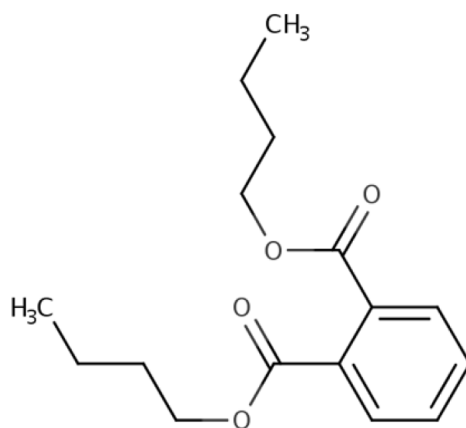

**Data Quality Evaluation and Data Extraction Information for
Environmental Release and Occupational Exposure for
Dibutyl Phthalate (DBP)
(1,2-Benzenedicarboxylic acid, 1,2-dibutyl ester)**

Systematic Review Support Document for the Risk Evaluation

CASRN: 84-74-2



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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 Dibutyl Phthalate (DBP)* 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* (referred to hereafter '2021 Draft Systematic Review Protocol').

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

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

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Occupational Exposure		
Monitoring Data		
10816675	[Redacted] (1985). [Redacted] n-Butyl alcohol, dibutyl phthalate, and phthalic anhydride concentrations, ____.	24
10816887	[Redacted] (1997). [Redacted] Dibutyl phthalate concentrations - Plasticizers section.	25
789522	Afshari, A., Gunnarsen, L., Clausen, P. A., Hansen, V. (2004). Emission of phthalates from PVC and other materials. <i>Indoor Air</i> 14(2):120-128.	26
3859024	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. <i>Microchemical Journal</i> 132:227-232.	27
4728733	Andaluri, G., Manickavachagam, M., Suri, R. (2018). Plastic toys as a source of exposure to bisphenol-A and phthalates at childcare facilities. <i>Environmental Monitoring and Assessment</i> 190(2):65.	28
6950643	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. <i>Atmosphere</i> 11(5):547.	29
6318028	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. <i>Environmental Science & Technology</i> 53(24):14630-14637.	30
4166920	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. <i>Environment International</i> 112:115-126.	31
7976806	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. (2020). Corrigendum to "Multi-pathway human exposure assessment of phthalate esters and DINCH" [<i>Environ. Int.</i> 112 (2018) 115-126]. <i>Environment International</i> 143(Elsevier):106071.	32
7978731	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. <i>Environment International</i> 155(Elsevier):106598.	33
2241693	Gong, M., Zhang, Y., Weschler, C. J. (2014). Predicting dermal absorption of gas-phase chemicals: Transient model development, evaluation, and application. <i>Indoor Air</i> 24(3):292-306.	34
3859087	González-Mariño, I., Rodil, R., Barrio, I., Cela, R., Quintana, J. B. (2017). Wastewater-based epidemiology as a new tool for estimating population exposure to phthalate plasticizers. <i>Environmental Science & Technology</i> 51(7):3902-3910.	35
1332993	Haas, R.a. (1990). Air monitoring of freshly painted interior rooms with cover letter.	36
9551210	Harley, K. G., Calderon, L., Nolan, S., J.E., Maddalena, R., Russell, M., Roman, K., Mayo-Burgos, S., Cabrera, J., Morga, N., Bradman, A. (2021). Changes in Latina women's exposure to cleaning chemicals associated with switching from conventional to "green" household cleaning products: The LUCIR intervention study. <i>Environmental Health Perspectives</i> 129(9):97001.	37
697394	Hines, C., Hopf, N., Deddens, J., Silva, M., Calafat, A. (2011). Estimated daily intake of phthalates in occupationally exposed groups. <i>Journal of Exposure Science & Environmental Epidemiology</i> 21(2):133-141.	38
6558523	Hollett, B. (1977). Health hazard evaluation report no. HETA 76-92-363, Jeffery Bigelow Design Group, Inc., Washington, D.C.	39
2915537	Ishii, S., Katagiri, R., Minobe, Y., Kuribara, I., Wada, T., Wada, M., Imai, S. (2015). Investigation of the amount of transdermal exposure of newborn babies to phthalates in paper diapers and certification of the safety of paper diapers. <i>Regulatory Toxicology and Pharmacology</i> 73(1):85-92.	40

1333391	Jannerfeldt, E., Johnson, P. (1982). Health Hazard Evaluation Report, No. HETA-81-277-1089, Indiana Army Ammunition Plant, Charlestown, Indiana.	41
1332799	Kang, Y., Den, W., Bai, H., Ko, F. H. (2005). Direct quantitative analysis of phthalate esters as micro-contaminants in cleanroom air and wafer surfaces by auto-thermal desorption–gas chromatography–mass spectrometry. <i>Journal of Chromatography A</i> 1070(1-2):137-145.	42
2345960	Kolena, B., Petrovicova, I., Pilka, T., Pucherova, Z., Munk, M., Matula, B., Vankova, V., Petlus, P., Jenisova, Z., Rozova, Z., Wimmerova, S., Trnovec, T. (2014). Phthalate exposure and health-related outcomes in specific types of work environment. <i>International Journal of Environmental Research and Public Health</i> 11(6):5628-5639.	43
6558312	Kullman, G. (1987). Health hazard evaluation report no. HETA 86-191-1836, West Virginia Department of Highways, Charleston, WV.	44
1007791	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. <i>Atmospheric Environment</i> 44(19):2294-2301.	45
2346023	Liang, Y., Xu, Y. (2014). Improved method for measuring and characterizing phthalate emissions from building materials and its application to exposure assessment. <i>Environmental Science & Technology</i> 48(8):4475-4484.	46
6968274	Lim, M., Lee, K. (2020). Aggregate exposure assessment using cosmetic co-use scenarios: II. Application and validation for phthalates. <i>Food and Chemical Toxicology</i> 144:111583.	47
680348	Masi, F., Lepri, L., Bubba, Del, M., Sacco, C., Nostro, Lo, A., Comodo, N. (1999). Organic chemicals and microbial facies of liquid aerosols from a wastewater treatment plant. <i>Annali di Chimica</i> 89(3-4):231-248.	48
3028963	Morrison, G., Li, H., Mishra, S., Buechlein, M. (2015). Airborne phthalate partitioning to cotton clothing. <i>Atmospheric Environment</i> 115:149-152.	49
1323321	NICNAS, (2008). Existing chemical hazard assessment report: Dibutyl phthalate.	50
5017615	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. <i>Chemosphere</i> 208:1002-1007.	51
6499659	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.	52
6983058	OSHA, (2020). Chemical Exposure Health Data (CEHD).	53
6558302	Pryor, P., Whorton, D. (1981). Health hazard evaluation report no. HETA 80-094-840, Ford Motor Company, San Jose, California.	60
1009699	Roper, C. P., Jr (1976). Health Hazard Evaluation Determination, Report No. 74-120-260, Goodyear Tire and Rubber Company, Gadsden, Alabama.	61
198234	Rudel, R. A., Brody, J. G., Spengler, J. D., Vallarino, J., Geno, P. W., Sun, G., Yau, A. (2001). Identification of selected hormonally active agents and animal mammary carcinogens in commercial and residential air and dust samples. <i>Journal of the Air and Waste Management Association</i> (1990-1992) 51(4):499-513.	62
4058592	Ruhe, R. L., Bennett, D. (1986). Health hazard evaluation report HETA-85-060-1670, City of Norwood, Norwood, Ohio. NIOSH(HETA-85-060-1670):85-060.	63
2915827	Salgueiro-Gonzalez, N., Alda, L.d., M. J., Muniategui-Lorenzo, S., Prada-Rodriguez, D., Barcelo, D. (2015). Analysis and occurrence of endocrine-disrupting chemicals in airborne particles. <i>Trends in Analytical Chemistry</i> 66:45-52.	64
3520009	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. <i>Environmental Science & Technology Letters</i> 4(1):1-5.	65
6816297	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. <i>Chemosphere</i> 237:124500.	66
7978848	Stewart, E. (2011). Air and wipe sampling for phthalates in a medical office building. 1:85-90.	67
1332959	Tremco, (1982). Exhibit I: Exposure data with cover letter.	68

11845992	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.	69
4176702	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. <i>Building and Environment</i> 124(Elsevier):315-322.	70
Published Models for Exposures or Releases		
3869608	Avsar, E., Iskender, F. G., Demir, S., Babuna, F. G. (2017). Effect of di-butylphthalate spillage scenarios on the general layout of a plant. <i>Fresenius Environmental Bulletin</i> 26(1):204-207.	71
4829426	Cao, J., Zhang, X., Zhang, Y. (2018). Predicting dermal exposure to gas-phase semivolatile organic compounds (SVOCs): a further study of SVOC mass transfer between clothing and skin surface lipids. <i>Environmental Science & Technology</i> 52(8):4676-4683.	72
3230538	Frasch, H. F., Bunge, A. L. (2015). The transient dermal exposure II: post-exposure absorption and evaporation of volatile compounds. <i>Journal of Pharmaceutical Sciences</i> 104(4):1499-1507.	73
3469207	Morrison, G. C., Weschler, C. J., Bekö, G. (2016). Dermal uptake of phthalates from clothing: Comparison of model to human participant results. <i>Indoor Air</i> 27(3):642-649.	74
3602893	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. <i>Environment International</i> 102:106-113.	75
5043594	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?. <i>Journal of Exposure Science & Environmental Epidemiology</i> 30(3):567-584.	76
11373482	U.S. EPA, (2021). Generic model for central tendency and high-end inhalation exposure to total and respirable Particulates Not Otherwise Regulated (PNOR).	77
680214	Wormuth, M., Scheringer, M., Vollenweider, M., Hungerbühler, K. (2006). What are the sources of exposure to eight frequently used phthalic acid esters in Europeans?. <i>Risk Analysis</i> 26(3):803-824.	84
5043519	Xia, M., Ouyang, X., Wang, X., Shen, X., Zhan, Y. (2018). Occupational exposure assessment of phthalate esters in indoor and outdoor microenvironments. <i>Journal of Environmental Sciences</i> 72:75-88.	85
Completed Exposure or Risk Assessments		
1267867	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.	86
1333013	Consultants,, Woodward-Clyde (1993). BFGoodrich Akron plant risk assessment with cover letter dated 01/06/1994.	87
3688160	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.	88
5353181	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.	89
5155574	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCb).	90
3661424	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.	94
5155558	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.	96
7265437	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).	100
1987638	Guo, Y., Wang, L., Kannan, K. (2014). Phthalates and parabens in personal care products from China: Concentrations and human exposure. <i>Archives of Environmental Contamination and Toxicology</i> 66(1):113-119.	102
4730751	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. <i>International Journal of Environmental Research and Public Health</i> 15(4):744.	103

6836808	NICNAS, (2015). Priority existing chemical draft assessment report: Diisodecyl Phthalate & Di-n-octyl Phthalate.	105
679850	NTP-CERHR, (2000). NTP-CERHR expert panel report on di-n-butyl phthalate.	106
3808976	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.	107
3827299	OECD, (2009). Emission scenario document on adhesive formulation.	108
3827300	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.	109
3827418	OECD, (2011). Emission scenario document on the use of metalworking fluids.	110
3833136	OECD, (2015). Emission scenario document on use of adhesives.	111
3840003	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.	112
6568745	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.	113
6311222	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.	114
10366192	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).	115
10368811	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	121
10480466	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).	122
11182966	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	123
11373493	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).	124
3827197	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.	125
6304171	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.	126
6311218	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.	127
6311221	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	128
6385708	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).	129
6385709	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.	130
6385710	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.	131
6385711	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.	132
6385719	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.	133
6385740	U.S. EPA, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.	134

6385741	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.	135
6385748	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.	136
6549571	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.	137
Reports for Data or Information Other than Exposure or Release Data		
10369850	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.	139
5160123	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.	140
4198524	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.	141
5676112	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.	142
1335313	Bang, D.,uY, Kyung, M., Kim, M., Jung, B.,uY, Cho, M. C., Choi, S., Kim, Y., Lim, S. K., Lim, D., Won, A., Kwack, S., Lee, Y., Kim, H., Lee, M.,u, B. (2012). Human Risk Assessment of Endocrine-Disrupting Chemicals Derived from Plastic Food Containers. Comprehensive Reviews in Food Science and Food Safety 11(5):453-470.	143
2816857	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.	144
7349060	Canada,, G.o. (2020). Phthalate substance grouping – Information sheet.	145
664488	CDC, (2009). Fourth national report on human exposure to environmental chemicals.	146
5432993	Chung, B. Y., Choi, S. M., Roh, T. H., Lim, D. S., Ahn, M. Y., Kim, Y. J., Kim, H. S., Lee, B. M. (2019). Risk assessment of phthalates in pharmaceuticals. Journal of Toxicology and Environmental Health, Part A: Current Issues 82(5):351-360.	147
3230347	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.	148
5432879	Dong, H., Jiang, L., Shen, J., Zhao, Z., Wang, Q., Shen, X. (2019). Identification and analysis of odor-active substances from PVC-overlaid MDF. Environmental Science and Pollution Research 26(20):20769-20779.	149
10112937	ECHA, (2017). Opinion on an Annex XV dossier proposing restrictions on four phthalates (DEHP, BBP, DBP, DIBP).	150
6316858	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.	151
7325405	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.	152
200024	Fishbein, L. (1992). Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health 18(S1):5-16.	153
7978498	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.	154
6957637	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.	155
1005742	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.	156

10816795	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.	157
1311700	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. <i>Environmental Science & Technology</i> 46(15):8422-8430.	158
788300	Koniecki, D., Wang, R., Moody, R. P., Zhu, J. (2011). Phthalates in cosmetic and personal care products: Concentrations and possible dermal exposure. <i>Environmental Research</i> 111(3):329-336.	159
2345987	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. <i>Journal of Occupational and Environmental Hygiene</i> 11(5):D43-D48.	160
789380	Latini, G. (2005). Monitoring phthalate exposure in humans. <i>Clinica Chimica Acta</i> 361(1-2):20-29.	161
3015875	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. <i>Environmental Science & Technology</i> 48(24):14228-14237.	162
5349749	Lowell Center for Sustainable Production at the University of Massachusetts, (2011). Technical briefing: Phthalates and their alternatives: Health and environmental concerns. :23.	163
4728432	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. <i>Environmental Science and Pollution Research</i> 25(21):20550-20561.	164
4164912	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. <i>Journal of Environmental Science and Health, Part A: Toxic/Hazardous Substances & Environmental Engineering</i> 53(1):79-90.	165
5155535	NICNAS, (2016). C4-6 side chain transitional phthalates: Human health tier II assessment.	166
10182525	NIOSH, (1976). Occupational health guideline for dibutylphthalate.	167
192177	NIOSH, (2007). NIOSH pocket guide to chemical hazards.	168
8407729	NIOSH, (2019). NIOSH pocket guide to chemical hazards: Dibutyl phthalate.	169
8683475	NIOSH, (2019). Evaluation of ergonomics, chemical exposures, and ventilation at four nail salons.	170
10172655	OECD, (2016). Report On The Proposal For Classification And Labelling (C&L) Of Dibutyl Phthalate.	172
1415211	Ohlson, C. G., Hardell, L. (2000). Testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. <i>Chemosphere</i> 40(9-11):1277-1282.	173
1598544	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. <i>American Association of Occupational Health Nurses Journal</i> 55(1):12-17.	174
1249953	Pak, V. M., Mccauley, L. A., Pinto-Martin, J. (2011). Phthalate exposures and human health concerns: A review and implications for practice. <i>American Association of Occupational Health Nurses Journal</i> 59(5):228-33; quiz 234-5.	175
2219803	Pan, T. L., Wang, P. W., Aljuffali, I. A., Hung, Y. Y., Lin, C. F., Fang, J. Y. (2014). Dermal toxicity elicited by phthalates: Evaluation of skin absorption, immunohistology, and functional proteomics. <i>Food and Chemical Toxicology</i> 65:105-114.	177
5620073	Petrovicova, I., Kolena, B., Pilka, T. (2014). The human biomonitoring of occupational exposure to phthalates. <i>Mediterranean Journal of Social Sciences</i> 5(19):101-107.	178
6580284	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.	179
10472417	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.	180
674473	Scott, R. C., Dugard, P. H., Ramsey, J. D., Rhodes, C. (1987). In vitro absorption of some o-phthalate diesters through human and rat skin. <i>Environmental Health Perspectives</i> 74(0):223-227.	181

2624719	SRC, (2001). Toxicological profile for di-n-butyl phthalate.	182
675435	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.	183
5432967	SUNY, (2019). Phthalates in infant cotton clothing: Occurrence and implications for human exposure. <i>Science of the Total Environment</i> 683:109-115.	184
5163392	Tokumura, M., Seo, M., Wang, Q., Miyake, Y., Amagai, T., Makino, M. (2019). Dermal exposure to plasticizers in nail polishes: An alternative major exposure pathway of phosphorus-based compounds. <i>Chemosphere</i> 226:316-320.	185
11138808	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.	186
5097881	U.S. Census Bureau, (2015). Statistics of U.S. Businesses (SUSB).	187
10293388	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.	188
11224653	U.S. EPA, (2013). Updating CEB's method for screening-level estimates of dermal exposure.	189
4565597	U.S. EPA, (2012). Phthalates action plan.	190
7315971	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.	191
8726953	U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.	192
5043338	Velázquez-Gómez, M., Hurtado-Fernández, E., Lacorte, S. (2019). Differential occurrence, profiles and uptake of dust contaminants in the Barcelona urban area. <i>Science of the Total Environment</i> 648:1354-1370.	193
6106854	Väisänen, K., A.J., Hyttinen, M., Ylönen, S., Alonen, L. (2019). Occupational exposure to gaseous and particulate contaminants originating from additive manufacturing of liquid, powdered, and filament plastic materials and related post-processes. <i>Journal of Occupational and Environmental Hygiene</i> 16(3):258-271.	194
5547263	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. <i>Toxics</i> 7(2):21.	195
5740947	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.	196
Environmental Releases		
Environmental Release Data		
5160123	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.	197
5676112	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.	198
6311430	Cadogan, D., Howick, C. (2000). Plasticizers.	199
629069	Castillo, M., Oubiña, A., Barceló, D. (1998). Evaluation of ELISA kits followed by liquid chromatography-atmospheric pressure chemical ionization-mass spectrometry for the determination of organic pollutants in industrial effluents. <i>Environmental Science & Technology</i> 32(14):2180-2184.	200
10442901	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.	201
10442902	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.	202
5433039	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. <i>Environmental Pollution</i> 248(Elsevier):1036-1045.	203
3585789	Clapp, L. W., Talarczyk, M. R., Park, J. K., Boyle, W. C. (1994). Performance comparison between activated-sludge and fixed-film processes for priority pollutant removals. <i>Water Environment Research</i> 66(2):153-160.	204

1335586	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.	205
659922	Dempsey, C. R. (1993). A comparison of organic emissions from hazardous waste incinerators versus the 1990 toxics release inventory air releases. <i>Journal of the Air and Waste Management Association</i> 43(10):1374-1379.	206
10385015	Earthjustice, (2020). Exhibit 1 to comments of rubbertown emergency action et al., re: TSCA risk evaluations for high-priority substances and substances undergoing manufacturer-requested risk evaluations.	207
7330238	ECCC/HC, (2020). Science assessment of plastic pollution.	208
6316858	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.	209
7325021	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.	215
7681883	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.	216
7349020	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.	219
5432720	Fischer, J., Ventura, K., Prokes, B., Jandera, P. (1993). Method for determination of plasticizers in industrial emissions. <i>Chromatographia</i> 37(1-2):47-50.	221
200024	Fishbein, L. (1992). Exposure from occupational versus other sources. <i>Scandinavian Journal of Work, Environment and Health</i> 18(S1):5-16.	222
10816795	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.	223
4683362	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. <i>Environmental Research</i> 165:81-90.	224
7978640	Kim, H., Tanabe, S. I., Koganei, M. (2019). The emission rate of newly regulated chemical substances from building materials. <i>IOP Conference Series: Materials Science and Engineering</i> 609(4):042046.	225
6825427	Koszelnik, P., Ziembowicz, S., Kida, M. (2020). Analysis of concentrations of selected phthalic acid esters in aquatic ecosystems - Poland's case study. <i>Desalination and Water Treatment</i> 186:56-64.	226
5631621	Kruopiene, J., Dvarioniene, J., Dudutyte, Z., Stance, L., Buzelyte, J. (2014). The use of hazardous chemical substances in Lithuanian industry: how sound is it?. <i>Journal of Cleaner Production</i> 72:89-95.	227
1323186	Lee, Y. J., Kim, Y. H., Kim, K., Lee, D. S. (2007). Development and evaluation of an aquatic ecological risk assessment system (KO-RECORisk) for the management of industrial complexes. <i>Integrated Environmental Assessment and Management</i> 3(4):508-516.	228
6959335	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. <i>Science of the Total Environment</i> 692:354-360.	229
4259743	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. <i>Environmental Pollution</i> 231(Pt 1):115-122.	230
3867109	Markiewicz, A., Björklund, K., Eriksson, E., Kalmykova, Y., Strömwall, A. M., Siopi, A. (2017). Emissions of organic pollutants from traffic and roads: Priority pollutants selection and substance flow analysis. <i>Science of the Total Environment</i> 580:1162-1174.	231
1335811	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. <i>Science</i> 46(4056):46-47.	232
6826007	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. <i>Progress in Polymer Science</i> 27(10):2227-2277.	233
1269556	Midwest Research Institute, (1984). Performance evaluation of full-scale hazardous waste incinerators - Volume I (excutive summary) contract no. 68-02-3177 (43).	234

11360398	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.	235
2718034	Nohr, M., Horn, W., Jann, O., Richter, M., Lorenz, W. (2015). Development of a multi-VOC reference material for quality assurance in materials emission testing. Analytical and Bioanalytical Chemistry 407(11):3231-3237.	236
7348917	OECD, (2011). Resource compendium of PRTR release estimation techniques, part 4: Summary of techniques for releases from products, version 1.0.	237
1267868	Oppelt, E. T. (1991). Air emissions from the incineration of hazardous waste. Advances in Modern Environmental Toxicology XIX:1-26.	238
1924583	Oppelt, E. T. (1987). Incineration of hazardous waste. Journal of Air Pollution Control Association 37(5):558-586.	239
6580284	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.	240
1335691	Radian Corp, (1989). Environmental analysis for the Shell Martinez RM-17 incinerator, with cover letter dated 3/15/1991 (sanitized).	242
3859095	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.	243
2510812	Schripp, T., Salthammer, T., Fauck, C., Bekö, G., Weschler, C. J. (2014). Latex paint as a delivery vehicle for diethylphthalate and di-n-butylphthalate: Predictable boundary layer concentrations and emission rates. Science of the Total Environment 494-495:299-305.	244
9493521	Schripp, T., Wensing, M. (2009). Emission of VOCs and SVOCs from electronic devices and office equipment. :405-430.	245
4173202	Sendesi, T., S.M., Ra, K., Conkling, E. N., Boor, B. E., Nuruddin, M., Howarter, J. A., Youngblood, J. P., Kobos, L. M., Shannahan, J. H., Jafvert, C. T., Whelton, A. J. (2017). Worksite chemical air emissions and worker exposure during sanitary sewer and stormwater pipe rehabilitation using cured-in-place-pipe (CIPP). Environmental Science & Technology Letters 4(8):325-333.	246
1315839	Trenholm, A. R., Lee, C. C. (1987). Analysis of PIC and total mass emissions from an incinerator. Nuclear and Chemical Waste Management 7(1):33-36.	247
10293388	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.	248
11347319	U.S. EPA, (2023). 2020 National Emissions Inventory (NEI) Data (August 2023 version).	249
12212773	U.S. EPA, (2024). Toxics Release Inventory (TRI) data: Dibutyl phthalate (DBP), reporting years 2017-2022.	250
12212774	U.S. EPA, (2024). Discharge Monitoring Report (DMR) data: Dibutyl phthalate (DBP), reporting years 2017-2022.	251
4565597	U.S. EPA, (2012). Phthalates action plan.	252
46492	U.S. EPA, (1995). AP-42: Compilation of air pollutant emission factors. Volume I: Stationary point and area sources, fifth edition.	253
6535959	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.	254
7310513	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.	255
7315820	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.	261
7315841	U.S. EPA, (1995). AP-42: Chapter 4.12 - Manufacture of rubber products.	262
7315971	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.	263
8347325	U.S. EPA, (2021). National analysis TRI dataset (TRI): Data used for TSCA risk evaluations, reporting year 2019.	264
8726953	U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.	265

8784984	U.S. EPA, (2019). TRI on-site and off-site reported disposed of or otherwise released (in pounds), for all industries.	266
5740947	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.	267
5043529	Zhu, Q., Jia, J., Zhang, K., Zhang, H., Liao, C. (2019). Spatial distribution and mass loading of phthalate esters in wastewater treatment plants in China: An assessment of human exposure. Science of the Total Environment 656:862-869.	268
Published Models for Exposures or Releases		
87136	Middleton, P., Sockwell, R., Carter, L., W.P. (1990). Aggregation and analysis of volatile organic compound emissions for regional modeling. Atmospheric Environment, Part A: General Topics 24(5):1107-1133.	269
Completed Exposure or Risk Assessments		
2816494	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.	270
675060	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.	271
5353181	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.	272
679967	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.	273
7325020	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA's first Recommendation for the inclusion of substances in Annex XIV.	278
5155558	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.	284
3808976	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.	289
3827298	OECD, (2009). Emission scenario documents on coating industry (paints, lacquers and varnishes).	290
3827299	OECD, (2009). Emission scenario document on adhesive formulation.	291
3827300	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.	292
3827416	OECD, (2004). Emission scenario document on lubricants and lubricant additives.	293
3827418	OECD, (2011). Emission scenario document on the use of metalworking fluids.	294
3833136	OECD, (2015). Emission scenario document on use of adhesives.	295
3840003	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.	296
4445826	OECD, (2004). Emission scenario document on additives in rubber industry.	297
5079084	OECD, (2009). Emission scenario document on plastic additives.	298
6306751	OECD, (2019). Complementing document to the emission scenario document on plastic additives: Plastic additives during the use of end products.	299
6306753	OECD, (2011). Emission scenario document on the chemical industry.	300
6393282	OECD, (2009). Emission scenario document on transport and storage of chemicals.	301
6568745	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.	302
6311222	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.	303

10366192	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).	304
10368811	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	306
10480466	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).	307
11182966	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	308
11373493	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).	309
3827197	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.	310
6304171	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.	311
6311218	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.	312
6311221	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	313
6385708	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).	314
6385709	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.	315
6385710	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.	316
6385711	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.	317
6385719	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.	318
6385740	U.S. EPA, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.	319
6385741	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.	320
6385748	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.	321
6549571	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.	322
Reports for Data or Information Other than Exposure or Release Data		
11360400	APR, (2020). U.S. post-consumer plastic recycling data.	323
6813724	Björklund, K. (2010). Substance flow analyses of phthalates and nonylphenols in stormwater. Water Science and Technology 62(5):1154-1160.	324
7349060	Canada, G.o. (2020). Phthalate substance grouping – Information sheet.	326
9641570	Canada, G.o. (2019). Page 5 - Fifth report on human biomonitoring of environmental chemicals in Canada.	327
657949	Castaldi, F. J., Ford, D. L. (1992). Slurry bioremediation of petrochemical waste sludges. Water Science and Technology 25(3):207-212.	328

664488	CDC, (2009). Fourth national report on human exposure to environmental chemicals.	329
10186827	Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.	330
10454465	DOE,, WA (2020). Priority consumer products report to the Legislature: Safer products for Washington implementation phase 2.	331
7325405	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.	332
10633678	ExxonMobil, (2022). EM BRCP DINP/DIDP facility – virtual tour (sanitized).	334
1322091	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. <i>Atmospheric Environment</i> 37(39-40):5495-5504.	335
4168432	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. <i>Journal of Hazardous Materials</i> 344:179-199.	336
5360034	Junter, G. A., Jouenne, T., Vilain, S. (2002). Biological treatment of water using immobilized-cell systems. III. Phenolic compounds and other monoaromatics. Part 2. <i>Chimica Oggi</i> 20(7-8):77-83.	337
5489083	Li, X. (2018). Chemical emissions from plastic manufactured in water infrastructure.	338
3015875	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. <i>Environmental Science & Technology</i> 48(24):14228-14237.	339
4728432	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. <i>Environmental Science and Pollution Research</i> 25(21):20550-20561.	340
5433479	Naumczyk, J. H., Kucharska, M. A., Ladynska, J. A., Wojewodka, D. (2019). Electrochemical oxidation process in application to raw and biologically pre-treated tannery wastewater. <i>Desalination and Water Treatment</i> 162:166-175.	342
10182525	NIOSH, (1976). Occupational health guideline for dibutylphthalate.	343
7978775	Parkerton, T. F., Staples, C. A. (2003). An assessment of the potential environmental risks posed by phthalates in soil and sediment. <i>Handbook of Environmental Chemistry Series</i> , vol. 3 pt. Q 3:317-349.	344
10472417	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.	345
1333014	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.	346
5433106	Samsonova, A. S., Aleshchenkova, Z. M., Syomochkina, N. F., Baikova, S. V. (1996). Microbial decontamination of effluents from phthalate esters. <i>Dechema Monographs</i> 133:607-610.	347
6816297	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. <i>Chemosphere</i> 237:124500.	348
2624719	SRC, (2001). Toxicological profile for di-n-butyl phthalate.	349
11845553	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.	350
5933015	Zhu, L. (2015). Rejection of organic micropollutants by clean and fouled nanofiltration membranes. <i>Journal of Chemistry</i> 2015(934318):1-9.	351

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Published Models for Exposures or Releases

680214	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.	352
Completed Exposure or Risk Assessments		
1267867	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.	353
675060	Cousins, A. P., Remberger, M., Kaj, L., Ekheden, Y., Dusan, B., Brorstrom-Lunden, E. (2007). Results from the Swedish National Screening Programme 2006. Subreport 1: Phthalates. GRA and I(GRA and I):39.	354
5155574	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCb).	355
679967	ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.	359
3661424	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.	360
3687875	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- <i>n</i> -isononyl phthalate (DINP).	363
7325020	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA's first Recommendation for the inclusion of substances in Annex XIV.	364
5155558	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.	369
7265437	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).	372
4730751	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.	375
3664467	NICNAS, (2015). Priority existing chemical assessment report no. 40: Butyl benzyl phthalate.	376
6836808	NICNAS, (2015). Priority existing chemical draft assessment report: Diisodecyl Phthalate & Di-n-octyl Phthalate.	377
3808976	OECD, (2011). Emission scenario document on coating application via spray-painting in the automotive refinishing industry.	378
3827298	OECD, (2009). Emission scenario documents on coating industry (paints, lacquers and varnishes).	379
3827299	OECD, (2009). Emission scenario document on adhesive formulation.	380
3827300	OECD, (2013). Emission scenario document on the industrial use of adhesives for substrate bonding.	381
3827416	OECD, (2004). Emission scenario document on lubricants and lubricant additives.	382
3827418	OECD, (2011). Emission scenario document on the use of metalworking fluids.	383
3833136	OECD, (2015). Emission scenario document on use of adhesives.	384
3840003	OECD, (2010). Emission scenario document on formulation of radiation curable coatings, inks and adhesives.	385
4445826	OECD, (2004). Emission scenario document on additives in rubber industry.	386
5079084	OECD, (2009). Emission scenario document on plastic additives.	387
6306753	OECD, (2011). Emission scenario document on the chemical industry.	388
6393282	OECD, (2009). Emission scenario document on transport and storage of chemicals.	389
6568745	OECD, (2011). Emission Scenario Document on the application of radiation curable coatings, inks, and adhesives via spray, vacuum, roll, and curtain coating.	390

6311222	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.	391
10366192	U.S. EPA, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).	392
10368811	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	396
10480466	U.S. EPA, (2023). Use of laboratory chemicals - Generic scenario for estimating occupational exposures and environmental releases (Revised draft generic scenario).	397
11182966	U.S. EPA, (2022). Chemical repackaging - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	398
11373493	U.S. EPA, (2021). Use of additives in plastics converting – Generic scenario for estimating occupational exposures and environmental releases (revised draft).	400
3827197	U.S. EPA, (2014). Formulation of waterborne coatings - Generic scenario for estimating occupational exposures and environmental releases -Draft.	401
6304171	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.	402
6311218	U.S. EPA, (2004). Additives in plastics processing (compounding) – generic scenario for estimating occupational exposures and environmental release – Draft.	403
6311221	U.S. EPA, (2001). Manufacture and use of printing ink - Generic scenario for estimating occupational exposures and environmental releases (revised draft).	404
6385708	U.S. EPA, (2003). Transportation equipment cleaning - Generic scenario for estimating occupational exposures and environmental releases (draft).	405
6385709	U.S. EPA, (1999). Flexographic printing - generic scenario for estimating occupational exposures and environmental releases: Draft.	406
6385710	U.S. EPA, (2010). Manufacture and use of printing inks - generic scenario for estimating occupational exposures and environmental releases: Draft.	407
6385711	U.S. EPA, (2014). Use of additives in the thermoplastic converting industry - generic scenario for estimating occupational exposures and environmental releases.	408
6385719	U.S. EPA, (2004). Spray coatings in the furniture industry - generic scenario for estimating occupational exposures and environmental releases: Draft.	409
6385740	U.S. EPA, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.	410
6385741	U.S. EPA, (1994). Fabric finishing - generic scenario for estimating occupational exposures and environmental releases: Draft.	411
6385748	U.S. EPA, (2014). Use of additive in plastic compounding - generic scenario for estimating occupational exposures and environmental releases: Draft.	412
6549571	U.S. EPA, (2004). Additives in plastics processing (converting into finished products) -generic scenario for estimating occupational exposures and environmental releases. Draft.	413
Reports for Data or Information Other than Exposure or Release Data		
10369850	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.	415
5160123	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.	416
7978472	Anonymous (2001). Toy safety: European Commission extends ban on phthalates. Europe Environment (12 June 2001):415.	417
11360400	APR, (2020). U.S. post-consumer plastic recycling data.	418

11374516	APR, (2023). Model Bale Specifications: 1-7 ALL Rigid Plastics.	419
789466	Aqil, M., Ali, A., Sultana, Y., Najmi, A. K. (2004). Fabrication and evaluation of polymeric films for transdermal delivery of pinacidil. Die Pharmazie 59(8):631-635.	420
4198524	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.	421
5676112	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.	422
2816857	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.	423
6813724	Björklund, K. (2010). Substance flow analyses of phthalates and nonylphenols in stormwater. Water Science and Technology 62(5):1154-1160.	424
674952	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.	425
6311430	Cadogan, D., Howick, C. (2000). Plasticizers.	426
1322045	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.	427
6301510	Carboline Company (2018). SDS - Carbocrylic 3358-G.	428
6301511	Carboline Company (2019). SDS - Carbocrylic 3359 mixed metal oxide.	429
6301531	Carboline Company (2018). SDS - Carbocrylic 3359 MC.	430
6301548	Care, S.W. (2016). SDS - SWC natureone renew.	431
6301556	Care, S.W. (2016). SDS - SWC natureone 100% acry EN CED.	432
790189	Castle, L., Mayo, A., Gilbert, J. (1989). Migration of plasticizers from printing inks into foods. Food Additives and Contaminants 6(4):437-443.	433
6302648	CBC, (2014). Safety Data Sheet (SDS): Centerfire Pistol & Revolver and Rifle Cartridges.	434
664488	CDC, (2009). Fourth national report on human exposure to environmental chemicals.	435
10442901	CEPE, (2020). SpERC fact sheet: Industrial application of coatings by spraying.	436
10442902	CEPE, (2020). SpERC fact sheet: Professional application of coatings and inks by spraying.	437
6301542	CertiPrep., SPEX (2017). Safety data sheet: Phthalates in polyethylene standard w/BPA.	438
6301560	CertiPrep., SPEX (2017). Phthalates in polyethylene standard: Safety data sheet.	439
6302559	CertiPrep., SPEX (2016). Safety Data Sheet (SDS): Haloethers & Phthalates.	440
2346103	Chao, K., Huang, C. S., Wei, C. Y. (2013). Extraction and percolation of PAEs from chemical protective gloves. Polymer Testing 32(8):1551-1557.	441
1335586	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.	442
6301544	Clinical, Pentron (2014). SDS - TempSpan transparent temporary cement - base.	443
6301538	Consumer, ITW (2008). Material Safety Data Sheet - WELDIT™ ALL PURPOSE ADHESIVE.	444

10186827	Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.	445
2346094	Cornak, S., Jarosova, A. (2013). The screening of phthalic acid esters in operating fluids of vehicles. <i>Applied Mechanics and Materials</i> 436:153-157.	446
5155508	CPSC, (2015). Exposure assessment: Composition, production, and use of phthalates.	447
5155510	CPSC, (2015). Exposure assessment: Potential for the presence of phthalates in selected plastics.	448
11438267	Daly's, (2015). Safety Data Sheet (SDS): CrystalFin Floor Finish.	449
2952861	Dixit, S., Yadav, A., Dwivedi, P. D., Das, M. (2015). Toxic hazards of leather industry and technologies to combat threat: a review. <i>Journal of Cleaner Production</i> 87(Elsevier):39-49.	450
10454465	DOE,, WA (2020). Priority consumer products report to the Legislature: Safer products for Washington implementation phase 2.	451
10385015	Earthjustice, (2020). Exhibit 1 to comments of rubbertown emergency action et al., re: TSCA risk evaluations for high-priority substances and substances undergoing manufacturer-requested risk evaluations.	452
5353181	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.	453
10112937	ECHA, (2017). Opinion on an Annex XV dossier proposing restrictions on four phthalates (DEHP, BBP, DBP, DIBP).	455
6316858	ECHA, (2009). Data on manufacture, import, export, uses and releases of dibutyl phthalate (DBP) as well as information on potential alternatives to its use.	457
7325405	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.	463
8435433	ECHA, (2010). Background document for diisobutyl phthalate (DIBP): Document developed in the context of ECHA's second Recommendation for the inclusion of substances in Annex XIV.	464
2079182	ECPI, (2011). Endocrine data evaluation report. For selected high molecular weight (HMW) phthalates (DINP, DIDP) and a low molecular weight (LMW) phthalate (DBP), using the OECD conceptual framework. Volume I. Mammalian data.	465
6301529	Electron Microscopy Sciences (2018). SDS - DEPEX mounting medium.	466
11360395	ENF, (2024). Plastic recycling plants in the United States.	467
6301507	Enterprises, BJB (2019). SDS - TC-4485 Part A.	468
6301495	Enterprises,, BJB (2021). Safety Data Sheet (SDS): TC-812 Part B.	469
6301497	Enterprises,, BJB (2016). Safety Data Sheet (SDS): TC-816 Part B.	470
7681883	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.	471
7349020	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.	475
10312764	ExxonMobil, (2022). Data submission from ExxonMobil regarding DINP and DIDP exposure.	477
10633678	ExxonMobil, (2022). EM BRCP DINP/DIDP facility – virtual tour (sanitized).	478
10472414	FCW, (2017). Statistical Report 2016.	479
200024	Fishbein, L. (1992). Exposure from occupational versus other sources. <i>Scandinavian Journal of Work, Environment and Health</i> 18(S1):5-16.	480
7978498	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. <i>International Journal of Hygiene and Environmental Health</i> 229:13548.	481

6301518	GAF, (2017). SDS - Hydrostop premiumcoat foundation coat.	482
6301526	GAF, (2016). SDS - Hydrostop trafficcoat deck coating.	483
6301537	GAF, (2018). SDS - Hydrostop premiumcoat finish coat.	484
6957637	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. <i>Environment International</i> 136:105465.	485
7978842	Gardiner, N. (2008). Disposable decisions. <i>Cleanroom Technology</i> 15(2):27-28.	486
6301539	General Dynamics - Ordnance and Tactical Systems - Canada Inc (2018). SDS - Cartridge 9 mm FX Marking, Toxfree primer.	487
8338316	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. <i>International Journal of Environmental Research and Public Health</i> 17(16):1-43.	488
3469349	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. <i>Environmental Research</i> 151:251-264.	489
7978731	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. <i>Environment International</i> 155(Elsevier):106598.	490
7324538	Godwin, A. D., Krauskopf, L. G. (2008). Monomeric plasticizers. :173-238.	491
1256038	Gu, Z., Feng, J., Han, W., Wu, M., Fu, J., Sheng, G. (2010). Characteristics of organic matter in PM2.5 from an e-waste dismantling area in Taizhou, China. <i>Chemosphere</i> 80(7):800-806.	492
1987638	Guo, Y., Wang, L., Kannan, K. (2014). Phthalates and parabens in personal care products from China: Concentrations and human exposure. <i>Archives of Environmental Contamination and Toxicology</i> 66(1):113-119.	493
4168432	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. <i>Journal of Hazardous Materials</i> 344:179-199.	494
6301527	Head, I.R. (2016). SDS - Epcon acrylic 7.	496
6558523	Hollett, B. (1977). Health hazard evaluation report no. HETA 76-92-363, Jeffery Bigelow Design Group, Inc., Washington, D.C.	497
10816795	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.	498
1104286	IARC, (2012). Chemical agents and related occupations: A review of human carcinogens.	499
6301550	Inc, M.I. (2011). SDS - D.L.M. adhesive 22-68.	500
6301541	Inc, P.R. (2018). SDS - prime flex 920.	501
6301547	Inc, P.R. (2018). SDS - prime flex 900MV.	502
6301552	Inc, P.R. (2018). SDS - prime flex 910.	503
6301561	Inc, P.R. (2018). SDS - prime flex 900XLV.	504
6301493	Inc, W.P. (2015). SDS - Accurate Solo 1000, Accurate LT-30, Accurate LT-32, Accurate 2015, Accurate 2495, Accurate 4064, Accurate 4350.	505
2915537	Ishii, S., Katagiri, R., Minobe, Y., Kuribara, I., Wada, T., Wada, M., Imai, S. (2015). Investigation of the amount of transdermal exposure of newborn babies to phthalates in paper diapers and certification of the safety of paper diapers. <i>Regulatory Toxicology and Pharmacology</i> 73(1):85-92.	506

2889692	Ishikawa, S., Sakazaki, Y., Eguchi, Y., Suetomi, R., Nakamura, E. (2005). Identification of chemical substances in industrial wastes and their pyrolytic decomposition products. <i>Chemosphere</i> 59(9):1343-1353.	507
6984562	ITW Inc., (2018). Safety data sheet: Spotcheck ® SKL-SP2.	508
5432958	Jager, de, C., Aneck-Hahn, N., Zijl, Van, M., Hayward, S., Swart, P., Genthe, B. (2019). Endocrine disrupting chemicals in commercially available cling film brands in South Africa. <i>Human and Ecological Risk Assessment</i> 25(6):1633-1644.	509
5433231	Jean, J. H., Chang, R. L. (1997). Organic distributions on the surfaces of alumina green tape. <i>Japanese Journal of Applied Physics</i> 36(2A):L136-L138.	510
4683362	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. <i>Environmental Research</i> 165:81-90.	511
5533904	Koch, H. M., Angerer, J. (2011). Phthalates: Biomarkers and human biomonitoring. <i>Issues in Toxicology</i> 9:179-233.	512
6825427	Koszelnik, P., Ziembowicz, S., Kida, M. (2020). Analysis of concentrations of selected phthalic acid esters in aquatic ecosystems - Poland's case study. <i>Desalination and Water Treatment</i> 186:56-64.	513
6301543	Lanco Mfg. Corp (2016). SDS - lanco seal.	514
789380	Latini, G. (2005). Monitoring phthalate exposure in humans. <i>Clinica Chimica Acta</i> 361(1-2):20-29.	515
4730751	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. <i>International Journal of Environmental Research and Public Health</i> 15(4):744.	516
6959335	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. <i>Science of the Total Environment</i> 692:354-360.	517
7978846	Lerner, I. (2005). European plastics industry moves from 2-EH, DEHP. <i>Chemical Market Reporter</i> 267(26):26-27.	518
2346023	Liang, Y., Xu, Y. (2014). Improved method for measuring and characterizing phthalate emissions from building materials and its application to exposure assessment. <i>Environmental Science & Technology</i> 48(8):4475-4484.	519
3015875	Liang, Y., Xu, Y. (2014). Emission of phthalates and phthalate alternatives from vinyl flooring and crib mattress covers: The influence of temperature. <i>Environmental Science & Technology</i> 48(24):14228-14237.	520
6301521	Lima Associates, Inc, G.A. (2015). SDS - COE-RECT (powder).	521
6302509	LLC, S.C. (2017). SDS - Phthalates in Poly(vinyl chloride).	522
6302556	LLC, S.C. (2019). Base/Neutrals Mix 1.	523
5349749	Lowell Center for Sustainable Production at the University of Massachusetts, (2011). Technical briefing: Phthalates and their alternatives: Health and environmental concerns. :23.	524
4728432	Lu, X., Xu, X., Lin, Y., Zhang, Y., Huo, X. (2018). Phthalate exposure as a risk factor for hypertension. <i>Environmental Science and Pollution Research</i> 25(21):20550-20561.	525
1335811	Marx, J. L. (1972). Phthalic acid esters: Biological impact uncertain. <i>Science</i> 46(4056):46-47.	526
6826007	Mersiowsky, N. (2002). Long-term fate of PVC products and their additives in landfills. <i>Progress in Polymer Science</i> 27(10):2227-2277.	527
1269556	Midwest Research Institute, (1984). Performance evaluation of full-scale hazardous waste incinerators - Volume I (excutive summary) contract no. 68-02-3177 (43).	528
11360398	Milbrandt, A., Coney, K., Badgett, A., Beckham, G. T. (2022). Quantification and evaluation of plastic waste in the United States. <i>Resources, Conservation and Recycling</i> 183:106363.	529
1323321	NICNAS, (2008). Existing chemical hazard assessment report: Dibutyl phthalate.	530
5155533	NICNAS, (2013). Priority existing chemical assessment report no. 36: Dibutyl pthalate.	531

8683475	NIOSH, (2019). Evaluation of ergonomics, chemical exposures, and ventilation at four nail salons.	532
679850	NTP-CERHR, (2000). NTP-CERHR expert panel report on di-n-butyl phthalate.	533
10172655	OECD, (2016). Report On The Proposal For Classification And Labelling (C&L) Of Dibutyl Phthalate.	534
7681900	OECD, (2018). Socio-economic assessment of phthalates.	535
1415211	Ohlson, C. G., Hardell, L. (2000). Testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. <i>Chemosphere</i> 40(9-11):1277-1282.	536
6301545	Olin Corporation - Winchester Division, I (2010). SDS - rimfire blank round - circuit breaker.	537
1598544	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. <i>American Association of Occupational Health Nurses Journal</i> 55(1):12-17.	538
1249953	Pak, V. M., Mccauley, L. A., Pinto-Martin, J. (2011). Phthalate exposures and human health concerns: A review and implications for practice. <i>American Association of Occupational Health Nurses Journal</i> 59(5):228-33; quiz 234-5.	539
6301555	Parkell, I. (2017). SDS - SmarTemp (all shades).	540
5469249	Parsons, N. S., Lam, W., M.H., Hamilton, S. E. (2013). Chemical characterization of automotive polyurethane foam using solid-phase microextraction and gas chromatography-mass spectrometry. <i>Journal of Forensic Sciences</i> 58(S1):S186-S191.	541
6301564	Phenova (2017). Custom 8061 Phthalates Mix Safety Data Sheet.	542
6302481	Phenova (2017). SDS - Custom Low ICAL Mix.	543
11803682	Phenova, (2018). Safety Data Sheet (SDS): Custom 8270 Cal Mix 1.	544
6280738	Phenova, (2017). Safety Data Sheet (SDS): BN Extractables – Skinner List.	545
6280755	Phenova, (2018). Safety Data Sheet (SDS): Custom SS 8270 Cal Mix 1.	546
6287089	Phenova, (2017). Safety Data Sheet (SDS): Custom 8270 Cal Standard.	547
6289707	Phenova, (2017). Safety Data Sheet (SDS): Custom 8270 Plus Cal Mix.	548
6302494	Phenova, (2017). Safety Data Sheet (SDS): Custom 8061 Phthalates Mix.	549
6302555	Phenova, (2018). Safety Data Sheet (SDS): EPA 525.2 Semivolatile Mix.	550
6580284	programs, E.O. (1974). Air pollution control engineering and cost study of the paint and varnish industry.	551
6558302	Pryor, P., Whorton, D. (1981). Health hazard evaluation report no. HETA 80-094-840, Ford Motor Company, San Jose, California.	553
1262512	Radian Corp, (1985). Industrial process profiles for environmental use: Chapter 10b, Plastics additives.	554
6302548	Restek Corp, (2023). Safety Data Sheet (SDS): 31845/EPA Method 506 Phthalate and Adipate Esters.	555
6302560	Restek Corp, (2023). Safety Data Sheet (SDS): 31903/CLP 04.1 B/N MegaMix Mix A (Revision 2).	556
6311458	Restek Corp, (2023). Safety Data Sheet (SDS): 31031/606 Phthalate esters calibration mix.	557
10472417	RFCI, (2020). Comments of the Resilient Floor Covering Institute (RFCI) on the Safer Products for Washington Priority Consumer Products draft report to Legislature.	558
1009699	Roper, C. P., Jr (1976). Health Hazard Evaluation Determination, Report No. 74-120-260, Goodyear Tire and Rubber Company, Gadsden, Alabama.	559
6301565	Rust-Oleum Corporation (2015). SDS - marine coating antifouling blue.	560

9493521	Schripp, T., Wensing, M. (2009). Emission of VOCs and SVOCs from electronic devices and office equipment. :405-430.	561
6301546	Sika Corporation (2017). SDS - sika loadflex-524 EZ part B.	562
2624719	SRC, (2001). Toxicological profile for di-n-butyl phthalate.	563
675435	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.	564
10218052	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.	567
5432967	SUNY, (2019). Phthalates in infant cotton clothing: Occurrence and implications for human exposure. Science of the Total Environment 683:109-115.	568
6301522	Technology, F.C. (2011). Material safety data sheet - side out gym floor finish.	569
5163392	Tokumura, M., Seo, M., Wang, Q., Miyake, Y., Amagai, T., Makino, M. (2019). Dermal exposure to plasticizers in nail polishes: An alternative major exposure pathway of phosphorus-based compounds. Chemosphere 226:316-320.	570
5155511	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.	571
5155525	Toxicology Excellence for Risk Assessment (TERA) (2016). Exposure assessment: Potential for the presence of phthalates in specified materials at concentrations above 0.1 percent.	572
11138808	U.S. BLS, (2023). U.S. Census Bureau of Labor Statistics Data from 2021.	573
10293388	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.	574
11803647	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.	575
11845553	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.	576
1316234	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).	577
4565597	U.S. EPA, (2012). Phthalates action plan.	578
7310513	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.	580
7315820	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.	586
7315841	U.S. EPA, (1995). Ap-42: Chapter 4.12 - Manufacture of rubber products.	587
7315971	U.S. EPA, (1995). AP-42: Chapter 11.1 - Hot mix asphalt plants.	588
8726953	U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.	589
9102524	U.S. EPA, (2016). Federal research action plan on recycled tire crumb used on playing field and playgrounds. Status report.	590
7324696	Urban, D., Egan, L. (2002). Applications in the adhesives and construction industries.	591
5043338	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.	593
6106854	Väisänen, K., A.J., Hyttinen, M., Ylönen, S., Alonen, L. (2019). Occupational exposure to gaseous and particulate contaminants originating from additive manufacturing of liquid, powdered, and filament plastic materials and related post-processes. Journal of Occupational and Environmental Hygiene 16(3):258-271.	594

5547263	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. <i>Toxics</i> 7(2):21.	595
5740947	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.	596
5633778	Wypych, G. (2015). Health & safety and environmental impact. :413-439.	597
7978600	Wypych, G. (2020). Health and safety and environmental impact. :431-458.	598
5043636	Yan, Y., Lu, Y., Gao, Y., Wang, B., Zhao, L., Balam, 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. <i>Mapan-Journal of Metrology Society of India</i> 33(3):329-346.	599
5433467	Yang, M., Sui, W. Y., Qin, Y., Nie, Y. J. (2011). Study on recycling of waste styrofoam for adhesive. <i>Advanced Materials Research</i> 181-182:975-978.	600
1598698	Yano, K., Hirose, N., Sakamoto, Y., Katayama, H., Moriguchi, T., Joung, K. E., Sheen, Y. Y., Asaka, K. (2002). Phthalate levels in beverages in Japan and Korea. <i>Bulletin of Environmental Contamination and Toxicology</i> 68(4):463-469.	602
5164231	Young, A. S., Allen, J. G., Kim, U. J., Seller, S., Webster, T. F., Kannan, K., Ceballos, D. M. (2018). Phthalate and Organophosphate Plasticizers in Nail Polish: Evaluation of Labels and Ingredients. <i>Environmental Science & Technology</i> 52(21):12841-12850. [Environmental science & technology].	603
5533553	Zhang, L.,i, Su, W.,ei, Qian, Y., Zhao, Y., Zhu, Z., Wang, D. (2016). Quantitative detection and impact evaluation of phthalate plasticizers in insulating oil. <i>IEEE Transactions on Dielectrics and Electrical Insulation</i> 23(6):3429-3434.	604
5933015	Zhu, L. (2015). Rejection of organic micropollutants by clean and fouled nanofiltration membranes. <i>Journal of Chemistry</i> 2015(934318):1-9.	605
7976469	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. <i>Waste Management</i> 104:148-182.	606

Study Citation:	[Redacted] (1985). [Redacted] n-Butyl alcohol, dibutyl phthalate, and phthalic anhydride concentrations, ____.			
HERO ID:	10816675			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Area sampling data:	<0.1 - 0.27 (mg/m^3). Average of 0.13 (mg/m^3)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacture, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old. [1985]
	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	Low	Sample type 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:	[Redacted] (1997). [Redacted] Dibutyl phthalate concentrations - Plasticizers section.			
HERO ID:	10816887			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unit Operator Exposures in DBP production			
Personal sampling data:	Worker Description:Date:Duration (min):DBP Conc.(mg/m3)Unit 3 Operator9/3/97240<0.10Unit 5 Operator9/3/97235<0.10Unit 1, 2, & 4 Operator9/3/97408<0.05Unit 3 Operator9/8/97500<0.04Unit 5 Operator9/8/97167<0.13Unit 1, 2, & 4 Operator9/8/97295<0.09Unit 3 Operator9/17/9718<1.23Unit 3 Operator 9/17/97423<0.05(cleaning presses)			
Area sampling data:	Area Description:Date:Duration (min):DBP Conc.(mg/m3)#5 Filter Press (cleaning)9/17/9715<3.33#5 Filter Press (cleaning)9/17/9715<1.42#5 Filter Press9/17/97270<0.09#5 Filter Press9/17/97311<0.07#5 Filter Press9/17/97396<0.06			
Exposure duration:	Duration estimated by worker PBZ sample data. Not quantified as to whether representative of a full shift.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Likely US due to OSHA PEL citation, but not specified, therefore reduced confidence.	
	Metric 3: Applicability	High	The data are for manufacture of DBP, an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sample type and exposure type provided along with sample duration but missing sampling method, clear worker activities, etc.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	Afshari, A., Gunnarsen, L., Clausen, P. A., Hansen, V. (2004). Emission of phthalates from PVC and other materials. Indoor Air 14(2):120-128.			
HERO ID:	789522			
Conditions of Use:	Commercial use - lab study			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Physical form:	vapor			
Area sampling data:	Highest DBP air conc. of 22 ug/m^3. Referenced study had max conc. of DBP between 1 and 5.1 ug/cm^3 from wallpaper for polyolefine covered with wax. Construction material listed in Figure 2 and 3have concentrations ranging between ~1.2 and 0 ug/m^3.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Sampling methodology is not OSHA/NIOSH but is well documented
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Denmark (OECD country)
	Metric 3:	Applicability	Low	Data is non-occupational but could be applied to occupational scenario
	Metric 4:	Temporal Representativeness	Medium	Data sampled is from after 2002 so >10 years but <20 years
	Metric 5:	Sample Size	Medium	Samples are not characterized by statistics but discrete individual samples are listed and provide a range.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Data includes sample type and exposure duration but lacks other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability by sampling multiple products, addresses uncertainty.
Overall Quality Determination		Medium		

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 - 5.2, 375, 1.5, 0.8; Saudi car dust - 4.29, 356, 46, 19.4; Saudi AC filter dust - 8.4, 123, 42, 29.3; Kuwaiti floor dust - 0.49, 34.4, 4, 1.6; Kuwaiti car dust - 0.49, 50, 4.6, 1.1. Dust samples from other countries in Table 2, does not mention if they are means, medians or maxes, etc: Sweden - 103, 150, 62; Denmark - 15, 34; Germany - 47, 87; France - 9.1, 22; Different Kuwait samples - 45; Bulgaria - 9930; China - 24, 20; USA - 13, 20; Spain - 120; UK - 50, Finland - 49.			
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 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:	General population			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Area sampling data:	Atmospheric concentrations (ng/m3) of DBP in industrial areas of Ulsan are reported as follows: Site A - 16.67 +/- 13.78; Site B - 18.62 +/- 14.73; Site C - 29.87 +/- 23.71. Atmospheric concentrations (ng/m3) of DBP in residential areas of Ulsan are reported as follows: Site D - 18.05 +/- 12.37; Site E - 25.26 +/- 16.84. The mean concentrations of DBP were observed to be slightly higher in the residential areas than in the industrial areas, but there was no significant difference between them (p > 0.05).			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	methodology well described
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 data are 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 is less than 10 years old
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data include sample type but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The monitoring study provides only limited discussion of the variability but none on uncertainty
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:	Personal care products			
EXTRACTION				
Parameter	Data			
Worker activity description:	nail technicians and nail salon owners			
Exposure route:	inhalation			
Personal sampling data:	all samples <1120 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:	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:	140.2 ng/m3			
Area sampling data:	333.1 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	Most critical metadata included.
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:	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. (2020). Corrigendum to "Multi-pathway human exposure assessment of phthalate esters and DINCH" [Environ. Int. 112 (2018) 115-126]. Environment International 143(Elsevier):106071.			
HERO ID:	7976806			
Conditions of Use:	Consumer Use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal uptake, dust ingestion, inhalation, dietary intake (2/5)			
Physical form:	dust (2/5)			
Personal sampling data:	Daily inhalation intake is 61.6 (1.35-558 ng/kg/day). (4/5)			
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	Data are from Sweden, Belgium, and Norway, all OECD countries.
	Metric 3:	Applicability	Low	Data are for consumer use of plastic products and ambient indoor air, which is similar to commercial use of plastic 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 (means, ranges, 95th percentiles) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Exposure concentration and route are provided but missing engineering controls, PPE, and frequency and duration of exposure.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in analytical methodology by including corrections to the original report. Variability addressed by comparing results to other published studies.
Overall Quality Determination		Medium		

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)			
Comments:	Table 2Individual and mixture phthalate exposure estimates (mg/kg bw/day) for males and females on study day 1 compared with TDI (mg/kg bw/day).			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
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:	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:	Commercial use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation and dermal			
Physical form:	can be as vapor. Also can be mixed with cream			
Personal sampling data:	DBP inhaled under different conditions: Scenario 1 (24 hours) – 11,000 ug/day; Scenario 2 (7 days) – 11,000 ug/day (intake on the 7th day)			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	Two scenarios were studied: 24 hours and 7 days			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	methodology well described
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The data is less 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		Medium		

Study Citation:	González-Mariño, I., Rodil, R., Barrio, I., Cela, R., Quintana, J. B. (2017). Wastewater-based epidemiology as a new tool for estimating population exposure to phthalate plasticizers. Environmental Science & Technology 51(7):3902-3910.			
HERO ID:	3859087			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal, ingestion			
Area sampling data:	Ares: 186 ug/day/person Baiona 200 ug/day/person Cambados: 392 ug/day/person Gondomar: 90 ug/day/person Nigran: 54 ug/day/person Santiago: 114 ug/day/person			
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 plasticizers in plastic and resin manufacturing, 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 (means) but discrete samples not provided and distribution not fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Area samples and exposure type provided but missing concentrations, engineering controls, PPE, particle size, and physical form.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling in 6 cities.
Overall Quality Determination			High	

Study Citation:	Haas,, R.a. (1990). Air monitoring of freshly painted interior rooms with cover letter.			
HERO ID:	1332993			
Conditions of Use:	Paint and coatings			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Physical form:	vapor/mist			
Area sampling data:	DBP air concentration for various paint formulas ranged from 0.68 - 3.9 mg/m^3. All concentrations below the exposure limit of 5 mg/m^3 as set by OSHA at the time			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling method is likely equivalent to OSHA/NIOSH methods
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Low	Exposure study is a focused lab study and not occupational, but could be applied to one.
	Metric 4:	Temporal Representativeness	Low	Data is from 90s so over 20 years old
	Metric 5:	Sample Size	Low	Data characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data includes media, sample type and sample duration but lacks other meta-data
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Low	

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

EXTRACTION

Parameter	Data
Worker activity description:	Cleaning surfaces, glass, toilet, shower/bath tub, and floor.
Exposure route:	Inhalation is a primary route of human exposure to cleaning product chemicals because many products emit VOCs or semi-volatile organic compounds
Personal sampling data:	See table 3 on page 6 for personal sampling results for DBP. The geometric mean using the normal cleaning products was 79.28 micrograms per cubic meter, and with the use of green cleaning products that value was 77.44 micrograms per cubic meter. See Figure 1 for information on the percent change between the two products. More detailed results are included in the supplement document on page 4 of 6.
Exposure frequency:	Table 1 on page 5 shows the frequency of various cleaning activities.

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. Differences in methods are not expected to lead to lower quality data.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	From USA
	Metric 3: Applicability	Low	The data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
	Metric 4: Temporal Representativeness	High	2021
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Monitoring data include all associated metadata, including sample types, exposure types, sample durations, exposure durations worker activities, and exposure frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The monitoring study addresses variability in the determinants of exposure for the sampled site or sector. The monitoring study addresses uncertainty in the exposure estimates or uncertainty can be determined from the sampling and analytical method.

Overall Quality Determination**High**

Study Citation:	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			
Exposure route:	inhalation, ingestion, dermal			
Physical form:	vapor/mist			
Personal sampling data:	Urine samples: 0.1-76 ug/kg/day with highest geometric means in rubber gasket and phthalate manufacturing (17 ug/kg/day) along with a geometric mean in rubber hose manufacturing (6.9 ug/kg/day). Other industries had GMs <2 ug/kg/day. (2003-2005)			
Number of workers:	156			
Comments:	These sectors included one company from each of seven manufacturing sectors: phthalate manufacturing, PVC film, PVC compounding, vehicle filters, rubber hoses, rubber gaskets, and rubber boots, and 13 companies from one service sector: nail-only salons. (study population, methods section)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Approved NIOSH study.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Data is for plasticizer COU in manufacturing and processing.
	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	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Includes metadata such as personal sampling data (urinary), exposure route, number of sites, physical form and specific industry sectors but lacks additional metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability across industries and uncertainty
Overall Quality Determination		High		

Study Citation:	Hollett, B. (1977). Health hazard evaluation report no. HETA 76-92-363, Jeffery Bigelow Design Group, Inc., Washington, D.C.
HERO ID:	6558523
Conditions of Use:	Industrial Use - Adhesives and Sealants

EXTRACTION	
Parameter	Data
Worker activity description:	Finishing and gluing table
Exposure route:	inhalation
Physical form:	vapor
Personal sampling data:	The six periodic BZ samples were below the detection limit.
Area sampling data:	DBP was measured in two area samples. Measured levels were at and just above the detection limit. The concentrations were less than a tenth of a milligram per cubic meter of air. The other eleven area samples were below the limit of detection.
Number of workers:	4 full time craftsmen, 2 part time. 2 full time sales & administrative work. One driver.
Engineering control:	Shop is ventilated by two exhaust fans and a window air conditioner. One small axial fan rated at 750 CFM is mounted in the ceiling above the primary gluing tables. The larger 3,000 CFM axial fan is wall mounted on the end where machining is accomplished. The air conditioner is mounted on the same wall as the exhaust fan. Five windows and an overhead door provide natural ventilation in moderate weather. It is the practice to conserve air conditioning by using the large wall exhaust fan only when gluing.
Comments:	Detection limit was 0.01 mg

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Methodology conducted by NIOSH.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is 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	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	Variability is not addressed but uncertainty is provided by LOD.

Overall Quality Determination

Medium

Study Citation:	Ishii, S., Katagiri, R., Minobe, Y., Kuribara, I., Wada, T., Wada, M., Imai, S. (2015). Investigation of the amount of transdermal exposure of newborn babies to phthalates in paper diapers and certification of the safety of paper diapers. Regulatory Toxicology and Pharmacology 73(1):85-92.			
HERO ID:	2915537			
Conditions of Use:	Consumer use - diapers			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is equivalent to an approved [OSHA/NIOSH] method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Japan, an OECD country.
	Metric 3:	Applicability	Low	Data are for consumer exposure to personal care products, which is similar to commercial use of personal care products.
	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	Dermal data and exposure type provided but missing engineering controls, PPE, area/personal samples, duration, and physical form.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling multiple brands of diapers.
Overall Quality Determination			High	

Study Citation:	Jannerfeldt, E., Johnson, P. (1982). Health Hazard Evaluation Report, No. HETA-81-277-1089, Indiana Army Ammunition Plant, Charlestown, Indiana.			
HERO ID:	1333391			
Conditions of Use:	Manufacturing - import			
EXTRACTION				
Parameter	Data			
Number of sites:	1			
Worker activity description:	Processing DBP propellant by taking DBP out of imported drums and dumping it into cylindrical cloth bags that are weighed, packed and sealed by sewing.			
Exposure route:	inhalation, ingestion			
Physical form:	dust/mist			
Personal sampling data:	ND			
Area sampling data:	Air sample found 0.08 mg/m^3 in one location. OSHA standard at time was 5.0 mg/m^3. All other samples had concentration below the limit of detection. Dust samples ranged from 0.09 to 0.95 mg/m^3. Dust samples could contain DBP and had OSHA standard of 15 mg/m^3 for total dust and 5 mg/m^3 for respiratory dust.			
Number of workers:	1567 hourly employees. 30-40 employees work in affected area			
Personal protective equipment:	Coveralls with other protective equipment. The type of equipment is not listed.			
Engineering control:	Re-circulating air system where air passes through filters, had not been altered or improved and virtually unchanged.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling methodology is an approved NIOSH method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Study is directly applicable to condition of use.
	Metric 4:	Temporal Representativeness	Low	Data is from 1981 so greater than 20 years old.
	Metric 5:	Sample Size	Low	Distribution of samples characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data includes sample type, exposure type, sample durations, worker activities but lacks exposure frequency and worker exposure durations
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Kang, Y., Den, W., Bai, H., Ko, F. H. (2005). Direct quantitative analysis of phthalate esters as micro-contaminants in cleanroom air and wafer surfaces by auto-thermal desorption–gas chromatography–mass spectrometry. Journal of Chromatography A 1070(1-2):137-145.			
HERO ID:	1332799			
Conditions of Use:	Commercial use			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Physical form:	vapor			
Area sampling data:	Concentration of cleanroom air sample of DBP was 0.12 ug/m^3 and for a wafer box it was 0.45 ug/m^3. Surface density of wafer box was 0.67 ng/cm^2 and according to ITRS it should be less than 0.3 ng/cm^2.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Methodology not stated to be OSHA/NIOSH or approved by EPA but is well documented.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from Taiwan (not OECD country)
	Metric 3:	Applicability	Uninformative	Data is not for an occupational scenario
	Metric 4:	Temporal Representativeness	Medium	Report from 2005 so >10 years old but <20 years old
	Metric 5:	Sample Size	Low	Distribution of samples is based on laboratory study, does not summarize them whatsoever just states single data points.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data includes sample type and duration but is based on laboratory study.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Kolena, B., Petrovicova, I., Pilka, T., Pucherova, Z., Munk, M., Matula, B., Vankova, V., Petlus, P., Jenisova, Z., Rozova, Z., Wimmerova, S., Trnovec, T. (2014). Phthalate exposure and health-related outcomes in specific types of work environment. International Journal of Environmental Research and Public Health 11(6):5628-5639.			
HERO ID:	2345960			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Waste management workers: waste truck drivers and co-drivers, sorting and processing waste substances for recycling			
Exposure route:	inhalation, dermal			
Exposure duration:	At least 8 hours per shift			
Exposure frequency:	Men were employed on average 7.9 years and women 5.6 years.			
Number of workers:	20 men and 10 women			
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 Slovakia, an OECD country.
	Metric 3:	Applicability	High	Data are for incorporation into plasticizers in plastic and resin manufacturing, 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 (mean, standard deviation) 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 concentrations, engineering controls, PPE, particle size, and physical form.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by comparing results to other published studies.
Overall Quality Determination		High		

Study Citation:	Kullman, G. (1987). Health hazard evaluation report no. HETA 86-191-1836, West Virginia Department of Highways, Charleston, WV.			
HERO ID:	6558312			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Silkscreening operation is in an enclosed area at one end of the sign shop; this area includes a film room, a silkscreening room, and a screen wash room. Approximately one to two workers operate the silkscreening operation depending on the workload. The silkscreens are prepared from photo-sensitive dibutyl phthalate emulsion. In the film room, patterned areas of the emulsion-coated screens are exposed to ultraviolet light with the vacuum applicator machine; this fixes the light-exposed emulsion areas to the screen. The unexposed emulsion areas are washed off with water spray and serve as ink-permeable screen surfaces to form the positive sign images. (See page 4 out of 23)DBP is only sampled for within the film room, implying that DBP is not a major part of operations in other areas.See page 4 out of 23: Workers prepare the silkscreens from photo-sensitive dibutyl phthalate emulsion. Then, in the film room, they expose patterned areas of the emulsion-coated screens to ultraviolet light with the vacuum applicator machine (this fixes the light-exposed emulsion areas to the screen). Then workers wash off the unexposed emulsion areas with water spray (the unexposed emulsion areas serve as ink-permeable screen surfaces to form the positive sign images).			
Personal sampling data:	Two samples were taken and both were below the LOD of 0.01 mg/sample (see page 10 out of 23)			
Area sampling data:	concentrations in air less than 0.02 mg/m^3 (see page 10 out of 23)			
Exposure duration:	Full shift - 7 hours or longer (see page 5 out of 23)			
Number of workers:	one to two workers at a time (see page 4 out of 23)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Methodology is a NIOSH analytical method
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Medium	Data is for an occupational scenario that could be similar to an in-scope use such as processing.
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5:	Sample Size	Medium	States discrete samples but fails to provide the data in tables similar to how it provides all the other data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Includes critical metadata such as sample type, exposure type but lacks additional meta-data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses uncertainty by its LOD, does not address variability.
Overall Quality Determination		Medium		

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			
Comments:	Table 2. Geometric mean (geometric standard deviation) and median for mass-fractions ($\mu\text{g g}^{-1}$) of phthalates and PAHs in dust samples collected from homes and daycare centers.			
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). 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:	commercial use			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation of indoor air, dermal absorption of gas and deposited dust, and oral ingestion of dust when the tested flooring is present in a residential building			
Area sampling data:	Gas phase concentration of DBP was measured as 1.54 ug/m3			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	methodology is well described
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States
	Metric 3:	Applicability	Low	The data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation
	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	Monitoring data include most critical metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The monitoring study provides only limited discussion of the variability but none on uncertainty
Overall Quality Determination		Medium		

Study Citation:	Lim, M., Lee, K. (2020). Aggregate exposure assessment using cosmetic co-use scenarios: II. Application and validation for phthalates. Food and Chemical Toxicology 144:111583.			
HERO ID:	6968274			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	liquid, mist, vapors, gels			
Dermal exposure data:	Dermal exposure data			
Comments:	Check table 1.			
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	Medium	Data are from Korea, 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, and 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 (percentiles, 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 is addressed by sampling different subpopulations and doing a Monte Carlo analysis.
Overall Quality Determination			Medium	

Study Citation:	Masi, F., Lepri, L., Bubba, Del, M., Sacco, C., Nostro, Lo, A., Comodo, N. (1999). Organic chemicals and microbial facies of liquid aerosols from a wastewater treatment plant. Annali di Chimica 89(3-4):231-248.			
HERO ID:	680348			
Conditions of Use:	Municipal and industrial wastewater treatment			
EXTRACTION				
Parameter	Data			
Worker activity description:	wastewater treatment plant workers			
Area sampling data:	Concentration of phthalates above aeration tanks of wastewater treatment plant over 10 months - 150-370 ng/m^3. Figure 5 shows concentrations on a graph of phthalates. Figure 8 provides a somewhat illegible graph of percentage makeup of different phthalates (DBP making up anywhere between 30-70%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Source is peer reviewed so methodology is likely high quality.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for Italy, an OECD country.
	Metric 3:	Applicability	Low	Data is applicable to municipal and industrial sewage treatment. Could be applied to certain forms of disposal.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old.
	Metric 5:	Sample Size	Low	Characterized by a range but no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Only contains area sampling data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by sampling across multiple months. Does not address uncertainty.
Overall Quality Determination			Low	

Study Citation:	Morrison, G., Li, H., Mishra, S., Buechlein, M. (2015). Airborne phthalate partitioning to cotton clothing. Atmospheric Environment 115:149-152.			
HERO ID:	3028963			
Conditions of Use:	Consumer use - t-shirts and cotton clothing			
EXTRACTION				
Parameter	Data			
Comments:	Source is a controlled lab study to find the concentration of phthalate attached to cotton clothing. Figure 1 provides the data. From air conc. up to 100 ug/m^3 DBP concentration on the clothing ranged up to 3.8 x 10^8 ug/m^3.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data from US
	Metric 3:	Applicability	Uninformative	Data is concentration on cotton clothes after exposure, not applicable to occupational exposure or environmental release.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old.
	Metric 5:	Sample Size	Low	Samples provided on graph, but not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Parameters of study are provided in the article but does not provide other critical meta-data for occupational exposure.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	NICNAS, (2008). Existing chemical hazard assessment report: Dibutyl phthalate.			
HERO ID:	1323321			
Conditions of Use:	use			
EXTRACTION				
Parameter	Data			
Worker activity description:	This article cites a study where workers involved in the manufacture of artificial leather and exposed chronically to phthalates (mostly DBP and higher phthalates) were investigated for toxicity. This article cites a 2nd study for male workers involved in the production of phthalate esters, including DBP			
Exposure route:	Oral, dermal, inhalation			
Physical form:	Oily liquid			
Area sampling data:	Ambient vapor or aerosol levels of the plasticizers at the workplace were 1.7-60 mg/m3 for the 1st study. Mean phthalate concentration varied from 1-5 mg/m3 with a maximum of 61 mg/m3 for the 2nd study.			
Number of workers:	147 workers in the 1st study referred above. 38 workers in the 2nd study referred above.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Sampling/analytical methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Report is from Australia, an OECD country.
	Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Monitoring 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	Low	Sample type 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:	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 work			
EXTRACTION				
Parameter	Data			
Worker activity description:	Office workers			
Exposure route:	Inhalation			
Personal sampling data:	Personal air concentrations (ng/m3) for 3 participants were reported as: Participant 1 – 219, Participant 2 – 207, Participant 3 – 374, Median – 219. Inhalation exposure (ng/day) for 3 participants were reported as: Participant 1 - 3,500, Participant 2 - 3,320, Participant 3 - 5,990, Median - 3,500.			
Exposure duration:	8 hrs daily for four days			
Number of workers:	3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	methodology well described
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country. other than the U.S.
	Metric 3:	Applicability	Low	Office work is not a condition of use considered for occupational exposure assessment, but data may offer insight to ONU exposures.
	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	High	Monitoring data include all associated metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The monitoring study provides only limited discussion of the variability and none on uncertainty
Overall Quality Determination		Medium		

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:	Personal samples range from ND to 2.23 mg/m3			
Area sampling data:	All area samples are ND for DBP			
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	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	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			High	

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	PVC Plastics Compounding			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA tailored to the Plastics and Rubber Manufacturing NAICS code (NAICS 326) and the resulting dataset contains 237 discrete sample data points.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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	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	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	PVC Plastics Converting			
EXTRACTION				
Parameter	Data			
Area sampling data:		EPA tailored to the Plastics and Rubber Manufacturing NAICS code (NAICS 326) and the resulting dataset contains 237 discrete sample data points.		
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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	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	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA used a subset of the respirable particulate data from the generic model identified with the Professional, Scientific, and Technical Services NAICS code (NAICS code 54) to assess this OES.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	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	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	All metadata provided.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	Non-PVC Materials Compounding and Converting			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA tailored to the Plastics and Rubber Manufacturing NAICS code (NAICS 326) and the resulting dataset contains 237 discrete sample data points.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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	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	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	Fabrication or Use of Final Product and Articles			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA used a subset of the respirable particulate data from the generic model identified with the Furniture and Related Product Manufacturing NAICS code (NAICS code 337) to assess this OES.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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	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	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA used a subset of the respirable particulate data from the generic model identified with the Administrative and Support and Waste Management and Remediation Services NAICS code (NAICS code 56) to assess this OES.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	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	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	All metadata provided.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	OSHA, (2020). Chemical Exposure Health Data (CEHD).			
HERO ID:	6983058			
Conditions of Use:	Waste handling, treatment, and disposal			
EXTRACTION				
Parameter	Data			
Area sampling data:	EPA used a subset of the respirable particulate data from the generic model identified with the Administrative and Support and Waste Management and Remediation Services NAICS code (NAICS code 56) to assess this OES.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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	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	All metadata provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by samples collected at multiple sites, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Pryor, P., Whorton, D. (1981). Health hazard evaluation report no. HETA 80-094-840, Ford Motor Company, San Jose, California.			
HERO ID:	6558302			
Conditions of Use:	Industrial Use: Plastic and rubber products			
EXTRACTION				
Parameter	Data			
Worker activity description:	Job/Area description: Truck Alignment, Truck Tow-In, Commercial Alignment, Commercial Tow-In,			
Exposure route:	inhalation			
Physical form:	vapor			
Personal sampling data:	All samples were below the detection limit of 0.01 mg			
Area sampling data:	All samples were below the detection limit of 0.01 mg			
Exposure duration:	Sampling time: 350 mins - 425 mins			
Number of workers:	60			
Personal protective equipment:	Ear protection			
Engineering control:	General room ventilation systems and local exhaust systems. Report recommended that general room ventilation always be turned on and that local exhaust get a flange to better receive fumes. Gas Vapor recovery system in place as a means to reduce vapors that come off of the gas filling process			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling was conducted by NIOSH.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US.
	Metric 3:	Applicability	High	Data is directly applicable to a condition of use.
	Metric 4:	Temporal Representativeness	Low	Data is more than 20 years old, from 1980.
	Metric 5:	Sample Size	High	Individual discrete samples provided.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Monitoring data includes sample types, sample duration, worker activities, PPE, engineering controls.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability by testing across different worker activities, addresses uncertainty by stating the limits of detection.
Overall Quality Determination			High	

Study Citation:	Roper, C. P., Jr (1976). Health Hazard Evaluation Determination, Report No. 74-120-260, Goodyear Tire and Rubber Company, Gadsden, Alabama.			
HERO ID:	1009699			
Conditions of Use:	Processing: Plasticizers in rubber product manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Banbury operator, batch builder, rubber opener, cutter man, fork lift trucker, mill man, tuber operator, cure man. (2/16)			
Exposure route:	inhalation (6/16)			
Area sampling data:	Area sampling revealed only trace quantities of DBP. (7/16)			
Number of workers:	Three employees on the #15 mixer, two cutter men, one fork lift trucker, four employees at the #13 mill, and one operator in the curing area per shift (2/16).			
Engineering control:	Local exhaust ventilation systems are present near the #15 Banbury mixer and over the heating mill. (2/16)			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Sampling/analytical methodology is an approved NIOSH method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for the use of plasticizers in rubber product manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are 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	Sample data, exposure type, and worker information provided, but missing exposure duration, frequency, and PPE.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Rudel, R. A., Brody, J. G., Spengler, J. D., Vallarino, J., Geno, P. W., Sun, G., Yau, A. (2001). Identification of selected hormonally active agents and animal mammary carcinogens in commercial and residential air and dust samples. Journal of the Air and Waste Management Association (1990-1992) 51(4):499-513.			
HERO ID:	198234			
Conditions of Use:	Plasticizer			
EXTRACTION				
Parameter	Data			
Physical form:	vapor, dust			
Personal sampling data:	2.8 ug/m3 in plastics workplace where plastics are melted and glued and heated up			
Area sampling data:	Dust samples averaged 27.4 ug/g of dust; Min of 11.1 ug/g and max of 59.4 ug/g with SD of 17.2 ug/g			
Comments:	One data point for work exposure in plastics/glue industry. Dust samples are an office space.			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	High	Method follows EPA guidelines for sampling and analyzing.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data from US
	Metric 3:	Applicability	Medium	Personal air data is for an in-scope use. Dust data is for commercial office space.
	Metric 4:	Temporal Representativeness	Medium	Journal from 2001 so >10 years old but <20 years old
	Metric 5:	Sample Size	Low	Data is one data point about a single plastics workplace. Not expanded upon in regards to specific workplace exposures
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Monitoring data is stated but no other metadata is provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Study does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Ruhe, R. L., Bennett, D. (1986). Health hazard evaluation report HETA-85-060-1670, City of Norwood, Norwood, Ohio. NIOSH(HETA-85-060-1670):85-060.
HERO ID:	4058592
Conditions of Use:	Consumer use

EXTRACTION	
Parameter	Data
Worker activity description:	Xerox operator, secretary, supervisor
Exposure route:	inhalation
Physical form:	vapor/mist
Personal sampling data:	Total particulate 0.01-0.02 mg/^3. Limit of detection was 0.01 mg/m^3 with TLV of 10 mg/m^3 and OSHA standard of 15 mg/m^3.
Area sampling data:	0.01mg/^3
Exposure duration:	~8/day
Exposure frequency:	5 day/week
Number of workers:	3

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Sampling and Analytical Methodology	High	Conducted by NIOSH
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	Uninformative	Study could be applied to occupational but does not contain quantitative information about exposure level of chemical of interest
	Metric 4: Temporal Representativeness	Low	Study done in 1985 so >20 years old
	Metric 5: Sample Size	Low	Samples not characterized by statistical data
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Contains metadata such as media, exposure time, type but lacks other metadata
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty.

Overall Quality Determination	Uninformative
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Study Citation:	Salgueiro-Gonzalez, N., Alda, L.d., M. J., Muniategui-Lorenzo, S., Prada-Rodriguez, D., Barcelo, D. (2015). Analysis and occurrence of endocrine-disrupting chemicals in airborne particles. Trends in Analytical Chemistry 66:45-52.			
HERO ID:	2915827			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Houses, day care centers, offices			
Exposure route:	inhalation			
Physical form:	vapor			
Area sampling data:	DBP air concentration ranged from 190-2300 (ng/m^3)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Report does not use NIOSH/OSHA method but is well documented
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Spain (OECD country)
	Metric 3:	Applicability	Low	Data is for consumer exposure for office workers, but may be applicable to an occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is from 2014 so <10 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is simply over a range and does not specify identifying characteristics of the data
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	Addresses variability by testing different locations but does not not address uncertainty.
Overall Quality Determination		Medium		

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:	Consumer use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Office workplace			
Physical form:	dust			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Low	Report is not OSHA/NIOSH and does not document procedure of analysis very well.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Report is from China (not OECD country)
	Metric 3:	Applicability	Low	Report contains a general office workplace, not an occupational scenario. However, surface sampling data could be used to justify the need for surface wipe sampling test orders.
	Metric 4:	Temporal Representativeness	High	Report is from 2016 so <10 years old
	Metric 5:	Sample Size	High	Distribution of samples characterized by large amount of statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Data includes critical metadata such as sample type, level of exposure of workers but lacks other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by sampling multiple sites but not 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 110.7 mg/m3, 99.5 ng/m3, and 24.8 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:	Near the walk-off mats outdoors, DBP was detected at 1.21 ug/m3. (5/7)			
Dermal exposure data:	Dermal exposure data			
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 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	High	Uncertainty is addressed in sampling/analytical methodology. Variability is addressed by comparing results to other studies done.
Overall Quality Determination			High	

Study Citation:	Tremco, (1982). Exhibit I: Exposure data with cover letter.				
HERO ID:	1332959				
Conditions of Use:	Processing – incorporating into formulation, mixture, or reaction product				
EXTRACTION					
Parameter	Data				
Worker activity description:	Mastics Mixing				
Personal sampling data:	Not detected				
Exposure duration:	302 min				
Number of workers:	1				
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	High	The data are from the United States and are representative of the industry being evaluated.
		Metric 3:	Applicability	High	The data are for an occupational scenario within the scope of the risk evaluation.
		Metric 4:	Temporal Representativeness	Low	Report is more than 20 years old.
		Metric 5:	Sample Size	Low	Sample size is 1 measurement only.
Domain 3: Accessibility/ Clarity		Metric 6:	Metadata Completeness	Low	Monitoring data include sample type (e.g., personal breathing zone) but no other meta-data.
Domain 4: Variability and Uncertainty		Metric 7:	Metadata Completeness	Low	The monitoring study does not address variability or uncertainty.
Overall Quality Determination				Low	

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:	Toys, playground, and sporting equipment			
EXTRACTION				
Parameter	Data			
Area sampling data:	Area samples taken at 3 fields that use synthetic turf (PDF Pg. 123):Field 1: 7.4 ng/m^3Field 2: 19 ng/m^3Field 3: 102 ng/m^3			
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 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:	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 - household/office exposure			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, ingestion, dermal			
Physical form:	dust			
Area sampling data:	Phthalate conc. in dust from different environments (ug/g): Homes - Median: 68.8, Range: 6.40-985; Office - Median: 145, Range: nd - 490; Kindergarten - median: 31.2, range: 6.95 - 473; public place - median: 117, range: 28.2 - 1280. Provides specific estimates of dust conc. on certain materials sampled from.			
Comments:	See table 1			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Sampling and Analytical Methodology	Medium	Unclear if article is peer reviewed, however sampling methodology does not appear to lead to lower quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is for china, a non-OECD country.
	Metric 3:	Applicability	Low	Data is not for an occupational scenario
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old
	Metric 5:	Sample Size	Medium	Characterized by range with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Monitoring data include sample type, sample locations and exposure route.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing multiple sites but does not address uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Avsar, E., Iskender, F. G., Demir, S., Babuna, F. G. (2017). Effect of di-butylphthalate spillage scenarios on the general layout of a plant. Fresenius Environmental Bulletin 26(1):204-207.			
HERO ID:	3869608			
Conditions of Use:	Manufacturing/ processing/ industrial use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Handling of DBP chemicals			
Exposure route:	inhalation			
Physical form:	vapor/mist			
Personal sampling data:	Simulation study of spills of 5, 8, and 10 L in a 300 m^3 and 900 m^3 room with different air exchange rates of 1, 5, and 10 per hour. Notable exposure levels above possible short-term exposure level (10 mg/^3) are 5L spill, 300 m^3 with AER of 1 per hour; 8L spill, 300 m^3 with AER of 1 or 5 per hour; 10L spill, 300 m^3 with AER of 1 or 5 AER; and 10L spill, 900 m^3 with AER of 1 per hour.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Model is sound and approved by the EPA
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Report is from US
	Metric 3:	Applicability	High	Report is directly applicable to an occupational scenario
	Metric 4:	Temporal Representativeness	High	Report is from 2017 so <10 years old
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, and choice of parameters are approved by the EPA however it is not explained or elaborated on within the article.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Addresses variability by testing different AERs, spillage levels and room sizes but does not address uncertainty.
Overall Quality Determination		High		

Study Citation:	Cao, J., Zhang, X., Zhang, Y. (2018). Predicting dermal exposure to gas-phase semivolatile organic compounds (SVOCs): a further study of SVOC mass transfer between clothing and skin surface lipids. Environmental Science & Technology 52(8):4676-4683.			
HERO ID:	4829426			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	vapor			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Scientifically sound approach and model.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data from China (not OECD country)
	Metric 3:	Applicability	High	Model can be applied to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	Study was received in 2018 so testing was likely done in the 2010s. Less than 10 years old
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	Model approach, equations, parameters are all transparent and clear and can be evaluated.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination			Medium	

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			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	vapor, liquid			
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 modified to manufacturing or processing scenario for DBP.	
	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. Uncertainty is not addressed.	
Overall Quality Determination		High		

Study Citation:	Morrison, G. C., Weschler, C. J., Bekö, G. (2016). Dermal uptake of phthalates from clothing: Comparison of model to human participant results. Indoor Air 27(3):642-649.			
HERO ID:	3469207			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Exposure route:	Transport from clothing to skin lipids is assumed to take place through a thin quiescent layer of air between the clothing and the surface of the lipids by gas-phase diffusion.			
Dermal exposure data:	Dermal exposure data			
Exposure duration:	12 hours of wear per garment.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Model is peer-reviewed and free of mathematical errors, based on sound approaches/methods, and uses appropriate equations and parameters.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Model can be applied to commercial use of fabric, textile, and leather products.
	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 of parameters. Variability addressed by running a sensitivity analysis of the model on partition coefficients of skin.
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:	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:	Consumer Use: Plastic and rubber products not covered elsewhere		
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).		
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.		
Comments:	See Table 2 - Assumed rubber dust concentrations of 12 ug/m3 (indoor value)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Article is peer reviewed and the model appears to be free of mathematical errors and is 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	Low	The model is used for consumer exposure, but may be applied to an occupational scenario within the scope of the risk evaluation like industrial/commercial use.
	Metric 4: Temporal Representativeness	High	The journal article with the model was published in 2018, which is less than 10 years old.
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:	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:	PVC Plastics Compounding			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Sampling/analytical methodology is an approved OSHA method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	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.	
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.	
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:	PVC Plastics Converting			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.
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:	Non-PVC Material Manufacturing			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.
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:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.
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:	Fabrication or Use of Final Product or Articles			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Sampling/analytical methodology is an approved OSHA method.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	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.	
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.	
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:	Recycling			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.
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:	Waste Handling, Treatment, and Disposal			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Personal sampling data:	Estimates worker inhalation exposure to respirable solid particulates using personal breathing zone Particulate, Not Otherwise Regulated (PNOR) monitoring data from OSHA’s Chemical Exposure Health Data (CEHD) data set.			
Area sampling data:	Estimates an 8-hour TWA for particulate concentrations			
Exposure duration:	Estimates an 8-hour TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Sampling/analytical methodology is an approved OSHA method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	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.
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	Medium	Sample distribution characterized by a range with uncertain statistics.
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		
Exposure route:	Inhalation, dermal, oral		
Area sampling data:	Table 5 has min, median, mean, and max in indoor and outdoor ambient air: 720 ng/m (median) in indoor air; 11.9 ng/m3 (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:	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:	Consumer use

EXTRACTION	
Parameter	Data
Exposure route:	ingestion, inhalation, dermal
Physical form:	gas
Area sampling data:	DBP exposure for doctors ranged 0.58 - 1.83 and averaged 1.03 ug/(kg day). DBP exposure for college teachers ranged 0.23 - 0.73 and averaged 0.44 ug/(kg day). Drivers such as cab drivers ranged 0.31 - 0.6 and averaged 0.43 ug/(kg day)
Engineering control:	Room was evacuated and closed for over 24 hours to prevent outdoor circulation. An already published model was used to estimate exposure levels.
Comments:	College students: 0.31-0.89 ug/(kg day), Mean 0.54, SD 0.19, Table 6.

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Article is peer reviewed
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, not an OECD country
	Metric 3:	Applicability	Low	Model contains non-occupational data or occupational data out of scope. Could be modified for in scope use.
	Metric 4:	Temporal Representativeness	High	Latest sampling was 2011 so all information is less than 10 years old
Domain 3: Accessibility/ Clarity	Metric 5:	Metadata Completeness	Medium	Model approach, equations, and choice of parameter values are transparent, Rationale for selection of approach, etc. not provided.
Domain 4: Variability and Uncertainty	Metric 6:	Metadata Completeness	High	Addresses variability by using samples for model across multiple locations and uncertainty is addressed by conducting an uncertainty analysis.

Overall Quality Determination	Medium
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Study Citation:	Burgess, W. A. (1991). Potential exposures in the manufacturing industry—Their recognition and control. :595-674.			
HERO ID:	1267867			
Conditions of Use:	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:	Consultants,, Woodward-Clyde (1993). BFGoodrich Akron plant risk assessment with cover letter dated 01/06/1994.			
HERO ID:	1333013			
Conditions of Use:	Processing - plasticizer			
EXTRACTION				
Parameter	Data			
Worker activity description:	Excavation for expansion of a facility			
Exposure route:	vapor/dust			
Physical form:	inhalation, ingestion			
Area sampling data:	DBP air exposure estimated to be 1.06E-04 at site facility for workers and 1.72E-06 for nearby residents. Soil analysis had values of DBP below 0.25 mg/kg of soil from 0-2 feet, most were below 0.25 mg/kg of soil from 2-6 feet			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Uses techniques and models that are previously used by EPA assessments	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US	
	Metric 3: Applicability	High	Assessment is for an occupational scenario within scope	
	Metric 4: Temporal Representativeness	Low	Data is from 90s so over 20 years old	
	Metric 5: Sample Size	Medium	Unclear if samples are representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment documents results, methods and assumptions well	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses uncertainty but not variability.	
Overall Quality Determination		High		

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	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

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, DBP 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 = 0.10 ng/m3, median: 22.6 ng/m3, maximum: 111 ng/m3) (67/228)			
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:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.003 ppm (N=114) (pg. 138)			
Exposure duration:	8-hr TWA			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.	
	Metric 3: Applicability	High	Data are for multiple in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	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	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Industrial Process Solvent Use			
EXTRACTION				
Parameter		Data		
Chemical concentration:		0.003 ppm (N=114) (pg. 138)		
Exposure duration:		8-hr TWA		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability				
	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness				
	Metric 2:	Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3:	Applicability	High	Data are for multiple in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-benzopyran (HHCB).		
HERO ID:	5155574		
Conditions of Use:	Import and Repackaging		
EXTRACTION			
Parameter	Data		
Chemical concentration:	0.003 ppm (N=114) (pg. 138)		
Exposure duration:	8-hr TWA		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3: Applicability	High	Data are for multiple in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium	

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-benzopyran (HHCB).		
HERO ID:	5155574		
Conditions of Use:	Incorporation into Formulations, Mixtures, and Reaction Products		
EXTRACTION			
Parameter	Data		
Chemical concentration:	0.003 ppm (N=114) (pg. 138)		
Exposure duration:	8-hr TWA		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3: Applicability	High	Data are for multiple in-scope occupational scenarios.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5: Sample Size	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	Low	Variability and uncertainty are not addressed.
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:	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: 8.2E-11 to 1.5E-9 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	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
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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, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.		
HERO ID:	5155558		
Conditions of Use:	Plastics product manufacturing		
EXTRACTION			
Parameter	Data		
Exposure route:	Inhalation, Dermal		
Area sampling data:	[BGAA 1996]Polymer industry: 90th percentile is <0.007 (mg/m^3); 95th percentile is <0.008 (mg/m^3) from 22 samples.polymer industry, machine welding, and manual welding of roofing materials: median of 0.01 (mg/m^3) and 90th percentile of <0.03 (mg/m^3) from 13 samples.[Posniak, in King 1996]Manufacture of cables (thermodegradation of PVC): 0.19-0.75 (mg/m^3 from 2 samples.		
Dermal exposure data:	Dermal exposure data		
Personal protective equipment:	Protective gloves.		
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	Data are from the European Union.
	Metric 3: Applicability	High	Data are for Plastics product manufacturing, an in-scope occupational scenario.
	Metric 4: Temporal Representativeness	Medium	Monitoring data are greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (range, mean, max) 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 obtaining sampling info from multiple literature sources, but uncertainty is not addressed.
Overall Quality Determination		Medium	

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Worker activity description:	Cleaning the tanks in which DBP had been produced. Drumming of DBP.			
Exposure route:	Inhalation, Dermal			
Area sampling data:	Producer ASupervision, handling filter cake, esterification, mechanic: max of 0.5 (mg/m^3) from 20 samples.Filling Station: max of 5 (mg/m^3) from 5 samples.Sampling: Max of 5.2 (mg/m^3) from 4 samples.Emptying and decocting of distant receiver: max of 1.1 (mg/m^3) from 8 samples.Production: <0.5 (mg/m^3)Producer BProduction, including drumming: 0-0.3 (mg/m^3) mean of 0.04 (mg/m^3) from 114 samplesProduction: mean of 0.7 (mg/m^3)			
Dermal exposure data:	Dermal exposure data			
Personal protective equipment:	Working clothes, gloves, and goggles.			
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	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for manufacture, 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. [2004]
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (range, mean, max) 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 at 2 sites, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Application of paints and coatings			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation, Dermal			
Area sampling data:	Polymer, leather, electrotechnical coating: Median of 0.09; 90th percentile of 0.57; 95th percentile of 1.01 (mg/m^3)			
Dermal exposure data:	Dermal exposure data			
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	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for Application of paints and coatings, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (range, mean, max) 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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Low	

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Use of laboratory chemicals			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation			
Area sampling data:	Laboratory work: mean of 0.006 and std. of 0.002 (mg/m^3)			
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	Data are from the European Union.
	Metric 3:	Applicability	High	Data are for Use of laboratory chemicals, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Monitoring data are greater than 20 years old.years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (range, mean, max) 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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Low	

Study Citation:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ethylhexyl)phthlate (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.			
Area sampling data:	Table 24 has steady state concentrations in indoor air: 8.2E-11 to 1.5E-9 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:	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:	Personal care products			
EXTRACTION				
Parameter	Data			
Exposure route:	Dermal			
Physical form:	Liquid			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for personal care products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (max) 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 products but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.			
HERO ID:	4730751			
Conditions of Use:	Deodorizing products			
EXTRACTION				
Parameter		Data		
Area sampling data:		0.0166 mg/m3		
Dermal exposure data:		Dermal exposure data		
Exposure duration:		nan		
Exposure frequency:		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., 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 assessment is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
		Metric 4: Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
		Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
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Study Citation:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.		
HERO ID:	4730751		
Conditions of Use:	Deodorizing products		
Domain	Metric	EVALUATION Rating	Comments
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)			
Comments:	Average of 4.5 years of exposure.			
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	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 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, (2000). NTP-CERHR expert panel report on di-n-butyl phthalate.		
HERO ID:		679850		
Conditions of Use:		Manufacture		
EXTRACTION				
Parameter		Data		
Exposure route:		Inhalation, dermal		
Physical form:		Vapor, dust		
Area sampling data:		0.01-0.08 (mg/m^3)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	Assessment uses high quality [data/techniques/methods] from frequently-used sources.
Domain 2: Representativeness		Metric 2: Geographic Scope	High	Data are from the U.S.
		Metric 3: Applicability	High	Data are for manufacture, 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	Low	Variability addressed by [describe variability] but uncertainty is not 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:	Use - Automotive Coating Application			
EXTRACTION				
Parameter	Data			
Worker activity description:	transferring and mixing liquid products, container cleaning, transferring mixed coating to application equipment, overspray			
Exposure route:	dermal and inhalation.			
Personal sampling data:	Inhalation: Provides methods for modeling exposures to mists. 8-hr TWA surrogate data.			
Dermal exposure data:	nan			
Exposure frequency:	250 days/yr			
Number of workers:	8 workers/site			
Personal protective equipment:	air-purifying respirators or air-supplied respirators, Gloves (typically latex or nitrile), paint suits, and face masks/eye protection			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	Most of the data used is more than 10 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		High		

Study Citation:	OECD, (2009). Emission scenario document on adhesive formulation.		
HERO ID:	3827299		
Conditions of Use:	Processing: Adhesives and sealants		
EXTRACTION			
Parameter	Data		
Worker activity description:	Unloading, container cleaning, mixing operations, sampling, equipment cleaning, packaging		
Exposure route:	dermal and inhalation.		
Area sampling data:	Inhalation: Provides methods for modeling exposures to both solids and volatile liquids		
Dermal exposure data:	nan		
Exposure frequency:	Exposure frequency: days/yr equal to number of bt/yr		
Number of workers:	22 workers/site		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering various chemical functions and types of adhesives.
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			
Worker activity description:	unloading, container cleaning, adhesive application, equipment cleaning, curing/drying			
Exposure route:	dermal and inhalation.			
Area sampling data:	Inhalation: Provides methods for modeling exposures to mists and volatile liquids			
Dermal exposure data:	nan			
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, (2011). Emission scenario document on the use of metalworking fluids.			
HERO ID:	3827418			
Conditions of Use:	Use of Penetrants and Inspection Fluids			
EXTRACTION				
Parameter	Data			
Worker activity description:	unloading, container cleaning, mixing, shaping operations, filter changeout, spent MWF, on-site treatment operations			
Exposure route:	dermal and inhalation			
Personal sampling data:	PBZ data			
Exposure frequency:	246-249 days/yr			
Number of workers:	46 machinists/site			
Personal protective equipment:	safety glasses, hearing protection, steel-toed boots, gloves			
Engineering control:	general, dilutional, and local exhaust ventilation, machine enclosures, splash guards, antimisting polymers			
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 limited statistics (mean and 90th percentile) 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 MWF types and chemical functions.	
Overall Quality Determination		Medium		

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:	50-250 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	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 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, (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			
Exposure route:	dermal and inhalation			
Exposure frequency:	250 days/yr			
Number of workers:	average 19 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. Respiratory protection is used when necessary, especially when escape of spray particles into the work environment is unavoidable			
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	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:	Commercial Use: Paints and coatings			
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. 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.			
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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation			
Exposure frequency:	246 days/yr			
Number of workers:	21 workers/site			
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 (ILO, 2011).			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).			
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 and additive types.
Overall Quality Determination			Medium	

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:	PVC 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		
Exposure frequency:	246 days/yr		
Number of workers:	21 workers/site		
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 (ILO, 2011).		
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).		
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 and additive types.
Overall Quality Determination		Medium	

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:	PVC Plastics Converting			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation			
Exposure frequency:	246 days/yr			
Number of workers:	21 workers/site			
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 (ILO, 2011).			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).			
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 and additive types.
Overall Quality Determination			Medium	

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:	Non-PVC Material Manufacturing		
EXTRACTION			
Parameter	Data		
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes		
Exposure route:	dermal and inhalation		
Exposure frequency:	246 days/yr		
Number of workers:	21 workers/site		
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 (ILO, 2011).		
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).		
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 and additive types.
Overall Quality Determination		Medium	

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:	Fabrication or Use of Final Product or Articles			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation			
Exposure frequency:	246 days/yr			
Number of workers:	21 workers/site			
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 (ILO, 2011).			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).			
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 and additive types.
Overall Quality Determination		Medium		

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:	Waste Handling, Treatment, and Disposal			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging additives to process, container cleaning, equipment cleaning, and compounding processes			
Exposure route:	dermal and inhalation			
Exposure frequency:	246 days/yr			
Number of workers:	21 workers/site			
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 (ILO, 2011).			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).			
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 and additive types.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	10368811			
Conditions of Use:	Use of Penetrants and Inspection Fluids			
EXTRACTION				
Parameter	Data			
Worker activity description:	container unloading (liquids and solids), application and use of cleaning products			
Exposure route:	dermal, inhalation			
Physical form:	Liquid or solid			
Exposure duration:	8 hr/day			
Exposure frequency:	260 days/yr			
Number of workers:	9 workers/company			
Personal protective equipment:	safety glasses, safety goggles or face shield during prolonged handling or when splashing is possible (page 36)			
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, (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			
EXTRACTION				
Parameter	Data			
Worker activity description:	Exposure to compounded plastic resin during container unloading, Exposure to dusts generated from converting processes, Exposure to solids generated during trimming activities, Exposure to additives during loading of plastic articles			
Exposure route:	dermal and inhalation			
Exposure frequency:	253 days/yr			
Number of workers:	19 workers/site			
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 (ILO, 2011).			
Engineering control:	According to AP-42, most plants use forced ventilation techniques to reduce worker exposure to vapors (EPA, 2008). In areas where particulates or vapor may be formed, local exhaust ventilation (LEV) should be used (ILO, 2011) and, if ventilation is not an option or is insufficient, respiratory protection should be worn (Doney et al., 2008).			
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 and additive types.	
Overall Quality Determination		Medium		

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:	Incorporation into Formulations, Mixtures, or Reaction Products			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading, container cleaning, sampling, equipment cleaning, filter media changeout, packaging			
Exposure route:	dermal and inhalation			
Exposure frequency:	235-350 days/yr (41/172)			
Number of workers:	25-40 workers/site (72/172)			
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.	
	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). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
HERO ID:	6304171			
Conditions of Use:	Incorporating into formulation, mixture, or reaction product: Plasticizers in plastic material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Transfer from shipping containers, Operation/supervision of the foam mix head/dispenser, Foam Production, Transfer/handling of newly foamed articles			
Exposure route:	dermal and inhalation.			
Exposure duration:	8 hr/day			
Exposure frequency:	250 days/yr			
Number of workers:	<50 workers/site			
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	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	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	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	Uncertainty not addressed. Variability addressed by considering multiple foam types.	
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 Plasticizers in plastic material and resin manufacturing; incorporating into articles Plasticizers in plastics product manufacturing

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

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

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 and Use of Printing Inks		
EXTRACTION			
Parameter	Data		
Worker activity description:	PROC: unloading, cleaning, packagingUSE: Printing operations, unloading		
Exposure route:	dermal and inhalation		
Personal sampling data:	PROC: Inhalation: Provides methods for modeling exposures to volatile liquids and solidsUSE: Inhalation: Provides methods for modeling exposures to volatile liquids and solids		
Dermal exposure data:	Dermal exposure data		
Exposure frequency:	PROC: 250 days/yrUSE: 250 days/yr		
Number of workers:	PROC: 13-22 workers/siteUSE: 16-43 workers/site		
Comments:	QC Note: This is an early draft of the Printing Ink GS and may not provide the most up to date info		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This GS is based on U.S. data
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple printing applications, and multiple chemical functions
Overall Quality Determination		Medium	

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:	Incorporation into formulations, mixtures, or reaction product			
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 and Use of Printing Inks		
EXTRACTION			
Parameter	Data		
Worker activity description:	PROC: Unloading, formulation (dispersion and milling), equipment cleaning, packaging. Workers are likely to encounter both inhalation and dermal exposure during handling of raw materials and ink products as well as equipment cleaning.USE: Unloading, printing operations and ink drying, equipment cleaning. Inhalation exposure among production workers is likely to occur as a result of potential emissions with major contributions coming from ink handling and ink mist generation from printing equipment. Dermal exposure to inks and cleaning solvents are expected during material unloading and cleaning of the printing equipment.		
Exposure route:	Inhalation and dermal		
Physical form:	PROC: Liquid, solid particulateUSE: Liquid, mist		
Number of workers:	See Table 2-2: Total number of workers is 64,973, with the number of workers for each printing type varying from ~13,000 to ~225,000		
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:	Incorporation into article (Plasticizers in plastics product manufacturing)			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading and charging compounded resins to process, converting processes, converting equipment cleaning, trimming processes			
Exposure route:	dermal and inhalation			
Personal sampling data:	Provides methods for modeling exposures to both solids and volatile liquids			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	137-254 days/yr			
Number of workers:	30-69 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	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:	Commercial Uses: Paints and coatings			
EXTRACTION				
Parameter	Data			
Worker activity description:	unloading, spray application, equipment cleaning			
Exposure route:	Dermal and inhalation. 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	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 various chemical functions and wood vs metal furniture uses.	
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.			
HERO ID:	6385740			
Conditions of Use:	Incorporation into formulation as plasticizers in soap, cleaning compound, and toilet preparation manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	handling bags, connecting feed hose, sampling mixtures, equipment leaks, handling fines from dust collectors/cyclone, cleaning spray dryer, dumping fines back into system, packing, maintenance work			
Exposure route:	dermal and inhalation. Inhalation: Provides methods for modeling exposures to volatile liquids and solids.			
Physical form:	powder			
Dermal exposure data:	Dermal exposure data			
Exposure frequency:	250 days/yr			
Number of workers:	3 material handlers/site3 wet-end operators/site3 dry-end operators/site6-9 packers/site3-6 maintenance 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 job types.	
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 Formulation as Plasticizers in textiles, apparel, and leather 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 - 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. 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:	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:	Additives in Plastics Processing (Converting into Finished Products)

EXTRACTION

Parameter	Data
Worker activity description:	Receipt of compounded resin, Forming (Heating), Molding/Shaping, Trimming, Finishing (including coating)
Exposure route:	Inhalation and Dermal
Physical form:	Exposure to solids during unloading of compounded resin from transport containers and charging to forming operation; Exposure to dusts generated from converting processes; Exposure to liquids during equipment cleaning of equipment; Exposure to solids during trimming activities.
Personal sampling data:	Exposure from Unloading and Charging Compounded Resin; Exposure from Converting Processes; Exposure from Trimming Processes: Inhalation exposure = OSHA PEL x breathing rate x hours x fraction of additive in resin x fraction of chemical in additive (if applicable)Exposure from Converting Equipment Cleaning: Not expected, particles are expected to be contained in water.
Dermal exposure data:	Dermal exposure data
Exposure duration:	8 hours/day assumed for inhalation calculations
Exposure frequency:	CEB standard assumption, 250 days per year based on 5 day work week and two weeks per year of operation shut down.
Number of workers:	Overall, there were 736,698 workers employed in the Plastic Product Manufacturing industry in 2001. Table 1 provides Number of Workers for subcategories of NAICS 3261 Plastic Product Manufacturing.
Engineering control:	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.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment uses high quality data that are from a frequently used source 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. However, data are not chemical specific.
	Metric 4: Temporal Representativeness	Low	Data greater than 20 years old.
	Metric 5: Sample Size	N/A	Sample size criteria are not applicable to data extracted.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.

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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:	Additives in Plastics Processing (Converting into Finished Products)		
Domain	Metric	EVALUATION Rating	Comments
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability in worker activities is captured through identification of various NAICS codes associated with plastic additive use, but uncertainty associated with number of workers is not characterized.
Overall Quality Determination		Medium	

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:	Coatings and adhesives			
EXTRACTION				
Parameter	Data			
Personal protective equipment:	Workers loading DBP into mixing reactors may wear dermal and inhalation PPE. Customers loading coatings with DBP into application equipment or cleaning the same equipment may wear similar PPE.			
Engineering control:	Engineeering controls may be used for mixing DBP in reactors. Customers loading coatings with DBP into application equipment or cleaning the same equipment may wear similar PPE.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Data and data sources not specified.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Low	Sample data is not provided to support the claims of engineering controls and PPE use.	
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 of engineering controls and PPE use.	
Overall Quality Determination		Medium		

Study Citation:	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.		
HERO ID:	5160123		
Conditions of Use:	Phthalate manufacturing		
EXTRACTION			
Parameter	Data		
Number of sites:	31502		
Worker activity description:	Filtering or loading/unloading of tank cars with DBP.		
Exposure route:	inhalation, ingestion		
Physical form:	vapor, mist, liquid		
Area sampling data:	Concentrations have ranged from below 0.01 mg/m^3 up to 0.08 mg/m^3 based on self reported data. American chemistry council estimated exposure in the workplace based on an assumed level of 1 mg/m^3 in the air during production of phthalates. Resulting exposure estimate was 143 ug/kg body weight/workday for workers in pthalate manufacturing. Adverse health effects have been reported in workers in DBP manufacturing with 0.5-19 years of work at concentrations between 1.7-66 mg/m^3, with frequency of adverse effects increasing with length of employment.		
Number of workers:	Estimated 512,631 employees exposed, 198,249 being female.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data and sound methods that are from a frequently used source and are generally accepted which indicate no flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US
	Metric 3: Applicability	High	Report is directly applicable to an occupational scenario
	Metric 4: Temporal Representativeness	Low	Most data is reported from over 20 years ago.
	Metric 5: Sample Size	Medium	Sample size is representative but lacks important statistical information.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents sources, methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty in regards to occupational exposure data.
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				
EXTRACTION					
Parameter	Data				
Exposure route:	ingestion				
Physical form:	solid				
Comments:	Table 2. Page 3				
EVALUATION					
Domain		Metric		Rating	Comments
Domain 1: Reliability		Metric 1:	Methodology	High	Journal is peer reviewed
Domain 2: Representativeness		Metric 2:	Geographic Scope	Medium	Data is from New Zealand, an OECD country.
		Metric 3:	Applicability	High	Consumer use. Within the scope of the risk evaluation. (Toys, playground and sporting equipment)
		Metric 4:	Temporal Representativeness	High	Article is from 2018
		Metric 5:	Sample Size	Medium	Gives range of uncertain statistics, does not provide discrete samples
Domain 3: Accessibility/ Clarity		Metric 6:	Metadata Completeness	Medium	Report clearly documents results, methods and assumptions. Data sources are generally described but not fully transparent
Domain 4: Variability and Uncertainty		Metric 7:	Metadata Completeness	Medium	Addresses variability by testing across multiple different samples, addresses uncertainty by providing a limit of quantitation
Overall Quality Determination				High	

Study Citation:	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.			
HERO ID:	5676112			
Conditions of Use:	phthalate manufacturing/processing as a plasticizer			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, ingestion, dermal			
Physical form:	vapor, mist, liquid			
Area sampling data:	No quantifiable data on exposure levels in occupations			
Number of workers:	512,631 employees, 1983,249 are female from same NIOSH survey.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data from NIOSH.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is for the US	
	Metric 3: Applicability	High	Data is applicable to scope of use.	
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.	
	Metric 5: Sample Size	Low	Samples of occupational exposure are qualitative	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report documents results but 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:	Bang, D.,uY, Kyung, M., Kim, M., Jung, B.,uY, Cho, M. C., Choi, S., Kim, Y., Lim, S. K., Lim, D., Won, A., Kwack, S., Lee, Y., Kim, H., Lee, M.,u, B. (2012). Human Risk Assessment of Endocrine-Disrupting Chemicals Derived from Plastic Food Containers. Comprehensive Reviews in Food Science and Food Safety 11(5):453-470.		
HERO ID:	1335313		
Conditions of Use:	consumer use - migration to food from packaging		
EXTRACTION			
Parameter	Data		
Exposure route:	inhalation, ingestion		
Physical form:	vapor, solid		
Personal sampling data:	Notable risk for EDI (estimated daily intake) of DBP was for adults (60 kg) from packaged lunch of 14.5 ug/kg bodyweight/ day. Then for infants <6 months old (5.5 kg), EDI of 16.4 ug/kg body weight/day. Hazard Index identified as 1.480 and 1.640, meaning high risk above tolerable daily intake set by either EPA, EU or Korea which is 10 ug/kg/day.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data, uses evaluation criteria approved by the EU and EPA
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Korea (OECD country)
	Metric 3: Applicability	Uninformative	Data is not for an occupational scenario and uses urine sampling data to determine exposure.
	Metric 4: Temporal Representativeness	Medium	Report cites data sources all within the early to late 2000s so >10 years old but <20 years old
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by range of samples from age, gender, weight, country.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Report clearly states its data sources, assessment methods, results and assumptions
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by taking data from multiple age groups but not uncertainty
Overall Quality Determination		Uninformative	

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:	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	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 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	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		Low		

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:	Ingestion, inhalation, and, to a lesser extent, dermal contact with products that contain phthalates			
Physical form:	vapor/gas			
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	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	Medium	The report provides only limited discussion of the variability but none on uncertainty
Overall Quality Determination			High	

Study Citation:	Chung, B. Y., Choi, S. M., Roh, T. H., Lim, D. S., Ahn, M. Y., Kim, Y. J., Kim, H. S., Lee, B. M. (2019). Risk assessment of phthalates in pharmaceuticals. Journal of Toxicology and Environmental Health, Part A: Current Issues 82(5):351-360.		
HERO ID:	5432993		
Conditions of Use:	Pharmaceutical use/ consumer use - Drug use		
EXTRACTION			
Parameter	Data		
Exposure route:	ingestion		
Physical form:	solid		
Particle size characterization:	Levels of DBP in drugs ranged from non-detectable up to 7.07 ug/L. Highest concentrations found in tablets from 1.32 - 7.07 ug/L. HI well below one at 0.046 x 10^-3 and 0.04x10^-3 which is well below 1. Max exposure rate determined to be 3.95 ng/kg/day. Human dermal absorption rate upon ingestion calculated to be 0.45%		
Dermal exposure data:	Dermal exposure data		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses EPA approved method and cites US sources that are frequently used. Also is peer reviewed.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Sampling material is from South Korea (OECD country)
	Metric 3: Applicability	Low	Lab study for non-occupational scenario but could be used for an individual worker evaluation
	Metric 4: Temporal Representativeness	High	Study received in 2019 and acknowledgements cite a grant from 2012 so study was likely conducted in 2010s
	Metric 5: Sample Size	Medium	Samples sufficiently representative but not characterized by many statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents sources, methods, results and assumptions
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing across different drugs but not uncertainty.
Overall Quality Determination	Medium		

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:	Manufacturing			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation			
Physical form:	vapor/mist			
Area sampling data:	Workplace exposure estimated to be 143 ug/kg bw/day in US. DBP in europe detected at majority of workpalce below 0.5 mg/m^3. Manufacturing of goods containing this phtalate was from <0.008 mg/m^3 to 0.75 mg/m^3.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	Report is not OSHA/NIOSH and cites studies not verifiable to be credible
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Report is from poland (OECD country)
	Metric 3:	Applicability	Medium	Report contains occupational scenarios but not worker specific activity or industry.
	Metric 4:	Temporal Representativeness	Medium	Data is from 2003 so >10 years old but <20 years old
	Metric 5:	Sample Size	Low	Samples characterized by little to no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report provides results but underlying methods, data sources, and assumptions are not transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Report does not address variability or uncertainty
Overall Quality Determination		Low		

Study Citation:	Dong, H., Jiang, L., Shen, J., Zhao, Z., Wang, Q., Shen, X. (2019). Identification and analysis of odor-active substances from PVC-overlaid MDF. Environmental Science and Pollution Research 26(20):20769-20779.			
HERO ID:	5432879			
Conditions of Use:	Lab Study - plasticizer in PVC			
EXTRACTION				
Parameter	Data			
Physical form:	vapor			
Area sampling data:	Airborne concentration of DBP ranged between 14.38 to 29.14 ug/m^3 over the course of 28 days with PVC overlaid MDF in controlled study.			
Exposure duration:	8 hr			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report is peer reviewed.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Sampling material is from China (not OECD country)
	Metric 3:	Applicability	Low	Lab study of airborne concentration but could be applied to occupational scenario
	Metric 4:	Temporal Representativeness	High	Study received in 2019 so likely completed in the 2010s
	Metric 5:	Sample Size	Low	Characterized by few statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its sources, assessment methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing across different mass concentrations for samples. 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:	Commercial Use			
EXTRACTION				
Parameter	Data			
Worker activity description:	workers are exposed to DBP, BBP and DIBP during the service life stage of imported articles (professional handling of PVC articles during installation of building materials and workers wearing PVC work clothes and footwear). (page 17 of 65)			
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 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	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	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:	Manufacturing

EXTRACTION

Parameter	Data
Worker activity description:	The production of DBP usually takes place in a closed system, but exposures may occur from "breathing" of the system at elevated temperatures, during system leaks, filling of road and rail tankers, drumming, cleaning of tanks, during service and maintenance, transfer, and process sampling. Most of the transport is done in tanks, and drumming only happens occasionally. The manufacturers of DBP contacted during this study report possible exposures during the filling of drums, during the release of pumps, during disposal of rinsing water in between production campaigns, and during sampling from the production. (p. 12-13)
Exposure route:	Both inhalation and dermal exposure may occur during the production of DBP (p. 12). Generally, the main routes of occupational exposure are anticipated to be inhalation of DBP-gas and liquid aerosol, and by dermal uptake of liquid DBP, especially in cases of manual loading of DBP into process equipment. Much of the gas emitted in cases of hot processes with DBP will rapidly condense to form an aerosol with the consequence that workers will be exposed to both gas and aerosol. The exposure of workers in the further processes depends on the DBP concentrations generated in the working environment air (exposure via inhalation), on the direct skin contact with surfaces with DBP present (dermal exposure), and in both cases the time span of the exposures. (Page 27)
Personal protective equipment:	Personal protection equipment has to be worn during working hours (page 13). Specifics were not specified.

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.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	N/A	qualitative data
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	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:	Industrial/Commercial Use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Workers become exposed to DBP during: 1- Use of DBP as an absorption solvent in a closed system in the manufacture of maleic anhydride, 2- Industrial use of DBP as a burning rate surface moderant, plasticiser and/or coolant in the formulation of nitrocellulose-based propellant grains, 3- Industrial use of DBP-containing propellant grains in manufacture of ammunition for military and civilian uses, and pyrocartridges for aircraft ejection seat safety systems, 4- Industrial use of DBP in ceramic sheets and printing pastes for production of capacitors and lambda sensor elements, 5- Industrial use of DBP in manufacture of solid propellants and motor charges and within a specialty paint in manufacture of motors for rockets and tactical missiles.			
Exposure route:	Inhalation, oral, dermal			
Physical form:	Oily liquid			
Dermal exposure data:	Dermal exposure data			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country other than the U.S.	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	N/A	No sample 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	Report discusses variability among phthalates but uncertainty is not discussed.	
Overall Quality Determination		High		

Study Citation:	Fishbein, L. (1992). Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health 18(S1):5-16.			
HERO ID:	200024			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Calendering and coating operations (processing of softened plastics)			
Physical form:	vapor/mist			
Area sampling data:	Ambient air concentration range between 0.2 and 20 mg/m^3 in localities in Sweden.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data, method and techniques as approved by EPA.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is global, some US, some Sweden.
	Metric 3:	Applicability	High	Data is applicable to condition of use
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old
	Metric 5:	Sample Size	Low	Data characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Includes release media but no other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination			Low	

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:	Processing, Disposal			
EXTRACTION				
Parameter	Data			
Worker activity description:	Waste plastic recycling site workers, PVC production workers, waste management workers, plastic manufacturing 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)			
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:	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	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	No sample data for occupational exposure monitoring.
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 including different studies but uncertainty is not addressed.
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:	commercial use				
EXTRACTION					
Parameter	Data				
Exposure route:	dermal				
Physical form:	incorporated in feminine hygiene products				
Dermal exposure data:	Dermal exposure data				
EVALUATION					
Domain	Metric	Rating		Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	report uses high quality data	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States	
	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	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	Low	The report does not address variability or 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:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Phthalate manufacturing, rubber hoses, rubber gaskets, rubber boots, and nail-only salons			
Exposure route:	inhalation, ingestion			
Number of workers:	130			
Comments:	The sampling data in the article is urinary phthalate metabolite concentrations among workers, which is not used in the occupational exposure section of the risk evaluation.			
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	Data is from USA.	
	Metric 3: Applicability	Low	Data in source is within the scope of the risk evaluation, however sampling data is urinary metabolite data.	
	Metric 4: Temporal Representativeness	Medium	Report is more than 10 years old.	
	Metric 5: Sample Size	N/A	N/A: No sampling data extracted.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	No scope to address variability and uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.			
HERO ID:	10816795			
Conditions of Use:	Import			
EXTRACTION				
Parameter	Data			
Worker activity description:	Sampling and unloading of DBP.			
Exposure route:	Dermal and inhalation during sampling and unloading of DBP			
Physical form:	Liquid			
Personal protective equipment:	Unloading DBP: Hard Hat, Safety Glasses with side shield, neoprene gloves, safety toe shoe, FRC coverall or pants/shirts, hearing single HPD, protective mask with filter against organic vapors - type ADBP Process: Goggles, Butyl gloves, safety toe shoe, acid suit including hood,			
Engineering control:	Unloading: DBP is supplied via iso-containers each with a capacity of 45,000 lbs. Containers are unloaded by pressurizing the container with nitrogen from a top vent line. Pensacola site uses a dip tube for unloading and uses an unloading pump. Geismear uses a bottom rear valve of container with a flexible hose to hard piping and relies on pressure from the nitrogen to unload. Once unloaded the piping is blown free and clear with nitrogen before hoses are disconnected.The process using DBP is a closed system and no/minimal releaases or exposures occur from the process (Note, closed process not described in detail).			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for import, which is an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	N/A	Sample size is not applicable to Occupational Exposure information extracted.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Variability and uncertainty are not applicable to Occupational Exposure information extracted.
Overall Quality Determination			High	

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 - plasticizer

EXTRACTION	
Parameter	Data
Number of sites:	3
Worker activity description:	hospital employee, electronic factory - assembling electronic equipment such as computers, manufacturing plant - producing furniture, toys and textiles.
Exposure route:	inhalation, ingestion
Physical form:	dust
Area sampling data:	Concentration unit: ug/g of dust. electronic factor had median conc of 55.6 with range of 52.0 to 78.6; manufacturing plant had median of 82.0 and range from 63.6 to 109; hospital had median of 51.79 with range of 17.8 to 88.9; commercial office had median of 69.2 with range of 26.7 to 138; schools had median of 51.8 with range of 42.0 to 73.7; mall had median of 82.4 with range of 58.6 to 113; overall all workplaces had median of 63.6 with range of 17.8 to 138; houses had median of 77 with range from 3.11 to 878.
Comments:	Briefly, air-conditioner filter dust samples were collected from 6types of buildings: commercial offices (n = 20), secondaryschools (n = 4), shopping malls (n = 5), hospitals (n = 16),electronic factories (n = 6), and manufacturing plants (n = 4)(Table 1).

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, non OECD country
	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:	Koniecki, D., Wang, R., Moody, R. P., Zhu, J. (2011). Phthalates in cosmetic and personal care products: Concentrations and possible dermal exposure. Environmental Research 111(3):329-336.			
HERO ID:	788300			
Conditions of Use:	Consumer use - paints			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal, inhalation			
Dermal exposure data:	Dermal exposure data			
Comments:	Detected in high concentrations of nail products with highest concentration of 24,304 ug/g of nail polish. References a study already in DEE for Adsorption rate of DBP into human skin was cited to be 0.07 +/- 0.02 ug/cm^2/h. Permeability coefficient of 0.23 +/- 0.06 x 10^-5 cm/h			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Uses NIOSH data and model to generate adsorption and permeability data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Canada (OECD country)
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation. *personal care products
	Metric 4:	Temporal Representativeness	Medium	Samples collected in 2007 and 2008 so >10 years but <20 years
	Metric 5:	Sample Size	Medium	Samples are characterized by detection limits, median and max values.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment documents sources, results, methods and assumptions. Sources are stated and described briefly.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by sampling different products and permeability affects on different age groups. Does not address 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:	dermal				
Physical form:	vapor, solid				
Area sampling data:	Concentration on unused and used firefighter gear. Used inner glove: 0.8-2.2 ug/g of sample. Unused outer glove: 0.4 ug/g. Used middle glove: 9.1 ug/g. Used hood: 0.6 ug/g.				
Personal protective equipment:	layers of gloves, as well as a protection hood.				
EVALUATION					
Domain	Metric	Rating	Comments		
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses EPA certified analytical method	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US	
	Metric 3:	Applicability	Low	Data is a lab study but can be applied directly to occupational scenario	
	Metric 4:	Temporal Representativeness	High	Report is from 2014 so <10 years old	
	Metric 5:	Sample Size	Medium	Samples are relevant with range of values between used and unused but unclear if it is representative of all firefighters	
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its sources, assessment methods, results and assumptions	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across multiple layers of protection but not uncertainty	
Overall Quality Determination			High		

Study Citation:	Latini, G. (2005). Monitoring phthalate exposure in humans. Clinica Chimica Acta 361(1-2):20-29.		
HERO ID:	789380		
Conditions of Use:	Consumer exposure		
EXTRACTION			
Parameter	Data		
Exposure route:	Humans are exposed to these compounds through ingestion, inhalation, and dermal exposure for their whole lifetime, since the intrauterine life.		
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	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	N/A	Information is qualitative
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	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:	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 0.02 ug/cm3 to 4146 ug/cm3.		
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The data are from the United States and are representative of the industry being evaluated.
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 by sampling phthalate concentrations in gas phase at various temperatures, but measurement uncertainty is not characterized.
Overall Quality Determination			High	

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.			
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	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. Datasources 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			Low	

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:	Waste treatment			
EXTRACTION				
Parameter	Data			
Number of sites:	1			
Exposure route:	inhalation			
Physical form:	Dust			
Personal sampling data:	Average median ingestion: 9.95 x 10^-4 ug/kg of bw/day			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	Not an approved OSHA or NIOSH method and sampling method not well documented.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Thailand data (not an OECD country)	
	Metric 3: Applicability	Low	Data is for an occupational scenario but contains little to no information about working activity and is an industry not seen in scope.	
	Metric 4: Temporal Representativeness	High	Sampling took place in 2014 so <10 years old	
	Metric 5: Sample Size	Medium	Samples characterized by good statistical data but small number of samples	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Only contains metadata of release media	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability but not uncertainty	
Overall Quality Determination		Low		

Study Citation:	NICNAS, (2016). C4-6 side chain transitional phthalates: Human health tier II assessment.			
HERO ID:	5155535			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Transfer and blending activities, quality control analysis, and cleaning and maintenance of equipment. Worker exposure to the chemicals at lower concentrations may also occur while using formulated products containing the chemicals.			
Exposure route:	Dermal, inhalation			
Physical form:	Solid, Vapor			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	The report uses high quality data not from a frequently used source but does not indicate flaws or quality issues.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Australia (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 began in 2012 so less than 10 years old	
	Metric 5: Sample Size	N/A	No sample data.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	No scope to address variability and uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	NIOSH, (1976). Occupational health guideline for dibutylphthalate.			
HERO ID:	10182525			
Conditions of Use:	General			
EXTRACTION				
Parameter	Data			
Worker activity description:	Report lists common operations: spray application of polyvinyl acetate surface coatings by spraying, dipping, or crushing; spray application of polyester and epoxy resins, hand and dip applications of polyvinyl acetate and polyester and epoxy resins; molding and forming of cellulose acetate butyrate, acetate, propionate, and polyvinyl acetate; application of polyvinyl acetate adhesives, both solvent and hot-melt types; manufacture of nitrile rubber, during molding of polyester and epoxy articles, manufacture of polyvinyl acetate surface coatings; spray application of nitrocellulose lacquer surface coatings, including paper coatings; [full list in report] pg.2			
Exposure route:	oral, dermal, inhalation			
Physical form:	oily liquid (pg. 1), spray/mist, vapor (pg. 2)			
Personal protective equipment:	should be required to wear safety goggles; respiratory protection if engineering or administrative controls are not technically feasible, when such controls are in process of being installed or have failed and need to be supplemented. pg. 2			
Engineering control:	depending on the operations, different engineering controls are suggested. EC includes: local exhaust ventilations, general dilution ventilation.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The report is published by NIOSH, a frequently used source, and generally accepted by the scientific community.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	High	General information on DBP is given, which is applicable to multiple occupational scenarios within the scope of the risk evaluation.
	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	Medium	Report clearly documents results, methods, and assumptions. Datasources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is not addressed. Variability is considered in different potential exposure scenarios.
Overall Quality Determination			Medium	

Study Citation:	NIOSH, (2007). NIOSH pocket guide to chemical hazards.			
HERO ID:	192177			
Conditions of Use:	All uses-generic			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, ingestion, skin and/or eye contact (page 125 of 454)			
Physical form:	Colorless to faint-yellow, oily liquid with a slight, aromatic odor (page 125 of 454)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	NIOSH pocket guide to chemical hazards
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	From NIOSH, in United States
	Metric 3:	Applicability	Low	General information about exposure routes and physical form, which is applicable to any occupational scenario where pure DBP is present
	Metric 4:	Temporal Representativeness	Medium	From 2007 (The report is generally more than 10 yearsbut no more than 20 years old.)
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	NIOSH, (2019). NIOSH pocket guide to chemical hazards: Dibutyl phthalate.				
HERO ID:	8407729				
Conditions of Use:	All				
EXTRACTION					
Parameter	Data				
Exposure route:	inhalation, ingestion, skin and/or eye contact (page 2 of 3)				
Physical form:	Colorless to faint-yellow, oily liquid with a slight, aromatic odor (page 1 of 3)				
Personal protective equipment:	Respirator RecommendationsNIOSH/OSHAUp to 50 mg/m :(APF = 10) Any air-purifying full-facepiece respirator equipped with an N95, R95, or P95 filter. The following filters mayalso be used: N99, R99, P99, N100, R100, P100.Click here for information on selection of N, R, or P filters.Up to 125 mg/m :(APF = 25) Any supplied-air respirator operated in a continuous-				
EVALUATION					
Domain	Metric	Rating		Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	from NIOSH	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	From USA	
	Metric 3:	Applicability	High	Relevant to all COUs	
	Metric 4:	Temporal Representativeness	High	information last reviewed 2019	
	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:	NIOSH, (2019). Evaluation of ergonomics, chemical exposures, and ventilation at four nail salons.		
HERO ID:	8683475		
Conditions of Use:	Commercial use of Personal Care Products (Non-TSCA)		
EXTRACTION			
Parameter	Data		
Worker activity description:	See page 17 of 48 for in-depth description of worker activity. Briefly, employees do application of acrylic nails, manicures, and pedicures		
Exposure route:	Inhalation and dermal (page 18 of 48)		
Physical form:	vapor and liquid (in nail polish)		
Exposure duration:	Reported length of shift varies, between 2–8 hours. Median number of hours worked per week: 30 hours (range: 12–60 hours) (page 17 of 48)		
Exposure frequency:	Median job tenure is 9 months (range: 1 week–21 years). Six employees at one salon reported working there for only 1 week. (page 17 of 48)		
Number of workers:	24 (page 16 of 48)		
Engineering control:	Salon A: No ducted ventilation system, a mini split ductless unit for heating and coolingSalon B: Exhaust vents along the salon ceiling centerline served by one roof exhaust fan, air conditioning units on the exterior wall without outdoor air introductionSalon C: Exhaust vents throughout the salon floor centerline served by one roof exhaust fan, baseboard radiant heating system and air conditioning units located on exterior wall without outdoor air introductionSalon D: Shop served by the mall’s air handling units with supply and return grilles on or near the ceiling, the shop also had two exhaust vents on or near ceiling (page 16 of 48, see for more information about the sampling locations)		
Comments:	The concentrations of DBP in used and unused nail polish are reported in Table C5 on page 35 of 48, which ranged between not detected and 14,000 ug/mL. There was no area or personal monitoring for DBP. See discussion of DBP exposure on pages 22 and 26.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The report uses high quality data and sound methods that are from frequently used sources (e.g., NIOSH HHES,) 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.
	Metric 3: Applicability	Uninformative	The report is for an occupational scenario that in terms of the type of industry and expected products would be FDA-regulated (e.g., nail polish and biocides)
	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	NA- no sampling data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized
Continued on next page ...			

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Study Citation:	NIOSH, (2019). Evaluation of ergonomics, chemical exposures, and ventilation at four nail salons.
HERO ID:	8683475
Conditions of Use:	Commercial use of Personal Care Products (Non-TSCA)

		EVALUATION	
Domain	Metric	Rating	Comments
Overall Quality Determination		Uninformative	

Study Citation:	OECD, (2016). Report On The Proposal For Classification And Labelling (C&L) Of Dibutyl Phthalate.			
HERO ID:	10172655			
Conditions of Use:	General Information			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation, dermal, oral			
Physical form:	Dibutyl phthalate is an odorless and colorless to faint yellow oily liquid.			
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	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

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:	Processing/consumer use of plastics

EXTRACTION	
Parameter	Data
Worker activity description:	Plastic workers, Amateur radio operator, Electrician, Engineer Electronics/telecommunication, Mechanics, Radar worker, Road worker, Telephone assembler, Welder, Video display unit work
Exposure route:	no information provided
Number of workers:	Number of workers in each occupation: Amateur radio operator – 7, Electrician – 7, Engineer Electronics/ telecommunication – 8, Mechanics – 4, Plastics worker – 18, Radar worker – 2, Road worker – 7, Telephone assembler – 5, Welder – 15, Video display unit work - 53
Comments:	Article is about testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. DBP is only mentioned with regards to health effects in humans and rats.

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 an occupational scenario within the scope of the risk evaluation, but information is not specific to DBP and most worker activities are out of scope.
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5: Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	No scope to address variability and uncertainty.

Overall Quality Determination	Medium
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Study Citation:	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. American Association of Occupational Health Nurses Journal 55(1):12-17.			
HERO ID:	1598544			
Conditions of Use:	Commercial use			
EXTRACTION				
Parameter	Data			
Worker activity description:	Workers in beauty salon, occupational health nurses.			
Exposure route:	Phthalates can be ingested, inhaled, or absorbed through the skin.			
Physical form:	vapor			
Number of workers:	According to a 1997 U.S. economic census, more than 407,000 individuals employed in approximately 81,000 beauty salons across the country were exposed to phthalates like DBP.			
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.
	Metric 3:	Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation (commercial use of inks, toner, colorant products similar to products in beauty salons).
	Metric 4:	Temporal Representativeness	Medium	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	Report clearly documents its data sources.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Factual data, no scope to address variability and uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Pak, V. M., Mccauley, L. A., Pinto-Martin, J. (2011). Phthalate exposures and human health concerns: A review and implications for practice. American Association of Occupational Health Nurses Journal 59(5):228-33; quiz 234-5.			
HERO ID:	1249953			
Conditions of Use:	Nail manicurists			
EXTRACTION				
Parameter		Data		
Personal protective equipment:		Glove use was associated with a significant reduction in urinary cross-shift MBP concentrations (p =.04) manicurists working in a setting without ventilation had a 54% increase in urinary cross-shift MBP concentration, compared to a 7% decrease among manicurists working in settings with exhaust fans. page no. 230		
Engineering control:				
Comments:				
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.
		Metric 2: Geographic Scope	High	
		Metric 3: Applicability	Medium	
		Metric 4: Temporal Representativeness	Medium	
		Metric 5: Sample Size	Low	
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	Medium	Datasources 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:	Pak, V. M., Mccauley, L. A., Pinto-Martin, J. (2011). Phthalate exposures and human health concerns: A review and implications for practice. American Association of Occupational Health Nurses Journal 59(5):228-33; quiz 234-5.		
HERO ID:	1249953		
Conditions of Use:	PVC flooring production		
EXTRACTION			
Parameter	Data		
Worker activity description:	A recent Chinese study compared 74 men who manufactured polyvinyl chloride (PVC) flooring at a plant in Liaoning Province to 63 men employed at a construction company (Pan et al., 2006). The men completed questionnaires on lifestyle factors. Blood samples were analyzed for circulating free testosterone, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). Urinalysis provided data on concentrations of MBP and MEHP, which served as biomarkers of exposure. PVC plant workers had 100-fold higher levels of MBP and MEHP and significantly lower blood testosterone concentrations than construction workers.		
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 captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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. Datasources 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:	Pan, T. L., Wang, P. W., Aljuffali, I. A., Hung, Y. Y., Lin, C. F., Fang, J. Y. (2014). Dermal toxicity elicited by phthalates: Evaluation of skin absorption, immunohistology, and functional proteomics. Food and Chemical Toxicology 65:105-114.			
HERO ID:	2219803			
Conditions of Use:	Lab study			
EXTRACTION				
Parameter	Data			
Exposure route:	dermal			
Physical form:	vapor			
Dermal exposure data:	Dermal exposure data			
Comments:	Mouse skin accumulation 10.8 +/- 0.51 (nmol/mg) and for pig skin it is 0.41 +/- 0.41+/- (nmol/mg) with Flux at 94.7 +/- 6.49 (nmol/cm^2/h) for mouse skin and 11.9 +/- 3.20 (nmol/cm^2/h) for pig skin.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report does not use EPA or NIOSH method but adequately describes analytical technique.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from Taiwan (not OECD country)
	Metric 3:	Applicability	Uninformative	Data is not for an occupational scenario and likely can't be applied to one.
	Metric 4:	Temporal Representativeness	High	Report is from 2014 so <10 years old
	Metric 5:	Sample Size	Low	Samples are few and tested two animals not humans
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report is not applicable to risk assessment but sources and reasoning
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Uninformative		

Study Citation:	Petrovicova, I., Kolena, B., Pilka, T. (2014). The human biomonitoring of occupational exposure to phthalates. Mediterranean Journal of Social Sciences 5(19):101-107.			
HERO ID:	5620073			
Conditions of Use:	Processing - plasticizer in plastic product manufacturing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Plastic manufacturing with division of films and composites and injection molding			
Exposure route:	inhalation, dermal, oral			
Physical form:	vapor			
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. (Slovakia).
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	

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 assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	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 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:	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:	Vinyl flooring installation			
EXTRACTION				
Parameter	Data			
Exposure route:	Inhalation and Dermal			
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	High	Frequently used sources were used to identify routes of exposure.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not chemical specific.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	Sample size not applicable to qualitative data relating to exposure route.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Variability and uncertainty not applicable to qualitative data relating to exposure route.
Overall Quality Determination			High	

Study Citation:	Scott, R. C., Dugard, P. H., Ramsey, J. D., Rhodes, C. (1987). In vitro absorption of some o-phthalate diesters through human and rat skin. Environmental Health Perspectives 74(0):223-227.			
HERO ID:	674473			
Conditions of Use:	Dermal Exposure (Laboratory study)			
EXTRACTION				
Parameter		Data		
Dermal exposure data:		Dermal exposure data		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report uses high quality data and techniques that are not from frequently used sources but do not indicate quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from UK (OECD country)
	Metric 3:	Applicability	High	The report is for dermal absorption which applies to multiple occupational scenarios within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is from 1987 so >20 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by range of 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	Addresses variability by testing human and rat skin, does not address uncertainty.
Overall Quality Determination			Medium	

Study Citation:	SRC, (2001). Toxicological profile for di-n-butyl phthalate.		
HERO ID:	2624719		
Conditions of Use:	manufacturing		
EXTRACTION			
Parameter	Data		
Number of sites:	31502		
Worker activity description:	Filtering or loading/unloading of tank cars with DBP.		
Exposure route:	inhalation, ingestion		
Physical form:	liquid, mist, vapor		
Area sampling data:	Concentrations have ranged from below 0.01 mg/m^3 up to 0.08 mg/m^3 based on self reported data. American chemistry council estimated exposure in the workplace based on an assumed level of 1 mg/m^3 in the air during production of phthalates. Resulting exposure estimate was 143 ug/kg body weight/workday for workers in pthalate manufacturing. Adverse health effects have been reported in workers in DBP manufacturing with 0.5-19 years of work at concentrations between 1.7-66 mg/m^3, with frequency of adverse effects increasing with length of employment.		
Number of workers:	Estimated 512,631 employees exposed, 198,249 being female.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data and sound methods that are from a frequently used source and are generally accepted which indicate no flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US
	Metric 3: Applicability	High	Report is directly applicable to an occupational scenario
	Metric 4: Temporal Representativeness	Low	Most data is reported from over 20 years ago.
	Metric 5: Sample Size	Medium	Sample size is representative but lacks statistical information.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment clearly documents sources, methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty in regards to occupational exposure data.
Overall Quality Determination		Medium	

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.			
HERO ID:	675435			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Physical form:	Page 40/151 - colorless, oily liquid			
Number of workers:	Page 46/151 - The National Occupational Hazard Survey indicates that 905,227 workers are potentially exposed to di-n-butyl 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 (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	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	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

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:	Consumer use: cotton clothing			
EXTRACTION				
Parameter	Data			
Exposure route:	inhalation, dermal. Phthalates in infant clothing enter the infant body through dermal absorption and mouthing by infants. See Table 2.			
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	Low	The data are from a non-OECD country
	Metric 3:	Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	High	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, 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:	Tokumura, M., Seo, M., Wang, Q., Miyake, Y., Amagai, T., Makino, M. (2019). Dermal exposure to plasticizers in nail polishes: An alternative major exposure pathway of phosphorus-based compounds. Chemosphere 226:316-320.			
HERO ID:	5163392			
Conditions of Use:	Nail polish			
EXTRACTION				
Parameter	Data			
Dermal exposure data: Comments:	Dermal exposure data see Fig. 2			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Source is peer reviewed so likely contain high quality data.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country, Japan.	
	Metric 3: Applicability	Medium	Data may be applicable to a commercial use of personal care products and nail polish. Contains dermal exposure data.	
	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	Contains dermal exposure data, exposure route, chemical concentration.	
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. 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 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, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.		
HERO ID:	10293388		
Conditions of Use:	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		
Comments:	The inhalation exposure data was modeled data, not monitoring data. Therefore, it was not evaluated as monitoring data.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	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	Medium	Report is between 10 and 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	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, (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:	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		
Particle size characterization:		Emissions from HMA plants may be divided into ducted production emissions, pre-production fugitive dust emissions, and other production-related fugitive emissions. Pre-production fugitive dust sources associated with HMA plants include vehicular traffic generating fugitive dust on paved and unpaved roads, aggregate material handling, and other aggregate processing operations. Fugitive dust may range from 0.1 um to more than 300 um in aerodynamic diameter. On average, 5 percent of cold aggregate feed is less than 74 um (minus 200 mesh). Fugitive dust that may escape collection before primary control generally consists of PM with 50 to 70 percent of the total mass less than 74 um.		
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	Data is general and not specific to this chemical. Although the condition of use is not included in the scope for DBP, the information may be used for similar condition of use like building/construction materials.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			Medium	

Study Citation:	U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.			
HERO ID:	8726953			
Conditions of Use:	All (Loading/Unloading)			
EXTRACTION				
Parameter	Data			
Worker activity description:	Unloading/Loading of drums can be done via pumping or pouring of the liquid from the drum. (pg. 2) During water-based cleaning, workers may manually be cleaned using hand-held spray nozzles.			
Physical form:	liquid			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report was developed by EPA, 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.
	Metric 3:	Applicability	High	The report discusses a routine tasks applicable to multiple occupational scenarios 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 (2010).
	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, andassumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty is not addressed for extracted data. Variability is briefly discussed in different methods of unloading drums.
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				
Exposure route:	Inhalation				
Physical form:	as particulates (dust)				
Particle size characterization:	dust was sieved using 500 and 125 μm stainless steel sieves				
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	N/A	Background information	
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:	Väisänen, K., A.J., Hyttinen, M., Ylönen, S., Alonen, L. (2019). Occupational exposure to gaseous and particulate contaminants originating from additive manufacturing of liquid, powdered, and filament plastic materials and related post-processes. Journal of Occupational and Environmental Hygiene 16(3):258-271.			
HERO ID:	6106854			
Conditions of Use:	processing			
EXTRACTION				
Parameter	Data			
Worker activity description:	Not indicated in the article			
Exposure route:	Not indicated in the article			
Area sampling data:	Not indicated in the article			
Comments:	Only table supplementary data attached			
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	Uninformative	no geographic location is known
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Uninformative	report does not document its data sources, assessment methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.		
HERO ID:	5547263		
Conditions of Use:	commercial use		
EXTRACTION			
Parameter	Data		
Exposure route:	Human exposure to phthalates occurs mainly via dietary sources, dermal absorption, and air inhalation.		
Dermal exposure data:	Dermal exposure data		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	report uses high quality data
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States
	Metric 3: Applicability	Uninformative	Exposure doses to phthalates were calculated through the ingestion of foods, air inhalation, and dust ingestion for the general population in the US
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	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		Uninformative	

Study Citation:	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.				
HERO ID:	5740947				
Conditions of Use:	Disposal - wastewater				
EXTRACTION					
Parameter	Data				
Engineering control:	air-stripping, sand filtration, and granular activated carbon contact were to be expanded to ensure limitations were being met and increase the capacity of the plant.				
EVALUATION					
Domain	Metric		Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Source is a published chapter of a book, likely uses sound method of analysis that wouldn't indicate flaws or quality issues	
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US	
	Metric 3:	Applicability	Low	Data is for waste treatment method	
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.	
	Metric 5:	Sample Size	Medium	Range with uncertain statistics	
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report documents results, methods and assumptions. Sources generally described.	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address uncertainty or variability.	
Overall Quality Determination			Low		

Study Citation:	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.			
HERO ID:	5160123			
Conditions of Use:	Phthalate manufacturing			
EXTRACTION				
Parameter	Data			
Number of sites:	184			
Release quantity:	Release quantities reported for every state for air, water, injection, land , on and off site releases. Total amounts for air are 36,477 lbs/yr; for water are 279 lbs/yr; for injection are 290,000 lbs; for land 13,645 lbs/yr; for total on-site release 350,401 lbs/yr; off-site release is 50,350 lbs/yr.			
Release or emission factors:	nan			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data and sound methods that are from frequently used sources and does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Report is directly applicable to scope of risk evaluation
	Metric 4:	Temporal Representativeness	Low	Data is reported from exactly or greater than 20 years old.
	Metric 5:	Sample Size	High	Samples are sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its data sources, results and assumptions
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses uncertainty but not variability.
Overall Quality Determination			High	

Study Citation:	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.
HERO ID:	5676112
Conditions of Use:	Phthalate manufacturing/processing as a plasticizer

EXTRACTION

Parameter	Data
Release quantity:	Table 5-1 provides releases by air, water, land, underground injection, total environment, POTW transfer, and off-site waste transfer numbers for 29 states for DBP. Across all of these 29 states air releases estimated to be 85,100 lbs/yr; water releases estimated to be 450 lbs/yr; land releases estimated to be 313 lbs/yr; underground injection estimated to be 180,000 lbs/yr; total environment estimated to be 270,000 lbs/yr, POTW transfer estimated to 6,300 lbs/yr and off-site waste transfer estimated to be 285,900 lbs/yr. This is based on TRI 1996 data. Total releases dominated by a single petrochemical plant in Cantonment, Florida, releases more than 2x the DBP phthalate released from all other TRI sources combined.
Release or emission factors:	nan
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Release data from 1996 TRI data.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is US data.
	Metric 3: Applicability	High	Data is directly applicable to scope.
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5: Sample Size	Medium	TRI requires only certain types of facilities to report so it is not entirely representative of all DBP emissions.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data includes critical metadata, release media, frequency, but lacks specific industrial operations that are the source of these releases.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Addresses variability across different states, addresses uncertainty by stating not all facilities that use DBP are required to report.

Overall Quality Determination**High**

Study Citation: Cadogan, D., Howick, C. (2000). Plasticizers.
HERO ID: 6311430
Conditions of Use: emissions

EXTRACTION

Parameter	Data
Description of release source:	Though the article does not mention emissions of DBP 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:	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. (pg 23 of 30) 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)
Waste treatment methods and pollution control:	nan

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 Western Europe (OECD countries).
	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:	Castillo, M., Oubiña, A., Barceló, D. (1998). Evaluation of ELISA kits followed by liquid chromatography-atmospheric pressure chemical ionization-mass spectrometry for the determination of organic pollutants in industrial effluents. Environmental Science & Technology 32(14):2180-2184.			
HERO ID:	629069			
Conditions of Use:	Disposal - landfill			
EXTRACTION				
Parameter	Data			
Release quantity:	0.78 ug/L of DBP detected in landfill			
Release or emission factors:	nan			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Methodology is an approved EPA methodology for use in determining wastewater and soil samples.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Study conducted in Spain, an OECD country.	
	Metric 3: Applicability	Medium	Data is for disposal into a landfill and DBP releases from it. Does not specify what industries are disposed in this landfill or its location.	
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old, published in 1998.	
	Metric 5: Sample Size	Low	Sample characterized by no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	No metadata provided except for analytical method.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address variability or uncertainty.	
Overall Quality Determination		Low		

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

EXTRACTION

Parameter	Data
Description of release source:	Covers the whole process* of application of organic solvent borne, water borne liquid and powder coatings by industrial users by spraying.
Release or emission factors:	Release or emission factors
Release frequency:	Continuous release: 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 for some estimates (from OECD ESD) while others had no OECD ESD- industry data, which were assumption.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country(EU) other than the U.S.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation (Use of Paints and Coatings) but is not chemical specific.
	Metric 4: Temporal Representativeness	High	Release data are generally no than 10 years old.
	Metric 5: Sample Size	Low	Emission factors were not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study addresses variability in the determinants of release(considers volatility and product). The release data study does not address uncertainty in the release results.

Overall Quality Determination**Medium**

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

EXTRACTION

Parameter	Data
Description of release source:	For a coating film to form, the volatile phase of organic solvent borne and water borne coatings must evaporate into the atmosphere. A proportion of the solid phase will be contained in overspray. During application of coatings outdoors, a proportion of the applied coating can be deposited into water.
Release or emission factors:	Release or emission factors
Release frequency:	Indoor- 365 days/yr, Outdoor- 225 days/yr
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	The release data methodology is known for some estimates (from OECD ESD) while others had no OECD ESD- industry data, which were assumption.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country(EU) other than the U.S.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation (Use of Paints and Coatings) but is not chemical specific.
	Metric 4: Temporal Representativeness	High	Release data are generally no than 10 years old.
	Metric 5: Sample Size	Low	Emission factors were not characterized by statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The release data study addresses variability in the determinants of release(considers volatility and environment). The release data study does not address uncertainty in the release results.

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 - e-waste			
EXTRACTION				
Parameter	Data			
Number of sites:	4			
Release quantity:	Min-max (mean +/- SD); precious metal recovery sites (EWR) had DBP soil contamination of 25-91 (39 +/- 29) ng/g; e-waste dismantling site (EWD) was 8-105 (29+/- 42); e-waste shredding sites (EWS) had 8-36 (21+/-12) ng/g; and dumpsites had 8-36 (21+/-8)ng/g			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Article is peer reviewed.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from India (not an OECD country)
	Metric 3:	Applicability	Low	Data is not for an occupational scenario but contains information about release amounts and concentrations
	Metric 4:	Temporal Representativeness	High	Samples taken in 2014 so data is less than 10 years old
	Metric 5:	Sample Size	High	Samples are representative and are characterized by statistical data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Includes release media and site activities but no other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across different industries but not uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Clapp, L. W., Talarczyk, M. R., Park, J. K., Boyle, W. C. (1994). Performance comparison between activated-sludge and fixed-film processes for priority pollutant removals. Water Environment Research 66(2):153-160.
HERO ID:	3585789
Conditions of Use:	Waste removal - wastewater treatment

EXTRACTION

Parameter	Data
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 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 over 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:	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 - incineration

EXTRACTION

Parameter	Data
Description of release source:	Release source is from two different waste incinerators. Phthalates are not being fed into the incinerators but is a by-product of the combustion reaction occurring. The incinerators are a liquid incinerator and rotary kiln incinerator
Release quantity:	Of 9 tested emission rates for the liquid incinerator, BBP was detected twice. The emission rates were 9.56×10^{-4} and 2.87×10^{-4} lbs/hr. For rotary kiln, BBP is not explicitly stated as being tested for but it gives general phthalate emission rates. Average emission rate was 4.54×10^{-4} with a max of 1.40×10^{-4} g/sec. Average release for total phthalates in liquid incinerator was 8.68×10^{-4} with max of 2.68×10^{-3} g/sec
Release frequency:	24 hours/day 365 days per year for "conservative" calculations which is likely unreliable. Document states it is more likely they operate 85% of the year which is about 311 days
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High
			Contractor for the analysis was hired by EPA, it is likely an approved method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High
	Metric 3:	Applicability	Medium
			Data is for US
			Data is for waste incineration methods which is not an exact in scope of use but useful data in the source could be applied to site specific models for on-site incineration releases where DBP is manufactured or processed.
	Metric 4:	Temporal Representativeness	Low
	Metric 5:	Sample Size	Medium
			Data is over 20 years old
			Samples characterized by an average with a maximum.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High
			Includes release media, process, unit operation, source of release, and release frequency
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High
			Addresses variability by testing two different incinerators, also addresses uncertainty in its analysis.

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:	Waste treatment - hazardous waste incineration

EXTRACTION

Parameter	Data
Release quantity:	0.03 tons/yr of worst case scenario HWI emissions, TRI releases 54 tons/year (1990)
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability			
	Metric 1: Methodology	High	Methodology conducted by EPA
Domain 2: Representativeness			
	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	High	Applicable to chemical of interest
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old (1993)
	Metric 5: Sample Size	Low	Data not characterized by statistics
Domain 3: Accessibility/ Clarity			
	Metric 6: Metadata Completeness	Medium	Includes release media, activity of source release
Domain 4: Variability and Uncertainty			
	Metric 7: Metadata Completeness	Medium	Data addresses variability by sampling from different HWI facilities but not uncertainty

Overall Quality Determination**Medium**

Study Citation:	Earthjustice, (2020). Exhibit 1 to comments of rubbertown emergency action et al., re: TSCA risk evaluations for high-priority substances and substances undergoing manufacturer-requested risk evaluations.		
HERO ID:	10385015		
Conditions of Use:	Disposal		
EXTRACTION			
Parameter	Data		
Description of release source:	Disposal from chemical plants, refineries, paper mills, and wastetreatment facilities in various regions in Texas.		
Release quantity:	Releases & Transfers of High Priority Chemicals (Port Arthur, TX Area) 2012-2018 (lbs): Air = 6; Total = 6; Offsite Transfer = 24; Incoming Waste Transfer = 20,397; % of Nationwide Total (releases) = 0.0004; % Nationwide Total (Offsite Transfers) = 0.002; % Nationwide Total (Incoming Waste Transfers) = 1.825Releases & Transfers of High Priority Chemicals (Houston, TX Area) 2012-2018 (lbs): Air = 4,745.72; Total = 4,745.72; Offsite Transfer = 131,372; Incoming Waste Transfer = 128,115.90; % of Nationwide Total (releases) = 0.325; % Nationwide Total (Offsite Transfers) = 11.375; % Nationwide Total (Incoming Waste Transfers) = 11.465Releases & Transfers of High Priority Chemicals (Mossville, LA Area) 2012-2018 (lbs): Incoming Waste Transfer = 1,126; % Nationwide Total (Incoming Waste Transfers) = 0.101Releases & Transfers of High Priority Chemicals in Cancer Alley, 2012-2018 (lbs): Air = 3,594.20; Land = 1,126.00; Underground injection = 102,300.00; Total =105,951.20; Offsite Transfer = 45,000.00; % of Nationwide Total (releases) = 7.263; % Nationwide Total (Offsite Transfers) = 3.896		
Release or emission factors:	Release or emission factors		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Release data are from Toxics Release Inventory.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evalu- ated.
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	Data collected in past 10 years.
	Metric 5: Sample Size	High	Discrete release data provided.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Annual releases provided for various release media. However, no additional metadata is provided.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability is addressed through collection of data throughout various regions of Texas. However, measurement uncertainty is not characterized.
Overall Quality Determination		High	

Study Citation: ECC/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. (Disposal)
	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). 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:	Distribution in Commerce			
EXTRACTION				
Parameter	Data			
Description of release source:	Almost all of the phthalates consumed within the EU, including DBP, are transported by road tankers. The release during distribution of pure DBP relates to spillage and the cleaning of transport vessels. It is assumed that this release occurs to the waste water system outside the production site. (p. 13)			
Release quantity:	Table 0-1 (page 6): 0.0 t/y to air, 0.0 t/y to soil, and 6.1 t/y to wastewater, with the basis being 12,200 t/y handled.			
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	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; Distribution in Commerce COU
	Metric 4:	Temporal Representativeness	Medium	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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

Parameter	Data
Release quantity:	Table 0-1 (page 6): 0.9 t/y to air, 0.2 t/y to soil, and 13.8 t/y to wastewater, with the basis being 7,710 t/y handled. // Fig 0-1 (page 5) contains volumes from all lifecycle stages being disposed: 5,500 t/y to landfill, 2,200 t/y to incineration, 154 t/y to air, 126 t/y to soil, and 317 t/y to wastewater. // See Tab 2-12 for breakdown of releases of DBP from main solid waste operations.
Release or emission factors:	Release or emission factors
Waste treatment methods and pollution control:	nan

Domain	Metric	EVALUATION Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The release data methodology is known or expected to be accurate and is known to cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S., and locality-specific factors (e.g., potential differences in regulatory emission limits, industry/ process technologies) may impact releases relative to 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	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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:	Manufacturing			
EXTRACTION				
Parameter	Data			
Release quantity:	Table 0-1 (page 6): 0.1 t/y to air, 0.0 t/y to soil, and 0.9 t/y to wastewater, with the basis being 10,000 t/y handled. // Table 1-4 (page 12) provides more granularity:Site 1 = 0.0002 t/y air, 0 to soil, and 0.2 t/y to wastewater.Site 2 = 0.08 t/y to air, 0 to soil, and 0.7 t/y to wastewater.			
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., and locality-specific factors (e.g., potential differences in regulatory emission limits, industry/ process technologies) may impact releases relative to 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	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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 - Formulation			
EXTRACTION				
Parameter	Data			
Release quantity:	Table 0-1 (page 6): 5.2 t/y to air, 0.2 t/y to soil, and 6.2 t/y to wastewater, with the basis being 2,380 t/y handled. // Additional breakdown of estimated DBP releases from formulation in Table 2-7 on page 25.			
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., and locality-specific factors (e.g., potential differences in regulatory emission limits, industry/ process technologies) may impact releases relative to 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	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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 quantity:	Table 0-1 (page 6): 6.7 t/y to air, 10.3 t/y to soil, and 9.0 t/y to wastewater, with the basis being 8,300 t/y handled. // Additional breakdown in Tab 2-8 on page 25, titled "Estimated DBP 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		
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., and locality-specific factors (e.g., potential differences in regulatory emission limits, industry/ process technologies) may impact releases relative to 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	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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:	Consumer Uses			
EXTRACTION				
Parameter	Data			
Description of release source:	As the specific processes and end-product uses are notknown in detail, the releases have only been estimated with high uncertainty. It is, however, certain that the end-product uses represent the major part of the releases to air, soil and waste water during the entire life-cycle. (page 6)From page 29: DBP present in end-products is mainly released to the environment during their service-life by the following processes:• Emission to air by evaporation for both indoor and outdoor applications;• Leaching and abrasion; for indoor applications the substance is released to waste water by washing operations.• Leaching, abrasion and weathering; for outdoor applications the substance is released to waste water, surface water and soil by rainwater or as small pieces of the materials from abrasion.DBP, which is not released during the life of the end-products, will be present in the products at the time of disposal of these products and will be directed either to landfills or incineration.			
Release quantity:	Table 0-1 on page 6: 141 t/y to air, 115 t/y to soil, and 281 t/y to wastewater, with the basis being 8,250 t/y handled. // See Table 2-10 on page 29 for breakdown of DEP releases from end-products during their lifetime			
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	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	Medium	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, operations, equipment, and worker activities are 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	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:	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			
Release quantity:	See table 2-9 on page 32 of 87 to see the estimated emission factors and other information for DBP from waste incinerators based on data on Danish incinerators in 1994. The total emission in kg is 68			
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	From Denmark, an OECD country
	Metric 3:	Applicability	Medium	Data is from incinerators
	Metric 4:	Temporal Representativeness	Low	From 1994
	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 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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Processing			
EXTRACTION				
Parameter	Data			
Release quantity:	Dibutyl phthalate has also been detected in Canadian chemical plant effluents at concentrations within the range of 1 to 100 µg/L (Munro et al., 1985; OME, 1992a;b). Loadings in5/10/2020 ARCHIVED - Dibutyl Phthalate - PSL1 - Canada.cahttps://www.canada.ca/en/health canada/services/environmental-workplace-health/reports publicatons/environmental-contaminants/canadian environmental-protection-act-priority-substances-list-ass... 13/58 liquid effluents from Ontario’s organic chemical industry totalled about 1.7 kg dibutyl phthalate/day (12-month average) (OME, 1992a), while those from the inorganic chemical industry totalled about 0.06 kg dibutyl phthalate/day (12-month average) (OME, 1992b).(pg. 12-13/58)			
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	Medium	The data are from Canada, an OECD country	
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	Data is over 20 years old	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Processing - Plasticizers in textiles, apparel, and leather manufacturing			
EXTRACTION				
Parameter	Data			
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	Medium	The data are from Canada, an OECD country
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The release data methodology is not specified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from Canada, an OECD country
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	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:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.
HERO ID:	7349020
Conditions of Use:	Processing: Plastic 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	Medium	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation; 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	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include most critical metadata, including release media and emission factor, but lacks additional metadata, such as the activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Emission factor provided for only one process, therefore variability is not addressed. Uncertainty is documented.

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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: Processing: Plastic Product Manufacturing			
Domain		Metric	Comments
EVALUATION		Rating	
Overall Quality Determination		Medium	

Study Citation:	Fischer, J., Ventura, K., Prokes, B., Jandera, P. (1993). Method for determination of plasticizers in industrial emissions. Chromatographia 37(1-2):47-50.			
HERO ID:	5432720			
Conditions of Use:	Industrial use			
EXTRACTION				
Parameter	Data			
Area sampling data:	nan			
Description of release source:	Production lines, exhaust pipeline before and after air filter, chimney exhaust gas.			
Release quantity:	PVC plant DBP exposures ranged from 0.4 - 8.2 mg/m^3 depending on sampling location.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Journal is peer reviewed.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Czech Republic (OECD country)
	Metric 3:	Applicability	High	Report contains info directly applicable to COU but does not evaluate worker exposure, just output concentration of certain plant locations
	Metric 4:	Temporal Representativeness	Low	Report is from 1990 so greater than 20 years old
	Metric 5:	Sample Size	Low	Characterized by little to no statistical data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Contains release media
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Low		

Study Citation:	Fishbein, L. (1992). Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health 18(S1):5-16.			
HERO ID:	200024			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Release quantity:	Ground deposition of DEHP and DBP was estimated to be 200 tons a year and is a similar order of magnitude as the emissions.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data, method and techniques as approved by EPA.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is global, some US, some Sweden.
	Metric 3:	Applicability	High	Data is applicable to condition of use
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old
	Metric 5:	Sample Size	Low	Data characterized by no statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Includes release media but no other metadata
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty
Overall Quality Determination			Medium	

Study Citation:	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.
HERO ID:	10816795
Conditions of Use:	Non-incorporative activities - Solvent in Huntsman's maleic anhydride manufacturing technology

EXTRACTION

Parameter	Data
Description of release source:	releases occur primarily from absorber off-gassing and by decomposition. Absorber off-gasses are incinerated. DBP in solvent extractor is decomposed to phthalic acid under the process conditions and the aqueous waste stream is sent to deep well injection. Transport containers are sealed wrench tight and shipped to off-sight cleaning.
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	Data are from the U.S.
	Metric 3: Applicability	High	Data are for non-incorporative activities - solvent in Huntsman's maleic anhydride manufacturing technology, which is an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5: Sample Size	Low	No 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	Low	The release data study 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:	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 (e.g. similar to commercial use in floor coverings).
	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	Medium	Release data include most critical 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:	Kim, H., Tanabe, S. I., Koganei, M. (2019). The emission rate of newly regulated chemical substances from building materials. IOP Conference Series: Materials Science and Engineering 609(4):042046.			
HERO ID:	7978640			
Conditions of Use:	Building/construction materials			
EXTRACTION				
Parameter		Data		
Description of release source:		Building materials such as carpet, PVC flooring, water paint, and insulation. (2/7)		
Release or emission factors:		Release or emission factors		
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 Japan, an OECD country.
	Metric 3:	Applicability	High	Data are for building and constructions materials, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	High	Statistical distribution of samples is fully characterized (discrete sampling data provided).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Uncertainty is addressed in the sampling method and detection ranges. Variability is addressed by sampling multiple building products multiple times.
Overall Quality Determination			High	

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:	Kruopiene, J., Dvarioniene, J., Dudutyte, Z., Stance, L., Buzelyte, J. (2014). The use of hazardous chemical substances in Lithuanian industry: how sound is it?. Journal of Cleaner Production 72:89-95.			
HERO ID:	5631621			
Conditions of Use:	waste/disposal			
EXTRACTION				
Parameter	Data			
Number of sites:	phthalate discharges identified at 7 different industries.			
Description of release source:	shipyards, car washing, regeneration of used oil, leakage from landfills, and supermarkets			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report is peer reviewed.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is for Lithuania, an OECD country.	
	Metric 3: Applicability	Low	Data contains information about the industries that DBP has been detected in samples but does not quantify the concentrations or amounts at which they were. It does provide values for DEHP. DBP was found in the following samples: shipyards, car washing, regeneration of used oil, leakage from landfills, and supermarkets.	
	Metric 4: Temporal Representativeness	High	Sampling conducted in 2011 so data is less than 10 years old	
	Metric 5: Sample Size	Low	Qualitative data characterized by no statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report documents results, methods and assumptions and data sources are generally described.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability across different release sources, does not address uncertainty.	
Overall Quality Determination		Medium		

Study Citation:	Lee, Y. J., Kim, Y. H., Kim, K., Lee, D. S. (2007). Development and evaluation of an aquatic ecological risk assessment system (KORECORisk) for the management of industrial complexes. Integrated Environmental Assessment and Management 3(4):508-516.			
HERO ID:	1323186			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Description of release source:	For a wastewater treatment plant for domestic and industrial loadings from the Daejeon 1 and 2 industrial complex, DBP use rate is 16.90 ton/year.			
Release quantity:	For a wastewater treatment plant for domestic and industrial loadings from the Daejeon 1 and 2 industrial complex, estimate effluent concentration of DBP is 0.222 ug/L and the release rate is 1.73e-2 mol/hr.			
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	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 is between 10 and 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		Low		

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:	Primary sources of DBP in WWTPs are industrial activities. The land application of sludge could be a potential source of phthalates and their alternatives.
Release quantity:	Average emission fluxes of DBP through discharges of sludge (kg/day/WWTP) and effluent (kg/day/WWTP), and per-capita discharge (g capita/day/WWTP) from wastewater treatment plants (WWTPs) in Korea: Domestic WWTPs - 61.4 in sludge and 48.6 in effluent and 0.35 per capita; Mixed WWTPs – 66.2 in sludge and 52.5 in effluent and 0.92 per capita; Industrial WWTPs – 78.1 in sludge and 61.9 in effluent and 428 per capita; Total – 68.7 in sludge and 54.5 in effluent and 131 per capita.
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 is known or expected to be accurate
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium
	Metric 3:	Applicability	High
	Metric 4:	Temporal Representativeness	High
	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. Supporting information document also provides data.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium
			The release data study provides only limited discussion of the 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:	Textile dyeing wastewater treatment

EXTRACTION

Parameter	Data
Number of sites:	4
Release quantity:	Mean concentration in wastewater was 1.98 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	Methodology is peer reviewed.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data is from China
	Metric 3: Applicability	Medium	Data is for textile-dyeing wastewater plants. Information could be applied to other US plants if similar treatment is used.
	Metric 4: Temporal Representativeness	High	Sampling conducted in 2017 so < 10 years old
	Metric 5: Sample Size	Low	Mean chemical concentration stated, but no other statistical information provided
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Includes release media but no other metadata
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing multiple sites but does not address uncertainty

Overall Quality Determination**Medium**

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:	Commercial use - vehicle exhaust			
EXTRACTION				
Parameter	Data			
Description of release source:	vehicles and traffic-related activities			
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	Medium	The data are from an OECD country other than the U.S.	
	Metric 3: Applicability	Low	Emissions from vehicles is not within scope. However, data may be useful for estimating similar releases.	
	Metric 4: Temporal Representativeness	High	Study conducted within the past 10 years and likely represents current emissions.	
	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 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	Low	The release data study does not address variability or uncertainty.	
Overall Quality Determination		Low		

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	The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation but data is general to phthalates, not specific to DBP.
	Metric 4: Temporal Representativeness	Low	Report is more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Uncertainty is addressed by discussing differences between studies. Variability isn't 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:	High	Methodology is known and expected to be accurate and cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Medium	Data are from Germany, an OECD country.
	Metric 3:	High	Data are for the disposal of phthalate wastes, an in-scope occupational scenario.
	Metric 4:	Medium	Data are greater than 10 years old but no more than 20 years old.
	Metric 5:	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:	High	Most critical metadata included.
Domain 4: Variability and Uncertainty	Metric 7:	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 - incineration			
EXTRACTION				
Parameter	Data			
Description of release source:	Release source is stack gas from the incineration process.			
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 for US
	Metric 3:	Applicability	Medium	Release data is for an occupational scenario but does not include any information regarding DBP but has information regarding other phthalates.
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5:	Sample Size	Low	No statistical data for DBP.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	No metadata for DBP samples
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing multiple sites but does not address uncertainty.
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:	Nohr, M., Horn, W., Jann, O., Richter, M., Lorenz, W. (2015). Development of a multi-VOC reference material for quality assurance in materials emission testing. Analytical and Bioanalytical Chemistry 407(11):3231-3237.			
HERO ID:	2718034			
Conditions of Use:	Lab study			
EXTRACTION				
Parameter	Data			
Release quantity:	DBP area-specific emission rates varied from 29 - 61 ug/m^2 hr. Relative standard deviation ranged from 6-10% depending on sampling day. DBP exposure behavior similar to DMP exposure behavior in article which was sampled over 192 -264 hours.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report does not use NIOSH/OSHA method but is well documented
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Germany (OECD country)
	Metric 3:	Applicability	Low	Data is a lab study but could be applied to occupational scenario for airborne DBP concentration
	Metric 4:	Temporal Representativeness	High	Report is from 2014 so <10 years old
	Metric 5:	Sample Size	High	Distribution of sample size varies over the course of many hours. Standard deviation, uncertainty values, and averages are provided.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment clearly documents sources, methods, results and assumptions
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Address variability by testing different conditions, addresses and calculates uncertainty in calculations
Overall Quality Determination			High	

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:	Commercial & Consumer Use			
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 low-cost jewelry (page 17/109). Releases typically occur during the first use of a product, when carrying out maintenance of the product, and due to wearing, exposure to heat or light or other ageing of the product (page 63/109).			
Release or emission factors:	Release or emission factors			
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 not chemical-specific (data is for DEHP).	
	Metric 4: Temporal Representativeness	Low	Paper was published in 2011, but most emission factor data is from 2002, which is greater than 20 years old.	
	Metric 5: Sample Size	Low	Emission factor data is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Release data include release source and emission factors. Formulas for release quantity are provided. Data lacks release frequency and waste treatment methods.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	The release data study does not address variability or uncertainty.	
Overall Quality Determination		Low		

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:	Disposal - incineration

EXTRACTION

Parameter	Data
Description of release source:	Incineration of hazardous waste
Release quantity:	Hazardous waste: 0.3 ng/kJ of combustor heat range of 0-1.1; Coal Power plant: mean of 3.0 ng/kJ range of 0.09 - 8.7. 1 ng/kJ = 2.34 lb/MMBtu
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 collection was done by EPA
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	Low	Release data not for occupational scenario but could be applied to one.
	Metric 4: Temporal Representativeness	Low	Article is from 1992 so >20 years old
	Metric 5: Sample Size	Medium	Data represented by an average and range of values
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Provides operation equipment used and media but no other data
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing different equipment but does not address uncertainty.

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: Waste treatment/emission				
EXTRACTION				
Parameter	Data			
Description of release source:	Incineration is an engineered process that employs thermal decomposition via thermal oxidations at high temperature (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.			
Release quantity:	Mean hazardous waste DBP was 0.3 ng/kJ, municipal waste DPB was 3.9 ng/kJ, and Coal Power plant DBP waste was 3.0 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 uses high quality data and methods that do not indicate flaws in the data
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Medium	Report information could be applied to an occupational scenario.
	Metric 4:	Temporal Representativeness	Low	Data is from 1987 so it is greater than 20 years old
	Metric 5:	Sample Size	Low	Unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report does not provide other important metadata but documents sources and elaborates on topics clearly.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability but not uncertainty.
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	Cited data is mostly EPA and is a TSCA submission so likely is accurate.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Low	Data is for company waste incinerator which is in-scope, but the source does not contain any info for DBP specifically.
	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 but there is an uncertainty analysis conducted.

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

EXTRACTION

Parameter	Data
Description of release source:	The major sources of pollutants in the marine areas were the discharges from Shatt Al Arab, untreated domestic sewage, untreated industrial effluents, petroleum production, refining and transportation, in addition to atmospheric deposition.
Release quantity:	Total amount of wastewater treated in Kuwait's 4 treatment plant is 800,000 m3/day. Average concentrations of phthalates in the inflow and outflow of three sewage treatment plants were reported as: Sulaibiya water treatment plant (capacity 450,000 m3/day) – 19.7 and 3.0 ug/L; Um Al-Hyman plant (capacity 27,000 m3/day) – 29.4 and 3.9 ug/L; Kabd treatment plant (capacity 250,000 m3/day) – 31 and 5.1 ug/L. Three phthalates (DEP, DBP and DEHP) constituted about all of the residues (80% to 95%).
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:	High	methodology is known or expected to be accurate
Domain 2: Representativeness	Metric 2:	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Low	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation
	Metric 4:	High	Data is less than 10 years old
	Metric 5:	Medium	Distribution of samples is characterized by a range with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Low	Release data include release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Medium	The release data study provides only limited discussion of the variability but none on uncertainty

Overall Quality Determination**Medium**

Study Citation:	Schripp, T., Salthammer, T., Fauck, C., Bekö, G., Weschler, C. J. (2014). Latex paint as a delivery vehicle for diethylphthalate and di-n-butylphthalate: Predictable boundary layer concentrations and emission rates. Science of the Total Environment 494-495:299-305.		
HERO ID:	2510812		
Conditions of Use:	Paint emissions		
EXTRACTION			
Parameter	Data		
Description of release source:	emissions from applied paint		
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 (only covers emissions from applied paint).
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is from Germany, an OECD country
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	Data is less than 10 years old (2014)
	Metric 5: Sample Size	High	Distribution of sample type is small but there is a range of statistical data for what was tested
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		High	

Study Citation:	Schripp, T., Wensing, M. (2009). Emission of VOCs and SVOCs from electronic devices and office equipment. :405-430.			
HERO ID:	9493521			
Conditions of Use:	Electronic Products			
EXTRACTION				
Parameter	Data			
Description of release source:	TV sets, VCRs, fax machines, computers, printers, monitors, scanners, copiers, Cathode ray tube PCs, Thin-film transistor PCs all have polymeric content that may have VOC and SVOC emissions. Table 17.1 lists DBP as a chemical emitted from TV sets and and VCR (pdf pg. 3-4)			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Release methodology is expected to be accurate but may not cover all release sources at a particular site (i.e., release data is specific to source product, not necessarily an environment/site)
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	High	Release data are can be used for the commercial use of plastic products, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Release data include all associated metadata.
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:	Sendesi, T., S.M., Ra, K., Conkling, E. N., Boor, B. E., Nuruddin, M., Howarter, J. A., Youngblood, J. P., Kobos, L. M., Shannahan, J. H., Jafvert, C. T., Whelton, A. J. (2017). Worksite chemical air emissions and worker exposure during sanitary sewer and stormwater pipe rehabilitation using cured-in-place-pipe (CIPP). Environmental Science & Technology Letters 4(8):325-333.
HERO ID:	4173202
Conditions of Use:	Waste removal

EXTRACTION

Parameter	Data
Description of release source:	CIPP sewage line
Release quantity:	two sites had chemical sampling flux of DBP at 0.02 - 0.03 mg/m ² /s at one site and the other site had flux of DBP at 0.13 mg/m ² /s
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Data collection was conducted according to Standard Methods (1989), not OSHA/NIOSH but well documented
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	Low	Data is for municipal sewage line
	Metric 4: Temporal Representativeness	High	Sampling conducted in 2016 so less than 10 years old
	Metric 5: Sample Size	Low	Chemical concentration stated, but no other statistical information provided
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Includes release media but no other metadata
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing multiple sites but not uncertainty

Overall Quality Determination**Medium**

Study Citation:	Trenholm, A. R., Lee, C. C. (1987). Analysis of PIC and total mass emissions from an incinerator. Nuclear and Chemical Waste Management 7(1):33-36.
HERO ID:	1315839
Conditions of Use:	Disposal

EXTRACTION

Parameter	Data
Number of sites:	31
Description of release source:	municipal incinerator and coal-fired power plants
Release quantity:	Hazardous waste: 0.3 ng/kJ of combustor heat range of 0-1.1; Coal Power plant: mean of 3.0 ng/kJ range of 0.09 - 8.7. 1 ng/kJ (data is from study above)
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 collection was done by EPA
Domain 2: Representativeness	Metric 2: Geographic Scope	High	US data
	Metric 3: Applicability	Low	Release data not for occupational scenario since it is a municipal plant but it could be applied to a scenario.
	Metric 4: Temporal Representativeness	Low	Article is from 1987 so >20 years old
	Metric 5: Sample Size	Medium	Data represented by an average and range of values
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Provides operation equipment used and media but no other data
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing different equipment but does not address uncertainty.

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: Commercial use in ink, toner and colorant products

EXTRACTION

Parameter	Data
Description of release source:	Source estimates air releases from fugitive releases from ink chamber and the press process as well as stack releases from the oxidizer after the press process (pdf page 146)
Release quantity:	Calculated air release estimates provided for multiple types of inks (i.e. water-based, solvent-based, and UV-cured) on pdf page 148 and more in appendix 3-D (not included in the HERO file)
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium
			The release data methodology is known or expected to be accurate but may not cover all release sources at the site.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High
			The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium
			The report is for an occupational scenario within the scope of the risk evaluation but data is not chemical-specific.
	Metric 4:	Temporal Representativeness	Medium
			Report is between 10 and 20 years old.
	Metric 5:	Sample Size	Medium
			Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium
			Release data include most critical metadata, including release media and release frequency, but lacks additional metadata, such as process, unit operation, and/or activity that is the source of the release.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High
			Variability is addressed by including different types of inks and uncertainty is also discussed.

Overall Quality Determination**Medium**

Study Citation:	U.S. EPA, (2023). 2020 National Emissions Inventory (NEI) Data (August 2023 version).			
HERO ID:	11347319			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Description of release source:	Provides unit/process of release.			
Release quantity:	Provides media of release.			
Release or emission factors:	Release or emission factors			
Release frequency:	Provides annual operating time.			
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 2020.	
	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, (2024). Toxics Release Inventory (TRI) data: Dibutyl phthalate (DBP), reporting years 2017-2022.			
HERO ID:	12212773			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Description of release source:	Provides media of release.			
Release quantity:	Provides media of release and release data.			
Release or emission factors:	Release or emission factors			
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	TRI is U.S. based data.
	Metric 3:	Applicability	High	TRI includes industries included in the scopes of multiple chemicals.
	Metric 4:	Temporal Representativeness	High	TRI data are from 2017-2022.
	Metric 5:	Sample Size	Medium	Due to reporting requirements, statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	TRI includes some metadata but not all.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	TRI does not address variability or uncertainty in submitter provided data.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2024). Discharge Monitoring Report (DMR) data: Dibutyl phthalate (DBP), reporting years 2017-2022.			
HERO ID:	12212774			
Conditions of Use:	All			
EXTRACTION				
Parameter	Data			
Description of release source:	Provides media of release			
Release quantity:	Provides media of release and amount released			
Release or emission factors:	Release or emission factors			
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.
	Metric 5:	Sample Size	Medium	Universe is limited to NPDES permit holders; statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	DMR only includes some 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, (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.			
Release quantity:	2007 TRI data (EPA, 2009) for DBP and DEHP show total on-site and off-site releases of more than 336,000 pounds from 134 sites and 1,229,000 pounds from 251 sites, respectively; however, under TRI, some volume of releases are not reported by some facilities. These data also indicate that the volume of releases to particular media generally ranks in the following order (from highest to lowest release volume): land, air, water.			
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 evalu-ated.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The release data were collected after the most recent federal regulatory action or update but are generally, more than 10 years old. If no federal regulation is established, the data are more than 10 years but no more than 20 years old. However, 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. 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:	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, Portland cement kilns			
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	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	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 release data.
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 less than 10 years old.
	Metric 5: Sample Size	Medium	Universe is limited to units subject to NESHAP with threshold potential to emit, although states may have different requirements; statistical representativeness is unclear.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	NEI includes release media and generally also includes daily and annual operating time, specific unit/process that is the source of release, and presence of engineering controls.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	NEI does not address variability or uncertainty in submitter provided data.

Overall Quality Determination**High**

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 DBP.
	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 DBP.
	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 DBP.
	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 DBP.
	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 DBP.
	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 butldiene is then compressed, condensed, and pumped back to the tank farm storage area for subsequent reuse. The condenser tail gases and noncondensables pass through a butadiene adsorber/desorber unit, where more butadiene is recovered. Some noncondensables and VOC vapors pass to the atmosphere or, at some plants, to a flare system. The latex stream from the butadiene recovery area is then sent to the styrene recovery process, usually taking place in perforated plate steam stripping columns. Additional description provided.			
Release or emission factors:	Release or emission factors			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
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 DBP.
	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:	Use (Paints, coatings, adhesives)

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	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 and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The release data are for an occupational scenario within the scope of the risk evaluation but is not specific to DBP.
	Metric 4:	Temporal Representativeness	Low	Data is more than 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
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 theuncertainty in the release results.

Overall Quality Determination**Medium**

Study Citation: U.S. EPA, (1995). Ap-42: Chapter 4.12 - Manufacture of rubber products.
HERO ID: 7315841
Conditions of Use: emissions

EXTRACTION

Parameter	Data
Description of release source:	The mechanically created or externally added heat present during the six principal processes (mixing, milling, extrusion, calendaring, curing, and grinding) cause VOC and HAP to be emitted. Particulate matter is primarily emitted from the dry chemicals utilized in mixing and as a result of grinding.
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 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:	Releases from manufacturing of hot mix asphalt paving materials			
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	Data is general and not specific to this chemical. Although the condition of use is not included in the scope for DBP, the information may be used for similar condition of use like building/construction materials.
	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, (2021). National analysis TRI dataset (TRI): Data used for TSCA risk evaluations, reporting year 2019.			
HERO ID:	8347325			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Release quantity:	Provides release quantities on a per-site basis for specific release media, including fugitive air, stack air, water, land, energy recovery, recycling, treatment, etc.Total on- and off-site releases (gross) (lb): 2272039.939			
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 releases from all facilities.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	TRI is U.S. based data.	
	Metric 3: Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	High	TRI data are from 2019.	
	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	TRI only includes release media but no other metadata.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	TRI does not address variability or uncertainty in submitter provided data.	
Overall Quality Determination		Medium		

Study Citation: U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.
HERO ID: 8726953
Conditions of Use: All (Unloading/Loading)

EXTRACTION

Parameter	Data
Description of release source:	Manufacturers, processors and users may clean out drums with solvent (if solvent-based materials were in the drums) or with water (if water-based materials were in the drums). The rinsate may be either sent to onsite wastewater treatment, used in the process, or incinerated (offsite or onsite). This section discusses typical drum washing occurring at drum reconditioning facilities. Note that industrial facilities may employ these methods when cleaning drums. Further details within source (pdf pg. 6-9)
Release or emission factors:	Release or emission factors
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	Report also discusses emission factors provided by fragrance materials associations. This is not associated with a COU of DBP.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	The release data methodology is known but this methodology is specific to releases from a one release source (cleaning of transport containers).
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States.
	Metric 3: Applicability	High	Release data is applicable to multiple occupational scenarios within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	The report was published in 2010 but the underlying data for emission factors is based on 1987 study. Therefore the data are more than 20 years old.
	Metric 5: Sample Size	Medium	Characterized by mean and high-end emission factors but full statistical distribution is uncertain.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Release data include all associated metadata, including release media; process, unit operation, or activity that is the source of the release; and release frequency.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The release data study addresses variability in the determinants of release. The release data study addresses uncertainty in the release results.

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2019). TRI on-site and off-site reported disposed of or otherwise released (in pounds), for all industries.			
HERO ID:	8784984			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Release quantity:	Total on-site disposal or other releases in 2017 = 332,569 lbs; Total off-site disposal or other releases in 2017 = 14,183 lbs; Total on and off-site disposal or other releases in 2017 = 346,752 lbs.			
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	TRI is U.S. based data.
	Metric 3:	Applicability	High	The release data are for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	TRI data are from 2017.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics (just totals).
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	TRI only includes release media but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	TRI does not address variability or uncertainty in submitter provided data.
Overall Quality Determination			Medium	

Study Citation:	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.
HERO ID:	5740947
Conditions of Use:	Disposal - wastewater

EXTRACTION

Parameter	Data
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	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	Low	Data is greater than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	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:	Zhu, Q., Jia, J., Zhang, K., Zhang, H., Liao, C. (2019). Spatial distribution and mass loading of phthalate esters in wastewater treatment plants in China: An assessment of human exposure. Science of the Total Environment 656:862-869.
HERO ID:	5043529
Conditions of Use:	Wastewater treatment

EXTRACTION

Parameter	Data
Number of sites:	22
Description of release source:	wastewater plant
Release quantity:	4.52 tons/yr
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	Report is peer reviewed.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	Data is from China
	Metric 3: Applicability	Low	Data is a non-occupational scenario (municipal wastewater treatment) but contains information regarding total environmental output of the chemical of interest
	Metric 4: Temporal Representativeness	High	Samples taken during 2017 and 2018 so less than 10 years old
	Metric 5: Sample Size	High	Sample size is characterized across broad samples as well as statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results, methods, and assumptions but sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability across multiple sites but not uncertainty.

Overall Quality Determination**Medium**

Study Citation:	Middleton, P., Sockwell, R., Carter, L., W.P. (1990). Aggregation and analysis of volatile organic compound emissions for regional modeling. Atmospheric Environment, Part A: General Topics 24(5):1107-1133.			
HERO ID:	87136			
Conditions of Use:	Manufacturing/processing/disposal			
EXTRACTION				
Parameter	Data			
Release quantity:	18,000 metric tons per year (1980)			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Medium	Model is based on scientifically sound approaches or methods. Equations and choices of parameters are not fully described. Model is peer reviewed though.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from the US	
	Metric 3: Applicability	High	Model can be applied to occupational scenarios within the scope fo the risk evaluation.	
	Metric 4: Temporal Representativeness	Low	Model is based on data that is more than 20 years old.	
Domain 3: Accessibility/ Clarity	Metric 5: Metadata Completeness	Medium	Model approach is transparent. Equations and parameters are not transparent.	
Domain 4: Variability and Uncertainty	Metric 6: Metadata Completeness	Medium	Model takes into account variability by looking at releases across the country but does not take into account uncertainty.	
Overall Quality Determination		Medium		

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:	Waste treatment			
EXTRACTION				
Parameter	Data			
Number of sites:	1			
Release quantity:	240,000 m^3 of wastewater of paris and its suburbs. DBP concentration averaged 3.81 ug/L in the wastewater treatment plant			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Methodology well documented but not NIOSH/OSHA certified.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from France (OECD country)
	Metric 3:	Applicability	Uninformative	Not applicable since it is a municipal wastewater facility
	Metric 4:	Temporal Representativeness	High	Article from 2012 so <10 years old
	Metric 5:	Sample Size	Medium	Sample from one site taken over the course of a few months. Mean and max/min data provided
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Release media is water, other metadata not provided.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by testing over multiple days but not uncertainty
Overall Quality Determination		Uninformative		

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			
Description of release source: See Fig 4 and Table A3 - air concentrations near industry point sources were <1 to 15 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	Low	Data are for ambient air concentrations near industrial settings
	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			Medium	

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)			
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	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	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		
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 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: ECETOC, (1985). An assessment of the occurrence and effects of dialkyl ortho-phthalates in the environment.				
HERO ID: 679967				
Conditions of Use: Distribution (container cleaning)				
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	
		Metric 3: Applicability	High	
		Metric 4: Temporal Representativeness	Low	
		Metric 5: Sample Size	Low	
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:	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	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:	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			
Comments:	Unclear if this falls into occupational or consumer use			
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	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	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:	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 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, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter	Data			
Release quantity:	The estimated releases in the EU in 2007 are: 0.9 t/y to air, 0.2 t/y to soil, and 13.8 t/y to wastewater (Table 3). Basis is 7,710 t/y handled.			
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 - ECHA document).	
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.		
HERO ID:	7325020		
Conditions of Use:	Distribution / Transportation		
EXTRACTION			
Parameter	Data		
Release quantity:	The estimated releases in the EU in 2007 are: 0.0 t/y to air, 0.0 t/y to soil, and 6.1 t/y to wastewater (Table 3). Basis is 12,200 t/y handled.		
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Release quantity:	From three MFG sites, the estimated releases in the EU in 2007 are: 0.1 t/y to air, 0.0 t/y to soil, and 0.9 t/y to wastewater (p. 2 and Table 3). Basis is 10,000 t/y handled.			
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Formulation			
EXTRACTION				
Parameter	Data			
Release quantity:	The estimated releases in the EU in 2007 are: 5.2 t/y to air, 0.2 t/y to soil, and 6.2 t/y to wastewater (Table 3). Basis is 2,380 t/y handled.			
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	End-product use (plastics, paints, adhesives)			
EXTRACTION				
Parameter	Data			
Release quantity:	The estimated releases in the EU in 2007 are: 141 t/y to air, 115 t/y to soil, and 281 t/y to wastewater (Table 3). Basis is 8,250 t/y handled.			
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 - ECHA document).
	Metric 3:	Applicability	Medium	The scenario is a grouping of both commercial and consumer uses, including use of plastics and application of paints.
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Processing into plastic articles			
EXTRACTION				
Parameter	Data			
Release quantity:	The estimated releases in the EU in 2007 are: 6.7 t/y to air, 10.3 t/y to soil, and 9.0 t/y to wastewater (Table 3). Basis is 8,300 t/y handled.			
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.				
HERO ID:	5155558				
Conditions of Use:	Plastics product manufacturing				
EXTRACTION					
Parameter	Data				
Release quantity:	Open ProcessRaw materials handling: 18.6 kg/year to waterCompounding: 93 kg/year to airConversion: 465 kg/year to airPartially OpenRaw materials handling: 100 kg/year to waterCompounding: 499 kg/year to airConversion: 1,500 kg/year to airClosedRaw materials handling: 5 kg/year to waterCompounding: 255 kg/year to airConversion: 255 kg/year to air				
Release or emission factors:	Release or emission factors				
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 Plastics product manufacturing, 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	Low	Release media provided but no other metadata.	
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling at multiple sites, but uncertainty is not addressed.	
Overall Quality Determination			Low		

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Textiles, apparel, and leather manufacturing			
EXTRACTION				
Parameter	Data			
Release quantity:	4.7 kg/day released to air			
Release or emission factors:	Release or emission factors			
Release frequency:	300 days/year			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	Low	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 Textiles, apparel, and leather manufacturing, 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 controls.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Low		

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Manufacture			
EXTRACTION				
Parameter	Data			
Release quantity:	Site A: 0.08 kg/day to air; 47 kg/day to waterSite B: 0.07 kg/day to air; 0.377 kg/day to waterSite C: 0.18 kg/day to air; 0.41 kg/day to water			
Release frequency:	Site A: 300 DPYSite B: 300 DPYSite C: 104 DPY			
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 and emission controls.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by sampling at multiple sites, but uncertainty is not addressed.
Overall Quality Determination		Medium		

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Manufacture of adhesives			
EXTRACTION				
Parameter	Data			
Release quantity:	Formulation in Adhesives (air):1.5 kg/dayProcessing/use in adhesives (air): 0.04 kg/dayFormulation in Adhesives (water): 1.8 kg/dayProcessing/use in adhesives (water): 4 kg/day			
Release or emission factors:	Release or emission factors			
Release frequency:	300 days/year			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	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 of adhesives, 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 controls.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by emission factors from multiple steps of manufacturing process but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Paint and coating manufacturing			
EXTRACTION				
Parameter	Data			
Release quantity:	Formulation in printing inks (air): 0.25 kg/dayProcessing/use in printing inks (air): 1.2 kg/dayFormulation in printing inks (water): 0.3 kg/dayProcessing/use in printing inks (water): 0.01 kg/day			
Release or emission factors:	Release or emission factors			
Release frequency:	300 days/year			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	Low	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 Use of Paint and coating manufacturing, 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 controls.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by emission factors from multiple steps of manufacturing process but uncertainty is not 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:	Use - Automotive Coating Application

EXTRACTION

Parameter	Data
Description of release source:	Container cleaning, equipment cleaning, coating application (overspray). Releases to air, 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	Medium	Most of the data used is 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 multiple coating types.

Overall Quality Determination**High**

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

EXTRACTION

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

EXTRACTION

Parameter	Data
Description of release source:	Container cleaning, dusts and volatiles from unloading containers, vented losses during mixing, sampling, equipment cleaning, volatiles from loading containers, off-spec products. Releases to water, air, and land.
Release quantity:	Provides models for estimating various releases to air and non-air media during formulation of adhesives.
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, (2004). Emission scenario document on lubricants and lubricant additives.
HERO ID:	3827416
Conditions of Use:	Use of Lubricants and Functional Fluids

EXTRACTION

Parameter	Data
Description of release source:	Description of losses is included.
Release quantity:	Provides factors for estimating various releases
Release or emission factors:	Release or emission factors
Release frequency:	Provides typical release 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	Medium	The data are from an OECD country other than the U.S
	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	The completed exposure or risk assessment is 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	Medium	Uncertainty not addressed. Variability addressed by considering multiple additive types.

Overall Quality Determination**Medium**

Study Citation: OECD, (2011). Emission scenario document on the use of metalworking fluids.
HERO ID: 3827418
Conditions of Use: Use of Penetrants and Inspection Fluids

EXTRACTION

Parameter	Data
Description of release source:	Container Residue Release, Dragout Losses, Filter Media and Other Recycling Wastes, Spent Metalworking Fluid Release,
Release or emission factors:	Release or emission factors
Release frequency:	246-249 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 limited statistics (mean and 90th percentile) 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 MWF types and chemical functions.

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
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	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 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, (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 Manufacturing			
EXTRACTION				
Parameter	Data			
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 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 - Plastic Additives			
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, (2019). Complementing document to the emission scenario document on plastic additives: Plastic additives during the use of end products.			
HERO ID:	6306751			
Conditions of Use:	Use of plastic products			
EXTRACTION				
Parameter	Data			
Description of release source:	Release during product use. Releases to air.			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	This ESD was not developed by EPA, but another OECD-member country.	
	Metric 3: Applicability	High	Data is for an in-scope occupational scenario and contain chemical-specific emission factors	
	Metric 4: Temporal Representativeness	High	Assessment is based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Low	Sample distribution is characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Variability addressed by presenting emission factors for multiple additive types. Uncertainty is addressed in methodology for measuring emissions.	
Overall Quality Determination		High		

Study Citation:	OECD, (2011). Emission scenario document on the chemical industry.			
HERO ID:	6306753			
Conditions of Use:	Manufacture, processing, use			
EXTRACTION				
Parameter	Data			
Description of release source:	Stack Air: Reactor vents, distillation column vents, absorber units, strippers, sumps/decanter, dryers, cooling vents Fugitive Air: Valves, pump seals, compressor seals, pressure-relief valves, flanges/connections, open-ended lines, sampling connections Water: Drum cleaning, equipment cleaning, aqueous distillation streams, extraction, reaction water, absorption, solids-liquids separation, adsorption, condensation. Releases to air 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 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
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 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
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Study Citation:	Science Applications International Corporation, (1996). Generic scenario for automobile spray coating: Draft report.
HERO ID:	6311222
Conditions of Use:	Commercial Use: Paints and coatings

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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).
HERO ID:	10366192
Conditions of Use:	PVC Plastics Compounding

EXTRACTION

Parameter	Data
Description of release source:	Unloading containers, Container cleaning, dusts and fugitive emissions from compounding, equipment cleaning, loading, Direct contact cooling water releases to water
Release quantity:	Provides models for estimating various releases
Release or emission factors:	Release or emission factors
Release frequency:	246
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 and additive types.

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:	Recycling

EXTRACTION

Parameter	Data
Description of release source:	Unloading containers, Container cleaning, dusts and fugitive emissions from compounding, equipment cleaning, Direct contact cooling water releases to water
Release quantity:	Provides models for estimating various releases
Release or emission factors:	Release or emission factors
Release frequency:	246
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 and additive types.

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	10368811			
Conditions of Use:	Use of Penetrants and Inspection Fluids			
EXTRACTION				
Parameter	Data			
Description of release source:	container unloading, container cleaning, application and use of cleaning products			
Release or emission factors:	Release or emission factors			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality information/data from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data.
	Metric 3:	Applicability	Medium	Data 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, (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

EXTRACTION

Parameter	Data
Description of release source:	Unloading containers, Container cleaning, dusts and fugitive emissions from converting, equipment cleaning, Direct contact cooling water releases to water, trimming
Release or emission factors:	Release or emission factors
Release frequency:	253
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 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:	Incorporation into Formulations, Mixtures, or Reaction Products

EXTRACTION

Parameter	Data
Description of release source:	Unloading containers, container cleaning, dispersion and blending operations, sampling, equipment cleaning, filter wastes, loading, off-spec coating
Release quantity:	Provides models for estimating various air releases
Release or emission factors:	nan
Release frequency:	235-350
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 coating applications, and multiple chemical functions

Overall Quality Determination**High**

Study Citation:	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
HERO ID:	6304171			
Conditions of Use:	Incorporating into formulation, mixture, or reaction product: Plasticizers in plastic material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Description of release source:	Container residues, equipment residues, release of auxiliary blowing agents (ABAs), scrap or off-spec product disposal			
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.	
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 a chemical.	
	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	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	Uncertainty not addressed. Variability addressed by considering multiple foam types.	
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 Plasticizers in plastic material and resin manufacturing; incorporating into articles Plasticizers in plastics product manufacturing

EXTRACTION

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

EVALUATION

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

Overall Quality Determination**High**

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 and Use of Printing Inks

EXTRACTION

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

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability			
Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness			
Metric 2:	Geographic Scope	High	This GS is based on U.S. data
Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old.
Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity			
Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty			
Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple printing applications, and multiple chemical functions

Overall Quality Determination**Medium**

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: 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:	Incorporation into formulations, mixtures, or reaction product

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 and Use of Printing Inks

EXTRACTION

Parameter	Data
Description of release source:	PROC: Packaging disposal, material transfer, ink processing, equipment cleaning. VOC and particulate emissions are expected from the unloading of raw materials into the dispersion tank. Additional VOC emissions are expected as a result of heat-up losses and surface evaporation during the dispersion and milling operations as well as during the loading of the final ink product into receiving containers. Additional environmental releases are expected from waste streams associated with container and equipment cleaning. USE: disposal/cleaning of ink container, cleaning printing equipment, ink drying. A large portion of the releases from the printing industry are associated with VOC emissions. These come from the volatile components in the printing inks as well as from various solvents that are used for equipment cleaning. Air emissions are likely to result from unloading inks into the ink reservoirs on the printing press, the generation of ink mist during high speed printing operations, and fugitive emissions from various source points in the printing process (e.g. ink reservoirs, drying ovens). Additional environmental releases of chemicals contained in printing inks can result from residual ink wastes from container cleaning, and disposal of rags and solvents used to wipe down and clean printing equipment.
Release quantity:	PROC: See Table 2-4 for 2007 TRI data. Air releases = 190,832 lb/yr, Surface water releases = 29 lb/yr, POTW/Wastewater releases = 823 lb/yr, Land releases = 5,561 lb/yr, Other disposal = 51,303 lb/yr. USE: See Table 2-5 for 2007 TRI data based on the type of printing. Depending on the type of printing, Air releases = 14,150 to 5,865,923 lb/yr, Surface water releases = 0 to 275 lb/yr, Wastewater releases = 0 to 3,200 lb/yr, Land releases = 11 to 18,619 lb/yr, Other disposal = 1,767 to 210,010 lb/yr.
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Medium	The GS is more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Uncertainty not addressed. Variability not addressed.

Overall Quality Determination**Medium**

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:	Incorporation into article (Plasticizers in plastics product manufacturing)

EXTRACTION

Parameter	Data
Description of release source:	Container cleaning, spillage, dusts and fugitive emissions from converting, equipment cleaning, trimming wastes
Release quantity:	Provides models for estimating various fugitive air releases
Release or emission factors:	Release or emission factors
Release frequency:	137-254 days/yr
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	High	This GS is based on U.S. data
	Metric 3:	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	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:	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	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:	Commercial Uses: Paints and coatings

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, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.
HERO ID:	6385740
Conditions of Use:	Incorporation into formulation as plasticizers in soap, cleaning compound, and toilet preparation manufacturing

EXTRACTION

Parameter	Data
Description of release source:	equipment cleaning, spillage
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	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 chemical physical forms.

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 Formulation as Plasticizers in textiles, apparel, and leather 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-Plastics compounding

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:	Additives in Plastics Processing (Converting into Finished Products)

EXTRACTION

Parameter	Data
Description of release source:	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.
Release quantity:	Container Residue from Compounding Transport Container: Daily Release from Container Residue (kg/site-day) = Daily Use Rate (kg/site-day) x Loss Fraction Dust Generation from Converting Activities Released to Water or Landfill: Daily release of dust = daily use rate x loss fraction Fugitive Air from Converting Activities Released to Water or Air: Daily release to water (or air) from volatilization = daily use rate x loss fraction Residual from Converting Equipment Cleaning: Daily release from equipment cleaning = daily use rate x loss fraction Trimming Waste: Daily release from trimmings = daily use rate x loss fraction
Release or emission factors:	Release or emission factors
Release frequency:	CEB standard assumption, 250 days per year based on 5 day work week and two weeks per year of operation shut down.
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment uses high quality data and methods that are from a frequently used source 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. However, data are not chemical specific.
	Metric 4:	Temporal Representativeness	Low	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	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 by evaluation of various sources of release, but uncertainty in release estimation is not addressed.

Overall Quality Determination**Medium**

Study Citation:	APR, (2020). U.S. post-consumer plastic recycling data.			
HERO ID:	11360400			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Release quantity:	4,803.8 million pounds of post-consumer plastic material sourced in the U.S. is recycled, which accounts for 57.1% of all bottles, 20.5% of all films, and 0.3% of all other plastics used.			
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 from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for recycling, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	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 the different plastic products that are recycled, but uncertainty is not addressed.
Overall Quality Determination			High	

Study Citation:	Björklund, K. (2010). Substance flow analyses of phthalates and nonylphenols in stormwater. Water Science and Technology 62(5):1154-1160.		
HERO ID:	6813724		
Conditions of Use:	Consumer use of plastics		
EXTRACTION			
Parameter	Data		
Description of release source:	Emission of phthalates and NP/EOs from vehicles is assumed to be a result of wear and tear during driving and deposition on parking areas through migration from car components and washed-out car care products. Other human activities in urban areas include diffuse sources such as shoe and textile wear, toys, paper and packaging, strollers and bicycles which may lead to emissions of phthalates and NP/EOs. Roofing material, coil coating, car undercoating and paints have been estimated by the ECB to cause almost 80% of the DEHP emissions to surface water (ECB 2004a). In the current study, the remaining phthalate sources, including atmospheric deposition, sealants and human activities, are all minor sources contributing with only a few percent to total phthalate emissions to stormwater. Similar conclusions are drawn by the ECB, who reports that the remaining uses of phthalates, for example sealants, shoe wear and some applications of soft PVC, each give rise to approximately 2–7% of the total emissions.		
Release quantity:	The flow calculations showed that approximately 4.1 kg of the four phthalates are emitted annually to stormwater in the studied area (Figure 2a–d). The highest loads were found for DINP (2,200 g), followed by DIDP (1,100 g), DEHP (800 g) and DBP (12 g).		
Release or emission factors:	Release or emission factors		
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
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. The model can be appropriately applied to an occupational scenario within the scope of the risk evaluation. 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. Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative
	Metric 3: Applicability	High	
	Metric 4: Temporal Representativeness	Medium	
	Metric 5: Sample Size	Medium	
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 model has limited characterization of the variability of parameter values. The model has limited characterization of the uncertainty in the results.
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Study Citation:		Björklund, K. (2010). Substance flow analyses of phthalates and nonylphenols in stormwater. Water Science and Technology 62(5):1154-1160.		
HERO ID:		6813724		
Conditions of Use:		Consumer use of plastics		
Domain	Metric	EVALUATION		Comments
		Rating		
Overall Quality Determination		Medium		

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

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. 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:	Castaldi, F. J., Ford, D. L. (1992). Slurry bioremediation of petrochemical waste sludges. Water Science and Technology 25(3):207-212.
HERO ID:	657949
Conditions of Use:	Disposal - waste treatment

EXTRACTION

Parameter	Data
Description of release source:	effluent of bioreactor
Release quantity:	Raw waste had 8.9 ug/g; control reactor had 2,8 ug/g; other reactors had below 2.5 ug/g; all of these after 90 days of aeration.
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	Each reactor was different based on the amount of waste material per gram of microorganism seed for the reactors.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium
			Report uses high quality data and techniques that do not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High
	Metric 3:	Applicability	Low
	Metric 4:	Temporal Representativeness	Low
	Metric 5:	Sample Size	Low
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low
			Provides results but underlying methods, data sources, and assumptions are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium
			Addresses variability by using different reactor conditions but does not address uncertainty.

Overall Quality Determination**Low**

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:	Phthalates are industrial chemicals that are added to plastics to impart flexibility and resilience and are often referred to as plasticizers. Phthalates are also used as solubilizing and stabilizing agents in other applications. Phthalates are widespread in many products. Because they are not chemically bound to the plastics to which they are added, phthalates can be released into the environment during use or disposal of the product.			
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	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	Low	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	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:	Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.
HERO ID:	10186827
Conditions of Use:	Plasticizer in adhesive manufacturing

EXTRACTION

Parameter	Data
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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
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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.
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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	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.
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Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	No scope to address variability and uncertainty.
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Overall Quality Determination**High**

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	Release data are estimated from Ecology’s Puget Sound Toxics Loading Study which does not indicate flaws or quality issues, but underlying methodology 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, release estimates are not for DINP specifically.
	Metric 4: Temporal Representativeness	Medium	Release estimates are based on data that is more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	Low	No sample statistics provided for release estimation.
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 of releases.
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			
Description of release source: Environmental release of phthalates occurs from phthalatemanufacturing plants (DEHP and DBP only).				
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	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Report addresses variability among phthalates but uncertainty is not addressed.
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:	Industrial Use			
EXTRACTION				
Parameter	Data			
Description of release source:	Environmental release of phthalates occurs from downstream use of phthalates (DEHP and DBP only) and from the article service life (including the waste stage).			
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	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Report addresses variability among phthalates but uncertainty is not addressed.
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			
Description of release source:		Release points includes reaction, neutralization and hydrolysis, filtration, water wash, flash distillation/steam stripping/N2 Stripping, Anti-oxidant addition, vessel cleaning, and Product Loading		
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	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Sample type is described qualitatively.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
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 quantity:	Flux concentrations varied by material and temperature. Vinyl flooring DBP flux rate (ug h^-1 m^-2) between 20 and 80 C varied up to 1.3 x 10^2. For wallpaper it varied up to 6.2 x 10^2. For leather it varied up to 1.0 x 10^2. Activation energy of vaporization of DBP determined to be 77 kJ/mol			
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
	Metric 3:	Applicability	Low	Laboratory study but could be applied to other exposure scenarios
	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:	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:	Use			
EXTRACTION				
Parameter	Data			
Description of release source:	released from plastics during the various recycling and recovery processes and from the products produced from recyclates			
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	Low	Distribution of samples is qualitative or 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:	Junter, G. A., Jouenne, T., Vilain, S. (2002). Biological treatment of water using immobilized-cell systems. III. Phenolic compounds and other monoaromatics. Part 2. Chimica Oggi 20(7-8):77-83.			
HERO ID:	5360034			
Conditions of Use:	disposal			
EXTRACTION				
Parameter	Data			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	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	Treatment method information
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:	Li, X. (2018). Chemical emissions from plastic manufactured in water infrastructure.			
HERO ID:	5489083			
Conditions of Use:	Waste management - Waste transportation (piping)			
EXTRACTION				
Parameter	Data			
Description of release source:	Exhaust piping - manholes			
Release quantity:	concentration of release water ranged from 4.8 to 12.5 ug/L. Table 1.3			
Comments:	Three CIPP stormwater culvert installation sites in Syracuse, NY and one installation sitein Fairfax, VA were studied (Figure A.1)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	The assessment uses high quality data and techniques that do not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Low	Not for a condition of use but could be applied to releases.
	Metric 4:	Temporal Representativeness	High	Study is from 2018 so less than 10 years old.
	Metric 5:	Sample Size	Medium	Represented by some statistical data and unsure if it is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment clearly documents its data sources, methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across different sampling sites but not uncertainty.
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 quantity:	Concentrations in Residential House at 25 and 36 °CTotal airborne (μg/m3) for DnBP at 25 °C: 1.70Total airborne (μg/m3) for DnBP at 36 °C: 29.9Table 1 and Figure 1 also shows that the gas-phase concentration of DBP increases with increasing temperature. The gas phase concentration increases from 27.1 (μg/m3) to 4146 (μg/m3) from 25 °C to 55 °C.			
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report 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 by sampling phthalate concentrations in gas phase at various temperatures, but measurement uncertainty is not characterized.
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:	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	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. Datasources 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:	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	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. Datasources 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			Low	

Study Citation:	Naumczyk, J. H., Kucharska, M. A., Ladynska, J. A., Wojewodka, D. (2019). Electrochemical oxidation process in application to raw and biologically pre-treated tannery wastewater. Desalination and Water Treatment 162:166-175.
HERO ID:	5433479
Conditions of Use:	Disposal

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

High

Study is a peer-reviewed journal article, and associated information does not indicate flaws or quality issues.

Domain 2: Representativeness

Metric 2:

Geographic Scope

Medium

Study was conducted in Poland, an OECD country.

Metric 3:

Applicability

High

The data pertains to an occupational scenario, Plasticizers in textiles, apparel, and leather manufacturing, 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

Medium

Samples were fully characterized but only 2 samples were tested (A and D).

Domain 3: Accessibility/ Clarity

Metric 6:

Metadata Completeness

Medium

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.

Overall Quality Determination**High**

Study Citation: NIOSH, (1976). Occupational health guideline for dibutylphthalate.
HERO ID: 10182525
Conditions of Use: Disposal

EXTRACTION**Parameter****Data**

Waste treatment methods and pollution control: Waste treatment methods and pollution control

EVALUATION**Domain****Metric****Rating****Comments**

Domain 1: Reliability

Metric 1:

Methodology

High

NIOSH report is from a frequently use source, and generally accepted by the scientific community.

Domain 2: Representativeness

Metric 2:

Geographic Scope

High

U.S. data.

Metric 3:

Applicability

High

General information which may be applicable to multiple occupational scenarios 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

Medium

Report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.

Domain 4: Variability and Uncertainty

Metric 7:

Metadata Completeness

Medium

Uncertainty not discussed. Variability in waste disposal methods is included.

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:	Disposal

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	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	Information is mainly from Europe and some from USA.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Medium	The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability in waste treatment methods and release sources is described. Uncertainty is not addressed.

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:	Disposal of vinyl flooring			
EXTRACTION				
Parameter	Data			
Description of release source:	Releases from disposal of vinyl flooring (landfills). Lifespan of vinyl flooring is 30 - 50 years.			
Release or emission factors:	nan			
Waste treatment methods and pollution control:	Waste treatment methods and pollution control			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The data reported references an RFCI product declaration report which is not a frequently used source, but does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. However, data for DBP is not mentioned specifically.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability is described through the various types of materials used for vinyl flooring. However, uncertainty related to the quantity released to landfills annually is not characterized.
Overall Quality Determination		Medium		

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:	Wastewater treatment

EXTRACTION

Parameter	Data
Number of sites:	3
Description of release source:	Wastewater Treatment Plant
Release quantity:	3.3 mgd to wastewater. In plant effluent, DBP was either not detected but two instances of 0.45 lbs/day and 1.05 lbs/day were reported.
Waste treatment methods and pollution control:	nan

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data and methods that are used by EPA or are direct sampling.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US
	Metric 3: Applicability	Medium	Report is for an occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation in terms of type of industry
	Metric 4: Temporal Representativeness	Low	Report is older than 20 years old.
	Metric 5: Sample Size	Medium	Uncertain statistics but samples are representative
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents results, methods, and assumptions but sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	limited discussion of the variability and uncertainty

Overall Quality Determination

Medium

Study Citation:	Samsonova, A. S., Aleshchenkova, Z. M., Syomochkina, N. F., Baikova, S. V. (1996). Microbial decontamination of effluents from phthalate esters. Dechema Monographs 133:607-610.
HERO ID:	5433106
Conditions of Use:	Waste treatment

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 appears to use high quality data with sound techniques/methods that do not indicate flaws

Domain 2: Representativeness

Metric 2:

Geographic Scope

Low

Pilot plant where study was conducted was in Moscow. Russia is not an OECD country.

Metric 3:

Applicability

Medium

Report is for waste release method which is not for occupational exposure but can be applied to environmental releases.

Metric 4:

Temporal Representativeness

Low

Report is more than 20 years old

Metric 5:

Sample Size

Low

Samples not characterized by statistics

Domain 3: Accessibility/ Clarity

Metric 6:

Metadata Completeness

Low

Report provides results but underlying methods, sources and assumptions are not fully transparent

Domain 4: Variability and Uncertainty

Metric 7:

Metadata Completeness

Low

Does not address variability or uncertainty.

Overall Quality Determination**Low**

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:	SRC, (2001). Toxicological profile for di-n-butyl phthalate.
HERO ID:	2624719
Conditions of Use:	manufacturing

EXTRACTION

Parameter	Data
Number of sites:	184
Release quantity:	Release quantities reported for every state for air, water, injection, land , on and off site releases. Total amounts for air are 36,477 lbs/yr; for water are 279 lbs/yr; for injection are 290,000 lbs; for land 13,645 lbs/yr; for total on-site release 350,401 lbs/yr; off-site release is 50,350 lbs/yr.
Release or emission factors:	nan
Waste treatment methods and pollution control:	Waste treatment methods and pollution control

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data and sound methods that are from frequently used sources and does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Report is directly applicable to scope of risk evaluation
	Metric 4:	Temporal Representativeness	Low	Data is reported from exactly or greater than 20 years old.
	Metric 5:	Sample Size	Medium	Data is not representative of statistics but are likely sufficiently representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its data sources, results and assumptions
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability across states but not uncertainty.

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
Release or emission factors:	nan
Waste treatment methods and pollution control:	Waste treatment methods and pollution control
Comments:	Personal and area sampling not given in report. Numerical results are for emission testing data.

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	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 emission chamber testing methods. Variability addressed by testing emissions of different types of crumb rubber at different temperatures.

Overall Quality Determination	High
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Study Citation:	Zhu, L. (2015). Rejection of organic micropollutants by clean and fouled nanofiltration membranes. Journal of Chemistry 2015(934318):1-9.
HERO ID:	5933015
Conditions of Use:	Wastewater treatment with membrane filtration

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

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

Medium

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

Overall Quality Determination**Medium**

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: 0 mg/kg in gloves; 5,500 mg/kg (mean) in paints; 36,900 mg/kg (mean) in adhesives; 128 mg/kg (mean) in deodorant; 297 mg/kg (mean) in perfumes; 5,450 mg/kg (mean) in aftershaves; 39 mg/kg (mean) in hair styling products; 70 mg/kg (mean) in shampoo; 0 mg/kg (mean) in skin care products; 60,000 mg/kg (mean) in nail care; 5,300 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.
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		
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 210 tonnes in 2005 (for 144 preparations, mainly glues, paints, fillers, process regulators, coloring agents, surface treatment)			
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:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.003 ppm (N=114) (pg. 138)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.	
	Metric 3: Applicability	High	Data are for multiple in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	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	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Industrial Process Solvent Use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.003 ppm (N=114) (pg. 138)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3:	Applicability	High	Data are for multiple in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Import and Repackaging			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.003 ppm (N=114) (pg. 138)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data are from the Netherlands, an OECD country.
	Metric 3:	Applicability	High	Data are for multiple in-scope occupational scenarios.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.
	Metric 5:	Sample Size	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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

Study Citation:	ECB, (2008). European Union risk assessment report: 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta- γ -2-benzopyran (HHCB).			
HERO ID:	5155574			
Conditions of Use:	Incorporation into Formulations, Mixtures, and Reaction Products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.003 ppm (N=114) (pg. 138)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data are from the Netherlands, an OECD country.	
	Metric 3: Applicability	High	Data are for multiple in-scope occupational scenarios.	
	Metric 4: Temporal Representativeness	Low	Assessment is based on data greater than 20 years old and industry conditions that are expected to be outdated.	
	Metric 5: Sample Size	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	Low	Variability and uncertainty are not addressed.	
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:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume: About 2.7 x 10^6 tonnes/year of total phthalates are produced. DBP 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		
Life cycle description:	Breakdown of DBP by use in Table 2: 35.5% for other polymer applications, 24% for adhesives/sealants, 1.9% for lacquers and paints, 3% for other non-polymer applications. Per Annex 5: Based on data from industry (1995), an average of around 76% of the total DBP production is used as plasticiser in polymers, 14% in adhesives, 7% in printing inks and the remaining 3% of DBP is used in miscellaneous other 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	Medium	Data within report is greater 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	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
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:	Plastics			
EXTRACTION				
Parameter	Data			
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%. DBP is 1.3% in flooring. 1-5% in bags. The 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. PVC in the tested footwear contained up to 9.6% DBP. Another large producer informs that DEHP and DBP are used in very low concentrations (<1%) in balls. 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	Medium	Data within report is greater 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	The assessment provides only limited discussion of the variability and uncertainty in the results.
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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:	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:	Recycling			
EXTRACTION				
Parameter	Data			
Chemical concentration:	At global level DINP and DIDP represent only ca. 30% of the total consumption of plasticisers			
Comments:	Used applicable DINP and DIDP data as surrogate.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Global Data not U.S. data.	
	Metric 3: Applicability	High	Data are for recycling, 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 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	Low	Variability and uncertainty are not addressed.	
Overall Quality Determination		Medium		

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Processing into plastic articles			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the EU in 2007: 5,700 t/y for polymers formulation and processing (69% of total volume); 160 t/y for formulation and processing of fiber glass (2% of total volume) (Table 1).			
Number of sites:	The formulation and processing of DBP into preparations and into polymer products by major users take place at 50-100 sites in the EU (p. 7).			
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Application (use) of paints, adhesives, grouting agents, other non-polymeric			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the EU in 2007: 160 t/y for paints (2% of total volume); 1,900 t/y for adhesives (23% of total volume); 80 t/y for grouting agents (1% of total volume); 250 t/y for other non-polymeric (3% of total volume) (Table 2).			
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 - ECHA document).
	Metric 3:	Applicability	Medium	The scenario is for application of paints, adhesives, grouting agents, and other formulations, which can include industrial, commercial, and consumers.
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA's first Recommendation for the inclusion of substances in Annex XIV.
HERO ID:	7325020
Conditions of Use:	Manufacturing, export, use

EXTRACTION	
Parameter	Data
Production, import, or use volume:	The substance is manufactured in the European Union (EU) in a volume of less than 10,000 tonnes/year in 2007 (COWI, IOM & Entec, 2009). The manufacture has decreased over the last 10 years from 26,000 tonnes/year in EU-15 in 1998. A net export of approximately 2,000 tonnes/year is estimated (COWI, IOM & Entec, 2009). Thus, it is estimated that the net use of DBP in the EU is approximately 8,000 tonnes/year in 2007. // EU Manufacture and use is 8,250 t/y in 2007 (table 2).
Life cycle description:	The manufactured DBP is either further processed - mainly as gelling aid and plasticiser - in various types of polymers (PVC and other polymers) or formulated as component in preparations (e.g. adhesives, grouting agents, paints). DBP is a specialist plasticiser often used in combination with other high molecular weight phthalates. It is also used as a gelling aid in combination with other plasticizers for nitrocellulose, cellulose ether, and polyacrylate and polyacetate dispersions. Applications mentioned include floor coverings, gelling additives, adhesives and dispersions (COWI, IOM & Entec, 2009). It is worthwhile noticing that DBP when used as a plasticiser is not chemically bound in the matrix. This leads to a wide range of end products (COWI, IOM & Entec, 2009) in addition to interior and outdoor polymer applications such as e.g. advanced textile products, coating and primary packaging of medicinal products, military propelling charges, explosives, equipments for nuclear installations, catalysts for the production of polypropylene (RCOM, 2009). (p. 2).

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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.

Overall Quality Determination

Medium

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.		
HERO ID:	7325020		
Conditions of Use:	Use of plastic products (interior and exterior)		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In the EU in 2007: 2,930 t/y for interior use of plastics (36% of total volume); 2,930 t/y for exterior use of plastics (36% of total volume)(Table 2).		
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium	

Study Citation:	ECHA, (2009). Background document for dibutyl phthalate (DBP): Document developed in the context of ECHA’s first Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	7325020			
Conditions of Use:	Formulation (paints, adhesives, grouting agents, other non-polymeric)			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the EU in 2007: 160 t/y for paints (2% of total volume); 1,900 t/y for adhesives (23% of total volume); 80 t/y for grouting agents (1% of total volume); 250 t/y for other non-polymeric (3% of total volume) (Table 1).			
Number of sites:	The formulation and processing of DBP into preparations and into polymer products by major users take place at 50-100 sites in the EU (p. 7).			
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 - ECHA document).
	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	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination			Medium	

Study Citation:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Textiles, apparel, and leather manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10% concentration in production of glass fibers (Table 3.4)			
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 the European Union.
	Metric 3:	Applicability	High	Data are for textiles, apparel, and leather manufacturing, 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 described qualitatively.
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:	ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.			
HERO ID:	5155558			
Conditions of Use:	Paint and coating manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5% concentration in printing inks (Table 3.4)			
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 the European Union.	
	Metric 3: Applicability	High	Data are for paint and coating manufacturing, 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 described qualitatively.	
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:		ECJRC, (2004). European Union Risk Assessment Report: Dibutyl phthalate with addendum to the environmental section - 2004.		
HERO ID:		5155558		
Conditions of Use:		Adhesive Manufacturing		
EXTRACTION				
Parameter		Data		
Chemical concentration:		10% DBP in formulation (Table 3.4)		
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 the European Union.
		Metric 3: Applicability	High	Data are for adhesive manufacturing, 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 described qualitatively.
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:	EPA,, Danish (2011). Annex XV restriction report: Proposal for a restriction, version 2. Substance name: bis(2-ehlylhexyl)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 7:8,250 t/y is manufactured for use in articles, 0 t/y is imported or exported		
Life cycle description:	Breakdown of DBP by use in Table 7: 35.5% for other polymer applications, 24% for adhesives/sealants, 1.9% for lacquers and paints, 3% for other non-polymer applications. Per Annex 3: Based on data from industry (1995), an average of around 76% of the total DBP production is used as plasticiser in polymers, 14% in adhesives, 7% in printing inks and the remaining 3% of DBP is used in miscellaneous other applications.		
Chemical concentration:	>= 99%		
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-ethylhexyl)phthlate (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP).			
HERO ID:	7265437			
Conditions of Use:	Plastics			
EXTRACTION				
Parameter	Data			
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%. DBP is 1.3% in flooring. 1-5% in bags. The 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. PVC in the tested footwear contained up to 9.6% DBP. Another large producer informs that DEHP and DBP are used in very low concentrations (<1%) in balls.			
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:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.		
HERO ID:	4730751		
Conditions of Use:	Deodorizing products		
EXTRACTION			
Parameter	Data		
Throughput:	0.55-1.02 g/sec used for spray deodorizer		
Chemical concentration:	358.860 mg DBP/kg product		
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	The assessment is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
	Metric 4: Temporal Representativeness	High	The assessment captures operations, equipment, and worker activities expected to be representative of current conditions. EPA has no reason to believe exposures have changed. The completed exposure or risk assessment is generally no more than 10 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The assessment addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		High	

Study Citation:	NICNAS, (2015). Priority existing chemical assessment report no. 40: Butyl benzyl phthalate.		
HERO ID:	3664467		
Conditions of Use:	Use as plasticizer		
EXTRACTION			
Parameter	Data		
Process description:	DBP is ‘not convenient’ as the primary plasticiser for PVC due to its high volatility (although it can be used as a secondary plasticiser) and is normally used for cellulose nitrate (p. 21). BBP is likely to substitute for DBP in any of its applications, but is not likely to substitute for DINP, which is a HMW phthalate commonly used in PVC toys and childcare articles (p. 21). The chemical DBP is reported to have uses in children’s toys and childcare articles in Australia (p. 22).		
Chemical concentration:	BBP (together with DEHP and DBP) ’shall not be used as substances or in mixtures, in concentrations greater than 0.1% by weight of the plasticised material, in toys and childcare articles (p. 16). Reported maximum DBP level of 0.45 % in children’s toys by the Australian industry (p. 23).		
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	Data are from Australia, an OECD country.
	Metric 3: Applicability	High	The assessment is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	Report is from 2015, which is less than 10 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The assessment provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		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) 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)			
Chemical concentration:				
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	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 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:	Use - Automotive Coating Application		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	”54,633,000 total gallons automotive refinish coatings/yr 99,747 - 1,097,457 gallons coating/yr (depending on coating type)”		
Life cycle description:	Automotive Coating Application		
Process description:	Repair/replace automotive surface, initial wash (water/detergent and/or solvent), sanding (dry or wet), mixing of primer coatings, spray paint (multiple layers of primer), curing/drying each layer, sanding (dry or wet), solvent wipe-down, mixing of each coating (basecoat and clearcoat), spray paint (multiple layers of basecoat and clearcoat), curing/drying each layer		
Throughput:	Op days: 250 days/yr. 0.25-12 gal coating/site-day, depending on number of jobs. Also provides method for adjusting the use rate based on the type of coating product used.		
Number of sites:	36,296		
Chemical concentration:	15-25%		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data.
	Metric 3: Applicability	Medium	Data is for multiple in-scope occupational scenarios; however, data is general and not specific to a chemical.
	Metric 4: Temporal Representativeness	Medium	Most of the data used more than 10 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		High	

Study Citation:	OECD, (2009). Emission scenario documents on coating industry (paints, lacquers and varnishes).		
HERO ID:	3827298		
Conditions of Use:	Processing and Use: Formulation of Coatings and Use of Coatings		
EXTRACTION			
Parameter	Data		
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: Adhesives and sealants		
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/yr & 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.		
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: 50-365 days/yr. Provides methodology for estimating throughput based on the amount of adhesived 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, (2004). Emission scenario document on lubricants and lubricant additives.			
HERO ID:	3827416			
Conditions of Use:	Use of Lubricants and Functional Fluids			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides UK total production per year			
Process description:	Includes description of different lubricants			
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	The data are from an OECD country other than the U.S.
	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	Document is from 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, (2011). Emission scenario document on the use of metalworking fluids.			
HERO ID:	3827418			
Conditions of Use:	Use of Penetrants and Inspection Fluids			
EXTRACTION				
Parameter	Data			
Life cycle description:	Metalworking Fluids			
Process description:	Mixing (water-based MWF), MWF added to metal shaping machine trough, metal shaping machine, shaped part rinse/dry			
Throughput:	4,260 gal MWF/site-yr (mean); 12,000 gal MWF/site-yr (90th percentile)			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, use rate, and operating days			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	This ESD was developed by EPA based on U.S. data	
	Metric 3: Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.	
	Metric 4: Temporal Representativeness	Medium	Assessment is generally based on data greater than 10 years old but no more than 20 years old and industry conditions that are expected to be representative of current industry conditions.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean and 90th percentile) 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 MWF types and chemical functions.	
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		
Production, import, or use volume:	1,500 - 9,100,000 kg adhesive/site-yr (46/189)		
Life cycle description:	Adhesive application		
Process description:	unloading, dilute and mix (optional), application (roll, spray, curtain, bead/syringe), drying/curing, product finishing		
Throughput:	Provides methodology for estimating throughput based on the amount of adhesives used, and the concentration of the chemical in the formulation.		
Number of sites:	541-22,294 (49/189)		
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	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 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, (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 Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Provides total synthetic rubber production and synthetic and natural rubber consumption in various EU (including UK) countries indicating EU accounts for 25% of world synthetic rubber production, and percentage used for various end-use products, and market share of various rubbers			
Life cycle description:	Rubber Manufacturing			
Process description:	Mastication and creation of mixtures, shaping, vulcanisation/curing			
Throughput:	Provides throughputs of various rubber product at a generic point source			
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 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 - Plastic Additives		
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 compounding and converting processing. Including the following compounding processes: tumbling, ball blending, gravity mixers, paddle mixers, intensive vortex mixers, banbury mixers, two roll mills, and extruder mixing. And the following converting processes: extrusion, injection molding, compression 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, (2011). Emission scenario document on the chemical industry.			
HERO ID:	6306753			
Conditions of Use:	Manufacture, processing, use			
EXTRACTION				
Parameter	Data			
Life cycle description:	Manufacture, formulation of processing aids, processing as a reactant, use of processing aids			
Process description:	General synthesis process consists of reaction, handling/transportation, isolation, handling/transportation, purification, handling/transportation, then either reaction to make another chemical or on to the next life cycle stage			
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	N/A	N/A - This metric is not applicable to the data being extracted (process description only)	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	N/A - This metric is not applicable to the data being extracted (process description only)	
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:	UK: 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			
Production, import, or use volume:	Table 1-2 has 2005 North American Market for Radiation Curable Products by End Use Category			
Life cycle description:	Coating, Ink, and Adhesive Application			
Process description:	Unloading from containers, dilute and mix (optional), application (roll, spray, curtain), UV/EB curing			
Throughput:	Provides methodology for estimating throughput based on the amount of product produced, and the concentration of the chemical in the formulation			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the use rate, and the concentration of the chemical in the formulation			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This ESD was developed by EPA based on U.S. data.
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	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:	Commercial Use: Paints and coatings			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Auto OEM: 166,000 cars painted/yr per site. Auto refinish: 70-2,000 L paints/yr per 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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	PVC Plastics Compounding			
EXTRACTION				
Parameter	Data			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.			
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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Non-PVC Material Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.			
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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Fabrication or Use of Final Product or Articles			
EXTRACTION				
Parameter	Data			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.			
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, (2021). Use of additives in plastic compounding – Generic scenario for estimating occupational exposures and environmental releases (Revised draft).			
HERO ID:	10366192			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic			
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.			
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, (2022). Chemicals used in furnishing cleaning products - Generic scenario for estimating occupational exposures and environmental releases (revised draft).			
HERO ID:	10368811			
Conditions of Use:	Use of Penetrants and Inspection Fluids			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	total industry volume based on the default values in this GS are approximately 50,600,000 kg furnishing cleaning products/yr (average) and 203,000,00 kg cleaning products/yr (maximum)			
Life cycle description:	Cleaning Products			
Process description:	Receive chemicals, application and use of cleaning product, solution extraction from fabric and/or surfaces			
Throughput:	2.74 kg cleaning product /site-day (average); Table 3-2 gives daily throughput based on chemical function			
Number of sites:	Provides methodology to estimate number of sites based on chemical production volume, annual throughput			
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, (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.			
Process description:	Receive chemicals, weigh or measure chemical, add chemical to labware, dilute/add other laboratory chemicals, add sample, run analytical testing, dispose of sample and laboratory chemical waste.			
Throughput:	255 grams reagent/site-day (average); 2,000 mL reagent/site-day (average); Table 3-2 gives daily throughput for laboratory stock solutions.			
Number of sites:	Provides method to calculate - 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			
EXTRACTION				
Parameter	Data			
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			
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	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:	Incorporation into Formulations, Mixtures, or Reaction Products		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	1.6-16 million kg coatings/site-yr		
Life cycle description:	Formulation of Coatings		
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		
Throughput:	Provides methodology for estimating throughput based on the amount of coatings produced, and the concentration of the chemical in the coating		
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 coating applications, and multiple chemical functions
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (2004). Use of additives in foamed plastics – generic scenario for estimating occupational exposures and environmental releases – Draft.			
HERO ID:	6304171			
Conditions of Use:	Incorporating into formulation, mixture, or reaction product: Plasticizers in plastic material and resin manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	2,365 million lbs polyurethane foam/yr6,442 million lbs polystyrene/yr			
Life cycle description:	Flexible and Rigid Polyurethane Foam Manufacture			
Process description:	Converters mix plastic resins with additives, shaping/molding			
Number of sites:	566 total polystyrene sites, 610 total polyurethane foam sites			
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, but data is general and not specific to the chemical.	
	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	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	Uncertainty not addressed. Variability addressed by considering multiple foam types.	
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 Plasticizers in plastic material and resin manufacturing; incorporating into articles Plasticizers 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 -p. 3
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging
Throughput:	'Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic
Number of sites:	'Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic
Chemical concentration:	'Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic
Comments:	QC Note: This is an early draft of the Plastic Compounding GS and may not provide the most up to data info

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

Overall Quality Determination	High
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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 and Use of Printing Inks			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	11.9-373.8 million kg ink/yr (depending on printing application)			
Process description:	PROC: Vehicle consisting of resin, solvent, drying agents, and resn plasticizing oils is prepared, pigment blended into vehicle, fed to dispersing mill, raw ink let down with additional solvent and other additives, packaged for sale.USE: Provides descriptions for lithography, gravure, flexography, letterpress, digital priting, and screen printing.			
Throughput:	Provides methodology for estimating throughput based on the amount of ink produced, and the concentration of the chemical in the ink for both PROC and USE			
Number of sites:	PROC: 13-239 (depending on printing application)USE: 454-18,622 (depending on printing application)			
Chemical concentration:	Provides conc. estimates based on chemical function, not chemical specific.			
Comments:	QC Note: This is an early draft of the Printing Ink GS and may not provide the most up to date info			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Assessment uses high quality data/techniques/methods from frequently-used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	This GS is based on U.S. data
	Metric 3:	Applicability	Medium	Data is for an in-scope occupational scenario; however, data is general and not specific to a chemical.
	Metric 4:	Temporal Representativeness	Low	Assessment is based on data greater than 20 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Uncertainty not addressed. Variability addressed by considering multiple printing applications, and multiple chemical functions
Overall Quality Determination		Medium		

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:	Incorporation into formulations, mixtures, or reaction product			
EXTRACTION				
Parameter	Data			
Process description:	ink received in drums, charged to ink chamber, flexographic press, ink on substrate product.			
Throughput:	1,800 kg ink/site-day.			
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 and 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			
Process description:	PROC: Vehicle consisting of resin, solvent, drying agents, and resn plasticizing oils is prepared, pigment blended into vehicle, fed to dispersing mill, raw ink let down with additional solvent and other additives, packaged for sale.USE: Provides descriptions for lithography, gravure, flexography, letterpress, digital priting, and screen printing.			
Number of sites:	See Table 2-2: A total of 4,221 sites from 2007 data			
Chemical concentration:	Of the reviewed 15 chemicals, 8 chemicals were manufactured or imported in 100% concentration; 7 chemicals were manufactured or imported in concentrations < 100%.			
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:	Incorporation into article (Plasticizers in plastics product manufacturing)

EXTRACTION	
Parameter	Data
Process description:	Compounded resins received, unloaded, forming/molding/shaping, trimming, finishing (including coating operations)
Throughput:	Provides methodology for estimating throughput based on the amount of plastic produced, and the concentration of the chemical additive in the plastic
Number of sites:	Provides methodology for estimating number of sites based on chemical PV, the amount of plastic produced, and the concentration of the chemical additive in the plastic
Chemical concentration:	Provides conc. estimates based on additive function in various plastics, not chemical specific.

		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:	Commercial Uses: Paints and coatings			
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, (1991). Granular detergents manufacture - generic scenario for estimating occupational exposures environmental releases: Draft.			
HERO ID:	6385740			
Conditions of Use:	Incorporation into formulation as plasticizers in soap, cleaning compound, and toilet preparation manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Raw material receipt and storage, paste making (surfactant), adding additives, mixing and pumping, spray drying, cooling/screening/mixing, packaging			
Throughput:	300,000-500,000 kg detergent/site-day; may not include specific information for use of DBP			
Number of sites:	Provides estimate for estimating number of sites assuming 300 days/yr of operation, chemical PV, and concentration of chemical in detergent			
Chemical concentration:	Provides conc. estimates based on function of chemical in product			
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 chemical functions
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 Formulation as Plasticizers in textiles, apparel, and leather 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 - Plastics Compounding			
EXTRACTION				
Parameter	Data			
Life cycle description:	Plastics Compounding			
Process description:	Polymer pellets/resins received, blending/compounding into masterbatch, extrusion/shaping, packaging			
Throughput:	Op days/yr: 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.			
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:	Additives in Plastics Processing (Converting into Finished Products)

EXTRACTION

Parameter	Data
Production, import, or use volume:	Table 2 presents the types of thermoplastic resins, common uses, and 2003 production volume.
Life cycle description:	The plastic manufacturing industry can be divided into four sections: polymer manufacturing, compounding, converting, and “in-house” manufacturing. This generic scenario will address converting operations. Polymer manufacturing will not be included in this scenario. Compounders produce masterbatches of plastic resins with specific properties by blending the polymer (resin), additives, fillers, and reinforcements. Converters receive the masterbatch of plastic resin from compounders and form finished plastic products. Compounding and converting may take place at the same facility (“in-house” manufacturing) or at separate facilities. This scenario assumes that compounding and converting take place at separate facilities; therefore, in-house manufacturing is not covered in this scenario.
Process description:	Various plastic processing operation descriptions are provided in Table 5, and a Process Diagram is provided on PDF pg. 10. More generally, 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.
Throughput:	Daily use rate = amount of resin / # converting sites / days of operation x fraction of additive x fraction of chemical in additive
Number of sites:	Overall, there were 12,191 Plastic Product Manufacturing establishments in 2001. Table 1 provides Number of Establishments for subcategories of NAICS 3261 Plastic Product Manufacturing.
Chemical concentration:	Default values used to represent the weight fraction of various additives in plastic resin range from 0.001 - 0.5. These values are provided in Table 2 and Table 3.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment uses high quality data that are from a frequently used source 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. However, data is not chemical specific.
	Metric 4: Temporal Representativeness	Low	Data are 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

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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:		Additives in Plastics Processing (Converting into Finished Products)		
EVALUATION				
Domain		Metric	Rating	Comments
	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 by evaluation of various plastic processing operations, as well as various additive fractions. However, uncertainty associated with data are not characterized.
Overall Quality Determination			Medium	

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:	Coatings and adhesives			
EXTRACTION				
Parameter	Data			
Life cycle description:	The chemical is used in plasticizers. It’s used as an additive in coatings and adhesives. It is sometimes also found as an impurity in coatings and adhesives.			
Chemical concentration:	Specialty products may contain amounts above 10%.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	The data and data sources for concentration of DBP in specialty products are not provided.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is not characterized.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	Agency for Toxic Substances and Disease Registry (ATSDR) (2001). Toxicological profile for di-b-butyl phthalate.			
HERO ID:	5160123			
Conditions of Use:	Phthalate manufacturing/plasticizer			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In 1994, more than 17 million pounds (7.8 million kg) were made. Production volume records reported along with di-iso-butyl phthalate. From 1980 to 1994 production volumes are reported ranging from 6,555 kg up to 11,573 kg depending on the year on Table 5-1. Total imported in 1997 was 358,600 pounds, for 1998 was 567,000 pounds. in 1977, 937 pounds were exported.			
Process description:	Manufacturing via esterification of phthalic acid with n-butyl alcohol in the presence of a catalyst such as sulfuric acid or p-toluene sulfonic acid. Performed at a tempearture of 150 C along with agitation. Water in the process is recovered for other operations or treated and discharged as waste water. DBP is finally purified by vacuum distillation and/or with activated charcoal. The majority of phthalate esters are produced in Europe with the US, Asia, and Pacific rim countries producing similar amounts of each			
Number of sites:	2			
Physical form:	liquid, mist, vapor			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from reputable sources that do not indicate flaws in the data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	High	Data is directly applicable
	Metric 4:	Temporal Representativeness	Low	Report is from 2001 but most data referenced is greater than 20 years old.
	Metric 5:	Sample Size	High	Samples are representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Report clearly documents its data sources, assessment methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability and uncertainty.
Overall Quality Determination		High		

Study Citation:	Anonymous (2001). Toy safety: European Commission extends ban on phthalates. Europe Environment (12 June 2001):415.			
HERO ID:	7978472			
Conditions of Use:	Use in Toys			
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	Uninformative	Data are for children’s toys, which is not in-scope or similar to 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	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		Uninformative		

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)."			
Life cycle description:	% of total recovered for recycling: All bottles: 57.1%PET Bottles: 36.8%HDPE Bottles: 19.6% PP & Other Bottles: 0.7%Non-bottle Rigid: 22.0%Film: 20.5%Other Plastics: 0.3%			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data from frequently-used sources.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.	
	Metric 3: Applicability	High	Data are for recycling, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	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		High		

Study Citation:	APR, (2023). Model Bale Specifications: 1-7 ALL Rigid Plastics.			
HERO ID:	11374516			
Conditions of Use:	Recycling			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Bales are 15-20 lb/ft3 and standard bale sizes are 30”x42”x48” or 30”x48”x60” (525-1,000 lbs or 240-453 kg) and that a single truck load is typically a minimum of 35,000 lbs (15,875 kg)			
Process description:	Recycled PVC arrives at a typical recycling site tightly baled as crushed finished articles.			
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	High	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for Recycling, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Data are no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Sample type provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by range of mass values, but uncertainty is not addressed.
Overall Quality Determination			Medium	

Study Citation:	Aqil, M., Ali, A., Sultana, Y., Najmi, A. K. (2004). Fabrication and evaluation of polymeric films for transdermal delivery of pinacidil. Die Pharmazie 59(8):631-635.			
HERO ID:	789466			
Conditions of Use:	Processing - Plasticizer in Polymeric Film			
EXTRACTION				
Parameter	Data			
Life cycle description:	The polymeric film is being developed for use in transdermal drug delivery for pinacidil, DBP is plasticizer. (page 1 of 5)			
Chemical concentration:	The polymeric films in the study is 5% w/w DBP (page 1 of 5)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The assessment or report uses high quality data and/or techniques or sound methods that are not from a frequently used source and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	From India, a non-OECD country
	Metric 3:	Applicability	Low	use as a plasticizer, but in a research setting
	Metric 4:	Temporal Representativeness	Medium	from 2003
	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	Low	The report does not address variability or uncertainty wrt DBP.
Overall Quality Determination			Low	

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			
EXTRACTION				
Parameter	Data			
Chemical concentration:	TDI is 10 ug/kg bw/day. Most samples had 0-0.1% DBP by mass, max was between 10.1 - 20%.			
Exposure route:	ingestion			
Physical form:	solid			
Comments:	Table 2. Page 3			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Journal is peer reviewed
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from New Zealand, an OECD country.
	Metric 3:	Applicability	High	Consumer use. Within the scope of the risk evaluation. (Toys, playground and sporting equipment)
	Metric 4:	Temporal Representativeness	High	Article is from 2018
	Metric 5:	Sample Size	Medium	Gives range of uncertain statistics, does not provide discrete samples
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report clearly documents results, methods and assumptions. Data sources are generally described but not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing across multiple different samples, addresses uncertainty by providing a limit of quantitation
Overall Quality Determination			High	

Study Citation:	ATSDR, (1999). Toxicological profile for di-n-butyl phthalate (update): Draft for public comment.			
HERO ID:	5676112			
Conditions of Use:	phthalate manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Production volume of DBP listed from 1979 to 1994. Values of production volume over those years ranged from 7,752,000 kg in 1994 at the smallest and 11,573,000 kg in 1988 as the most. In 1997, 45% of DBP was used for PVC plasticizers, 50% for other polymers. Table 4-2 provides number of facilities by state and range of DBP usage and classifies their activities and uses.			
Life cycle description:	DBP is manufactured and used as a plasticizer primarily in PVC. It can also be used as a solvent, insecticide, peroxide, fragrance fixative. Unsuitable for plastics exposed to high temperature bc it has a higher volatility to other plasticizers. DBP has also been used in cosmetics, lubricants, floor carpets, tapestry, nail polish, clothing treatments, rubber settings in dentistry, measurement of pore space in carbon black, dehydration of maleic acid, a fuel stabilizer in propellents, in nitroglycerin explosives as a desensitizer, solvent for chlorinated rubber, in leather varnishes and lacqueres, as an adjusting agent for lead chromate pigments, as a concrete additive to impart workability and in polyvinyl acetate emulsions. For disposal, facilities use incineration methods, washed out from containers, where wash water is passed through separators to remove residuals to then be incinerated. DBP waste can find its way into wastewater treatment plants after being washed off of products into treatment plants and be released into waterways. It can also be disposed into landfills.			
Process description:	Manufactured bia the esterification of phthalic acid with n-butyl alcohol in the presence of a catalyst such as sulfuric acid or p-toluene sulfonic acid. This reaction is generally performed at a temperature of 150 C along with agitation. Water from this process is either recovered for other operations or discharged as waste water. DBP is purified by vacuum distillation and/or activated charcoal.			
Number of sites:	108			
Physical form:	liquid, mist, vapor			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from TRI.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from the US
	Metric 3:	Applicability	High	Data is directly applicable to scope of use
	Metric 4:	Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5:	Sample Size	Medium	Data is likely not sufficiently representative since not all facilities that use DBP are required to report for TRI.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report documents results, methods and assumptions, sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability across different state’s reported uses, addresses uncertainty since not all facilities report.
Overall Quality Determination			High	

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:	Phthalate esters 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 772 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:	Björklund, K. (2010). Substance flow analyses of phthalates and nonylphenols in stormwater. Water Science and Technology 62(5):1154-1160.		
HERO ID:	6813724		
Conditions of Use:	Production of plastics		
EXTRACTION			
Parameter	Data		
Life cycle description:	One of the most important sources of phthalates is flexible PVC, where 95% of the phthalates are used as plasticisers (ECB 2003a,b, 2004a,b). Flexible PVC is often used for coating on roofing and cladding sheets or in products such as tarpaulins, cable coating and hoses. The remaining 5% of the phthalate consumption involves non-PVC polymers and non-polymer uses, such as paints and sealants.		
Chemical concentration:	the phthalates make up 35% of the PVC material		
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	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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 report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		Medium	

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:	Use			
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)			
Life cycle description:	DBP is used in latex adhesives, as a plasticizer in cellulose plastics, as a solvent for certain dyes, and, to a lesser extent than DEHP, as a plasticizer in PVC. (pg 1 of 6)			
Chemical concentration:	Based on phthalate concentrations in dust collected from 346 children’s bedrooms, DBP concentrations (mg/g dust) are: Mean - 0.226, Median – 0.150, Min–Max - 0.000–5.446, 95th percentile – 0.568 (pg 3 of 6) The most frequently identified phthalate was DEHP. DBP was found in 89% of the samples. The concentrations of DnBP, BBzP, and DEHP were higher in multifamily houses than in single-family houses, but the differences did not reach significance. (pg 3 of 6) Measurements of the 95th concentration (ug/g dust) of DBP in dust in different countries: USA – 44, and others. (pg 4 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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
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:	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)			
Process description:	DBP is one of the specialty phthalates, which is produced from alcohols of varying chain lengths. (pg 4 of 30) Small amounts of plasticizer (eg, DBP) are used as a processing aid in polystyrene (pg 19 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	Variability and uncertainty are not addressed.
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 was detected in 4 PVC films with migration levels ranging from 0.24 to 1.1 mg/dm2. (3/23) DBP and DCHP is present in printing ink formulations from 2-8% DBP, DiBP,and BzP in various paper towels were at levels of 1.9 to 2.9 and 9.0 mg/kg, respectively. (4/23)			
Comments:	Like many other PVC products, plasticizers such as phthalates are used in PVC tubing to makeit more flexible, and among which DEHP is the most frequently used with as much as 40% in the tubing (Ruuska and others 1987; Tsumura and others 2002a). Table 2— Concentrations of phthalates and adipates in foods.			
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 - Carbocrylic 3358-G.			
HERO ID:	6301510			
Conditions of Use:	Application of Paints and Coatings			
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 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 - Carbocrylic 3359 mixed metal oxide.			
HERO ID:	6301511			
Conditions of Use:	Application of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<5%			
Physical form:	Liquid			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	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:		Carboline Company (2018). SDS - Carbocrylic 3359 MC.		
HERO ID:		6301531		
Conditions of Use:		Application of Paints and Coatings		
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 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:	Care, S.W. (2016). SDS - SWC natureone renew.			
HERO ID:	6301548			
Conditions of Use:	Application of Paints and Coatings			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	2-3%			
		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 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:	Care, S.W. (2016). SDS - SWC natureone 100% acry EN CED.			
HERO ID:	6301556			
Conditions of Use:	Application of Paints and Coatings			
Parameter		EXTRACTION		
Data				
Chemical concentration:	2-3%			
Domain		Metric		EVALUATION
		Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	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:	Castle, L., Mayo, A., Gilbert, J. (1989). Migration of plasticizers from printing inks into foods. Food Additives and Contaminants 6(4):437-443.			
HERO ID:	790189			
Conditions of Use:	Consumer use - food packaging coating			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Retail confectionary product concentrations ranged from 0.2 to 9.2 mg/kg. DBP in snack food ranged from 0.1 to 14.1 mg/kg			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Sampling methodology is not OSHA/NIOSH but is documented.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from UK (OECD country)
	Metric 3:	Applicability	Uninformative	Data is from non-occupational scenario that is not in scope
	Metric 4:	Temporal Representativeness	Low	Article is from 1989 so all data is prior to that so >20 years old
	Metric 5:	Sample Size	Medium	Samples characterized by a range of values as well as averages. Data is given in charts to evaluate all samples taken.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Report provides clear results but data sources are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing different food products but does not address uncertainty.
Overall Quality Determination			Uninformative	

Study Citation:	CBC, (2014). Safety Data Sheet (SDS): Centerfire Pistol & Revolver and Rifle Cartridges.			
HERO ID:	6302648			
Conditions of Use:	Propellants			
EXTRACTION				
Parameter		Data		
Chemical concentration:		Concentration range 0.6-1.4 (4/17)		
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	Low	From non-OECD country
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	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:	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:	Dibutyl phthalates (both di-n-butyl and di-isobutyl phthalates, referred to as DBP) are industrial solvents or additives used in many personal care products such as nail polish and cosmetics, and also in some printing inks, pharmaceutical coatings, and insecticides.			
Chemical concentration:	Geometric mean of urinary Mono-isobutyl phthalate (MiBP), metabolite of DBP, (in $\mu\text{g/g}$ of creatinine), for the U.S. population from the National Health and Nutrition Examination Survey showed: Total – 2.54 – 3.57; Males – 2.22-3.32; Females – 2.88-3.96; Age group 6-11 years – 4.81-6.94; Age group 12-19 years – 2.68-3.41; Age group 20 years and older – 2.33-3.32.			
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	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	Facility data (gen. engineering data)
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	report clearly documents its data sources
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	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 Use of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Throughput:	Typical maximum daily usage, for any one substance, based on sector knowledge 1000 kg product/day at any one location. Also includes amounts based on chemical function:Pigment/extender/filler - 100.0 kg/dBinder - 100.0 kg/dWater - 350.0 kg/dOrganic solvent/coalescent - 450.0 kg/dAdditives - 5.0 kg/d			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Data are from published ESD and are generally accepted by the scientific community.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country(EU) other than the U.S.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not specific to DBP. Information is collected in general for the industry.
	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	Characterized by a maximum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results and assumptions. For extracted data, data sources or justification are 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:	Application of coatings and inks by spraying		
EXTRACTION			
Parameter	Data		
Throughput:	Typical maximum daily usage for any one substance, based on sector knowledge- 100 kg product/day. Includes estimates based on function:Pigment/extender/filler - 10.0 kg/dBinder - 10.0 kg/dWater - 35.0 kg/dOrganic solvent/coalescent - 45.0 kg/dAdditives - 0.50 kg/d		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	Data are from published ESD and are generally accepted by the scientific community.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	The data are from an OECD country(EU) other than the U.S.
	Metric 3: Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but information is not specific to DBP. Information is collected in general for the industry.
	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	Characterized by a maximum with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results and assumptions. For extracted data, data sources or justification are 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:	CertiPrep., SPEX (2017). Safety data sheet: Phthalates in polyethylene standard w/BPA.			
HERO ID:	6301542			
Conditions of Use:	Use of lab chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.30%			
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	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:	CertiPrep., SPEX (2017). Phthalates in polyethylene standard: Safety data sheet.			
HERO ID:	6301560			
Conditions of Use:	Use of Lab Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.30%			
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	The SDS 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:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Composition 0.2% (2/9)			
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:	Chao, K., Huang, C. S., Wei, C. Y. (2013). Extraction and percolation of PAEs from chemical protective gloves. Polymer Testing 32(8):1551-1557.			
HERO ID:	2346103			
Conditions of Use:	Chemical protective gloves			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP extracted concentration varied by extraction chemical. Chemicals were Acetone, Ethyl ether, Hexane, and Methanol. DBP conc in gloves (mg/g glove) from solvents on extraction: Neoprene - 0.007 +/- 0.001, 0.008 +/- 0.003, 0.013 +/- 0.006, 0.001+/- 0.000; Nitrile - 0.014 +/- 0.001, 0.017 +/- 0.003, 0.025 +/- 0.006, 0.013 +/- 0.006; PVC - 0.027 +/- 0.002, 0.022 +/- 0.009, 0.033 +/- 0.006, 0.019 +/- 0.008. DBP was extracted at different temperatures using hexane at 20, 40, 60 and 80 C. Neoprene - 0.013 +/- 0.006, 0.014 +/- 0.001, 0.016 +/- 0.001, 0.017 +/- 0.003; Nitrile - 0.029 +/- 0.006, 0.032 +/- 0.004, 0.041 +/- 0.003, 0.042 +/- 0.004; PVC - 0.037 +/- 0.006, 0.045 +/- 0.003, 0.069 +/- 0.009, 0.072 +/- 0.021			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Unclear if source is peer reviewed, source is controlled lab study and appears to be high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, a non-OECD country.
	Metric 3:	Applicability	Low	Data is not explicitly for an occupational scenario but could be applied to one where workers are required to wear neoprene, nitrile or PVC protective gloves.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old (2013)
	Metric 5:	Sample Size	Medium	Characterized by a range of data with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Provides data sources, methods, results and assumptions and are generally described.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by looking at different protective gloves and evaluating extraction of DEHP at different temperatures with different solvents. Does not address uncertainty.
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. 890000189:#86-890000189.			
HERO ID:	1335586			
Conditions of Use:	disposal - incineration			
EXTRACTION				
Parameter	Data			
Process description:	Incinerator process description is given on PDF pages 26 - 37, noted in the doc as A-7 to A-18.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Contractor for the analysis was hired by EPA, it is likely an approved method.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is for US
	Metric 3:	Applicability	Medium	Data is for waste incineration methods which is not an exact in scope of use but useful data in the source could be applied to site specific models for on-site incineration releases where DBP is manufactured or processed.
	Metric 4:	Temporal Representativeness	Low	Data is over 20 years old
	Metric 5:	Sample Size	Medium	Samples characterized by an average with a maximum
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Includes release media, process, unit operation, source of release, and release frequency
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	High	Addresses variability by testing two different incinerators, also addresses uncertainty in its analysis.
Overall Quality Determination			High	

Study Citation:	Clinical, Pentron (2014). SDS - TempSpan transparent temporary cement - base.			
HERO ID:	6301544			
Conditions of Use:	Use of lab chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	5-10 %			
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 for an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	Source is from 2014, which is 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	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 is addressed by providing a range but not uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Consumer, ITW (2008). Material Safety Data Sheet - WELDIT™ ALL PURPOSE ADHESIVE.			
HERO ID:	6301538			
Conditions of Use:	Application of Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	<3%			
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:	Cordeiro, C. F., Petrocelli, F. P. (2005). Vinyl acetate polymers.			
HERO ID:	10186827			
Conditions of Use:	Plasticizers in adhesive manufacturing			
EXTRACTION				
Parameter	Data			
Life cycle description:	Plasticizers are added to emulsion adhesives to modify several properties of both the emulsion and the finished adhesive film. By softening the polymer particles dispersed in the emulsion and increasing their mobility, plasticizers cause them to flow together more easily. This usually increases the viscosity of the emulsion and tends to destabilize it for faster breaking and setting speeds at the time it is applied. In addition, the increased softness and mobility help the emulsion to wet smooth, nonporous surfaces, eg, films, foils, and coated papers, thereby increasing its adhesion to them. Also, the softened polymer particles coalesce more rapidly and at a lower temperature than is possible with the unplasticized emulsion. This improved coalescence increases the water resistance of the adhesive film. Plasticizers are usually high boiling esters, eg, phthalates.In comparison, the lowering of the brittle point accomplished byaddition of plasticizers such as dibutyl phthalate, tricresyl phosphate, etc, to the preformed polymer may be lostwith the migration of the plasticizer out of the film.			
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.
	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	N/A - Life Cycle Description
Overall Quality Determination			High	

Study Citation:	Cornak, S., Jarosova, A. (2013). The screening of phthalic acid esters in operating fluids of vehicles. Applied Mechanics and Materials 436:153-157.		
HERO ID:	2346094		
Conditions of Use:	Industrial use of automotive care products (lubricant and oils)		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Mid-90s, nearly 600,000 tons were made in Europe yearly.		
Chemical concentration:	Final product of plastic materials may contain up to 40% of plasticizer. 10 samples taken of different automobile operational materials (mg/kg): plastic lubricants EP-2 - 2.46; Plastic lubricants G3 - <0.20; Vaseline - 0.58; Konkor oil - <0.20; Conservative oil for CV 2 engine - 13.86; Oil for two-stroke engine - 0.33; Gear oil 80W/90 - <0.20; Silicon oil - 3.47; Multigrade engine oil 15W/40 - <0.20; Engine oil Castrol 0W/40 - 4.11		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data and sound methods not from frequently used sources but does not indicate flaws or issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Data is for Switzerland, an OECD country.
	Metric 3: Applicability	High	Data is directly applicable to COU of automobile care products.
	Metric 4: Temporal Representativeness	High	Report is less than 10 years old, chemical concentration data is less than 10 years old. PV data is over 10 years old.
	Metric 5: Sample Size	Medium	Characterized by a range of data based on the sample.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Sources, methods and results are documented and sources are generally apparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability by testing various different automobile care products. Does not address uncertainty.
Overall Quality Determination		Medium	

Study Citation:	CPSC, (2015). Exposure assessment: Composition, production, and use of phthalates.			
HERO ID:	5155508			
Conditions of Use:	Phthalate manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the US from 1986 to 2002, production of DBP ranged from 10 to 50 million pounds. In 2012, the production of DBP in the US had decreased to 7 million pounds. From 1982-1986, average annual production was reported as 44,092,452 pounds in Germany. In the EU, DBP production decreased from approximately 108 million pounds in 1994 and 57 million pounds in 1998 to less than 22 million in 2007. Estimated approximately 41 million pounds of DBP in end product in the EU during 2007. Nordic countries have total use of DBP at approximately 69,000 pounds from 2000 to 2012. Japan production of DBP was 37,478,585 pounds in 1994 and Korea reported 15,432,400 pounds produced in 2010.			
Process description:	Manufactured by esterification of n-butyl alcohol with phthalic anhydride in the presence of a catalyst such as sulfuric acid or p-toluene sulfonic acid. DBP can also be made from phthalic anhydride and butyl halide in the presence of a tertiary aliphatic amine.			
Number of sites:	27 companies in the US report manufacture of DBP (2015). 11 companies in Mexico. 9 companies in China. 5 companies in the UK. 2 companies in Germany, Hong Kong, and India. And 1 company in Belgium, Canada, Czech Republic, Japan, and Switzerland.			
Physical form:	liquid, mist, vapor			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data from reputable sources that do not indicate flaws in the data.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US & includes other OECD countries	
	Metric 3: Applicability	High	Data is directly applicable	
	Metric 4: Temporal Representativeness	High	For US, most recently reported data is from 2012 so less than 10 years old	
	Metric 5: Sample Size	High	Sample size is sufficiently representative.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Report documents results, and sources are accurately described	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Address variability across multiple years but 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:	Processing - Plastics Manufacturing		
EXTRACTION			
Parameter	Data		
Process description:	DBP is present in the manufacturing of various plastics such as polypropylene, polyethylene and acrylonitrile butadiene styrene, typically as a catalyst.		
Chemical concentration:	DBP identified in polypropylene and may be present in concentrations up to 1 mg/kg but tests indicate the values do not exceed 0.15 mg/kg and often below the threshold of the analytical method of 0.01 mg/kg. In polyethylene conc. of up to 1 mg/kg (1ppm), no tests identified phthalate levels however. Acrylonitrile butadiene styrene (ABS) identified to concentration of DBP at less than 40 ppm.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report appears to use high quality data not from frequently used sources but does not indicate flaws or quality issues.
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	Most reported data is over 10 years old but less 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	N/A - No scope to address variability and uncertainty.
Overall Quality Determination		High	

Study Citation:	Daly’s, (2015). Safety Data Sheet (SDS): CrystalFin Floor Finish.			
HERO ID:	11438267			
Conditions of Use:	Application of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	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 December 2015, 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:	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 artifical 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			
Comments:	Source contains information regarding the leather industry and states the use of DBP and other toxic chemicals used in the industry. No quantifiable data regarding any phthalates is present within the article towards a General Engineering Assessment or Release data.			
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	Uninformative	Data is primarily for global regulations on leather industry and contains information about amount of general waste but not for DBP.
	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		Uninformative		

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	Medium	The report uses high quality data that does not indicate flaws or quality issues. However, data measurement methodology 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	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	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:	Earthjustice, (2020). Exhibit 1 to comments of rubbertown emergency action et al., re: TSCA risk evaluations for high-priority substances and substances undergoing manufacturer-requested risk evaluations.			
HERO ID:	10385015			
Conditions of Use:	Disposal			
EXTRACTION				
Parameter		Data		
Production, import, or use volume:		No production or use volume provided for DBP.		
Number of sites:		Port Arthur: 1 siteHouston: 7 sitesMossville: 1 siteCancer Alley: 3 sites		
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Number of release sites is reported from Toxics Release Inventory.
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	Discrete release data 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	Medium	Variability is addressed by evaluating releases from various sites and regions. However, uncertainty in number of releasing sites is not addressed.
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)"			
Comments:	Table 4.2			
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	N/A	This metric is not applicable to the data being extracted
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	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:	EC/HC, (2017). Draft screening assessment: Phthalate substance grouping.			
HERO ID:	5353181			
Conditions of Use:	Personal Care Products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	In nail polishes, the mean concentration of DBP is 5280 ug/g. (73/228)			
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	Low	Data are for consumer use of personal care products, which is similar to the formulation of personal care products.	
	Metric 4: Temporal Representativeness	High	Assessment is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	This metric is not applicable to the data being extracted	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed in the estimation parameters in the study. Variability is addressed by compiling different studies in the report.	
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:	Import		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Tonnes of DEHP, DBP, DIBP and BBP contained inImported articles; 124,245 (2014), 112,965 (2020), 136,474 (2039) (Table 2, page 14 of 65).		
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 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	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:	ECHA, (2017). Opinion on an Annex XV dossier proposing restrictions on four phthalates (DEHP, BBP, DBP, DIBP).			
HERO ID:	10112937			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Tonnes of DEHP, DBP, DIBP and BBP used in EU28 articlemanufacturing, baseline and projections; 62,612 (2014) 13,828 (2020) 9,663 (2039)			
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 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	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:	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:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	See Figure 0-1 (page 5), in EU in 2007: less than 10,000 tonnes/year MFG. Additional discussion on page 10-12// See Tables A2-1, A2-2, A2-3, and A2-4, on pages 70-5 for European country use rates.			
Life cycle description:	See Fig 0-1 on page 5: Mfg & Import -> Export or formulation -> Processing -> use of end-products. Releases from each stage to landfill, incineration, wastewater, air, and soil are mapped on this figure. //See Fig 0-2 (page 6) or 2-1 (page 15): MFG (10,000 t/y) + Import (150 t/y) - Export (2,000 t/y) -> 5,900 t/y to polymer formulation and processing, 160 t/y to paints, 1,890 t/y to adhesives, 80 t/y to grouting agents, and 250 t/y to other non-polymeric.// See Table 2-2 (page 20) for a distribution breakdown by percent in 2007: 69% to polymers, 2% to fiber glass, 25% to adhesives, 2% to paint, 1% to grouting agents, 1% to other non-polymers			
Process description:	According to the Annex XV dossier, DBP is produced by the reaction of phthalic anhydride with n-butanol in the presence of concentrated sulphuric acid as a catalyst. Excess alcohol is recovered and recycled and the di-n-butyl phthalate is purified by vacuum distillation and/or activated charcoal. (page 10).			
Number of sites:	two manufacturers (page 4 and 10)			
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. (Europe).	
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	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 report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Medium		
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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:	Manufacturing		
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:	Processing - Formulation		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Fig 0-1 (page 5): 2,380 t/y // See Tab 2-4 (page 21) for breakdown: 160 t/y to paints, 1,890 t/y to adhesives, 80 t/y to grouting agents, and 250 t/y to other non-polymeric		
Process description:	Table 2-1 (page 16): 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.		
Chemical concentration:	DBP contents as high as 30-60% are (were) found in polyurethane foams used in grouting applications for water control in tunnels, sewer systems, buildings etc. (RAR). (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 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 captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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 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 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		
Production, import, or use volume:	Fig 0-1 (page 5): 8,300 t/y // See Tab 2-5 (page 22) for a breakdown: 5,700 t/y to polymer formulation and processing, 160 t/y to fiberglass, 160 t/y to paint, 1,900 t/y to adhesives, 80 t/y to grouting agents, and 250 t/y to other non-polymeric		
Process description:	Table 2-1 (page 16-8):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 (page 21): Here, "processing" is the production of the polymer products themselves (hoses, toys, etc.). See additional explanation on p. 22.		
Chemical concentration:	In a Danish investigation in 2001, DBP was found in a concentration of 1.5% in one out of 5 investigated floorings (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 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 captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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 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 dibutyl phthalate (DBP) as well as information on potential alternatives to its use.		
HERO ID:	6316858		
Conditions of Use:	Consumer Use (of articles such as plastics, flooring, coated materials)		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Figure 0-1 (page 5): 8,250 t/y // See Tab 2-6 (page 23) for breakdown: 2,930 t/y for fiber glass each for interior and exterior use, 160 t/y paint, 1,900 t/y adhesives, 80 t/y grouting agents, 250 t/y other		
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.
	Metric 3: Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.
	Metric 4: Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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 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 dibutyl phthalate (DBP) as well as information on potential alternatives to its use.			
HERO ID:	6316858			
Conditions of Use:	Import/Export			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the EU, data demonstrate that the import of DBP on its own is small and less than 156 tonnes in 2007 (page 11). According to Table 1-3 (page 12), DBP is also imported and exported in polymer products. Export is approximated at 2,000 t/y (See fig 0-2 on page 6 or 2-1 on page 15)			
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.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation
	Metric 4:	Temporal Representativeness	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	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 report provides only limited discussion of the variability and uncertainty in the results.
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:	Estimated total tonnes of DBP, DIBP and BBP contained in articles in the scope of this proposal placed on the EU28 market: Tonnes contained in Exported articles – 1,813 in Yr 2014; Tonnes contained in Imported articles – 12,158		
Life cycle description:	DBP is used as a plasticiser for PVC, poly vinyl alcohol (PVA) and rubber as well as a solvent and a fixative in paint. DBP is essentially used for its viscosity reducing properties and compatibility with non-PVC mixtures (lacquers, printing inks, sealants, adhesives) or as processing aid for PVC (plastisols, compounds) in concentrations of 5 to 10 % w/w due to their higher polarity (ECHA 2013). Its soft PVC uses include flooring, packaging material, shoes, home furnishing, and clothing.		
Chemical concentration:	Recent sampling of articles showed that DBP can be present in concentrations up to 345 000 mg/kg. DBP’s reported concentration ranges in different articles: Shoes (soles) (1.1 % – 8.4%), Personal protective equipment (rain gear), rain jackets (3%), Inflatable mattresses, boats (0.5% – 20%), Pencil cases (0.2%), Textile accessories (0.2% – 1.6%), Pool covers, grain covers, truck covers, general covers, tents, membrane structure covers, warehouse covers, roofing, etc. (0.5% – 3.5%).		
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	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report addresses variability by comparing concentrations in different products but uncertainty is not addressed.
Overall Quality Determination		High	

Study Citation:	ECHA, (2010). Background document for diisobutyl phthalate (DIBP): Document developed in the context of ECHA’s second Recommendation for the inclusion of substances in Annex XIV.			
HERO ID:	8435433			
Conditions of Use:	Manufacturing and processing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The world wide production of both DBP (dibutyl phthalate) and DIBP was estimated by a consultant as being 450,000 t/y (cited in Annex XV, 2009) (p. 1).			
Number of sites:	Presuming a situation similar to that of DBP it can be assumed that formulation and processing take place at about 50-100 major sites, and at an unknown number of smaller installations (ECHA, 2009). (p. 2).			
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 the European Chemicals Agency, which is comprised of OECD countries.
	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 from 2010, which is greater than 10 years old but less than 20 years old.
	Metric 5:	Sample Size	Medium	Number of sites and production volume provided as a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	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:	ECPI, (2011). Endocrine data evaluation report. For selected high molecular weight (HMW) phthalates (DINP, DIDP) and a low molecular weight (LMW) phthalate (DBP), using the OECD conceptual framework. Volume I. Mammalian data.			
HERO ID:	2079182			
Conditions of Use:	Processing: Plastic Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Global annual market: 34 mTon of PVC (65% is rigid, 35% flexible); 6 MTon plasticizers (87% is phthalates)			
Life cycle description:	DBP has some use as a PVC plasticiser, but is more commonly used as a gelling aid, as a solvent, as an antifoam agent or as a lubricant. // Per Figure 1, 4% of phthalates are used for sensitive applications (medical, food, toys) and the remaining 96% are used for durable goods (wires, film, roofing, flooring, wall coverings, etc.). // PVC use in Europe is broken down in Figure 2: 25% for wires and cables, 22% for film and sheet, 14% for floor covering, 11% for extrusions, 10% for coated fabric, 9% for plastisol, and 9% for other.			
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	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	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PV information and Life Cycle Description.
Overall Quality Determination		Medium		

Study Citation:	Electron Microscopy Sciences (2018). SDS - DEPEX mounting medium.			
HERO ID:	6301529			
Conditions of Use:	Use of Lab chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	>2.5-≤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 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:	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	High	Data are for recycling, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	N/A	N/A - number of sites.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	N/A - number of sites.	
Overall Quality Determination		High		

Study Citation:	Enterprises, BJB (2019). SDS - TC-4485 Part A.			
HERO ID:	6301507			
Conditions of Use:	Non-PVC Material Manufacturing			
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 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:	Enterprises,, BJB (2021). Safety Data Sheet (SDS): TC-812 Part B.				
HERO ID:	6301495				
Conditions of Use:	Non-PVC Material Manufacturing				
EXTRACTION					
Parameter	Data				
Chemical concentration:	1-5 wt% (2/7)				
Physical form:	liquid (5/7)				
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 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:	Enterprises,, BJB (2016). Safety Data Sheet (SDS): TC-816 Part B.			
HERO ID:	6301497			
Conditions of Use:	Non-PVC Material Manufacturing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	wt% 1-5 (2/8)			
Physical form:	liquid (5/8)			
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	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Dibutyl phthalate is not currently produced in Canada. About 540 tonnes/year are imported...Additional dibutyl phthalate may be imported into Canada in plastic products(pg. 3/58)About 540 tonnes of dibutyl phthalate were imported into Canada in 1991, down from the 860 tonnes in 1988. About 83% of the imported dibutyl phthalate came from the United States in1991 (CIS, Inc., 1992). (pg. 11/58)			
Life cycle description:	for use mainly as a plasticizer in polyvinyl emulsions (pg. 3/58)			
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 Canada, 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	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Lab Chemical			
EXTRACTION				
Parameter	Data			
Life cycle description:	Phthalates frequently occur as contaminants in laboratory air and solvents, and as plasticizers in analytical equipment (pg. 10/58)			
Chemical concentration:	Ishida et al. (1980) reported the presence of dibutyl phthalate in laboratory solvents at concentrations up to 0.17 mg/kg (in benzene) and in solid reagents at concentrations up to 9.89 mg/kg (in carboxymethylcellulose) (pg. 10/58)			
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 Canada, 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	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.			
HERO ID:	7681883			
Conditions of Use:	Processing – incorporating into articles			
EXTRACTION				
Parameter	Data			
Chemical concentration:	polyvinyl tubing contained 23.3% dibutyl 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 (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 Canada, 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	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:	Environment Canada (1994). Archived - Dibutyl phthalate - PSL1.		
HERO ID:	7681883		
Conditions of Use:	Processing – incorporating into formulation, mixture, or reaction product		
EXTRACTION			
Parameter	Data		
Life cycle description:	Dibutyl phthalate is used mainly as a plasticizer in polyvinyl emulsions. In 1991, approximately 54% of the total Canadian supply of dibutyl phthalate was used in adhesives, about 15% was used in coatings (including lacquers), and 31% in miscellaneous applications, including paper coating (CIS, Inc., 1992). Dibutyl phthalate is used in cosmetics as a perfume solvent and fixative, a suspension agent for solids in aerosols, a lubricant for aerosol valves, an antifoamer, a skin emollient, and as a plasticizer in nail polish, fingernail elongators, and hair spray (CIR, 1985). (pg. 11/58)		
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 Canada, 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	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:	ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.		
HERO ID:	7349020		
Conditions of Use:	Processing: Plastic 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	Low	The report is from 1998, which is more than 20 years old.
	Metric 5: Sample Size	Medium	Volumes are provided as discrete values, but the statistical representativeness and number of samples is unknown.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty			
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Study Citation:		ERG, (1998). Air emissions inventories, volume 2: Point sources: Chapter 11: Preferred and alternative methods for estimating air emissions from plastic products manufacturing.		
HERO ID:		7349020		
Conditions of Use:		Processing: Plastic Product Manufacturing		
Domain		Metric	EVALUATION	
			Rating	Comments
Metric 7:		Metadata Completeness	High	The report addresses variability (different plastic types) and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination			High	

Study Citation:	ExxonMobil, (2022). Data submission from ExxonMobil regarding DINP and DIDP exposure.			
HERO ID:	10312764			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Manufacturing operations include reaction, neutralization and hydrolysis, filtration, water wash, flash distillation/steam stripping/N2 Stripping, Anti-oxidant addition, vessel cleaning, and Product Loading			
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	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is 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	Sample type provided but no other metadata.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium		

Study Citation:	ExxonMobil, (2022). EM BRCP DINP/DIDP facility – virtual tour (sanitized).			
HERO ID:	10633678			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	Manufacturing operations include reaction, neutralization and hydrolysis, filtration, water wash, flash distillation/steam stripping/N2 Stripping, Anti-oxidant addition, vessel cleaning, and Product Loading			
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	Data are from the U.S.
	Metric 3:	Applicability	High	Data are for manufacturing, an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Monitoring data are no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample distribution is characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Sample type is described qualitatively.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Variability and uncertainty are not addressed.
Overall Quality Determination			Medium	

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, but data is general and 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. Samples chosen for analysis is not fully transparent.
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 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:	Fishbein, L. (1992). Exposure from occupational versus other sources. Scandinavian Journal of Work, Environment and Health 18(S1):5-16.			
HERO ID:	200024			
Conditions of Use:	Manufacturing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	US production of phthalate esters is estimated at 700,000 tons			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data, method and techniques as approved by EPA.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is global, some US, some Sweden.
	Metric 3:	Applicability	High	Data is applicable to condition of use
	Metric 4:	Temporal Representativeness	Low	Data is greater 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	Includes release media but no other metadata
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:	Manufacturing			
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	The information is for an occupational scenario within the scope of the risk evaluation but data is not chemical specific.
	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	Low	The production volume information does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	GAF, (2017). SDS - Hydrostop premiumcoat foundation coat.			
HERO ID:	6301518			
Conditions of Use:	Application of Paints and Coatings			
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 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:	GAF, (2016). SDS - Hydrostop trafficcoat deck coating.			
HERO ID:	6301526			
Conditions of Use:	Application of Paints and Coatings			
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 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination			High	

Study Citation:	GAF, (2018). SDS - Hydrostop premiumcoat finish coat.			
HERO ID:	6301537			
Conditions of Use:	Application of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - <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 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:	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:	commercial use			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Mean concentrations (ng/g) of DBP in feminine hygiene products from Albany, New York: Pad – 764, Panty liners – 1230, Tampons – 378, Wipes – 74.8, Bactericidal creams and solutions – 1.22, Deodorant sprays - <LOD, powders – 3.89. Median concentrations (ng/g) of DBP in feminine hygiene products from Albany, New York: Pad – 83.3, Panty liners – 393, Tampons – 125, Wipes – 64.7, Bactericidal creams and solutions – <LOD, Deodorant sprays - <LOD, powders – 3.37.			
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	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	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	Low	The report does not address variability or uncertainty.
Overall Quality Determination			High	

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:	General Dynamics - Ordnance and Tactical Systems - Canada Inc (2018). SDS - Cartridge 9 mm FX Marking, Toxfree primer.			
HERO ID:	6301539			
Conditions of Use:	Final			
EXTRACTION				
Parameter	Data			
Chemical concentration:	trace			
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	Uninformative	Source does not apply to an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Source is from 2021, which is less than 10 years old.
	Metric 5:	Sample Size	N/A	N/A - physical form.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just trace for concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	N/A - physical form.
Overall Quality Determination			Uninformative	

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:	Processing				
EXTRACTION					
Parameter	Data				
Life cycle description:	DBP used in cellulose acetate plastics, solvent for oil-soluble dyes, pesticides, personal care products (e.g., nail polish and cosmetics), lacquers, varnishes, and coatings (e.g., pharmaceuticals) (page 3 of 45)				
Chemical concentration:	In PVC materials, the total amount of DEHP, DBP, and BBP used as plasticizers adds up to 30–60% (page 5 of 45)				
EVALUATION					
Domain	Metric	Rating	Comments		
Domain 1: Reliability	Metric 1: Methodology	High	International Journal of Environmental Research and Public Health		
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	data gathered internationally		
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.		
	Metric 4: Temporal Representativeness	High	2020		
	Metric 5: Sample Size	N/A	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 in the form of a range of concentrations.		
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	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is not specific to DBP.
	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	PV data only.
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	PV data. No scope to address variability and uncertainty.
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	High	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:	Processing - Plasticizer			
EXTRACTION				
Parameter	Data			
Life cycle description:	While these are particularly strong solvators, both of them suffer from excessively high volatility. In the United States, DBP is also a component of co-ester blends such as butyl octyl phthalate (BOP). However, the use of DBP or DIBP as a primary plasticizer or as a secondary plasticizer is limited because of the higher volatility, the higher specific gravity, and the price premium. (page 15 of 66)See page 55 of 66 for a table listing some additional general uses of DBP, including use with adhesives, coatings, aqueous and fatty foods, and rubber articles of repeated use. in 2006 the EU prohibited the use of DBP in any toy or childcare article (page 58 and 64 of 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, from Handbook of Vinyl Formulating
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Most information from EU
	Metric 3:	Applicability	High	Use as plasticizer
	Metric 4:	Temporal Representativeness	Medium	2008
	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		Medium		

Study Citation:	Gu, Z., Feng, J., Han, W., Wu, M., Fu, J., Sheng, G. (2010). Characteristics of organic matter in PM2.5 from an e-waste dismantling area in Taizhou, China. Chemosphere 80(7):800-806.
HERO ID:	1256038
Conditions of Use:	Disposal and recycling of products containing DBP

Parameter	Data
Process description:	electrical and electronic waste (e-waste) recycling industry
Chemical concentration:	Concentration of DBP as total suspended particles from burning of waste plastics was reported as 610 ug/g for wires/cables and 80 ug/g for plastic blocks. Concentration of DBP in PM2.5 from Taizhou was reported as 7.99 +/- 6.62 in summer, 52.54 +/- 45.89 in winter for a reference site in Luqiao; and 13.74 +/- 13.03 in summer, 45.71 +/- 18.25 in winter for a reference site in Taizhou.

Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	report uses high quality data and/or techniques or sound methods that are not from a frequently used source and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	The data are from a non-OECD country
	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
	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 mean and standard deviation.
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 and none on 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:	Personal care products			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Face cream: <0.1 (ug/g); body or hand lotion: 0.3 (ug/g); face cleanser: 0.7 (ug/g); shampoo: <0.1 (ug/g); body wash: 0.1 (ug/g) see table 1			
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 personal care products, an in-scope occupational scenario.	
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.	
	Metric 5: Sample Size	Medium	Sample distribution characterized by limited statistics (mean) but discrete samples not provided and distribution not fully characterized.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Variability addressed by testing concentrations in multiple products but uncertainty is not addressed.	
Overall Quality Determination		High		

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:	Use

EXTRACTION	
Parameter	Data
Life cycle description:	The life cycle of a plastic material passes, mainly, through three phases (production phase, use phase, and end-of-life phase). Plastics Emissions of PoTSs stemming from plastic products into the air-water and soil may occur in all phases of the product life cycle. Release of PoTSs from plastic products to air, extraction fluids, water, food, food simulants (FS), saliva and sweat have been identified by chemical (laboratory) analysis. The life cycle of plastic products (excluding energy input and emissions) created in STAN (subSTance flow ANalysis) Software (redrawn from Source: “F” stands for Flow and the number shown next to corresponds to the particular flow series (an automatic procedure incorporated in STAN)).
Process description:	Chemical recovery (tertiary recycling), involves chemicals being recovered and/or converted from the plastic material. This can potentially be done by catalytic depolymerization or by controlled thermal degradation, such as thermolysis, which is a non-catalytic cracking process. Pyrolysis is also considered to be a sustainable and efficient treatment that can produce a range of useful hydrocarbons, potentially used as a chemical feedstock or as energy, thereby minimizing the dependency on non-renewable fossil fuels, while solving the landfilling problem. The migration process can be divided into four major steps exemplified for a food contact material: 1) diffusion of chemical compounds through the polymers, 2) desorption of the molecules from the polymer surface, 3) sorption of the compounds at the plastic–food interface, and 4) absorption of the compounds in the food. Other processes described in the article.
Chemical concentration:	A study investigated the phthalate migration from baby bottles under hot-fill conditions of 70 degC, for an approx. contact time of 2 h and found that migration levels of DiBP and DBP were in the range of 50–150 ug/kg. Another study investigated the migration of 5 phthalates (including DBP) from disposable tableware to drinking water using hexafluoroisopropanol-induced cationic surfactant coacervate extraction. Concentrations of DBP the drinking water samples (10.13 ng/mL) exceeded the limit levels for drinking water (8 ng/mL). Another study evaluated the migration of 8 PAE compounds(DMP, DEP, BBP, DBP, DEHP, DINP, DOP, and DIDP) from plastics to a) cooking oil and b) mineral water, under various storage conditions. Storage times tested were up to 2 months, under several static conditions (20 degC, 40 degC, and 60 degC) and under a “dynamic” state (20 degC). The PAE content was always measured in higher levels in cooking oil than in mineral water. DBP and DINP demonstrated the highest migration into the mineral water. DEHP and DBP displayed the highest level of migration into cooking oil at 20 degC after 2 months. It needs to be taken into consideration that several migration limits have been set from European Commission (EC) for different plasticizers, e.g. 0.3 mg/kg for DBP.

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	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.

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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:	Use		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Head, I.R. (2016). SDS - Epcon acrylic 7.			
HERO ID:	6301527			
Conditions of Use:	Application of Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1 - 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	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:	Hollett, B. (1977). Health hazard evaluation report no. HETA 76-92-363, Jeffery Bigelow Design Group, Inc., Washington, D.C.
HERO ID:	6558523
Conditions of Use:	Industrial Use - Adhesives and Sealants

EXTRACTION	
Parameter	Data
Process description:	<p>Shop is equipped with a band saw, table saw, joiner, router, polishers and sanders. The work is not strictly segregated into separate locations therefore finishing, gluing, and layout are accomplished on work benches or in the middle of the shop floor as necessary. The power cutting tools are generally located at one end of the work area however due to the close proximity of the work benches no appreciable reduction in exposures to noise or vapors could be anticipated from the separation. The shop layout is shown in the article. There is no more than 2,300 square feet of floor space with an average ceiling height of 13 feet. Furniture is fabricated from sheet or bar plastic by cutting and gluing. A small amount of heat forming is accomplished. The plastic used is Rohm and Haas Plexiglass GM Sheets; about 500 sq/ft./mo. of various thicknesses are used. The adhesives are Cadco PS-30 Cement, usage is about 2 gallons per month, and RPC-25 which is used in small quantity. The A component of Cadco PS-30 is 65% Methyl Methacrylate Monomer, 35% Polymethyl Methacrylate, and 0.3% N, N-Bis (Hydroxyethyl)-P-Toluidine. The B Component 96.5% di-n-Butyl Phthalate and 3.5% benzoyl peroxide. The glue is mixed in paper cups and applied by syringe. The RPC-25 glue is primarily Methylene Chloride. Masking tape is used to avoid unwanted glue contact. Alcohol is used to remove tape adhesive after gluing. Plexiglass materials are cut and routed similarly to wood however finishing after sanding includes polishing with Jewelers Rouge, Plascor 205 and Plascor 1405, supplied by Unilab. Polishing and buffing are accomplished on a pedestal machine as well as with mobile units. Heat forming is not a routine procedure and did not occur during this survey. Heating elements are used to raise the temperature of the sheet from 280 F to 310°F. The heating period depends on the thickness of the sheet but normally would not exceed a 15 to 20 minute cycle. Small amounts (1 pint/mo) of Weld Wood filler cleaner, and cement are used for certain types of work.</p>

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	NIOSH HHE Report.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5: Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Process description.

Overall Quality Determination	High
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Study Citation:	Huntsman, (2015). Dibutyl phthalate (DBP): Effective exposure control from its use as a solvent in Huntsman Maleic Anhydride Technology.		
HERO ID:	10816795		
Conditions of Use:	Non-incorporative activities - Solvent in Huntsman’s maleic anhydride manufacturing technology		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Dibutyl phthalate is supplied via iso-containers, each with a capacity of 45,000 lbs. Two container per month are typically supplied and unloaded at the Pensacola facility and one container per month at the Geismar facility.		
Process description:	Normal Butane vapor is mixed with compressed air and is fed to a multiple tube reactor which contains a solid vanadium pyrophosphate catalyst. In the presence of the catalyst, normal butane is converted to maleic anhydride (MA) by reaction with oxygen present in the air. Most normal butane converted, but remainder residual normal butane leaves reactor in the product gas which is cooled and fed to an absorber column with DBP which is used to absorb MA from the reactor product gas. DBP goes through the top of the absorber and product gas from the bottom. The DBP-MA solvent mix is then sent to a stripping column where the MA is recovered from the DBP solvent. A portion of the stripped DBP is fed to a solvent treater to remove impurities and all is recycled back to top of the absorber.The aqueous stream from the solvent treater is disposed of via deepwell injection.Crude Maleic Acid is sent to a refining column. All MA-stripped product gas is sent to incinerator or boiler.		
Throughput:	Geismar Facility: 1 x 45,000 lbs iso-container/monthPensacola Facility: 2 x 45,000 lb iso-container/month		
Number of sites:	2 sites operated by Huntsman using DBP as a processing aid in the creation of maleic anhydride: Pensacola, FL and Geismar, LA		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data that are not from frequently-used sources and there are no known quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data are from the U.S.
	Metric 3: Applicability	High	Data are for non-incorporative activities - solvent in Huntsman’s maleic anhydride manufacturing technology, which is an occupational scenario within the scope of the risk evaluation.
	Metric 4: Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5: Sample Size	N/A	Sample size is not applicable to the General Engineering information extracted.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	All data sources, methods, results, and assumptions are clearly documented.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Variability and uncertainty are not applicable to the General Engineering information extracted.
Overall Quality Determination		High	

Study Citation:	IARC, (2012). Chemical agents and related occupations: A review of human carcinogens.			
HERO ID:	1104286			
Conditions of Use:	Industrial use - plasticizer			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Added in quantities of up to 2% by weight as plasticizers. Possible added by 0.1-5% by weight to paints/coatings.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Published by the World Health Organization so likely a credible source.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Report is from France (OECD country)
	Metric 3:	Applicability	Low	Report does not contain useful occupational exposure data but can be used to help identify industries of use.
	Metric 4:	Temporal Representativeness	Low	Only notable data for DBP specifically is from 1998. Other data regarding phthalates or plasticizers is from 2000s.
	Metric 5:	Sample Size	Low	Not characterized by any statistical data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report does not contain notable results with underlying methods of retrieving data not identified
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address uncertainty and variability.
Overall Quality Determination			Low	

Study Citation:	Inc, M.I. (2011). SDS - D.L.M. adhesive 22-68.			
HERO ID:	6301550			
Conditions of Use:	Application of Adhesives and Sealants			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	2.5-10%			
		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 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:	Inc, P.R. (2018). SDS - prime flex 920.			
HERO ID:	6301541			
Conditions of Use:	Application of Adhesives and Sealants			
EXTRACTION				
Parameter	Data			
Chemical concentration:	25 - <50%			
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:	Inc, P.R. (2018). SDS - prime flex 900MV.			
HERO ID:	6301547			
Conditions of Use:	Application of Adhesives and Sealants			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	1-10%			
		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 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:	Inc, P.R. (2018). SDS - prime flex 910.			
HERO ID:	6301552			
Conditions of Use:	Application of Adhesives and Sealants			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	50 - <75%			
		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:	Inc, P.R. (2018). SDS - prime flex 900XLV.			
HERO ID:	6301561			
Conditions of Use:	Application of Adhesives and Sealants			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	2.5 - <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 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:	Inc, W.P. (2015). SDS - Accurate Solo 1000, Accurate LT-30, Accurate LT-32, Accurate 2015, Accurate 2495, Accurate 4064, Accurate 4350.			
HERO ID:	6301493			
Conditions of Use:	Explosive materials			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0-10%			
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 the 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:	Ishii, S., Katagiri, R., Minobe, Y., Kuribara, I., Wada, T., Wada, M., Imai, S. (2015). Investigation of the amount of transdermal exposure of newborn babies to phthalates in paper diapers and certification of the safety of paper diapers. Regulatory Toxicology and Pharmacology 73(1):85-92.			
HERO ID:	2915537			
Conditions of Use:	Consumer use - diapers			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1-0.2 ug/g topsheet material			
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	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 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	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	Uncertainty is addressed in sampling/analytical methodology. Variability addressed by sampling multiple brands of diapers.
Overall Quality Determination			High	

Study Citation:	Ishikawa, S., Sakazaki, Y., Eguchi, Y., Suetomi, R., Nakamura, E. (2005). Identification of chemical substances in industrial wastes and their pyrolytic decomposition products. Chemosphere 59(9):1343-1353.			
HERO ID:	2889692			
Conditions of Use:	disposal			
EXTRACTION				
Parameter	Data			
Number of sites:	Eleven different industrial wastes were collected for the study. See table 1			
Chemical concentration:	Concentrations (ng/g) of different phthalates, including DBP, in different industrial wastes were reported as follows: in Sludge D (waste from coagulation sedimentation from municipal water purifying plant) – 30 +/- 10; Cast sand O (from the 7 metal goods or machine and tools factories) – 8.9 +/- 1.2; Dust H (from incinerators at a waste treatment facility and a soda and chlorine compounds factory – 160 +/- 46; Garbage R (brick garbage from a coax factory) – 230 +/- 85. Concentrations od DBP (ug/L) in eluate from the wastes were as follows: Sludge D – 0.5 +/- 0.2; Dust H – 7.9 +/- 2.9; Garbage R – 8.3 +/- 1.9.			
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	Medium	The report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	High	Statistical distribution of samples is fully characterized	
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:	ITW Inc., (2018). Safety data sheet: Spotcheck ® SKL-SP2.			
HERO ID:	6984562			
Conditions of Use:	Use of penetrants and inspection fluids			
EXTRACTION				
Parameter	Data			
Chemical concentration:	10-20% (2/7)			
Comments:	Used as surrogate data (DINP for DBP)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Product is from a EU manufacturer.
	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			Medium	

Study Citation:	Jager, de, C., Aneck-Hahn, N., Zijl, Van, M., Hayward, S., Swart, P., Genthe, B. (2019). Endocrine disrupting chemicals in commercially available cling film brands in South Africa. Human and Ecological Risk Assessment 25(6):1633-1644.			
HERO ID:	5432958			
Conditions of Use:	Commercial use - cling wrap			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Cling films comprise of plasticizers, which are known endocrine disrupting chemicals (EDCs). DBP was detected in four of the eight cling film brands. DBP values ranged between 0.62 and 1.21 mg/kg (at concentrations of 1.21, 1.13, 0.62, and 0.81 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	
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	The data are from a non-OECD country	
	Metric 3: Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation, such as a consumer DIY scenario that is similar to a worker scenario.	
	Metric 4: Temporal Representativeness	High	The report is generally no more than 10 years old.	
	Metric 5: Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Assessment or report provides results, but the underlying methods, data sources, and assumptions are not fully transparent.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.	
Overall Quality Determination		Low		

Study Citation:	Jean, J. H., Chang, R. L. (1997). Organic distributions on the surfaces of alumina green tape. Japanese Journal of Applied Physics 36(2A):L136-L138.			
HERO ID:	5433231			
Conditions of Use:	Adhesives and Sealants- Ceramic Tape			
EXTRACTION				
Parameter	Data			
Process description:	A slurry composed of the DBP (as plasticizer), alumina, PVB, toluene, ethanol, and MIBK are mixed for several hours. The slurry mixture was casted on glycol terephthalic acid polyester film using a bench type tape caster. Tape drying was carried out isothermally at 30 to 80 deg C for 16 hours. (pg. 2/4)			
Chemical concentration:	2.4% of DBP in slurry mixture (Table 1, pg. 2/4)			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Report is a published journal article, 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.
	Metric 3:	Applicability	Medium	Report is for plasticizer use in tape manufacturing, which may fit under adhesives and sealants, which would be an occupational scenario within scope.
	Metric 4:	Temporal Representativeness	Low	More than 20 years old(published in 1997).
	Metric 5:	Sample Size	Low	This report covers an experimental procedure and it is unclear if the data extracted is representative of industrial/commercial uses
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty pertaining to general industry practices
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:	Commercial Use of plastics			
EXTRACTION				
Parameter	Data			
Chemical concentration:	A mixture of phthalates containing 1,000 ug/L DBP 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	Low	The release data are for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation (e.g. similar to commercial use in floor coverings).
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Concentration info - no scope to address variability and uncertainty.
Overall Quality Determination		Medium		

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:	Consumer use - personal care products		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In 2008 more than 5 million tonnes of phthalates were used as plasticizers worldwide. 50% in Asia, 20% in Western Europe and 16% in North America.		
Life cycle description:	Phthalates are used primarily in PVC polymer and plastisol applications, plasticizing phthalate content can be up to 40%. Typical products are building and construction materials, flooring and roofing materials, cables and wires, clothing, furnishings, car interiors and care underbody coatings, toys and also food contact materials. DBP 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. Use in the pharmaceutical field as a constituent of the enteric coating of some medications. Prohibited in europe from use in cosmetics.		
Chemical concentration:	Urinary metabolite concentration for DBP daily intake range from 0.84 up to 7.6 ug/kg body weight / day based on studies across gen pop in different countries. Different study populations that are not specified contain urinary metabolite concentrations ranging from 12.6 to 181 ug/L.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Report uses high quality data that does not appear to indicate any flaws
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Report is from UK, an OECD country
	Metric 3: Applicability	Low	Report is likely not applicable but some studies they reference could be for occupational exposure but those studies are not completely specified.
	Metric 4: Temporal Representativeness	Low	Sources are between 1990s and 2000s
	Metric 5: Sample Size	Medium	Samples characterized by some statistics and unclear if it is representative.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Report provides results and data sources but analytical methods and soundness of studies referenced are not elaborated on.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability within a section of the report but not 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. Desalination and Water Treatment 186:56-64.		
HERO ID:	6825427		
Conditions of Use:	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 selected phthalates (DBP): Nail polishes, deodorants, perfumes, pharmaceuticals, insecticides. Table 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 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	Sample distribution characterized by limited statistics (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	Low	Variability and uncertainty are not addressed.
Overall Quality Determination		Medium	

Study Citation:	Lanco Mfg. Corp (2016). SDS - lanco seal.			
HERO ID:	6301543			
Conditions of Use:	Application of Adhesives and Sealants			
Parameter		EXTRACTION		
Chemical concentration:		0.05-10%		
Domain		Metric		EVALUATION
		Rating		Comments
Domain 1: Reliability	Metric 1:	Methodology	High	SDS information is primary data from the supplier. SDS does not appear to have quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Product is from a US supplier.
	Metric 3:	Applicability	High	SDS is applicable to an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	Source is from 2016, which is less than 10 years old.
	Metric 5:	Sample Size	Medium	Characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides concentration and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Variability addressed by providing a range of potential concentrations. Uncertainty not addressed.
Overall Quality Determination		High		

Study Citation:	Latini, G. (2005). Monitoring phthalate exposure in humans. Clinica Chimica Acta 361(1-2):20-29.		
HERO ID:	789380		
Conditions of Use:	Overall use volume		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	Globally, more than 18 billion pounds of phthalates are used each year.		
Comments:	No specific numbers for DBP		
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	Medium	The report captures operations, equipment, and worker activities that are expected to be reasonably representative of current conditions. The report is generally more than 10 years but no more than 20 years old.
	Metric 5: Sample Size	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:	Lee, M., Kim, J. H., Lee, D., Kim, J., Lim, H., Seo, J., Park, Y. K. (2018). Health risk assessment on hazardous ingredients in household deodorizing products. International Journal of Environmental Research and Public Health 15(4):744.			
HERO ID:	4730751			
Conditions of Use:	Laboratory grade			
EXTRACTION				
Parameter	Data			
Chemical concentration:	99.5% DBP in reagent used for lab analyses			
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 on use of consumer products
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	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:	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			
Life cycle description:	Phthalates have been used as plasticizers in floorings, paints, foodpacking, wall covering, cosmetics, and medical devices, among other products, since the 1930s.			
Chemical concentration:	Concentrations (ng/g dry weight) of DBP in sludge samples collected from three different types of wastewater treatment plants (WWTPs) in Korea: Domestic WWTPs – range 790–6300 and mean 3000; Mixed WWTPs – range 1500–11,000 and mean 4100; Industrial WWTPs - 580–59,000 range and mean 5900; Total – range 580–59,000 and mean 4300.			
Comments:	See table 1			
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., 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:	commercial use			
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. ^{6,18} However, following the restrictions on using certain phthalates in toys and child care products, ¹⁹ phthalates used in PVC products are changing rapidly, with a trend toward using phthalates of higher molecular weight and lower volatility.			
Chemical concentration:	DBP content in one vinyl flooring sample was: Sample 5 – 9 +/- 1%. DBP material-phase concentration in this sample was 1.42e11 ug/m3.			
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	Medium	The report is for an 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	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	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		High		

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 DnBP in vinyl flooring products: 9 ± 1%TABLE 1, 16 types of vinyl flooring found concentrations of phthalates ranging from 9 – 23% of the flooring by weight. Phthalates that were measured are DEHP, DINP, BBP, and DBP.			
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	High	Variability is addressed through evaluation of various types of vinyl flooring, and measurement uncertainty is addressed through calculation of mean and standard deviation of measurements.
Overall Quality Determination			High	

Study Citation:	Lima Associates, Inc, G.A. (2015). SDS - COE-RECT (powder).			
HERO ID:	6301521			
Conditions of Use:	Laboratory chemicals			
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 for an in-scope occupational scenario.	
	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. (2017). SDS - Phthalates in Poly(vinyl chloride).			
HERO ID:	6302509			
Conditions of Use:	Use of Lab Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.30%			
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	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:	LLC, S.C. (2019). Base/Neutrals Mix 1.			
HERO ID:	6302556			
Conditions of Use:	Use of Laboratory Chemicals			
		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:	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, poly vinyl alcohol (PVA) and rubber. Used in Latex adhesives, sealants, car care products, cosmetics, some inks and dyes, insecticides, food wrapping materials, home furnishing, paint, clothing and pharmaceutical coating. (may sometimes be present in toys as impurity or by-product in trace amounts (Table 1).			
Chemical concentration:	PVC products may contain up to 50 percent by weight of plasticizers, most commonly phthalates. (p. 4).			
Comments:	Table 1 Six Common Phthalates, Their Primary Functions and Products in Which They Are Used			
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 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:	Polyvinyl emulsions, adhesives, and coatings			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources (e.g., European Union or OECD reports, NIOSH HHEs, journal articles, Kirk-Othmer) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country, and locality-specific factors (e.g., potentially greater differences in regulatory occupational exposure or emission limits, industry/ process technologies) may impact exposures or releases relative to the U.S., or the country of origin is not specified.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report captures operations, equipment, and worker activities expected to be representative of current conditions. The report is generally no more than 10 years old.
	Metric 5:	Sample Size	N/A	for Facility data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Datasources 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:	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	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 release data are for an occupational scenario within the scope of the risk evaluation but data is general to phthalates, not specific to DBP.
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5: Sample Size	N/A	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	Uncertainty is addressed by discussing differences between studies. Variability isn't 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			
Chemical concentration:	Phthalates make up 30% of generic PVC cable and 35% of generic 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.
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 between 10 and 20 years old.
	Metric 5:	Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics. It is unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

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

EXTRACTION

Parameter	Data
Process description:	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.
Number of sites:	8
Chemical concentration:	DBP was not explicitly stated to be tested for at each individual facility.

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 are for an occupational scenario but does not include any information regarding DBP but has information regarding other phthalates.
	Metric 4: Temporal Representativeness	Low	Data greater 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	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:	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%			
Throughput:	3% of PVC plastic waste managed was recycled			
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:	NICNAS, (2008). Existing chemical hazard assessment report: Dibutyl phthalate.			
HERO ID:	1323321			
Conditions of Use:	Use			
EXTRACTION				
Parameter	Data			
Life cycle description:	DBP is used as a plasticiser in resins and polymers. DBP is also used as a softener in adhesives, lacquers, varnishes and printing inks. The ubiquity of DBP in consumer products is demonstrated by its wide usage in cosmetics: a perfume solvent and fixative, a suspension agent for solids in aerosols, a lubricant for aerosol valves, an antifoamer, a skin emollient and a plasticiser in nail polish and fingernail elongators. In Australia, DBP is mainly imported as finished products or mixtures. The chemical is used industrially for automotive repair and assembly (in adhesives), mining and construction coatings (e.g. sealants; clear wood and waterproofing coatings, protection for marine structures and vessels), explosives, rocket propellants, in textiles and leather treatments and as a plasticiser in nitrocellulose lacquers, elastomers, rubber, and epoxy products. Screen printing inks also contain DBP. Downstream products include safety glass, resins, adhesives, sealants, fragrance bases for household, personal care and cosmetic products, children’s toys, exercise balls, hoses and rubber sheets. (pg 14 of 67)			
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 Australia, 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	N/A	This metric is not applicable to the data being extracted
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			Medium	

Study Citation:	NICNAS, (2013). Priority existing chemical assessment report no. 36: Dibutyl phthalate.			
HERO ID:	5155533			
Conditions of Use:	Industrial use - phthalate manufacturing, plasticizer			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	In the US, more than 8500 tons of DBP was produced in 1994. Progressive decline in DBP use from 1996 onwards - total volume of DBP used in Massachusetts in 1996 was reported to be 679,177 pounds, about 400,000 pounds for 2002 and further declining to 28,811 pounds in 2007. Manufacture of DBP was self reported by companies in Massachusetts.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses high quality data from reputable sources that do not indicate flaws in the data.	
Domain 2: Representativeness	Metric 2: Geographic Scope	Medium	Report is from Australia (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	Most recently reported US data is from 2007	
	Metric 5: Sample Size	Low	Unclear if analysis is representative. No statistical data.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report clearly documents its results and sources are generally described.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability over the course of DBP production over years. Does not address uncertainty	
Overall Quality Determination		Medium		

Study Citation:	NIOSH, (2019). Evaluation of ergonomics, chemical exposures, and ventilation at four nail salons.			
HERO ID:	8683475			
Conditions of Use:	Commercial use of Personal Care Products (Non-TSCA)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	The concentrations of DBP in used and unused nail polish are reported in Table C5 on page 35 of 48, which ranged between not detected and 14,000 ug/mL.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	The report uses high quality data and sound methods that are from frequently used sources (e.g., NIOSH HHEs,) 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.	
	Metric 3: Applicability	Low	The report is for an occupational scenario that in terms of the type of industry and expected products would be FDA-regulated (e.g., nail polish and biocides)	
	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		High		

Study Citation:	NTP-CERHR, (2000). NTP-CERHR expert panel report on di-n-butyl phthalate.			
HERO ID:	679850			
Conditions of Use:	Adhesive manufacturing			
EXTRACTION				
Parameter	Data			
Life cycle description:	DBP is used mainly as a coalescing aid in latex adhesives. DBP is also used as a plasticizer in cellulose plastics and as a solvent for dyes. Although there was limited use of DBP in poly-vinyl chloride (PVC) plastics during the 1970’s and 1980’s, it is not currently used as a plasticizer in PVC. Release of DBP to the environment can occur during its production and also during the incorporation of the phthalate into plastics, adhesives, or dyes. Because DBP is not bound to the final product, it can be released during the use or disposal of the product.			
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 adhesive manufacturing, 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	N/A	Not applicable - life cycle description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Methods, results, and assumptions are clearly documented, but underlying data sources are not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Not applicable - life cycle description.
Overall Quality Determination			High	

Study Citation:	OECD, (2016). Report On The Proposal For Classification And Labelling (C&L) Of Dibutyl Phthalate.			
HERO ID:	10172655			
Conditions of Use:	General Information about Uses			
EXTRACTION				
Parameter	Data			
Life cycle description:	According to the National Library of Medicine’s Hazardous Substance Data Bank (HSDB), dibutyl phthalate is used as a plasticizer; a solvent for oil-soluble dyes, insecticides and other organics; an antifoam agent; a textile fiber lubricant; a fragrance fixative; and an insect repellent. Additional uses identified by EPA (2012) include paints, wood varnishes and lacquers, use in cosmetics, medical supplies, textiles, propellants, food packaging, dental materials, and paper.			
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	High	The report is generally no more than 10 years old.	
	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	Low	The report does not address variability or uncertainty.	
Overall Quality Determination		High		

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:	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:	Processing/consumer use of plastics			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Plasticizers, mostly DEHP, are used in PVC from 0% to almost 50% of the weight.			
Comments:	Article is about testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics. DBP is only mentioned with regards to health effects in humans and rats.			
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 an occupational scenario within the scope of the risk evaluation, but information is not specific to DBP and most worker activities are out of scope.	
	Metric 4: Temporal Representativeness	Low	The report is more than 20 years old.	
	Metric 5: Sample Size	N/A	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	N/A - Concentration information	
Overall Quality Determination		Medium		

Study Citation:	Olin Corporation - Winchester Division, I (2010). SDS - rimfire blank round - circuit breaker.			
HERO ID:	6301545			
Conditions of Use:	Bullets (Non-TSCA)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.5-12 %			
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	Uninformative	Source is for an out of scope occupational scenario.
	Metric 4:	Temporal Representativeness	Medium	More than 10 but less than 20 years old
	Metric 5:	Sample Size	N/A	N/A - Physical Form
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Source just provides physical form and does not document how this value was obtained.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	N/A - Physical Form
Overall Quality Determination			Uninformative	

Study Citation:	Pak, V. M., Mccauley, L. A. (2007). Risks of phthalate exposure among the general population: Implications for occupational health nurses. American Association of Occupational Health Nurses Journal 55(1):12-17.
HERO ID:	1598544
Conditions of Use:	Commercial use

EXTRACTION	
Parameter	Data
Number of sites:	According to a 1997 U.S. economic census, more than 407,000 individuals employed in approximately 81,000 beauty salons across the country were exposed to phthalates like DBP.

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.
	Metric 3:	Applicability	Low	The report is for a non-occupational scenario that is similar to an occupational scenario within the scope of the risk evaluation (commercial use of inks, toner, colorant products similar to products in beauty salons).
	Metric 4:	Temporal Representativeness	Medium	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	Report clearly documents its data sources.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	No scope to address variability and uncertainty.

Overall Quality Determination	Medium
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Study Citation:	Pak, V. M., Mccauley, L. A., Pinto-Martin, J. (2011). Phthalate exposures and human health concerns: A review and implications for practice. American Association of Occupational Health Nurses Journal 59(5):228-33; quiz 234-5.			
HERO ID:	1249953			
Conditions of Use:	Nail manicurists			
EXTRACTION				
Parameter	Data			
Process description:		DBP is also used in nail polish to maintain color and prevent chipping.		
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.
	Metric 5:	Sample Size	N/A	Information is qualitative
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Datasources 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:	Parkell, I. (2017). SDS - SmarTemp (all shades).		
HERO ID:	6301555		
Conditions of Use:	Use of Lab Chemicals		
EXTRACTION			
Parameter	Data		
Chemical concentration:	Proprietary		
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	Uninformative	Concentration value is not given - says proprietary. Information cannot be used in the risk evaluation.
	Metric 4: Temporal Representativeness	High	Source is from 2017, which is less than 10 years old.
	Metric 5: Sample Size	N/A	No value given.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	N/A	Concentration value is not given - says proprietary
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	N/A	Concentration value is not given - says proprietary
Overall Quality Determination		Uninformative	

Study Citation:	Parsons, N. S., Lam, W., M.H., Hamilton, S. E. (2013). Chemical characterization of automotive polyurethane foam using solid-phase microextraction and gas chromatography-mass spectrometry. Journal of Forensic Sciences 58(S1):S186-S191.			
HERO ID:	5469249			
Conditions of Use:	Automotive Polyurethane Foam use			
EXTRACTION				
Parameter	Data			
Physical form:	Vapor			
Comments:	Table 2 contains GC-MS abundance in seats from various cars, but this is not chemical concentration			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	Medium	Used GC-MS technique, but not explained well.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country
	Metric 3:	Applicability	Medium	Plastic and rubber products not covered elsewhere
	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	small sample size
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	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:	Phenova (2017). Custom 8061 Phthalates Mix Safety Data Sheet.			
HERO ID:	6301564			
Conditions of Use:	Use of Lab chemical			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.10%			
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 (2017). SDS - Custom Low ICAL Mix.			
HERO ID:	6302481			
Conditions of Use:	Use of lab chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.10%			
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): Custom 8270 Cal Mix 1.			
HERO ID:	11803682			
Conditions of Use:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Composition 0.1% (4/39)			
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 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:	Phenova, (2017). Safety Data Sheet (SDS): BN Extractables – Skinner List.			
HERO ID:	6280738			
Conditions of Use:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP Composition information 0.2% (2/19)			
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	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 SS 8270 Cal Mix 1.			
HERO ID:	6280755			
Conditions of Use:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	0.1% (pg. 4 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	Source is from 2018, 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 Cal Standard.			
HERO ID:	6287089			
Conditions of Use:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP concentration of 0.2% (5/45)			
Physical form:	liquid (20/45)			
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:	Use of laboratory chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP concentration given as 0.1% (4/46)			
Physical form:	liquid (21/46)			
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:	Use of laboratory chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP composition 0.1% (2/10)			
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:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	DBP Composition 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:	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	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	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	Low	The report does not address variability or 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
Overall Quality Determination		Medium	

Study Citation:	Pryor, P., Whorton, D. (1981). Health hazard evaluation report no. HETA 80-094-840, Ford Motor Company, San Jose, California.			
HERO ID:	6558302			
Conditions of Use:	Industrial Use: Plastic and rubber products			
EXTRACTION				
Parameter	Data			
Process description:	Finished vehicle is filled with gasoline which is lead-free gas. Only potential contaminants thought to be produced here are hydrocarbons of which benzene is the primary concern. vehicle is filled with gas, it is then started and driven to either a waiting area or directly to the next station which is the tow-in area. If the vehicle is driven to the waiting area, the engine is required to be turned off until it can be driven into the tow-in area. Once in the tow-in area, the actual time required to adjust the vehicle’s front wheels is from 2-3 minutes. There are two tow-in stations for the passenger section and one tow-in station for the truck section and each of these areas requires the tow-in operator to perform his job in a submerged room, i.e., the vehicle is driven onto surface level ramps while the operator does the adjustment below. Also, during this time another operator adjusts the headlights on the vehicle. The potential contaminants in these areas are those associated with normal vehicle exhaust emissions, e.g.. carbon monoxide, sulfur dioxide, nitrogen dioxide, and ozone. Oil mist and phthalates were also mentioned in the request and thought to be potential contaminants in these areas. After the intiial walk through oil mist did not appear to be present at either of the assembly lines, and therefore, it was omitted as a potential contaminant from our investigation. Phthalates, however, were considered because of a sweet smell mentioned in the request and the potential for burning plastic was thought to be the source of this concern. The last stage of this assembly process requires the vehicles to be driven to the road test areas where the wheels of the vehicle are placed on rollers. The engine is then raced at various speeds to determine if the engine, as well as various aspects of the vehicle are functioning properly. The truck area has one road test station and the passenger assembly section has two such areas. Again, the same potential contaminants suspected in the start-up and tow-in areas were also evaluated at the road test stations.			
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 evalu-ated.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Process description.
Overall Quality Determination			Medium	

Study Citation:	Radian Corp, (1985). Industrial process profiles for environmental use: Chapter 10b, Plastics additives.			
HERO ID:	1262512			
Conditions of Use:	Processing - plasticizer			
EXTRACTION				
Parameter	Data			
Process description:	The following is stated on pg. 29/452 about polymer additives in general: Additive concentrates, mixtures of the polymer with additives in high concentrations are produced by custom compounders and marketed as pellets, granules, or powders. This allows the incorporation of small size additive particles with significantly less dusting during processing of the finished product, and reduces the amount of blending required. Because the additives are present in such high concentrations, custom compounders can meet safety guidelines more economically than plastics processors. Paste mixtures and liquid concentrates incorporate additives in solvents and plasticizers. Encapsulated and oiled grades coat the surface of solid additives, making the particles larger, tackier, denser or less toxic.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The data source is an EPA report although it contains a disclaimer that it has not been the subject of peer review.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The information pertains to the U.S.
	Metric 3:	Applicability	High	Compounding of plastics is a type of processing, which is an COU, and will likely constitute an exposure scenario.
	Metric 4:	Temporal Representativeness	Medium	Although the report is more than 20 years old, this reviewer believes the extracted information is not outdated.
	Metric 5:	Sample Size	Medium	The process description is stated in general terms (see comment at top.)
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Metadata in general is clearly documented in the report but the source of the information that is extracted is not stated.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	The information is stated in general terms - see comment at top.
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:	Use of laboratory chemicals			
EXTRACTION				
Parameter		Data		
Chemical concentration:		DBP composition 0.1% (2/7)		
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:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Composition 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 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:	Use of Laboratory Chemicals			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Composition 0.2% (2/6)			
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:	Plasticizers in plastic material and resin manufacturing			
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:	OEHHA considered an “upper-end estimate” of exposure to DINP in vinyl flooring containing 18.9% or less DINP by weight.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	OEHHA provided as reference for concentration of DINP in vinyl flooring. Data does not indicate quality issues, but methodology for determining chemical concentration is not transparent.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from the United States.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation. However, data is for DINP rather than DBP, but could potentially be useful as surrogate data.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Sample size was not provided for determination of chemical concentration.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Roper, C. P., Jr (1976). Health Hazard Evaluation Determination, Report No. 74-120-260, Goodyear Tire and Rubber Company, Gadsden, Alabama.			
HERO ID:	1009699			
Conditions of Use:	Processing: Plasticizers in rubber product manufacturing			
EXTRACTION				
Parameter	Data			
Process description:	”The #15 Banbury mixer is the only such mixer used for the formulation and mixing of rubber sleeve stock. On the second floor of the building, employees add the raw ingredients into the top of the Banbury. These raw ingredients include a vinyl chloride resin, three plasticizers, and a nitrile synthetic rubber. The materials are mixed and heated at temperatures up to 325 degrees F. When the batches of sleeve stock exit the bottom of the Banbury on the first floor of the building, large amounts of smoke are emitted. Each batch of sleeve stock is run through a series of rolling mills and then cut into 3x4 ft. sheets and stacked by the cutter man. The mill man loads the sleeve stock which has come from the Banbury area onto a warm-up mill where the stock is heated slightly and milled. The stock is fed automatically in a continuous strip from the warm-up mill to the heating mill where the stock is heated considerably more and further milled. The stock is fed off the heating mill in a continuous strip to the tuber where it is extruded. The stock is cut into lengths after extrusion, and two bookers layoff the slugs into trays. No chemicals are added in Building 9; the sleeve stock is simply heated and mechanically treated. There are about 5 presses in the area which mold the slugs into sleeves. The slugs are molded and compressed by a hydraulic press. The sleeves are cured in the press mold under pressure at 300-400 degrees F for 15 minutes each. The operator removes the sleeves manually from the presses and throws them onto metal tables to cool. (2/16)”			
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 the use of plasticizers in rubber product 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	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Process description.
Overall Quality Determination			High	

Study Citation:	Rust-Oleum Corporation (2015). SDS - marine coating antifouling blue.			
HERO ID:	6301565			
Conditions of Use:	Application of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	2.5-10%			
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 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:	Schripp, T., Wensing, M. (2009). Emission of VOCs and SVOCs from electronic devices and office equipment. :405-430.			
HERO ID:	9493521			
Conditions of Use:	Plastic and rubber products not covered elsewhere			
EXTRACTION				
Parameter	Data			
Process description:	”After scanning the original image the print data is transferred to a character generator that forms a latent image on a photoconductor drum. Then toner is added to this unit to get a toned image that can be transferred on the paper. During the fusing step the toner isfixed on the paper by use of high temperatures (150 – 220 ° C). For the application of the toner some additives like silica and wax are necessary. Beside these separating agents ‘ carriers ’ consisting of iron globules are used. These particles feature diameters between 35 and 300 μ m and are utilized as charge control substances (total content in the toner: 1 – 3%). Other toner ingredients are resin (80 – 90%) and integrated color pigments (5 – 15%) like carbon black. ” pdf pg. 10			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The report is in a published book chapter, not a frequently used source, but associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	The data are from US and OECD Countries (EU)
	Metric 3:	Applicability	High	Use of printing ink is an occupational scenario in scope.
	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 description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination			Medium	

Study Citation:	Sika Corporation (2017). SDS - sika loadflex-524 EZ part B.			
HERO ID:	6301546			
Conditions of Use:	Application of Adhesives and Sealants			
		EXTRACTION		
Parameter	Data			
Chemical concentration:	>= 70 - < 90%			
		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:	SRC, (2001). Toxicological profile for di-n-butyl phthalate.		
HERO ID:	2624719		
Conditions of Use:	manufacturing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In 1994, more than 17 million pounds (7.8 million kg) were made. Production volume records reported along with di-iso-butyl phthalate. From 1980 to 1994 production volumes are reported ranging from 6,555 kg up to 11,573 kg depending on the year on Table 5-1. Total imported in 1997 was 358,600 pounds, for 1998 was 567,000 pounds. in 1977, 937 pounds were exported.		
Process description:	Manufacturing via esterification of phthalaic acid with n-butyl alcohol in the presence of a catalyst such as sulfuric acid or p-toluene sulfonic acid. Performed at a tempearture of 150 C along with agitation. Water in the process is recovered for other operations or treated and discharged as waste water. DBP is finally purified by vacuum distillation and/or with activated charcoal. The majority of phthalate esters are produced in Europe with the US, Asia, and Pacific rim countries producing similar amounts of each		
Number of sites:	2		
Physical form:	liquid, mist, vapor		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The report uses high quality data approved by NIOSH and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is from US
	Metric 3: Applicability	High	Report is directly applicable to condition of use
	Metric 4: Temporal Representativeness	Low	Most sources used are greater than 20 years old.
	Metric 5: Sample Size	Medium	Sample size is not characterized by statistics but appears to be sufficiently representa-tive.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Report clearly documents its data sources, assessment methods, results and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Addresses variability and uncertainty.
Overall Quality Determination		High	

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.		
HERO ID:	675435		
Conditions of Use:	Manufacturing		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	See pg 41 out of 151 - 17.2 million pounds in 1979See page 41 for addition years’ productions		
Process description:	see pg 45 out of 151 - produced by esterifying phthalic anhydride with n-butyl alcohol in the presence of catalytic amounts of sulfuric acid. The production process begins by charging phthalic anhydride and the appropriate alcohol into a reactor that is actually the still of a distillation column. The reactor is equipped with an efficient agitator and internal steam coils for heating. A stoichiometric excess of alcohol is normally utilized. A solution of concentrated sulfuric acid is added as a catalyst. The reactor is heated to such a temperature that the azeotrope of water and alcohol distills at the column-head. The distillate is cooled and separated by decantation. The alcohol-rich layer is recycled to the column, while the water rich layer is either wasted or sent to recovery. When the optimum amount of water has been removed from the reactor, the residual crude phthalate (still bottoms) is discharged to ~n alkali washer that neutralizes the sulfuric acid content with sodium carbonate. This neutralizing operation is followed by a water-washing operation. The crude phthalate is then stripped in a vacuum column to separate the volatile products such as olefins, alcohol, and other impurities. When economically feasible, the alcohol is recovered for reuse. The phthalate can be further purified by decolorizing with activated charcoal.		
Number of sites:	see table 11, page 42 out of 151 - 11 manufacturers		
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	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5: Sample Size	N/A	Data not 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	Data not dependent on metadata completeness
Overall Quality Determination		High	

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.			
HERO ID:	675435			
Conditions of Use:	Import			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	See pg 41 out of 151 - 1.004 million pounds imported in 1979See page 41 for data on years 1976-1978			
Number of sites:	see table 11 on pg 42-3 out of 151 - 9 importers			
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	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.	
	Metric 5: Sample Size	N/A	Data not dependent on 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	Data not dependent on metadata completeness	
Overall Quality Determination		High		

Study Citation:	SRC, (1982). Information profiles on potential occupational hazards: Phthalates.			
HERO ID:	675435			
Conditions of Use:	Processing			
EXTRACTION				
Parameter		Data		
Life cycle description:		See page 41 and 44/151. Used primarily as a plasticizer in polyvinyl acetate emulsions; small amounts are consumed in specialized vinyl compounds; used in nail polish. The remaining uses are described as minor. Used as an insect repellant impregnated into clothing; solid rocket propellant; solvent for perfume oils; perfume fixative; textile lubricating agent; safety glass; insecticides; printing inks; resin solvent; paper coating; adhesives; lipsticks and cosmetics; and diluent in elastomers for dental materials		
Chemical concentration:		See page 41/151: a typical nail polish remover formula is ethyl acetate 40%, acetone 30%, carbitol 19%, dibutyl-n-phthalate 10%, sesame oil 1%		
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. Various sources (with the relevant page numbers) are sited within text.
Domain 2: Representativeness		Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evaluated.
		Metric 3: Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
		Metric 4: Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
		Metric 5: Sample Size	N/A	Data is all qualitative
Domain 3: Accessibility/ Clarity		Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty		Metric 7: Metadata Completeness	N/A	Data not dependent on variability/uncertainty
Overall Quality Determination			High	

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:	Plasticizers in plastic material and resin manufacturing

EXTRACTION	
Parameter	Data
Life cycle description:	Most PVC geomembranes contain plasticizers as an additive to increase the flexibility, softness, workability, pliability, and distensibility of the material.
Process description:	Plasticization is classified into two types: internal plasticization and external plasticization (Mark and Gaylord 1964; Nass and Heiberger 1986; Wilson 1995). In internal plasticization, plasticizer molecules are attached to the polymer resin by primary bonds and incorporated as part of the polymer chain. Thus plasticizer retention is typically not a concern with internal plasticization because of the strong primary bonds. In external plasticization the small monomeric plasticizer molecules absorb into and adsorb onto the porous PVC polymer.
Chemical concentration:	A typical formulation for PVC geomembranes is about 60–65% of PVC resin, 30–35% of plasticizer, and 0–5% of other additives such as fillers and stabilizers (Hammond et al. 1993).

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	The data are from an OECD country other than the U.S.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but data is 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	Process description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.

Overall Quality Determination	Medium
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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:	Concentration on cotton clothing		
EXTRACTION			
Parameter	Data		
Chemical concentration:	See Table 1: concentration of DBP is 0.62 ug/g (min), 0.94 ug/g (25th%), 1.18 ug/g (median), 1.51 ug/g (75th%), and 13.3 ug/g (max) on 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, 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	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
Overall Quality Determination		Medium	

Study Citation:	Technology, F.C. (2011). Material safety data sheet - side out gym floor finish.			
HERO ID:	6301522			
Conditions of Use:	Application of Paints and Coatings			
EXTRACTION				
Parameter	Data			
Chemical concentration:	1 - < 3%			
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:	Tokumura, M., Seo, M., Wang, Q., Miyake, Y., Amagai, T., Makino, M. (2019). Dermal exposure to plasticizers in nail polishes: An alternative major exposure pathway of phosphorus-based compounds. Chemosphere 226:316-320.			
HERO ID:	5163392			
Conditions of Use:	Nail polish			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Concentration range of 0.7-7.0 wt %.			
EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Reliability	Metric 1:	Methodology	High	Source is peer reviewed so likely contain high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is for Japan, an OECD country
	Metric 3:	Applicability	Medium	Data may be applicable to a commercial use of personal care products and nail polish. Contains dermal exposure data.
	Metric 4:	Temporal Representativeness	High	Data is less than 10 years old.
	Metric 5:	Sample Size	N/A	Engineering data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Contains dermal exposure data, exposure route, chemical concentration.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
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 - Fabric, textile, and leather products			
EXTRACTION				
Parameter	Data			
Process description:	DBP is present in the manufacturing of various plastics such as polyester, nylon, acrylic/modacrylic and natural latex rubber, typically as a carrier or accelerant.			
Chemical concentration:	Carrier content expected to be below 0.2% but could be as high as 2.7%. Concentration in textile samples were 0.73 mg/kg for polyester; 0.83 mg/kg for nylon and 0.65 mg/kg for Acrylic. For latex rubber DBP concentrations of 1.33 to 3.07%.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	Report appears to use high quality data not from frequently used sources but does not indicate flaws or quality issues.
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	Most reported data is from 2000s so data is greater than 10 years old.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	No scope to address variability and uncertainty.
Overall Quality Determination		High		

Study Citation:	Toxicology Excellence for Risk Assessment (TERA) (2016). Exposure assessment: Potential for the presence of phthalates in specified materials at concentrations above 0.1 percent.			
HERO ID:	5155525			
Conditions of Use:	Plastics manufacturing - processing			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	DBP is present in polymethylmethacrylate/ polyacrylonitrile (PMMA / PAN), ethylene-butene copolymers (EBC), ethylene-propylene monomer and ethylene-propylene-diene monomer (EPM / EPDM), polycarbonate (PC), polystyrene, silicone rubber, styrene-butadiene-styrene rubber and styrene-butadiene rubber. Detailed descriptions of multiple different production methods of each plastic are provided.			
Chemical concentration:	PMMA and PAN; approximately 5% of the material can contain DBP. All other chemicals could have concentrations 0.0001 weight percent.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Report uses high quality data from reputable sources that do not indicate flaws in the data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Medium	Does not have occupational exposure or environmental data but has information for possible industry use.
	Metric 4:	Temporal Representativeness	Low	Data has mix of information from sources ranging from the 1990s to the 2010s
	Metric 5:	Sample Size	Medium	Unclear if analysis is representative.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Clearly documents its sources, methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
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.				
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	BLS is expected to use reliable survey methods.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	U.S. based economic data.	
	Metric 3: Applicability	High	These economic data cover all industry and occupation types in scope for all chemicals.	
	Metric 4: Temporal Representativeness	High	The BLS OES data are from 2021.	
	Metric 5: Sample Size	High	The BLS OES program provides detailed statistics and estimated relative standard error for each state, industry, and occupation survey conducted (https://www.bls.gov/oes/current/oes_research_estimates.htm).	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	BLS documents results and methods, but underlying survey results not accessible.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Limited discussion of variability and uncertainty in results.	
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2002). Flexographic ink options: A cleaner technologies substitutes assessment. Volume 1.		
HERO ID:	10293388		
Conditions of Use:	Commercial use in Ink, toner and colorant products		
EXTRACTION			
Parameter	Data		
Production, import, or use volume:	In 2000, the industry overall used more than 513 million pounds of ink. Water-based inks represent 65% of all inks used during flexographic printing, where the remaining 35% are solvent-based inks. The U.S. exported about 115 million pounds of printing ink in 1998. Page 78 of the pdf provides a table of the top 20 manufacturers of inks.		
Process description:	Source describes solvent-based ink process, water-based ink process, and UV cured ink process. The source also describes the type of substrates typically used during manufacturing which includes, corrugated and preprinted containers, flexible film packaging, folding cartons, labels and tag, and other (pdf pages 74-75). Source also lists typical components of inks (pdf pages 69-71)		
Number of sites:	914 commercial printing with flexographic printing as the primary print process but 2,300 facilities operate flexographic printing in addition to other printing. A total of 30,000 employees for facilities with flexographic printing as the primary print process and over 80% have fewer than 50 employees.		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2: Geographic Scope	High	The data are from the United States and are representative of the industry being evalu-ated.
	Metric 3: Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation but data is not chemical-specific.
	Metric 4: Temporal Representativeness	Low	Data used is generally more than 20 years old.
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	Uncertainty is addressed by reporting estimated values and ranges. Variability addressed by reporting data from multiple years.
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: "0.68 mg/kg for DBP"

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 is for an in-scope occupational scenario.
	Metric 4:	Temporal Representativeness	High	Report is based on current industry conditions and data no more than 10 years old.
	Metric 5:	Sample Size	Medium	Sample distribution characterized by limited statistics (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
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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
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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:	Disposal - waste treatment			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Total pulp production in 1977 was about 50 million tons. Total paper product is 30 million an 1978. Total paperboard products is about 30 million.			
Process description:	Production of pulp, paper, and paperboard involves several standard manufacturing processes including (a) raw material preparation, (b) pulping, (c) bleaching, and (d) papermaking. Process descriptions for all of the variations are given from PDF pages 96 to 104/ Pulping and papermaking process flow sheet given on PDF page 131.			
Number of sites:	674 operating facilities involved in the manufacture of pulp, paper and paperboard products			
Chemical concentration:	final average effluent conc. of DBP was 16 ug/L			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Source is an EPA document.	
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is for US	
	Metric 3: Applicability	Low	Data is for waste treatment. Contains an industry of use in the wood, pulp and paper industry however the data is not very transparent about what uses specifically have phthalates used or their relative concentrations.	
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.	
	Metric 5: Sample Size	Low	Samples characterized by a range with uncertain statistics	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Low	Report provides results but underlying methods, data sources, and assumptions are not fully transparent	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	Addresses variability across multiple sites but does not address uncertainty.	
Overall Quality Determination		Low		

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	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:	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:		A number of uses of DBP have been identified including the manufacture of plastics, paints, wood varnishes and lacquers, use in cosmetics, medical supplies, textiles, propellants, food packaging, dental materials, and paper (OSHA, 2009). More specifically, it is used as a plasticizer in uses such as nail polishes, explosives, and solid rocket propellants. 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	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:	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 DBP.	
	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	Process description. 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	Medium	The report is for an occupational scenario within the scope of the risk evaluation. Not specific to DBP.
	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	Process description. 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	Medium	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources. Not specific to DBP.
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	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	Process description. 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:	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 650 °F).			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
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 DBP.
	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	Process description.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Medium		

Study Citation:	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 DBP.	
	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	Process description. 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 DBP.
	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	Process description. 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:	Use (Paints, coatings, adhesives)			
EXTRACTION				
Parameter	Data			
Process description:	Though DBP 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). DBP 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	The data are from the United States.
	Metric 3:	Applicability	Medium	The report is for an occupational scenario within the scope of the risk evaluation, but data is not specific to DEHP.
	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	Report clearly documents its data sources.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	Process description.
Overall Quality Determination			High	

Study Citation:	U.S. EPA, (1995). Ap-42: Chapter 4.12 - Manufacture of rubber products.		
HERO ID:	7315841		
Conditions of Use:	manufacturing		
EXTRACTION			
Parameter	Data		
Process description:	Many of the rubber manufacturing facilities in the United States produce pneumatic tires for automobile, trucks, airplanes, and farm machinery. However, many rubber manufacturing facilities produce other engineered rubber products. The processes involved in these industries are very similar. Differences basically consist of the raw rubber material (natural or synthetic) used, the chemical additives, and the type of curing employed. The following is a description of a generic rubber manufacturing facility applicable to both tire and other manufactured rubber products, except where noted. The manufacturing of rubber products involves six processing steps (mixing, milling, extrusion, calendaring, curing, and grinding), with ancillary steps in between. Initially, the raw rubber (natural or synthetic) is mixed with several additives which are chosen based upon the desired properties of the final product. The mixed rubber is often milled and transferred to an extruder where it can be combined with other rubbers. Many rubber products contain synthetic fabric or fibers for strengthening purposes. These fibers are typically coated with mixed rubber using a calender. The extruded rubber and rubber coated materials are then assembled into a final shape and cured. Among the steps in the tire assembly process are bead building; cementing and marking; cutting and cooling; tire building; and green tire spraying. It is during the curing process that the rubber vulcanizes (crosslinks), producing the characteristic properties of finished rubber. Once the final product is cured, it is often ground to remove rough surfaces and/or to achieve symmetry.		
EVALUATION			
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	Facility data
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	report clearly documents its data sources
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	

Study Citation:	U.S. EPA, (1995). AP-42: Chapter 11.1 - 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	Low	Data is general and not specific to this chemical. Although the condition of use is not included in the scope for DBP, the information may be used for similar condition of use like building/construction materials.
	Metric 4:	Temporal Representativeness	Low	The report is more than 20 years old. The report captures operations, equipment, and worker activities that are expected to be outdated.
	Metric 5:	Sample Size	N/A	No sample data.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	PV and process description. No scope to address variability and uncertainty.

Overall Quality Determination

Medium

Study Citation:	U.S. EPA, (2010). Generic model to estimate environmental releases from container residue for drums containing liquids: Revised draft.			
HERO ID:	8726953			
Conditions of Use:	All (Loading/Unloading)			
EXTRACTION				
Parameter	Data			
Life cycle description:	Distribution into commerce-> 'Empty' containers sent to Industrial Container and Drum Cleaning (ICDC) facility->sent back to be used by industry OR drums can be cleaned at manufacturer, repackager, or user. (pdf pg. 6)			
Process description:	Empty drums may be sent to drum reconditioner after several uses; drums require cleaning for both reuse/recycling and reconditioning. Cleaning may be done manually or in an automated system with water or solvent, and may include presteaming. Reclamation may also involve furnace processes for steel drums. (page 6 of 28)Full process description details for water-based cleaning, solvent-based cleaning, and drum reclamation furnace process. (pdf pg. 6-9)			
Throughput:	"Model only applies to liquids shipped in drums ranging from 20 to 100 gallons, with the default drum size set at 55 gallons" (page 5)"Depending on the thickness and handling, steel drums may be recycled and reused five to six times before they need to be sent for reconditioning. Plastic drums may last up to 10 years but will realistically make around five to ten trips before they are sent to a reconditioner." (page 6 of 28)			
Number of sites:	291 ICDC facilities (118 do not clean transportation equipment, 173 also clean transportation equipment) (page 6 of 28)			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1: Methodology	High	Report uses sound methods from frequently used sources (EPA) 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.	
	Metric 3: Applicability	High	Report is applicable to multiple occupational scenarios within the scope of the risk evaluation.	
	Metric 4: Temporal Representativeness	Medium	Report is generally more than 10 years but no more than 20 years old.	
	Metric 5: Sample Size	N/A	Process description	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	Assessment or report clearly documents its data sources, assessment methods, results, and assumptions.	
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results.	
Overall Quality Determination		High		

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:	Commercial Use: Plastic and rubber products not covered elsewhere

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	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	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	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 explaining two turf production processes. Uncertainty isn't addressed in terms of facility information.

Overall Quality Determination	High
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Study Citation:	Urban, D., Egan, L. (2002). Applications in the adhesives and construction industries.
HERO ID:	7324696
Conditions of Use:	Application of Adhesives and Sealants

EXTRACTION

Parameter	Data
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Process description:	Coating of adhesive is described on pg. 15-17 of the source. Self-adhesive labels and films are produced by coating support materials such as silicone release liner, paper stock, and film webs with pressure sensitive adhesives (Fig. 8-9). Various coating methods are used to ensure the correct amount of adhesive is applied per unit area of substrate [37–40]. High viscosity adhesives can be applied using a knife-over-roll coater. In reverse-roll coating, the adhesive is transferred to the substrate web after being taken up by an application roll rotating in a direction opposite to that of the web. Knife coaters and reverse roll coaters are traditional systems originally developed for coating solvent-based adhesives. But with aqueous dispersions, coating speeds of only 100–120 m min ⁻¹ are possible with these coating methods – at application rates of about 20 g m ⁻² . For higher production speeds, Meyer rod (150–250 m min ⁻¹), reverse gravure (300 m min ⁻¹), vario gravure (600+ m min ⁻¹), and slot die technologies are available. These systems require low viscosity dispersions and their development in the 1960s paved the way for a major breakthrough by acrylate dispersions for mass-produced pressure sensitive articles in Europe. Improvements in coating speeds, reliability, coating consistency, and product quality led to lower production costs and continuation of the trend to waterbased emulsion coating technologies. Reverse gravure was introduced by BASF at the beginning of the 1980s for pressure sensitive adhesive processing and basically consists of a blade pressed on to a gravure cylinder rotating in a pan of wet adhesive in a direction opposite to that of the web. Adhesive is transferred from the pan into the recesses of the gravure roll and then on to the web. The blade and roll assembly are primarily responsible for metering on the correct quantity of wet adhesive and establishing a consistent, defect free adhesive coating. Gravure rolls (Fig. 8-10) with 14 to 18 lines cm ⁻¹ give a dry coating weight of about 20 g m ⁻² . A gravure roll with 36 lines cm ⁻¹ gives, for example, about 10 g m ⁻² (in each case with an approximately 50 % solids adhesive). If desired, the coating weight can be varied slightly by adjusting the blade position and by modifying the viscosity of the adhesive. For significant changes, a roll with a different grid must be used. When high reverse-gravure coating speeds (600+ m min ⁻¹) are attempted, coating weight is found to drop off drastically above about 300 m min ⁻¹ . This behavior occurs at high speeds because of the shorter residence time of the gravure roll in the dispersion reservoir – i.e., so short that the gravure line cells are no longer completely filled and too little dispersion is applied to the web. However, if the dispersion is forced into the engraving under pressure, it is possible to vary coating weight over a broader range, even with a constant number of lines. For example, application rates from 15 to 30 g m ⁻² can be achieved at 600 m min ⁻¹ with an 18 lines cm ⁻¹ gravure roll and from 20 to 40 g m ⁻² with a 14 lines cm ⁻¹ gravure roll. Vario gravure is a substantial refinement of the standard reverse gravure method (Fig. 8-11). The side seal consists of two polyethylene “margin wipes” pressed against the polished ends of the gravure roll. Two grooves, providing pressure release and lubrication, are incorporated into each margin wipe. Rubber parts are also built into the margin wipes to seal the side edges of the coating blade – the entire “casting box” assembly is sealed by a lateral force applied on to the sides of two margin wipes. The upper blade is additionally pressed against the gravure roll surface, which simultaneously prevents air being drawn in and results in very low air entrainment (i.e. low foaming). Coating weight is controlled mainly via the pump pressure, designed to operate without pulsation (Mohno pump). Due to the excess pressure prevailing in the casting box (0.2–0.6 bar), not only are the recesses of the gravure roll surface filled, but a film, i.e. an excess, is also applied on to the roll. This is the only way that a coating weight of 20 g m ⁻² can be maintained at higher speeds (400–600+ m min ⁻¹). The flow rate of wet adhesive through the pump can also be coupled to the web speed in order to keep coating weight constant during speed changes. Water based pressure sensitive adhesives can also be directly applied on to the substrate web using a slot die coater (Fig. 8-12). Die coating is widespread in the USA (est. 60–70 % of total label production), but is only used occasionally in Europe. Coating weight can be easily varied over a broad range at different web speeds. Uniform distribution of medium-viscosity adhesive over the web width is achieved with a special die geometry where the outlet aperture is larger at the web edges than in the center. This method provides an impressive final coating – characterized by unusual levelness.
Chemical concentration:	Small amounts of plasticizer (2–5 %) are frequently added to the acrylic dispersions in order to obtain gentler removal. The main plasticizers used are the classical plasticizers (i.e. phthalates such as DOP, DBP and DIDP) (pg. 11)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Reliability			

Continued on next page ...

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Study Citation:	Urban, D., Egan, L. (2002). Applications in the adhesives and construction industries.			
HERO ID:	7324696			
Conditions of Use:	Application of Adhesives and Sealants			
		EVALUATION		
Domain		Metric	Rating	Comments
	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources (journalarticles) and are generally accepted by the scientific community, and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness				
	Metric 2:	Geographic Scope	Medium	The data 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/ processtechnologies) 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	N/A	No sample data provided in the source
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:	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:	Median (min-max) concentrations (ng/g) of DBP in dust in different environments were reported as follows: Houses - 6726 (383–24,234); High schools - 14,716 (4524–23,874); Museums - 6298 (1832–25,037); Libraries - 12,869 (4076–55,027); and Cars - 4443 (960–16,752). (Table 4)			
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:	Väisänen, K., A.J., Hyttinen, M., Ylönen, S., Alonen, L. (2019). Occupational exposure to gaseous and particulate contaminants originating from additive manufacturing of liquid, powdered, and filament plastic materials and related post-processes. Journal of Occupational and Environmental Hygiene 16(3):258-271.			
HERO ID:	6106854			
Conditions of Use:	processing			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Concentration (ug/m3): at the beginning - 3; middle - 7; end - 6.			
Comments:	Only table supplementary data attached			
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	Uninformative	no geographic location is known
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is generally no more than 10 years old.
	Metric 5:	Sample Size	Low	Distribution of samples is qualitative or characterized by no statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Uninformative	report does not document its data sources, assessment methods, and assumptions.
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	The report does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Wang, Y., Zhu, H., Kannan, K. (2019). A review of biomonitoring of phthalate exposures. Toxics 7(2):21.			
HERO ID:	5547263			
Conditions of Use:	commercial use			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	The annual global production of phthalate was 4.7 million metric tons in 2006 and ~8 million metric tons in 2015, and DBP is one of the ten commonly used phthalates.			
Chemical concentration:	Metabolites of DEP, DBP, DiBP, and DEHP were the most abundant compounds measured in urine. Different studies found the following urinary concentrations of MBP (a metabolite of DBP): 18.9 ug/L for 7600–10,031 individuals; 36 ug/L for 186 persons in Northern Manhattan; 17.8 ug/L for 482 individuals; 20.7 ug/L for 2350 individuals; and 14.5 ug/L for 406 men. The urinary concentrations of MBP were 20–100 times those in blood or milk. The estimated mean daily exposure doses to DBP in the US were one to two orders of magnitude below the EPA RfD (DBP = 100 ug/kg body weight (bw)/day). DBP (2.06 ug/L) were reported at high concentrations in male seminal plasma from men in the US.			
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	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	Low	The report is more than 20 years old.	
	Metric 5: Sample Size	Medium	Distribution of samples is characterized by a range with uncertain statistics.	
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	High	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:	Whittaker, K. F., Moore, A. T. (1984). Pilot scale investigations in the removal of volatile organics and phthalates from electronics manufacturing wastewater. :579-589.
HERO ID:	5740947
Conditions of Use:	Disposal - wastewater

EXTRACTION	
Parameter	Data
Process description:	In preparing influent for continuous flow column adsorption studies, a sequence of treatment operations similar to the proposed full-scale treatment process was employed. Raw wastewater was flocculated with ferric chloride and polymer before settling, air stripping, and eventual carbon contact. Prior to flocculant addition and rapid mixing, the wastewater was spiked with the volatile organics and phthalates. Theoretical concentration levels added by spiking, assuming no losses due to volatilization, adsorption onto settling floe, etc. are given in Table JI. These concentration levels were chosen so that, after allowing for an expected degree of removal via filtration or air stripping, influent volatile organic levels in the pilot columns would be maintained at approximately 100 ppb, the average compound concentration expected during full-scale treatment. The wetted pans of each unit in the pilot plant were composed of nonleachable materials (stainless steel, Teflon, or glass) to prevent contamination by volatile or non-volatile species. A 500 gallon stainless steel tank with suitable piping and valving to allow easy solids drainage was used for influent storage. The air-stripping unit, constructed from a ten-gallon stainless steel liquid storage can, was equipped with Teflon influent and effluent lines and an air stone diffuser. Air flow, measured by an in-line rotameter, was supplied from an oil-free compressor at a 20:1 air-to-water flow ratio. The carbon adsorption module consisted of four, 4-inch inside diameter, 60-inch long columns of beaded kimax glass. End caps were attached via specialized stainless steel bolt type couplings with Teflon pressure seals and Viton "O-rings". Each column was outfitted with Teflon screens and glass beads for media support and flow distribution. All systems components were rinsed with methanol before introduction of appropriate media. A schematic drawing of the pilot plant used during the continuous flow studies is given in Figure I. Photographs of the various plant components are shown in Figure 2.
Comments:	The combined unit operations are effective in removing volatile organics, activated carbon alone will be successful in removing phthalate compounds. The high affinity of activated carbon for phthalates suggests that the concentration of these chemicals will not be a critical parameter in determining effective carbon adsorption life.

		EVALUATION	
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	Source is a published chapter of a book, likely uses sound method of analysis that wouldn't indicate flaws or quality issues
Domain 2: Representativeness	Metric 2: Geographic Scope	High	Data is for US
	Metric 3: Applicability	Low	Data is for waste treatment method
	Metric 4: Temporal Representativeness	Low	Data is greater than 20 years old.
	Metric 5: Sample Size	Medium	Range with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6: Metadata Completeness	Medium	Report documents results, methods and assumptions. Sources generally described.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	Low	Does not address uncertainty or variability.

Overall Quality Determination

Low

Study Citation:	Wypych, G. (2015). Health & safety and environmental impact. :413-439.			
HERO ID:	5633778			
Conditions of Use:	Processing (into PVC)			
EXTRACTION				
Parameter		Data		
Life cycle description:		Table 12.9 (pgs. 16-18/27) contains various components of PVC formulations that are permitted as "indirect additives to food". The list includes: Adhesives, Components of paper and paperboard in contact with aqueous and fatty foods, slimicides, Cellophane, polyester resins (cross linked), and Rubber articles intended for repeated use.		
Chemical concentration:		Content levels of different phthalates are listed on pg. 13 for cosmetic products such as deodorants and perfumes. (dibutyl phthalate was not a list phthalate found in cosmetic products)		
EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Reliability		Metric 1: Methodology	High	Report is a review paper, which cites various frequently used sources, and the associated information does not indicate flaws or quality issues.
Domain 2: Representativeness		Metric 2: Geographic Scope	Medium	The extracted data refers to concentrations in European cosmetics, which may be a combination of OECD and non-OECD countries.
		Metric 3: Applicability	Medium	Report is for general PVC use but appears to cover items that may fall under FDA and not TSCA
		Metric 4: Temporal Representativeness	Medium	The report is predominantly based on data that is between 10 and 20 years old
		Metric 5: Sample Size	Medium	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	Uncertainty not addressed. Variability is addressed in the different class of products provided.
Overall Quality Determination			Medium	

Study Citation:	Wypych, G. (2020). Health and safety and environmental impact. :431-458.			
HERO ID:	7978600			
Conditions of Use:	Processing – incorporating into formulation, mixture, or reaction product (plasticizer and coating)			
EXTRACTION				
Parameter	Data			
Life cycle description:		DBP is listed in table 12.9 as a PVC formulation component permitted as indirect additives to food (page 17-18 of 28). It is listed as a component to adhesives, components of paperand paperboard in contact with aqueous andfatty foods, slimicides, cellophane, Polyester resins (crosslinked), and Rubber articles intended for repeated use		
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 source. I am unsure the author of this document but the reference for the relevant information is from the FDA
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data from the USA
	Metric 3:	Applicability	Low	Not an occupational scenario but possibly relevant to know the products/uses DBP is used
	Metric 4:	Temporal Representativeness	Medium	data are from 2008
	Metric 5:	Sample Size	N/A	qualitative data
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	High	Sources documented
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	N/A	qualitative
Overall Quality Determination			High	

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 DBP 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			
Comments:	Source provides other process descriptions and concentrations for metals such as cadmium, chromium lead and mercury. Mentions specific phthalates such as DBP but does not provide any quantitative data on any phthalates.			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	The assessment or report uses high quality data and/or techniques or sound methods that are from frequently used sources.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	The data are from a non-OECD country.
	Metric 3:	Applicability	High	The report is for an occupational scenario within the scope of the risk evaluation.
	Metric 4:	Temporal Representativeness	High	The report is no more than 10 years old.
	Metric 5:	Sample Size	N/A	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	N/A	No scope to address variability and uncertainty.
Overall Quality Determination			High	

Study Citation:	Yang, M., Sui, W. Y., Qin, Y., Nie, Y. J. (2011). Study on recycling of waste styrofoam for adhesive. Advanced Materials Research 181-182:975-978.		
HERO ID:	5433467		
Conditions of Use:	Adhesive production from waste EPS foam		
EXTRACTION			
Parameter	Data		
Process description:	Adhesive was prepared by the following process: Firstly, the waste PS foam washed with a dilute detergent solution, then cleaned by water. At last, it was crushed by hand after drying. Secondly, 10 g crushed waste PS foam was dissolved in 25 ml mixed solvent of ethyl acetate and toluene. Then the mixture were added into a 100 ml round-bottomed flasks equipped with a thermometer, reflux condenser, constant pressure funnel and through nitrogen management while stirring and heating to 70 °C. The reaction was started when some modifier, such as BPO, DBP, the amount of rosin resin and phenolic resin, were added in. The temperature of the reactive system increases gradually and starts to reflux for 2.5 h. Then heating stopped. When the temperature is 55 °C, a certain amount of isocyanate and azo-bis-isocyanate are added into the mixture. The reaction continued for 0.5 h while stirring. Lastly, a certain amount of antioxidant and alumina were added, and the reaction were heated to reflux for another 0.5 h. then cooled to room temperature.		
Chemical concentration:	10% DBP in adhesive made from recycled EPS (note this is an optimized formulation and not a result of product testing)		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Reliability	Metric 1: Methodology	Medium	The assessment or report uses high quality data and/or techniques or sound methods that are not from a frequently used source and associated information does not indicate flaws or quality issues.
Domain 2: Representativeness	Metric 2: Geographic Scope	Low	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	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	Medium	Assessment or report clearly documents results, methods, and assumptions. Data sources are generally described but not fully transparent.
Domain 4: Variability and Uncertainty	Metric 7: Metadata Completeness	High	The report addresses variability and uncertainty in the results. Uncertainty is well characterized.
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Study Citation:	Yang, M., Sui, W. Y., Qin, Y., Nie, Y. J. (2011). Study on recycling of waste styrofoam for adhesive. Advanced Materials Research 181-182:975-978.		
HERO ID:	5433467		
Conditions of Use:	Adhesive production from waste EPS foam		
Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Yano, K., Hirose, N., Sakamoto, Y., Katayama, H., Moriguchi, T., Joung, K. E., Sheen, Y. Y., Asaoka, K. (2002). Phthalate levels in beverages in Japan and Korea. Bulletin of Environmental Contamination and Toxicology 68(4):463-469.			
HERO ID:	1598698			
Conditions of Use:	Plasticizer in water bottles			
EXTRACTION				
Parameter	Data			
Production, import, or use volume:	Production of phthalates in Japan was 474,000 tones in 1998, 3% was DBP.			
Chemical concentration:	Concentration of DBP (ug/g) in Japan and Korea; Bottled water: zero for both. Beer: both close to 0.04. Fiber drink: ~ zero. Alcoholic drink: ~ zero. Nutritive drink: Japan ~0.04; Korea ~ 0.1. Vinegar: ~ zero. Juice: ~0.005 for Japan, ~0.01 for Korea. Rice Punch: ~0.005 for Japan, ~ zero for Korea. Wine: ~0.18 for Japan, ~0 for Korea. Figure 2			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Low	Report does not use EPA or NIOSH method and briefly describes analytical technique.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Medium	Data is from Japan and Korea (OECD countries)
	Metric 3:	Applicability	Uninformative	Data is not for an occupational scenario and likely can't be applied to one.
	Metric 4:	Temporal Representativeness	Medium	Report is from 2002 so >10 years but <20 years old
	Metric 5:	Sample Size	Low	Samples are few and only tested between two different countries
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report is not applicable to risk assessment and methods and sources are not fully transparent
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Medium	Addresses variability by testing from two different countries but does not address uncertainty
Overall Quality Determination		Uninformative		

Study Citation:	Young, A. S., Allen, J. G., Kim, U. J., Seller, S., Webster, T. F., Kannan, K., Ceballos, D. M. (2018). Phthalate and Organophosphate Plasticizers in Nail Polish: Evaluation of Labels and Ingredients. Environmental Science & Technology 52(21):12841-12850. [Environmental science & technology].			
HERO ID:	5164231			
Conditions of Use:	Consumer use			
EXTRACTION				
Parameter	Data			
Chemical concentration: Physical form:	Concentration of DBP in 40 nail polish samples: median was 0.021 ug/g with a range of <0.0005 to 0.138 ug/g. liquid			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	Medium	The report uses high quality data not from a frequently used source but does not indicate flaws or quality issues
Domain 2: Representativeness	Metric 2:	Geographic Scope	High	Data is from US
	Metric 3:	Applicability	Uninformative	Report is not for an occupational scenario
	Metric 4:	Temporal Representativeness	High	Report was received for review in 2018 so it was likely conducted in the 2010s
	Metric 5:	Sample Size	Medium	Characterized by statistical data with uncertain statistics
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Low	Report does not contain information regarding worker exposure
Domain 4: Variability and Uncertainty	Metric 7:	Metadata Completeness	Low	Does not address variability or uncertainty.
Overall Quality Determination		Uninformative		

Study Citation:	Zhang, L.,i, Su, W.,ei, Qian, Y., Zhao, Y., Zhu, Z., Wang, D. (2016). Quantitative detection and impact evaluation of phthalate plasticizers in insulating oil. IEEE Transactions on Dielectrics and Electrical Insulation 23(6):3429-3434.			
HERO ID:	5533553			
Conditions of Use:	Insulating oils in electrical parts (transformers)			
EXTRACTION				
Parameter	Data			
Chemical concentration:	Table 5 gives DBP concentration in insulating oil samples (mg/L): 16.08, 20.53, 17.61, 22.29, 19.55, 16.68; Table 7 gives other concentrations of seven oil samples: 1.22, 1.82, 1.44, 1.16, 0.54, last two are NDs..			
EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Reliability	Metric 1:	Methodology	High	Source is peer reviewed so likely contains high quality data.
Domain 2: Representativeness	Metric 2:	Geographic Scope	Low	Data is from China, a non-OECD country.
	Metric 3:	Applicability	High	Data is applicable to amount of DBP present in transformer electrical parts.
	Metric 4:	Temporal Representativeness	High	Report is from 2016, less than 10 years old.
	Metric 5:	Sample Size	Low	Characterized by individual samples but not statistics.
Domain 3: Accessibility/ Clarity	Metric 6:	Metadata Completeness	Medium	Documents results, methods 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		Medium		

Study Citation:	Zhu, L. (2015). Rejection of organic micropollutants by clean and fouled nanofiltration membranes. Journal of Chemistry 2015(934318):1-9.		
HERO ID:	5933015		
Conditions of Use:	Laboratory use		
EXTRACTION			
Parameter	Data		
Chemical concentration:	99.5% purity DBP purchased as laboratory chemical		
Comments:	Initial concentration of compounds 0.5–0.8mg L–1. Table 4 (page 7).Also, check Fig 2(f), P. 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 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	Medium	The report provides only limited discussion of the variability and uncertainty in the results.
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 temperaturesuch as PVC, and their flexibility is improved via strong interactionbetween the plasticizer and polymer chain units (Stepek, 1983). In addition, they reduce shear during polymer processing andimprove the impact resistance of the final material (Bhunia et al.,2013). (p. 13).		
Chemical concentration:	Plasticizers are typically organic liquids with high molecularweight and boiling point. The used concentration varies between20 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	The report provides only limited discussion of the variability and uncertainty in the results.
Overall Quality Determination		High	