scope occupational scenario use of toys, playground, and sporting equipment.
	Metric 4:	Temporal Representativeness	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (average) 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	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling at multiple facilities.
Overall Quality Determination			High	

Study Citation:	Baek, K. M., Kim, M. J., Seo, Y. K., Kang, B. W., Kim, J. H., Baek, S. O. (2020). Spatiotemporal variations and health implications of hazardous air pollutants in Ulsan, a multi-industrial city in Korea. Atmosphere 11(5):547.			
HERO ID:	6950643			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Physical form:	vapor and particulates			
Area sampling data:	"Industrial Site A: 0.33+-0.44 ng/m3 Industrial Site B: 0.28+-0.27 ng/m3 Residential Site C: 0.62+-0.57 ng/m3 Residential Site D: 0.45+-0.48 ng/m3 Residential Site E: 3.15+-2.22 ng/m3"			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling method is an EPA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Korea, an OECD country.
	Metric 3:	Applicability	Medium	Data are for processing as a reactant in other inorganic chemical manufacturing, an in-scope occupational scenario. Data is for a chemical group, not specific to BBP.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (means, standard deviations) 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	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by sampling multiple sites in both industrial and residential areas during different seasons.
Overall Quality Determination			High	

Study Citation:	Christia, C., Poma, G., Harrad, S., Wit, De, C. A., Sjostrom, Y., Leonards, P., Lamoree, M., Covaci, A. (2019). Occurrence of legacy and alternative plasticizers in indoor dust from various EU countries and implications for human exposure via dust ingestion and dermal absorption. Environmental Research 171:204-212.			
HERO ID:	5772597			
Conditions of Use:	consumer use			
EXTRACTION				
Parameter	Data			
Exposure route:	ingestion, inhalation, dermal			
Area sampling data:	Dust samples given in units of ug/g. In Belgium homes - mean: 4.3; median: 8.5; SD: 5; Min: 0.20; Max: 16. In Ireland homes - mean: 3.9; median: 3.9; SD: 1.7; Min: 2.0; Max: 6.4. In Netherland homes - mean: 5.7; median: 2.7; SD: 6.8; min: 0.70; max: 18. In Netherland offices - Mean: 11; median: 5.3; SD: 14; min: 0.70; max: 36. In Swedish offices - mean: 11; median: 8.3; SD: 7.9; min: 4.0; max: 25. Swedish daycare centers in Winter - mean: 104; median: 78; SD: 88; min: 32; max: 201. Swedish daycare centers in Spring - mean: 29; median: 29; SD: 25; min: 11; max: 46.			
Dermal exposure data:	Dermal exposure data			
Comments:	States no time was kept during sampling			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Journal is peer reviewed so likely contains high quality data and exposure comparisons are for EU and EPA.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for EU OECD countries: Belgium, Ireland, Sweden, and Netherlands
	Metric 3:	Applicability	Low	Report is for gen pop studies for household, daycare and office space phthalate dust.
	Metric 4:	Temporal Representativeness	High	Report is from 2019
	Metric 5:	Sample Size	Medium	Distribution of samples characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data includes sample type, sample location but no other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability by sampling across different countries and addresses uncertainty through its description of determining limits of quantitation.
Overall Quality Determination		Medium		

Study Citation:	Craig, J. A., Ceballos, D. M., Fruh, V., Petropoulos, Z. E., Allen, J. G., Calafat, A. M., Ospina, M., Stapleton, H. M., Hammel, S., Gray, R., Webster, T. F. (2019). Exposure of nail salon workers to phthalates, di(2-ethylhexyl) terephthalate, and organophosphate esters: A pilot study. Environmental Science & Technology 53(24):14630-14637.			
HERO ID:	6318028			
Conditions of Use:	Commercial Use - Nail Polish			
EXTRACTION				
Parameter	Data			
Worker activity description:	nail technicians and nail salon owners			
Exposure route:	inhalation			
Personal sampling data:	<6.7-45.7 ng/g, median <6.7 ng/g			
Exposure duration:	8 hours/day			
Exposure frequency:	40 hours/week			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for the use of nail polish at a salon, which is similar to the commercial use of paints and coatings.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (means, standard deviations, medians, ranges) 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	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling at seven salons during multiple days.
Overall Quality Determination		High		

Study Citation:	Dobrzyńska, M. M. (2016). Phthalates - widespread occurrence and the effect on male gametes. Part 1. General characteristics, sources and human exposure. Roczniki Państwowego Zakładu Higieny 67(2):97-103.			
HERO ID:	3230347			
Conditions of Use:	Processing - plasticizer in PVC			
EXTRACTION				
Parameter	Data			
Worker activity description:	PVC manufacturing, phthalate manufacturing			
Exposure route:	inhalation			
Physical form:	colorless liquid, vapor			
Area sampling data:	During manufacture of phthalate, BBP concentration in air was estimated as 1 mg/m^3 while during manufacture of PVC it was estimated as 2 mg/m^3. Equivalent to staff exposure to doses of 143 ug/kg bw/day and 286 ug/kg bw/day. Indoor air (not specified where the indoor measurement was) measurements found 12 mg/m^3 of phthalates where 3.97 mg/m^3 was BBP.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology for occupational exposure not specified
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Poland, an OECD country
	Metric 3:	Applicability	High	Data is for phthalate and PVC manufacturing, an in-scope occupational scenario
	Metric 4:	Temporal Representativeness	Medium	Data was collected more than 10 years ago but less than 20 years ago.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Sample type provided but not other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by testing two different manufacturing industries. Uncertainty is not addressed
Overall Quality Determination		Low		

Study Citation:	DuPont, (2006). Polyvinyl chloride film plasticized with butyl benzyl phthalate: In vitro dermal absorption rate testing.				
HERO ID:	10617082				
Conditions of Use:	Use of plastic and rubber products not Covered Elsewhere (castings, component of compound (resin) used to cast models, transportation equipment manufacturing, floor coverings)				
EXTRACTION					
Parameter	Data				
Worker activity description:	Handling PVC films containing BBP for up to 8-hours.				
Exposure route:	Dermal				
Physical form:	Clear colorless film with thickness of 0.010 inches and area of 0.64 cm2. Skin moistened with 10 uL/cm2 saline solution. Concentration was 301.4 mg BBP/g film.				
Dermal exposure data:	Dermal exposure data				
Exposure duration:	8 hour exposure duration for in vitro testing				
EVALUATION					
Domain	Metric		Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Study uses OECD 428 dermal absorption testing guidance for the in vitro dermal absorption experiments. However, the skin thickness used in the experiments is greater than recommended by OECD 428 guidance. Also, the study has limited applicability to dermal exposure to films containing BBP for up to 8-hours only.	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.	
	Metric 3:	Applicability	High	Data are for use of plastic and rubber products not covered elsewhere, an in-scope occupational scenario.	
	Metric 4:	Temporal Representativeness	High	Monitoring data are collected using OECD 428, which is the most current guidance for dermal absorption testing.	
	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	Monitoring data include all associated metadata for in vitro dermal absorption testing.	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by testing samples from 3 donors.	
Overall Quality Determination			High		

Study Citation:	DuPont, (2006). [Sanitized] Butyl benzyl phthalate: In vitro dermal absorption rate testing.		
HERO ID:	10709437		
Conditions of Use:	All dermal exposure to neat BBP		
EXTRACTION			
Parameter	Data		
Worker activity description:	Handling of neat BBP		
Exposure route:	Dermal		
Physical form:	Neat BBP is a clear, oily liquid. The density of the neat BBP used for in vitro testing was 1120 mg/mL.		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	8 hours exposure duration for in vitro testing		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	Dermal analysis was conducted using OECD 428 for guidance. However, the study has limited applicability to exposure of neat BBP for up to 8-hours only. Also, an infinite dose volume was used and the skin thickness was greater than recommended by OECD 428 guidance. Though the study does not follow OECD 428 exactly, the data may be useful for informing dermal exposure to neat BBP.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for all scenarios where there is dermal exposure to neat BBP.
	Metric 4: Temporal Representativeness	High	Though the study is greater than 10 years old, OECD 428 is the most recent dermal absorption guidance that is currently used.
	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 relevant aspects of the in vitro testing experiments including sample types and exposure duration are provided.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by conducting dermal sampling at different time periods.
Overall Quality Determination		High	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates: Annexes.			
HERO ID:	7325405			
Conditions of Use:	use			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation, oral, dermal			
Physical form:	liquid			
Area sampling data:	Recent sampling of flooring products revealed the BBP concentrations of 113 mg/kg. BBP content in the plasticised materials in the recycling waste stream of non-integrated recyclers does not exceed 0.3% w/w. Historical sampling of bags on the EU market has revealed the presence of BBP below 1% w/w.			
Dermal exposure data:	Dermal exposure data			
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	Medium	The data are from an OECD country. other than the U.S.,	
	Metric 3: Applicability	Medium	The data are for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.	
	Metric 4: Temporal Representativeness	High	no more than 10 years old	
	Metric 5: Sample Size	Low	characterized by no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Monitoring data include sample type but no other metadata.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.	
Overall Quality Determination		Low		

Study Citation:	ExxonMobil, (2022). Data submission from ExxonMobil regarding DINP and DIDP exposure.			
HERO ID:	10312764			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Describes potential exposure routes for different worker groups, including Operators, Lab Technicians, and Maintenance workers. (pg. 8-9 of 10, 1_1_IH Data Analysis Report)			
Physical form:	Liquid (pg. 8 of 10, 1_1_IH Data Analysis Report)			
Personal sampling data:	Contains personal sampling data for DIDP and DINP			
Exposure duration:	Describes average exposure durations for each worker group.			
Exposure frequency:	Describes exposure frequency based on worker tasks.			
Personal protective equipment:	Workers use standard PPE when collecting these samples: Fire resistant clothing, goggles, leather gloves, steel toe shoes, hard hat. (pg. 8 of 10, 1_1_IH Data Analysis Report)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Source describes sampling strategy in detail and references the American Industrial Hygiene Association’s (AIHA) exposure assessment guidance.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from US manufacturers.
	Metric 3:	Applicability	Medium	Applicable to an occupational scenario within scope. However, the data are for different chemicals (DIDP, DINP) than the chemical of interest (BBP).
	Metric 4:	Temporal Representativeness	Medium	Source explains that the ”qualitative and quantitative assessments have been carried out periodically between 2002 and 2019. The operating conditions have not changed in this period of time, and therefore are directly applicable to EPA’s risk evaluation.”
	Metric 5:	Sample Size	High	Source states, ”given the small size of the population exposed (4 workers per worker group, 1 per shift), and the consistency of the results, in addition to the qualitative assessment carried out by industrial hygienists at the site, it can be considered representative of the full-time exposures of operators at our site.”
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Both uncertainty and variability in data are addressed.
Overall Quality Determination		High		

Study Citation:	Frery, N., Santonen, T., Porras, S. P., Fucic, A., Leso, V., Bousoumah, R., Duca, R. C., Yamani, El, M., Kolossa-Gehring, M., Ndaw, S., Viegas, S., Iavicoli, I. (2020). Biomonitoring of occupational exposure to phthalates: A systematic review. International Journal of Hygiene and Environmental Health 229:13548.		
HERO ID:	7978498		
Conditions of Use:	Plasticizers		
EXTRACTION			
Parameter	Data		
Worker activity description:	Hairdressing apprentices, sales clerks, waste plastic recycling site workers, community service workers, manufacturing workers, custodians, PVC production workers, waste management workers, flavoring factory workers, car manufacturing workers, dental laboratories, rubber workers. (6/22)		
Exposure route:	Since phthalates usually have a low vapor pressure, inhalation is often not the dominant route of uptake; oral (e.g., hands to-mouth transfer) and dermal routes can thus play an important role in the total exposure. (2/22)		
Physical form:	oily liquid (6/22)		
Number of workers:	Number of workers for various occupations given in Table 2. (6/22)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are for multiple European countries and analysis was done in France, an OECD country.
	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	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (ranges, means, mins, maxes) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Monitoring data include most critical metadata but missing exposure duration/frequency, and personal or area sampling, and PPE/controls.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by comparing different published studies and their results.
Overall Quality Determination		High	

Study Citation:	Gaspar, F. W., Castorina, R., Maddalena, R. L., Nishioka, M. G., Mckone, T. E., Bradman, A. (2014). Phthalate exposure and risk assessment in California child care facilities. Environmental Science & Technology 48(13):7593-7601.				
HERO ID:	2345959				
Conditions of Use:	Use				

EXTRACTION				
Parameter		Data		
Exposure route:		inhalation, dermal		
Physical form:		indoor dust		
Personal sampling data:		0.01+-4.17 ug/m3		
Exposure duration:		Approximately 22, 41, and 37% of children spent <5 h, 5–8 h, and >8 h per day attending the 40 ECE facilities, respectively.		
Exposure frequency:		5 days/week		
Number of workers:		1764 children		

EVALUATION					
Domain		Metric	Rating	Comments	
Domain 1: Reliability		Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness		Metric 2:	Geographic Scope	High	Data are from the U.S.
		Metric 3:	Applicability	Low	Data are for childcare facilities, which is similar to the in-scope occupational scenario use of toys, playground, and sporting equipment.
		Metric 4:	Temporal Representativeness	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
		Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, standard deviation, per-centiles, p-values) but discrete samples not provided and distribution not fully character-ized.
Domain 3: Accessibility/ Clarity		Metric 6:	Metadata Completeness	Medium	Most critical metadata included.
Domain 4: Variability and Uncertainty		Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling during multiple visits to many facilities.

Overall Quality Determination	High
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Study Citation:	G Giovanoulis, G., Bui, T., Xu, F., Papadopoulou, E., Padilla-Sanchez, J. A., Covaci, A., Haug, L. S., Cousins, A. P., Magnér, J., Cousins, I. T., Wit, de, C. A. (2017). Multi-pathway human exposure assessment of phthalate esters and DINCH. Environment International 112:115-126.			
HERO ID:	4166920			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal, ingestion			
Physical form:	dust, gas			
Personal sampling data:	2.7 ng/m3			
Area sampling data:	10.3 ng/m3			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	24 hours/day			
Exposure frequency:	365 days/year			
Comments:	See table 2			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Norway, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer use of personal care products, furniture and furnishings, and fabric products, which is similar to the in-scope occupational scenario commercial use of these categories.
	Metric 4:	Temporal Representativeness	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (percentiles, medians) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Monitoring data include all associated metadata-table 2
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by performing Mann Whitney U tests.
Overall Quality Determination			High	

Study Citation:	Gkrillas, A., Dirven, H., Papadopoulou, E., Andreassen, M., Hjertholm, H., Husøy, T. (2021). Exposure estimates of phthalates and DINCH from foods and personal care products in comparison with biomonitoring data in 24-hour urine from the Norwegian EuroMix biomonitoring study. Environment International 155(Elsevier):106598.			
HERO ID:	7978731			
Conditions of Use:	Personal Care Products			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal, oral, inhalation (2/13)			
Physical form:	liquids, gels, creams, etc. (8/13)			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	24 hours (1/13)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Norway, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer use of Personal care products, which is similar to the in-scope occupational scenario commercial use of personal care products.
	Metric 4:	Temporal Representativeness	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (medians, upper and lower bounds) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sampling data and exposure type provided but missing worker information, exposure frequency, engineering controls, and PPE.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by comparing results to other studies done.
Overall Quality Determination		Medium		

Study Citation:	Heitbrink, W. (1993). In-depth survey report: Control technology for autobody repair and painting shops at Team Chevrolet, Colorado Springs, Colorado.				
HERO ID:	6558535				
Conditions of Use:	Commercial use - spray painting.				
EXTRACTION					
Parameter	Data				
Worker activity description:	sanding, grinding, welding, spray painting.				
Personal sampling data:	Table 3 presents summary statistics for individual monitoring points contained in Appendix A Sampling Results. Table 3-Summary Statistics on Short-Term Total Dust ConcentrationBooth,TYPE of sample, N, Geometric Mean mg/m3, Geometric Standard Deviation, Range mg/m3Trimatic,Exhaust,6,10.6,2.6,3.2-24Trimatic,Personal,5,6.8,1.6,3.7-11Trimatic,Side of Booth,6,10.1,2.0,3.5-22Devilbiss,Exhaust,5,18.0,3.1,4.6-62Devilbiss,Personal,6,6.0,2.0,3.1-17Devilbiss,Side of booth,6,11.6,3.2,1.7-39				
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:	It is unknown if paint or dust contain BBP				
EVALUATION					
Domain	Metric	Rating	Comments		
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Total dust concentrations were measured using NIOSH method 0500.	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the US.	
	Metric 3:	Applicability	High	The survey is for painting, a COU that is in scope.	
	Metric 4:	Temporal Representativeness	Low	Data are from 1993	
	Metric 5:	Sample Size	High	Individual monitoring data points are published.	
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	All associated metadata is included, except for exposure frequency	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Study addresses variability and uncertainty.	
Overall Quality Determination			High		

Study Citation:	Hines, C. J., Hopf, Nilsen, N. B., Deddens, J. A., Calafat, A. M., Silva, M. J., Grote, A. A., Sammons, D. L. (2009). Urinary phthalate metabolite concentrations among workers in selected industries: A pilot biomonitoring study. Annals of Occupational Hygiene 53(1):1-17.			
HERO ID:	1005742			
Conditions of Use:	Manufacturing/processing - plasticizer			
EXTRACTION				
Parameter	Data			
Number of sites:	20			
Worker activity description:	Seven manufacturing sectors: phthalate manufacturing, PVC film, PVC compounding, vehicle filters, rubber hoses, rubber gaskets, and rubber boots, and 13 companies from nail-only salons			
Exposure route:	inhalation, ingestion, dermal			
Physical form:	vapor/mist/liquid			
Personal sampling data:	Samples taken during mid and end-shift. End-shift GM concentrations were highest in two rubber sectors: rubber gasket (70.1 ug/g) and rubber boot (40.4 ug/g). Mid and end shift concentrations for industries sampled were 11.8 and 19.8 ug/g for phthalate manufacturing, 15.8 and 14.9 ug/g for PVC film, 17.6 and 17.0 ug/g for Vehicle filter, 13.4 and 17.9 ug/g for PVC compounding, 10.6 and 10.0 ug/g for Rubber hose, 32.2 and 40.4 ug/g for rubber boot, 48.2 and 70.1 ug/g for rubber gasket, then 2.24 and 4.59 in nail-only salons			
Number of workers:	156			
Comments:	Personal sampling data is urine samples, not breathing zones.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Study was approved by NIOSH
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Medium	Applicable to condition of use. Data is urine data so not directly applicable to current assessment methods
	Metric 4:	Temporal Representativeness	Medium	Data is from 2003-2005 so more than 10 years old but less than 20 years old
	Metric 5:	Sample Size	Medium	Statistical distribution characterized by a range of data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Includes metadata such as worker activity, exposure route, sampling type, exposure route.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across different industries but not uncertainty
Overall Quality Determination		Medium		

Study Citation:	Hines, C., Hopf, N., Deddens, J., Silva, M., Calafat, A. (2011). Estimated daily intake of phthalates in occupationally exposed groups. Journal of Exposure Science & Environmental Epidemiology 21(2):133-141.
HERO ID:	697394
Conditions of Use:	Manufacturing/processing - plasticizer

EXTRACTION	
Parameter	Data
Number of sites:	20
Worker activity description:	Seven manufacturing sectors: phthalate manufacturing, PVC film, PVC compounding, vehicle filters, rubber hoses, rubber gaskets, and rubber boots, and 13 companies from nail-only salons
Personal sampling data:	daily intake estimated varied by 2-3 order of magnitude (0.02 - 17 ug/kg bw/day). GM estimates were <3 ug/kg bw/ day in all sectors studied. Rubber gasket industry had highest individual estimate (17 ug/kg bw/day); this intake was <10% of the RfD (200 ug/kg bw/day) and <5% of the TDI (500 ug/kg/day). No companies studied reported using BBP.
Number of workers:	156

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Study was approved by NIOSH
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Applicable to condition of use
	Metric 4:	Temporal Representativeness	Medium	Data is from 2003-2005 so more than 10 years old but less than 20 years old
	Metric 5:	Sample Size	High	Statistical distribution characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Includes critical metadata but lacks additional metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability across industries and uncertainty in its calculation method.

Overall Quality Determination	High
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Study Citation:	Langer, S., Weschler, C. J., Fischer, A., Bekö, G., Toftum, J., Clausen, G. (2010). Phthalate and PAH concentrations in dust collected from Danish homes and daycare centers. Atmospheric Environment 44(19):2294-2301.			
HERO ID:	1007791			
Conditions of Use:	Dust samples from daycare centers and bedrooms			
EXTRACTION				
Parameter	Data			
Exposure route:	The mass-fraction of an SVOC in settled dust provides information on its anticipated concentration in other indoor compartments and can be used to estimate human exposure via multiple pathways including inhalation, ingestion and dermal sorption.			
Physical form:	Solid - dust on surfaces			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling and analytical methodology is well described.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Denmark, an OECD country other than the U.S.
	Metric 3:	Applicability	Low	The data are for a non-occupational scenario that may be applicable to an occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Source was published in 2010.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as exposure durations, exposure frequency, and worker activities.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.
Overall Quality Determination		Medium		

Study Citation:	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. Environmental Science & Technology 48(24):14228-14237.			
HERO ID:	3015875			
Conditions of Use:	Floor Coverings			
EXTRACTION				
Parameter		Data		
Area sampling data:		Gas phase concentrations immediately adjacent to the vinyl flooring surface are provided in Table 1 for temperatures ranging from 25C to 55C. Ambient concentrations range from 12 ug/cm3 to 136 ug/m3.		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling or analytical methodology is not equivalent to an approved OSHA or NIOSH method and EPA review of information indicates the methodology is acceptable.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2014.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized.
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	Medium	Variability is addressed by taking measurements at different temperatures but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Martens, F., Martens, M. (2002). Analysis of the monoester metabolites of butylbenzyl phthalate by GC-MS in urine of exposed workers. Acta Clinica Belgica 57(Suppl. 1):16-23.			
HERO ID:	1464959			
Conditions of Use:	Floor covering industry.			
EXTRACTION				
Parameter	Data			
Worker activity description:	Preparation of PVC plastisols plasticized with BBP in floor tile coating.			
Exposure route:	inhalation, dermal			
Personal sampling data:	Table III provides urinary metabolite concentrations in urine workers occupationally exposed to BBP. Total monophthalate (ug/L): BUP - 125, 530, 820, 566, 570, 70, 200, 515, 60, 150, 340, 260, 450, 1300, 260, 390, 460, 213, 533, 480 and <LOD; BeP - <LOD, 75, 230, 150, 250, 125, 220, 120, 500, 1020, 120, 245, 465, and 180; Total monophthalate (ug/g creatinine): BuP - 170, 500, 570, 959, 522, 170, 200, 485, 111, 333, 258, 228, 336, 715, 183, 295, 377, 288, 463, 336, and <LOD; BeP - <LOD, 70, 210, 150, 235, 278, 167, 105, 373, 560, 85, 186, 381, 126			
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	Medium	Country is likely from Belgium, an OECD country
	Metric 3:	Applicability	Medium	Data is applicable to floor covering industry, sampling data is urinary metabolite data.
	Metric 4:	Temporal Representativeness	Medium	Data is from 2002, just under 20 years old.
	Metric 5:	Sample Size	Medium	Data characterized by a range of data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Contains exposure route, urine sampling data, and worker activity.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Samples are taken in the start and end of shift over the course of 8 days. Does not address uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Nielsen, J., Akesson, B., Skerfving, S. (1985). Phthalate ester exposure - Air levels and health of workers processing polyvinylchloride. AIHA Journal 46(11):643-647.
HERO ID:	63456
Conditions of Use:	Processing- plasticizer

EXTRACTION

Parameter	Data
Worker activity description:	Calendar operators, machine attendants, repair men, mixing workers, other. (Page 2, under Subjects Studied; Workers)
Exposure route:	Inhalation (Page 2, under Introduction)
Personal sampling data:	Detected at less than 10% of total sum of PAE (Page 4 under Results; PAE in air). PAE's varied by across worker activities, ranging from 0.1 up to 2.8 mg/m ³ (Page 3 see Table I)
Particle size characterization:	The aerosol particle size was not studied, but may be important, both for local effects in the respiratory tract and for the absorption in the lung or, after clearance in the gastrointestinal tract. When spraying of DEHP dissolved in ethanol, the mean mass median diameter is 0.3 um. In the present plant the PAE aerosol was formed by fumigation from the PVC. The resulting particle size is probably smaller, and thus respirable. (Page 4-5 under Discussion; PAE in air)
Exposure duration:	For the different exposure groups "time of working" averaged at 7.0, 8.7, and 9.6 (assumed hours, it does not specify. See page 4 Table II as well as under Results; Exposure groups).
Number of workers:	54 workers studied, 23 in thin film department where BBP is noted to be involved (page 2, under Subjects Studies; Workers)
Engineering control:	Exhaust devices were installed over the calendars from the start of production (thin film 1947 and thick film 1960) and continuously have been improved (see page 2, under Production)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	Data is not NIOSH or OSHA method but is likely equivalent to one.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Sweden (OECD country)
	Metric 3: Applicability	High	The data is for an occupational scenario (PVC processing) that is in the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Metadata on the operations, equipment, and worker activities associated with the data are greater 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	Monitoring data includes sample types, exposure durations, worker activities, exposure frequency, exposure route.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by sampling across different departments across multiple workers among multiple age groups as well as a control group of workers without previous exposure. Does not address uncertainty.

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Study Citation:	Nielsen, J., Akesson, B., Skerfving, S. (1985). Phthalate ester exposure - Air levels and health of workers processing polyvinylchloride. AIHA Journal 46(11):643-647.		
HERO ID:	63456		
Conditions of Use:	Processing- plasticizer		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Nielsen, J., Fahraeus, C., Bensryd, I., Akesson, B., Welinder, H., Linden, K., Skerfving, S. (1989). Small airways function in workers processing polyvinylchloride. International Archives of Occupational and Environmental Health 61(7):427-430.			
HERO ID:	5175880			
Conditions of Use:	Processing - incorporation into article - plasticizer in PVC			
EXTRACTION				
Parameter	Data			
Worker activity description:	machine attendants and calendar operators (page 2 under Material and methods; Subjects)			
Exposure route:	inhalation (page 1 under Introduction)			
Area sampling data:	PAE mean exposure in thin film department was 0.2 mg/m^3 for machine attendants and 2.0 mg/m^3 for calendar operators. For both machine attendants and calendar operators in thick film department PAE exposure mean was 0.4 mg/m^3 (page 2 under Materials and methods; Exposure).			
Number of workers:	20 exposed workers and 19 control subjects. The controls were 19 age-matched males working in the same factory, but in the storeroom for finished products, and thus not presently exposed to chemicals to any significant degree. (Page 2 under Materials and methods; Subjects)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical 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	Medium	Data is from Sweden (an OECD country)
	Metric 3:	Applicability	High	Data is for PVC manufacturing, an in-scope occupational scenario
	Metric 4:	Temporal Representativeness	Low	Report is older than 20 years
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as sample durations, exposure durations, exposure frequency, and/or worker activities.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing different departments and having a control group, but does not address uncertainty.
Overall Quality Determination		Medium		

Study Citation:	NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of butyl benzyl phthalate (BBP).			
HERO ID:	678590			
Conditions of Use:	Processing - Incorporating into Articles - Plasticizer			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation exposure to BBP in flexible PVC manufacturing facilities has been estimated at 286 µg/kg bw/workday. Exposure through contact of BBP-containing materials with skin is negligible due to the relatively slow absorption through skin (page 36). Higher exposures to phthalates can occur during the incorporation of the phthalate into the final product if the process is run at a higher temperature than is used in the manufacturing process (page 18).			
Area sampling data:	The ACC has estimated exposure to BBP in the workplace based upon an assumed level of 2 mg/m3 during the manufacture of flexible PVC. An exposure level was estimated by using assumptions of a 10 m3/day inhalation rate and a 70 kg body weight. The resulting exposure estimates were 286 µg/kg bw/workday for workers employed in flexible PVC production operations (page 18). Occupational exposures to phthalate mixtures containing BBP have been associated in single studies with respiratory/neurological effects and cancer . In a large, population-based case-control study, a significant increase in the risk of multiple myeloma has been found among workers employed for 5 or more years in PVC production (page 19). There were no human data available on the reproductive toxicity of BBP alone. Occupational exposure to phthalate mixtures containing BBP in PVC production has been associated with increased incidence of menstrual disorders and spontaneous abortions among female workers (page 32).			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	From the US Department of Health and Human Services
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	From US
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	Less than 20 years old but more than 10
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as sample durations, exposure durations, exposure frequency, and/orworker activities.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The monitoring study provides only limited discussion of theuncertainty in the exposure estimates.
Overall Quality Determination		Medium		

Study Citation:	Okeme, J. O., Nguyen, L. V., Lorenzo, M., Dhal, S., Pico, Y., Arrandale, V. H., Diamond, M. L. (2018). Polydimethylsiloxane (silicone rubber) brooch as a personal passive air sampler for semi-volatile organic compounds. Chemosphere 208:1002-1007.			
HERO ID:	5017615			
Conditions of Use:	Office workers			
EXTRACTION				
Parameter	Data			
Worker activity description:	using computer workstations			
Personal sampling data:	See Table 1: 17 ng/m3 (participant 1), 10 ng/m3 (participant 2), 20 ng/m3 (participant 3)			
Exposure duration:	8 hrs/day			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling or analytical methodology is an approved OSHA or NIOSH method or is well described and found to be equivalent to approved OSHA or NIOSH methods.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country. other than the U.S., and locality-specific factors (e.g., potential differences in regulatory occupational exposure limits, industry/ process technologies) may impact exposures relative to the U.S.	
	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 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	High	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Monitoring data include most critical metadata, such as sample type and exposure type, but lacks additional metadata, such as sample durations, exposure durations, exposure frequency, and/or worker activities.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.	
Overall Quality Determination		High		

Study Citation:	OSHA, (2019). Chemical exposure health data (CEHD) sampling results: CASRNs 75-34-3, 85-68-7, 84-74-2, 78-87-5, 117-81-7, 106-93-4, 50-00-0, 95-50-1, 85-44-9, 106-46-7, 79-00-5, and 115-86-6.			
HERO ID:	6499659			
Conditions of Use:	OSHA data contains multiple industries			
EXTRACTION				
Parameter	Data			
Personal sampling data:	Samples range from ND to 7.1 mg/m3			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	OSHA and state inspectors are expected to use OSHA or NIOSH sampling methods. Samples sent to the OSHA SLTC are expected to be analyzed using OSHA or NIOSH analytical methods.
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 OSHA data include occupational scenarios within the scopes of the chemicals as identified by NAICS code and facility name. However, some occupational scenarios are not clear and cannot be clearly mapped to conditions of use within scope.
	Metric 4:	Temporal Representativeness	Low	Samples range from 1992-2005
	Metric 5:	Sample Size	High	Individual measurements are provided so the sample sets can be fully statistically characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	OSHA data include sample type and exposure type. Sample times also provided. Exposure frequency is inconsistently provided. Worker job descriptions provided, but often lacks sufficient clarity.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	OSHA data do not discuss variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Shivani, Gadi, R., Sharma, S. K., Mandal, T. K. (2019). Seasonal variation, source apportionment and source attributed health risk of fine carbonaceous aerosols over National Capital Region, India. Chemosphere 237:124500.			
HERO ID:	6816297			
Conditions of Use:	Ambient air concentration (general population)			
EXTRACTION				
Parameter	Data			
Area sampling data: See Table 1: Average concentration at the three sites were 65.9 mg/m3, 59.0 ng/m3, and 14.4 ng/m3				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling or analytical methodology is an approved OSHA or NIOSH method or is well described and found to be equivalent to approved OSHA or NIOSH methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	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	Uninformative	The data are 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 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	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., personal breathing zone) but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.
Overall Quality Determination		Uninformative		

Study Citation:	Stewart, E. (2011). Air and wipe sampling for phthalates in a medical office building. 1:85-90.			
HERO ID:	7978848			
Conditions of Use:	Plastic and rubber products			
EXTRACTION				
Parameter	Data			
Worker activity description:	Source of exposure for office workers were roof-top walk-off mats that were removed and stored on the property. Employees are workers in a medical office building. (3/7)			
Exposure route:	ingestion, dermal, inhalation (2/7)			
Physical form:	vapor (2/7)			
Area sampling data:	BBP was not detected. (5/7)			
Engineering control:	An onsite air handling unit supplied outdoor air to the building. (3/7)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling methodology is an EPA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for commercial use of plastic and rubber products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Monitoring data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample data, exposure type, and worker information provided, but missing exposure duration, frequency, number of workers, and PPE.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by comparing results to other studies done.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2024). Synthetic turf field recycled tire crumb rubber research under the Federal Research Action Plan, Final report part 2: Exposure characterization, volume 1.			
HERO ID:	11845992			
Conditions of Use:	Rubber products			
EXTRACTION				
Parameter	Data			
Area sampling data:	Area samples taken at 3 fields that use synthetic turf (PDF Pg. 123):Field 1: 4.8 ng/m^3Field 2: 11 ng/m^3Field Air Max: 75 ng/m^3			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved OSHA/NIOSH method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for rubber products, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Monitoring data are no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure frequency, exposure duration, PPE, and engineering controls.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling at multiple locations.	
Overall Quality Determination		High		

Study Citation:	Velázquez-Gómez, M., Hurtado-Fernández, E., Lacorte, S. (2019). Differential occurrence, profiles and uptake of dust contaminants in the Barcelona urban area. Science of the Total Environment 648:1354-1370.			
HERO ID:	5043338			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Museum workers, library workers, high school staff			
Exposure route:	inhalation, ingestion			
Physical form:	indoor dust			
Exposure duration:	8 hours/ day for museum and library workers			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Spain, an OECD country.
	Metric 3:	Applicability	High	Data are for commercial use of furniture and furnishings, paints and coatings, building/construction materials, and fabric and textile products, all in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (medians, ranges, maximums, minimums, frequencies) 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	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by sampling multiple locations for each different occupational scenario.
Overall Quality Determination			High	

Study Citation:	Xia, M., Ouyang, X., Wang, X., Shen, X., Zhan, Y. (2018). Occupational exposure assessment of phthalate esters in indoor and outdoor microenvironments. Journal of Environmental Sciences 72:75-88.		
HERO ID:	5043519		
Conditions of Use:	Commercial use - adhesives/floor coverings/paints		
EXTRACTION			
Parameter	Data		
Worker activity description:	Doctors, college teachers, college students, and drivers. Among these groups, drivers were specified to cab, bus, tube, or other drivers that worked in the public transportation system. Reasons for choosing these four kinds of occupations were that high concentrations of PAEs have been detected in doctor offices, hospital wards, and some public transportation carriages, and people exposed to classrooms for a long time have proven the existence of inhalation health risk from PAEs (page 2)		
Exposure route:	Human exposure pathways to PAEs in air included inhalation, oral ingestion, and dermal absorption. Researchers concluded that contaminated air was the important source of people’s daily PAEs intake, accounting for 45% of total PAEs exposure. In soil and street dust studies, recent researches demonstrated children were inclined to exposure to PAEs by getting in touch with some products containing PAEs (Page 2).		
Area sampling data:	All sampling concentrations listed are for total phthalate amounts and does not indicate individual components. BBP concentration varied by the profession studied, which were doctors, college teachers, college students, and public transportation drivers. The average concentrations were 1.16 ug/kg/day (doctors), 0.68 ug/kg/day (college teachers), 0.44 ug/kg/day (college students), and 0.74 ug/kg/day (drivers). The baseline (defined as a group who spent all daytime in their residences) for BBP was 0.67 ug/kg/day. (Table 6, page 7). See Figure 1 (page 8) for visual graph of the composition of the six phthalates in various microenvironments (including the % that BBP makes up).		
Exposure duration:	between 6.6 and 7.7 hours (see Table 4 on page 6).		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Medium	All sampling requirements had referred to Chinese Technical Specifications for Monitoring of Indoor Air Quality
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data from China
	Metric 3: Applicability	Medium	The data are for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.
	Metric 4: Temporal Representativeness	High	The operations, equipment, and worker activities associated with the data are expected to be representative of current operations, equipment, and activities.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Monitoring data include all associated metadata, including sample types, exposure types, sample durations, exposure durations worker activities, and exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.
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Study Citation:	Xia, M., Ouyang, X., Wang, X., Shen, X., Zhan, Y. (2018). Occupational exposure assessment of phthalate esters in indoor and outdoor microenvironments. Journal of Environmental Sciences 72:75-88.		
HERO ID:	5043519		
Conditions of Use:	Commercial use - adhesives/floor coverings/paints		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Frasch, H. F., Bunge, A. L. (2015). The transient dermal exposure II: post-exposure absorption and evaporation of volatile compounds. Journal of Pharmaceutical Sciences 104(4):1499-1507.			
HERO ID:	3230538			
Conditions of Use:	Processing-plasticizer in PVC			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	vapor/liquid			
Dermal exposure data:	Dermal exposure data			
Comments:	Lab study but is a dermal exposure model based on air or liquid concentrations. Can be highly applicable to industry use.			
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Model is peer reviewed and free of mathematical errors, based on sounds approaches/methods, and uses appropriate equations and parameters
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Model could be applied to manufacturing or processing scenario
	Metric 4:	Temporal Representativeness	High	Model is no more than 10 years old
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent. Rationales for choice of approach, equations, and parameters are provided.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Variability is addressed by testing with different exposure times as well as liquid and vapor states of BBP. Uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Gong, M., Zhang, Y., Weschler, C. J. (2014). Predicting dermal absorption of gas-phase chemicals: Transient model development, evaluation, and application. Indoor Air 24(3):292-306.				
HERO ID:	2241693				
Conditions of Use:	Use				
EXTRACTION					
Parameter		Data			
Exposure route:		dermal			
Physical form:		gas			
Dermal exposure data:		Dermal exposure data			
Exposure duration:		24 hours/day			
Exposure frequency:		7 days/week			
EVALUATION					
Domain		Metric	Rating	Comments	
Domain 1: Reliability		Metric 1:	Methodology	High	Model is peer-reviewed and free of mathematical errors, based on sound approaches/methods, and uses appropriate equations and parameters.
Domain 2: Representativeness		Metric 2:	Geographic Scope	Medium	Data are from the U.S., Denmark (OECD), and China (non-OECD).
		Metric 3:	Applicability	High	Model can be applied to commercial use of personal care products, and plastic and rubber products, both in-scope occupational scenarios.
		Metric 4:	Temporal Representativeness	High	Model is based on current industry conditions and based on data no more than 10 years old.
Domain 3: Accessibility/ Clarity		Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent. Rationales for choice of approach, equations, and parameter values provided.
Domain 4: Variability and Uncertainty		Metric 6:	Metadata Completeness	High	Uncertainty is addressed by discussing uncertainties in parameter values. Variability addressed by doing a sensitivity analysis to four model parameters.
Overall Quality Determination			High		

Study Citation:	Pelletier, M., Bonvallot, N., Ramalho, O., Blanchard, O., Mercier, F., Mandin, C., Bot, Le, B., Glorennec, P. (2017). Dermal absorption of semivolatile organic compounds from the gas phase: Sensitivity of exposure assessment by steady state modeling to key parameters. Environment International 102:106-113.		
HERO ID:	3602893		
Conditions of Use:	Use		
EXTRACTION			
Parameter	Data		
Exposure route:	dermal		
Physical form:	gas		
Dermal exposure data:	Dermal exposure data		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Model is peer-reviewed and free of mathematical errors, based on sound approaches/methods, and uses appropriate equations and parameters.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from France, an OECD country.
	Metric 3: Applicability	High	Model can be applied to commercial use of fabric product, furniture and furnishings, and personal care products, in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	High	Model is based on current industry conditions and based on data no more than 10 years old.
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent. Rationales for choice of approach, equations, and parameter values provided.
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	High	Uncertainty is addressed with respect to chosen parameters. Variability addressed by running a sensitivity analysis to 6 key parameters.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2021). Generic model for central tendency and high-end inhalation exposure to total and respirable Particulates Not Otherwise Regulated (PNOR).			
HERO ID:	11373482			
Conditions of Use:	All			
EXTRACTION				
Parameter		Data		
Exposure route:		Inhalation (pg. 2)		
Physical form:		Dust - This model estimates potential worker inhalation exposure to total and respirable particulates not otherwise regulated (PNOR). OSHA defines PNOR as inert or nuisance dust, including all inert or nuisance dusts not specifically listed in 29 CFR 1910.1000. (pg. 2)		
Personal sampling data:		Table 3. Summary of Included Total PNOR Inhalation Monitoring Data, with Industry-Specific Defaults includes various statistics for PBZ monitoring data in various industries. (pg. 11)		
Exposure duration:		The dataset used for this model only includes those samples which are representative of full-shift exposures as the OSHA PNOR PEL is an 8-hour TWA value. (pg. 7)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Model seems to be free of mathematical errors and is based on scientifically sounds approaches and methods.
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	Model is applicable to occupational scenarios. However, the model is not chemical specific.
	Metric 4:	Temporal Representativeness	High	Published in 2021 and based on data from 2020.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent and clear and can be evaluated. Rationale for selection of approach, equations, and parameter values is provided.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	High	Includes a section on the assumptions, uncertainties, and limitations of the model.
Overall Quality Determination			High	

Study Citation:	Wormuth, M., Scheringer, M., Vollenweider, M., Hungerbühler, K. (2006). What are the sources of exposure to eight frequently used phthalic acid esters in Europeans?. Risk Analysis 26(3):803-824.
HERO ID:	680214
Conditions of Use:	Consumer use

EXTRACTION	
Parameter	Data
Exposure route:	Inhalation, dermal, oral
Area sampling data:	Table 5 has min, median, mean, and max in indoor and outdoor ambient air: 7.0 ng/m (median) in indoor air; 0 ng/m ³ (median) in outdoor air.// For spray painting, a typical fingertip dispenser generates 25 grams of spray per minute and the fraction of particles that are available for inhalation is 0.005.
Dermal exposure data:	Dermal exposure data
Exposure duration:	For spray paints, the mean duration of spraying is 4 minutes and the mean contact time with aerosols is 15 minutes.
Exposure frequency:	Table 7 has frequency of use of personal care products: 0.29-2/day for deodorant; 0.12-1.5/day for perfume; 0.14-1/day for aftershave; 0.05-2/day for hair styling; 0.43-2/day for shampoo; 0.16-2/day for skin care; 0.11-1/day for nail care; 0.18-1/day for makeup; 0.11-8.43/day for baby products. // Spray paints are infrequently used by teenagers and adults (two times per year, which is 0.0055 per day).

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The model is free of mathematical errors and is based on scientifically sound approaches or methods. Equations and choice of parameter values are appropriate for the model's application (note: peer review may address appropriate application).
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	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. However, the model is based on operations, equipment, and worker activities are expected to be reasonably representative of current conditions.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameter values are transparent and clear and can be evaluated. Rationale for selection of approach, equations, and parameter values is provided.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	High	The model characterizes variability and uncertainty in the results.

Overall Quality Determination

High

Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.			
HERO ID:	1267867			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal			
Physical form:	particles of powder, solvent vapors, solvents			
Particle size characterization:	Basecoat applications by air atomization had a MMAD of 4-14 um. Application by rotary atomizer generated particles of 25-35 um. In another study, the MMAD of lacquer mist was 6.4+-3.4 um and enamel had a MMAD of 5.7+-2.0 um.			
Number of workers:	Half a million workers in the U.S. are included in the application of paint products. Of this number, 200,000 are employed in autobody shops.			
Personal protective equipment:	The minimum respirator for all paint applications should be a combination mist-organic vapor air-purifying device. Higher levels of protection including air-supplied hoods or helmets may be necessary on certain systems such as spray application.			
Engineering control:	All storage and mixing vessels should be provided with close fitting covers designed with access ports. It should be normal to equip these tanks with integral agitators. All dispensing stations should be provided with collection trays and safety cans. Transfer of solvent should be done by closed-pump systems not by open pouring. Controls in the application of paint systems must include excellent housekeeping, effective ventilation control, and protective clothing. Adequate washing facilities should be available, and eating and drinking should be prohibited.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for the use of paints and coatings, but are a general model, and not for one specific 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	Medium	Sample distribution characterized by limited statistics (means, standard deviations) 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 including different paint application techniques. Uncertainty isn't addressed.
Overall Quality Determination			High	

Study Citation:	Cousins, A. P., Remberger, M., Kaj, L., Ekheden, Y., Dusan, B., Brorstroem-Lunden, E. (2007). Results from the Swedish National Screening Programme 2006. Subreport 1: Phthalates. GRA and I(GRA and I):39.			
HERO ID:	675060			
Conditions of Use:	Use (general use, not differentiated)			
EXTRACTION				
Parameter	Data			
Area sampling data: See Fig 4 and Table A3 - air concentrations near industry point sources were <1 ng/m3				
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., 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	Uninformative	Data are ambient air concentrations, which are not in scope for engineering
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	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			Uninformative	

Study Citation:	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.			
HERO ID:	3688160			
Conditions of Use:	All - dermal absorption			
EXTRACTION				
Parameter	Data			
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	Uninformative	Does not apply to any occupational 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	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	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Uninformative		

Study Citation:		EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.		
HERO ID:		5353181		
Conditions of Use:		Plastic and rubber products not covered elsewhere		
EXTRACTION				
Parameter		Data		
Exposure route:		oral, inhalation, dermal		
Physical form:		dust		
Area sampling data:		Recently, BBP has also been measured in indoor air in homes in the United States (detected in 100% of 20 samples from homes in Albany, NY, method quantification limit = 0.20 ng/m3, median:2.99 ng/m3, maximum: 24.7 ng/m3) (62/228)		
Dermal exposure data:		Dermal exposure data		
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	Medium	Data are from Canada, an OECD country.
		Metric 3: Applicability	Low	Data are for consumer use of plastic and rubber products, which is similar to the fabrication of final products from articles.
		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 (means, medians, maximums, 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	High	Uncertainty is addressed by including limits of detection and estimation methods in the appendix. Variability is addressed by compiling different studies in the report.
Overall Quality Determination			High	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.		
HERO ID:	3661424		
Conditions of Use:	Plastics		
EXTRACTION			
Parameter	Data		
Exposure route:	Workers can be exposed to the four phthalates during manufacturing of articles – not only due to direct “hands on” contact, but also due to the emissions from e.g. industrial extrusion processes or the presence of articles like e.g. PVC flooring at the production site. Other occupational exposures can come from different job situations in private households, nurseries, offices, hospitals, kindergardens etc.		
Area sampling data:	Table 23 has steady state concentrations in indoor air: 1.8E-6 to 4.4E-5 ug/m3 depending on room of the house.		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	See table 12 for dermal exposure duration for various plastic articles (non-occupational exposure)		
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., 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	Low	Exposure estimates are for non-occupational use of plastics.
	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
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Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.		
HERO ID:	3661424		
Conditions of Use:	Plastics		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	ECJRC, (2008). European Union Summary Risk Assessment Report: Benzyl butyl phthalate (BBP) (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	2121719			
Conditions of Use:	Manufacturing - domestic			
EXTRACTION				
Parameter	Data			
Worker activity description:	filling of and rail tankers; drumming, process sampling; cleaning and maintenance; Flooring with the plastisol spread coating process; processing of PVC floats; processing of sealants; flooring with the calendaring process; processing of films with the extrusion process			
Exposure route:	inhalation, dermal			
Physical form:	vapor/liquid			
Area sampling data:	Includes specific sampling data for every workplace operation. Summary of exposures: lowest exposure is <0.005 mg/m^3 with highest at 2.6 mg/m^3. Table 4.32			
Comments:	Assumed 7,200 operating days/year.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment uses high quality data not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Italy, Germany and Belgium, all OECD countries
	Metric 3:	Applicability	High	Data is directly applicable to conditions of use
	Metric 4:	Temporal Representativeness	Low	Occupation data is from 1990s so greater than 20 years old
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by testing multiple sites but uncertainty is not addressed
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).
HERO ID:	5348378
Conditions of Use:	Floor coverings manufacturing

EXTRACTION

Parameter	Data
Worker activity description:	[Flooring with the Plastisol Spread Process]Quality checkingMachine operatorsLab operatorsFoam mixer ad top coat operatorsKnife coating, reverse roll coater and roll winder operatorsEnd of line operators[Flooring with the Calendering Process]Calendering takes place at elevated temperatures, 150-180 C. Sources of exposure during the flooring process may be related to opening of the processing vessel, film travelling over the reels, the exit of the oven, exit of the extruder, extrusion coating, when heat is applied to the extruded sheet, curing and above the calender mill.
Exposure route:	[Flooring with the Plastisol Spread Process]Inhalation[Flooring with the Calendering Process]Inhalation, dermal
Personal sampling data:	[Flooring with the Plastisol Spread Process]Activity (reference)Pre-Coat Station (Solutia monitoring at plant 1 1995): 0.015 mg/m ³ [1 sample]Clear-coat station (Solutia monitoring at plant 1 1995): <0.01 (mg/m ³) [1 sample]Oven Exit Reel-up Station (Solutia monitoring at plant 1 1995): <0.01 (mg/m ³) [1 sample]Drumline (Solutia monitoring at plant 2 1995): Operator: 0.035 (mg/m ³) [1 sample]; Partial period sample: 0.053 (mg/m ³) [1 sample]CFS Line ((Solutia monitoring at plant 2 1995): 0.007-0.013, average of 0.010 (mg/m ³) [2 samples]Laboratory (Solutia monitoring at plant 2 1995): 0.01 (mg/m ³) [1 sample]Compounding (Solutia monitoring at plant 3 1995): <0.0022-0.0057, average of 0.004 (mg/m ³) [2 samples]Top Foam (Solutia monitoring at plant 2 1995): <0.002-0.0025, average of 0.0023 (mg/m ³) [3 samples]Wear Layer and Backing (Solutia monitoring at plant 2 1995): <0.0022-0.0028 (mg/m ³), average of 0.0023 (mg/m ³) [4 samples][Flooring with the Calendering Process]activity (reference) (mg/m ³) (mean; range)Calendar operators (Nielsen et al. 1985): 2.0; 1.0-2.8 [12 samples]Calendar operators/machine attendants (Nielsen et al. 1985): 0.4; 0.1-0.8 [16 samples]Machine attendants ((Nielsen et al. 1985): 0.2; 0.1-0.2 [8 samples]Repair men (Nielsen et al. 1985): 0.3; 0.1-0.3 [8 samples]Mixing workers (Nielsen et al. 1985): 0.02; 0.01-0.02 [8 samples]Calendar Operations (Hagmar et al. 1990): 0.5-3 Workers in mixing departments and machine attendants ((Hagmar et al. 1990): 0.1-0.5Quality inspectors and packing personnel (Hagmar et al. 1990): <0.1Calendar operator (Solutia 1999d): 0.16; 0.031-0.42 [10 samples]Furnish Mill Operator(Solutia 1999d): 0.075; 0.075-0.078 [4 samples]Mill Operators(Solutia 1999d): 0.072; 0.053-0.091 [2 samples]Mixer operator (Solutia 1999d): 0.4; 0.19-0.61 [2 samples]Calendering (BG Chemie 1994): 0.29-0.33 [2 samples]
Dermal exposure data:	Dermal exposure data

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Sampling/analytical methodology is not an approved OSHA/NIOSH method but is an acceptable methodology.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	Data are for floor coverings manufacturing, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean, range) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure frequency, exposure duration.

Domain 4: Variability and Uncertainty

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Study Citation:		ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:		5348378		
Conditions of Use:		Floor coverings manufacturing		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7: Metadata Completeness	Medium	Variability addressed by sampling multiple activities, but uncertainty is not addressed.	
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:	5348378		
Conditions of Use:	Plastic material and resin manufacturing		
EXTRACTION			
Parameter	Data		
Worker activity description:	Field man, feeding extruder, pulling film.		
Exposure route:	Inhalation		
Area sampling data:	Activity (Solutia Monitoring plant 7289, 1996) (mg/m^3)Field Man: <0.03 [2 samples]Feeding extruder: <0.03 [1 sample]Pulling film: <0.03, mean of <0.03 [2 samples]		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Low	Sampling/analytical 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean, range) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure frequency and duration.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by sampling multiple activities, but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:	5348378		
Conditions of Use:	Plastic product manufacturing		
EXTRACTION			
Parameter	Data		
Worker activity description:	Mixing BBP with other raw materials.Moulding of the blend with a filling pistol and removing the mould using tongs.		
Exposure route:	Inhalation, dermal		
Area sampling data:	Activity (NIOSH 1999) (average; range)Mixing Raw materials: 0.00144; 0.00034-0.00255 (mg/m^3) [2 samples]Mixing raw materials/filling/hardening area: 0.00488; 0.00404-0.00572 (mg/m^3) [2 samples]Filling: 0.00124; 0.00063-0.00178 (mg/m^3) [2 samples]Filling Moulds: 0.00195; 0.00057-0.00292 (mg/m^3) [2 samples]Filling/hardening area: 0.00175; 0.00024-0.00384 (mg/m^3) [7 samples]Filling/painting/hardening area: 0.00141 (mg/m^3) [1 sample]Filling/expanding area: 0.00175; 0.00109-0.00242 (mg/m^3) [2 samples]Packing: 0.00078; 0.00071-0.00086 (mg/m^3) [2 samples]Expanding area/packing: 0.00134; 0.00038-0.00302 (mg/m^3) [8 samples]		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	Mixing BBP with other raw materials: 15 minutes, once per day		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Low	Sampling/analytical 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Monitoring data are greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean, range) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided but missing exposure frequency and duration.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by sampling multiple activities, but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:	5348378		
Conditions of Use:	Manufacture		
EXTRACTION			
Parameter	Data		
Worker activity description:	Filling of tank trucks and rail tankers (pumped transfer from bulk storage vessels).DrummingProcess sampling (manual sampling)Maintenance and cleaning (e.g. cleaning the tanks in which BBP has been produced, stored or transported)		
Exposure route:	Inhalation, dermal		
Personal sampling data:	Activity (reference)Loading 1 tank truck (Solutia Data Plant 1995): <0.47 - 0.61 (mg/m^3); average 0.54 (mg/m^3) [2 samples]Drumming (Monsanto Data Plant 1997): <0.001 - 0.004 (mg/m^3); average 0.002 (mg/m^3) [3 samples]Emptying drums (Monsanto Data Plant 1997): 2.6 (mg/m^3) [1 sample]		
Area sampling data:	Activity (reference)Production (Monsanto Plant 1997): <0.001 - 0.001 (mg/m^3); average <0.001 (mg/m^3) [3 samples]Truck Loading Loading, 3-4 tank trucks (Solutia Data Plant 1995): average <0.1 (mg/m^3) [3 samples]Sampling (EASE): 0-1.3 (mg/m^3) [2 samples]Drumming (EASE): 0-1.3 (mg/m^3) [2 samples]Cleaning and Maintenance (EASE): 0-1.3 (mg/m^3) [2 samples]		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	Filling of tank trucks and rail tankers: 60-90 minutes.Drumming: 30 minutes/day.Process sampling: 15 minutes (3-5 times per shift)		
Exposure frequency:	Manufacture occurs 300 days/yearDrumming occurs 8 times/monthProcess sampling occurs 3-5 times per shift		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Low	Sampling/analytical 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Data greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean, range) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by sampling multiple activities related to manufacture, but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ethylhexyl)phthalate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).
HERO ID:	7265437
Conditions of Use:	Plastics

EXTRACTION	
Parameter	Data
Exposure route:	Workers can be exposed to the four phthalates during manufacturing of articles – not only due to direct “hands on” contact, but also due to the emissions from e.g. industrial extrusion processes or the presence of articles like e.g. PVC flooring at the production site. Other occupational exposures can come from different job situations in private households, nurseries, offices, hospitals, kindergardens etc.
Physical form:	dust
Area sampling data:	Table 24 has steady state concentrations in indoor air: 1.8E-6 to 4.4E-5 ug/m3 depending on room of the house.
Dermal exposure data:	Dermal exposure data
Exposure duration:	See table 18 for dermal exposure duration for various plastic articles (non-occupational exposure)

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., 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	Low	Exposure information is non-occupational.
	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.

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Study Citation:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehthylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).		
HERO ID:	7265437		
Conditions of Use:	Plastics		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Gao, C. J., Kannan, K. (2020). Phthalates, bisphenols, parabens, and triclocarban in feminine hygiene products from the United States and their implications for human exposure. Environment International 136:105465.			
HERO ID:	6957637			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	creams, powders, wipes, and cotton products like pads and tampons			
Dermal exposure data:	Dermal exposure data			
Comments:	Table S2-S4 (supplemental material document)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for consumer use of Personal care products, which is similar to the in-scope occupational scenario use of fabric products and textiles.
	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 (means, medians, 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	High	Uncertainty is addressed in the limits of detection and sampling methodologies. Variability is addressed by sampling different products and product brands.
Overall Quality Determination			High	

Study Citation:		Monsanto, (1982). Final report: A case-control study of leukemia with cover letter.		
HERO ID:		1359247		
Conditions of Use:		Processing		
EXTRACTION				
Parameter		Data		
Number of workers:		107 employees claimed malignancies due to BBP.		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Assessment 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	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for plasticizers in plastic and resin manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (number of samples, p-values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in a section of the submission titled, "Limitations of the Study". Variability is addressed by including matched controls based on sex, race, and job.
Overall Quality Determination			High	

Study Citation:	NICNAS, (2015). Priority existing chemical assessment report no. 40: Butyl benzyl phthalate.			
HERO ID:	3664467			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Use in children’s toys, childcare articles and cosmetics			
Exposure route:	Oral, Dermal. Consumer products being potentially significant sources of repeated and long-term exposure of the public to BBP both directly and indirectly through migration and leaching from products. (P. 9/57)			
Physical form:	Colourless oily liquid (P. 19/57)			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	A reasonable typical time the child spends handling toys is 0.8 hours/day and a reasonable worst-case contact time is 2.2 hours/day.			
Comments:	Report also includes in vivo dermal absorption, which will be evaluated under a human health hazard.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	No more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			High	

Study Citation:	NICNAS, (2015). Priority existing chemical draft assessment report: Diisodecyl Phthalate & Di-n-octyl Phthalate.			
HERO ID:	6836808			
Conditions of Use:	Plasticizers			
EXTRACTION				
Parameter	Data			
Worker activity description:	Workers at a plasticizer manufacturing facility. (39/65)			
Exposure route:	Oral, dermal, inhalation (10/65)			
Physical form:	Oily liquid (19/65)			
Number of workers:	23 sampled workers (39/65)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Australia, an OECD country.
	Metric 3:	Applicability	Medium	Data are for plasticizers in plastic and resin manufacturing, an in-scope occupational scenario. Not specific to BBP.
	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 (averages) 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 by listing critiques of the studies and data used in the assessment. Variability is addressed by using data from many studies.
Overall Quality Determination		High		

Study Citation:	NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of di-isodecyl phthalate (DIDP). (3):i-III90.
HERO ID:	679108
Conditions of Use:	Production of phthalates and PVC

EXTRACTION	
Parameter	Data
Worker activity description:	Some exposures may occur during the loading and unloading of railroad cars and trucks.
Exposure route:	Occupational exposure occurs primarily through inhalation and dermal contact. Somewhat higher exposures (than manufacturing) may occur during the production of polyvinyl chloride (PVC) products because of elevated temperatures and more open processes.
Area sampling data:	The American Chemistry Council (ACC, formerly CMA) (1) cites six studies that indicate that exposures are below 1 mg/m3 during production of phthalates and below 2 mg/m3 during production of PVC. (page 16) // Public comment on page 73 indicates that data submitted to CERHR show that actual occupational exposures during phthalate production and downstream use are far below the conservative estimate provided by the panel.

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	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The assessment is for an occupational scenario within the scope of the risk evaluation. The area monitoring data is for phthalates and not BBP specific
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report documents its data sources, assessment methods, results, and assumptions. Sources for the monitoring data are described but not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The assessment provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination	Medium
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Study Citation:	NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of di-isononyl phthalate (DINP). Center for the Evaluation of Risks to Human ReproductionVol(2):i-III90.		
HERO ID:	680097		
Conditions of Use:	Production of phthalates and PVC		
EXTRACTION			
Parameter	Data		
Worker activity description:	Some exposures may occur during the loading and unloading of railroad cars and trucks (p. 17).		
Exposure route:	Occupational exposure occurs primarily through inhalation and dermal contact. Somewhat higher exposures (than manufacturing) may occur during the production of polyvinyl chloride (PVC) products because of elevated temperatures and more open processes (p. 17).		
Area sampling data:	The American Chemistry Council (ACC, formerly CMA) (1) cites six studies that indicate that exposures are below 1 mg/m3 during production of phthalates and below 2 mg/m3 during production of PVC. (page 17) // Public comment on page 79 and 118 indicates that data submitted to CERHR show that actual occupational exposures during phthalate production and downstream use are far below the conservative estimate provided by the panel.		
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	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	Medium	The assessment is for an occupational scenario within the scope of the risk evaluation. The data is for phthalate esters and does not specifically highlight BBP
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions. The report cites data but details on how the data was collected are not apparent in the report.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.		
HERO ID:	3808976		
Conditions of Use:	Paints and coatings		
EXTRACTION			
Parameter	Data		
Worker activity description:	transferring and mixing liquid products, container cleaning, transferring mixed coating to application equipment, overspray		
Exposure route:	dermal and inhalation. dermal: 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		
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 limited statistics (min, max, mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple coating types.
Overall Quality Determination		Medium	

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.			
HERO ID:	3827299			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading, container cleaning, mixing operations, sampling, equipment cleaning, packaging			
Exposure route:	dermal and inhalation. dermal: Provides methods for modeling exposures to both solids and non-volatile liquids Inhalation: Provides methods for modeling exposures to both solids and volatile liquids			
Exposure frequency:	250 days per year; days/yr equal to number of bt/yr			
Number of workers:	22 workers/site			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Low	Model results characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.	
Overall Quality Determination		Medium		

Study Citation:	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.		
HERO ID:	3827300		
Conditions of Use:	Use of adhesives for substrate bonding		
EXTRACTION			
Parameter	Data		
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 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		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions, types of adhesives, and end use markets.
Overall Quality Determination		High	

Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.		
HERO ID:	3833136		
Conditions of Use:	Application of Adhesives and Sealants		
EXTRACTION			
Parameter	Data		
Worker activity description:	unloading, container cleaning, adhesive application, equipment cleaning, curing/drying		
Exposure route:	dermal and inhalation		
Exposure frequency:	50-365 days/yr		
Number of workers:	26-106 workers per site (Tables 5-2, 5-3, 5-4)		
Personal protective equipment:	Chemical-resistant gloves and safety glasses. Heat-resistant gloves are used when applying hot-melt adhesives. Of the four sites that replied to the questionnaire, only one reported the use of respirators. This site applied solventless adhesives to substrates. (pg. 78)		
Engineering control:	For spray applications, spray booths are typically implemented to provide makeup air, capture overspray, and exhaust emissions. (pg. 72)Spray booth technology has 90% capture efficiency with a dry filter. (pg. 101)		
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, types of adhesives, and end use markets.
Overall Quality Determination		Medium	

Study Citation:	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.		
HERO ID:	3840003		
Conditions of Use:	Processing: Paints and Coatings		
EXTRACTION			
Parameter	Data		
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.		
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	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.
Overall Quality Determination		Medium	

Study Citation:	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.		
HERO ID:	6568745		
Conditions of Use:	Application of Paints and Coatings		
EXTRACTION			
Parameter	Data		
Worker activity description:	Unloading, container cleaning, sampling, application, equipment cleaning (pg. 21)		
Exposure route:	Dermal and inhalation		
Exposure duration:	Up to 8 hr/day (Table 5-3, pg. 67)		
Exposure frequency:	250 days/yr (pg. 66)		
Number of workers:	7-85 workers/site (Table 5-2; pg. 64)		
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. Respiratory protection is used when necessary, especially when escape of spray particles into the work environment is unavoidable. (pg. 62)		
Engineering control:	Spray booths (pg. 74)		
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	

Study Citation:	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.		
HERO ID:	6311222		
Conditions of Use:	Industrial/Commercial Use: Automotive Care Products		
EXTRACTION			
Parameter	Data		
Worker activity description:	Auto OEM: robotics operations, paint mixing, paint booth cleaning, inspection, and manual "touch-up" painting. Auto refinish: wet sanding, car washing, stripping (paint removal), machine sanding, blowing, buffing, polishing, paint spraying, paint and primer mixing, and inspection.		
Exposure route:	dermal and inhalation. Inhalation: Provides methods for modeling exposures to mists.		
Dermal exposure data:	Dermal exposure data		
Exposure frequency:	Auto OEM: 250 days/yr. Auto refinish: 170 days/yr.		
Number of workers:	Auto OEM: 17 workers/site. Auto refinish: 2-10 workers/site.		
Personal protective equipment:	Respirator		
Engineering control:	Spray booths, LEV		
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	

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			
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			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for 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	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by discussing assumptions. Variability addressed by providing low-end and high-end data
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Processing - Plastics Compounding			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes.			
Exposure route:	Dermal and inhalation			
Physical form:	Describes the routes of exposure based on physical form. (Table 5-1; pg. 59 of 123)			
Personal sampling data:	Presents default parameter for the weight fraction of the total particulate in the worker breathing zone (mg chemical/kg chemical handled). (Table A-2)			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	Since the OSHA Total PNOR PEL is an 8-hr TWA, the exposure duration must be assumed as 8 hours/worker-day for the model defaults to apply. (footnote on pg. B-20)			
Exposure frequency:	248 days/yr (pg. 72 of 123)			
Number of workers:	On average, approximately 21 workers and 7 ONUs per facility are potentially exposed to plastic additives in the industry sectors of interest. (pg. 5-2)			
Personal protective equipment:	Within the plastics industry, suitable PPE should be worn, including gloves, hearing protection in areas of high noise levels, and eye protection. (pg. 5-2)			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008) (pg. 5-2)			
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	GS is based on US 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.The revised draft was published in 2021.	
	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		

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

Study Citation:	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	11182966			
Conditions of Use:	Repackaging			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading transport containers, container cleaning, equipment cleaning, loading of transport containers.			
Exposure route:	Dermal, Inhalation			
Physical form:	Liquid or solid			
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.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data are for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete use amounts provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple worker activities.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).
HERO ID:	11373493
Conditions of Use:	PVC Plastics Converting/Non-PVC Plastics Converting

EXTRACTION

Parameter	Data
Worker activity description:	Unloading, container cleaning, equipment cleaning
Exposure route:	Inhalation and dermal
Number of workers:	Table 5-4 identifies the number of potentially exposed employees within Plastics Converting Industry sectors. 24 employees (19 workers and 5 ONUs) are potentially exposed to the chemical of interest at each site. (pg. 6-7)
Engineering control:	Air control technologies may be used to reduce worker exposure and environmental releases due to dust generation, volatilization, or incinerator emissions. Air pollution control methods may include incineration, scrubbers, condensers, adsorption, electrostatic precipitation, and absorption, among other technologies. (pg. 4-2)

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**

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.		
HERO ID:	3827197		
Conditions of Use:	Formulation of Coatings		
EXTRACTION			
Parameter	Data		
Worker activity description:	Unloading, container cleaning, sampling, equipment cleaning, filter media changeout, packaging.		
Exposure route:	Dermal and inhalation		
Exposure frequency:	Site-specific information indicate the typical days of operation for a formulation site range from 235 days per week to 350 days per week. If the number of days of operation is not known, EPA assumes a maximum of 250 days per year based on an operating schedule of five days per week over 50 weeks per year, with a two-week annual downtime for maintenance. (pg.41-42 of 172)		
Personal protective equipment:	PPE depends on the type of potential exposure. Typically, PPE used in the workplace include safety glasses and gloves. Face shields and a particulate respirator may also be required in cases where there is a potential for dust exposure.		
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.Draft is from 2014.
	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 applications, and multiple chemical functions.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
HERO ID:	6311218
Conditions of Use:	Incorporating into formulation, mixture or reaction product as a plasticizer; Incorporating into articles as a plasticizer in plastics product manufacturing

EXTRACTION	
Parameter	Data
Worker activity description:	Exposure to solid or liquids during unloading of additives from transport container and charging additives to operation; Exposure to liquids during equipment cleaning of compounding equipment; Exposure to solids during filling containers with compounded plastic resin (page 10 of 18)
Exposure route:	inhalation and dermal (page 15 of 18)
Personal sampling data:	Inhalation: Provides methods for modeling exposures to both solids and volatile liquids (page 15-17 of 18)
Dermal exposure data:	Dermal exposure data
Exposure frequency:	250 days/yr (page 11 of 18)
Number of workers:	24 workers/site (page 15 of 18)

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

Overall Quality Determination	Medium
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Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	6311221			
Conditions of Use:	Formulation of Printing Inks			
EXTRACTION				
Parameter	Data			
Worker activity description:	unloading, cleaning, packaging (page 30 of 54)			
Exposure route:	dermal and inhalation (page 31-33 and 39-40 of 54)			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to volatile liquids and solids (page 31-32 of 54)			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	250 days/yr (page 31 of 54)			
Number of workers:	13-22 workers/site (page 30 of 54)			
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		

Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	6311221			
Conditions of Use:	Use of Printing Inks			
EXTRACTION				
Parameter	Data			
Worker activity description:	Printing operations, unloading (page 38 - 40 of 54)			
Exposure route:	dermal and inhalation (page 31-33 and 39-40 of 54)			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to volatile liquids and solids (page 39-40 of 54)			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	250 days/yr (page 38 of 54)			
Number of workers:	16-43 workers/site (page 38 of 54)			
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	

Study Citation:	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).			
HERO ID:	6385708			
Conditions of Use:	Distribution in Commerce, disposal			
EXTRACTION				
Parameter	Data			
Worker activity description:	The greatest potential for worker exposure to materials last transported occurs during heel removal.			
Personal protective equipment:	Facility personnel typically wear coveralls, safety shoes, protective glasses, and gloves during tank cleaning.			
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 multiple in-scope occupational scenarios; 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	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.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385709			
Conditions of Use:	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	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 worker activities.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385710			
Conditions of Use:	Formulation of Printing Inks			
EXTRACTION				
Parameter	Data			
Worker activity description:	Dermal exposure solid raw materials and inhalation exposure to particulate; Dermal exposure to liquid raw materials and inhalation exposure to volatile materials; Inhalation exposure to fugitive air emissions from dispersion tank; Inhalation exposure to fugitive air emissions from milling; Dermal and inhalation exposure during equipment cleaning; Dermal exposure to ink during loading and inhalation exposure from volatile components. (page 10 of 23)			
Exposure route:	Inhalation and dermal (page 10 of 23)			
Physical form:	Liquid, vapor, solid particulate (page 9 of 23)			
Number of workers:	See Table 2-2 on page 7: Total number of workers is 64,973, with the number of workers for each printing type varying from ~13,000 to ~225,000			
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		

Study Citation:	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385710			
Conditions of Use:	Use of Printing Inks			
EXTRACTION				
Parameter	Data			
Worker activity description:	Dermal exposure to ink and inhalation exposure to volatile components during unloading; Inhalation exposure to fugitive air releases from ink reservoir; Inhalation exposure to ink mist generated from printing press; Dermal and inhalation exposure during equipment cleaning; Inhalation exposure to fugitive air releases from drying (page 15 of 23)			
Exposure route:	Inhalation and dermal (page 10 of 23)			
Physical form:	Liquid, mist (page 15 of 23)			
Number of workers:	See Table 2-2 on page 7: Total number of workers is 64,973, with the number of workers for each printing type varying from ~13,000 to ~225,000			
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		

Study Citation:	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.			
HERO ID:	6385711			
Conditions of Use:	Plastics Converting			
EXTRACTION				
Parameter	Data			
Worker activity description:	Inhalation exposures to solids during unloading/transferring of compounded resins; Inhalation exposure to dusts generated during converting processes; Inhalation exposure to solids during trimming activities (page 25 of 96) Page 25-27 contains a narrative of the process where possible exposures are explained in context.			
Exposure route:	inhalation (page 25 of 96)			
Physical form:	EPA expects most plastics additives to be non-volatile liquids or solids (page 25 of 96)			
Personal sampling data:	Provides methods for modeling exposures to both solids and volatile liquids (page 55-60 of 96)			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	137-254 days/yr (page 30 of 96)			
Number of workers:	30-69 workers/site (page 53-54 of 96)			
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.
Overall Quality Determination			Medium	

Study Citation:	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385719			
Conditions of Use:	Furniture Coating Application			
EXTRACTION				
Parameter	Data			
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 and volatile liquids			
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			
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	High	Statistical distribution of samples related to spray application 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	Uncertainty not addressed. Variability addressed by considering various chemical functions and wood vs metal furniture uses
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385741			
Conditions of Use:	Incorporating into articles as a plasticizer in fabric, textile, and leather products not covered elsewhere manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	mixing			
Exposure route:	Dermal and inhalation. Inhalation is negligible.			
Dermal exposure data:	Dermal exposure data			
Number of workers:	3-6 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.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple finishing agent types.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385748			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
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			
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.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.			
HERO ID:	6549571			
Conditions of Use:	PVC Plastic Converting			
EXTRACTION				
Parameter	Data			
Worker activity description:	Worker exposures from unloading, converting process, equipment cleaning, trimming processes (pg. 16 - 18)			
Exposure route:	inhalation and dermal			
Physical form:	Describes the physical form of the chemicals in each potential exposure activity. (pg. 16 - 18)			
Exposure duration:	8 hr/day (pg. 16)			
Exposure frequency:	CEB standard assumption, 250 days/year based on 5 day work week and two weeks per year of operation shut down. (pg. 11)			
Number of workers:	Describes how to calculate the number of workers exposed per site. (pg. 15 -16)			
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. There is a brief mention of BBP, but only for vapor pressure at various temperatures.
	Metric 4:	Temporal Representativeness	Low	Assessment is more than 20 years old. Industry conditions 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		Medium		

Study Citation:	Ashworth, M. J., Chappell, A., Ashmore, E., Fowles, J. (2018). Analysis and assessment of exposure to selected phthalates found in children’s toys in Christchurch, New Zealand. International Journal of Environmental Research and Public Health 15(2):200.			
HERO ID:	4198524			
Conditions of Use:	Consumer use - paints and coating on children’s toys			
EXTRACTION				
Parameter	Data			
Exposure route:	ingestion			
Physical form:	solid			
Dermal exposure data:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data and methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from New Zealand, an OECD country
	Metric 3:	Applicability	Low	Data is for children/infant exposure to phthalates .
	Metric 4:	Temporal Representativeness	High	Report is from 2017 so less than 10 years old
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	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.			
HERO ID:	2816857			
Conditions of Use:	Use of Personal care products			
EXTRACTION				
Parameter	Data			
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	

Study Citation:	California Office of Environmental Health Hazard Assessment (OEHHA) (2013). Evidence on the carcinogenicity of butyl benzyl phthalate.			
HERO ID:	5155605			
Conditions of Use:	Manufacturing - domestic			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal			
Physical form:	vapor			
Personal sampling data:	Only urinary concentrations are listed and they are for general population exposure			
Number of workers:	NIOSH estimates that 331,000 workers are exposed			
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 is from US	
	Metric 3: Applicability	Medium	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and workactivities.	
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by referencing multiple studies, uncertainty is not addressed.	
Overall Quality Determination		Medium		

Study Citation: Canada., G.o. (2020). Phthalate substance grouping – Information sheet.
HERO ID: 7349060
Conditions of Use: General population exposure

EXTRACTION

Parameter	Data
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). Exposure to DIBP and DINP may also occur from the use of certain plastic toys and children’s articles (for example, from mouthing these objects). (p. 4).

EVALUATION

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	Uninformative	Exposure routes are for the general population and do not translate to occupational setting.
	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.

Overall Quality Determination **Uninformative**

Study Citation:	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
HERO ID:	664488			
Conditions of Use:	Commercial use			
EXTRACTION				
Parameter	Data			
Exposure route:	People are exposed through ingestion, inhalation, and, to a lesser extent, dermal contact with products that contain phthalates.			
Physical form:	BzBP is a solvent			
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	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	This metric is not applicable to the data being extracted	
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		High		

Study Citation:	Easter, E., Lander, D., Huston, T. (2016). Risk assessment of soils identified on firefighter turnout gear. Journal of Occupational and Environmental Hygiene 13(9):1-38.
HERO ID:	3159225
Conditions of Use:	Firefighting

EXTRACTION	
Parameter	Data
Worker activity description:	Depending on the assignment, tasks, and time spent at the fire, a firefighter may be exposed to the products of combustion at varying levels. Today, firefighters also spend a considerable amount of time in the “post-fire,” or overhaul, environment, and their gear often becomes covered/contaminated with post-fire combustion products.[12] Although routine cleaning procedures are recommended to ensure proper care and maintenance of firefighter turnout gear, procedures are often ignored, leading to increased exposure of hazardous chemicals and cross contamination.
Exposure route:	dermal
Dermal exposure data:	Dermal exposure data
Personal protective equipment:	firefighter’s turnout gear includes a coat and trousers or overalls. The coat and trousers are made up of three different layers: the outer shell provides flame resistance, a water-resistant middle layer is referred to as the moisture barrier, and an inner thermal liner provides protection for the skin against radiation, convection, and conduction which are types of heat transfer.[14] For head and neck protection, a hood, or balaclava, is worn. The hood’s knit structure and placement in direct contact with the skin allows for an increased risk of dermal absorption of soils.

		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	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.
	Metric 4: Temporal Representativeness	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

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Study Citation:		Easter, E., Lander, D., Huston, T. (2016). Risk assessment of soils identified on firefighter turnout gear. Journal of Occupational and Environmental Hygiene 13(9):1-38.		
HERO ID:		3159225		
Conditions of Use:		Firefighting		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 7:		Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.		
HERO ID:	1333728		
Conditions of Use:	Processing - incorporation into product		
EXTRACTION			
Parameter	Data		
Physical form:	clear, oily liquid (Page 14, see page for more physical and chemical properties)		
Area sampling data:	Data in humans relevant to the assessment of the potential adverse effects of BBP are restricted to limited studies of respiratory/neurological effects or cancer in populations of workers generally exposed to mixtures of plasticizers, of which BBP was a minor component (Page 34).		
Dermal exposure data:	nan		
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	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, such as a consumer DIY scenario that is similar to a worker scenario. Information on dermal exposure could be applicable to occupational scenario.
	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	Low	Distribution of samples 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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Low	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.			
HERO ID:	7325021			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Worker activity description:	PVC conversion/formulation processes. The formulation(production) of sealants may be done in open or closed mixing processes.			
Exposure route:	inhalation and dermal exposure			
Physical form:	inhalation of BBP-gas and, if formed, liquidaerosol			
Comments:	Table 2-4 BBP use for processing in 2007 and 2004			
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	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 20 years
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2021). Registration dossier: Benzyl butyl phthalate: Toxicological summary.			
HERO ID:	7349229			
Conditions of Use:	All occupational scenarios (general exposure route information)			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation (assumed that 100% absorbed after inhalation)			
Dermal exposure data:	nan			
Exposure duration:	Assumed 8-hour work shift			
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	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	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	Giulivo, M., Alda, L.d., M., Capri, E., Barceló, D. (2016). Human exposure to endocrine disrupting compounds: Their role in reproductive systems, metabolic syndrome and breast cancer. A review. Environmental Research 151:251-264.			
HERO ID:	3469349			
Conditions of Use:	General population exposure			
EXTRACTION				
Parameter		Data		
Area sampling data:		Table 1: 3.44-106 ng/g total PHTs in indoor dust; 1.246-839 ng/m3 total PHTs in indoor air		
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	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	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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	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.			
HERO ID:	1987638			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	creams, lotions, cleansers, shampoos, body washes			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	The data are from a non-OECD country. China	
	Metric 3: Applicability	Medium	Data are for consumer use of Personal care products, which is similar to the in-scope occupational scenario other uses of commercial products.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		High		

Study Citation:	Hagmar, L., Akesson, B., Nielsen, J., Andersson, C., Linden, K., Attewell, R., Moller, T. (1990). Mortality and cancer morbidity in workers exposed to low levels of vinyl chloride monomer at a polyvinyl chloride processing plant. American Journal of Industrial Medicine 17(5):553-565.			
HERO ID:	675185			
Conditions of Use:	Processing - plasticizer			
EXTRACTION				
Parameter	Data			
Number of sites:	1			
Worker activity description:	mixing department, calendar operators, machine attendants, raw material transport workers, PVC crushing			
Exposure route:	inhalation			
Physical form:	vapor, mist			
Personal sampling data:	TWA of PBZ of phthalic acid esters among "highly" exposed workers (calendar operators) was >0.5 - 3 mg/m^3. Among "moderatley" exposed workers (mixing departments and machine attendants) >0.1 - 0.5 mg/m^3. Among "low" exposed workers (quality inspectors and packing personnel) up to 0.1 mg/m^3.			
Area sampling data:	TWA of PBZ of phthalic acid esters among "highly" exposed workers (calendar operators) was >0.5 - 3 mg/m^3. Among "moderatley" exposed workers (mixing departments and machine attendants) >0.1 - 0.5 mg/m^3. Among "low" exposed workers (quality inspectors and packing personnel) up to 0.1 mg/m^3.			
Exposure duration:	nan			
Number of workers:	2,042			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Does not used frequently referenced data but does not indicate any flaws
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for Sweden (OECD country)
	Metric 3:	Applicability	High	Applicable to condition of use
	Metric 4:	Temporal Representativeness	Low	Study conducted from 1961 to 1985 so greater than 20 years old
	Metric 5:	Sample Size	Medium	Some statistical information provided, unclear if it is representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Documents results and assumptions but not method of analysis of samples. Sources generally described
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across different departments but does not address uncertainty
Overall Quality Determination			Medium	

Study Citation:	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.
HERO ID:	6558536
Conditions of Use:	Commercial use - spray painting

EXTRACTION	
Parameter	Data
Worker activity description:	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 Garbat Inc. Vehicle prep station shown in article how 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.
Number of workers:	7
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. At the time, OSHA respiratory practice standards is not being completely followed.
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. Employees required to wear respirators when operating with spray paint operations as well as sanding, grinding, and welding.

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	Low	Data is likely for an in-scope of use which is paints and coatings, however the study does not mention BBP or phthalates in this source.
	Metric 4: Temporal Representativeness	Low	The 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	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.

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Study Citation:	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.		
HERO ID:	6558536		
Conditions of Use:	Commercial use - spray painting		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 4: Variability and Uncertainty			
	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Low	

Study Citation:	IARC, (1999). Hexachlorobutadiene. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, vol. 73 73:277-294.			
HERO ID:	18474			
Conditions of Use:	Manufacturing/processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Occupational exposure may occur during its production and in its use as a plasticizer in polyvinyl chloride products such as vinyl floor tiles.			
Number of workers:	for Occupational Safety and Health, 1998), approximately 330 000 workers in the United States were potentially exposed to butyl benzyl phthalate			
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 thatare 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.	
	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.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	Kang, Y., Man, Y. B., Cheung, K. C., Wong, M. H. (2012). Risk assessment of human exposure to bioaccessible phthalate esters via indoor dust around the Pearl River Delta. Environmental Science & Technology 46(15):8422-8430.			
HERO ID:	1311700			
Conditions of Use:	processing/commercial use			
EXTRACTION				
Parameter	Data			
Worker activity description:	hospital employee, electronic factory - assembling electronic equipment such as compouters, manufacturing plant - producing furniture, toys and textiles.			
Exposure route:	inhalation, ingestion			
Physical form:	dust			
Area sampling data:	Samples taken were for many gen pop locations and then for an electronic factory, manufacturing plant and hospital. The electric factory had a median exposure level of 10.70 ug/g of dust with a range between 3.32 - 26.1 ug/g. The manufacutring plant had a median exposure level of 23.6 ug/g of dust with a range of 3.18 - 33.4 ug/g. The hopsital had a median exposure level of 10.6 ug/g with a range between 4.93 - 328 ug/g. Also assesses the bioaccessiblity of BBP for human exposure to be around 12% of total BBP inhaled or ingested			
Comments:	See table 2			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data and sound methods that do not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China
	Metric 3:	Applicability	High	Applicable to condition of use
	Metric 4:	Temporal Representativeness	High	Study conducted in 2011/2012 so less than 10 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. Unclear if analysis is representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results, methods and assumptions. Data sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination			Medium	

Study Citation:	Lacey, S., Alexander, B. M., Baxter, C. S. (2014). Plasticizer contamination of firefighter personal protective clothing - a potential factor in increased health risks in firefighters. Journal of Occupational and Environmental Hygiene 11(5):D43-D48.			
HERO ID:	2345987			
Conditions of Use:	Plasticizer			
EXTRACTION				
Parameter	Data			
Worker activity description:	Firefighter			
Exposure route:	possibility of dermal exposure			
Physical form:	solid			
Dermal exposure data:	Dermal exposure data			
Personal protective equipment:	Protective hoods, coats and structural gloves			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality method from frequently-used sources, an EPA method
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the US
	Metric 3:	Applicability	Low	Data are for firefighter phthalate level on clothes, which is similar to an in-scope occupational scenario
	Metric 4:	Temporal Representativeness	High	Report is 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	Medium	Variability addressed by testing used and unused clothing. Uncertainty not addressed
Overall Quality Determination			Medium	

Study Citation:	Lowell Center for Sustainable Production at the University of Massachusetts, (2011). Technical briefing: Phthalates and their alternatives: Health and environmental concerns. :23.			
HERO ID:	5349749			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Exposure route:	Since phthalates are not chemically bound to the PVC polymer, they can be released from products or dissolve upon contact with liquids or fats. Phthalates have low volatility and are slowly released from PVC products during use, diffusing into the air. They are also released into the environment during their production, processing and waste disposal. Once in the environment, phthalates bind to particles—primarily dust particles in the home—and can be carried in the air over long distances [2]. Human exposure to phthalates occurs through inhalation and ingestion of contaminated air and food as well as from skin contact. An additional exposure route for young children is through mouthing toys, childcare articles, and other products containing phthalates. (p. 6).			
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 is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	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.
HERO ID:	4728432
Conditions of Use:	Use of plastic products

EXTRACTION

Parameter	Data
Exposure route:	Populations are exposed to environmental phthalates from routes of ingestion, inhalation, derma, and intravenous contact throughout life, including intrauterine development.
Personal sampling data:	The inhalation dose of exposure to phthalates was estimated at 0.845, 0.423, 0.203, 0.089, and 0.070 $\mu\text{g/kg}$ body mass/day for infants, toddlers, children, teenagers, and adults, respectively (Tran and Kannan 2015).

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, 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	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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination**Medium**

Study Citation:	Muenhor, D., Moon, H. B., Lee, S., Goosey, E. (2018). Organophosphorus flame retardants (PFRs) and phthalates in floor and road dust from a manual e-waste dismantling facility and adjacent communities in Thailand. Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances & Environmental Engineering 53(1):79-90.		
HERO ID:	4164912		
Conditions of Use:	disposal - electronic waste		
EXTRACTION			
Parameter	Data		
Number of sites:	1		
Exposure route:	ingestion		
Physical form:	vapor, dust		
Personal sampling data:	Occupational exposure to adults was evaluated for average dust ingestion at a median value of 5.7 x 10^-5 ug/kg bw/day and for high-end dust ingestion at a median value of 1.43 x 10^-4 ug/kg bw/day		
Area sampling data:	Facility floor dust BBP dust concentration was averaged at 690 ng/g with a range between 410 - 940 ng/g. Road dust by the facility was averaged at 30 ng/g with a range between 20-50 ng/g.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data and methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data is from Thailand, a non-OECD country
	Metric 3: Applicability	Low	Data is for electronic waste facility which is similar to disposal
	Metric 4: Temporal Representativeness	Low	Report’s data is from 2014 so less than 10 years old
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics 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		Low	

Study Citation:	Ng, M. G., Tongeren, van, M., Semple, S. (2014). Simulated transfer of liquids and powders from hands and clothing to the mouth. Journal of Occupational and Environmental Hygiene 11(10):633-644.			
HERO ID:	3222353			
Conditions of Use:	Commercial use: laboratory			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Physical form:	liquids and powders			
Dermal exposure data:	Dermal exposure data			
Comments:	TABLE III. Estimated Olive Oil Transfer Efficiencies (TE)TABLE IV. Data Summary from Task 1: Experiments of Direct and Indirect Hand-To-Mouth TransferTABLE V. Data Summary from Task 2: Experiments of Direct and Indirect Glove and Hand-To-Mouth TransferTABLE VI. Data Summary from Task 4: Experiments Involving Wiping the Perioral Area with the Arm or a Cotton Sleeve			
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. NIOSH 7903 and OSHA ID121 methods used. Published article.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country, UK.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation. Not specific to BBP.
	Metric 4:	Temporal Representativeness	High	No more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation: NICNAS, (2016). C4-6 side chain transitional phthalates: Human health tier II assessment.
HERO ID: 5155535
Conditions of Use: Manufacturing/processing/consumer use

EXTRACTION

Parameter	Data
Exposure route:	inhalation, ingestion, dermal
Physical form:	vapor
Dermal exposure data:	nan
Comments:	bioavailability from oral exposure expected to be 100%, from dermal exposure to be 5%.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Low	Report does not specify the technique or methods used.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Australia, an OECD country
	Metric 3: Applicability	Uninformative	Data is not applicable to conditions of use
	Metric 4: Temporal Representativeness	High	Referenced data is less than 10 years old
	Metric 5: Sample Size	Low	Sample distribution not characterized by statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Results provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination **Uninformative**

Study Citation:	NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of butyl benzyl phthalate (BBP).			
HERO ID:	678590			
Conditions of Use:	Commercial Use (and some widely applicable information)			
EXTRACTION				
Parameter	Data			
Exposure route:	Off-gassing from building materials has been reported as a potential source of BBP exposure through inhalation; however, exposure has been postulated to be minimal because of BBP’s low vapor pressure. The available data, though minimal, support this view (page 17-8). Dermal contact with products containing BBP is possible, but absorption through skin is most likely minimal (page 18).			
Dermal exposure data:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	From the US Department of Health and Human Services
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	From United States
	Metric 3:	Applicability	High	Fits BBP conditions of use
	Metric 4:	Temporal Representativeness	Medium	From 2003 thus less than 20 years old, so expected to be reasonably representative of current conditions
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	OECD, (2004). Emission scenario document on lubricants and lubricant additives.			
HERO ID:	3827416			
Conditions of Use:	Formulation of Lubricants			
EXTRACTION				
Parameter	Data			
Physical form:	PDF Pg. 19 Solids, liquids, gasses, or powders.			
Exposure duration:	Default 8 hours/day			
Exposure frequency:	PDF Pg. 65”For a lubricant tonnage of less than 1,000 tonnes, a production period of 50 days is assumed. For a tonnage between 1,000 and 5,000 tonnes 100 days production is assumed, and for greater than 5,000 tonnes a 300 day period is assumed. ”			
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 developed using data from the U.K., an OECD country.
	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	Data is greater than 10 but less than 20 years old (2004).
	Metric 5:	Sample Size	Low	Exposure duration and number of working days is not characterized by any 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 plant types.
Overall Quality Determination			Medium	

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:	Formulation of paint and varnish			
EXTRACTION				
Parameter	Data			
Number of workers:	This Bureau of Census publication lists the number of plants in various size ranges such as 1 to 3 employees, 4 to 7 employees, etc. The total number of employees in any plant size can also be computed and expressed as a percentage of total employment in the Paint and Varnish Industry. For example, as shown by arrows on Figure 31, 30% of the plants in the industry employ less than 8 people, 30% of the industry employees work in plants that have a plant employee size of less than 50, and this plant size accounts for 78% of the industry plants. // Page 196: 66,100 total employees.			
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	High	The release data are for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	The data were collected before the most recent federal regulatory action or update or are more than 20 years old if no federal regulation is established. The operations, equipment, and worker activities are not available or indicate that the associated data are expected to be outdated.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.	
Overall Quality Determination		High		

Study Citation:	Pronk, J., M.E., Woutersen, M., Herremans, M., J.M. (2020). Synthetic turf pitches with rubber granulate infill: are there health risks for people playing sports on such pitches?. Journal of Exposure Science & Environmental Epidemiology 30(3):567-584.		
HERO ID:	5043594		
Conditions of Use:	Use of synthetic rubber turf pitches for sports		
EXTRACTION			
Parameter	Data		
Exposure route:	For children and adults playing amateur football, exposure scenarios were developed to estimate their potential exposure to substances in rubber granulate via the oral (through accidental ingestion), dermal (through skin contact) and inhalation route (through inhalation of vapours or rubber dust) (p. 5). The results show that the oral route is the most important exposure route for PAHs and phthalates in rubber granulate (p. 9).		
Personal sampling data:	See Table 2 - Assumed rubber dust concentrations of 12 ug/m3		
Dermal exposure data:	Dermal exposure data		
Exposure duration:	See Table 2 - assumed exposure durations of 1, 1.5, and 2 hrs/event		
Exposure frequency:	See Table 2 - Assumed frequency of 2-5 times/week over 7 or 10 months/yr.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Article is peer reviewed and based on scientifically sound approaches or methods.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	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	High	The journal article with the model was published in 2018, which is less than 10 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The model characterizes variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.			
HERO ID:	10472417			
Conditions of Use:	Floor Coverings			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation, Dermal, Ingestion			
Exposure duration:	Mentions the life span of vinyl flooring (30 - 50 years), but exposure duration is not provided.			
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	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, exposure to BBP is not specifically investigated.	
	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	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	Variability and uncertainty not applicable to qualitative data relating to exposure route.	
Overall Quality Determination		High		

Study Citation:	Shi, W.,ei, Guo, J., Zhou, Y., Deng, D., Han, Z., Zhang, X., Yu, H., Giesy, J. P. (2017). Phthalate esters on hands of office workers: Estimating the influence of touching surfaces. Environmental Science & Technology Letters 4(1):1-5.			
HERO ID:	3520009			
Conditions of Use:	Commercial use - paints and coatings			
EXTRACTION				
Parameter	Data			
Number of sites:	10			
Worker activity description:	office workers			
Exposure route:	dermal			
Physical form:	solid (dust), vapor			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	at least 20 hours a week			
Number of workers:	55			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality not from frequently used sources and do not indicate quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, a non-OECD country
	Metric 3:	Applicability	Uninformative	Data is for office workspace which is not in-scope
	Metric 4:	Temporal Representativeness	High	Report is from 2016 so less than 10 years old
	Metric 5:	Sample Size	Low	Data characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing the same employees multiple times but does not address uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.			
HERO ID:	675435			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Number of workers:	68,488			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for manufacture/import, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.			
HERO ID:	11138808			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Number of sites:	Used to develop a method to estimate number of sites and workers.			
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 (https://www.bls.gov/oes/current/oes_research_estimates.htm).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	BLS documents results and methods, but underlying survey results not accessible.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Limited discussion of variability and uncertainty in results.	
Overall Quality Determination		High		

Study Citation:	U.S. Census Bureau, (2015). Statistics of U.S. Businesses (SUSB).			
HERO ID:	5097881			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Number of sites:	Used to develop a method to estimate number of sites and workers.			
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	U.S. Census Bureau is expected to use reliable survey and census 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 Census Bureau SUSB data are from 2015	
	Metric 5: Sample Size	High	The SUSB is a compilation of data extracted from the Business Register, U.S. Census Bureau’s ”most complete, current, and consistent data for U.S. business establishments.” Incorporates data from economic censuses and current business surveys, quarterly and annual Federal tax records, and other departmental and federal statistics. Expected to be sufficiently representative. (https://www.census.gov/programs-surveys/susb/about.html)	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	U.S. Census Bureau documents results and methods, but underlying survey results not accessible.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Limited discussion of variability and uncertainty in results.	
Overall Quality Determination		High		

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

Study Citation:	U.S. EPA, (2012). Phthalates action plan.			
HERO ID:	4565597			
Conditions of Use:	General industrial manufacturing, processing, or use			
EXTRACTION				
Parameter	Data			
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.			
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	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	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			High	

Study Citation:	Wang, L., Gong, M., Xu, Y., Zhang, Y. (2017). Phthalates in dust collected from various indoor environments in Beijing, China and resulting non-dietary human exposure. Building and Environment 124(Elsevier):315-322.
HERO ID:	4176702
Conditions of Use:	commercial use

Parameter	Data
Exposure route:	inhalation, ingestion
Physical form:	dust
Area sampling data:	Other studies found the BBP exposures across different countries, none are for occupational exposures, just home and consumer/commercial uses. Dust concentration samples ranged from 0.2 - 340 ug/g of dust.

Domain	Metric	EVALUATION Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	The report uses high quality data that are not from frequently used sources and does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data is from China, 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	Data was collected in 2010-2011 so just under 10 years old.
	Metric 5: Sample Size	Low	Distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Report results are provided by underlying methods, data sources and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Variability addressed by referencing data from multiple sources across different countries. Uncertainty analysis conducted as well.

Overall Quality Determination

Low

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
HERO ID:	5547263			
Conditions of Use:	Use of plastics			
EXTRACTION				
Parameter	Data			
Exposure route:	Human exposure to phthalates arises mainly from ingestion, inhalation, and dermal absorption [17,18].			
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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	[Redacted] (2021). TANKS 4.0.9d: Emissions Report - Detailed format tank identification and physical characteristics.			
HERO ID:	10617127			
Conditions of Use:	Unknown			
EXTRACTION				
Parameter	Data			
Description of release source:	Tank losses (1/6)			
Release quantity:	Total losses are 0.0005 lb/yr. 0.0001 lb/yr is from standing losses and 0.0004 lb/yr are from working losses (3/6).			
Comments:	Unknown COU as identifying information is redacted.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Analysis uses AP-42 for estimating tank losses, but it is not clear that inputs are representative.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the U.S., but it is not clear if the data is representative.
	Metric 3:	Applicability	Uninformative	Condition of use is unknown.
	Metric 4:	Temporal Representativeness	Medium	Data are no more than 10 years old, but it is unclear if the data are representative of current industry.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release quantity provided but missing release frequency, emission factors, and waste treatment.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Uninformative		

Study Citation:	Berge, A., Gasperi, J., Rocher, V., Coursimault, A., Moilleron, R. (2012). Phthalate and alkylphenol removal within wastewater treatment plants using physicochemical lamellar clarification and biofiltration. WIT Transactions on Ecology and the Environment 164:357-368.
HERO ID:	2816494
Conditions of Use:	Disposal - wastewater treatment

EXTRACTION

Parameter	Data
Release quantity:	Treats 240,000 m ³ of urban wastewater of Paris and its suburbs. BBP in raw wastewater averaged 1.57 ug/L with a range of 0.97 - 2.29 ug/L; BBP in settled wastewater averaged 0.56 ug/L with a range of below limit of quantification and 0.93 ug/L; BBP in final effluent averaged 0.10 ug/L with a range below limit of quantification and 0.21 ug/L.
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	Report uses high quality data/techniques and methods that are not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from France, an OECD country
	Metric 3: Applicability	Low	Data are for wastewater treatment, which is similar to the in-scope occupational scenario of disposal.
	Metric 4: Temporal Representativeness	High	Data is no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Data addresses variability by conducting multiple site visits but does not address uncertainty.

Overall Quality Determination**Medium**

Study Citation:	Cadogan, D., Howick, C. (2000). Plasticizers.			
HERO ID:	6311430			
Conditions of Use:	Processing - Plasticizers			
EXTRACTION				
Parameter	Data			
Description of release source:	Though the article does not mention emissions of BBP specifically, phthalates may be emitted to the environment during their incorporation into PVC and from the finished PVC article during its use or after its final disposal. (pg 22 of 30)			
Release quantity:	Not BBP specific: Inquiries of all the principal plasticizer producers indicate a maximum total emission in Western Europe of 220 t/yr, 90% of which is to the water compartment. This level is expected to decrease in the future due to increasing plant water treatment. It is estimated that, as a result of cleaning and spillages, the maximum emission to the environment is 80 t/yr. (pg 23 of 30)Not BBP specific: During the production of flexible PVC products plasticizers are exposed for up to several minutes to temperatures of ~180°C. The exact conditions depend on the processing technique employed, but it is evident that the loss of plasticizer by evaporation and degradation can be significant.			
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	High	The release data are for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	Data are greater than 20 years old.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Release media provided but no other metadata.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Low		

Study Citation:	Cadogan, D., Howick, C. (2000). Plasticizers.			
HERO ID:	6311430			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	Though the article does not mention emissions of BBP specifically, phthalates may be emitted to the environment during their incorporation into PVC and from the finished PVC article during its use or after its final disposal. (pg 22 of 30)			
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	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data are greater than 20 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release media provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Low		

Study Citation:	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.
HERO ID:	10442901
Conditions of Use:	Industrial application of coatings by spraying

EXTRACTION

Parameter	Data
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 release data are for an occupational scenario within the scope of the risk evaluation but is not specific to BBP use.
	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	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study addresses variability in the determinants of release but not uncertainty in the release results.

Overall Quality Determination**Medium**

Study Citation:	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.
HERO ID:	10442902
Conditions of Use:	Paints and coatings, Ink, toner and colorant products

EXTRACTION

Parameter	Data
Description of release source:	Professional application of coatings and inks by spraying
Release or emission factors:	Release or emission factors
Release frequency:	Indoor - 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	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is general and not specific to the chemical.
	Metric 4: Temporal Representativeness	High	Fact sheet is from 2020.
	Metric 5: Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed by including emission factors for different processes, but uncertainty is not addressed.

Overall Quality Determination**Medium**

Study Citation:	Chakraborty, P., Sampath, S., Mukhopadhyay, M., Selvaraj, S., Bharat, G. K., Nizzetto, L. (2019). Baseline investigation on plasticizers, bisphenol A, polycyclic aromatic hydrocarbons and heavy metals in the surface soil of the informal electronic waste recycling workshops and nearby open dumpsites in Indian metropolitan cities. Environmental Pollution 248(Elsevier):1036-1045.
HERO ID:	5433039
Conditions of Use:	Disposal

EXTRACTION

Parameter	Data
Number of sites:	4
Release quantity:	Min-max (mean +/- SD); EWR: 34-413 (140+/- 154) ng/g; EWD: ND-81 (29 +/- 30) ng/g; EWS: 23-113 (54+/-42); Dumpsite: 20-35 (23 +/- 5) ng/g. EWR is precious metal recovery sites; EWD is e-waste dismantling sites; EWS is e-waste shredding sites. 2014 global e-waste was 41.8 MT; 2009: india e-waste was 50,000 tons
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 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.
	Metric 3: Applicability	Low	Data is for e-waste which is not in-scope but is similar to the in-scope use of disposal.
	Metric 4: Temporal Representativeness	High	The data are generally no more than 10 years old (2014).
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.

Overall Quality Determination**Medium**

Study Citation:	Clement Associates., Inc. (1989). Human health risk assessment for the Ciba-Geigy St Gabriel, LA incineration project with cover letter dated 042789.
HERO ID:	890000189:#86-890000189.
Conditions of Use:	1335586
	Disposal

EXTRACTION

Parameter	Data
Description of release source:	incinerator to dispose of aqueous and organic wastes produced on site.
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
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	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 include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release.

Overall Quality Determination**Medium**

Study Citation:	DOE., WA (2020). Priority consumer products report to the Legislature: Safer products for Washington implementation phase 2.			
HERO ID:	10454465			
Conditions of Use:	Floor Coverings			
EXTRACTION				
Parameter	Data			
Description of release source:	Phthalates found in vinyl flooring can be released from the product into air and dust. They can also be released into our wastewater when we launder dusty items. Phthalates (BBP and DEHP) have been found in both WWTP influent and effluent. Phthalates are also an emerging and major source of leachate contaminant from landfills. There is widespread evidence from worldwide landfill studies that phthalates are leaching, and can become ubiquitous contaminants in the surrounding environment. Disposal of household materials such as flooring is a primary source of phthalates that can contaminate various environmental media.			
Release quantity:	In 2011, Ecology’s Puget Sound Toxics Loading Study estimated the environmental release of phthalates to the Puget Sound area from various sources, including vinyl flooring. Twenty percent of phthalates, seven tons per year, are attributable to PVC products. Of the PVC products, vinyl flooring is estimated to contribute 1.4% of phthalates or 0.1 metric tons of phthalates released into Puget Sound each year. Expanding this 0.1 metric tons estimate from the Puget Sound region only to the entire population in Washington, we expect that 0.17 metric tons (374 pounds) of phthalates are released to the environment from vinyl flooring.			
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.
	Metric 3:	Applicability	Low	The release data are for an occupational scenario within the scope of the risk evaluation but the release data is for Washington state only. Also, release data is not chemical-specific.
	Metric 4:	Temporal Representativeness	Medium	Data is more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	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:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.
HERO ID:	1333728
Conditions of Use:	Disposal

EXTRACTION

Parameter	Data
Description of release source:	BBP has been detected in stack emissions from hazardous waste combustion and from coal-fired power plants in the United States. BBP was identified, but not quantified, in extracts of municipal incinerator fly ash from the Netherlands, but it was not detected in extracts from Ontario (detection limits not stated) (page 17)
Release quantity:	Reasonable worst-case emissions of BBP from incinerators, boilers and industrial furnaces burning wastes were predicted to be 3 µg/m ³ waste gas. In a study of four U.S. coal-fired utility boiler plants, the emission rates for BBP in flue gases ranged from 210 to 3400 mg/hour (Page 17)
Waste treatment methods and pollution control:	nan

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	Medium	From Canada, an OECD country
	Metric 3: Applicability	High	Data is applicable to chemical of interest and its uses
	Metric 4: Temporal Representativeness	Low	Data are more than 20 years old
	Metric 5: Sample Size	Low	Distribution of samples is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by showing data over multiple years but does not address uncertainty

Overall Quality Determination**Medium**

Study Citation:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.			
HERO ID:	1333728			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	BBP is released into the environment from facilities that manufacture the substance or blend the substance with resins. (page 14) Most releases of BBP appear to be to the atmosphere, but the substance has also been detected in industrial and municipal liquid effluents (page 8).			
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	Medium	From Canada, an OECD country
	Metric 3:	Applicability	High	Data is applicable to chemical of interest and its uses
	Metric 4:	Temporal Representativeness	Low	Data are more then 20 years old
	Metric 5:	Sample Size	N/A	qualitative information
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:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.		
HERO ID:	1333728		
Conditions of Use:	Processing - incorporation into product		
EXTRACTION			
Parameter	Data		
Description of release source:	BBP is released into the environment from facilities that manufacture the substance or blend the substance with resins. (page 14) Most releases of BBP appear to be to the atmosphere, but the substance has also been detected in industrial and municipal liquid effluents (page 8). BBP has been detected in emissions from carpets, PVC flooring, and vinyl wall coverings. It is also a component of some consumer products and could be used as a component of certain cosmetics, such as nail polish (page 17)		
Release quantity:	3.7 tonnes released in 1994; 3.55 tonnes released into atmosphere from one facility, 0.13 tonnes from "chemical and chemical products industries", 0.02 tonnes from "paper and allied products industries" and 3.55 tonnes from "other manufacturing industries". In 1995, total on-site releases were 6.54 tonnes, 4.32 from the same facility that released the most in 1994. (Page 16) In 1996 releases were 6 tonnes in the atmosphere. (Page 17)Large range of chemical concentrations for various release sources listed on Table 1 (page 15). Range varies depending on the source, from <0.002 µg/L in Ontario organic chemical manufacturing sector effluents up to 50 µg/L in storm sewer effluent. Several industrial plants present on list.		
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	Medium	From Canada, an OECD country
	Metric 3: Applicability	High	Data is applicable to chemical of interest and its uses
	Metric 4: Temporal Representativeness	Low	Data are more then 20 years old
	Metric 5: Sample Size	Low	Distribution of samples is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by showing data over multiple years but does not address uncertainty
Overall Quality Determination		Medium	

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.
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	Medium	The data are from an OECD country other than the U.S.,
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	The data are generally no more than 10 years old.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative
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:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Description of release source:	Manufacture of BBP in the EU			
Release quantity:	Emissions (t/y)EU Manufacture of BBPAir: 0.1Soil: N.D.Waste Water: 220			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for manufacture, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and release frequency provided but missing emission factors.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Low	

Study Citation:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Description of release source:	Processing of BBP including processing of hard PVC, processing of sealants, processing of coatings and inks, processing of adhesives, and processing of other non-polymeric materials.			
Release quantity:	Annual release of BBP from processing in EU (t/y)Air: 19Soil: 5.3Wastewater: 10			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Methodology is not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from the EU.	
	Metric 3: Applicability	High	Data are for processing, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release media and release frequency provided but missing emission factors.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Low		

Study Citation:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Formulation			
EXTRACTION				
Parameter	Data			
Description of release source:	Formulation using BBP such as plastisol coating for flooring, coating of leather and textiles, and calendering of films.			
Release quantity:	Emissions (t/y)EU formulation of BBPAir: 1Soil: 0.3Waste Water: 4			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for formulating products with manufactured BBP, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Release media and release frequency provided but missing emission factors.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Low	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.			
HERO ID:	7325021			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Description of release source:	Air and water releases - For all PVC conversion processes, the RAR uses a split between air releases and releases to waste water of 50%/50%, based on the ESD assumption that while most releases occur initially to air at elevated temperatures, the gaseous BBP is subsequently condensed in the conversion premises resulting in BBP following liquid releases (probably via cleaning processes).			
Release quantity:	Table 2.6 provides release (t/y) data on Air, Soil, Waste water, WasteTable 2-7 Estimated BBP releases from processing (including releases from formulation where formulation and processing takes place at the same site)			
Release or emission factors:	Release or emission factors			
Comments:	Table 2-6 Estimated BBP releases from formulation			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	data are more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
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 ofthe release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination			High	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.		
HERO ID:	7325021		
Conditions of Use:	consumer use		
EXTRACTION			
Parameter	Data		
Description of release source:	The releases are life-time emissions indicating the ultimate fate of the substance in the end-products.Nearly 100% of the BBP-containing articles are used for indoor applications. Sealants are believed to be mainly used for insulating glazing which may be considered an outdoor use, but the sealant in the glazing is not exposed to the weather and the emissionsfrom the sealant is considered to resemble releases from indoor uses. Therefore no assessment has been performed with respect to direct release to the environment during service life. (P. 29/87)		
Release quantity:	Table 2-8 BBP releases from end-products during their lifetimeReleases to the environment, t/yAir, Soil, Waste water, Solid waste		
Release or emission factors:	Release or emission factors		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	data are more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
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 ofthe release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		High	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.		
HERO ID:	7325021		
Conditions of Use:	Disposal		
EXTRACTION			
Parameter	Data		
Description of release source:	Solid waste incinerationMunicipal landfillsBiological treatment/compostWaste water and sewage sludge		
Release quantity:	Solid Waste:The following concentrations of BBP were measured (Kjølholt et al. 1994):Flue gas: <0.01-0.19 Sg/m2Clinker: 0.02 - 0.2 mg/kgFly ash: <0.02 - 0.44 mg/kgFlue gas cleaning residue: <0.2 mg/kgWaste water: 0.02 - 0.04 Sg/lThe total amount of BBP in residues was 0.4 tonnes indicating that less than 1% of the BBP was not destroyed by the incineration.Landfilling:The amount of BBP discharged with leachate was estimated as2.1 tonnes/year in the RAR based on data from the UK and leachate concentrations from Sweden (based on the RAR).Biological treatment/compost:Phthalates may be present in materials directed to biological waste treatment. In compost produced in Denmark, a concentration of <0.1 mg BBP/kg has been registered, corresponding to total quantity of <1 kg for all compost produced in Denmark (Hoffmann1996). This quantity will be directed to soil. Assuming a similar situation in other European countries, the total amount of BBPdirected to soil with compost may be roughly estimated as <1 kg * 488.5/5.3 corresponding to <0.1 tonnes BBP/year.Waste water and sewage sludge:Reported measurements indicate that around 97-100% of BBP present in waste water will be removed by waste water treatment processes (Hoffmann 1996). Sludge concentrations between <0.4 and 0.7 mg BBP/kg DS have been reported (Hoffmann 1996). Based on the data reported it may be assessed that mean values would likely be about 0.5 mg BBP/kg dry matter. (P. 33/87)		
Comments:	SummaryThe releases from the main waste operations are shown in Table 2-10 below. Comparedto the estimated releases during the use of the end-product, the releases from waste disposal are small.Table 2-10 Releases of BBP from main solid waste operations		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	data are more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
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 ofthe release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		High	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates: Annexes.			
HERO ID:	7325405			
Conditions of Use:	Flooring and wall covering			
EXTRACTION				
Parameter	Data			
Description of release source:	To the extent the materials contain phthalates these substances may be released and bound to dust in indoor environment. Phthalates present on the surface of wall covering and flooring may be a source for exposure of small children touching the vinyl with fingers, etc. Phthalates present on the surface of wall covering and flooring may be removed by washing and thereby be disposed of with residues from the washing process, e.g., washing water directed to sewer systems.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Information 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	High	release data are for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	no more than 10 years old,	
	Metric 5: Sample Size	N/A	Exposure sources info	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	N/A	Exposure sources info	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Exposure sources info	
Overall Quality Determination		Medium		

Study Citation:	Ejlertsson, J., Karlsson, A., Lagerkvist, A., Hjertberg, T., Svensson, B. H. (2003). Effects of co-disposal of wastes containing organic pollutants with municipal solid waste - a landfill simulation reactor study. <i>Advances in Environmental Research</i> 7(4):949-960.
HERO ID:	4263232
Conditions of Use:	Disposal

EXTRACTION	
Parameter	Data
Description of release source:	The biotic and abiotic transformation processes of different wastes in a landfill give rise to pools of organic and inorganic compounds in the gaseous and liquid phases. Such compounds may be emitted to the atmosphere or surface and groundwater basins in the drainage area of the landfill. Most of these compounds are of anthropogenic origin and are brought to the landfill as components of building refuse, plastics, paints, materials treated with flame-retardants, cryogenic media, isolation materials, pesticides, and solvents.
Release quantity:	In this experiment. after 1122 days (3.07 years), landfill simulator LiU2 released 3.6 g of BBP. After 1640 days (4.49 years), simulator LiU4 released 1.3g of BBP.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Methodology is known and expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from Sweden, an OECD country.
	Metric 3:	Applicability	High	Data are for the disposal of phthalate wastes, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (total losses, percentages) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by discussing possible confounding factors in the study. Variability is not addressed.

Overall Quality Determination

Medium

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

Study Citation:	Fujii, M., Shinohara, N., Lim, A., Otake, T., Kumagai, K., Yanagisawa, Y. (2003). A study on emission of phthalate esters from plastic materials using a passive flux sampler. Atmospheric Environment 37(39-40):5495-5504.			
HERO ID:	1322091			
Conditions of Use:	Laboratory Study			
EXTRACTION				
Parameter		Data		
Release or emission factors:		Release or emission factors		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data and sound methods that do not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Japan, an OECD country.
	Metric 3:	Applicability	Low	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario. Laboratory study
	Metric 4:	Temporal Representativeness	Medium	Study conducted in 2003 so less than 20 years old
	Metric 5:	Sample Size	Medium	Characterized by range of statistics and unclear if analysis is representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results, methods and assumptions. Data sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination			Low	

Study Citation:	Koszelnik, P., Ziembowicz, S., Kida, M. (2020). Analysis of concentrations of selected phthalic acid esters in aquatic ecosystems - Poland’s case study.		
HERO ID:	Desalination and Water Treatment 186:56-64.		
Conditions of Use:	6825427		
	Disposal		
EXTRACTION			
Parameter	Data		
Description of release source:	”The three main sources of phthalates passing into aquatic ecosystems are considered to be atmospheric precipitation,treated effluent discharged from industrial and municipalwastewater treatment plants, and landfill leachate (3/10)”		
Release or emission factors:	Release or emission factors		
Waste treatment methods and pollution control:	Waste treatment methods and pollution control		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium Methodology is known and expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium Data are from Poland, an OECD country.
	Metric 3:	Applicability	High Data are for the disposal of phthalates, an in-scope occupational scenario,
	Metric 4:	Temporal Representativeness	High Data are no more than 10 years old.
	Metric 5:	Sample Size	Medium Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High Most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium Variability is addressed by including factors that could cause increases of phthalate pollution and including world data. Uncertainty isn’t addressed.
Overall Quality Determination		High	

Study Citation:	Lee, Y. S., Lee, S., Lim, J. E., Moon, H. B. (2019). Occurrence and emission of phthalates and non-phthalate plasticizers in sludge from wastewater treatment plants in Korea. Science of the Total Environment 692:354-360.			
HERO ID:	6959335			
Conditions of Use:	disposal			
EXTRACTION				
Parameter		Data		
Description of release source:		The authors found that the primary sources of phthalates in WWTPs are household activities. They also found that effluent from a paper mill could be the source of phthalates. The land application of sludge could be a potential source of phthalates.		
Release quantity:		The emission fluxes of phthalates through sludge discharge from domestic (mean: 2980 kg/day)WWTPs were higher than those for mixed (1600 kg/day) and industrial (1360 kg/day) WWTPs, while the emission fluxes of phthalates through effluent discharge from industrial (351 kg/day) WWTPs were higher than those found for domestic (155 kg/day) and mixed (168 kg/day) WWTPs.		
Release or emission factors:		Release or emission factors		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	Release data methodology is known or expected to be accurate
Domain 2: Representativeness		Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S
		Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
		Metric 4: Temporal Representativeness	High	Data is less than 10 years old.
		Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	Medium	Release data include most critical metadata.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release.
Overall Quality Determination			High	

Study Citation:	Liang, Y., Xu, Y. (2014). Improved method for measuring and characterizing phthalate emissions from building materials and its application to exposure assessment. Environmental Science & Technology 48(8):4475-4484.			
HERO ID:	2346023			
Conditions of Use:	Use of PVC Flooring			
EXTRACTION				
Parameter	Data			
Description of release source:	Because phthalate additives are not chemically bound to the polymer matrix, slow emission from the products to air or other media usually occurs.			
Release or emission factors:	Release or emission factors			
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	Low	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
	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	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination		Medium		

Study Citation:	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. Environmental Science & Technology 48(24):14228-14237.			
HERO ID:	3015875			
Conditions of Use:	Floor Coverings			
EXTRACTION				
Parameter		Data		
Description of release source:		Emissions directly from vinyl flooring to air.		
Release or emission factors:		Release or emission factors		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2014.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized.
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 taking measurements at different temperatures but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	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.			
HERO ID:	3867109			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
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.			
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	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	Medium	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.
Overall Quality Determination		Medium		

Study Citation:	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. Progress in Polymer Science 27(10):2227-2277.
HERO ID:	6826007
Conditions of Use:	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.
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	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	High	Data are for the disposal of phthalate wastes, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (medians, minimums and maximums, percentages) 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 in the life cycle assessment methods. Variability is not addressed.

Overall Quality Determination**High**

Study Citation:	Midwest Research Institute, (1984). Performance evaluation of full-scale hazardous waste incinerators - Volume I (excutive summary) contract no. 68-02-3177 (43).
HERO ID:	1269556
Conditions of Use:	Disposal - waste incineration

EXTRACTION

Parameter	Data
Number of sites:	8
Description of release source:	Release source is stack gas from the incineration process. Figure 3-2a and the paragraphs that follow describe the different type of incinerators and Table 3-2 is a summary of the process parameters for each incinerator. PDF pages 67 - 75 provides all of the process description information.
Release quantity:	in g/min: For Ross incinerator (appendix C) <0.0004. For incinerator in Appendix H: minimum output rate of <0.00003 up to 0.000048 g/min
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Study conducted by EPA
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is US data
	Metric 3: Applicability	Low	Data is mix of municipal and industrial incineration methods. Source of waste streams is not apparent, but no occupational exposure data provided.
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is a range with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data includes media, process, unit operation, and source of release (missing where waste streams come from)
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Addresses uncertainty in analysis of percent recovery experiments to determine accuracy of measurements. Addresses variability by testing multiple incineration sites.

Overall Quality Determination**Medium**

Study Citation:	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.			
HERO ID:	11360398			
Conditions of Use:	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	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	Data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	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		

Study Citation:	Oppelt, E. T. (1987). Incineration of hazardous waste. Journal of Air Pollution Control Association 37(5):558-586.			
HERO ID:	1924583			
Conditions of Use:	Disposal - incineration			
EXTRACTION				
Parameter	Data			
Description of release source:	hazardous waste combustion, coal power plant			
Release quantity:	expressed as ng of emission per kJ of combustor heat input (1 ng/kJ = 2.34 x 10^-6 lb/MMBtu); Hazardous waste: mean: 3.7, range: 0.7-23; Municipal waste: no data; Coal power plant: mean: 0.5, range: 0.3-1.0			
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
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from the US
	Metric 3:	Applicability	High	Data is for disposal, an in-scope occupational scenario
	Metric 4:	Temporal Representativeness	Low	Data greater than 20 years old
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized
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	The release data study provides only limited discussion of the variability in the determinants of release.
Overall Quality Determination		Medium		

Study Citation:	Parkerton, T. F., Staples, C. A. (2003). An assessment of the potential environmental risks posed by phthalates in soil and sediment. Handbook of Environmental Chemistry Series, vol. 3 pt. Q 3:317-349.
HERO ID:	7978775
Conditions of Use:	Plasticizers

EXTRACTION

Parameter	Data
Description of release source:	The primary source of phthalates to native soil is atmospheric deposition. Sources of phthalates to the aquatic environment include industrial and domestic wastewater effluents as well as non-point source inputs such as urban runoff and atmospheric deposition. (20/33)
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Methodology is known and expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from the U.S. and multiple EU countries.
	Metric 3: Applicability	High	Data are for the use of plasticizers, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release media and waste treatment provided but missing release quantities and emission factors.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability in waste treatment methods and release sources is described. Uncertainty is not addressed.

Overall Quality Determination**Medium**

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: 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 this chemical.
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	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	The data were collected before the most recent federal regulatory action or update or are more than 20 years old if no federal regulation is established. The operations, equipment, and worker activities are not available or indicate that the associated data are expected to be outdated.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.

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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:		Formulation of paint and varnish		
Domain	Metric	EVALUATION		Comments
		Rating		
Overall Quality Determination		High		

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

EXTRACTION

Parameter	Data
Description of release source:	The Shell incinerator contains a single combustion chamber with waste injection nozzles located at the base. The unit operates with a firebox temperature ranging between 1400 to 1800 F. Various air pollution control equipment exist in the process. Combustion gases exit the incinerator system through a 100-foot stack. Figure 2-1 in the source illustrates the combustion process. Two liquid waste feed streams and process offgases, generated in the production of RM-17, are injected into the incinerator as a primary means of waste treatment. Only waste streams generated from the production of RM-17 at the Shell Manufacturing Complex are combusted in the incinerator. The health risk calculations presented in this document assume a constant feed rate of one gallon per minute, or 525,600 gallons per year. This feed rate is approximately 150 times greater than the historical feed rate for the incinerator. The one gallon per minute feed rate was chosen to provide, a health conservative analysis.
Release quantity:	emission estimates for the RM-17 incinerator: 1.4×10^{-4} g/sec (this data is from published research data on waste incinerators not from this report).
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	Release data methodology and sources of information are mostly EPA sources so likely accurate.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US
	Metric 3:	Applicability	Low	Data is for company waste incinerator which is in-scope, but the source does not contain any info for BBP.
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5:	Sample Size	Low	Not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release include release media, process, unit operation and activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Does not address variability. Uncertainty analysis conducted in calculations

Overall Quality Determination**Medium**

Study Citation:	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.			
HERO ID:	10472417			
Conditions of Use:	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 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.
	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	Report is from last 10 years.
	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	Low	The release data study does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	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.
HERO ID:	3859095
Conditions of Use:	Disposal: Wastewater treatment plant (POTW)

EXTRACTION

Parameter	Data
Description of release source:	Use of 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	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation. Disposal.
	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	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.

Overall Quality Determination**Medium**

Study Citation:	Stark, T. D., Choi, H., Diebel, P. W. (2005). Influence of plasticizer molecular weight on plasticizer retention in PVC geomembranes. Geosynthetics International 12(2):99-110.
HERO ID:	10218052
Conditions of Use:	Plasticizer (PVC)

EXTRACTION

Parameter	Data
Description of release source:	migration from products containing BBP
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	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Data is from 1983
	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	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.

Overall Quality Determination**Medium**

Study Citation:	U.S. EPA, (2024). Discharge Monitoring Report (DMR) data: Butyl benzyl phthalate (BBP), reporting years 2017-2022.			
HERO ID:	12213571			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Release quantity:	Provides the total pounds per year (lb/yr) released from sites.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology used by submitters to estimate release data is not known.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	DMR is U.S. based data
	Metric 3:	Applicability	High	DMR includes industries included in the scopes of multiple chemicals.
	Metric 4:	Temporal Representativeness	High	DMR data are from 2017-2022, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Universe is limited to NPDES permit holders; statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	DMR only includes release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	DMR does not address variability or uncertainty in submitter provided data.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1982). Development document for effluent limitations, guidelines and standards for the pulp, paper, and paperboard, and the builders paper and board mills (final report) (EPA 440/1-82/025).			
HERO ID:	1316234			
Conditions of Use:	Waste treatment			
EXTRACTION				
Parameter	Data			
Release quantity:	BBP was not detected in the first 11 of the 15 mill groupings (which were established as representative of the pulp, paper, and paperboard industry) that were surveyed, see page 215. See Table V-31 (page 232) for the number of samples taken at mills in each subcategory, the number of samples in which the specific compound was detected, and the ranges of concentrations and the average concentration of specific compounds at those mills where the compound was detected. Results for both raw waste and final effluent sampling points are presented. BBP was detected on average that ranged from 0-797 ug/L in influent and 0-63ug/l on effluent, with ranges that varied greatly depending on subcategory. See table V-31 on page 232 for the average and range of reductions for the different subcategories.			
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 is an EPA study
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Report is US data
	Metric 3:	Applicability	Low	Report does not contain release amounts, just concentrations. Could be applied to determine release amounts. Also does not quite fall under any specific condition of use for BBP.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old, from 1982
	Metric 5:	Sample Size	Medium	Represented by a range of uncertain statistics and unclear if it is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents results and assumptions, sources are described and well defined.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability but not uncertainty
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.			
HERO ID:	46492			
Conditions of Use:	emission			
EXTRACTION				
Parameter	Data			
Description of release source:	waste oil combustors			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	release data methodology is known or expected to be accurate
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	data are from the United States
	Metric 3:	Applicability	High	release data are for 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	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			Medium	

Study Citation:	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.
HERO ID:	6535959
Conditions of Use:	All

EXTRACTION

Parameter	Data
Description of release source:	Provides unit/process of release.
Release quantity:	Provides amount released.
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 are from 2014.
	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**

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
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 ⁷ 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. Not specific to BBP.
	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**

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:	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. Not specific to BBP.
	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**

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:	printing ink manufacturing

EXTRACTION

Parameter	Data
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

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. Not specific to BBP.
	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**

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:	soap and detergent manufacturing

EXTRACTION

Parameter	Data
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

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. Not specific to BBP.
	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**

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:	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. Not specific to BBP.
	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**

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:	synthetic rubber manufacturing			
EXTRACTION				
Parameter	Data			
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 butadiene 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			
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. Not specific to BBP.
	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	

Study Citation:	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.
HERO ID:	7315820
Conditions of Use:	Emission

EXTRACTION

Parameter	Data
Description of release 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
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States
	Metric 3: Applicability	Low	The release data are for an occupational scenario within the scope of the risk evaluation, but no mention of BBP.
	Metric 4: Temporal Representativeness	Low	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	Release data include release media but no other metadata.
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.

Overall Quality Determination**Medium**

Study Citation:	U.S. EPA, (1995). Chapter 6.4: Paint and varnish. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
HERO ID:	7315881			
Conditions of Use:	emission			
EXTRACTION				
Parameter	Data			
Description of release source:	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.			
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	release data methodology is known or expected to be accurate
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	data are from the United States
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	more than 20 years old
	Metric 5:	Sample Size	Low	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		Medium		

Study Citation:	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.			
HERO ID:	7315971			
Conditions of Use:	Formulation of asphalt			
EXTRACTION				
Parameter	Data			
Description of release source:	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 that may escape collection before primary control generally consists of PM with 50 to 70 percent of the total mass less than 74 μm . A description of the sources of release for stack and fugitive air is provide for each type of processing operation.			
Release or emission factors:	Release or emission factors			
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 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.
Overall Quality Determination			Medium	

Study Citation:	U.S. EPA, (n.d.). AP-42: Chapter 10 - Wood products industry.			
HERO ID:	9263849			
Conditions of Use:	Construction, Paint, Electrical, and Metal Products			
EXTRACTION				
Parameter	Data			
Description of release source:	vapor and/or dust from process operations such as drying, pressing, and cutting			
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
	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 based on data that is over 20 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The release data study provides only limited discussion of the variability in the determinants of release. The release data study provides only limited discussion of the uncertainty in the release results.
Overall Quality Determination			Medium	

Study Citation:	ESIG, (2020). SPERC Factsheet – Use in rubber production and processing.		
HERO ID:	11360390		
Conditions of Use:	Non-PVC Material Compounding/Converting		
EXTRACTION			
Parameter	Data		
Description of release source:	Wastewater generated during cleaning and maintenance operations is directed to a wastewater treatment plant for biological degradation. Atmospheric release of waste vapour may be ameliorated using wet scrubbers, thermal oxidizers, solid adsorbents, membrane separators, biofilters, and/or cold oxidizers for trapping residual vapours. Solvent-containing liquid cleaning wastes are handled as hazardous waste and disposed of via thermal or catalytic incineration capable of efficiently converting volatile organic compounds to carbon dioxide and water. (pg. 1)		
Release or emission factors:	Release or emission factors		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Describes the justification behind the estimates for releases., but does not fully describe the equations and values.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from an OECD country (Belgium).
	Metric 3: Applicability	Medium	Applicable to occupational scenarios, but is not chemical specific.
	Metric 4: Temporal Representativeness	High	Published in 2020, which is in the past 10 years.
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	High	Rationale is provided and approaches are clear.
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	High	Addresses both variability and uncertainty in the estimates.
Overall Quality Determination		High	

Study Citation:	ESIG, (2012). SPERC fact sheet – Manufacture of substance – Industrial (Solvent-borne).			
HERO ID:	11373487			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Describes the justification behind the estimates for releases., but does not fully describe the equations and values.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from an OECD country (Belgium).
	Metric 3:	Applicability	Medium	Applicable to occupational exposure scenario, but not chemical-specific.
	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 (2012). However, the model is based on operations, equipment, and worker activities are expected to be reasonably representative of current conditions.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Rationale is provided and approaches are clear.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Low	Does not address uncertainty or variability.
Overall Quality Determination			Medium	

Study Citation: Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.
HERO ID: 10186827
Conditions of Use: Plasticizers

EXTRACTION

Parameter	Data
Description of release source:	...plasticizers such as dibutyl phthalate, tricresyl phosphate, etc, to the preformed polymer may be lost with the migration of the plasticizer out of the film.
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.
	Metric 3: Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but 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	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	Release Description and Waste Control only

Overall Quality Determination**High**

Study Citation:	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
HERO ID:	5353181			
Conditions of Use:	Waste handling, treatment and disposal			
EXTRACTION				
Parameter	Data			
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)			
Comments:	See Table 8.4			
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	Medium	Data are from Canada, an OECD country.
	Metric 3:	Applicability	High	Data are for waste handling, treatment, and disposal, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data 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	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			High	

Study Citation:		ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.		
HERO ID:		679967		
Conditions of Use:		Manufacturing		
Parameter		EXTRACTION		
Release or emission factors:		Release or emission factors		
Domain		EVALUATION		
Metric		Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	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. The basis for the 1% emission factor is unclear
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 assessment is for an occupational scenario within the scope of the risk evaluation. The emission factor is for phthalates and not BBP specific.
	Metric 4:	Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	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 clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized. The basis for the 1% estimate is unclear
Overall Quality Determination			Low	

Study Citation:	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.			
HERO ID:	679967			
Conditions of Use:	Distribution			
EXTRACTION				
Parameter	Data			
Description of release source:	During distribution, losses may occur during the cleaning of drums and tanks or, exceptionally, by accidental spillage.			
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 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., 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	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	Low	The assessment does not address variability of uncertainty.
Overall Quality Determination		Low		

Study Citation:	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.		
HERO ID:	679967		
Conditions of Use:	Manufacture of plasticized products		
EXTRACTION			
Parameter	Data		
Description of release source:	Loss to atmosphere during melt forming processes is likely.		
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 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., 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions. It is not fully transparent how the emission factors were generated.
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		Medium	

Study Citation:	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.		
HERO ID:	679967		
Conditions of Use:	Use of plasticized products		
EXTRACTION			
Parameter	Data		
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 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., 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 assessment is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation. Has applicability to use of paint.
	Metric 4: Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions. The basis for the percentages provided is unclear.
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		Medium	

Study Citation:	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.		
HERO ID:	679967		
Conditions of Use:	Disposal of plasticized products		
EXTRACTION			
Parameter	Data		
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 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., 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	High	The assessment is for a non-occupational scenario. Applicable to disposal of household waste. Primarily consumer and gen pop, but may have some relevance to occupational.
	Metric 4: Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report documents its data sources, assessment methods, results, and assumptions. Basis for how the estimates were developed is unclear.
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		Medium	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Transportation			
EXTRACTION				
Parameter	Data			
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 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. (Europe).	
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Disposal			
		EXTRACTION		
Parameter	Data			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	nan			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	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. (Europe).
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Formulation			
EXTRACTION				
Parameter	Data			
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 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. (Europe).	
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Processing into plastics, application of paints/adhesives/etc. to produce articles			
EXTRACTION				
Parameter	Data			
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 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. (Europe).
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	End-product uses (of articles such as plastics, flooring, coated materials)			
EXTRACTION				
Parameter	Data			
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 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. (Europe).	
	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	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2008). European Union Summary Risk Assessment Report: Benzyl butyl phthalate (BBP) (CAS No: 85-68-7, EINECS: 201-622-7).
HERO ID:	2121719
Conditions of Use:	Manufacturing - domestic

EXTRACTION

Parameter	Data
Release quantity:	Across all 3 sites: 1.6 kg BBP/day to surface water; Across all 3 sites: 0.41 kg BBP/day to air. (Page 31/274)
Release frequency:	300-320. Assumed 7,200 operating days/year. These estimates give a release of 18 tonnes/year or 3.6 tonnes/year and relate to the 1997 situation.
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Italy, Germany and Belgium, all OECD countries
	Metric 3: Applicability	High	Data is directly applicable to conditions of use
	Metric 4: Temporal Representativeness	Medium	Release data is a mix of 2004 and 1990s data so some data is greater than 10 years old and some is greater than 20 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	Medium	Addresses variability by sampling multiple sites over different years but does not address uncertainty.

Overall Quality Determination**Medium**

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Release quantity:	units in kg/yearSite A (air): 5 (kg/yr)Site A (water): 0.007 (kg/day)Site B (air): 115(kg/yr)Site B (water): <0.4 (kg/day)Site C (air): 1.75(kg/yr)Site C (water): <1.2 (kg/day)			
Release or emission factors:	Release or emission factors			
Release frequency:	Site A: 300 days/yearSite B: 300-320 days/yearSite C: 300 days/year			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	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	High	The assessment is for an occupational scenario 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 characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release media provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by giving releases from 3 plants, but uncertainty is not addressed.
Overall Quality Determination			Low	

Study Citation:	ExxonMobil, (2022). EM BRCP DINP/DIDP facility – virtual tour (sanitized).			
HERO ID:	10633678			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source: Environmental discharge occurs during filtration steps, reactor cleaning, process water generated during processing, and cleaning of delivery vessels.				
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Data seems to be collected from high quality sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the United States and are representative of the industry.
	Metric 3:	Applicability	Medium	Assessment is for an occupational scenario within the scope of risk evaluation, but it is unknown if the information is relevant to the chemical of interest.
	Metric 4:	Temporal Representativeness	High	Published in 2022, which is less than 10 years old.
	Metric 5:	Sample Size	N/A	Metric is not relevant to the extracted information.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report documents data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Metric is not relevant to the extracted information.
Overall Quality Determination			High	

Study Citation:	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. Science 46(4056):46-47.			
HERO ID:	1335811			
Conditions of Use:	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	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	High	Data are for the disposal of phthalates, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed by discussing differences between studies. Variability isn't addressed.
Overall Quality Determination			Medium	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.
HERO ID:	3808976
Conditions of Use:	Paints and coatings

EXTRACTION

Parameter	Data
Description of release source:	Container cleaning, equipment cleaning, coating application (overspray). Release 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

EXTRACTION

Parameter	Data
Description of release source:	PROC: material loading, heat-up, surface evaporation, filling, micellaneous 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-Formulation of Adhesives

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, and 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**

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

EXTRACTION

Parameter	Data
Description of release source:	container cleaning, unloading, equipment cleaning, application losses, curing/drying, trimming. Releases to water, air, and 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**

Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.			
HERO ID:	3833136			
Conditions of Use:	Application of Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Description of release source:	Container cleaning, unloading, equipment cleaning, application losses, curing/drying, trimming (Table 4-1)			
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	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, types of adhesives, and end use markets.
Overall Quality Determination		Medium		

Study Citation:	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.
HERO ID:	3840003
Conditions of Use:	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, and land.
Release quantity:	Provides models for estimating various fugitive air 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**

Study Citation:	OECD, (2004). Emission scenario document on additives in rubber industry.			
HERO ID:	4445826			
Conditions of Use:	Non-PVC Material Converting			
EXTRACTION				
Parameter	Data			
Description of release source:	Formulation and processing wastes to wastewater; formulation and processing wastes to air and soil, use of rubber products. (pg. 7)			
Release quantity:	Total WW flow rates (m3/day): 10-1,154, mean = 184, 90th percentile = 438(Table 7)			
Release or emission factors:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Low	Assessment from 2004 but is based on data greater than 20 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various additive functions, end-use products, and types of rubber.	
Overall Quality Determination		Medium		

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

Study Citation:	OECD, (2009). Emission scenario document on plastic additives.		
HERO ID:	5079084		
Conditions of Use:	Plastics Compounding and Converting		
EXTRACTION			
Parameter	Data		
Description of release source:	Raw material handling, compounding, converting, service life, disposal. Releases to air and water.		
Release or emission factors:	nan		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3: Applicability	Medium	Data 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.
Overall Quality Determination		Medium	

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:	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.
HERO ID:	6568745
Conditions of Use:	Application of Paints and Coatings

EXTRACTION

Parameter	Data
Description of release source:	Unloading, sampling, container residue, application losses, equipment cleaning (pg. 21)
Release quantity:	Container cleaning: 0.2 - 3% (pg. 50)Equipment Cleaning: 2% (pg. 58)Application losses: 10-80% (spray), 2-10% (roll/curtain) (pg. 54-56)
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 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**

Study Citation:	OECD, (2011). Resource compendium of PRTR release estimation techniques, part 4: Summary of techniques for releases from products, version 1.0.			
HERO ID:	7348917			
Conditions of Use:	End Uses			
EXTRACTION				
Parameter	Data			
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 3-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			
EVALUATION				
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 BBP is not mentioned specifically.	
	Metric 4: Temporal Representativeness	Medium	Paper was published in 2011, but most emission factor data is from 2003-2004, which is greater than 10 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.	
Overall Quality Determination		Low		

Study Citation:	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.
HERO ID:	6311222
Conditions of Use:	Industrial/Commercial Use: Automotive Care Products

EXTRACTION

Parameter	Data
Description of release source:	Auto OEM: blowdown, sludge processing, generated sludge, stack air releases. Auto refinish: 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. Auto refinish: 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**

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	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	Medium	Data are for 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	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by discussing assumptions. Variability addressed by providing calculated data for a range of scenarios

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).
HERO ID:	10366192
Conditions of Use:	Processing - 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 environmental releases (pg. 4-3 through 4-17)
Release or emission factors:	Release or emission factors
Release frequency:	248 days/yr (pg. 6-5)
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	GS is based on US 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. The revised draft was published in 2021.
	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**

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

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

Study Citation:	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).
HERO ID:	11373493
Conditions of Use:	PVC Plastics Converting/Non-PVC Plastics Converting

EXTRACTION

Parameter	Data
Description of release source:	Transfer losses, container residues cleaning, converting process, equipment cleaning, trimming operations.
Release or emission factors:	Release or emission factors
Release frequency:	253 days/year (pg. 6-1)
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**

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.
HERO ID:	3827197
Conditions of Use:	Formulation of Coatings

EXTRACTION

Parameter	Data
Description of release source:	Unloading containers, container cleaning, dispersion and blending operations, sampling, equipment cleaning, filter wastes, loading, off-spec coating. Releases to water, air, and land are possible.
Release quantity:	Provides models for estimating various fugitive air releases
Release or emission factors:	nan
Release frequency:	235-350 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.Draft is from 2014.
	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 applications, and multiple chemical functions.

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
HERO ID:	6311218
Conditions of Use:	Incorporating into formulation, mixture or reaction product as a plasticizer; Incorporating into articles as a plasticizer in plastics product manufacturing

EXTRACTION

Parameter	Data
Description of release source:	Container residue from additive transport container released to water, incineration, or landfill; Dust generation from transferring/compounding released to water or landfill; Fugitive air emissions from compounding/shaping released to water or air; Equipment cleaning and cooling water from compounding released to water (page 10 of 18)
Release quantity:	Provides models for estimating releases for each of the four release types listed in "description of release source" (page 12-14 of 18)
Release or emission factors:	Release or emission factors
Release frequency:	250 days/yr (page 11 of 18)
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	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**

Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	6311221			
Conditions of Use:	Formulation of Printing Inks			
EXTRACTION				
Parameter	Data			
Description of release source:	Packaging disposal, material transfer, ink processing, equipment cleaning (page 33 of 54)			
Release quantity:	estimated release equations to water, air, incineration, and land on pages 33-36 of 54			
Release or emission factors:	Release or emission factors			
Release frequency:	250 days/yr (page 31 of 54)			
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		

Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	6311221			
Conditions of Use:	Use of Printing Inks			
EXTRACTION				
Parameter	Data			
Description of release source:	disposal/cleaning of ink container, cleaning printing equipment, ink drying (page 40 of 54)			
Release quantity:	estimated release equations for water, air, incineration, and land on pages 40- 44 of 54			
Release or emission factors:	Release or emission factors			
Release frequency:	250 days/yr (page 38 of 54)			
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	

Study Citation:	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).
HERO ID:	6385708
Conditions of Use:	Distribution in Commerce, disposal

EXTRACTION

Parameter	Data
Description of release source:	Any water soluble heels that are compatible with the facility's treatment system and the conditions of the facility's wastewater discharge permit are usually combined with other wastewaters for treatment and discharge at the facility. Incompatible heels are segregated into drums or tanks for disposal by alternative means, which may include sale to a reclamation facility, landfill, or incineration. The TEC facility may reuse heels comprised of soaps, detergents, solvents, acids, or alkalis as tank cleaning solutions, as neutralizers for future heels, and for wastewater treatment.
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:	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	High	This GS is based on U.S. data.
	Metric 3:	Medium	Data are for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4:	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:	Medium	Sample distributions characterized by ranges/estimations with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Medium	Uncertainty not addressed. Variability addressed by considering multiple container types and cleaning methods.

Overall Quality Determination**Medium**

Study Citation:	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.
HERO ID:	6385709
Conditions of Use:	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	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.

Overall Quality Determination**Medium**

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

EXTRACTION

Parameter	Data
Description of release source:	Releases from solid particulate during unloading; Fugitive air releases from volatile liquids during unloading; Container Residue; Fugitive air releases from dispersion tank; Fugitive air releases from milling; Equipment cleaning residue; Fugitive air releases from volatile components during loading of ink (page 9 of 23)
Release quantity:	See Table 2-4 on page 9 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.
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**

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

EXTRACTION

Parameter	Data
Description of release source:	Container residue; Fugitive air releases during unloading from volatile components; Fugitive air releases from volatile components in ink reservoir; Fugitive air releases from ink mist generated by printing press; Equipment cleaning residuals; Fugitive air releases of volatile components during drying (page 15 of 23)
Release quantity:	See Table 2-5 on page 14 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**

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

EXTRACTION

Parameter	Data
Description of release source:	Container residue cleaning/disposal losses to landfill or incineration; Spillage from compounded resin handling to water, landfill, or incineration; Dust emissions from container transfers to air, water, landfill or incineration; Dust emissions from forming and molding processes to air, water, or landfill; Fugitive air emissions from forming and molding processes to air or water; Equipment cleaning and direct contact cooling water from forming/molding processes to water, landfill, or incineration; Solid waste from trimming operations to landfill or incineration (page 25 of 96) Page 25-27 contains a narrative of the process where possible releases are explained in context.
Release quantity:	Provides models for estimating each release listed above (page 44-51 of 96)
Release or emission factors:	Release or emission factors
Release frequency:	137-254 days/yr (page 30 of 96)
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**

Study Citation:	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.
HERO ID:	6385719
Conditions of 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**

Study Citation:	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385741			
Conditions of Use:	Incorporating into articles as a plasticizer in fabric, textile, and leather products not covered elsewhere manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	dumping finishing bath, drum residues			
Release quantity:	Provides method for estimating release to water based on bath size, and on-weight-bath percentage			
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 finishing agent types	
Overall Quality Determination		Medium		

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

EXTRACTION

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

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.
HERO ID:	6549571
Conditions of Use:	PVC Plastic Converting

EXTRACTION

Parameter	Data
Description of release source:	Environmental Releases:1. Container residue from plastic resin transport container released to water, incineration, or landfill.2. Dust generation from forming processes released to water or landfill.3. Fugitive air emissions from forming and molding processes released to water or air.4. Equipment cleaning and cooling water from forming and molding processes released to water, incineration, or landfill.5. Solid waste from trimming operations released to water or landfill.(pg. 10)
Release quantity:	Presents example calculations/formulas for each source of environmental releases (pg. 12-15)
Release or emission factors:	Release or emission factors
Release frequency:	250 days/yr (pg. 12)
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	Control Technologies:Water: According to the Development Document for Effluent Limitation Guidelines for the Plastics Molding and Forming Point Source Category (1984), approximately 31% of surveyed sites that use process water directly discharged their process water; 44% indirectly discharged (POTW); and 25% had a zero discharge. Zero discharge methods include recycling, evaporation pond, septic tank with leach field, evaporation from equipment, land application, and contract haul. Types of on-site treatment include settling, pH adjustment, activated sludge, activated carbon adsorption, filtration, and vacuum filtration. Air: The Emissions Scenario Document on Plastic Additives suggests that bag filters used to collect particulate emissions are 99% efficient. However, the prevalence of bag filter use was not available.(pg. 15)

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
	Metric 3:	Applicability	Medium
			This GS is based on U.S. data
			Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical. There is a brief mention of BBP, but only for vapor pressure at various temperatures.
	Metric 4:	Temporal Representativeness	Low
			The completed assessment is more than 20 years old. However, industry conditions 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.

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Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.
HERO ID:	6549571
Conditions of Use:	PVC Plastic Converting

		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	[Redacted] (2021). Environmental information for S160 at Bridgeport, NJ plant.
HERO ID:	10617126
Conditions of Use:	Plastic material and resin manufacturing

EXTRACTION**Parameter****Data**

Waste treatment methods and pollution control:	Waste treatment methods and pollution control
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EVALUATION**Domain****Metric****Rating****Comments**

Domain 1: Reliability

Metric 1:

Methodology

Medium

Report uses high quality data/techniques/methods that are not from frequently-used sources and there are no known quality issues.

Domain 2: Representativeness

Metric 2:

Geographic Scope

High

Data are from the U.S.

Metric 3:

Applicability

High

Data are for Plastic material and resin manufacturing, an in-scope occupational scenario.

Metric 4:

Temporal Representativeness

High

Report is based on current industry conditions and data no more than 10 years old.

Metric 5:

Sample Size

Medium

Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.

Domain 3: Accessibility/ Clarity

Metric 6:

Metadata Completeness

High

All data sources, methods, results, and assumptions are clearly documented.

Domain 4: Variability and Uncertainty

Metric 7:

Metadata Completeness

Medium

Variability addressed by removal efficiencies from multiple years but uncertainty is not addressed.

Overall Quality Determination**High**

Study Citation:	California Office of Environmental Health Hazard Assessment (OEHHA) (2013). Evidence on the carcinogenicity of butyl benzyl phthalate.
HERO ID:	5155605
Conditions of Use:	Manufacturing - domestic

EXTRACTION

Parameter	Data
Release quantity:	9 tons of BBP was emitted in 2006
Waste treatment methods and pollution control:	nan
Comments:	pages 6-7

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US
	Metric 3: Applicability	High	Data is for production, processing, and disposal of BBP
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty

Overall Quality Determination**Medium**

Study Citation:	Canada,, G.o. (2020). Phthalate substance grouping – Information sheet.			
HERO ID:	7349060			
Conditions of Use:	Applies to more than 1 COU (manufacturing, processing, use, disposal, distribution in commerce)			
EXTRACTION				
Parameter	Data			
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).				
EVALUATION				
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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Canada,, G.o. (2019). Page 5 - Fifth report on human biomonitoring of environmental chemicals in Canada.			
HERO ID:	9641570			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Description of release source:	PDF Pg. 4-5”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).”			
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	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.	
Overall Quality Determination		High		

Study Citation:	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
HERO ID:	664488			
Conditions of Use:	Commercial use			
EXTRACTION				
Parameter	Data			
Description of release source:	BzBP can be released into the environment during its production and, because it is not bound to products in which it is incorporated, it can be released into the ambient air during use or disposal of the products. Food crops take up BzBP, and diet is the major source for general population exposure.			
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	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	This metric is not applicable to the data being extracted
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	N/A	This metric is not applicable to the data being extracted
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	This metric is not applicable to the data being extracted
Overall Quality Determination			High	

Study Citation: Dempsey, C. R. (1993). A comparison of organic emissions from hazardous waste incinerators versus the 1990 toxics release inventory air releases. Journal of the Air and Waste Management Association 43(10):1374-1379.

HERO ID: 659922

Conditions of Use: Disposal - Hazardous waste incineration

EXTRACTION

Parameter	Data
Physical form:	vapor
Description of release source:	Hazardous waste incineration sites
Release quantity:	Reasonable worst case HWI stack emissions for BBP was determined to be 3.0 ng/L of Hazardous waste and 0.03 tons/yr. The 1990 TRI air releases for BBP was 114 tons/yr with a ratio of HWI to TRI emissions of 0.023
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Uses high quality data from frequently used sources and does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Report is US data
	Metric 3: Applicability	High	Applicable to chemical of interest
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old, report is from 1990
	Metric 5: Sample Size	Medium	Not represented by statistics and unclear if it is representative of hazardous waste industry.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results and assumptions, sources generally described.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty

Overall Quality Determination**Medium**

Study Citation:	ECHA, (2009). Background document for benzyl butyl phthalate (BBP): Document developed in the context of ECHA's first Recommendation for the inclusion of substances in Annex XIV.
HERO ID:	7325023
Conditions of Use:	manufacturing

EXTRACTION	
Parameter	Data
Description of release source:	The main releases are to air and waste water. For releases to the air, both processing and end product uses add significantly to the total with no pronounced major emission source (COWI, IOM & Entec, 2009).According to the Emission Scenario Document on Plastic Additives (OECD, 2004), the major releases of phthalates from polymer conversion processes occur initially as gaseous phthalate.The use of end products gives rise to the largest releases to the environment with washing of flooring as the largest single source. (P. 4/12)
Release or emission factors:	Release or emission factors
Comments:	Table 3 Releases of BBP from manufacturing, formulation, processing, endproductsuse and disposal in the EU in 2007 (COWI, IOM & Entec, 2009)

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. ECHA report.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination	Medium
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Study Citation:	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.			
HERO ID:	4168432			
Conditions of Use:	Commercial use			
EXTRACTION				
Parameter	Data			
Description of release source:	Phthalates can potentially migrate and undesirably lead to human exposure via e.g. food contact materials, such as packaging. They can also be released from plastics during the various recycling and recovery processes and from the products produced from recyclates. The sources of marine plastic litter vary from land based releases e.g. land littering (especially coastal areas), plastics that could have been blown from open dumpsites or leached sewage effluents, as well as spillage during transport and/or accidents with only a minor share from dumping at the sea. Plastic waste processing is a major source of toxic pollutants in road dusts.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than 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.
	Metric 4:	Temporal Representativeness	High	The report is generally 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	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		

Study Citation:	IARC, (1999). Hexachlorobutadiene. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, vol. 73 73:277-294.			
HERO ID:	18474			
Conditions of Use:	Manufacturing/processing			
EXTRACTION				
Parameter	Data			
Description of release source:	manufacturing facilities to air, water and soil.			
Release quantity:	1987: 147,000 kg into the air; 860 kg into water; 3900 kg onto land all in US. 1993: 170,000 kg into the air; 620 kg into water; 38 kg by underground injection; and 1200 onto land			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Uses EPA sources for release amounts
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Report is US data
	Metric 3:	Applicability	High	Report is applicable for chemical of interest
	Metric 4:	Temporal Representativeness	Low	Data is from 1987 and 1993 so over 20 years old
	Metric 5:	Sample Size	Medium	No statistics but likely representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report documents results but does not generally describe sources.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination		Medium		

Study Citation:	IARC, (1999). Some chemicals that cause tumours of the kidney or urinary bladder in rodents and some other substances.		
HERO ID:	666726		
Conditions of Use:	Manufacturing/processing - plasticizer		
EXTRACTION			
Parameter	Data		
Release quantity:	1987: 147,000 kg released into the air , 860 kg were discharged into water, and 39,000 released on the land. 1993: 170,000 kg were released into the air, 620 kg discharged into water, 38 kg disposed of by underground injection and 1200 kg released on the land		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data that are from NIOSH and are generally accepted, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Majority of data is for the US
	Metric 3: Applicability	Medium	Applicable to chemical of interest.
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old, report is from 1990
	Metric 5: Sample Size	Low	No statistical data provided.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Provides results but no explanation of data source.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination		Low	

Study Citation:	Jo, S. H., Lee, M. H., Kim, K. H., Kumar, P. (2018). Characterization and flux assessment of airborne phthalates released from polyvinyl chloride consumer goods. Environmental Research 165:81-90.			
HERO ID:	4683362			
Conditions of Use:	Consumer use of plastics			
EXTRACTION				
Parameter	Data			
Description of release source:	Emissions from consumer plastics in an emission chamber			
Release or emission factors:	Release or emission factors			
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	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
	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	High	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.
Overall Quality Determination		High		

Study Citation:	Liang, J., Ning, X. A., Kong, M., Liu, D., Wang, G., Cai, H., Sun, J., Zhang, Y., Lu, X., Yuan, Y. (2017). Elimination and ecotoxicity evaluation of phthalic acid esters from textile-dyeing wastewater. Environmental Pollution 231(Pt 1):115-122.
HERO ID:	4259743
Conditions of Use:	Disposal - wastewater treatment

EXTRACTION

Parameter	Data
Release quantity:	Mean concentration of BBP in effluent of textile-dyeing wastewater plants: 0.01 ug/L
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 and techniques that do not indicate quality issues. Source is peer reviewed.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data is from China, a non-OECD country
	Metric 3: Applicability	Low	Data is for a wastewater treatment plant which is similar to disposal which is an in-scope use.
	Metric 4: Temporal Representativeness	High	Data is from 2017 so less 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 results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by sampling multiple sites but does not address uncertainty.

Overall Quality Determination**Low**

Study Citation:	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.			
HERO ID:	4728432			
Conditions of Use:	Use of plastic products			
EXTRACTION				
Parameter	Data			
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, 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	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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	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.		
HERO ID:	4728432		
Conditions of Use:	Disposal: E-waste sites		
EXTRACTION			
Parameter	Data		
Description of release source:	The concentration range of total phthalates in the ambient environment of e-waste dismantling areas were 0.31–2.39 mg/kg in soil and 1.81–5.77 mg/kg in plants (dry weight/DW) (Ma et al. 2013). Other data from soils at three e-waste sites, Fengjiang, Nanshan, and Meishu in Taizhou city in China, showed that total phthalate concentrations ranged from 12.57 to 46.67 mg/kg (Liu et al. 2009). Environmental pollutants from informal e-waste recycling area present a high exposure risk to local populations via direct and indirect contact (Awasthi et al. 2016).		
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	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	OECD, (2004). Emission scenario document on lubricants and lubricant additives.			
HERO ID:	3827416			
Conditions of Use:	Formulation of Lubricants			
EXTRACTION				
Parameter	Data			
Description of release source:	Formulation of additive packages, formulation of lubricants, recycling of lubricants.			
Release or emission factors:	Release or emission factors			
Release frequency:	PDF Pg. 65For a lubricant tonnage of less than 1,000 tonnes, a production period of 50 days is assumed. For a tonnage between 1,000 and 5,000 tonnes 100 days production is assumed, and for greater than 5,000 tonnes a 300 day period is assumed.			
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	ESD was developed using data from the U.K., which is an OECD 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 based on data greater than 10 but less than 20 years old (2004).
	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 vehicle types.
Overall Quality Determination		Medium		

Study Citation:	Oppelt, E. T. (1991). Air emissions from the incineration of hazardous waste. Advances in Modern Environmental Toxicology XIX:1-26.
HERO ID:	1267868
Conditions of Use:	Waste treatment - hazardous waste incineration

EXTRACTION

Parameter	Data
Physical form:	vapor
Description of release source:	hazardous waste incinerators
Release quantity:	BBP Hazardous Waste: mean of 3.7 ng/kJ and range from 0.7-23 ng/kJ; Municipal Waste: no data and Coal Power Plant: mean of 0.5 ng/kJ and range of 0.3-1.0 ng/kJ
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report does not use frequently used sources but does not indicate any flaws
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Report is US data
	Metric 3: Applicability	High	Applicable to chemical of interest
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old, from 1992
	Metric 5: Sample Size	Medium	Not represented by statistics and unclear if it is representative of hazardous waste industry.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results and assumptions, sources generally described.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty

Overall Quality Determination**Medium**

Study Citation:	Roy F. Weston Inc, (1980). Characterization and fate of the discharge of priority pollutants from the Rohm and Haas Philadelphia plant into the Delaware low level collector of the Philadelphia sewer.
HERO ID:	1333014
Conditions of Use:	Waste treatment

EXTRACTION

Parameter	Data
Number of sites:	3
Release quantity:	City water: 0.004 lbs/day; river water: 0.012 lbs/day; Process sewer effluent: ND; Process operations contributed to sewer: 0 lbs/day.
Release or emission factors:	Release or emission factors
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report does not use frequently used sources but does not indicate any flaws
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Report is US data
	Metric 3: Applicability	Low	Report is for municipal waste treatment.
	Metric 4: Temporal Representativeness	Low	Data is from 1979 so over 20 years old
	Metric 5: Sample Size	Medium	Represented by a range of uncertain statistics and unclear if it is representative
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results and assumptions, sources are generally described
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty

Overall Quality Determination**Low**

Study Citation:	Shivani, Gadi, R., Sharma, S. K., Mandal, T. K. (2019). Seasonal variation, source apportionment and source attributed health risk of fine carbonaceous aerosols over National Capital Region, India. Chemosphere 237:124500.			
HERO ID:	6816297			
Conditions of Use:	Ambient air concentration (general population)			
EXTRACTION				
Parameter	Data			
Description of release source:		This study identifies the following sources of emissions to ambient air: vehicular emissions, biomass burning, coking emissions, plastic and waste burning, secondary organic carbon sources		
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	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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			Uninformative	

Study Citation:	U.S. EPA, (2012). Phthalates action plan.			
HERO ID:	4565597			
Conditions of Use:	General industrial manufacturing, processing, or use			
EXTRACTION				
Parameter	Data			
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.		
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	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	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			High	

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.		
HERO ID:	5547263		
Conditions of Use:	Use of plastics		
EXTRACTION			
Parameter	Data		
Description of release source: In most commercial products, DEHP, DiNP, and BzBP are used as additives, and they easily migrate from those products into the environment through evaporation, leaching, and abrasion [9].			
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	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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2024). Discharge Monitoring Report (DMR) data: Butyl benzyl phthalate (BBP), reporting years 2017-2022.			
HERO ID:	12213571			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Number of sites:	Provides number of sites, facility names and ID numbers, and locations of facilities.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	Methodology used by submitters to estimate release data is not known.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	DMR is U.S. based data
	Metric 3:	Applicability	High	DMR includes industries included in the scopes of multiple chemicals.
	Metric 4:	Temporal Representativeness	High	DMR data are from 2017-2022, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Universe is limited to NPDES permit holders; statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	DMR only includes release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	DMR does not address variability or uncertainty in submitter provided data.
Overall Quality Determination		Medium		

Study Citation:	APR, (2023). Model Bale Specifications: 1-7 ALL Rigid Plastics.			
HERO ID:	11374516			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Process description:	BaleSize: Approximately 30"x42"x48" or 30"x48"x60", forexample,balesizes should allowa minimum of35,000 poundsto be shippedon 48 foot trailer, which is an industry standard. Individual companies may apply pricedeductions for shipments that do not meet minimum their weight requirements.BaleDensity:15-20 lbs/ft3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Source does not describe approach to developing estimates.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the United States and are representative of the recycling industry.	
	Metric 3: Applicability	Medium	Applicable to occupational scenario, but is not chemical specific. However, the values do apply specifically to #1-7 rigid plastics.	
	Metric 4: Temporal Representativeness	High	Model published in 2023, which is within the last 10 years.	
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	Low	Does not identify how values were calculated. Some rationale is provided.	
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	Medium	Addresses variability by presenting values as ranges, but does not address uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	ESIG, (2020). SPERC Factsheet – Use in rubber production and processing.			
HERO ID:	11360390			
Conditions of Use:	Non-PVC Material Compounding/Converting			
EXTRACTION				
Parameter	Data			
Process description:	Manufacture of tires and general rubber articles, including processing of raw (uncured) rubber, handling and mixing of rubber additives, vulcanising, cooling and finishing. (pg. 1)			
Throughput:	Amount of substance use per day: 100,000 kg/day (pg. 2)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Describes the justification behind the estimates for releases., but does not fully describe the equations and values.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from an OECD country (Belgium).
	Metric 3:	Applicability	Medium	Applicable to occupational scenarios, but is not chemical specific.
	Metric 4:	Temporal Representativeness	High	Published in 2020, which is in the past 10 years.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Rationale is provided and approaches are clear.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	High	Addresses both variability and uncertainty in the estimates.
Overall Quality Determination			High	

Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.			
HERO ID:	1267867			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Process description:	In the industrial setting, paints can be applied to parts by 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. Here, paint is conveyed from a paint reservoir by either siphon pickup created by airflow or a pressurized system. Compressed air atomizes the paint at the nozzle to form droplets or mist, releases the droplet cloud from the gun and conveys it to the workpiece. During powder coating, the fluidized powder is conveyed through a corona discharge where the powder particles pick up a negative charge. They are then directed by the electrostatic field to the grounded workpiece and deposit a uniform coating.			
Throughput:	A 6-in wide brush may use 7 gallons of paint per day. A 9-in roller may use 14 gal/day, and air spray use varies from 10-70 gal/day.			
Chemical concentration:	Powder paints contain 50-60% resin and hardener, 50-40% pigments and fillers, and 1-2% additives.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for the use of paints and coatings, but are a general model, and not for one specific 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	Medium	Sample distribution characterized by limited statistics (means, standard deviations) 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 including different paint application techniques. Uncertainty isn't addressed.
Overall Quality Determination		High		

Study Citation:	Cousins, A. P., Remberger, M., Kaj, L., Ekheden, Y., Dusan, B., Brorstroem-Lunden, E. (2007). Results from the Swedish National Screening Programme 2006. Subreport 1: Phthalates. GRA and I(GRA and I):39.		
HERO ID:	675060		
Conditions of Use:	Use (general use, not differentiated)		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Swedish use volume was 727 tonnes in 2005 (for 119 preparations, mainly softeners, construction materials, fillers, and paints per Table 5)		
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., 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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	

Study Citation:	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
HERO ID:	5353181			
Conditions of Use:	Domestic Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	”DINP, DIDP, and DEHP were manufactured in and/or imported into Canada in quantities greater than 10 million kg/year. Manufacture and import quantities for theBBP, DBP, DCHP, and DIBP were in the range of 10 000 to 1 000 000 kg/year. (4/228)”			
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	Medium	Data are from Canada, an OECD country.	
	Metric 3: Applicability	High	Data are for domestic 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	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	High	Uncertainty is addressed in estimation method of total production data. Variability is addressed by compiling different studies in the report.	
Overall Quality Determination		High		

Study Citation:	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.		
HERO ID:	679967		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume: About 2.7 x 10^6 tonnes/year of total phthalates are produced. BBP accounts for 1-10% of the tonnage.			
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., 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	The completed exposure or risk assessment is more than 20 years old. The assessment captures operations, equipment, and worker activities that are expected to be outdated.
	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	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Medium	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.		
HERO ID:	3661424		
Conditions of Use:	Manufacture, import, export		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Tonnage by end use market in Table 2: a total of 8,000 t/y is manufactured for use in articles, 0 t/y is imported or exported		
Life cycle description:	Breakdown of BBP by use in Table 2: 53.6% for flooring, 1.4% for film/sheet/coated/molded products, 24% for adhesives/sealants, 2% for lacquers and paints, 1% for other non-polymer applications		
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., 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	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	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.		
HERO ID:	3661424		
Conditions of Use:	Plastics		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	The total consumption of EU-produced BBP for flooring products was estimated at 4,290 tonnes per year for 2007.		
Life cycle description:	The main use (94%) of the four phthalates contained in articles proposed for restriction is in PVC. Minor uses are in non-PVC polymers and non-polymers. Uses include: Flooring (and heavy wall covering), Insulation on wires and cables, Electronic devices, Plast coated fabric and film/sheets used for bags and brief/suitcases and similar items, Plast coated fabrics and film/sheets used for tablecloth, curtains, shower curtains and similar items (not industrial uses), Carpet tiles/squares produced with (typically) PVC-foam as back cover, Water- and air mattresses, Plast coated wallpaper/tapestry, Footwear, Bathing equipment (swim-coats/wings/belts and pools - inflatable and others), Balls for training and physical exercises, Others: Erasing rubber		
Chemical concentration:	concentrations of the phthalates in articles are between 25 and 50%. BBP is 0.44-0.89% in flooring per Table 4, <=6.8% per narrative. 1-5% in bags. he analyses showed that 4 oilcloths had a content of DEHP above 1% (up to 25%), the concentration of DBP and DIBP were below 0.1% in all of the analysed products and BBP was not detected in any of the oilcloths and dinner mats. None of the analysed tiles contained these four phthalates in concentrations above 0.1%. Plasticiser concentrations in PVC in water beds are assumed to similar to the film used in air mattresses, namely 20-30%. he Danish EPA has analysed 13 air mattresses for the content of DEHP, DBP, DIBP and BBP (Danish EPA, 2010a). Four of the analysed mattresses had a concentration of DEHP above 1% varying from 8.2 to 30.4%. DIBP was detected in one of the mattresses in concentrations below 0.1% and DBP and BBP were not detected in any of the analysed mattresses. Also see Tables 14 and 19.		
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., 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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty			
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Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.			
HERO ID:	3661424			
Conditions of Use:	Plastics			
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 7:		Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates.		
HERO ID:	3661424		
Conditions of Use:	Lacquers, paints, inks		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In the same manner, the total consumption of EU-produced BBP for paints and inks was estimated at 160 tonnes per year for 2007.		
Process description:	The main function of BBP in paints and inks is to give flexibility to prevent the paints/inks from chipping and flaking from the surfaces they are applied to (BBP RAR, 2007), (ECHA, 2009b).		
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., 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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	ECHA, (2010). Evaluation of new scientific evidence concerning the restrictions contained in Annex XVII to Regulation (EC) No 1907/2006 (REACH): Review of new available information for di-'isononyl' phthalate (DINP).
HERO ID:	3687875
Conditions of Use:	Use in plastics

EXTRACTION	
Parameter	Data
Life cycle description:	HMW phthalates can be used in (electrical) wire and cables, flexible PVC sheets, coated fabrics, automotive applications (synthetic leather for car interiors, car underbody coatings, cables), building and construction (e.g. waterproofing) and (vinyl) flooring (www.dinp-facts.com). Other reported uses are in shoe soles, sealings, paints and lacquers, same as for DEHP (EU, 2003; ECHA, 2009a), as well as in footwear in general and in swimming pools and ponds liners (www.dinp-facts.com). According to Industry, DINP can be blended into a paste (socalled "plastisol"), which makes it particularly fitted for coating (such as tarpaulins, synthetic leather, flooring, wall covering, etc.) and rotomoulding (such as some toys and sporting articles) applications; although it can also be used in "plastisols", DIDP is preferably used in extruded and calendered articles, such as cables, profiles, roofing sheets or ponds liners (ECPI, 2010; ECPI, 2010a). Phthalates, including DINP, have also been mentioned to be used in children's clothing (ECPI newsletter, summer 2009, issue 16; see also "Use in other articles for/in contact with children" section below).

		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., 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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	N/A	Information is general and 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	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.

Overall Quality Determination

High

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Study Citation:	ECHA, (2010). Evaluation of new scientific evidence concerning the restrictions contained in Annex XVII to Regulation (EC) No 1907/2006 (REACH): Review of new available information for di-'isononyl' phthalate (DINP).		
HERO ID:	3687875		
Conditions of Use:	Use in plastics		
		EVALUATION	
Domain	Metric	Rating	Comments

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Formulation			
EXTRACTION				
Parameter	Data			
Process description:	Table 2-1: Formulation of adhesives/sealant: Use in closed batch process (synthesis or formulation) Industrial setting; Use in batch and other process (synthesis) where opportunity for exposure arises. Industrial setting. Formulation of lacquers and paint: Use in closed batch process (synthesis or formulation) Industrial setting; Use in batch and other process (synthesis) where opportunity for exposure arises. Industrial setting. // Section 2.2.1: For polymer products, "formulation" means production of semi-final products, such as PVC compound, which is pre-mixed, extruded PVC granulate ready for production of PVC end-product (e.g. hoses or toys), or plastisol, a pasty mixture (or "paste") of constituents prepared for spread coating of textiles or other materials.			
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. (Europe).
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Information is qualitative. (gen. engineering 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	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Processing into plastics, application of paints/adhesives/etc. to produce articles			
EXTRACTION				
Parameter	Data			
Process description:	Table 2-1: Compounding of polymer: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact). Industrial setting. Calendering of polymer: Calendering operations. Industrial setting. Spread coating (with plastisol):Roller application or brushing of adhesive and other coating. Industrial or non-industrial setting. Application of adhesives/ sealant: Spraying in industrial settings and applications. Industrial setting; Roller application or brushing of adhesive and other coating. Industrial or non-industrial setting; Hand-mixing with intimate contact and only PPE available. Nonindustrial setting. Painting (application of lacquers and paint): Spraying in industrial settings and applications. Industrial setting; Spraying outside industrial settings and/or applications.// Section 2.2.1: Here, "processing" is the production of the polymer products themselves (hoses, toys, etc.). // See additional explanation on p. 22.			
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. (Europe).
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The assessment captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Information is qualitative. (Gen. Engineering)
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 assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2008). European Union Summary Risk Assessment Report: Benzyl butyl phthalate (BBP) (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:	2121719		
Conditions of Use:	Manufacturing - domestic		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	1994-1997 (EU): 45,000 tonnes/annum, with approximately 9,000 tonnes/annum being exported outside the EU. Total use in the EU of 36,000 tonnes/annum. 2004 (EU): 19,500 tonnes used in EU. For 2004 (EU): 60% used as plasticizer with 41% of that going towards flooring. 8,000 tonnes/annum used in flooring, 6,000 tonnes/annum in sealants.		
Process description:	Produced by esterification of phthalic anhydride in closed systems with a surplus of alcohol at temperatures of about 90 C. Vapour from the process is condensed and returned to the reactor. After virtually complete esterification the surplus alcohol is evaporated off under vacuum at 160 C. The second step involved the conversion of phthalic acid-monobutylester to BBP via reaction with benzylchloride. This step is slower than the first step. The product is then neutralised, washed, and finally filtered. Process occurs in closed systems.		
Number of sites:	3 sites from 1994 - 1997. 2 producing sites in 2005. Sites were Belgium, Germany, and Italy		
Chemical concentration:	Norwegian products concentrations: sealants: 1-30%; plastics: 5-100%; paints: 1-60%; chemical products: 60-100%; adhesives: 1-5%, 10-30%;		
Comments:	Assumed 7,200 operating days/year.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment uses high quality data not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Italy, Germany and Belgium, all OECD countries
	Metric 3: Applicability	High	Data is directly applicable to conditions of use
	Metric 4: Temporal Representativeness	Medium	Production data is from 2004 and from 1990s, so a mix of more than 10 and more than 20 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	Medium	Addresses variability by multiple sites over multiple years but does not address uncertainty
Overall Quality Determination		Medium	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).
HERO ID:	5348378
Conditions of Use:	Manufacture

EXTRACTION

Parameter	Data
Production, import, or use volume:	European Union Production Volumes of BBP1994-1997: 45,000 tonnes/annum2004: 19,500 tonnes
Life cycle description:	In 2004The main use of BBP is as a plasticizer in PVC products (~60% PV) with flooring as the largest use category (41% of total use volume).8,000 tonnes/annum of total production (19,500 tonnes) were used in flooring. 6,000 tonnes/annum were used in sealants and 5,500 tonnes/annum were unspecified.PDF Pg. 25"BBP is also used with other polymers in e.g. sealants, (polysulfide based, polyurethane based or acrylic-based), adhesives (based on polyacrylics and polyvinylacetate), paints (e.g based on polyurethane and polyacrylics), inks and lacquers (based on acrylics, nitrocellulose and vinyl resins)."Additional info/diagram on PDF Pg. 29
Process description:	Pulled directly from PDF Pg. 24"Phthalate plasticisers are produced by esterification of phthalic anhydride in closed systems with a surplus of alcohol at temperatures of about 90 C. The vapour from the process is condensed and returned to the reactor. After virtually complete esterification the surplus alcohol is evaporated off under vacuum at 160 C. The second step involves the conversion of phthalic acid-monobutylester to BBP via reaction with benzylchloride. This step is slower than the first step. The product is then neutralised, washed and finally filtered. The reaction processes occur in closed systems. Process water is either treated in industrial wastewater treatment plants or discharged to the local municipal waste-water treatment plant. Liquid and /or solid waste fractions like distillation residues and used filter-papers are burned in an industrial combustion plant."
Number of sites:	3 sites:(Solutia) Ferro - Antwerp BelgiumBayer - Leverkusen GermanyLonza SPA - Marghera plants Italy
Chemical concentration:	Concentrations based on 1996 SFT survey:Sealing compounds/ fillers(sealants for thermophane windows,acrylic-based sealants, polyurethane foam sealants): 1-30%Plastics: 5-30%Plastic additives: 5-100%Anti fouling paints: 1-20%Paints and lacquers: 1-30%Additives for paint and lacquers: 1-60%Chemical products for textile industry: 60-100%Adhesives: 1-5%Glues: 10-30%Car care products, (other than paints, lacquers, under-coating): 0-30%Concentrations based on Danish Product Register 1998:Paints, lacquers and varnishes: 0-1%; 1-5%; 5-10%; 10-20%Fillers: 0-1%; 1-5%; 5-10%; 10-20%; 20-50%Process regulators (hardeners): 50-80%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3: Applicability	High	Data are for manufacture, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated. [1996-2004]
	Metric 5: Sample Size	Low	Sample distribution is described qualitatively.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by giving PVs from multiple years and chemical concentrations in multiple product types but uncertainty is not addressed.

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Study Citation:		ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:		5348378		
Conditions of Use:		Manufacture		
Domain		Metric	EVALUATION Rating	Comments
Overall Quality Determination			Medium	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Adhesive manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	PDF Pg. 115”The formulation of the sealant may be done with a closed or an open compounding process. In the open process, the worker may be exposed during the mixing of ingredients. Before the conversion or forming of the sealant can occur, the compound has to be fed from the mixer into the forming step. After mixing, the mixer is opened and the vessel is rolled to a press where the sealant is pushed to the packaging line (closed system). The sealant is packed in plastic cartridges for home and industrial use. Sealants are prepared as ready to use”			
Chemical concentration:	PDF Pg. 115”The BBP content in the polysulfide sealant is typically 15%”			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and as- sumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The assessment does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Floor coverings manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	PDF Pg. 116”The making of flooring commences with preblending and mixing. The mixing is done withintensive powder mixers under elevated temperatures. These types of mixers are closed mixtures. The resulting preheated compound is fed onto a calender, which is composed of a number of rolls. These rolls compress the melt into a thin layer, which make up the flooring. Adjusting the distance between the rolls, different gauges of sheeting become possible.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.	
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	N/A	Sample size is not applicable to process description information extracted.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and as- sumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Variability and uncertainty are not applicable to process description information ex- tracted.	
Overall Quality Determination		High		

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Plastic product manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	PDF Pg. 114”BBP is used in small PVC floating items; floats or ball floats, for fishing nets. The first step in the production is the mixing of BBP with the other raw materials. 10 litres of BBP is added manually, once a day, and the operation lasts for about 15 minutes at the Norwegian plant where the measurements are from. The BBP, PVC, and other ingredients are weighed openly, and emptied into the mixer. The mixer is then closed. This is a dispersion mixer or an intensive vortex action mixer.The blend is then transferred in pipelines with pressure air to the compression moulding step. The moulding is performed by two workers standing on both ends of a carousel, one filling themould with a filling pistol directly connected to the pipeline, and the other worker takes out the bowl-shaped PVC with tongs after it has passed the heating area. These workers will be prone to exposure, especially the worker filling the moulds. The carousel workers wear PPE.The stacked bowls are put in a hydraulic press with heat in a closed process. This foaming process creates large cells which are crossbanded in the PVC. This is done 4-5 times per shift. The newly shaped PVC-balls are allowed to cool down for 2 hours before taken out, and cooled even further down in a water bath, which is fully self-contained to equalise the pressure.After the setting period of 2 days the PVC-balls are shaped to their final shape by expansion in a boiling water bath for 2 hours. During the extrusion steam is emitted and can produce aerosols with PVC residue, hence also BBP. After the extrusion the floating balls are taken out of the mould and packed for shipping.’			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Sample size is not applicable to process description information extracted.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Variability and uncertainty are not applicable to process description information extracted.
Overall Quality Determination			High	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Application of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Process description:	<p>PDF Pg. 120Use of Polysulfide Sealants for Glass Insulation”The sealant is used for providing airtight fittings for thermo pane double glass windows. The tightening process takes place at the window production sites. In the case of mono component sealants this is done immediately at ambient temperatures using either a pneumatic or hand operated “gun”. For two components, the final user has to mix the base and the catalyst components. Today this is very seldomly hand mixed. Usually it is mixed in line in the extruding “gun”.Most of the sealant producers supply the sealants in standardised containers that are locked into presses, which pistons expel and meter the components to an in-line mixer, which feeds in an extrusion nozzle. The sealant is applied in the groove formed between two glass panels and an Aluminium spacer. It is extruded in place usually by a robot in open air at ambient temperature.The two parts of the sealant have generally no contact with the workers other than unplugging of the extrusion nozzles. In the conditions of application no gases or aerosols are produced. An increase of Argon filled windows is produced, replacing dry air filled windows. Producing the Argon filled windows, the sealant is applied in a closed container, which is roof-vented when the operation is completed. In its final use, on the window, the sealant is out of reach of the user. BBP as the other ingredients remain compatible and do not vaporise or migrate anywhere. The contact the workers have with the sealant is therefore limited. There are no measurements for this scenario, but an EASE estimate has been performed”PDF Pg.121Use of Polyurethane Sealants/Fillers/Grouting Agent”A minor application of BBP is as a component in the curing agent of expanding polyurethane used for grouting operations in tunnels/rocks to prevent water leakage. In Norway the application of this grouting agent is very limited and only small volumes (batches of < 10 l) is handled each time. These types of polyurethane sealants are also used when filling cracks in constructionconcrete. It is not known to what extent these types of fillers are used, but it seems like the use is increasing. The use pattern for injecting into tunnels/rocks or into concrete is similar.The sealant consists of a 1-component prepolymerized isocyanides including 10-20 weight% BBP and an accelerator containing selected amines and 60-100 weight% BBP. The quantity of accelerator added to the prepolymer is in the range of 1-10%, usually 1-2%. An amount of 1-2% of the accelerator implies a curing time of 20-30 minutes, whereas 10% implies a curing time of1-2 minutes (according to information from the Norwegian supplier of the product).The mixing process is manually performed, where the chemicals are poured into a mixing battery and typically stirred with a stick. When mixed, the hardening process is initiated, and the preparation is at once injected into cracks in the concrete/rock to restrict the flow of water through a structure. The injection is done with small electric pumps (of volume 1 - 10 l) at high pressure. BBP is incorporated in the polyurethane matrix after the reaction is finished (about 20-30 minutes). The redundant expanded polyurethane foam that oozes out of the wall is cut off. During this cutting process the friction of the cutting-knife through the hardened foam may create some evaporation including BBP.”</p>			
Chemical concentration:	Polyurethane sealants contain 10-20 weight% BBP			
Exposure route:	Inhalation, dermal			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.	
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	N/A	Sample size is not applicable to process description information extracted.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and as- sumptions.	

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Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).		
HERO ID:	5348378		
Conditions of Use:	Application of adhesives and sealants		
Domain	Metric	EVALUATION Rating	Comments
Domain 4: Variability and Uncertainty			
	Metric 7: Metadata Completeness	N/A	Variability and uncertainty not applicable to process description information extracted.
Overall Quality Determination		High	

Study Citation:	ECJRC, (2007). European Union Risk Assessment Report: Benzyl butyl phthalate (CAS No: 85-68-7, EINECS: 201-622-7).			
HERO ID:	5348378			
Conditions of Use:	Plastic material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	PDF Pg. 119”The compounding process when making films takes place in the extruder. This is a partially open process. Blends of polymer, additives and/or master batch are mixed either in the hopper or in the tumblers and then fed into an extruder comprising one or two screws. These both shear the material and transport it through a heating regime. The resultant compound can be converteddirectly into an extrudate as a film. The film is cooled by travelling upwards over a vertical bubble of air before being taken up onto reels (blown film). Film may also be extruded through a slit die; this approaches a closed process since the extrudate is quenched immediately after it leaves the die. ”			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The completed exposure or risk assessment is generally, more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Sample size is not applicable to process description information extracted.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment clearly documents its data sources, assessment methods, results, and as- sumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Variability and uncertainty are not applicable to process description information ex- tracted.
Overall Quality Determination		High		

Study Citation:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehthylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).		
HERO ID:	7265437		
Conditions of Use:	Manufacture, import, export		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Tonnage by end use market in Table 7: a total of 8,000 t/y is manufactured for use in articles, 0 t/y is imported or exported		
Life cycle description:	Breakdown of BBP by use in Table 7: 53.6% for flooring, 1.4% for film/sheet/coated/molded products, 24% for adhesives/sealants, 2% for lacquers and paints, 1% for other non-polymer applications		
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., 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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	EPA., Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehthylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).			
HERO ID:	7265437			
Conditions of Use:	Plastics			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The total consumption of EU-produced BBP for flooring products was estimated at 4,290 tonnes per year for 2007.			
Life cycle description:	The main use (94%) of the four phthalates contained in articles proposed for restriction is in PVC. Minor uses are in non-PVC polymers and non-polymers. Uses include: Flooring (and heavy wall covering), Insulation on wires and cables, Electronic devices, Plast coated fabric and film/sheets used for bags and brief/suitcases and similar items, Plast coated fabrics and film/sheets used for tablecloth, curtains, shower curtains and similar items (not industrial uses), Carpet tiles/squares produced with (typically) PVC-foam as back cover, Water- and air mattresses, Plast coated wallpaper/tapestry, Footwear, Bathing equipment (swim-coats/wings/belts and pools - inflatable and others), Balls for training and physical exercises, Others: Erasing rubber			
Chemical concentration:	concentrations of the phthalates in articles are between 25 and 50%. BBP is 0.44-0.89% in flooring per Table 9, <=6.8% per narrative. 1-5% in bags. he analyses showed that 4 oilcloths had a content of DEHP above 1% (up to 25%), the concentration of DBP and DIBP were below 0.1% in all of the analysed products and BBP was not detected in any of the oilcloths and dinner mats. None of the analysed tiles contained these four phthalates in concentrations above 0.1%. Plasticiser concentrations in PVC in water beds are assumed to similar to the film used in air mattresses, namely 20-30%. he Danish EPA has analysed 13 air mattresses for the content of DEHP, DBP, DIBP and BBP (Danish EPA, 2010a). Four of the analysed mattresses had a concentration of DEHP above 1% varying from 8.2 to 30.4%. DIBP was detected in one of the mattresses in concentrations below 0.1% and DBP and BBP were not detected in any of the analysed mattresses.			
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., 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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty				
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Study Citation:		EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehthylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).		
HERO ID:		7265437		
Conditions of Use:		Plastics		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 7:		Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehthylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).		
HERO ID:	7265437		
Conditions of Use:	Lacquers, paints, inks		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In the same manner, the total consumption of EU-produced BBP for paints and inks was estimated at 160 tonnes per year for 2007.		
Process description:	The main function of BBP in paints and inks is togive flexibility to prevent the paints/inks from chipping and flaking from the surfaces they are applied to (BBP RAR, 2007), (ECHA, 2009b).		
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., 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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	ExxonMobil, (2022). EM BRCP DINP/DIDP facility – virtual tour (sanitized).			
HERO ID:	10633678			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Describes the process of Di-Isononyl Phthalate BRCP Unit Operation. (pg. 5 of 22)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Data seems to be collected from high quality sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the United States and are representative of the industry.	
	Metric 3: Applicability	Medium	Assessment is for an occupational scenario within the scope of risk evaluation, but it is unknown if the information is relevant to the chemical of interest.	
	Metric 4: Temporal Representativeness	High	Published in 2022, which is less than 10 years old.	
	Metric 5: Sample Size	N/A	Metric is not relevant to the extracted information.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Report documents data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Metric is not relevant to the extracted information.	
Overall Quality Determination		High		

Study Citation:	Gao, C. J., Kannan, K. (2020). Phthalates, bisphenols, parabens, and triclocarban in feminine hygiene products from the United States and their implications for human exposure. Environment International 136:105465.			
HERO ID:	6957637			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	The concentration of BBP in all feminine hygiene products was below the LOD in this study.			
Comments:	Table 1-3. In some case, range contains non-zero values.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for consumer use of Personal care products, which is similar to the in-scope occupational scenario use of fabric products and textiles.
	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 (means, medians, 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	High	Uncertainty is addressed in the limits of detection and sampling methodologies. Variability is addressed by sampling different products and product brands.
Overall Quality Determination			High	

Study Citation:	Irwin, J. A. (2022). Letter from IRWIN Engineers, Inc with information regarding DINP usage by Sika Corporation.			
HERO ID:	10293367			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Process description:	Scrap from off-specification membrane and edge trimming is recycled on-site with processing through a grinding system. Ground PVC chips are separated from lighter fabric fibers by airclassification in an enclosed system to recover the heavier fraction for reuse on the extrusion line. The fabric and felt fractions (“fluff”) containing some residual PVC is disposed off-site. (pg. 3)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from a frequently used source.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.	
	Metric 3: Applicability	Medium	The assessment is for an occupational scenario within the scope of the risk evaluation. However, the assessment is for a different chemical (DINP).	
	Metric 4: Temporal Representativeness	High	Data was collected within the past 10 years.	
	Metric 5: Sample Size	N/A	Sample size not applicable to process description.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The assessment does not address variability or uncertainty.	
Overall Quality Determination		High		

Study Citation:	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. Science 46(4056):46-47.		
HERO ID:	1335811		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
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.		
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	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for the production of phthalates, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed by discussing differences between studies. Variability isn’t addressed.
Overall Quality Determination		Medium	

Study Citation:	Monsanto, (1982). Final report: A case-control study of leukemia with cover letter.			
HERO ID:	1359247			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Number of sites:	5 Monsanto locations were identified which have or had exposure to BBP.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Assessment 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	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for plasticizers in plastic and resin manufacturing, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (number of samples, p-values) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in a section of the submission titled, "Limitations of the Study". Variability is addressed by including matched controls based on sex, race, and job.	
Overall Quality Determination		High		

Study Citation:	NICNAS, (2015). Priority existing chemical assessment report no. 40: Butyl benzyl phthalate.			
HERO ID:	3664467			
Conditions of Use:	Manufacturing, general use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Worldwide annual production and/or import volumes of BBP were 1000–10000 tonnes in the EU (REACH Dossier) and 90000–180000 tonnes in the USA (US EPA Chemical Data Reporting 2012). (P. 20/57)			
Life cycle description:	BBP might be used as a plasticiser (a substance added to make another substance more pliable) for toys, including play and exercise balls.BBP has been reported to have a number of industrial uses in Australia, including in the manufacture of adhesives, sealants, coatings, paints and inks. It serves as a specialty plasticiser in PVC compounds, vinyl and acrylic lacquers, nitrocellulose lacquers and polyurethane wheels for forklifts.			
Chemical concentration:	In the absence of data on the use of BBP in children’s toys, assumptions need to be made in modelling exposures that BBP completely substitutes for DBP in a mixed phthalate plasticiser, at a maximum concentration of 0.5 % w/w, with a total plasticiser concentration (DINP+BBP) in the PVC of 43 %. The use of BBP in children’s toys and childcare articles is restricted to 0.1 % by weight in the EU, the United States of America (USA) and Canada. (P. 9/57)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			High	

Study Citation:		NICNAS, (2015). Priority existing chemical draft assessment report: Diisodecyl Phthalate & Di-n-octyl Phthalate.		
HERO ID:		6836808		
Conditions of Use:		Plasticizers		
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		In 2010, the total global market for phthalates was estimated at six million tonnes, with 1.4 million tonnes in the EU, the Middle East and Africa; 1.1 million tonnes in the Americas and 3.5 million tonnes in Asia. (20/65)		
Chemical concentration:		PVC products made with DIDP include inflatable water products, hoppers, and play and exercise balls, with a maximum concentration of 40% (possibly in combination with other phthalates). (9/65)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.
Domain 2: Representativeness		Metric 2: Geographic Scope	Medium	Data are from Australia, an OECD country.
		Metric 3: Applicability	Medium	Data are for plasticizers in plastic and resin manufacturing, an in-scope occupational scenario. Not specific to BBP.
		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, production values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Medium	Uncertainty is addressed by listing critiques of the studies and data used in the assessment. Variability is addressed by using data from many studies.
Overall Quality Determination			High	

Study Citation:	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.			
HERO ID:	3808976			
Conditions of Use:	Paints and coatings			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	54,633,000 total gallons automotive refinish coatings/yr 99,747 - 1,097,457 gallons coating/yr (depending on coating type)			
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 adjsutng the use rate based on the type of coating product used			
Number of sites:	32,296			
Chemical concentration:	15-25%			
Physical form:	liquid			
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 limited statistics (min, max, mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple coating types.
Overall Quality Determination		Medium		

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

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.		
HERO ID:	3827299		
Conditions of Use:	Processing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	15.8-4,990 million kg adhesive/yr.		
Life cycle description:	Formulation of Adhesives		
Process description:	Unloading raw materials from containers into mixing vessel, mixing, packaging/on-site storage		
Throughput:	Batch Size: 4000 kg or 1,000 gallons of adhesive/bt. Op days & batches/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.		
Comments:	The maximum number of sites should not exceed 592, per U.S. Census data (USCB, 2003) (estimated as 50 largeformulators and 542 other formulators, per TRI data for top formulators as discussed in Section3.2). page 53		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.
Overall Quality Determination		High	

Study Citation:	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.		
HERO ID:	3827300		
Conditions of Use:	Use of adhesives for substrate bonding		
EXTRACTION			
Parameter	Data		
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/yr: 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.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions, types of adhesives, and end use markets.
Overall Quality Determination		High	

Study Citation:	OECD, (2015). Emission scenario document on use of adhesives.		
HERO ID:	3833136		
Conditions of Use:	Application of Adhesives and Sealants		
EXTRACTION			
Parameter	Data		
Life cycle description:	Adhesive application		
Process description:	Unloading from tank cars, totes, drums ; Dilute and mix (optional); Formulation; Adhesive Application (spray, roll, curtain, or syringe/bead application); Equipment Cleaning; Drying/Curing; Product finishing (pg. 33 of 189)		
Throughput:	Adhesive Annual Use Rate: 141,498 kg/site-yr (Table D-3)		
Number of sites:	Number of Sites for Adhesive Use in Computer/Electronic and Electrical Product Manufacturing: 22,294(Table 3-3)Number of Sites for Adhesive Use in Motor and Non-Motor Vehicles, Vehicle Parts, and Tire Manufacturing (Except Retreading): 8,366(Table 3-4)Number of Sites for Adhesive Use for Labels and Tapes Manufacturing: 541(Table 3-6)		
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, types of adhesives, and end use markets.
Overall Quality Determination		Medium	

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

Study Citation:	OECD, (2004). Emission scenario document on additives in rubber industry.		
HERO ID:	4445826		
Conditions of Use:	Non-PVC Material Compounding		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Provides total synthetic rubber production and synthetic and natural rubber consumption in various EU (including UK) countries indicating EU accounts for 25% of world synthetic rubber production, and percentage used for various end-use products, and market share of various rubbers. (pg. 10)		
Life cycle description:	Processing - rubber manufacturing		
Process description:	Mastication and creation of mixtures, shaping, vulcanisation/curing (pg. 12-23)		
Throughput:	Provides throughputs of various rubber products at a generic point source.		
Chemical concentration:	Plasticisers, natural and synthetic: 10-20 parts per hard rubber (prh) (pg. 27)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Low	Assessment from 2004 but is based on data greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various additive functions, end-use products, and types of rubber.
Overall Quality Determination		Medium	

Study Citation:	OECD, (2004). Emission scenario document on additives in rubber industry.			
HERO ID:	4445826			
Conditions of Use:	Non-PVC Material Converting			
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		Provides total synthetic rubber production and synthetic and natural rubber consumption in various EU (including UK) countries indicating EU accounts for 25% of world synthetic rubber production, and percentage used for various end-use products, and market share of various rubbers. (pg. 10)		
Life cycle description:		Processing - rubber manufacturing		
Process description:		Mastication and creation of mixtures, shaping, vulcanisation/curing (pg. 12-23)		
Throughput:		Provides throughputs of various rubber products at a generic point source.		
Chemical concentration:		Plasticisers, natural and synthetic: 10-20 parts per hard rubber (prh) (pg. 27)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness		Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.
		Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
		Metric 4: Temporal Representativeness	Low	Assessment from 2004 but is based on data greater than 20 years old.
		Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various additive functions, end-use products, and types of rubber.
Overall Quality Determination			Medium	

Study Citation:	OECD, (2009). Emission scenario document on plastic additives.		
HERO ID:	5079084		
Conditions of Use:	Processing		
EXTRACTION			
Parameter	Data		
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 compoundind 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 molding, 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.		
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 are for multiple in-scope occupational scenarios; 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.
Overall Quality Determination		Medium	

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			
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			
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:	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.
HERO ID:	6568745
Conditions of Use:	Application of Paints and Coatings

EXTRACTION	
Parameter	Data
Process description:	Unloading, dilute and mix (optional), application (roll, spray, curtain, vacuum), curing
Throughput:	Provides methodology for estimating throughput based on the amount of product produced, and the concentration of the chemical in the formulation. (Eqn 3-4; pg. 82)
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. (pg. 42)
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific. (Table 2-3 and 2-4; pg 29-30)If the concentration of the chemical in the formulation (Fchem_form) is unknown, 70 percent concentration may be assumed as a conservative default. (pg. 66)

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

Study Citation:	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.			
HERO ID:	6311222			
Conditions of Use:	Industrial/Commercial Use: Automotive Care Products			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Auto OEM: 166,000 cars painted/yr. Auto refinish: 70-2,000 L paints/yr/site.			
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. Auto refinish: 170 days/yr.			
Number of sites:	Auto OEM: 61 sites. Auto refinish: 1000’s of sites.			
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		

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			
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. No specific number of workers			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	Medium	Data are for 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	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by reporting estimated values and ranges. Variability addressed by reporting data from multiple years but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Processing - Plastics Compounding			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides methodology for estimating the annual facility use rate based on the annual facility use rate of all plastics additives, the mass fractions of the chemical of interest, the plastics additive of interest, and of all plastics additives contained in the compounded plastic resin. (pg. 37 of 123)			
Life cycle description:	Plastics Compounding			
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. (pg. 38 of 123)			
Chemical concentration:	Provides concentration estimates based on additive function in various plastics, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	GS is based on US 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. The revised draft was published in 2021.	
	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		

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

Study Citation:	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	11182966			
Conditions of Use:	Repackaging			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Table B-1 presents PMN data on repackaging rate in kg chemical/site-yr.			
Process description:	<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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Study Citation:		U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
HERO ID:		11182966		
Conditions of Use:		Repackaging		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 5:		Sample Size	High	Statistical distribution of samples is fully characterized (discrete use amounts provided).
Domain 3: Accessibility/ Clarity				
Metric 6:		Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty				
Metric 7:		Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple repackaging facilities.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).
HERO ID:	11373493
Conditions of Use:	PVC Plastics Converting/Non-PVC Plastics Converting

EXTRACTION

Parameter	Data
Process description:	Receive compounded plastic, unload, form/mold/shape, trim, finish (pg. 2-2)
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced.
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. (pg. 3-9)

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**

Study Citation:	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.			
HERO ID:	3827197			
Conditions of Use:	Formulation of Coatings			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	1.6-16 million kg coatings/site-yr depending on type of coating (Table 3-2; pg. 38 of 172)			
Process description:	Unloading solid/liquid components from tank cars, totes, drums, or sacks and from filter replacement → pre-mixer (pigment dispersion), grinder (pigment dispersion), blending tank, filter, packaging			
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.Draft is from 2014.	
	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 applications, and multiple chemical functions.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.
HERO ID:	6311218
Conditions of Use:	Incorporating into formulation, mixture or reaction product as a plasticizer; Incorporating into articles as a plasticizer in 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 (page 3 of 18)
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch (see page 8-9 of 18 for detailed description of methods for this step), extrusion/shaping (page 4 of 18)
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic (page 11 of 18)
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 (page 11-12 of 18). In 2001 there were 715 plastic compounding sites (page 11 of 18).
Chemical concentration:	'Provides conc. estimates based on additive function in various plastics, not chemical specific (page 5-6 of 18)

		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

Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).		
HERO ID:	6311221		
Conditions of Use:	Formulation of Printing Inks		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	11.9-373.8 million kg ink/yr (depending on printing application) (Table 4 and Table 7, page 28 and 37 of 54)		
Process description:	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. (page 22 of 54)		
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 (page 37-38 of 54)		
Number of sites:	13-239 (depending on printing application, Table 4 on page 28 of 54)		
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific. (Table 5 on page 29 of 54)		
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	

Study Citation:	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	6311221			
Conditions of Use:	Use of Printing Inks			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	11.9-373.8 million kg ink/yr (depending on printing application) (Table 4 and Table 7, page 28 and 37 of 54)			
Process description:	Provides descriptions for lithography, gravure, flexography, letterpress, digital printing, and screen printing. (page 22-26 of 54)			
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 (page 37-38 of 54)			
Number of sites:	454-18,622 (depending on printing application, Table 7 on page 37 of 54)			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific. (Table 5 on page 29 of 54)			
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		

Study Citation:	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).			
HERO ID:	6385708			
Conditions of Use:	Distribution in Commerce, disposal			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	EPA estimates 500,000 IBCs are cleaned annually in the United States. Of this amount, EPA believes 225,000 IBCs are cleaned by Transportation Equipment Cleaning facilities. The remaining 275,000 IBCs are cleaned by drum reconditioning facilities.			
Process description:	Cleaning process generally include reviewing manifests, draining the tank heel, rinsing, washing or using material-specific cleaning methods, rinsing a second time, and drying. Cleaning processes vary between facilities depending on the available cleaning equipment and the commodities last transported in the tanks to be cleaned.			
Throughput:	IBCs are portable plastic and metal containers with 450 liters (199 gallons) to 3,000 liters (793 gallons) capacity. Cleaning time for tank barges typically ranges from four to eight hours. On average, tank trucks, IBCs, or intermodal tank containers requires two hours for cleaning.			
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 multiple in-scope occupational scenarios; 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	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 multiple container types and cleaning methods.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385709			
Conditions of Use:	Flexographic Printing			
EXTRACTION				
Parameter	Data			
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.			
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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385710			
Conditions of Use:	Formulation of Printing Inks			
EXTRACTION				
Parameter	Data			
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 (page 6 of 23)			
Process description:	The manufacturing of printing inks consists of two major processes: vehicle preparation and dispersion. Vehicle preparation consists of creating and mixing all other components of the ink except the dye or pigment. The process can consist of polymerization of resins, solvent mixing, and dissolving of other solid and liquid components. These processes are conducted in various types of autoclaves, reactors and high speed mixers. The dispersion stage is where dyes and pigments are added to the ink vehicle to form the final product. Dispersion is done in ball or media mills. The type of media used in the mills depends on the color, texture and final use of the ink product (page 7 of 23)			
Number of sites:	See Table 2-2 on page 7 of 23: 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%. (page 16 of 23)			
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		

Study Citation:	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385710			
Conditions of Use:	Use of Printing Inks			
EXTRACTION				
Parameter	Data			
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 (page 6 of 23)			
Process description:	Provides descriptions for lithography, gravure, flexography, letterpress, digital printing, and screen printing. (pages 10-13 of 23)			
Number of sites:	See Table 2-2 on page 7 of 23: 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%. (page 16 of 23)			
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		

Study Citation:	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.		
HERO ID:	6385711		
Conditions of Use:	Plastics Converting		
EXTRACTION			
Parameter	Data		
Process description:	Plastics converters receive the masterbatch of plastic resin from compounders and convert the plastic resin into a finished plastic product. The plastic resins, which contain the chemical additives, are received at the converting site as solid pellets, sheets, or films. They are then heated and are formed into the desired shape through a variety of converting methods, including extrusion, injection molding, and thermoforming (BPF, no date b). The converted plastics may then undergo finishing operations, where secondary modifications yield the final, finished plastic product. Finishing operations include filing, grinding, sanding, polishing, painting, bonding, coating, engraving, etc. (page 24 of 96)		
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic (page 37-38 of 96)		
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 (page 38-39 of 96)		
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific. (page 15-18 of 96).		
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	

Study Citation:	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385719			
Conditions of Use:	Furniture Coating Application			
EXTRACTION				
Parameter	Data			
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 (spray booth, manual or automatic), flash-off, drying oven Wood furniture: coating unloaded, coating mixing, coating application (spray booth, 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.			
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	

Study Citation:	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385741			
Conditions of Use:	Incorporation into articles as a plasticizer in fabric, textile, and leather products not covered elsewhere manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	73 million kg finishing agents/yr			
Process description:	Fabric immersed in an aqueous finishing formulation then squeezed between metal rolls to remove excess padding solution and to aid in the even distribution of the finishing agent, fabric dried by passing over a series of heated metal rolls, fabric cured by passing through a long oven.			
Throughput:	3,520-50,000 kg cloth/site-day			
Number of sites:	1,100 total finishing plants			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This 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 finishing agent types.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.			
HERO ID:	6385748			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
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.			
Comments:	Page 28 (pdf document)			
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		

Study Citation:	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.
HERO ID:	6549571
Conditions of Use:	PVC Plastic Converting

EXTRACTION	
Parameter	Data
Production, import, or use volume:	Table 2 presents types of thermoplastics, North American production values (pounds and kg), and common uses. (pg. 2-3)
Life cycle description:	Plastics Converting
Process description:	Polymer resin is received at the compounding sites from the resin manufacturer in the form of pellets. A compounding site blends the resin and additives to produce a masterbatch. The converting site then processes the masterbatch by shaping the plastic into the desired form for the final plastic product. The blending and forming may take place at the same facility ("in house" manufacturing) or separate facilities. As a conservative estimate, it is assumed that the compounding of the plastic resin and the converting of the resin into plastic products take place at separate facilities. Therefore, in-house manufacturing is not covered in this scenario. After shaping, finishing operations such as filing, grinding, sanding, polishing, painting, bonding, coating, engraving etc. are performed to complete the finished plastic product. This scenario covers the converting of plastic resins into finished products. (pg. 3-4)
Throughput:	Describes how to calculate the daily use rate of plastic additives. (pg. 11)
Number of sites:	Describes how to calculate the number of converting sites. The number of sites should not exceed 12,191 converting sites. (pg. 11)

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. There is a brief mention of BBP, but only for vapor pressure at various temperatures.
	Metric 4:	Temporal Representativeness	Low	Assessment is more than 20 years old. Industry conditions 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

Medium

Study Citation:	[Redacted] (2021). TANKS 4.0.9d: Emissions Report - Detailed format tank indentification and physical characteristics.			
HERO ID:	10617127			
Conditions of Use:	Unknown			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Net tank throughput is 1,591,340 gal/yr. (1/6)			
Throughput:	34.13 batches/yr with a batch size of 46,619.76 gal. (1/6)			
Comments:	Unknown COU, since most identifying data are redacted.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Assessment uses data from unknown sources to inform AP-42 modeling inputs.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the U.S., but it is not clear that the data are representative of the industry being evaluated.	
	Metric 3: Applicability	Low	The OES is unclear since data is redacted, but data are for tank capacity and throughput.	
	Metric 4: Temporal Representativeness	Medium	Data are less than 10 years old, but it is not clear if the information is representative of current conditions.	
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Low		

Study Citation:	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.			
HERO ID:	10369850			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Life cycle description:	The chemical is used in trace amounts as a plasticizer and additive in clear coatings and industrial wood coatings. Some of these products are designed for spray application and consumer use. It’s also used in adhesives and sealants. Amounts used in coatings manufacture is extremely low, if used at all. Amounts used are below 2,500 pounds per year, falling under the CDR reporting threshold for hazardous chemicals.			
Chemical concentration:	Amounts in products are typically negligible, although some specialty adhesives and sealants may contain amounts above 10%, but below 50%.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Data sources not provided for BBP concentrations in adhesives and sealants.	
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	No sample statistics provided regarding concentration of BBP in adhesives and sealants.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	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		

Study Citation:	Anonymous (2001). Toy safety: European Commission extends ban on phthalates. Europe Environment (12 June 2001):415.			
HERO ID:	7978472			
Conditions of Use:	Distribution in Commerce			
EXTRACTION				
Parameter	Data			
Life cycle description:	On December 7, 1999, the European Commission imposed an emergency ban on toys intended to be placed in the mouths of children under 3, manufactured in soft PVC, and containing one or more of the substances DINP, DEHP, DBP, DIDP, DNOP, and BBP.			
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	Medium	Data are from the European Commission.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation	
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	N/A	N/A - Life cycle description.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	N/A - Life cycle description.	
Overall Quality Determination		High		

Study Citation:	APR, (2020). U.S. post-consumer plastic recycling data.			
HERO ID:	11360400			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
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).”% 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%			
EVALUATION				
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	High	Data are from the U.S.
	Metric 3:	Applicability	Medium	Data are for recycling, an in-scope occupational scenario, but is not specific to BBP
	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	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 amounts of recycled products for several categories but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	APV (2018). SDS - BLACK TIRE PAINT CONCENTRATE.			
HERO ID:	6302473			
Conditions of Use:	Use of automotive paint			
EXTRACTION				
Parameter		Data		
Chemical concentration:		0.7%		
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 2018, which is less than 10 years old.
		Metric 5: Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Ashworth, M. J., Chappell, A., Ashmore, E., Fowles, J. (2018). Analysis and assessment of exposure to selected phthalates found in children’s toys in Christchurch, New Zealand. International Journal of Environmental Research and Public Health 15(2):200.			
HERO ID:	4198524			
Conditions of Use:	consumer use - paints and coating on children’s toys			
EXTRACTION				
Parameter	Data			
Chemical concentration:	% phthalate by mass for all samples ranged between 0-0.1% with a max of 0.031%, a mean of 0.01%, and a median of 0.014%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data and methods that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from New Zealand, an OECD country
	Metric 3:	Applicability	Low	Data is for children/infant exposure to phthalates .
	Metric 4:	Temporal Representativeness	High	Report is from 2017 so less than 10 years old
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	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.			
HERO ID:	2816857			
Conditions of Use:	Use of Personal care products			
EXTRACTION				
Parameter	Data			
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 11 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	

Study Citation:	Barr, W.M. (2015). SDS - Klean-Strip Mask & Peel Paint Booth Coating.			
HERO ID:	6302531			
Conditions of Use:	Use of paint coatings and primers			
EXTRACTION				
Parameter	Data			
Chemical concentration:	< 2.0 %			
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 2015, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	Bio SB Inc. (2019). SDS - PermaMounter.			
HERO ID:	6302475			
Conditions of Use:	Use of laboratory chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<1 %			
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	Low	SDS does not list publication date.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:		BJB Enterprises Inc. (2019). SDS - 6840 ULTRA BLACK.		
HERO ID:		6302458		
Conditions of Use:		Ink, toner, and colorant products		
EXTRACTION				
Parameter		Data		
Chemical concentration:		30-60%		
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	

Study Citation:	BJB Enterprises Inc. (2019). SDS - TC-690 PART B.			
HERO ID:	6302460			
Conditions of Use:	Processing - Incorporation into formulation, mixture, or reaction product			
EXTRACTION				
Parameter	Data			
Chemical concentration:	40-70%			
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		

Study Citation:	BJB Enterprises Inc. (2018). SDS - TC-995 PART B.			
HERO ID:	6302463			
Conditions of Use:	Processing - Incorporation into formulation, mixture, or reaction product			
EXTRACTION				
Parameter	Data			
Chemical concentration:	40-70%			
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	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	BJB Enterprises Inc. (2018). SDS - TC-9445 PART B.			
HERO ID:	6302472			
Conditions of Use:	Processing - Incorporation into formulation, mixture, or reaction product			
EXTRACTION				
Parameter	Data			
Chemical concentration:	40-70%			
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 2018, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	Bornehag, C. G., Lundgren, B., Weschler, C. J., Sigsgaard, T., Hagerhed-Engman, L., Sundell, J. (2005). Phthalates in indoor dust and their association with building characteristics. Environmental Health Perspectives 113(10):1399-1404.			
HERO ID:	674952			
Conditions of Use:	processing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Worldwide phthalate production has been estimated to exceed 3.5 million tons/year. DEHP accounts for roughly 50% of overall phthalate production, although this percentage has been decreasing in recent years. The production of BBP and DBP is about one-tenth that of DEHP. (pg 1 of 6)			
Chemical concentration:	Concentrations (mg/g dust) for different phthalates in settled dust from 346 bedrooms: BBP – 0.319 (mean), 0.135 (median), 0.000–45.549 (range), 0.599 (95th percentile). BBP concentrations depends on flooring: no-PVC – 0.089 and PVC – 0.192. This article has also presented concentration of BBP in dust in different countries. As for example, in USA - 45 ug/g (50th percentile) and 277 ug/g (95th percentile). High concentrations (above median) of BBP in dust were associated with PVC flooring. (pg 3 of 6)			
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	Medium	Data are from an OECD country.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	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	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		High		

Study Citation:	Cadogan, D., Howick, C. (2000). Plasticizers.			
HERO ID:	6311430			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	BBP is commonly used as a plasticizer. Worldwide consumption of plasticizers is estimated at 3.5 × 10^6 tons and is of the order of 1 million tons in Western Europe. The distribution of plasticizers into various applications is as follows: 27%, wire and cable covering; 23%, extrusion/profile; 17%, film and sheet; 13%, coated fabrics; 12%, wall covering; and 8%, undersealing/coating. (pg 20 of 30) In Western European Plasticizer Market, BBP's market share is 12%. (pg 21 of 30)			
Process description:	BBP is one of the specialty phthalates, which is a fast-fusing, low carbon number phthalate produced from alcohols of varying chain lengths. (pg 4 of 30)The steps involved in the incorporation of a plasticizer into a PVC product can be divided into five distinct stages:(1) Plasticizer is mixed with PVC resin.(2) Plasticizer penetrates and swells the resin particles.(3) Polar groups in the PVC resin are freed from each other.(4) Plasticizer polar groups interact with the polar groups on the resin.(5) The structure of the resin is re-established, with full retention of plasticizer. (pg 6 of 30)			
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	Medium	Data are from OECD countries
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	California Office of Environmental Health Hazard Assessment (OEHHA) (2013). Evidence on the carcinogenicity of butyl benzyl phthalate.			
HERO ID:	5155605			
Conditions of Use:	Manufacturing - domestic			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	BBP was 50-100 million pounds in 2002. 70% of BBP is used as a plasticizer, mainly for PVC in vinyl floor tiles, vinyl foam, carpet backing, and cellulosic resins.			
Process description:	BBP is synthesized by the reaction of the monobutyl ester of phthalic acid with benzyl chloride.			
Chemical concentration:	In the U.S., BBP has been detected in surface waters, such as the Delaware River, Mississippi River and Lake Michigan, at levels ranging from 0.2-4 $\mu\text{g/L}$ (ECB, 2007). One study reported that while BBP was not detected in 5 sites of the San Francisco Bay, the concentration of BBP in the Mississippi River south of St. Louis was up to 2.4 $\mu\text{g/L}$ (Gledhill et al., 1980). In a study of U.S. publicly owned wastewater treatment works, BBP was detected in 34 of the 302 effluent samples, with concentrations ranging from 1 to 34 $\mu\text{g/L}$ (U.S. EPA, 1982). BBP has also been detected in raw and treated drinking water (U.S. EPA, 2009).			
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 is from US	
	Metric 3: Applicability	High	Data is directly applicable to conditions of use	
	Metric 4: Temporal Representativeness	Medium	Report is based on data greater than 10 years old 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	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty	
Overall Quality Determination		Medium		

Study Citation:	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.			
HERO ID:	1322045			
Conditions of Use:	Plasticizers			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP, DiBP,and BBP in various paper towels were at levels of 1.9 to 2.9 and 9.0 mg/kg, respectively. (4/23) PVC gloves used in the preparation of the foods contained up to 74.8% of DiNP, and 27.9% of BBP. (5/23)			
Comments:	Higher-molecular-weight phthalates, such as di-2-ethylhexyl phthalate (DEHP), DiNP, and DiDP, are primarily used as plasticizers to soften polyvinyl chloride (PVC) products, while the lower-molecular-weight phthalates, such as diethyl phthalate (DEP), di-n-butyl phthalate (DBP), and butyl benzyl phthalate (BBzP), are widely used as solvents to hold color and scent in various consumer and personal care products.			
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		

Study Citation:	Carboline Company (2018). SDS - AD FIREFILM III C.			
HERO ID:	6302456			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-<1%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2023, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Carboline Company (2018). SDS - CARBOCRYLIC 3359 DTM.			
HERO ID:	6302467			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1.0 - <2.5%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.	
	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		

Study Citation:	Carboline Company (2019). SDS - CARBOTHANE 133 HB PART A.			
HERO ID:	6302497			
Conditions of Use:	Use of industrial coating			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1.0 - <2.5%			
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 2023, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation: Carboline, (2023). Safety Data Sheet (SDS): A/D Firefilm III.	
HERO ID: 11506938	
Conditions of Use: Use of industrial coating	
EXTRACTION	
Parameter	Data
Chemical concentration:	0.1 - <1.0%
Physical form:	Liquid
EVALUATION	
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 2023, 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.
Overall Quality Determination	
High	

Study Citation:	CDC, (2009). Fourth national report on human exposure to environmental chemicals.			
HERO ID:	664488			
Conditions of Use:	commercial use			
EXTRACTION				
Parameter	Data			
Life cycle description:	Benzylbutyl phthalate (BzBP) is a solvent and additive used in products such as adhesives, vinyl tile, sealants, car care products, and to a lesser extent, some personal care products.			
Chemical concentration:	Geometric mean of urine concentrations (in ug/g of creatinine) of BzBP metabolite for the U.S. population from the National Health and Nutrition Examination Survey were reported: males – 11.5 to 12.7; females – 14.4 to 15.6. Similar data is available for different age groups and different race/ethnicity.			
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	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	report clearly documents its data sources	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability but none on uncertainty	
Overall Quality Determination		High		

Study Citation:	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.			
HERO ID:	10442901			
Conditions of Use:	Industrial application of coatings by spraying			
EXTRACTION				
Parameter	Data			
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			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	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 report is for an occupational scenario within the scope of the risk evaluation. However, BBP is not mentioned.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a maximum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by providing different values based on chemical function, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.			
HERO ID:	10442902			
Conditions of Use:	Paints and coatings, Ink, toner and colorant products			
EXTRACTION				
Parameter	Data			
Throughput:	Typical maximum daily usage, 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			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	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 report is for an occupational scenario within the scope of the risk evaluation. However, BBP is not mentioned.
	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is addressed by including throughput for different substance functions but uncertainty is not addressed
Overall Quality Determination			Medium	

Study Citation:	CertiPrep., SPEX (2021). Safety Data Sheet (SDS): Phthalates in poly(vinyl chloride).			
HERO ID:	6301562			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.3%			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	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	

Study Citation:	CertiPrep., SPEX (2016). Safety Data Sheet (SDS): Haloethers & Phthalates.			
HERO ID:	6302559			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2% (pg 2 of 9)			
Physical form:	Liquid (pg. 4 of 9)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Christia, C., Poma, G., Harrad, S., Wit, De, C. A., Sjostrom, Y., Leonards, P., Lamoree, M., Covaci, A. (2019). Occurrence of legacy and alternative plasticizers in indoor dust from various EU countries and implications for human exposure via dust ingestion and dermal absorption. Environmental Research 171:204-212.			
HERO ID:	5772597			
Conditions of Use:	consumer use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	BBP manufacture/import volumes reported by ECHA (2017) is 1-10 tone/year			
Number of sites:	33 homes sampled. 18 from Belgium, 6 from Ireland, 9 from Netherlands. 3 daycare centers in Sweden.			
Chemical concentration:	BBP required to not exceed 0.1% of plasticized material in toys and childcare articles. In 2012, more than 90% of all phthalates in Europe were used in the production of PVC.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Journal is peer reviewed so likely contains high quality data and exposure comparisons are for EU and EPA.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for EU OECD countries: Belgium, Ireland, Sweden, and Netherlands
	Metric 3:	Applicability	Low	Report is for gen pop studies for household, daycare and office space phthalate dust.
	Metric 4:	Temporal Representativeness	High	Report is from 2019
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results.
Overall Quality Determination		High		

Study Citation:	Clement Associates., Inc. (1989). Human health risk assessment for the Ciba-Geigy St Gabriel, LA incineration project with cover letter dated 042789. 890000189:#86-890000189.		
HERO ID:	1335586		
Conditions of Use:	Disposal		
EXTRACTION			
Parameter	Data		
Process description:	EXISTING LIQUID INCINERATOR: process description. (P. 26/475)The CIBA-GEIGY Sc. Gabriel liquid incinerator is a multi-component facility designed co burn both aqueous and liquid organic wastes from St. Gabriel plant operations as well as certain wastes from other CIBA-GEIGY facilities.ROTARY KILN INCINERATOR. process description (P. 31/475)Organic liquid wastes will be fed from the organic liquid storage tanks directly into the organic burner portion of the kiln. The natural gas feed mentioned above will be sent to the outer barrel of this burner. Aqueous wastes will be fed directly into the kiln from the aqueous waste storage tanks.Full process description on pages 27-37		
Throughput:	Maximum feed rate to liquid incinerator: 15,900 lb/hr (based on its design) p.76		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment 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	Low	The report is more than 20 years old.
	Metric 5: Sample Size	N/A	Process description.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	CPSC, (2015). Exposure assessment: Composition, production, and use of phthalates.			
HERO ID:	5155508			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Life cycle description:	BBP is used primarily as a plasticizer in PVC to soften the material and to add flexibility. It is reported to be used with other polymers including acrylic resins, ethyl cellulose, polyvinyl formal and polyvinyl butyral. BBP is also formulated as a component in printing inks, paints, adhesives and sealants (page 74-5).			
Chemical concentration:	BBP concentration in coatings, adhesives and paints vary from 0.1 - 40% depending on the product (page 78). Modeling clay in the US can also contain 3.98% (39800 ppm). Detected in water bottles at a max concentration of <0.0001% (page 79). See Table 5-3 and associated discussion on page 75-6 for discussion on BBP concentrations in child care products, and Table 5-4 and associated discussion on 77-8 for discussion on BBP in other products.			
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 for the US	
	Metric 3: Applicability	High	Data are for processing, an in-scope occupational scenario	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and most recent data is no more than 10 years old	
	Metric 5: Sample Size	N/A	n/a	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		High		

Study Citation:	CPSC, (2015). Exposure assessment: Composition, production, and use of phthalates.		
HERO ID:	5155508		
Conditions of Use:	Manufacturing - domestic		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Listed as a High Production Volume (HPV) chemical. 1968: 100,200 lbs; 1971: 105,200 lbs; 1974: 134,200 lbs; 1977: 132,200 lbs; 1977 (again): >150 million lbs; 1978: >100 million lbs; 1981: >164 million lbs; 1986: >50 million - 100 million lbs; 1990: >100 million - 500 million lbs; 1994: >50 million - 100 million pounds; 1998: >100 million - 500 million lbs; 2002: >50 million - 100 million pounds; 2012: >50 million - 100 million lbs. (see table 5-2 on page 74 for visual of this data)		
Life cycle description:	See "process description" below for manufacturing description. The thermal decomposition temperature of BBP has not been determined, but BBP decomposes into toxic gases. IPCS confirmed that BBP reacts with oxidants and decomposes on burning. BBP is reduced to the alcohol by the action of hydrogen and hydrolyzed in the presence of strong aqueous acid (page 71).		
Process description:	BBP is produced through simple chemical synthesis, generally through a two-step reaction process. Phthalic anhydride is converted to monobutyl phthalate by alcoholysis with n-butyl alcohol in the presence of an acid catalyst. The monobutyl phthalate is converted to BBP either by esterification with benzyl alcohol or by reaction with benzyl chloride in the presence of an acid catalyst. Either sulfuric acid or p-toluene sulfonic acid can be used as the acid catalyst. (Page 70)Technical specifications of BBP differ slightly between the product made in the U.S. and in Japan due to a slightly different manufacturing process. (Page 70)		
Number of sites:	One manufacturer reported in 1982; Two manufacturers reported in 2015; Five and four manufacturers reported in 2012 and 2015 respectively (Page 73). See page 73, section 5.3, for information on international production.		
Physical form:	clear, oily liquid at room temperature and is considered a viscous, high boiling point solvent (page 70). Section 5.2 on page 71 has more chemical and physical properties.		
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 for the US
	Metric 3: Applicability	High	Data are for domestic manufacturing, an in-scope occupational scenario
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and most recent data is no more than 10 years old
	Metric 5: Sample Size	Low	Sample distribution 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	Addresses variability by citing production amounts over many years. Does not address uncertainty.
Overall Quality Determination		High	

Study Citation:	CPSC, (2015). Exposure assessment: Potential for the presence of phthalates in selected plastics.			
HERO ID:	5155510			
Conditions of Use:	Commercial Use - Plastic and rubber products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Referenced study found BBP at less than 40 ppm in an ABS copolymer. Referenced study (2003) found BBP in PE bottles up to 0.2 ug/L (0.2 ppb). Referenced study (2011) found BBP in bottled water at concentrations less than 0.002 ppm			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Report does not specify the technique or methods used.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Referenced studies contains data from OECD countries.
	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 plastic bottles similar to plastic and rubber products in commercial use).
	Metric 4:	Temporal Representativeness	Medium	Information is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Low	Sample distribution not characterized by statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Low	

Study Citation:	Dixit, S., Yadav, A., Dwivedi, P. D., Das, M. (2015). Toxic hazards of leather industry and technologies to combat threat: a review. Journal of Cleaner Production 87(Elsevier):39-49.			
HERO ID:	2952861			
Conditions of Use:	Processing - incorporation into final product			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	1.67 x 10^9 m^2 of leather produced annually worldwide			
Process description:	Used in process for the production of a micro porous artificial leather coating/water vapour-permeable sheet material			
Chemical concentration:	Less than 0.1% of phthalates can be present in leather in the EU and Germany, as well as less than 0.05% in Denmark			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data that are not from frequently used sources and there are no known quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Report is from India, not an 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 less than 10 years old
	Metric 5:	Sample Size	Low	Sample distribution characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report results are provided but underlying methods, assumptions and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by looking at the leather industry across multiple countries. Does not address uncertainty
Overall Quality Determination			Medium	

Study Citation:	DOE., WA (2020). Priority consumer products report to the Legislature: Safer products for Washington implementation phase 2.			
HERO ID:	10454465			
Conditions of Use:	Floor coverings			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	It was estimated that vinyl flooring sold in Washington each year contributes 4,500 – 16,800 metric tons of phthalates to our homes, workplaces, and schools and 0.15 metric tons of phthalates to the environment. Recent national estimates of the sales of resilient flooring, a category of flooring comprised largely of types of vinyl flooring, range from \$3.68 billion in 2016 (Floor Covering Weekly, 2017) to \$4.5 billion in 2019 (Resilient Floor Covering Institute, 2019), the lower amount corresponding to 4.27 billion square feet.			
Life cycle description:	Vinyl flooring manufacturing, installation, and disposal			
Chemical concentration:	It was estimated that over half of vinyl flooring may contain phthalates at concentrations ranging from 9 to 32% by weight. The volume of phthalates used in vinyl flooring has changed over time. In 2011, Washington state estimated that among polyvinyl chloride products, including flooring, 30% are composed of DEHP (Ecology 2011). Afshari et al. (2004) found that 17 – 18.5% of the PVC flooring was comprised of DEHP. In 2014, a study of 16 types of vinyl flooring found concentrations of phthalates ranging from 9 – 23% of the flooring by weight (Liang & Xu, 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.
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	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 addressed by evaluating various flooring materials, but measurement uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:		Dudick Inc. (2015). SDS - STERI-CRETE SL COMPONENT A.		
HERO ID:		6302464		
Conditions of Use:		Paints and Coatings		
EXTRACTION				
Parameter		Data		
Chemical concentration:		20-25%		
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 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.			
HERO ID:	1333728			
Conditions of Use:	Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	About 4 kilotonnes of BBP were imported into Canada in 1996 (Page 14)			
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	Medium	Data is from Canada, an OECD country	
	Metric 3: Applicability	High	Data is applicable to industrial use of chemical	
	Metric 4: Temporal Representativeness	Low	Report references data from over 20 years old.	
	Metric 5: Sample Size	N/A	n/a	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		Low		

Study Citation:	EC/HC, (2000). Canadian environmental protection act priority substances list assessment report: Butylbenzylphthalate.		
HERO ID:	1333728		
Conditions of Use:	Processing - incorporation into product		
EXTRACTION			
Parameter	Data		
Life cycle description:	BBP is used in Canada as a plasticizer in polyvinyl chloride (PVC) flooring and other materials, in paints and coatings, in adhesive formulations and in printing inks. BBP had been used as a component of certain pest control products, but the registration of all such products in Canada expired as of December 31, 1996 (Page 14).		
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	Medium	Data is from Canada, an OECD country
	Metric 3: Applicability	High	Data is applicable to industrial use of chemical
	Metric 4: Temporal Representativeness	Low	Report references data from over 20 years old.
	Metric 5: Sample Size	N/A	n/a
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing across multiple plants but does not address uncertainty
Overall Quality Determination		Medium	

Study Citation:	ECHA, (2017). Opinion on an Annex XV dossier proposing restrictions on four phthalates (DEHP, BBP, DBP, DIBP).			
HERO ID:	10112937			
Conditions of Use:	Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	According to EU28 article, the amount in tonnes imported in products of the four phthalates DEHP, DBP, DIBP and BBP, was 124,245 in 2014; and predicted to be 112,965 in 2020 and 136,474 in 2039 (for more information see table 2 on page 14 of 65).			
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	from EU	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	from 2017	
	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, 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		

Study Citation:	ECHA, (2017). Opinion on an Annex XV dossier proposing restrictions on four phthalates (DEHP, BBP, DBP, DIBP).			
HERO ID:	10112937			
Conditions of Use:	Processing, Incorporating into formulation, mixture or reaction product			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	According to EU28 article, the use in tonnes in manufacturing of the four phthalates DEHP, DBP, DIBP and BBP, was 62,612 in 2014; and predicted to be 13,828 in 2020 and 9,663 in 2039 (for more information see table 2 on page 14 of 65). See page 24 of 65 for some information about amount of BBP compared to the other three chemicals: "even if BBP has a low contribution to the benefits and costs of the proposed restriction (due to its low contribution to combined exposure and lower use in articles in scope in comparison to the other three phthalates), its inclusion in the scope together with the other three phthalates is proportionate and consistent with previous decisions for its inclusion"			
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	From EU
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	From 2017
	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, 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	

Study Citation:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Production, import, or use volume: Throughput:	Manufacture volumes in the EU1994-1997: 45,000 tonnes/year 2007: 20,000 tonnes/year (with 12,000 tonnes/year exported) Estimated BBP tonnage in end-products marketed in the EU27 based on EU manufacture data from 2007 (tonnes/year; % of 2007 PV)Flooring: 4,290; 54%Film: 0; 0%Coated fabric, upholstery, shoe uppers, luggage, etc.: 800; 10%Hard PVC: 640; 8%Sealant: 1,520; 19%Paints and ink: 160; 2%Adhesives: 400; 5%Other non-polymeric: 80; 1%TOTAL end-product use: 7,890; 100%			
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	Medium	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for manufacture, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by comparing to production volumes in previous years but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Life cycle description:	Processing of hard PVC, sealants, coatings, inks, adhesives, and other non-polymeric materials.			
Throughput:	BBP USE FOR PROCESSING (tonnes/year; % of 2007 PV)Processing of hard PVC: 640; 8%Processing of sealants: 1,520; 19%Processing of coatings and inks: 160; 2%Processing of adhesives: 400; 5%Processing of other non-polymeric: 80; 1%			
Number of sites:	Processing of sealants: 6 sitesNo data for other processing uses			
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	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	Report is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5:	Sample Size	Low	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 comparing to production volumes in previous years but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Butyl benzyl phthalate: Prioritisation and Annex XIV background information.			
HERO ID:	10617122			
Conditions of Use:	Formulation			
EXTRACTION				
Parameter	Data			
Life cycle description:	Formulation of plastisol coating for flooring, coating of leather and textiles, and calendaring for films.			
Throughput:	BBP USE FOR FORMULATION (tonnes/year; % of 2007 PV)Plastisol coating for flooring: 3,840; 48%Coating of leather and textiles: 800; 10%Calendaring for films: 560; 7%			
Number of sites:	Plastisol coating for flooring: 9 sites in 2006Coating of leather and textiles: < 10 sitesCalendaring of films: Few (no data)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	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	Data is greater than 10 years old but generally less than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.
HERO ID:	7325021
Conditions of Use:	Processing

EXTRACTION	
Parameter	Data
Process description:	For chemical products such as adhesives, paints, inks and sealants, "formulation" means the actual manufacture of the products, whereas the application of the products in for example the building industry, paper products industry or similar, is termed "processing". (P. 20/87)Formulation of adhesives, sealants, paints, lacquers and printing inks - Formulation of these chemical products basically consists of mixing of ingredients in a batch or continuous processes. (P. 21/87)
Throughput:	Table 2-3 Estimated BBP use for formulation in 2007 and 2004Total formulation (rounded) Amount used % of Amount used Number of (t/y), 2007 total , 2007 (t/y),1999*1 sites of use, 1999 2,800 100 8,520Table 2-4 BBP use for processing in 2007 and 2004Total processing (rounded) Amount used % of tonnage Number of (t/y), 2007 total , 2007 (t/y),2004*1 sites of use, 2004/2006 8000 100 19400
Comments:	Table 2-4 BBP use for processing in 2007 and 2004

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	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 20 years
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination

Medium

Study Citation:	ECHA, (2009). Data on manufacture, import, export, uses and releases of benzyl butyl phthalate (BBP) as well as information on potential alternatives to its use.
HERO ID:	7325021
Conditions of Use:	Manufacturing

EXTRACTION	
Parameter	Data
Production, import, or use volume:	According to information retrieved from two manufacturers of BBP in the EU, the total manufactured volume in 2007 was below 18,000 tonnes. The market for BBP has been decreasing over the last decade. During the period 1994-1997, the total reported Western European 1 manufacture of BBP was 45,000 tonnes/year and for 2004 a production volume of 19,500 tonnes/year is reported.
Life cycle description:	More than 70% of the BBP is used as a plasticiser in polymer products, mainly PVC for flooring. Plasticisers have the function of improving the polymer material's flexibility and workability. BBP is one of a number of substances used as plasticiser in PVC and other polymer materials. BBP is, according to industry, an unusual plasticiser because of its chemical asymmetry which results in unique performance properties.
Comments:	Figure 2-1 Overall flow of BBP through manufacturing processes in 2007. TonnesBBP/year

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	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 20 years
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination

Medium

Study Citation:	ECHA, (2009). Background document for benzyl butyl phthalate (BBP): Document developed in the context of ECHA's first Recommendation for the inclusion of substances in Annex XIV.
HERO ID:	7325023
Conditions of Use:	manufacturing

EXTRACTION	
Parameter	Data
Production, import, or use volume:	BBP is either processed, mainly as plasticiser in polymers, and in particular in PVC for floorings, or formulated as component in preparations (e.g. printing inks, adhesives and sealants, paints). BBP is manufactured in the European Union (EU) in a volume of approximately 20,000 tonnes/year in 2007 (COWI, IOM & Entec, 2009). The manufacture has decreased dramatically over the last 10 years from 45,000 tonnes/year in EU-15 in 1994-1997. A net export of approximately 12,000 tonnes/year is estimated (COWI, IOM & Entec, 2009). Thus, the use of BBP in the EU is estimated to be approximately 8,000 tonnes/year. (P. 1/12)
Number of sites:	BBP is manufactured at two sites in the EU (COWI, IOM & Entec, 2009).
Comments:	Table 1 BBP use for processing in 2007 (COWI, IOM & Entec, 2009)

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. ECHA report.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.

Overall Quality Determination

Medium

Study Citation:	ECHA, (2012). Committee for Risk Assessment (RAC) Committee for Socio-economic Analysis (SEAC): Background document to the Opinion on the Annex XV dossier proposing restrictions on four phthalates: Annexes.
HERO ID:	7325405
Conditions of Use:	manufacturing

EXTRACTION	
Parameter	Data
Production, import, or use volume:	Information particular to BBP is not available. Tonnes of DEHP, DBP, DIBP and BBP used in EU28 article manufacturing by year: 2011 – 99,735, 2014 – 68,130, 2020 – 13,828. Tonnes of DEHP, DBP, DIBP and BBP contained in exported articles by year: 2011 – 14,438, 2014 – 15,722, 2020 – 5,952. Tonnes of DEHP, DBP, DIBP and BBP contained in imported articles by year: 2011 – 101,256, 2014 – 124,245, 2020 – 112,965.
Life cycle description:	BBP is used mainly as a specialty plasticiser for PVC or other polymers. BBP is used primarily as a fast fusing plasticiser for foamed plastisols and in polysulfides. BBP is used in some soft PVC products such as flooring, packaging, and artificial leather as well as car care products and together with other polymers in sealants, adhesives, paints, coatings and inks.
Chemical concentration:	Analysis of articles within the scope of the restriction showed BBP in concentrations between 2 and 73,000 mg/kg. BBP content in the plasticised materials in the recycling waste stream of non-integrated recyclers does not exceed 0.3% w/w

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	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	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

Study Citation:	ENF, (2024). Plastic recycling plants in the United States.			
HERO ID:	11360395			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
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	Medium	Data are for recycling, an in-scope occupational scenario, but it is not specific to the chemical of interest.	
	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		

Study Citation:	Enterprises,, BJB (2018). SDS - TC-680 PART B.			
HERO ID:	6302454			
Conditions of Use:	Processing - Incorporation into Formulation, mixture, or reaction product			
EXTRACTION				
Parameter	Data			
Chemical concentration:	60-100%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Product is from a US supplier.	
	Metric 3: Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	Source is from 2021, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.		
HERO ID:	7349020		
Conditions of Use:	Plastics Product Manufacturing		
EXTRACTION			
Parameter	Data		
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)		
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	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	Medium	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	Metric 7: Metadata Completeness	Medium	The report addresses variability and uncertainty in the results.
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Study Citation:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.		
HERO ID:	7349020		
Conditions of Use:	Plastics Product Manufacturing		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	FCW, (2017). Statistical Report 2016.		
HERO ID:	10472414		
Conditions of Use:	Floor Coverings		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	TABLE 2, U.S. floor covering market sales volume (in millions of square feet) for years 2012, 2013, 2014, 2015, and 2016, respectively: Carpet & area rugs 10,459; 10,865; 11,358; 11,551; 11,523Hardwood flooring 1,160; 1,357; 1,496; 1,567; 1,691Ceramic floor & wall tile 2,165; 2,366; 2,640; 2,839; 3,000Laminate flooring 964; 993; 1,002; 1,010; 1,008Luxury vinyl tile (LVT) 711; 852; 1,002; 1,177; 1,495Vinyl sheet & floor tile 2,020; 2,181; 2,216; 2,251; 2,505Other resilient flooring 191; 200; 204; 241; 273TABLE 5, U.S. floor covering imports volume (in millions of square feet) for years 2012, 2013, 2014, 2015, and 2016, respectively: Carpet & area rugs 2,074.8; 2,158.5; 2,425.0; 2,550.4; 2,755.9Hardwood flooring 420.3; 531.8; 530.0; 569.4; 543.3Ceramic floor & wall tile 1,489.9; 1,722.6; 1,709.9; 1,881.1; 1,985.9Vinyl sheet & floor tile 1,582.5; 1,825.8; 2,124.7; 2,047.9; 2,780.1Other resilient 153.4; 168.1; 173.8; 210.2; 246.4Laminates 557.5; 612.8; 657.0; 649.5; 640.6		
Life cycle description:	Various types of flooring (e.g., vinyl, laminate, etc.) are manufactured, imported, and installed within the United States.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data from Catalina Research, but the methodology used to determine sales volumes and import volumes is not fully 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. However, BBP 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. Samples chosen for analysis is not fully transparent.
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 by evaluating sales volumes and import volumes over several years for various types of flooring. However, uncertainty related to reported volumes is not addressed.
Overall Quality Determination		Medium	

Study Citation:	Ford Motor Company, (2019). SDS - Lacquer Touch-Up Paint - Clear Topcoat.			
HERO ID:	6302466			
Conditions of Use:	Paints and coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Frery, N., Santonen, T., Porras, S. P., Fucic, A., Leso, V., Bousoumah, R., Duca, R. C., Yamani, El, M., Kolossa-Gehring, M., Ndaw, S., Viegas, S., Iavicoli, I. (2020). Biomonitoring of occupational exposure to phthalates: A systematic review. International Journal of Hygiene and Environmental Health 229:13548.			
HERO ID:	7978498			
Conditions of Use:	Plasticizers			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Phthalates (also known as phthalate esters or esters of phthalic acid) are a group of plasticizers with a worldwide production volume of around 5.5 million tons per year. (1/22)			
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	Medium	Data are for multiple European countries and analysis was done in France, an OECD country.
	Metric 3:	Applicability	Medium	Data are for the use of plasticizers in plastic and resin products, an in-scope occupational scenario. Not specific to BBP.
	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	Range of production volumes.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty for engineering data.
Overall Quality Determination		Medium		

Study Citation:	Fromme, H., Lahrz, T., Piloty, M., Gebhart, H., Oddoy, A., Rüden, H. (2004). Occurrence of phthalates and musk fragrances in indoor air and dust from apartments and kindergartens in Berlin (Germany). Indoor Air 14(3):188-195.			
HERO ID:	5556411			
Conditions of Use:	Consumer use - household exposure			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	90% of phthalates are used as plasticizers in PVC. In germany, 400,000 tons of phthalates were produced, 9000 tons being BBP were produced annually with serval million being produced worldwide in 1994/1995			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Peer reviewed article, analytical method based on EPA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for Germany, an OECD country.
	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	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty and variability are addressed
Overall Quality Determination			Medium	

Study Citation:	Gardiner, N. (2008). Disposable decisions. Cleanroom Technology 15(2):27-28.			
HERO ID:	7978842			
Conditions of Use:	Plastic and rubber products			
EXTRACTION				
Parameter	Data			
Life cycle description:	The most frequently encountered plasticizers are phthalates and in PVC products thefollowing phthalates seen to be most frequently employed: DEHP, DIDP, DINP, DBP, and BBP.For many years, there have been concerns regarding the risk of plasticizers leaching out of the PVC materials. (1/2) When vinyl gloves are disposed of by landfill, phthalates may be released, especially when in contact with non-aqueous solvents. (2/2)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	Report does not specify the data used.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the U.K., an OECD country.
	Metric 3:	Applicability	High	Data are for commercial use of plastic and rubber products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	N/A	Life cycle description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Gaspar, F. W., Castorina, R., Maddalena, R. L., Nishioka, M. G., Mckone, T. E., Bradman, A. (2014). Phthalate exposure and risk assessment in California child care facilities. Environmental Science & Technology 48(13):7593-7601.			
HERO ID:	2345959			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Number of sites:	40 early childhood education facilities			
Chemical concentration:	Concentration in Dust: 68.8+-4.6 ug/g			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	Low	Data are for childcare facilities, which is similar to the in-scope occupational scenario use of toys, playground, and sporting equipment.
	Metric 4:	Temporal Representativeness	High	Monitoring data were collected after the most recent PEL and no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (mean, standard deviation, percentiles, p-values) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Data sources are generally described and most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling during multiple visits to many facilities.
Overall Quality Determination			High	

Study Citation:	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.		
HERO ID:	8338316		
Conditions of Use:	Plasticizer		
EXTRACTION			
Parameter	Data		
Life cycle description:	Vinyl flooring, adhesives and sealants, car-care products, toys, food packaging, synthetic leather, industrial solvents, glues, personal care products, and automotive productspg. 2/45		
Chemical concentration:	"Phthalates (PAEs) are esters of phthalic acid widely spread in many industrial applications, being the main plasticizers used in the polymer industry since the 1930s. They are usually added to plastic materials, such as polyvinyl chloride (PVC), polyethylene terephthalate (PET), polyvinyl acetate (PVA), and polyethylene (PE), at the percentage of 10% up to 60% of PAEs by weight, in order to improve extensibility, elasticity, and workability of the polymers" pg. 1/45"In PVC materials, the total amount of DEHP, DBP, and BBP used as plasticizers adds up to 30–60%" pg. 5/45		
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	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	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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	Giulivo, M., Alda, L.d., M., Capri, E., Barceló, D. (2016). Human exposure to endocrine disrupting compounds: Their role in reproductive systems, metabolic syndrome and breast cancer. A review. Environmental Research 151:251-264.			
HERO ID:	3469349			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
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.			
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	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	General engineering 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	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		High		

Study Citation:	Gkrillas, A., Dirven, H., Papadopoulou, E., Andreassen, M., Hjertholm, H., Husøy, T. (2021). Exposure estimates of phthalates and DINCH from foods and personal care products in comparison with biomonitoring data in 24-hour urine from the Norwegian EuroMix biomonitoring study. Environment International 155(Elsevier):106598.			
HERO ID:	7978731			
Conditions of Use:	Plasticizers			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The Organization for Economic Co-operation and Development (OECD) reported in 2018 that global production volumes of phthalate plasticizers could reach approximately 5.5 million metric tonnes per year. (2/13)			
Chemical concentration:	Uses of DBP, DEHP and DiBP were regulated so as not to exceed concentrations equal or greater than 0.1% by weight of plasticized material, individually or in combination in the EU market after July 2020. (2/13)			
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	Medium	Data are from Norway, an OECD country.
	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	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 is addressed in sampling/analytical methodology. Variability is addressed by comparing results to other studies done.
Overall Quality Determination		High		

Study Citation:	Godwin, A. D., Krauskopf, L. G. (2008). Monomeric plasticizers. :173-238.		
HERO ID:	7324538		
Conditions of Use:	Plasticizer (vinyl flooring)		
EXTRACTION			
Parameter	Data		
Life cycle description:	In some formulations, the high specific gravity of BBP may be at an economic disadvantage for products sold on a volume cost basis. BBP has been the most widely used stain-resistant plasticizer in vinyl flooring, but its use, especially in Europe, is declining.		
Chemical concentration:	”Vinyl composition tile...Furthermore, the increased ability to process at higher temperatures reduced the need for strong-solvating plasticizers in the new composition tiles. Thus, GP plasticizers, such as DOP and DINP, are currently used at 50–100 percent of the plasticizersystem. When they are not used as the sole plasticizer, the balance is a strongersolvating plasticizer, such as BBP, DIHP, or a benzoate ester, which improves processability...However, as with composition tile, some commercial-grade homogenous tiles continue to employ strong-solvating plasticizers such as BBP or DIHP, sometimes up to 50 percent of the plasticizer system.” pg.42/66		
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	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	Report is over 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	The report does not address variability or uncertainty
Overall Quality Determination		Medium	

Study Citation:	Group, Identity (2017). SDS - HANDSTAMP - BLUE.			
HERO ID:	6302508			
Conditions of Use:	Use of inks			
EXTRACTION				
Parameter	Data			
Chemical concentration:	15-25%			
Physical form:	Gel matrix			
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 2017, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	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.			
HERO ID:	1987638			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
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:	Face cream: maximum of 0.1 ug/g Lotion: maximum of 0.2 ug/g Face cleanser: ND Shampoo: ND Body Wash: ND			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country. China
	Metric 3:	Applicability	Medium	Data are for consumer use of Personal care products, which is similar to the in-scope occupational scenario other uses of commercial products.
	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.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by limited statistics (means, medians, maximums, frequencies) but discrete samples not provided and distribution not fully characterized.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The report addresses variability and uncertainty in the results.
Overall Quality Determination		Medium		

Study Citation:	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.
HERO ID:	4168432
Conditions of Use:	commercial use

EXTRACTION	
Parameter	Data
Life cycle description:	BBP is used as plasticizer – about 80% is used in PVC while the remaining 20% in cellulose plastic.
Process description:	Polymer blending has been extensively used over the last few decades to produce new polymeric materials that combine the individual attributes of the component polymers. Compatibilizers are substances that are commonly used to enable the creation of such special resin blends (co-polymer), with the desired performance, starting from component resins that would otherwise be incompatible. Compatibilization is often a necessary procedure in blending polymers mainly due to the immiscibility and incompatibility of most polymer pairs. Specifically, use of compatibilizers improve the overall performance of the blend thorough: improved blend morphology and enhanced interfacial adhesion.
Chemical concentration:	European Commission (EC) has set migration limits for different plasticizers, including BBP – the limit is 30 mg/kg for BBP.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than 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.
	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
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Study Citation:	HCC Holdings Inc. (2015). SDS - Hercules Plumber’s Caulk - White Linen.			
HERO ID:	6302474			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5-10 %			
Physical form:	Paste			
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	

Study Citation:	Heitbrink, W. (1993). In-depth survey report: Control technology for autobody repair and painting shops at Team Chevrolet, Colorado Springs, Colorado.			
HERO ID:	6558535			
Conditions of Use:	Commercial use - spray painting.			
EXTRACTION				
Parameter	Data			
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 hte 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.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The report is a NIOSH survey
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The survey is from the US
	Metric 3:	Applicability	High	The survey is for painting, a COU that is in scope
	Metric 4:	Temporal Representativeness	Low	The report is from 1993.
	Metric 5:	Sample Size	N/A	No samples
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	The report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	The only extractable information for BBP is process information and variability and uncertainty is not relevant.
Overall Quality Determination			High	

Study Citation:	Henry Company (2015). SDS - AIR BLOC 33.			
HERO ID:	6302496			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - 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 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	IARC, (1982). IARC monographs on the evaluation of the carcinogenic risk of chemicals to humans: Some industrial chemicals and dyestuffs. IARC monographs on the evaluation of carcinogenic risks to humans 29:1-398.
HERO ID:	27010
Conditions of Use:	Manufacturing - domestic

EXTRACTION	
Parameter	Data
Production, import, or use volume:	'68 million kg (1979). US imports were 661,000 kg (1974). 3 million kg produced in Japan (1979). Over half of BBP used goes into PVC. The next is adhesives, and then other various uses.
Process description:	Commercial production in the US is based on synthesis by the reaction of the monobutyl ester produced by the reaction of phthalic anhydride with n-butyl alcohol in the presence of an acidic catalyst.
Number of sites:	1 US site, 1 in Germany, 1 in the UK, 1 in Belgium, 2 in Japan, 1 in Brazil
Chemical concentration:	'Plasticizer concentration of 50-75 parts per 100 parts of resin.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from the World Health Organization (WHO) so likely a credible source.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Reported data is for the US
	Metric 3:	Applicability	High	Directly applicable to condition of use.
	Metric 4:	Temporal Representativeness	Low	Report is more than 20 years old. Report is from 1979.
	Metric 5:	Sample Size	Low	Distribution of samples characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results but sources are generally described and not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.

Overall Quality Determination

Medium

Study Citation:	Jo, S. H., Lee, M. H., Kim, K. H., Kumar, P. (2018). Characterization and flux assessment of airborne phthalates released from polyvinyl chloride consumer goods. Environmental Research 165:81-90.		
HERO ID:	4683362		
Conditions of Use:	Laboratory use		
EXTRACTION			
Parameter	Data		
Chemical concentration:	A mixture of phthalates containing 1,000 ug/L BBP was purchased. This was used to make standards at five concentration levels (1, 5, 10, 20, and 50 ng/uL) for calibration.		
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	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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	Koch, H. M., Angerer, J. (2011). Phthalates: Biomarkers and human biomonitoring. Issues in Toxicology 9:179-233.			
HERO ID:	5533904			
Conditions of Use:	processing - plasticizer			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Within soft PVC, the plasticizing phthalate content can be up to 40%. In 2008 more than 5 million tons of phthalates were used as plasticizers worldwide. Of the phthalates used, 50% are used in Asia, 20% in Western Europe and 16% in North America. Western Europe used around 1 million tons from 1998 - 2008 but the spectrum of those phthalates changed dramatically and are shown in figure 3A.1. BBP had a slow decline and in 2008 appeared to be around 20 kt/yr usage in Western Europe. (BBP makes up 1% of market share of phthalates in western europe in 2008).			
Life cycle description:	Typical products containing phthalates are building and construction materials, flooring and roofing materials, cables and wires, clothing, furnishings, car interiors and car underbody coatings, toys and also food contact materials. Short chain phthalates (BBP) are often used in non-PVC applications such as industrial solvents and lubricants, additives in the textile industry, pesticide formulations, personal care products, paints or adhesives. Europe prohibits BBP use in cosmetics owing to their classification as CMR substances (carcinogenic, mutagenic or reproductive toxicants)			
Chemical concentration:	Phthalates can comprise up to 40% of PVC			
Comments:	Source is primarily for human metabolic data for phthalate intake. First 3 pages contain information regarding what was tagged for this source.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses risk assessment reports from the EU as its primary source for the relevant information. Does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data elaborates mostly on EU
	Metric 3:	Applicability	High	Data is applicable to scope of use.
	Metric 4:	Temporal Representativeness	Medium	Data is from 2008 so more than 10 years old.
	Metric 5:	Sample Size	Low	Samples characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results, methods, and assumptions. Sources generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by evaluating phthalates as a whole and individual phthalate chemicals across the entirety of Western Europe. Also look at Asia and North America. Does not address uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Koszelnik, P., Ziembowicz, S., Kida, M. (2020). Analysis of concentrations of selected phthalic acid esters in aquatic ecosystems - Poland’s case study.			
HERO ID:	Desalination and Water Treatment 186:56-64.			
Conditions of Use:	6825427			
	Domestic Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Production of phthalates was 1.9 Mt in 1975, 6.2 Mt in 2009, and >8 Mt in 2011. (3/10)			
Comments:	Application of phthalates is as components in laboratory products (test tubes, capsules, sept and gloves), and as industrial solvents.			
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 from Poland, an OECD country.
	Metric 3:	Applicability	High	Data are for domestic 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	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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	Lee, Y. S., Lee, S., Lim, J. E., Moon, H. B. (2019). Occurrence and emission of phthalates and non-phthalate plasticizers in sludge from wastewater treatment plants in Korea. Science of the Total Environment 692:354-360.			
HERO ID:	6959335			
Conditions of Use:	disposal			
EXTRACTION				
Parameter	Data			
Chemical concentration:	BBzP and DiDP were detected in all sludge samples from domestic and mixed WWTPs, while moderate detection rates of BBzP (33%) and DiDP (53%)were found in sludge from industrial WWTPs. Concentrations (ng/g dry weight) of BBP in sludge samples collected from three different types of wastewater treatment plants (WWTPs) in Korea are reported as follows: Domestic WWTPs - range 63–150 and mean 95; Mixed WWTPs - range 66–110 and mean 92; Industrial WWTPs - range ND–1900 and mean 170; Total – range ND–1900 and mean 120.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data
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	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	report clearly documents its data sources
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The report provides only limited discussion of the variability but none on uncertainty.
Overall Quality Determination		High		

Study Citation:	Lerner, I. (2005). European plastics industry moves from 2-EH, DEHP. Chemical Market Reporter 267(26):26-27.		
HERO ID:	7978846		
Conditions of Use:	Plasticizers		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	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. About 70 percent of the plasticizer market volume is phthalates, (1/2)		
Life cycle description:	DEHP, dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) were banned from children’s toys. BASF says it will offer its customers diisononyl phthalate (DINP) and di-propyl heptyl phthalate (DPHP) plasticizers as substitutes. (1/2)		
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	

Study Citation:	Liang, Y., Caillot, O., Zhang, J., Zhu, J., Xu, Y. (2015). Large-scale chamber investigation and simulation of phthalate emissions from vinyl flooring. Building and Environment 89:141-149.			
HERO ID:	3072211			
Conditions of Use:	commercial use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the last decade, the global production of phthalates has increased from 3.5 to 6.0 million tons/yr.			
Chemical concentration:	Concentrations of BBP in 3 out of 6 vinyl flooring samples studied were: 0.05, 0.08, and 0.04 mg/mg. BBP was not detected in the remaining 3 samples.			
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 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.
	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	High	The report addresses variability and uncertainty in the results.
Overall Quality Determination		High		

Study Citation:	Liang, Y., Xu, Y. (2014). Improved method for measuring and characterizing phthalate emissions from building materials and its application to exposure assessment. Environmental Science & Technology 48(8):4475-4484.			
HERO ID:	2346023			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The global production rate of phthalate plasticizers has increased from 2.5 to 6 million tons/yr within a decade.			
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. Data are global.
	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	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	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	Liang, Y., Xu, Y. (2014). Improved method for measuring and characterizing phthalate emissions from building materials and its application to exposure assessment. Environmental Science & Technology 48(8):4475-4484.			
HERO ID:	2346023			
Conditions of Use:	Use of PVC Flooring			
EXTRACTION				
Parameter	Data			
Chemical concentration:	15 ± 2% in the studied PVC flooring			
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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. Environmental Science & Technology 48(24):14228-14237.			
HERO ID:	3015875			
Conditions of Use:	Floor coverings			
EXTRACTION				
Parameter	Data			
Life cycle description:	Use in vinyl flooring products. Source also covers crib mattress covers, but this is outside the scope of occupational exposure and release.			
Chemical concentration:	Content of BBP in vinyl flooring products: BBP 15 ± 2%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The assessment uses high quality data and techniques that are from frequently used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed through evaluation of various types of vinyl flooring, but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	Lima Associates, Sealants, T.C. (2018). SDS - Vulkem 360 NF.			
HERO ID:	6302492			
Conditions of Use:	Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10 - 20%			
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 2018, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	LLC, S.C. (2019). SDS - Base/Neutrals Mix 1.			
HERO ID:	6292132			
Conditions of Use:	Laboratory Chemical			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2019, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	LLC, S.C. (2016). SDS - Butylbenzyl phthalate in PE.			
HERO ID:	6302525			
Conditions of Use:	Use of laboratory chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.10%			
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 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	

Study Citation:	LLC, Wilsonart (2013). SDS - Wilsonart Color Matched Caulk.		
HERO ID:	6302530		
Conditions of Use:	Use of multipurpose caulk		
EXTRACTION			
Parameter	Data		
Chemical concentration:	7 - 13 %		
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	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	

Study Citation:	Lowell Center for Sustainable Production at the University of Massachusetts, (2011). Technical briefing: Phthalates and their alternatives: Health and environmental concerns. :23.		
HERO ID:	5349749		
Conditions of Use:	Use as plasticizer		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	The annual global production of phthalates is estimated to be 11 billion pounds. (p. 4).		
Life cycle description:	Used as a plasticizer for PVC, polyurethane, polysulfide and acrylic-based polymers. Used in Vinyl flooring, sealants, adhesives, car care products, automotive trim, food conveyor belts, food wrapping material, and artificial leather. (low concentrations have been detected in baby equipment and children’s toys as by-products and impurities; not intentionally added to those products) (Table 1).		
Chemical concentration:	PVC products may contain up to 50 percent by weight of plasticizers, most commonly phthalates. (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 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 is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	N/A	Process and life cycle 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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	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.		
HERO ID:	4728432		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
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:	PVC, plastics, paints, coatings, adhesives, and printing inks		
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	Medium	Distribution of samples is 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.
Overall Quality Determination		High	

Study Citation:	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. Progress in Polymer Science 27(10):2227-2277.			
HERO ID:	6826007			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Chemical concentration: Comments:	Phthalates make up 30% of generic PVC cable and 35% of generic PVC flooring. Table 6			
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	High	Data are for the disposal of phthalate wastes, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (medians, minimums and maximums, percentages) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is addressed in the life cycle assessment methods. Variability is not addressed.
Overall Quality Determination			High	

Study Citation:	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.			
HERO ID:	11360398			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
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	

Study Citation:	Momentive, (2017). Safety Data Sheet (SDS): GE7000.			
HERO ID:	11506967			
Conditions of Use:	Use of adhesive and sealant products			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	5 - <10%			
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 2017, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination		High		

Study Citation:	Multi-Tech Products Corp (2015). SDS - REPAIR AND REFINISHING SPRAY.			
HERO ID:	6302514			
Conditions of Use:	Use of refinishing spray			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 to <1%			
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 2015, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 2347Benzyl butyl phthalate.			
HERO ID:	6629530			
Conditions of Use:	Laboratory Chemical			
EXTRACTION				
Parameter	Data			
Chemical concentration:	100%			
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 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	NCBI, (2020). PubChem Compound Summary for CID 8343, Bis(2-ethylhexyl) phthalate.			
HERO ID:	7681905			
Conditions of Use:	Processing, Incorporating into articles			
EXTRACTION				
Parameter	Data			
Chemical concentration: Comments:	Congress has permanently banned BBP in any amount greater than 0.1 percent in (1) children’s toys and (2) certain child care articles (page 136/149) article uses both BBP and BBzP to refer to butyl benzyl phthalate			
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	Concentration in final article
	Metric 4:	Temporal Representativeness	High	Less than 10 years old
	Metric 5:	Sample Size	N/A	N/A- regulatory limit, no scope for sample size
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- regulatory limit, no scope to address variability and uncertainty.
Overall Quality Determination			High	

Study Citation:	Nielsen, J., Akesson, B., Skerfving, S. (1985). Phthalate ester exposure - Air levels and health of workers processing polyvinylchloride. AIHA Journal 46(11):643-647.			
HERO ID:	63456			
Conditions of Use:	Processing- plasticizer			
EXTRACTION				
Parameter	Data			
Process description:	Thin film was calendered from PVC stabilized with zinc and barium in six machines. PVC contained DIDP, DEHP, and BBP. Film was cut into diapers or ribbons for mat production or exported in rolls for use as packing materials. Thick film floor sheeting was produced in 10 calenders from PVC containing DEHP and aliphatic hydrocarbons as plasticizers. Plasticized PVC was treated to a max of 180 C. Local exhaust devices had been installed over the calenders. (page 2, under Production)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Data is not NIOSH or OSHA method but is likely equivalent to one.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Sweden (OECD country)
	Metric 3:	Applicability	High	The data is for an occupational scenario (PVC processing) that is in the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Metadata on the operations, equipment, and worker activities associated with the data are greater than 20 years old.
	Metric 5:	Sample Size	N/A	N/A - data not dependent on samples
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 - information not dependent on metada
Overall Quality Determination		Medium		

Study Citation:	Nielsen, J., Fahraeus, C., Bensryd, I., Akesson, B., Welinder, H., Linden, K., Skerfving, S. (1989). Small airways function in workers processing polyvinylchloride. International Archives of Occupational and Environmental Health 61(7):427-430.			
HERO ID:	5175880			
Conditions of Use:	Processing - incorporation into article - plasticizer in PVC			
EXTRACTION				
Parameter	Data			
Process description:	The study was performed in two departments of a PVC-processing plant. In the first, thin film was calendered, from PVC stabilized with zinc and barium, in six machines. The PVC contained mostly diisodecyl phthalate (DIDP), di-(2-ethylhexyl) phthalate (DEHP), and butylbenzyl phthalate (BBP) as plasticizers in a fraction of 10 to 60 %. The film was cut into diapers or ribbons for mat production or exported in rolls for use as packing material. In one calender, stiff packing material, with no plasticizers, was produced.In the second department, thick film for floor sheeting wasproduced in ten calenders from PVC, containing mainly DEHPand aliphatic hydrocarbons as plasticizers When calendering,the plasticized PVC was treated to a maximum of 180 °C Localexhaust devices were installed over the calenders. (page 2, under Material and methods; The plant)			
Chemical concentration:	PAE (including BBP, but also including DIDP and DEHP as plasticizers) is notably present in these operations in fractions of up to 10 to 60% (page 2 under Materials and methods; The plant).			
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	Medium	Data is from Sweden (OECD country)
	Metric 3:	Applicability	High	Data is for PVC manufacturing, an in-scope occupational scenario
	Metric 4:	Temporal Representativeness	Low	Report is older than 20 years old
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing different departments and having a control group, but does not address uncertainty.
Overall Quality Determination			Low	

Study Citation:	NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of butyl benzyl phthalate (BBP).			
HERO ID:	678590			
Conditions of Use:	Manufacturing - domestic manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	BBP is produced by sequentially reacting butanol and benzyl chloride with phthalic anhydride. U.S. annual production figures for BBP were not available. (Page 6)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	From the US Department of Health and Human Services
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	Medium	Report is based on data greater than 10 years old but no more than 20 years old
	Metric 5:	Sample Size	N/A	N/A- process description
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation: NTP-CERHR, (2003). NTP-CERHR monograph on the potential human reproductive and developmental effects of butyl benzyl phthalate (BBP).	
HERO ID: 678590	
Conditions of Use: Processing	
EXTRACTION	
Parameter	Data
Life cycle description:	The largest use of BBP is in the production of vinyl tiles. It is also a plasticizer in PVC used to manufacture food conveyor belts, carpettile, artificial leather, tarps, automotive trim, weather stripping, traffic cones, and is used to a limited extent in vinyl gloves. BBP is also used in some adhesives. (page 16)
EVALUATION	
Domain	Metric
Domain 1: Reliability	
Metric 1:	Methodology
	High
	From the US Department of Health and Human Services
Domain 2: Representativeness	
Metric 2:	Geographic Scope
	High
Metric 3:	Applicability
	High
Metric 4:	Temporal Representativeness
	Medium
Metric 5:	Sample Size
	N/A
	N/A- Lifecycle Description
Domain 3: Accessibility/ Clarity	
Metric 6:	Metadata Completeness
	Low
	Assessment results are provided but underlying methods, assumptions, and data sources are not fully transparent
Domain 4: Variability and Uncertainty	
Metric 7:	Metadata Completeness
	N/A
	Lifecycle description
Overall Quality Determination	High

Study Citation:	OECD, (2004). Emission scenario document on lubricants and lubricant additives.			
HERO ID:	3827416			
Conditions of Use:	Formulation of Lubricants			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Total U.K. lubricants production volume: 800,000 tonnes/yr			
Process description:	Formulation: Formulation of additive packages, formulation of lubricants, recycling of lubricants			
Throughput:	Automotive usage: 316,500 tonnes/yrIndustrial usage: 310,900 tonnes/yrAviation usage: 2,800 tonnes/yrMarine usage: 58,100 tonnes/yrGreases: 12,100 tonnes/yrFuel sold as lubricants: 650 tonnes/yrUsage not known: 102,600 tonnes/yr			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	ESD was developed based on data from the U.K., an OECD 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 based on data that is greater than 10 years old but less than 20 years old (2004).
	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 additive types.
Overall Quality Determination		Medium		

Study Citation:	OECD, (2018). Socio-economic assessment of phthalates.			
HERO ID:	7681900			
Conditions of Use:	Plasticizers			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The phthalate plasticizer market currently stands at around 5.5 million tonnes per year. (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. (15/90)			
Chemical concentration:	Phthalates can contribute as much as 50% of the weight of PVC materials. (15/90)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	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	Medium	Sample distribution characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		High		

Study Citation:	OEHHA, (2013). Proposition 65, Carcinogen Identification Committee (CIC) transcripts from 12/5/2013 hearing.		
HERO ID:	10217511		
Conditions of Use:	Manufacture		
EXTRACTION			
Parameter	Data		
Life cycle description:	"Basically we sell this as a polymer additive for several types of plastic. It winds up primarily in the built environment. We don't sell BBP to consumers today."pg. 132/187		
Number of sites:	"Ferro Corporation...headquartered in Cleveland...only manufacturer of BBP in the U.S. today. BBP has been on the market for about 50 years now, having been brought on the market by Monsanto in the seventies – or the sixties."pg. 131/187		
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	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 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	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized
Overall Quality Determination		High	

Study Citation:	Ohlson, C. G., Hardell, L. (2000). Testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. Chemosphere 40(9-11):1277-1282.			
HERO ID:	1415211			
Conditions of Use:	Plastics manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Phthalates make up 0 to almost 50% of PVC 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	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	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5:	Sample Size	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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			Medium	

Study Citation:	ooth-On Inc., Ltd, SciCan (2015). SDS - ENSURE Sterilization Emulator.			
HERO ID:	6302516			
Conditions of Use:	Use of dental products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	< 0.1%			
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	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 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Oppelt, E. T. (1987). Incineration of hazardous waste. Journal of Air Pollution Control Association 37(5):558-586.		
HERO ID:	1924583		
Conditions of Use:	Disposal - incineration		
EXTRACTION			
Parameter	Data		
Process description:	Incineration is an engineered process that employs thermal decomposition via thermal oxidations at high temeprature (usually 900 C) to destroy the organic fraction of the waste and reduce volume. Waste preparation and feeding -> combustion chambers -> air pollution control -> Residue and ash handling. Very detailed descriptions of the entire process provided in source.		
Chemical concentration:	Concentration unit expressed as ng of emission per kJ of combustor heat input (1 ng/kJ = 2.34 x 10^-6 lb/MMBtu) Hazardous Waste: mean: 3.7, range: 0.7-23. municipal waste: no data. Coal power plant: mean: 0.5, range: 0.3-1.0		
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
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from the US
	Metric 3: Applicability	High	Data is for disposal, an in-scope occupational scenario
	Metric 4: Temporal Representativeness	Low	Data greater than 20 years old
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics but discrete samples not provided and distribution not fully characterized
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	Uncertainty addressed by length of time to implement recent regulation. Variability addressed by different site visits and sampling different incineration equipment
Overall Quality Determination		Medium	

Study Citation:	Permatex, ITW (2018). SDS - 126VR DISC BRAKE QUIET.			
HERO ID:	6302518			
Conditions of Use:	Use of adhesives			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5 – 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 2020, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Permatite (2015). SDS - PERMATITE ACRYLIC SEALANT.			
HERO ID:	6302495			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	7-13%			
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 2015, which is less than 10 years old.	
	Metric 5: Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination		High		

Study Citation:	Phenova (2017). Custom 8061 Phthalates Mix Safety Data Sheet.			
HERO ID:	6301564			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	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.
Overall Quality Determination			Medium	

Study Citation:	Phenova (2017). SDS - Custom Low ICAL Mix.			
HERO ID:	6302481			
Conditions of Use:	Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	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.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2018). Safety Data Sheet (SDS): Custom 8270 Cal Mix 1.			
HERO ID:	11803682			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 3 of 39)			
Physical form:	Liquid (pg. 17 of 39)			
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 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	SDS is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2017). Safety Data Sheet (SDS): BN Extractables – Skinner List.			
HERO ID:	6280738			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2% (pg 2 of 19)			
Physical form:	Liquid (pg 9 of 19)			
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	SDS 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.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2018). Safety Data Sheet (SDS): Custom SS 8270 Cal Mix 1.			
HERO ID:	6280755			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 3 of 39)			
Physical form:	Liquid (pg. 17 of 39)			
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	Data is from the US.
	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 within 10 years.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2017). Safety Data Sheet (SDS): Custom 8270 Cal Standard.			
HERO ID:	6287089			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2% (pg 3 of 45)			
Physical form:	Liquid (pg. 20 of 45)			
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 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.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2017). Safety Data Sheet (SDS): Custom 8270 Plus Cal Mix.			
HERO ID:	6289707			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg 3 of 46)			
Physical form:	Liquid (pg. 21 of 46)			
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 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.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2017). Safety Data Sheet (SDS): Custom 8061 Phthalates Mix.			
HERO ID:	6302494			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 2 of 10)			
Physical form:	Liquid (pg. 4 of 10)			
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 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.
Overall Quality Determination			Medium	

Study Citation:	Phenova, (2018). Safety Data Sheet (SDS): EPA 525.2 Semivolatile Mix.			
HERO ID:	6302555			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 3 of 18)			
Physical form:	Liquid (pg. 7 of 18)			
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 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	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Phenova, Standard (2018). SDS - Butyl Benzyl Phthalate.			
HERO ID:	6302479			
Conditions of Use:	Lab chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1%			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Porras, S. P., Koponen, J., Hartonen, M., Kiviranta, H., Santonen, T. (2020). Non-occupational exposure to phthalates in Finland. Toxicology Letters 332:107-117.		
HERO ID:	6957499		
Conditions of Use:	Plasticizer		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	”Phthalates have been widely used as plasticizers to soften PVCplastics at volumes of millions of tons per year. Some phthalates (like diethyl phthalate) have also been used in personal care products and cosmetics, textiles, paints, polishes and waxes, lubricants and adhesives. Together these uses have resulted in the wide-spread exposure of the general population to these compounds.” pg. 1/11		
Comments:	Report, from Finland, is for non occupationally exposed subjects.		
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	Data is from Finland
	Metric 3: Applicability	Uninformative	The report is from an non-occupationalscenario that does not apply to any occupational scenario within the scope of the risk evaluation
	Metric 4: Temporal Representativeness	High	Report is 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	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		Uninformative	

Study Citation:	Products,, DAP (2013). Technical Bulletin: DAP Premium Polyurethane Roof & Flashing Sealant.			
HERO ID:	6302490			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10.0 - 30.0% (pg. 1 of 3)			
Physical form:	Paste (pg. 1 of 3)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from the US.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The MSDS date is from 2008 and was verified in 2011. The data is greater than 10 years old, 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	

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:	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.2 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 1,500 companies operating about 1,700 plants

EVALUATION			
Domain	Metric		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 release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low The data were collected before the most recent federal regulatory action or update or are more than 20 years old if no federal regulation is established. The operations, equipment, and worker activities are not available or indicate that the associated data are expected to be outdated.
	Metric 5:	Sample Size	N/A Gen. engineering data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty			

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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:		Formulation of paint and varnish		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 7:		Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.
Overall Quality Determination			High	

Study Citation:	Radian Corp, (1985). Industrial process profiles for environmental use: Chapter 10b, Plastics additives.			
HERO ID:	1262512			
Conditions of Use:	Plasticizers (for PVC)			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The total consumption of plasticizers in 1982 was reported to be 624 thousand metric tons, of this 64.1% was phthalates			
Life cycle description:	Section 14, pg. 122/452, is about Plasticizers and includes Phthalates as a class			
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	The report is for an occupational scenario within the scope of the risk evaluation, however data is for phthalates in general and not specific to BBP
	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. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	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		

Study Citation:	Restek Corp, (2024). Safety Data Sheet (SDS): 31621/8270 Calibration Mix #4.			
HERO ID:	6302542			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2% (pg. 2 of 9)			
Physical form:	"Physical State: No data applicable" (pg. 4 of 9)Melting point and Boiling point indicate 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 2024, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Restek Corp, (2023). Safety Data Sheet (SDS): 31845/EPA Method 506 Phthalate and Adipate Esters.			
HERO ID:	6302548			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 2 of 7)			
Physical form:	"Physical State: No data available" but Boiling Point and Melting Point indicate liquid(pg. 4 of 7)			
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	

Study Citation:	Restek Corp, (2023). Safety Data Sheet (SDS): 31903/CLP 04.1 B/N MegaMix Mix A (Revision 2).			
HERO ID:	6302560			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 2 of 10)			
Physical form:	"Physical State: No data available." but melting and boiling points indicate liquid (pg. 5 of 10)			
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	SDS is from 2023, which is less than 10 years old.
	Metric 5:	Sample Size	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Restek Corp, (2023). Safety Data Sheet (SDS): 31031/606 Phthalate esters calibration mix.			
HERO ID:	6311458			
Conditions of Use:	Laboratory Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.2% (pg. 2 of 6)			
Physical form:	Liquid (pg. 3 of 6)			
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	

Study Citation:	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.			
HERO ID:	10472417			
Conditions of Use:	PVC Processing			
EXTRACTION				
Parameter	Data			
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.			
Process description:	No process description, but rather life cycle information provided.			
Chemical concentration:	Concentration of BBP was not found in the source.			
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	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, data extracted is not for DEHP specifically.
	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	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	

Study Citation:	Rittfeldt, L., Ahlberg, M. S., Zingmark, P. A., Santesson, J. (1983). Occupational exposure to benzyl chloride and benzal chloride due to contaminated butylbenzyl phthalate. Scandinavian Journal of Work, Environment and Health 9(4):367-368.			
HERO ID:	675394			
Conditions of Use:	Processing - plasticizer			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Us production in 1979 was estimated to have been 68 x 10^6 kg, more than half of which was used for vinyl floor tiles. In Sweden approximately 2 x 10^6 kg of BBP is used yearly.			
Process description:	Vinyl floor tiles are manufactured by the process of laminating a surface film and a patterned film of polyvinyl chloride with a thicker sheeting of polyvinyl chloride at temperatures of 150-180 C. The surface and the patterned films contain about 30% by weight of BBP as a plasticizer and in the thicker sheeting DEHP is used. Commercial production of BBP is usually performed by the reaction of the monobutyl ester of phthalic acid with benzyl chloride, which may contain up to 1% benzal chloride.			
Chemical concentration:	30% by weight of BBP used as plasticizer in vinyl floor tiles.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Report cites sources not frequently used but does not indicate any flaws in quality.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Report developed in Sweden (OECD country)	
	Metric 3: Applicability	High	Directly applicable to condition of use	
	Metric 4: Temporal Representativeness	Low	Data is from 1979 so over 20 years old.	
	Metric 5: Sample Size	Medium	Unclear if it is representative of current industry and lack of statistical information	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Provides results but no explanation of data source.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty	
Overall Quality Determination		Low		

Study Citation:	Rust-Oleum Corporation (2017). SDS - SK CLEAR-SEAL SATIN SEALER 5 GAL.				
HERO ID:	6302517				
Conditions of Use:	Use of paint coatings and primers				
EXTRACTION					
Parameter	Data				
Chemical concentration:	0.1-1.0%				
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 2017, which is less than 10 years old.	
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination			High		

Study Citation:	Rust-Oleum Corporation (2018). SDS - IC 1-GL 2PK GRAY SHOP COAT PRIMER.			
HERO ID:	6302523			
Conditions of Use:	Use of paint coatings and primers			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1.5%			
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	Medium	Product is from both a US supplier and 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	Low	Single value - no distribution/statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:		Sealants, R.A. (2017). SDS - Double Bubble Urethane High Peel.		
HERO ID:		6302505		
Conditions of Use:		Adhesives and sealants		
EXTRACTION				
Parameter		Data		
Chemical concentration:		5-20%		
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	Source is from 2014, which is more than 10 years old but less than 20.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Sealants, T.C. (2015). SDS - SPECTREM 3 ALUMINUM STONE - 30 CTG.			
HERO ID:	6302483			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5 - <10%			
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	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.
Overall Quality Determination			Medium	

Study Citation:	Sealants, T.C. (2015). SDS - DYMONIC FC ANODIZED ALUMINUM.			
HERO ID:	6302493			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter		Data		
Chemical concentration:		15-40%		
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 2015, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Sealants,, T.C. (2015). Safety Data Sheet (SDS): Vulkem 45 SSL White.			
HERO ID:	6311468			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	15-40% (pg. 2 of 19)			
Physical form:	Solid- paste (pg. 9 of 19)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Product is from a Canadian supplier, which is 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 August 2015, which is about 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			Medium	

Study Citation:	Sealants,, Tremco (2018). Safety data sheet - Spectrem® 4.			
HERO ID:	6302529			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5 - <10%			
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 2018, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	Smooth-On Inc. (2018). SDS - FLEXER Epoxy Flexibilizer.			
HERO ID:	6302507			
Conditions of Use:	Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>99%			
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	

Study Citation:	Smooth-On Inc. (2010). SDS - Task 9 and Task 10 Part A.			
HERO ID:	6302521			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10-20%			
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	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	

Study Citation:	Smooth-On, (2007). Safety Data Sheet (SDS): SO-Flex (formerly PMC-724 Part C).			
HERO ID:	11506998			
Conditions of Use:	Use of adhesives			
EXTRACTION				
Parameter	Data			
Chemical concentration:	99-99.7%			
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	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	

Study Citation:		Smooth-On, (2022). Safety Data Sheet (SDS) - Part A: Smooth-Cast 325.		
HERO ID:		6302504		
Conditions of Use:		Use of adhesives and sealants		
EXTRACTION				
Parameter		Data		
Chemical concentration:		70-75%		
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	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	

Study Citation:	Smooth-On, (2023). Safety Data Sheet (SDS) - Part A: PMC-724.				
HERO ID:	6302515				
Conditions of Use:	Use of adhesives and sealants				
EXTRACTION					
Parameter	Data				
Chemical concentration:	40 – 70%				
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	Medium	Characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.	
Overall Quality Determination			High		

Study Citation:	Smooth-On, (2023). Safety Data Sheet (SDS) - Part A: Task 9.			
HERO ID:	6302519			
Conditions of Use:	Use of adhesives and sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5 – 15%			
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	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.			
HERO ID:	675435			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	manufacture: 110 million lbs; import: 1.1 million lbs			
Process description:	Butyl benzyl phthalate is manufactured from butyl alcohol, benzyl chloride (hydrolyzed to benzyl alcohol), and phthalic anhydride (Ringk, 1978). The reaction is typical of the esterification that produces the dialkyl phthalates.			
Number of sites:	3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality [data/techniques/methods] from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for manufacture/import, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	Low	Report is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Stark, T. D., Choi, H., Diebel, P. W. (2005). Influence of plasticizer molecular weight on plasticizer retention in PVC geomembranes. Geosynthetics International 12(2):99-110.			
HERO ID:	10218052			
Conditions of Use:	Plasticizer (PVC)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	"A typical formulation for PVC geomembranes is about 60–65% ofPVC resin, 30–35% of plasticizer, and 0–5% of other additives such as fillers and stabilizers (Hammond et al. 1993)."pg. 2/12			
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	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is from 1993
	Metric 5:	Sample Size	Medium	characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, sources, and assumptions. Methods 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 but not uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	Stonhard Inc. (2018). SDS - STONCLAD UT RESIN POLYOL.			
HERO ID:	6302511			
Conditions of Use:	Use of floor coverings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	25 - <50%			
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 2024, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	SUNY, (2019). Phthalates in infant cotton clothing: Occurrence and implications for human exposure. Science of the Total Environment 683:109-115.			
HERO ID:	5432967			
Conditions of Use:	Fabric, Textile, and Leather Products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	See Table 1: concentration of BBP is 0.017 ug/g (min), 0.024 ug/g (25th%), 0.029 ug/g (median), 0.043 ug/g (75th%), and 0.068 ug/g (max) in infant cotton clothing			
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 similar to industrial/commercial use in fabric).	
	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	High	Statistical distribution of samples is fully characterized. Sample size is sufficiently representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is well characterized but variability is not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Toxicology Excellence for Risk Assessment (TERA) (2016). Exposure assessment: Potential for the presence of phthalates and other specified elements in undyed manufactured fibers and their colorants.			
HERO ID:	5155511			
Conditions of Use:	processing-incorporation into formulation, mixture, or product			
EXTRACTION				
Parameter		Data		
Chemical concentration:		Referenced study (2016) measured phthalates in natural latex rubber where BBP migration concentrations of 1.33 to 3.07 percent in 3 of 8 samples were found.		
EVALUATION				
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	Low	Data is from Sri Lanka, not an OECD country
	Metric 3:	Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data is from 2016 so less than 10 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	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	

Study Citation:	U.S. EPA, (2020). 2020 CDR: Commercial and consumer use.			
HERO ID:	10366189			
Conditions of Use:	Manufacture and Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides U.S. domestic manufactured and imported PV and %PV to downstream uses.			
Number of sites:	Provides number of manufacturing and import sites.			
Chemical concentration:	Provides concentration.			
Physical form:	Provides physical form.			
Number of workers:	Provides number of workers.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	EPA is a trusted source.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	CDR is U.S. based data.
	Metric 3:	Applicability	High	CDR covers chemical manufacturers and importers, which are in scope for all chemicals.
	Metric 4:	Temporal Representativeness	High	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.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (2019). Synthetic turf field recycled tire crumb rubber research under the Federal Research Action Plan, Final report part 1: Tire crumb rubber characterization, volume 1.
HERO ID:	11803647
Conditions of Use:	Commercial Use - Toys, playground, and sporting equipment

EXTRACTION

Parameter	Data
Process description:	Page 43: "Synthetic turf systems have been installed in the United States since the 1960s. Currently, there are between 12,000 and 13,000 synthetic turf sports fields in the United States, with approximately 1,200 to 1,500 new installations each year (Synthetic Turf Council et al., 2016). These fields, which are designed to simulate the experience of practicing and playing on grass fields, are installed at a variety of venues, including parks, schools, colleges, stadiums and practice fields, and are used by a wide variety of people, such as professional, college and youth athletes; coaches; referees; and recreational users of all ages. It is estimated that 95% of synthetic turf fields utilize recycled rubber infill exclusively or in mixture with sand or alternative infills (Synthetic Turf Council et al., 2016). Infill is added for ballast, support for the synthetic grass blades and as cushioning for field users. The recycled rubber infill material used on these fields is produced from waste automobile and truck tires, which are reprocessed using either an ambient or cryogenic method to create "crumb"-sized material, with reported approximate diameters ranging from 1 to 6 mm (Lim & Walker, 2009). In addition to its use in synthetic turf, recycled tire material is increasingly being used for playground surfaces in the United States."
Chemical concentration:	Table 2-5, Page 70: "0.64 mg/kg for BBP"

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 fabrication of final product from articles, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by discussion of methodologies. Variability addressed by standard deviation statistics.

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2019). Synthetic turf field recycled tire crumb rubber research under the Federal Research Action Plan, Final report part 1: Tire crumb rubber characterization appendices, volume 2.
HERO ID:	11845553
Conditions of Use:	Recycling (rubber products)

EXTRACTION	
Parameter	Data
Production, import, or use volume:	PDF Pg. 20”An estimated 4.77 million tons of waste tires were generated in 2013, and 40.5 percent, or 1.93 million tons, were recovered through recycling and production of retreaded tires (U.S. EPA, 2015).””In 2013, approximately 172,000 tons of scrap tires were converted to tire shreds for use in road and landfill construction, septic tank leach fields, and other construction applications (RMA, 2016a). Approximately 975,000 tons of scrap tires (i.e., approximately 59.5 million tires) were used in the ground rubber applications market, which includes the manufacture of new rubber products, rubber-modified asphalt, and playground and sports surfacing (RMA, 2014 and 2016a).”
Process description:	PD on tire manufacturing process is given on PDF Pg. 21.PD on tire crumb rubber manufacturing given on PDF Pg. 22-23.PD on synthetic turf fields given on PDF Pg. 24-26.

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

Overall Quality Determination

High

Study Citation:	U.S. EPA, (2012). Phthalates action plan.			
HERO ID:	4565597			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Phthalates are produced in high volume, over 470 million pounds per year (EPA 2006).			
Life cycle description:	BBP is the most widely used stain-resistant plasticizer in PVC (Wickson, 1993); vinyl tile represents its largest use (NTP, 2003e). 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.			
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	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	General engineering 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	

Study Citation:	U.S. EPA, (2012). Phthalates action plan.			
HERO ID:	4565597			
Conditions of Use:	Production of plastics			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Among other provisions, the Consumer Product Safety Improvement Act of 2008 (CPSIA) banned the use of six phthalates in toys and child care articles at concentrations greater than 0.1 percent: DEHP, DBP, BBP, DINP, DIDP and DnOP. Vermont and California prohibits the manufacture, sale, or distribution in commerce of any toy or child-care article that contains DEHP, DBP, or BBP at greater than 0.1% and of any toy or child-care article, intended for use by children under three years of age that can be mouthed, that contains DINP, DIDP or DnOP at greater than 0.1%. Washington prohibits a manufacturer, wholesaler, or retailer from manufacturing, knowingly selling, offering for sale, or distributing for sale or for use in the state a children’s product or product component containing phthalates (DEHP, DBP, BBP, DINP, DIDP, DnOP) individually or in combination, at a concentration exceeding 0.1% by weight (CRS, 2008).			
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	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	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			High	

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. Not specific to BBP.
	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	

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:	Plastics Manufacturing			
EXTRACTION				
Parameter	Data			
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation. Not specific to BBP.	
	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		

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:	Printing ink Manufacturing			
EXTRACTION				
Parameter	Data			
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.			
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. Not specific to BBP.
	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	

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:	Soap and Detergent Manufacturing			
EXTRACTION				
Parameter	Data			
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.			
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. Not specific to BBP.	
	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		

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:	Synthetic fiber Manufacturing			
EXTRACTION				
Parameter	Data			
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.			
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. Not specific to BBP.	
	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		

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:	Synthetic rubber Manufacturing			
EXTRACTION				
Parameter	Data			
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation. Not specific to BBP.	
	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		

Study Citation:	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.			
HERO ID:	7315820			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Process description:	Though BBP is not specifically mentioned, the group of articles provide information on various types of coating on metal and non-mental surfaces. Solvent base surface coating is conceptually a simple process. Solvents used include toluene, xylene, heptane, hexane, and methyl ethyl ketone. The coating solids portion of the formulations consists of elastomers (natural rubber, styrene-butadiene rubber, polyacrylates), tackifying resins (polyterpenes, rosins, petroleum hydrocarbon resins, asphalts), plasticizers (phthalate esters, polybutenes, mineral oil), and fillers (zinc oxide, silica, clay). BBP is used as a plasticizer. The process of solvent based surface coating includes a continuous roll of backing material (called the web) is unrolled, coated, dried, and rolled again. To initiate the coating process the continuous web material is unwound from its roll. It travels to a coating head, where the solvent base coating formulation is applied. These formulations have specified levels of solvent and coating solids by weight. Solvent base adhesive formulations contain approximately 67 weight percent solvent and 33 weight percent coating solids. The order of application is generally release coat, primer coat (if any), and adhesive coat. A web must always have a release coat before the adhesive can be applied. Primer coats are not required on all products, generally being applied to improve the performance of the adhesive.			
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	Data are from the United States
	Metric 3:	Applicability	Low	The report is for an occupational scenario within the scope of the risk evaluation, but has no mention of BBP.
	Metric 4:	Temporal Representativeness	Low	The report 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	High	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
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1995). Chapter 6.4: Paint and varnish. Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition, AP-42.			
HERO ID:	7315881			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Process description:	BBP is used in paint and coating manufacturing. 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. These processes take place in large mixing tanks at approximately room temperature.			
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	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	N/A	This metric is not applicable to the data being extracted	
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	This metric is not applicable to the data being extracted	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.		
HERO ID:	7315971		
Conditions of Use:	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	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Medium	

Study Citation:	U.S. EPA, (2016). Federal research action plan on recycled tire crumb used on playing field and playgrounds. Status report.			
HERO ID:	9102524			
Conditions of Use:	Toys, playground, and sporting equipment			
EXTRACTION				
Parameter	Data			
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. (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. (4/169) There are nine tire crumb rubber producers in the U.S. that produce 95% of the recycled rubber used in synthetic turf. (13/169) There are approximately eight major synthetic field installers in the United States. (15/169)			
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 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..
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (n.d.). AP-42: Chapter 10 - Wood products industry.		
HERO ID:	9263849		
Conditions of Use:	Construction, Paint, Electrical, and Metal Products		
EXTRACTION			
Parameter	Data		
Process description:	Section 10.5, Plywood Manufacturing; Section 10.6.1, Waferboard/Oriented Strandboard Manufacturing; Section 10.6.2, Particleboard Manufacturing; and Section 10.6.3, Medium Density Fiberboard Manufacturing. In addition, two new AP-42 sections were developed: Section 10.6.4, Hardboard and Fiberboard Manufacturing; and Section 10.9, Engineered Wood Products Manufacturing.		
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	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	Report is based on data that is over 20 years old
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	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		High	

Study Citation:	Velázquez-Gómez, M., Hurtado-Fernández, E., Lacorte, S. (2019). Differential occurrence, profiles and uptake of dust contaminants in the Barcelona urban area. Science of the Total Environment 648:1354-1370.			
HERO ID:	5043338			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	BBP Median dust concentrations: Houses: 967 ng/g High Schools: 2761 ng/g Museums: 1851 ng/g Libraries: 3136 ng/g Cars: 1221 ng/g			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from Spain, an OECD country.	
	Metric 3: Applicability	High	Data are for commercial use of furniture and furnishings, paints and coatings, building/construction materials, and fabric and textile products, all in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	High	Monitoring data are no more than 10 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Most critical metadata included.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by sampling multiple locations for each different occupational scenario.	
Overall Quality Determination		High		

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
HERO ID:	5547263			
Conditions of Use:	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	Global values provided
	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	General engineering 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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
HERO ID:	5547263			
Conditions of Use:	Use of plastics			
EXTRACTION				
Parameter	Data			
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	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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.	
Overall Quality Determination		High		

Study Citation:	Wormuth, M., Scheringer, M., Vollenweider, M., Hungerbuhler, K. (2006). What are the sources of exposure to eight frequently used phthalic acid esters in Europeans?. Risk Analysis 26(3):803-824.
HERO ID:	680214
Conditions of Use:	Consumer use

EXTRACTION	
Parameter	Data
Production, import, or use volume:	Several million tons of phthalates are used per year worldwide in the production of soft polyvinyl chloride (PVC) and other plastics that are contained in many consumer products. // Table 7 has use rates of personal care products (amount applied per use): 500-3,000 mg/use for deodorant; 650-750 mg/use for perfume; 1,200 mg/use for aftershave; 3,700-10,000 mg/use for hair styling; 8,000-16,400 mg/use for shampoo; 3,000-7,000 mg/use for skin care; 280-3,060 mg/use for nail care; 490 mg/use for makeup; 500-1,400 mg/use for baby products.
Chemical concentration:	Table 5 has min/mean/max concentrations in consumer products: 26,750 mg/kg in gloves; 37,333 mg/kg (mean) in paints; 26,700 mg/kg (mean) in adhesives; 0 mg/kg (mean) in deodorant; 8mg/kg (mean) in perfumes; 0 mg/kg (mean) in aftershaves; 16 mg/kg (mean) in hair styling products; 0 mg/kg (mean) in shampoo; 0 mg/kg (mean) in skin care products; 0 mg/kg (mean) in nail care; 0 mg/mk (mean) in makeup; 0 mg/kg (mean) in baby product

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The model is free of mathematical errors and is based on scientifically sound approaches or methods. Equations and choice of parameter values are appropriate for the model's application (note: peer review may address appropriate application).
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	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. However, the model is based on operations, equipment, and worker activities are expected to be reasonably representative of current 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	Model approach, equations, and choice of parameter values are transparent and clear and can be evaluated. Rationale for selection of approach, equations, and parameter values is provided.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results.

Overall Quality Determination

High

Study Citation:		Wrap,, Protecto (2008). Protecto sealant 25XL: Material safety data sheet.			
HERO ID:		6302503			
Conditions of Use:		Adhesives and Sealants			
EXTRACTION					
Parameter		Data			
Chemical concentration:		10-30%			
EVALUATION					
Domain		Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology		High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope		High	Product is from a US supplier.
	Metric 3:	Applicability		High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness		High	Less than 10 years old.
	Metric 5:	Sample Size		Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness		Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness		Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination				High	

Study Citation:	Wypych, G. (2020). Health and safety and environmental impact. :431-458.			
HERO ID:	7978600			
Conditions of Use:	Processing (as a component of PVC formulations)			
EXTRACTION				
Parameter	Data			
Life cycle description:	Table 12.9 includes BBP as an indirect food additive in the following categories: AdhesivesPolyester Resins (cross linked) Plasticizers in polymeric substances(pg. 19/28)			
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	The report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, in terms of the type of industry, operations, and work activities.
	Metric 4:	Temporal Representativeness	Medium	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. (Table 12.9 based on data from 2008)
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Yan, Y., Lu, Y., Gao, Y., Wang, B., Zhao, L., Balaram, V., Rambabu, U., Reddy, P., M.R., Munirathnam, N. R., Chatterjee, S. (2018). RoHS regulation: Challenges in the measurement of substances of concern in industrial products by different analytical techniques. Mapan-Journal of Metrology Society of India 33(3):329-346.			
HERO ID:	5043636			
Conditions of Use:	Various commercial/consumer uses.			
EXTRACTION				
Parameter	Data			
Life cycle description:	Table 1 lists potential uses of BBP after manufacturing and processing - medical devices, monitoring and control instruments, toys and childcare items, furniture, water and air mattresses, rubber footwear, erasing rubber, packaging materials and insulation on wires and cable			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Data is high quality and is peer reviewed.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is for India, a non-OECD country
	Metric 3:	Applicability	Low	Data is not for occupational scenarios, just provides possible applications of the chemical.
	Metric 4:	Temporal Representativeness	High	Report is less than 10 years old.
	Metric 5:	Sample Size	Low	Characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	N/A	Life cycle description information
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Background information
Overall Quality Determination			Medium	

Study Citation:	Ügdüler, S., Geem, Van, K. M., Roosen, M., Delbeke, P., E.I., Meester, De, S. (2020). Challenges and opportunities of solvent-based additive extraction methods for plastic recycling. Waste Management 104:148-182.		
HERO ID:	7976469		
Conditions of Use:	Plasticizer for Plastics		
EXTRACTION			
Parameter	Data		
Life cycle description:	Plasticizers are used as a lubricant as they decrease the stiffness of the polymer via reduction of the cohesive intermolecular friction along the polymer chain (Subramanian, 2013). They are mostly used for polymers which are in a glassy state at room temperatures such as PVC, and their flexibility is improved via strong interaction between the plasticizer and polymer chain units (Stepek, 1983). In addition, they reduce shear during polymer processing and improve the impact resistance of the final material (Bhunia et al., 2013). (p. 13).		
Chemical concentration:	Plasticizers are typically organic liquids with high molecular weight and boiling point. The used concentration varies between 20 and 50% of the total plastic weight (p. 13).		
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 Belgium, an 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	The report was published in 2020.
	Metric 5: Sample Size	N/A	Life cycle 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	Medium	limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	Ügdüler, S., Geem, Van, K. M., Roosen, M., Delbeke, P., E.I., Meester, De, S. (2020). Challenges and opportunities of solvent-based additive extraction methods for plastic recycling. Waste Management 104:148-182.		
HERO ID:	7976469		
Conditions of Use:	Plastics Recycling - Solvent Extraction of Plastic Additives		
EXTRACTION			
Parameter	Data		
Process description:	The removal of molecules from a solid matrix is a complex process which is very difficult to model in a proper way as there are many factors that are relevant, ranging from pore size to chemical interactions between solute, solvent and solid matrix. Permeability of the solid matrix is the main physical factor which controls the rate mechanism of mass transport. When a solvent is in contact with the solid matrix, it is likely to percolate through the permeable matrix and remove the substances based on their solubility with a specific rate which is controlled by the diffusivity. Therefore, permeability depends on both solubility and diffusivity (p. 15). See Table 3.1 for summary of extraction methods found for phthalates: methanol ethanol, 2-propanol and acetone/CYHA for extraction of phthalates from PVC had a 71-96% efficiency; methanol extraction of phthalates from PVC had 60-95% efficiency; Sc-CO2 with methanol extraction of phthalates from PVC had a 10-90% efficiency; Sc-CO2 extraction of phthalates from PVC had a 30-98% efficiency; CYHA/2-propanol extraction of phthalates from PVC and PP had a ~100% efficiency; and, THF/ethanol extraction of phthalates from PVC had a >90% efficiency.		
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 Belgium, an 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	The report was published in 2020.
	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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	