August 04, 2025

Comments from Scientists, Academics, and Clinicians on the Cumulative Risk Analysis for Phthalates Under TSCA

Submitted online via Regulations.gov to docket EPA-HQ-OPPT-2024-0551-0011

These comments are submitted on behalf of the undersigned scientists, academics, and clinicians. We declare that we have no direct or indirect financial or fiduciary interests in the subjects of these comments. The co-signers' institutional affiliations are included for identification purposes only and do not imply institutional endorsement or support, unless indicated otherwise.

We appreciate the opportunity to provide written comments on EPA's Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) under the Toxic Substances Control Act (TSCA) (hereafter referred to as the *Phthalates CRA*), which requires EPA to evaluate chemical risks based on the "best available science."[1] Phthalates are used in building and construction materials, as plasticizers, and in personal care products, cosmetics, and food contact materials.[2] People can inhale, eat, drink and absorb phthalates, and fetuses can be exposed in utero.[3] EPA proposed this cumulative chemical group of phthalates based on their common adverse effects on the developing male reproductive system ("phthalate syndrome").[4]

EPA's approach using the endpoint of fetal testicular testosterone in the calculation of benchmark dose and relative potency factors is scientifically appropriate; however, the exposure assessment approach relying on National Health and Nutrition Examination Survey (NHANES) data will underestimate exposures and risks to workers and consumers. EPA should use data on phthalate concentrations in environmental media and products to develop workers and consumer exposure scenarios for the many known use patterns likely to result in exposure to multiple phthalates, such as use of multiple personal care products, salon products, and cleaning products.

The assessment of indoor dust exposures should be updated to include all 3 pathways relevant to phthalates: inhalation, vapor to dermal, and dust ingestion. Inhalation and vapor to dermal contribute significantly to indoor exposures for several phthalates in the CRA.

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[1] 15 USC §2625(h).
[2] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 10.
[3] National Research Council (2008). *Phthalates and Cumulative Risk Assessment: The Tasks Ahead*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12528.
[4] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 10.

Our detailed comments on the Phthalates CRA address the following issues:

1. **EPA's selection of the fetal testicular testosterone endpoint to derive relative potency factors (RPFs) for estimating cumulative risks to multiple phthalates is appropriate.**

2. **EPA's benchmark dose and relative potency factor estimates are appropriate for the phthalates cumulative risk assessment.**

3. **EPA's "Option 2" for computing cumulative risk is a potentially useful concept, but EPA's implementation of the option is deeply flawed.**

4. **EPA must ensure that the CRA is protective for both higher, acute exposures and for longer and lower exposures that can also cause adverse effects.**

5. **EPA should include other chemicals and non-chemical stressors in the phthalates CRA.**

6. **EPA's use of National Health and Nutrition Examination Survey (NHANES) data to represent background phthalate exposure is generally appropriate but must be supplemented by additional data to avoid underestimating cumulative exposures.**

7. **EPA should use reasonably available data to develop scenarios for worker exposures and combine worker and consumer exposures.**

8. **EPA should use reasonably available data to develop scenarios for consumer exposures.**

9. **EPA should include inhalation and dermal uptake from vapor in the cumulative risk from exposure to indoor dust. Cumulative risk from dust should be integrated into consumer and worker exposure scenarios, with consideration for sub-populations that experience higher exposures from dust, such as people in environmental justice and low-income communities.**

We appreciate the opportunity to provide public input. Please do not hesitate to contact us with any questions regarding these comments.

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Detailed Comments:

1. **EPA's selection of the fetal testicular testosterone endpoint to derive relative potency factors (RPFs) for estimating cumulative risks to multiple phthalates is appropriate.**

In the 2023 draft CRA approach document, EPA presented toxicology data for several outcomes related to phthalate syndrome, including both gestational events (reduced expression of cholesterol transport genes, reduced expression of steroidogenesis genes, reduced Insl3 mRNA, and reduced fetal testicular testosterone) and postnatal endpoints (reduced anogenital distance, nipple retention, hypospadias, seminiferous tubule atrophy, and multinucleated gonocyte formation).[5] From these various measures, EPA has selected reduced fetal testicular testosterone as the endpoint for development of relative potency factors (RPFs). This choice is appropriate given several important considerations: reduced fetal testosterone is a relatively early and critical biological marker for the broad spectrum of phthalate syndrome effects, including apical postnatal endpoints; there are multiple studies of this outcome for each of the six phthalates, conducted in multiple labs with comparable and consistent methods; and this outcome is less subject to experimental variability than other endpoints. EPA's CRA for male reproductive effects of phthalates should continue to use reduced fetal testicular testosterone data to determine points of departure (PODs) and RPFs.

2. **EPA's benchmark dose and relative potency factor estimates are appropriate for the phthalates cumulative risk assessment.**

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[5] U.S. EPA (2023). Draft Proposed Approach for Cumulative Risk Assessment of High-Priority Phthalates and a Manufacturer-Requested Phthalate under the Toxic Substances Control Act.

EPA's draft CRA is based on an RPF approach, with the calculation of RPF-weighted total exposures to combinations of the 6 phthalates expressed as dibutyl phthalate (DBP) equivalents. Use of RPFs is the preferred method for conducting CRAs. A critical advantage is that the end result of applying RPFs is an estimate of index chemical (in this case, DBP) equivalent exposures in a relevant exposure metric such as mg/kg-day, which is much more informative and useful for risk characterization than the unitless hazard index approach. EPA's CRA for male reproductive effects of phthalates should continue to use RPFs for calculating a weighted exposure metric for combined exposures to the 6 phthalates.

EPA estimated PODs and RPFs for reduced fetal testicular testosterone using an update of the meta-regression developed specifically for anti-androgenic phthalates by the nation's authoritative scientific body, the National Academies of Sciences, Engineering, and Medicine (NASEM).[6] The updated meta-regression applies rigorous statistical techniques to an extensive data set assembled from 14 different published studies of reduced fetal testosterone for the 6 anti-androgenic phthalates.[7] The meta-regression approach represents the best available science. From the meta-regression model, EPA derived benchmark doses (BMDs) and BMD lower confidence limits (BMDLs) for each of the 6 included phthalates, for benchmark responses (BMRs) of 5%, 10% and 40% reductions in fetal testicular testosterone. EPA appropriately selected DBP as the index chemical and the DBP $BMDL_5$ as the POD for the CRA. EPA then calculated RPFs using the BMD_{40} for each of the 6 phthalates. Although 40% is a high BMR, its use for calculating RPFs is appropriate in this case because the model did not estimate a BMD_5 for 2 of the 6 phthalates, and for the remaining 4 phthalates, there was strong consistency in RPFs derived from the BMD_{40} and the BMD_5. EPA's CRA method appropriately applies the resulting RPFs to calculate DBP-equivalent exposures to the 6 phthalates.

EPA's CRA for male reproductive effects of phthalates should continue to use PODs (with a 5% BMR) and RPFs derived from the updated NASEM meta-regression.

3. EPA's "Option 2" for computing cumulative risk is a potentially useful concept, but EPA's implementation of the option is deeply flawed.

In the recent revised version of the phthalates CRA document, EPA proposes a new "Option 2" for calculating cumulative risk that does not use the RPFs for scaling the exposures to the different phthalates. Instead, Option 2 uses the PODs selected from each of the individual phthalate risk evaluations for scaling the exposures to the different phthalates. This means that RPFs are replaced by NOAELs for alternate male reproductive endpoints for DEHP, BBP and DCHP, and by alternate BMDLs for reduced fetal testosterone for DIBP and DINP.[8] Option 2 is

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[6] NASEM (2017). Application of systematic review methods in an overall strategy for evaluating low-dose toxicity from endocrine active chemicals.

[7] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), pp. 19-25.

[8] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate

potentially useful in concept, but EPA's application of Option 2 is deeply flawed by its selection of inappropriate PODs for BBP, DCHP, DIBP and DINP.

EPA falsely claims that Option 2 has an equivalent impact on each phthalate's contribution to cumulative risk:

> Option 2 will have the same impact on cumulative risk estimates for every phthalates, resulting in cumulative risk estimates that are approximately 1.1x more sensitive for both DCHP and DEHP.[9]

EPA's own examples demonstrate that this statement is incorrect. In fact Option 2, as implemented by EPA, increases the relative importance of DEHP and decreases the relative importance of BBP, DCHP, DIBP, and DINP in computing cumulative risk. The MOEs calculated under each option for DCHP and DEHP are shown in the following table:

Comparison of Cumulative MOEs calculated by EPA Under Options 1 and 2		
Phthalate	**Option 1**	**Option 2**
DCHP	29	51
DEHP	46	21
Source: U U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), pp. 66 and 69.		

In EPA's examples, the MOE for DCHP is substantially increased by Option 2 relative to Option 1, and the MOE for DEHP is substantially decreased. The reason for this result is that in Option 2 EPA uses a POD for DEHP (NOAEL of 4.8 mg/kg-d, with an HED of 1.1 mg/kg-d) that is lower than the implicit DEHP POD incorporated in the Option 1 RPFs, which is equal to the DBP (index chemical) POD-HED derived from the meta-regression divided by the DEHP RPF: 2.1 mg/kg-d / 0.84 = 2.5 mg/kg-d.

In contrast, the DCHP MOE is increased because in Option 2 EPA uses a POD for DCHP (the value EPA specified as a NOAEL, but is actually a LOAEL, is 10 mg/kg-d, with an HED of 2.4 mg/kg-d) that is greater than the implicit DCHP POD incorporated in the Option 1 RPFs, which is equal to the DBP (index chemical) POD-HED derived from the meta-regression divided by the DCHP RPF: 2.1 mg/kg-d / 1.66 = 1.3 mg/kg-d.

EPA's examples demonstrate that the direction of outcome yielded by Option 2 relative to Option 1 is strongly dependent on the POD selected for each phthalate under Option 2. Further,

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(DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), Table 5-3.

[9] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 62.

DEHP is the only phthalate for which Option 2, as implemented by EPA, results in a lower MOE. The DBP MOE is the same for Option 1 and 2, and the MOEs for BBP, DCHP, DIBP and DINP are all higher under Option 2. This is because EPA has inappropriately selected PODs for BBP, DIBP, DCHP, and DINP that are less protective than the RPFs used in Option 1.

Comparison of toxicity values used for phthalate cumulative risk computation in EPA's Options 1 and 2

Phthalates	**Option 2 POD[a] (mg/kg-d HED)**	**RPF[a]**	**Option 1 Implicit POD (mg/kg-d HED) (DBP POD / RPF)**	**Option 2 POD compared with Option 1**
DBP	2.1	1	2.1	Same POD
DEHP	1.1	0.84	2.5	Lower POD
BBP	12	0.52	4.0	Higher POD
DIBP	5.7	0.53	4.0	Higher POD
DCHP	2.4	1.66	1.3	Higher POD
DINP	12	0.21	10.0	Higher POD

[a]U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), Table 5-3

The DEHP results demonstrate that Option 2 is potentially useful in concept, as it allows for incorporation of a DEHP POD that is more protective than the RPF for DEHP. EPA's DEHP Draft Risk Evaluation found evidence of male reproductive effects at exposure levels lower than those indicated by the meta-regression used to derive the RPFs, and Option 2 incorporates this information, albeit in a flawed manner by using the scientifically deficient NOAEL instead of a BMDL.

The BBP, DIBP, DCHP, and DINP results demonstrate that EPA's application of Option 2 is fatally flawed. There is no justification for calculating phthalate cumulative risk with toxicity values that are less protective than the RPFs derived from the scientifically rigorous meta-regression modeling. Yet in Option 2 – and in the individual Draft Risk Evaluations for BBP, DIBP, DCHP, and DINP – EPA effectively disregards the meta-regression results and selects PODs that are less protective.

Option 2 should be given consideration only with 2 important changes in how it is applied. First, NOAELs should not be used in the application of Option 2, as NOAELs are scientifically deficient and should not be used in place of BMD modeling.[10,11,12,13,14,15] For DEHP, EPA should conduct benchmark dose modeling to determine an appropriate BMDL for use in Option 2, rather than the NOAEL of 4.8 mg/kg-d (HED of 1.1 mg/kg-d), and similarly, EPA should conduct BMD modeling for each of the other phthalates to determine if there is a BMDL value more protective than the values provided by the meta-regression. Second, RPFs should be replaced with PODs from the individual phthalate assessments only when they provide greater health protection. There is no justification for using Option 2 with any POD that produces a reduced estimate of risk (e.g., a higher cumulative MOE). EPA should use the $BMDL_5$ from the meta-regression (using Metafor 2.0.0 when Metafor 4.6.0 does not provide a $BMDL_5$) or the implicit PODs shown in the above table for implementation of Option 2, and replace these values only if additional BMD modeling produces a lower BMDL.

4. EPA must ensure that the CRA is protective for both higher, acute exposures and for longer and lower exposures that can also cause adverse effects.

EPA notes that adverse effects on the developing male reproductive system can occur from a single exposure during the critical window of development. EPA states that it therefore "considers effects on fetal testicular testosterone relevant as an acute effect associated with higher, acute exposures."[16] However, adverse effects can also result from a single lower exposure and/ or multiple lower exposures over time. The critical window of development in humans is 7 weeks long (gestational weeks 8 to 14) which is a subchronic or intermediate exposure duration. EPA must assess risks from lower-level exposures in the critical window that cause adverse effects, along with higher, acute exposures to ensure the CRA is protective for both.

5. EPA should include other chemicals and non-chemical stressors in the phthalates CRA.

EPA includes only six phthalates in the CRA, selected from chemicals with ongoing risk evaluations for inclusion. To fully characterize the risk of phthalates related to phthalate syndrome, the CRA should incorporate other chemical stressors with shared mechanistic effects or apical phthalate syndrome endpoints into the CRA. Studies have identified dipentyl phthalate (DPeP) diisopentyl phthalate (DIPP), diheptyl phthalate (DHeP), diisoheptyl phthalate (DiHeP),

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[10] U.S. EPA (2012). Benchmark Dose Technical Guidance.
[11] U.S. EPA (2020). Risk Evaluation for n-Methylpyrrolidone (2-Pyrrolidinone, 1-Methyl-) (NMP), p. 262.
[12] U.S. EPA (2022). ORD Staff Handbook for Developing IRIS Assessments, pp. 8-1 and 8-18.
[13] NASEM (2017). Application of systematic review methods in an overall strategy for evaluating low-dose toxicity from endocrine active chemicals, p. 158.
[14] National Research Council (2009). Science and Decisions: Advancing Risk Assessment, p. 129.
[15] U.S. EPA (2024). Science Advisory Committee on Chemicals (SACC) Meeting Minutes and Final Report for the "Draft Risk Evaluation for Di-isodecyl Phthalate (DIDP) and Draft Hazard Assessments for Di-isononyl Phthalate (DINP)," p. 92.
[16] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 15.

and others as additional phthalates that produce phthalate syndrome outcomes.[17,18] Numerous other chemicals, including several pesticides, for example, are known or suspected to be endocrine-disrupting compounds that can act on androgen receptors and be associated with outcomes included in phthalate syndrome.[19] The pesticides vinclozolin and procymidon, among others, have been shown to be androgen receptor agonists and associated with apical outcomes related to phthalate syndrome.[20]

The EPA should account for pesticides and other chemicals that act on the same pathway (shared cellular-level or organ-level events) or have the same apical endpoints associated with phthalate syndrome, or other outcomes being considered in the risk assessment. This can be accomplished with the inclusion of adjustment factors in the risk evaluation.[21] Not accounting for these simultaneous chemical exposures will underestimate the health effects of phthalates in the CRA. Studies documenting the applicability of dose addition at low doses, described in EPA's *Draft Phthalates CRA Approach*, further demonstrate the importance of considering broad mixtures of antiandrogenic chemicals and the potential of many chemicals operating through diverse mechanisms to contribute to phthalate syndrome effects:

> Mixture studies by Conley et al. demonstrate several key points. First, they provide evidence to support the concept of "something from nothing" since effects were observed at exposure levels below the individual chemical LOAELs (i.e., LOAEL/80 in (Conley et al., 2018)) and NOAELs (i.e., NOAEL/15 in (Conley et al., 2021)). Secondly, these studies provide evidence to support the applicability of dose addition at low doses for mixtures of phthalates and other antiandrogens. Finally, these studies further demonstrate the applicability of dose addition for mixtures of antiandrogens with mixed MOAs. For example, although the tested chemicals disrupt androgen action through multiple molecular initiating events (e.g., finasteride is a 5α-reductase inhibitor, flutamide and vinclozolin are androgen receptor antagonists, linuron inhibits steroidogenic CYPs and is an androgen receptor antagonist, while the molecular initiating event for phthalates is unknown), these chemicals cause common key cellular

[17] Leon Earl Gray et al., "Genomic and Hormonal Biomarkers of Phthalate-Induced Male Rat Reproductive Developmental Toxicity Part II: A Targeted RT-QPCR Array Approach That Defines a Unique Adverse Outcome Pathway," *Toxicological Sciences: An Official Journal of the Society of Toxicology* 182, no. 2 (August 3, 2021): 195–214, https://doi.org/10.1093/toxsci/kfab053.
[18] Andreas Kortenkamp, "Which Chemicals Should Be Grouped Together for Mixture Risk Assessments of Male Reproductive Disorders?," *Molecular and Cellular Endocrinology* 499 (January 1, 2020): 110581, https://doi.org/10.1016/j.mce.2019.110581.
[19] Sílvia Moreira et al., "Pesticides and Male Fertility: A Dangerous Crosstalk," *Metabolites* 11, no. 12 (November 25, 2021): 799, https://doi.org/10.3390/metabo11120799.
[20] A. Kortenkamp, "Which Chemicals Should Be Grouped Together for Mixture Risk Assessments of Male Reproductive Disorders?" Molecular and Cellular Endocrinology 499 (2020) 110581, https://doi.org/10.1016/j.mce.2019.110581.
[21] Julia R. Varshavsky et al., "Current Practice and Recommendations for Advancing How Human Variability and Susceptibility Are Considered in Chemical Risk Assessment," *Environmental Health* 21, no. Suppl 1 (January 12, 2023): 133, https://doi.org/10.1186/s12940-022-00940-1.

events and lead to common adverse effects on development of the male reproductive tract in a manner consistent with dose addition.[22]

EPA should also use the proposed key characteristics of male reproductive toxicants[23] to identify additional chemicals that may act in a dose-additive manner with phthalates for inclusion in the CRA. These include: alters germ cell development, function, or death; alters somatic cell development, functions, or death; alters production and levels of reproductive hormones levels/functions; alters hormone receptor levels/functions; is genotoxic; induces epigenetic alterations; induces oxidative stress; and induces inflammation. Chemicals with "robust" or "moderate" evidence of one or more of the key characteristics should be identified as male reproductive toxicants and accounted for in the phthalates CRA.

Non-chemical stressors can also impact the relationship between phthalate exposure and outcomes related to phthalate syndrome. Prenatal stress and phthalates may interact with effects on fetal development relevant to androgen receptors and have been shown to affect anogenital distance.[24] For example, women with low prenatal stress (a non-chemical stressor) had infant boys with larger anogenital distances on average than high prenatal stress individuals[25] (shortened anogenital distance is the adverse health outcome).

The inclusion of psychosocial stressors in a cumulative risk assessment, in particular naming stressors like racism, poverty and exposure to violence, would ensure a more robust estimate of the risk from exposure to phthalates, limiting underestimation of risk.[26]

6. EPA's use of National Health and Nutrition Examination Survey (NHANES) data to represent background phthalate exposure is generally appropriate but must be supplemented by additional data to avoid underestimating cumulative exposures.

EPA importantly incorporates estimates of "non-attributable" exposures to phthalates, which include exposures from non-TSCA uses of phthalates such as food packaging and cosmetics, in the CRA by estimating background phthalate intakes from NHANES biomonitoring data. EPA combines estimates of exposure from TSCA conditions of use for any single phthalate with NHANES background exposure estimates for the other phthalates included in the CRA. This

[22] U.S. EPA (2023). Draft Proposed Approach for Cumulative Risk Assessment of High-Priority Phthalates and a Manufacturer-Requested Phthalate under the Toxic Substances Control Act, p. 100.

[23] Xabier Arzuaga et al., "Proposed Key Characteristics of Male Reproductive Toxicants as an Approach for Organizing and Evaluating Mechanistic Evidence in Human Health Hazard Assessments," *Environmental Health Perspectives* 127, no. 6 (2019): 065001, https://doi.org/10.1289/EHP5045.

[24] Emily S. Barrett et al., "Prenatal Stress as a Modifier of Associations between Phthalate Exposure and Reproductive Development: Results from a Multicentre Pregnancy Cohort Study," *Paediatric and Perinatal Epidemiology* 30, no. 2 (2016): 105–14, https://doi.org/10.1111/ppe.12264.

[25] Tye E. Arbuckle et al., "Do Stressful Life Events during Pregnancy Modify Associations between Phthalates and Anogenital Distance in Newborns?," *Environmental Research* 177 (October 1, 2019): 108593, https://doi.org/10.1016/j.envres.2019.108593.

[26] Office of General Counsel, U.S. EPA, "EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum," *360R22002*, January 2023, https://www.epa.gov/system/files/documents/2022-12/bh508-Cumulative%20Impacts%20Addendum%20Final%202022-11-28.pdf.

approach is useful for incorporating background exposures to multiple phthalates, but is insufficient for capturing high-end exposures to combinations of phthalates.

The limitations of NHANES for the phthalates CRA are demonstrated by a comparison of NHANES diisononyl phthalate (DINP) 95th percentile exposures to consumer exposures from the DINP draft risk evaluation. EPA estimates 95th percentile exposure to DINP from NHANES data for women 16-49 years old as 5.6 µg/kg-day.[27] In comparison, EPA's DINP draft risk evaluation identifies multiple consumer conditions of use with much greater exposures[28] – in some cases, even for low exposure scenarios:

> Carpet backing: high, medium and low exposure scenarios all substantially greater than 10 µg/kg-day
> Indoor furniture: high exposure scenario greater than 10 µg/kg-day, medium exposure scenario approximately 5 µg/kg-day
> Specialty wall coverings: high exposure scenario greater than 10 µg/kg-day, medium exposure scenario greater than 5 µg/kg-day
> Vinyl flooring: high and medium exposure scenarios both substantially greater than 10 µg/kg-day
> Polyurethane injection resin: high and medium exposure scenarios both substantially greater than 10 µg/kg-day
> Roofing adhesives: high, medium and low exposure scenarios all substantially greater than 10 µg/kg-day.

This comparison reveals that the NHANES estimates represent generally routine and population-wide exposures primarily from non-TSCA uses and are insufficient to capture the higher exposures resulting from TSCA conditions of use for phthalates. Inclusion of NHANES data in the CRA is useful to capture some aspects of exposure to multiple phthalates, but EPA's approach assumes that no individuals are exposed to more than 1 out of the 6 phthalates through TSCA conditions of use. This assumption is not plausible when considering real-world consumer use of multiple products within and across phthalate conditions of use identified in the draft CRA document. For example, EPA indicates that 5 out of the 6 phthalates are used in consumer arts, crafts and hobby materials; 3 phthalates are used in consumer cleaning products; and all 6 are used in consumer paints and coatings.[29] In most instances, consumers engaged in hobbies, home cleaning or home painting will use multiple products in a day, thus there is a likelihood of many consumers exposed to multiple phthalates in a day. Further, many workers who are exposed to one phthalate in the workplace are likely exposed to other phthalates from TSCA conditions of use at home. EPA's CRA approach disregards these scenarios, which are not captured by the NHANES data.

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[27] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), Table 4-2.

[28] U.S. EPA (2024). Draft Risk Evaluation for Diisononyl Phthalate (DINP), Figure 4-12.

[29] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), Table_Apx D-4.

A further limitation to the use of NHANES in the CRA is that NHANES does not provide phthalates data for children younger than 3 years old. Table 5-2 indicates that exposures for infants and toddlers are assumed to be the same as the exposures estimated from NHANES for children ages 3-5 years. This assumption is very likely to underestimate exposures to young children who typically have greater exposure per unit body weight to any contaminants, such as phthalates, that are present in house dust and food.

7. EPA should use reasonably available data to develop scenarios for worker exposures and combine worker and consumer exposures.

EPA states that "Due to the wide range of cumulative exposure scenarios that may exist in phthalate-containing workplaces, it was not possible to provide a robust quantitative assessment of cumulative risk for workers who may be exposed to multiple phthalates."[30]

However, there are significant issues with EPA's analysis.

EPA relied on safety data sheets (SDSs) to identify products containing multiple phthalates. SDS are notoriously inaccurate and incomplete.[31,32] EPA should use more reliable databases and product testing information. For example, product testing has identified products that building trades workers would use such as caulks, sealants and other exterior use products with multiple phthalates and high levels of phthalates.[33, 34]

To identify workplaces with potential phthalate co-exposures, EPA analyzed data from Chemical Data Reporting (CDR), the Toxics Release Inventory (TRI), Discharge Monitoring reports (DMR), and the National Emissions Inventory (NEI). However, these data sets will miss all workplaces where workers are using multiple products containing phthalates but are not required to report to EPA, including salon workers, cleaning professionals (home, hospitality, automotive, etc.), and building trades professionals (construction, remodeling, energy efficiency, etc.). This approach will also miss professional drivers who are exposed to phthalates from car or truck interiors.

There is significant data on phthalates in:

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[30] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 32.
[31] Nicol AM, Hurrell AC, Wahyuni D, McDowall W, Chu W. Accuracy, comprehensibility, and use of material safety data sheets: a review. Am J Ind Med. 2008 Nov;51(11):861-76. doi: 10.1002/ajim.20613. PMID: 18651574.
[32] BlueGreen Alliance and Clearya (2022). Obstructing the Right to Know. https://www.bluegreenalliance.org/wp-content/uploads/2022/12/Obstructing-the-RIght-to-Know-Report-vFINAL.pdf.
[33] Zero Waste Washington (2017). Phthalates in Exterior Use Products – Existing Data Summary. https://zerowastewashington.org/wp-content/uploads/2019/04/Phthalates-Project_product-report-Final.pdf.
[34] Toxic Free Future (2023). Harmful chemicals found in sealants commonly used for construction and remodeling. https://toxicfreefuture.org/blog/harmful-chemicals-found-in-sealants-commonly-used-for-construction-and-remodeling/.

- Building products based on data from Habitable's Pharos Common Product Library (see Appendix)[35] as well as caulks, sealants and other exterior use products with multiple phthalates and high levels of phthalates[36, 37]
- Salon products[38]
- Cleaning products used by professional cleaners[39]
- Car interiors.[40, 41]

Workers using multiple products for 8 hours a day, 5-7 days a week will have significantly higher exposures. For example, multiple studies find concerning phthalate exposures amongst hair and nail salon workers:

- Seven phthalates detected in active air samplers and nine phthalates detected in silicone brooches and wristbands worn by workers in Toronto nail salons[42]
- Black and Latina hairdressers had higher urinary levels of phthalates compared to office workers[43]
- Vietnamese American nail salon workers had significantly higher levels of multiple phthalate exposures compared to NHANES data, some exceeding the 95th percentile.[44]

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[35] https://pharos.habitablefuture.org/common-products.

[36] Zero Waste Washington (2017). Phthalates in Exterior Use Products – Existing Data Summary. https://zerowastewashington.org/wp-content/uploads/2019/04/Phthalates-Project_product-report-Final.pdf.

[37] Toxic Free Future (2023). Harmful chemicals found in sealants commonly used for construction and remodeling. https://toxicfreefuture.org/blog/harmful-chemicals-found-in-sealants-commonly-used-for-construction-and-remodeling/.

[38] Women's Voices for the Earth, et al. (2023). Exposed: Ingredients in Salon Products and Salon Worker Health and Safety. https://womensvoices.org/wp-content/uploads/2023/03/Salon-Label-Report_EXPOSED.pdf.

[39] Make the Road New York, Selikoff Centers for Occupational Health and the Institute for Exposomic Research at the Icahn School of Medicine at Mount Sinai, & Queens College of the City University of New York (2021). The Toll of Household Cleaning Work: Economic and Health Precarity of Immigrant Latinx Cleaners in New York, a report by the Safe and Just Cleaners Study, March 2021.

[40] Otmar Geiss, Salvatore Tirendi, Josefa Barrero-Moreno, Dimitrios Kotzias. Investigation of volatile organic compounds and phthalates present in the cabin air of used private cars, Environment International, Volume 35, Issue 8, 2009, Pages 1188-1195, https://doi.org/10.1016/j.envint.2009.07.016.

[41] Aalekhya Reddam, David C. Volz. Inhalation of two Prop 65-listed chemicals within vehicles may be associated with increased cancer risk, Environment International, Volume 149, 2021,106402, https://doi.org/10.1016/j.envint.2021.106402.

[42] Linh V. Nguyen, Miriam L. Diamond, Sheila Kalenge, Tracy L. Kirkham, D. Linn Holness, and Victoria H. Arrandale. Occupational Exposure of Canadian Nail Salon Workers to Plasticizers Including Phthalates and Organophosphate Esters. *Environmental Science & Technology* **2022** *56* (5), 3193-3203 DOI: 10.1021/acs.est.1c04974.

[43] Boyle MD, Kavi LK, Louis LM, Pool W, Sapkota A, Zhu L, Pollack AZ, Thomas S, Rule AM, Quirós-Alcalá L. Occupational Exposures to Phthalates among Black and Latina U.S. Hairdressers Serving an Ethnically Diverse Clientele: A Pilot Study. Environ Sci Technol. 2021 Jun 15;55(12):8128-8138. doi: 10.1021/acs.est.1c00427. Epub 2021 Jun 2. PMID: 34078083.

[44] Varshavsky JR, Morello-Frosch R, Harwani S, Snider M, Petropoulou SE, Park JS, Petreas M, Reynolds P, Nguyen T, Quach T. A Pilot Biomonitoring Study of Cumulative Phthalates Exposure among Vietnamese American Nail Salon Workers. Int J Environ Res Public Health. 2020 Jan 2;17(1):325. doi: 10.3390/ijerph17010325. PMID: 31906553; PMCID: PMC6981895.

These higher exposures are especially important to capture regarding PESS as salon workers are disproportionately women and women of color; in 2022, the salon workforce was 89.8% women and 34.2% people of color.[45]

By relying on NHANES data only for exposure to multiple phthalates, EPA will miss high exposures to workers. The Chronic Hazard Advisory Panel on phthalates and phthalate alternatives for the Consumer Product Safety Commission (CPSC) developed scenarios for consumer exposures and its methodology can be applied to developing worker exposure scenarios.[46] EPA should use data on concentrations of phthalates in environmental media and products workers use, physiological parameters, and general estimates of worker use information to develop worker exposure scenarios.

EPA should combine worker exposure scenarios with the consumer exposure scenarios recommended in comment 7 below because workers will also use consumer products. This is consistent with recommendations from the SACC as well: "The committee recommends that exposure scenarios should be developed that combine consumer and occupational estimates of TSCA COUs, since it is highly plausible that workers will also be consumers."[47]

We recommend that EPA develop worker exposure scenarios to account for cumulative exposures instead of an OEV.

EPA states that it "…has developed an option for deriving an OEV that accounts for cumulative exposure and differences in relative potency based on air monitoring methods."[48] However, it also notes that "only two phthalates (DEHP and DBP) currently have fully validated air monitoring methods" and "this approach is therefore currently limited in its application to workplaces only for DEHP and DBP."[49] This would significantly underestimate cumulative risks from phthalates and is such a serious limitation that EPA should not move forward with this approach.

If EPA develops an Occupational Exposure Value (OEV) to account for cumulative exposures, it should not be based on limited air monitoring data. Alternatively, EPA is considering using data

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[45] Data USA: Beauty Salons. https://datausa.io/profile/naics/beauty-salons.

[46] Gennings, C., Hauser, R., Koch, H. M., Kortenkamp, A., Lioy, P. J., Mirkes, P. E., & Schwetz, B. A. (2014). *Report to the U.S. Consumer Product Safety Commission by the Chronic Hazard Advisory Panel on Phthalates and Phthalate Alternatives*. Appendix E1. U.S. Consumer Product Safety Commission.

[47] U.S. EPA (2023). Meeting Minutes and Final Report for the Science Advisory Committee on Chemicals Public Virtual Meeting "Draft Proposed Principles of Cumulative Risk Assessment (CRA) under the Toxic Substances Control Act and a Draft Proposed Approach for CRA of High-Priority Phthalates and a Manufacturer-Requested Phthalate," p. 23.

[48] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 32.

[49] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), p. 127.

from urinary biomonitoring of workers to develop an OEV; this approach is less likely to underestimate phthalate exposures and would be preferred to using air monitoring data.

8. EPA should use reasonably available data to develop scenarios for consumer exposures.

EPA states that it "did not estimate co-exposure of phthalates from multiple consumer products and articles, as there is limited quantitative information on the co-occurrence of exposures to phthalate-containing consumer products and articles within the same day."[50]

Yet in 2014, the Chronic Hazard Advisory Panel on phthalates and phthalate alternatives for the Consumer Product Safety Commission (CPSC) did exactly that - modeled consumer exposures to multiple phthalates using data on concentrations of phthalates in environmental media and products, physiological parameters, and consumer use information.[51] Since 2014, additional data on phthalates in products and consumer use patterns has become available, including:

- Dollar store products with levels of regulated phthalates above levels allowed by the Consumer Product Safety Commission for children's products as well as products containing multiple phthalates[52,53]
- Caulks, sealants and other exterior use products with multiple phthalates and high levels of phthalates[54,55]
- Research showing that women on average use 6 to 8 cosmetic and personal care products every day, with some using as many as 25-30 products every day. Women of color use more products compared to white women.[56,57]

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[50] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA),, p. 33.

[51] Gennings, C., Hauser, R., Koch, H. M., Kortenkamp, A., Lioy, P. J., Mirkes, P. E., & Schwetz, B. A. (2014). *Report to the U.S. Consumer Product Safety Commission by the Chronic Hazard Advisory Panel on Phthalates and Phthalate Alternatives*. Appendix E1. U.S. Consumer Product Safety Commission.

[52] Campaign for Healthier Solutions. (2015) A Day Late and a Dollar Short. https://ej4all.org/assets/media/documents/Report_ADayLateAndADollarShort.pdf.

[53] Campaign for Healthier Solutions (2022). Toxic Chemicals in Dollar Store Products: 2022 Report. https://ej4all.org/assets/media/images/PDFs/2022%20Product%20Screening%20FINAL.pdf.

[54] Zero Waste Washington (2017). Phthalates in Exterior Use Products – Existing Data Summary. https://zerowastewashington.org/wp-content/uploads/2019/04/Phthalates-Project_product-report-Final.pdf.

[55] Toxic Free Future (2023). Harmful chemicals found in sealants commonly used for construction and remodeling. https://toxicfreefuture.org/blog/harmful-chemicals-found-in-sealants-commonly-used-for-construction-and-remodeling/.

[56] Environmental Working Group (2023). Survey finds use of personal care products up since 2004 – what that means for your health. https://www.ewg.org/research/survey-finds-use-personal-care-products-2004-what-means-your-health.

[57] Dodson RE, Cardona B, Zota AR, Robinson Flint J, Navarro S, Shamasunder B. Personal care product use among diverse women in California: Taking Stock Study. J Expo Sci Environ Epidemiol. 2021 May;31(3):487-502. doi: 10.1038/s41370-021-00327-3. Epub 2021 May 6. PMID: 33958707.

- Research documenting the use of multiple cleaning products when cleaning, sometimes every day.[58]

The CPSC found that its scenario-based exposure estimates were within an order of magnitude of those calculated from NHANES biomonitoring data, but generally higher - making the scenario estimates useful in determining the contributions of certain products and/ or phthalates to the combined risk. The higher exposures are especially important to capture for PESS such as women and women of color who use a greater number of phthalate-containing cosmetics, personal care and cleaning products with greater frequency.

EPA should develop scenarios for consumer exposures by building from the scenarios used in the CPSC report and updating them with new data on use patterns and concentrations of phthalates in environmental media and products.

9. EPA should include inhalation and dermal uptake from vapor exposure in the cumulative risk analysis for indoor dust. Cumulative risk from dust should be integrated into consumer and worker exposure scenarios, with consideration for sub-populations that experience higher exposures from dust, such as people in environmental justice and low-income communities.

EPA calculated cumulative risk from exposure to indoor dust, but included the dust ingestion exposure pathway only, excluding inhalation and vapor to dermal exposures.[59] This will significantly underestimate exposures and risks as many phthalates partition preferentially from dust to air in the indoor environment.[60] Mitro, et al. (2016) estimated residential intake from dust ingestion, inhalation, and dermal uptake from air and found that for BBP, DIBP, and DBP, 60-80% of the intake proportion comes from inhalation and dermal uptake from air, not dust ingestion (see excerpt from Fig. 3 below).[61]

Excerpt from Mitro, et al. Figure 3. Black arrows added to indicate phthalates included in EPA's CRA. DIBP, DBP, and BBP have 60-80% of estimated proportion of intake from inhalation and dermal from air.

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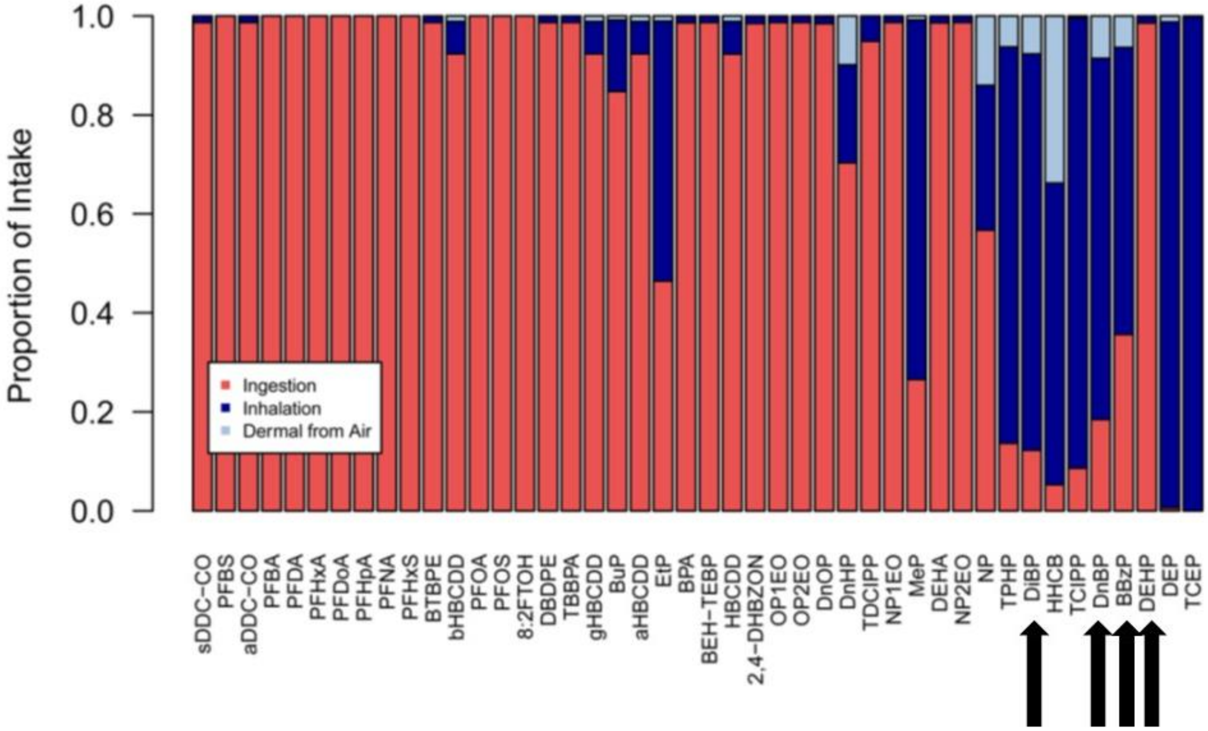
[58] Harley KG, Calderon L, Nolan JES, Maddalena R, Russell M, Roman K, Mayo-Burgos S, Cabrera J, Morga N, Bradman A. Changes in Latina Women's Exposure to Cleaning Chemicals Associated with Switching from Conventional to "Green" Household Cleaning Products: The LUCIR Intervention Study. Environ Health Perspect. 2021 Sep;129(9):97001. doi: 10.1289/EHP8831. Epub 2021 Sep 1. PMID: 34468180; PMCID: PMC8409434.
[59] U.S. EPA (2025). Revised Draft Technical Support Document for the Cumulative Risk Analysis of Di(2-ethylhexyl) Phthalate (DEHP), Dibutyl Phthalate (DBP), Butyl Benzyl Phthalate (BBP), Diisobutyl Phthalate (DIBP), Dicyclohexyl Phthalate (DCHP), and Diisononyl Phthalate (DINP) Under the Toxic Substances Control Act (TSCA), pp. 33-36.
[60] Weschler CJ, Nazaroff WW. (2014). Dermal uptake of organic vapors commonly found in indoor air. *Environmental science & technology.*; 48(2):1230-7.
[61] Mitro, S. D., Dodson, R. E., Singla, V., Adamkiewicz, G., Elmi, A. F., Tilly, M. K., & Zota, A. R. (2016). Consumer Product Chemicals in Indoor Dust: A Quantitative Meta-analysis of U.S. Studies. *Environmental Science & Technology*, acs.est.6b02023. https://doi.org/10.1021/acs.est.6b02023.



EPA should update the dust analysis and include inhalation and dermal to air pathways to more accurately estimate exposures. The SACC also identified dermal to air (also called dermal uptake from vapor) as in important exposure pathway.[62]

The SACC recommended that EPA identify a method to incorporate dust exposure estimates across different environmental justice/ fenceline and low-income communities.[63] EPA could apply an adjustment factor to account for these sub-populations that experience higher exposures from phthalates in dust.

EPA should integrate cumulative risk from indoor dust (inhalation, ingestion, and air to dermal pathways) into the worker and consumer exposure scenarios recommended in comments 6 and 7 to identify sub-populations as greatest risk. For example, there is concern for risks to workers exposed to phthalates on the job, using consumer products at home, and from indoor dust.

[62] U.S. EPA (2023). Meeting Minutes and Final Report for the Science Advisory Committee on Chemicals Public Virtual Meeting "Draft Proposed Principles of Cumulative Risk Assessment (CRA) under the Toxic Substances Control Act and a Draft Proposed Approach for CRA of High-Priority Phthalates and a Manufacturer-Requested Phthalate" pp. 89.

[63] U.S. EPA (2023). Meeting Minutes and Final Report for the Science Advisory Committee on Chemicals Public Virtual Meeting "Draft Proposed Principles of Cumulative Risk Assessment (CRA) under the Toxic Substances Control Act and a Draft Proposed Approach for CRA of High-Priority Phthalates and a Manufacturer-Requested Phthalate" pp. 99,100,103.

Appendix

This analysis was completed by Habitable in March 2020 based on data in the Pharos Common Product Library[64] and reflect Habitable's understanding of the common content at the time each record was completed. Some records are as old as 2015. The Pharos search was performed using the word "phthalate," not CASRNs which would be more accurate.

The results were filtered by CASRNs included in the Living Building Challenge Red List 4.0.[65] The Red List is a limited set of phthalates and should not be considered comprehensive. Chemicals marked "X" in the "Common Content" column are commonly found in that product type (at the time the research was done). Chemicals marked "X" in the "All Content" column were identified in product literature or another source indicating they are used in that type of product.

Table: Living Building Challenge Red List 4.0 phthalates identified in Pharos Common Products

Common Product Name	Chemical [CAS]	All Content	Common Content
Acrylic Latex Sealant	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
	Diisononyl phthalate (DINP-2 or DINP-3, mixture of isomers as manufactured) [28553-12-0]	X	
Drywall Acoustical Sealant	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
Drywall Joint Compound	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Elastic Facade Joint Sealant	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]		X
	DIISODECYL PHTHALATE (DIDP) [26761-40-0]	X	
	DIPROPYLHEPTYL PHTHALATE (DPHP) [53306-54-0]	X	
Exterior Door w/IGU	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]		X
Firestop Joint Spray	Diisononyl phthalate (DINP-2 or DINP-3, mixture of isomers as manufactured) [28553-12-0]	X	
Glass Fiber Reinforced Polymer Water Storage Tank	DIMETHYL PHTHALATE (DMP) [-645806]		X

[64] Pharos (2021). Common Product Methodology. https://pharos.habitablefuture.org/common-products/methodology.
[65] https://living-future.org/red-list/.

Heterogeneous Vinyl Resilient Sheet Flooring	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	
High Performance Coating (Epoxy)	DIISODECYL PHTHALATE (DIDP) [68515-49-1]	X	
Hollow Core Wood Veneer Door	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Intumescent Firestop Sealant	DIISOBUTYL PHTHALATE (DIBP) [84-69-5]	X	
Multilayer Resilient Flooring (WPC)	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	
Polyurethane Flooring Adhesive	DIUNDECYL PHTHALATE (DUP) [3648-20-2]	X	
Polyvinyl Acetate (PVA) Interior Wood Glue	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Polyvinyl Chloride Membrane Roofing	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]		X
PVDF-Coated Aluminum Curtainwall Extrusion	DIISODECYL PHTHALATE (DIDP) [68515-49-1]	X	
	Dimethyl phthalate [1352054-35-3]	X	
Ready Mix Concrete (BF Slag) (3,000 - 4,000 psi)	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Ready Mix Concrete (Fly Ash) (3,000 - 4,000 psi)	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Ready Mixed Concrete (Straight Mix) (NWC 3000-4000psi)	DIBUTYL PHTHALATE (DBP) [84-74-2]	X	
Roof Edge Flashing	DIISODECYL PHTHALATE (DIDP) [68515-49-1]	X	
	Dimethyl phthalate [1352054-35-3]	X	
Siliconized Latex Sealant	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
Silyl-terminated Polyether Sealant	DIISODECYL PHTHALATE (DIDP) [68515-49-1]		X
	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	

	Diisononyl phthalate (DINP-2 or DINP-3, mixture of isomers as manufactured) [28553-12-0]	X	
Single Component Polyurethane Sealant	DI-N-OCTYL PHTHALATE (DNOP) [117-84-0]	X	
	DIISODECYL PHTHALATE (DIDP) [26761-40-0]		X
	DIISODECYL PHTHALATE (DIDP) [68515-49-1]	X	
	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	
	DIISOOCTYL PHTHALATE (DIOP) [27554-26-3]	X	
Vinyl Composition Tile	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]	X	
	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	
Vinyl-Coated Wire Shelving	BUTYL BENZYL PHTHALATE (BBP) [85-68-7]		X
	DI-N-OCTYL PHTHALATE (DNOP) [117-84-0]	X	
	DIISODECYL PHTHALATE [1341-39-5]	X	
	Diisononyl phthalate (DINP-1, mixture of isomers as manufactured) [68515-48-0]	X	
	Diisooctyl phthalate [131-20-4]	X	
	Dioctyl phthalate [8031-29-6]	X	
	DIUNDECYL PHTHALATE (DUP) [3648-20-2]	X	