



**Albemarle Corporation**

4250 Congress Street, Suite 900  
Charlotte, NC 28209

February 5, 2023

Washington Department of Ecology  
300 Desmond Drive SE  
Lacey, Washington 98503

**Re: Draft Rule for Safer Products for Washington – Cycle 1 and flame retardants in plastic external enclosures for electric and electronic products**

To Whom It May Concern:

The Albemarle Corporation submits the following comments regarding the Washington Department of Ecology's (Department of Ecology) Draft Rule for Safer Products for Washington – Cycle 1 (Draft Rule). Albemarle's comments focus specifically on the proposed regulations regarding the use of organohalogen flame retardants (OFRs) in plastic casings and enclosures for electric and electronic products.

Albemarle appreciates the opportunity to comment on the Department's Draft Rule and looks forward to additional opportunities during the regulatory process to discuss with Ecology the benefits of flame retardants in casings and enclosures for electric and electronic products. If you have questions or need clarification, please contact me at [bob.miller@albemarle.com](mailto:bob.miller@albemarle.com) or 980.299.5628.

Sincerely,

ALBEMARLE CORPORATION

A handwritten signature in blue ink, appearing to read "Bob Miller, Jr.", written over the printed name.

Bob Miller, Jr.

*VP, Regulatory Affairs*

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## 1. Introduction

Albemarle supports chemical safety and appreciates the opportunity to comment on the Draft rule for OFRs in plastic external enclosures for electric and electronic products. Flame retardants are used in electronic and electrical equipment by product manufacturers to meet or exceed flammability standards as part of an overall approach to product safety.

Washington Department of Ecology as part of *Safer Products for Washington – Cycle 1* is developing regulations on the use of OFRs in device casings and enclosures for electronic and electrical equipment – including but not limited to TVs, laptops, mobile phones, kitchen appliances, washing machines, irons, coffee makers, vacuum cleaners, hair dryers, appliances, power tools, and various other electronic and electric devices – used in both residential and commercial settings.

The Department as part of the Draft Rule for Safer Products for Washington – Cycle 1 has proposed the following for OFRs in enclosures for electric and electronic products:

- Restrictions for indoor electric and electronic products that have OFRs in the plastic casing or enclosure; and,
- Reporting requirements for outdoor electric and electronic that have OFRs in the plastic casing or enclosure.

Overall, the analysis used to justify the regulatory proposal for OFRs in enclosures for electric and electronic products needs additional rigor and a more targeted approach for this important product category. While the underlying law for *Safer Products for Washington* identifies OFRs and some non-halogenated flame retardants as priority chemicals for evaluation,<sup>1</sup> Washington State could take a more targeted approach in its policy recommendations by enhancing its evaluation of OFRs, and narrowing the scope of electrical and electronic products subject to regulation.

The current regulatory approach is too broad and less restrictive measures are available – and should be pursued – to achieve the overall objectives of the program. Albemarle highlights the following recommendations to improve the Department's Draft Rule for OFRs in enclosures of electric and electronic products.

- Align regulations with other jurisdictions;
- Apply assessment criteria consistently and evenly for OFRs and potential alternatives;

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<sup>1</sup> Chapter 70A.350 Recorded Codes of Washington (RCW) <https://app.leg.wa.gov/rcw/default.aspx?cite=70A.350>

- Recognize the diversity of OFRs as part of any regulations;
- Provide greater consideration for the challenges associated with the design of both indoor and outdoor products;
- Revise the Preliminary Regulatory Analyses to better reflect commonly accepted practices for cost-benefit analysis; and,
- Take more time in developing regulations for this complex product category so that any regulations represent the least burdensome alternative.

Outlined below and expanded upon in greater detail are key issues and concerns that the Department should consider in developing regulations for a diverse set of chemicals used in a wide range of electrical and electronic products.

## **2. Scope of the regulation should be narrowed and align with existing regulations**

### **a. Need for alignment with existing regulations**

Any proposed regulations should align with relevant state, federal, and international regulations. No state, federal, or international regulatory authority has proposed or implemented restrictions on flame retardants in electronics as broad as that being proposed for Washington State. This would make the state an outlier, potentially both affecting electric and electronic products offered for purchase in the state and impacting broader product safety, innovation, sustainability, and trade.

Although Ecology has identified some relevant regulations, rather than having the Draft Rule align with those regulations, it has proposed an expansion well beyond them. Such an approach would almost certainly have unintended consequences for the state and could affect the availability of some electric and electronic products. Summarized below are several relevant regulations, including the scope of products, to help the Department develop a more streamlined regulatory approach.

The European Union's (EU) Restriction on Hazardous Substances (RoHS) came into effect in 2006 and has been updated several times.<sup>1</sup> While RoHS applies to numerous electronic and electrical products, the restrictions on the use of OFRs is limited to 1,000 ppm for both polybrominated biphenyls and PBDEs. An update to EU RoHS is expected later this year that would add restrictions for additive applications – but not reactive applications – of tetrabromobisphenol A (TBBPA, CAS RN 79-74-7).<sup>2</sup> All 27 EU member

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<sup>1</sup> Directive (EU) 2015/863. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32015L0863&from=EN>

<sup>2</sup> European Commission Delegated Directive, <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&do=groupDetail.groupDetail&groupID=2810&Lang=EN>.

countries comply with RoHS to aid market compliance. Any business manufacturing or selling covered products to RoHS-directed countries must comply with the applicable regulations. Acceptance of this measure by Washington State would help manufacturers and align the state with a recognized market standard.

There is also the European Commission's Ecodesign Directive that restricts the use of OFRs in enclosures or stands of electronic displays, which includes televisions, monitors, and digital signage displays.<sup>1</sup> The rationale for the restrictions is that OFRs hinder recycling of plastics from electronic products. However, plastics containing OFRs are readily sorted and can be reclaimed by recyclers in Europe. A study conducted by SOFIES, experts on recycling of waste electrical and electronic equipment (WEEE), for BSEF – The Internal Bromine Council – confirms that brominated flame retardants are not hindering the recycling of WEEE plastics in Europe.<sup>2</sup>

More recently, New York State enacted restrictions for OFRs in enclosures and stands of electronic displays regularly used or purchased to be used for personal, family or household purposes.<sup>3</sup> Additionally, electronic display is defined as a consumer product with a display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources and is available for purchase by individuals or households for personal use in a residential space. The definition does not include: (a) any electronic display with a screen area smaller than or equal to one hundred square centimeters or fifteen and one-half square inches; (b) projectors; (c) virtual reality headsets; (d) all-in-one video conference systems; or (e) displays that are integrated with appliances and are not available for purchase as separate products by end-users.<sup>4</sup> Restrictions on the use of OFRs in electronic displays take effect on December 1, 2024.<sup>5</sup>

Conversely, Washington State is proposing restrictions for all OFRs in the casings of electric and electronic products, going well beyond just electronic displays. While electronic display manufacturers may be aware of the restrictions posed by the laws mentioned above, this will be a new concept for other electric and electronic manufacturers who may be either unaware of the proposal, or unable to meet the tight

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<sup>1</sup> Regulation (EU) 2019/2021. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R2021&from=EN>

<sup>2</sup> Sofies, "Study on the Impacts of Brominated Flame Retardants on the Recycling of WEEE plastics in Europe," <https://www.bsef.com/wp-content/uploads/2020/11/Study-on-the-impact-of-Brominated-Flame-Retardants-BFRs-on-WEEE-plastics-recycling-by-Sofies-Nov-2020.pdf>.

<sup>3</sup> New York Environmental Conservation Law, § 37-1001.

<sup>4</sup> Ibid.

<sup>5</sup> New York Environmental Conservation Law, § 37-1007.

timelines proposed for compliance. The aforementioned regulations are all more narrowly tailored than what has been outlined in Draft Rule. Historically, restrictions have applied to either a narrow range of chemicals in wide variety of electronic products, or a wide range of chemicals in a narrow range of electronic products. Any regulation developed by Ecology regarding the use of OFRs in casings and enclosures for electronic and electrical equipment should more fully consider such approaches.

**b. Current regulatory scope is overly broad and should be narrowed**

The regulatory proposal is overly broad and could cause confusion for electric and electronic product supply chains. The Department does not define either electrical products or electronic products. The underlying statute for Safer Products for Washington defines electronic product,<sup>1</sup> which includes fewer products than Ecology has indicated that it intends to regulate.

Electronic product is defined under the statute as including “personal computers, audio and video equipment, calculators, wireless phones, game consoles, and handheld devices incorporating a video screen that are used to access interactive software, and the peripherals associated with such products.”<sup>2</sup> A definition of electric product is not even included in the underlying statute. This suggests that the legislative intent of the regulatory program was for any regulation of chemicals in electronics to apply only to the universe of products defined in the statute, not to a broader segment of electric and electronic products.

The Department should also narrow the scope of the regulatory proposal by specifying 1) individual OFRs by CAS Registry Number (CAS RN) that it plans to regulate and 2) finished electronic and electrical products that it plans to regulate. In addition, the definition of “consumer product” should not apply to products used in commercial and industrial settings. Using the federal definition of “consumer product”<sup>3</sup> could provide a more useful and widely accepted definition regarding the products covered by any regulation. These changes could potentially alleviate confusion and avoid supply chain disruptions that may harm availability of some electronic and electrical products available for purchase in Washington State.

In the Draft Rule, Ecology does not specify by CAS RN the OFRs that it plans to regulate. The Department states that it will not include a list of CAS RNs for every chemical it intends to regulate because this would prevent the Department from regulating

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<sup>1</sup> Chapter 70A.350.010 RCW

<sup>2</sup> Ibid.

<sup>3</sup> 15 USC § 2052(a)(5), <https://www.govinfo.gov/content/pkg/USCODE-2021-title15/pdf/USCODE-2021-title15-chap47-sec2052.pdf>.

chemical classes.<sup>1</sup> This reasoning is circular and insufficient for a regulatory proposal of this magnitude. Moreover, Ecology's intent to develop guidance that provides more information about known chemicals<sup>2</sup> is inadequate to provide the clarity needed for electric and electronic product supply chains.

Ironically, in the Draft Rule, the Department proposes regulating the use of OFRs in enclosures of electric and electronic products without specifying either individual OFRs or individual products, and yet has proposed a reporting requirement for each affected outdoor product that must include 1) the name and CAS RN of any OFR in the casing or enclosure, 2) the priority consumer product in which the OFR is used, 3) the product component within the product category that contains the priority chemical, 4) a description of the function of the priority chemical, and 5) the concentration range of each intentionally added priority chemical in each product component in each product category.<sup>3</sup> This illustrates that more narrowly defining the universe of chemicals and products to be regulated could help alleviate confusion associated with regulatory compliance.

The regulatory approach also incorrectly assumes that all OFRs used in enclosures for electric and electronic products pose the same level of risk even though that has not been established by the Department. In fact, the Department has indicated that some OFRs are preferred over other OFRs but are ignored because they are not used in electronic casings. Perhaps these preferred OFRs could be safely used in electronic casings but have not been evaluated for such purpose since existing preferred OFRs are already in use. Even more perplexing, the law does not allow for the innovation of new OFRs that could be developed and serve as preferred "safer" alternatives. There are not drop-in repla

There are no drop in replacements for OFRs, as change in the flame retardant also means a change in the resin system. By not specifying which OFRs or products it is seeking to regulate, Ecology is causing the regulatory scope to be overly broad. Moreover, failing to publish a complete list of chemicals and products that the Department intends to regulate limits the ability of manufacturers, distributors, and retailers to provide valuable feedback regarding design, feasibility of alternatives, and other considerations as part of an overall approach to product safety. The scope of any

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<sup>1</sup> Washington Department of Ecology, Preliminary Regulatory Analyses, Publication 22-04-042, December 2022, p. 64, <https://apps.ecology.wa.gov/publications/documents/2204042.pdf>.

<sup>2</sup> Ibid.

<sup>3</sup> Draft Rule at page 7.

regulation should also be narrowed by more appropriately defining the term “consumer product”<sup>1</sup> so it does not apply to products used in commercial and industrial settings.

Additionally, some (if not many) of the “safer” alternatives recommended by Ecology may have other more hazardous properties than those they are replacing, especially in their environmental or ecology impacts, leading to short-term “regrettable substitution” and other long-term impacts.

**c. Implementation of Ecology’s “safer” chemical alternatives would likely cause conflicts with other laws**

Implementation of the regulatory proposal would very likely lead to conflicts with federal and state legal requirements. One critical issue is that switching to the flame retardants identified by Ecology would likely require manufacturers to use PFAS substances in their products. The State of Maine will forbid the use of PFAS substances in any product as of January 1, 2030, and other states and the federal government may soon follow with their own restrictions. Another issue is that one of the chemical substances Ecology has identified as a “safer” alternative is currently undergoing a risk evaluation by EPA under the Toxic Substances Control Act (TSCA),<sup>2</sup> which is likely to lead to restrictions on the use of this chemical.

Each of the chemicals Ecology identified as a “safer” alternative to OFRs is an organophosphate flame retardant (OPFR).<sup>3</sup> Ecology acknowledged in the Final Determinations Report that “the identified OPFRs need to be combined with additives that provide an anti-drip function. This is commonly achieved by addition of fluoroorganic additives (e.g., polytetrafluoroethylene (PTFE)).”<sup>4</sup> PTFE falls under various key domestic PFAS definitions<sup>5</sup> and has been demonstrated to meet the Organization for Economic Cooperation and Development (OECD) criteria for polymers of low concern.<sup>6</sup>

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<sup>1</sup> Chapter 70A.350.010(1) RCW

<sup>2</sup> Triphenyl phosphate (CAS RN 115-86-6) is currently in the TSCA risk evaluation process.

<sup>3</sup> Regulatory Determinations Report at 64-67.

<sup>4</sup> *Id.* at 68.

<sup>5</sup> *See, e.g.*, Proposed 40 C.F.R. 705.3 (“Per- and polyfluoroalkyl substances or PFAS, for the purpose of this part, means any chemical substance or mixture that structurally contains the unit R-(CF<sub>2</sub>)-C(F)(R')R”. Both the CF<sub>2</sub> and CF moieties are saturated carbons. None of the R groups (R, R' or R”) can be hydrogen.”); 38 Maine Rev. Stat. Ann. 1614.1.F (“‘Perfluoroalkyl and polyfluoroalkyl substances’ or ‘PFAS’ means substances that include any member of the class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.”).

<sup>6</sup> OECD, ENV/JM/Mono(2009)1, <https://www.oecd.org/env/ehs/risk-assessment/42081261.pdf>.

The federal government and some U.S. states are considering, or have already enacted, restrictions on the use of PFAS in products. As noted above, effective January 1, 2030, Maine will prohibit the use of any PFAS in any product in any amount, unless the state Department of Environmental Protection issues an exemption by notice and comment rulemaking.<sup>1</sup> The U.S. Environmental Protection Agency (EPA) has proposed – for finalization later this year – sweeping reporting requirements that will cover imported products that contain any PFAS in any amount.<sup>2</sup> Restrictions under EPA's TSCA authority could follow. In Michigan, Executive Directive 2021-08 requires the state to purchase PFAS-free products whenever possible.<sup>3</sup> Other states are also considering restrictions on the use of PFAS in products.

In the Final Determinations Report, Ecology stated that because enclosures are identified as priority products for OFRs, but not PFAS, Ecology need not evaluate whether safer alternatives to PFAS anti-drip agents are feasible and available.<sup>4</sup> This analysis misses the point. If Ecology's identified alternatives require the use of an anti-drip agent, that anti-drip agent must be feasible and available in order for Ecology's identified alternatives to be workable. Ecology has not made this showing.

Additionally, one of the chemicals Ecology identified as a "safer" alternative – triphenyl phosphate – is undergoing a TSCA risk evaluation by EPA.<sup>5</sup> One of the conditions of use EPA is considering as part of the risk evaluation is use in electrical and electronic products.<sup>6</sup> If EPA concludes that this use presents an unreasonable risk, EPA could exercise its TSCA authority to forbid the use.<sup>7</sup>

Electronic product manufacturers design their products for worldwide compliance. It would not be feasible, for example, for a manufacturer to formulate a Washington-compliant product that contains PFTE and a PTFE-free product for other states. Under such a scenario, in order to avoid conflict with Washington State law it is entirely foreseeable that manufacturers would need to stop selling some electronic products in the state.

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<sup>1</sup> 38 Maine Rev. Stat. Ann. 1614.

<sup>2</sup> TSCA Section 8(a)(7), 15 U.S.C. 2607(a)(7); Proposed 40 C.F.R. Part 705.

<sup>3</sup> Michigan Executive Directive No. 2021-08, available at [https://content.govdelivery.com/attachments/MIEOG/2021/10/27/file\\_attachments/1978458/ED%202021-08.pdf](https://content.govdelivery.com/attachments/MIEOG/2021/10/27/file_attachments/1978458/ED%202021-08.pdf).

<sup>4</sup> Regulatory Determinations Report at 68.

<sup>5</sup> US EPA, Risk Evaluation for Phosphoric Acid, Triphenyl Ester, <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-evaluation-phosphoric-acid-triphenyl-ester-tpp>.

<sup>6</sup> US EPA, Final Scope of the Risk Evaluation for Triphenyl Phosphate, pages 25-27, [https://www.epa.gov/sites/default/files/2020-09/documents/casrn\\_115-86-6\\_triphenyl\\_phosphate\\_tpp\\_final\\_scope.pdf](https://www.epa.gov/sites/default/files/2020-09/documents/casrn_115-86-6_triphenyl_phosphate_tpp_final_scope.pdf).

<sup>7</sup> TSCA Section 6(a); 15 U.S.C. 2605(a).



**d. WTO TBT Notification suggests a need for greater regulatory coordination**

The need for additional regulatory coordination by the Department is underscored by recent action taken by the U.S. Department of Commerce. On January 6, 2023, the Draft Rule was notified to the World Trade Organization (WTO) Technical Barriers to Trade (TBT) Committee by the Commerce Department.<sup>1</sup> The action was taken because as a WTO member, the U.S. Government is required to provide notification of technical regulations at an early stage of the process so that amendments can still be made.<sup>2</sup> This includes notification for technical regulations of governments at the level directly below that of the central government.<sup>3</sup>

The notification by the U.S. government suggests that the Department of Ecology has not sufficiently coordinated with federal agencies, the Washington Department of Commerce, or other state agencies to avoid the creation of trade barriers or potential supply chain disruptions that could arise from the rulemaking.

**3. Inconsistent and incomplete assessment criteria for OFRs and potential alternatives**

**a. Assessment approach is uneven and treats OFRs differently than alternatives**

The Department's approach to regulating OFRs as a class has led to inconsistent and uneven application of its hazard criteria and has chosen a model that virtually assumes that all chemicals within an identified priority chemical class – in this case OFRs – will not qualify as safer. This has raised questions that additional criteria has been applied to OFRs, and not the alternatives, in order to achieve a preferred outcome. Or put another way, that in its desire to find acceptable alternatives, the Department has applied a lower level of scrutiny to identified alternatives. This could lead to regrettable – or needless and costly – substitution.

Under Ecology's Working Criteria for Feasible and Available<sup>4</sup> if an OFR achieves a Benchmark 2 score as part of a GreenScreen Assessment, it still may not meet its "safer"

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<sup>1</sup> Notification to the World Trade Organization Committee on Technical Barriers to Trade, G/TBT/N/USA/1958 Safer Products Restrictions and Reporting, January 6, 2023.

<sup>2</sup> WTO Agreement on Technical Barriers to Trade, Article 5.6.2, [https://www.wto.org/english/docs\\_e/legal\\_e/17-tbt\\_e.htm](https://www.wto.org/english/docs_e/legal_e/17-tbt_e.htm).

<sup>3</sup> WTO TBT Agreement, Article 3.2.

<sup>4</sup> Washington Department of Ecology, *Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3*, June 6, 2022, pages 301-305. <https://apps.ecology.wa.gov/publications/documents/2204018.pdf>

criteria. This is because such chemicals can fail within-class criteria established by the Department.<sup>1</sup>

Several OFRs meet the Department's minimum criteria for "safer" but are still being proposed for regulation. For one OFR, decabromodiphenyl ethane ((DBDPE) (CAS RN 84852-53-9)) a GreenScreen Assessment was conducted with the chemical assigned a Benchmark-2 score.<sup>2</sup> However, since DBDPE is an OFR additional within-class criteria applies. This higher bar applies despite no relevant environmental transformation products for this chemical.<sup>3</sup>

More recently, a GreenScreen® Assessment was conducted for another OFR, 1,3,5-triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (TTBPT or TTBP-TAZ) (CAS RN 25713-60-4) and submitted to the Department. That OFR has also been assigned a Benchmark 2 score.<sup>4</sup> Both TTBPT and DBDPE are not considered safer by the Department because as part of the class-based approach being employed, OFRs are not allowed to score high or very high for persistence. Notably, the Department has also concluded that two non-halogenated flame retardants identified as alternatives – triphenyl phosphate (TPP, CAS RN 115-86-6) and resorcinol bis(diphenyl Phosphate) (RDP, CAS RN 125997-21-9) – meet the minimum criteria for "safer" despite having the same Benchmark 2 score as DBDPE and TTBPT.<sup>5</sup>

Additionally, if within class criteria regarding persistence were applied in the same fashion for identified alternatives as it has for OFRs, four of the seven identified alternatives would not be considered safer. That is because three of the identified alternatives score very high for persistence<sup>6,7</sup> and another alternative scores high for

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<sup>1</sup> Regulatory Determinations Report at page 42.

<sup>2</sup> Gradient. GreenScreen® Assessment for [Decabromodiphenyl ethane; DBDPE (CAS # 84852-53-9)]; Prepared for: American Chemistry Council: December 2021.

<sup>3</sup> Ibid.

<sup>4</sup> Gradient. GreenScreen® Assessment for [1,3,5-triazine, 2,4,6-tris(2,4,6-tribromophenoxy) TTBPT (CAS # 25713-60-4)]; Prepared for ICL Group: June 2022.

<sup>5</sup> Regulatory Determinations Report at pages 64 - 65.

<sup>6</sup> GreenScreen® assessment scores for Phosphoric acid, P,P'-1,3-phenylene P,P',P'-tetrakis(2,6-dimethylphenyl) ester (CAS RN 68664-06-2), Aluminum diethylphosphinate (CAS RN 225789-38-8), courtesy of <https://pharosproject.net/>.

<sup>7</sup> GreenScreen Assessment score for Carbonic acid, diphenyl ester, polymer with diphenyl P-methylphosphonate and 4,4'-(1-methylethylidene)bis(phenol) (CAS RN 77226-90-5), courtesy of the Ministry of Environment and Food of Denmark, Environmental and Health Screening Profiles of Phosphorus Flame Retardants, page 13, <https://www2.mst.dk/udgiv/publications/2016/01/978-87-93435-23-0.pdf>

persistence.<sup>12</sup> For many manufacturers, what is described as persistence by the Washington Department of Ecology, would be called chemical stability in manufacturing and use. Stability in manufacturing and use is a preferred performance characteristic for many durable electronic goods with plastic casings. The plastics must often withstand repeated heat cycles during manufacture, must not degrade during the life of the product, and allow for recycle or reuse of the plastic at end of life. Albemarle maintains that electric and electronic product manufacturers need a variety of material choices as part of the product design process. Some products are designed for a short duration and some products for decades of use. Therefore, these choices should include options allowing for the safe use of OFRs, as well as options allowing for the safe use of non-halogenated flame retardants.

By applying different criteria to the OFRs category than the identified alternatives, Ecology is potentially trading one set of unconfirmed hazards, but consistent with responsible use (GreenScreen® Benchmark 2) with other chemistries that may have other short-term hazard potentials (not necessarily persistent, but with other immediate acute toxicities). This is the fallacy in evaluating chemistries based solely on hazard and ignoring the potential immediate risk to the environment.

**b. Expert analysis reinforces that the current alternatives assessment criteria is inconsistent**

Recently, NAFRA contracted with an authorized GreenScreen® Profiler to review the Department's assessment of OFRs and select OPFRs as part of Safer Products for Washington – Cycle 1. Benchmark 2 is categorized under GreenScreen® as "use but search for safer substitutes." This implies that while Benchmark 2 chemicals are not optimal, they can be used if there is no chemical with a Benchmark 3 or 4 score suitable for a specific need (e.g., electronic enclosures). The authorized GreenScreen® Profiler raised concerns that by creating a new, more stringent categorization for OFRs based on additional within class criteria, it could lead to confusion and undermine the assurance provided in the other programs that have adopted GreenScreen®.<sup>3</sup>

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<sup>1</sup> Gradient. GreenScreen® Assessment for [Bisphenol A Bis-(diphenyl phosphate); BADP (CAS # 181-028-79-5/5945-33-5)]; Prepared for: American Chemistry Council: January 2023.

<sup>2</sup> Hazard scores are provided for illustration purposes only. GreenScreen hazard scores and benchmarks can only be used to make claims about products if accompanied by a full GreenScreen Report.

<sup>3</sup> American Chemistry Council North American Flame Retardant Alliance comments to the Washington Department of Ecology on the Draft Rule for Safer Products for Washington – Cycle 1, submitted on January 18, 2023, found at [https://scs-public.s3-us-gov-west-1.amazonaws.com/env\\_production/oid100/did200002/pid\\_204575/assets/merged/990dio8\\_document.pdf?v=FEK4QG89W](https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200002/pid_204575/assets/merged/990dio8_document.pdf?v=FEK4QG89W).

The authorized GreenScreen® Profiler further noted that OFRs are a priority class of chemicals and therefore can be subject to additional within-class criteria, but that the Department did not take a similar approach for individual OPFRs it identified as alternatives, instead reviewing them as individual chemicals using the minimum criteria for safer. A review of GreenScreen® Benchmark scores for OFRs and OPFRs shows that each category contains chemicals with a substantial number of high and very high scores, as well as chemicals with a substantial number of low and very low scores. Applying within class criteria for the assessment of OFRs, while assessing OPFRs individually based on minimum criteria for safer, results in some lower hazard OFRs being proposed for restrictions while some OPFRs with higher hazards are not being proposed for restrictions.<sup>1</sup>

Further underscoring the complications in inconsistently applying assessment criteria, two additional OPFRs identified as alternatives – RDP and TPP – that score as moderate for carcinogenicity, would also fail to meet the minimum criteria for safer if within class criteria were applied. That is because OFRs are required to score as low for carcinogenicity as part of additional within class criteria. This means that if the seven OPFRs identified as alternatives were required to meet the additional within class criteria that OFRs are required to meet, at least six of the seven would fail this additional criteria.

Both DBDPE and TTBPT score as GreenScreen® Benchmark 2 chemicals, largely due to very high persistence. However, both OFRs have low bioaccumulation potential, low aquatic toxicity and are not carcinogens, mutagens, reproductive or developmental toxicants or endocrine (CMRDE), and thus meet the Ecology's minimum criteria for safer.<sup>2</sup> This further reinforces that the Department's assessment criteria should be the same for priority chemicals and alternatives.

**c. Comparison of OFR loading in electronic casings compared to alternatives is cursory and incomplete**

The Department considers the combination of the identified Benchmark 2 and Benchmark 3 OPFRs, or those listed on the TCO Certified Accepted Substance List with a maximum of 0.5% PTFE, to be a safer alternative to using OFRs in electric and electronic enclosures.<sup>3</sup> Ecology's rationale for this is based on data showing that OFRs are used in products at up to 25% by weight, and the relatively lower concentration of PTFE (up to

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<sup>1</sup> Ibid.

<sup>2</sup> Ibid.

<sup>3</sup> Regulatory Determinations Report at page 68.

0.5%) required to provide the anti-drip function.<sup>1</sup> PTFE provides an anti-drip function in electronic enclosures when used in combination with OPFRs for flame retardancy.

However, the analysis used as a justification that the combination of OPFRs with PTFE in electric and electronic enclosures are safer alternatives to that of OFRs is comparing dissimilar things. A more relevant comparison would be to compare the OPFR loading for the enclosure of an electric and electronic product to the OFR loading for the enclosure in a comparable product. Alternatively, the Department could use the combined loading of OPFR and PTFE in the enclosure of an electric and electronic product to the OFR loading for the enclosure in a comparable product.

Ecology's analysis is shallow and does not even directly compare the loading of OFRs in enclosures for electric and electronic products to the loading of OPFRs in enclosures of comparable products. At a minimum, such a comparison should be conducted by the Department as part of any analysis regarding the potential availability of alternatives to OFRs in plastic enclosures for electric and electronic products.

#### **4. Regulatory actions outlined by the Department are not supported by the state of the science and ignore fire safety**

##### **a. Many of the OFRs proposed for regulation have not been found in the Washington environment**

The current state of the science does not support the scope of regulatory actions that have been outlined by the Department in the Draft Rule. While there is data demonstrating some level of specific OFRs both in various media and in the environment, this is not the case for all OFRs, and Ecology has not established that plastic casings and enclosures for electronic and electrical equipment are a significant source of any potential releases.

In many instances, Ecology has utilized measurement of a subclass of older flame retardants, polybrominated diphenyl ethers (PBDEs) – which were used in textiles, upholstered furniture, and electronics – as a proxy for other flame retardants.<sup>2</sup> This data should not serve as a basis for making conclusions about other flame retardants, much less an entire class of flame retardants. As noted by Ecology in earlier assessments, beyond PBDEs, actual monitoring data indicates that some of the other referenced

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<sup>1</sup> Ibid.

<sup>2</sup> In the United States, the manufacture and import of pentaBDE and octaBDE ceased in 2004, and the manufacture and import of decaBDE ceased in 2013.

flame retardants (DBDPE, TBBPA, BTBPE, or TTBP-TAZ) are not found in the Washington environment or are found at extremely low levels not likely to present a risk.<sup>1</sup>

**b. National Academy of Sciences (NAS) finds that OFRs should not be assessed as a single class**

Notably, the NAS found that this diverse group of chemicals cannot be treated as a single class for purposes of assessment. Instead, the NAS has recommended that each OFR be sorted into one of 14 subgroups based on chemical structure, physicochemical properties, and predicted biologic activity for purposes of further assessment.<sup>2</sup> Despite this, the Department has stated that it has not further separated OFRs into subclasses and does not plan to group them by any specific mechanism of action.<sup>3</sup>

**c. Current regulatory approach does not differentiate between individual OFRs, including emerging technologies**

The Department's regulatory approach in the Draft Rule does not differentiate between additive and reactive OFRs. This is curious since in the Final Determinations Report, Ecology distinguished between additive and reactive flame retardants.<sup>4</sup> The Department contrasted additive flame retardants with reactive flame retardants, finding that reactive flame retardants have a lower potential for release because they are chemically reacted with the materials used in the product. Despite this recognition, Ecology still collectively considered and assessed exposure risk of additive and reactive flame retardants.

Flame retardants can be liquids or solids that can be physically incorporated into a material (additive) or chemically transformed to create a new fire-resistant material (reactive). Additive flame retardants are incorporated into compounds via physical mixing. Compounds containing flame retardant elements are mixed with existing polymers without undergoing any chemical reactions. By contrast, reactive flame retardants are incorporated into polymers via chemical reactions.

Ecology's focus on source reduction across the product lifecycle also likely overstates the potential exposure risk from OFRs. First, there are major differences between additive OFRs, with some achieving a Benchmark-2 score as part of a GreenScreen

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<sup>1</sup> Washington Department of Ecology, Flame Retardants in Ten Washington Lakes, 2017-2018, December 2019. <https://apps.ecology.wa.gov/publications/documents/1903021.pdf>

<sup>2</sup> National Academies of Sciences, Engineering, and Medicine. 2019. A Class Approach to Hazard Assessment of Organohalogen Flame Retardants. <https://doi.org/10.17226/25412>

<sup>3</sup> Regulatory Determinations Report at page 45.

<sup>4</sup> Regulatory Determinations Report at page 44.

Assessment. Consequently, there is a need to distinguish even among additive flame retardants. Second, it ignores the continued research and development by companies to chemically react OFRs with existing polymers to create new fire-resistant materials for electronic casings and enclosures. Restricting the use of OFRs in casings and enclosures unnecessarily lumps together a diverse range of compounds intended to improve fire safety and product performance. This could stifle innovation and ultimately lead to the use of alternatives that are less desirable in terms of both toxicological profile and product performance.

**5. Greater consideration is needed for product design and performance**

**a. Design options needed for product manufacturers**

Ecology's regulatory approach fails to consider the breadth of design and performance factors for this wide range of products. There is a tremendous difference within and amongst different types of electronic products. They have different functional and safety needs, so taking a one size fits all approach to this broad range of products does not make sense and likely undermines overall product safety and performance.

Electronic device manufacturers must balance the need to meet consumer demand for smaller, lighter, and more powerful electronics with the need to ensure that those devices meet performance and safety standards. Plastics have revolutionized electronic product designs. Manufacturers use plastics to achieve device performance goals, and plastic casings serve as an enclosure that protects from fire and shock risk. If left untreated, these plastics are flammable, so flame retardants serve as a critical line of defense against fire.

Likewise, when designing products, original equipment manufacturers (OEMs) need to consider specific plastic resin types and the flame retardant systems that are appropriate for those resins. Simple substitution is just not possible in many cases. Therefore, the electronics sector needs a broad array of material choices for differing product design needs, which includes the use of OFRs.

**b. Any regulations should more accurately reflect the range of product safety standards**

In the Draft Rule, Ecology assumes that OFRs have been intentionally added to the enclosure of an electric or electronic product if 1) total bromine or total chlorine concentrations are above 1,000 parts per million (ppm) or 2) total fluorine concentrations are above 1,000 ppm and accompanied by less than 5,000 ppm total phosphorus. As part of the Preliminary Draft Rule, the Department identified UL 746H,

which certifies plastics to either be non-halogenated or non-chlorine and non-bromine,<sup>1</sup> in the development of regulations for OFRs in enclosures for indoor electric and electronic products. UL 746H is an optional certification rating and is not always a viable design option for electric and electronic products.

Electric and electronic products with larger enclosures can be required by UL 746C<sup>2</sup> to undergo a specific test that assumes a flame threat occurs outside of the enclosure. In these instances, enclosures meeting specific size criteria must pass a larger scale fire test (either ASTM E162 or UL 723 can be used per UL 746C). Using an interior fire barrier (possibly metal) with a horizontal burn “shell” may not be enough to satisfy these additional requirements.

There are over 385 product standards where UL 746C is referenced. It is common for some of these product standards to supersede UL 746C. These end product standards can contain additional or stricter requirements than UL 746C, such as an enclosure needing a minimum of UL 94 V-1 or V-0 for flammability.

For example, the UL 2158 Standard for Safety for Electric Clothes Dryer has criteria for large mass considerations. Section 28.13 requires a polymeric part that meets the large mass criteria to have a flame spread of 200 or less in either UL 723, UL 94 (which uses the ASTM E162 test), or CAN/ULC-S102. There are other safety standards for indoor electric and electronic products where heat may be a primary design consideration (e.g., electric ranges,<sup>3</sup> microwave cooking appliances,<sup>4</sup> toasters<sup>5</sup>) and as such may require the use of OFRs to meet or exceed relevant product safety standards.

Ecology's proposal for OFR limits in casings and enclosures of electric and electronic products intended for indoor use does not adequately consider that indoor products may have various design and performance criteria that make restrictions inspired by UL 746H an unsuitable option. A more flexible standard that Ecology may wish to research is UL 746R, which is used to certify compliance with EU RoHS.<sup>6</sup>

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<sup>1</sup> UL 746H is an optional non-halogenated certification ratings requirement that uses combustion-ion chromatography

<sup>2</sup> UL 746C specifies standards for parts made of polymeric materials that are used in electrical equipment and describe the various test procedures and their use in the testing of such parts and equipment.

<sup>3</sup> UL 858 is the standard for household electric ranges

<sup>4</sup> UL 923 is the standard for microwave cooking appliances

<sup>5</sup> UL 1026 is the standard for electric household cooking and food serving appliances

<sup>6</sup> UL 746R is a standard that provides an outline for restricted use substances in polymeric materials, IEC 62321 - determination of certain substances in electrotechnical products.



**c. Ecology is already considering performance criteria for outdoor products and should also more fully-consider performance criteria for indoor products**

At the public session for the Preliminary Draft Rule held by the Department on August 16, Ecology staff noted that it was not restricting the use of OFRs in casings and enclosures for outdoor electronic and electrical equipment due to considerations related to weatherization. OFRs are often the preferred flame retardant option when product manufacturers have performance criteria to meet related to UV exposure, extreme fluctuations in temperatures, or moisture management. OFRs can be used in combination with high impact polystyrene resin (HIPS), polypropylenes and polyethylene systems in casings and enclosures for electronic and electrical equipment to meet or exceed performance requirements. The Department has acknowledged that there are a lack of alternatives to OFRs in casings and enclosures for electric and electronic products used outdoors and as such have proposed a reporting requirement but not restrictions.

Yet, in the Draft Rule, Ecology fails to consider the performance criteria that would allow for OFRs to be used in casings and enclosures for indoor electronic and electrical equipment. In particular, heat and moisture can be factors for electronic and electrical equipment used indoors and consequently OFRs may be the most appropriate design option for use in casings and enclosures for indoor electronic and electrical equipment. The Department should consider a broader set of performance and design criteria regarding the use of OFRs in casings and enclosures for indoor products just as it has for outdoor products.

If the majority of concern of Ecology is the release into the environment of the OFRs, it would seem inconsistent for external products to be subject only to reporting, while internal products are subject to limitations and restrictions. Additionally, external products that utilize the potentially identified substitutes are more like to be the source or unintentionally released substances to the environment, while internal products might be better controlled by other actions, such as mandated collection and recycling programs.

**6. Suggested improvements for Draft Rule provisions**

**a. Clarity needed regarding products intended for indoor and outdoor use**

The Department proposes restricting OFRs in enclosures for electric and electronic products intended for indoor use, and a reporting requirement covering all electronic and electrical equipment intended for outdoor use where OFRs are used in the casing or enclosure. This is reportedly due to the lack of identified flame retardant alternatives to OFRs for casings and enclosures intended for outdoor use.

The current regulatory proposal naturally raises the question of when and how electric and electronic products that can be used both indoors and outdoors would be regulated. In the Draft Rule, the Department defines “intended for indoor use” as “a product designed for primarily use in buildings” and “intended for outdoor use” as “a product designed to maintain functionality after exposure to ultraviolet (UV) light, water, or immersion when used outdoors for an extended time.”<sup>1</sup>

However, there are electric and electronic products that are marketed for both indoor and outdoor use. Products marketed for use both indoors and outdoors include, for example, portable bluetooth speakers, wireless security cameras, digital thermometers, and hand tools (e.g., drills and saws), and electric vehicle chargers. The example of electric vehicle chargers may present some of the biggest challenges based on the way Ecology has defined indoor and outdoor products. An electronic vehicle charger is often designed to be windproof and waterproof. However, many electric vehicle chargers are marketed for use indoors or outdoors. This raises the question as to how the Department intends to regulate products that are designed to withstand outdoor exposure but can be installed indoors.

**b. Improvements needed for the exemption process**

The Draft Rule identifies factors that the electric and electronic product value chain can point to when submitting an exemption request. Those factors include 1) the priority chemical is functionally necessary to the priority consumer product and there is no alternative, 2) it is not currently possible to comply with the restriction and also comply with another legally imposed requirement, and 3) an unforeseen event or circumstance limited the availability of alternatives.<sup>2</sup>

While such criteria does address some concerns with respect to requesting an exemption, Ecology is silent as to how much weight it will give these factors, or if there is a threshold number of factors that weigh in favor of granting an exemption. Albemarle asserts that the presence of any of these stated exemption bases should warrant an exemption. Moreover, the request for an exemption should not be limited to the stated exemption bases but also requested on other basis, including technical feasibility or newly identified use cases where cost-effective alternatives do not exist.

The Department should also provide a formal appeals process for entities that have their initial exemption request denied. As proposed, Ecology is only offering appeals to

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<sup>1</sup> Draft Rule at page 3.

<sup>2</sup> Draft Rule at page 2.

the Pollution Control Hearings Board for penalties.<sup>1</sup> Albemarle suggests that the Department reinstate the Appeals section that was part of the Preliminary Draft Rule<sup>2</sup> and contain the following language, “a manufacturer may appeal any adverse Ecology decision under this chapter to the pollution control hearings board.”

**c. Ecology’s notification requirements should incorporate the “known or reasonably ascertainable” standard commonly used by EPA**

Any reporting requirements Ecology implements should incorporate the “known or reasonably ascertainable” standard currently used by EPA in similar situations. EPA has incorporated this standard, for example, into its proposed EPA PFAS reporting rule<sup>3</sup> and to the TSCA quadrennial Chemical Data Reporting rule requirements.<sup>4</sup> It would be unreasonable to hold industry to a strict liability standard, especially for very complex products like electric and electronic products.

**7. Draft Rule for OFRs in enclosures for electric and electronic products does not represent the least burdensome alternative**

**a. Potential impact on supply chain and product availability**

Product manufacturers operate in a global regulatory environment and must take into account a broad range of product safety and design factors. This includes complex considerations related to product certification, performance, use and end of life, and even chemical registration and use. In addition, electronics manufacturers rely on a global supply chain for components and subcomponents. Any proposed recommendations should take these important global considerations into account, including how regulations may affect the reliability and resilience of the electronics supply chain.

The Department to-date has failed to meaningfully consider the cost of removing OFRs from the casings and enclosures of electronics and electrical equipment. In Appendix D of the final report, Ecology states that it will consider cost for scenarios like this. Washington State requires that any significant legislative rule being adopted include a cost-benefit analysis of the rule and be the least burdensome alternative for those required to comply with it to achieve the general goals.<sup>5</sup>

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<sup>1</sup> Draft Rule at page 4.

<sup>2</sup> Preliminary Draft Rule at page 6.

<sup>3</sup> Proposed 40 C.F.R. 705.15 (proposing to require manufacturers to report certain information “to the extent known to or reasonably ascertainable by them”).

<sup>4</sup> 40 C.F.R. 711.15 (requiring that a “submitter of information under this part must report information as described in this section to the extent that such information is known to or reasonably ascertainable by that person”).

<sup>5</sup> Chapter 34.05.328 RCW, <https://app.leg.wa.gov/rcw/default.aspx?cite=34.05.328>

No other regulatory authority has proposed regulations for OFRs in casings and enclosures for electronic and electrical equipment as broad as what is in the Draft Rule and would make Washington an outlier. If enacted, such regulations would potentially decrease the availability of electronic and electric products for purchase in the state, while also potentially increasing the fire risk posed by the products that are available for purchase. Electric and electronic products present unique fire risks and restricting the use of flame retardants in their plastic enclosures could undermine overall product safety and performance.

**b. Ecology's analysis on potential product redesign is unworkable**

Restricting the manufacture, sale, or distribution of consumer products that contain more than a specified amount of OFRs requires a determination that safer alternatives are feasible and available.<sup>1</sup> In the Final Determinations Report, Ecology claimed that products may be redesigned so that no flame retardants need to be used.<sup>2</sup> This conclusion is poorly supported and does not help justify the restrictions Ecology has proposed.

Ecology claimed, for example, that products could incorporate a non-flammable material (e.g., metal) for the device casing or an internal enclosure to serve as a fire barrier.<sup>3</sup> With regards to non-flammable enclosures, Ecology stated that this is something that manufacturers should consider when designing electric and electronic products.<sup>4</sup> Regarding the fire barrier, Ecology provided little detail as to the specifics of the materials required, such as the material thickness, cost, or weight.<sup>5</sup>

Electronic products vary widely by power source, size and weight requirements, and other key factors impacting performance needs and safety considerations. Electronic equipment of varying types accounts for more than a hundred pages of the Harmonized Tariff Schedule codes.<sup>6</sup> Ecology's current feasibility analysis does not adequately consider this variation (e.g., portability), and instead takes a one-size-fits-all approach. Albemarle recommends that Ecology reassess the feasibility of its suggested alternative

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<sup>1</sup> Chapter 70A.350.040(3)(a) RCW.

<sup>2</sup> Regulatory Determinations Report at 68-72.

<sup>3</sup> Regulatory Determinations Report at 68, 70, 72.

<sup>4</sup> Regulatory Determinations Report at 72.

<sup>5</sup> Ibid.

<sup>6</sup> See Chapters 84-85 of the Harmonized Tariff Schedule of the United States, available at <https://hts.usitc.gov/current>.

processes and its application for each type of electronic and electrical product as it develops regulations.

**c. Ecology's current approach does not consider the availability of alternatives at scale**

Any decision to restrict the use of a chemical requires Ecology to conclude that alternatives are feasible and available.<sup>1</sup> Ecology's "availability" analysis was limited to whether a chemical is both: "[c]urrently used for the application of interest [and] [o]ffered for sale at a price that is close to the current."<sup>2</sup> In order for chemical alternatives to be workable, however, the chemicals must also be available at a scale necessary to support industry's uses.

Ecology failed to consider the availability of alternatives at scale. Identified alternatives would need to be available in quantities sufficient to support an entire industry switching from one chemical to another prior to the phased compliance dates. The fact that one manufacturer may use one of these chemicals does not suffice to demonstrate this. Additionally, Ecology did not consider the significant scale-up pressures (and associated costs) the proposed compliance timeline would impose on manufacturers. Ecology should add a scaling component to its availability analysis.

**d. Ecology has an improperly narrow view as to what makes products "safer"**

Ecology's spectrum-based approach to its "criteria for safer" improperly narrows what is required in order for an alternative to be considered "safer."<sup>3</sup> The statute defines "safer alternative" as "an alternative that is less hazardous to humans or the environment than the existing chemical or chemical process."<sup>4</sup> The "hazardous to humans" component requires Ecology to consider not only the safety of replacement flame retardants in regards to toxicity, but also in regards to performance.

Ecology's criteria for "safer" does not sufficiently account for the hazards that flame retardants mitigate, such as inhibiting or suppressing the combustion process, reducing the heat released from a combustion event, or minimizing the potential for the fire to spread.<sup>5</sup> Instead, Ecology's framework assessment for its "safer" criteria does not adequately consider the fire safety hazards of products that are treated with flame retardants. An alternative chemical that presents an increased fire safety risk in a

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<sup>1</sup> RCW 70A.350.040(3)(a).

<sup>2</sup> Regulatory Determinations Report at 301.

<sup>3</sup> Regulatory Determinations Report at 279.

<sup>4</sup> RCW 70A.350.010(13).

<sup>5</sup> <https://www.americanchemistry.com/industry-groups/north-american-flame-retardant-alliance-Albemarle/electronics-and-flame-retardants>.

product cannot be considered “safer.” Albemarle urges Ecology to equally consider consumer safety when assessing what is a “safer” alternative.

For instance, proposed alternatives are more likely to degrade in high heat environments and/or over long periods of time. Degradation products of the alternatives can lead to electronic failures due to corrosions from the degradation products. Additionally, alternatives could lose fire safety efficacy in some durable goods versus the OFR it is replacing. What would be deemed an effective fire safe product as a new product could lose fire safe efficacy as it nears end of life.

Additionally, many of the proposed alternatives are more likely to be inadvertently released from the polymer system (“blooming”) than the identified OFRs, increasing the risk from these products in spite of the reduced perception of their individual hazards. That is, though the analysis might indicate a lower product hazard, the increased exposure due to the release might lead to a great individual exposure risk.

## **8. Recommendations and Conclusions**

Albemarle has serious concerns with the Draft Rule, as outlined above in greater detail, and recommends that the Department take additional time to perform a more rigorous alternatives assessment and thorough regulatory analyses as it considers potential regulations for a diverse set of flame retardant chemicals used in a wide range of electric and electronic products.

Suggested areas for improvement include 1) ensuring that any regulations for OFRs in casings and enclosures for electric and electronic products are the least burdensome alternative, 2) narrowing the regulatory scope, 3) align any regulations with relevant state, federal, and international laws, 4) greater recognition of the need for options in product design, including fire safety and overall product performance, and 4) redo the Preliminary Regulatory Analyses, and delay any final rules for flame retardants in enclosures for electric and electronic products until appropriate analyses can be conducted to better inform the regulatory decision making process.