

Appendix B. Written Comments

Overview

Ecology accepted formal comments on the proposed rule during the 60-day public comment period that closed on February 5, 2023. We received a total of 954 comment submissions on the proposed rule including verbal testimony shared during the January hearings. Some submissions included multiple comments and several submissions represented many individuals or organizations. We accepted formal comments via:

- The online comment tool on Ecology's webpage.
- US mail.
- The Safer Products for Washington email.
- Two online public hearings held on January 18 and 19, 2023.

The following are the written comment submissions we received during the 60-day formal public comment period.

Hiroki Honma

Restrictions on flame retardants used in information equipment.

Halogen-based flame retardants are generally used around power supply units and around heat-generating elements such as heaters in order to emphasize product safety.

In addition to halogen flame retardants, phosphorus-based flame retardants also exist, but exemption from regulations is considered appropriate if the technical issues cannot be resolved in consideration of corrosiveness, as in the case of circuit boards.

Therefore, regarding the use of halogen-based flame retardants, we are proposing exemptions for areas around heating elements and parts around power supply units that are subject to high temperatures.

Carrier Corporation

Regarding Proposed Rule Language "Chapter 173-337 WAC SAFER PRODUCTS RESTRICTIONS AND REPORTING" filed on Dec 7, 2022, NEW SECTION WAC 173-337-112
Flame retardants: Given that certain Life Safety system devices designed for long service lives require service or maintenance at infrequent but regular intervals may require the use of an ancillary hardwired product whose primary function is to provide power to the engaged device and to facilitate their removal as necessary for service and/or maintenance, and that certain Life Safety systems and devices connect wirelessly, we propose the following changes (pgs 11, 12 & 13);

On Pg 11, 12 - (1) Electric and electronic products with plastic external enclosures, intended for indoor use. (a) Applicability. (i) Priority consumer products. This subsection applies to electric and electronic products with plastic external enclosures, intended for indoor use that are powered by either of the following: (A) Standard 120 volt outlets and designed for up to 20 amp circuit; (B) Battery. (ii) This subsection does not apply to: (A) Electric and electronic products with plastic external enclosures, intended for outdoor use. (B) Consumer products that receive power only when they are hardwired into and permanently part of the fixed electrical wiring of a building. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment. (C) Life Safety, including fire alarm and security, systems & devices

On Pg 13 - (2) Electric and electronic products with plastic external enclosures, intended for outdoor use. (a) Applicability. (i) Priority consumer products. This subsection applies to electric and electronic products with plastic external enclosures, intended for outdoor use that are powered by either of the following: (A) Standard 120 volt outlets and designed for up to 20 amp circuit; (B) Battery. This subsection does not apply to: (A) Electric and electronic products with plastic external enclosures, intended for indoor use. B) Consumer products that receive power only when they are hardwired into and permanently part of the fixed electrical wiring of a building. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment. (C) Life Safety, including fire alarm and security, systems & devices

Courtney Carignan

I hold a Ph.D. in environmental health and have been studying exposure and health effects of halogenated flame retardants and PFASs for the past 15 years. My research has contributed to our understanding that halogenated flame retardants and PFASs escape from products they are added to, enter the air and dust of our indoor environments, enter our bodies and cause reproductive harm. Most notably, as a postdoc at Harvard in 2017 I found that women with higher exposure to organophosphate flame retardants were less likely to become pregnant and to have a viable birth, and that these effects were cumulative across the three investigated OPFRs.

I'm testifying today in favor of the proposed rule and in favor of regulating phthalates, phenols, halogenated flame retardants and PFAS each as a class to stop the cycle of regrettable substitution of one problematic chemical to a similar, but less studied, chemical that is later found to be similarly harmful.

For example, changing from DecaBDE to hexabromocyclododecane (HBCD) in the plastic casings of electronics. Both are highly persistent, easily migrate from products into air and dust, enter our bodies, are toxic, and are excreted in breast milk. As part of my dissertation research at Boston University, I found higher levels of HBCD in breast milk among mothers who had a larger number of stereo and video electronics in their home. One of my coauthors later found those products were being recycled overseas into cooking utensils such as spatulas and ladles. I also found that women who ate conventionally grown foods had higher levels of HBCD in their breast milk, suggesting a possible exposure pathway via land application of sludge – which has been found to contain HBCD and HBCD has been shown to be taken up into produce. These are just a few examples of sustainability issues with ongoing use of halogenated flame retardants.

I also conducted a series of studies that discovered high exposure to flame retardants among gymnasts from polyurethane foam pits and landing mats. These products are also commonly used in trampoline parks. Like with furniture, covers do not contain flame retardants in the products - and they easily migrate into air, dust, and our bodies. We accidentally ingest them and they are absorbed through the skin. I collaborated with a fire safety engineer who created guidelines for fire inspectors to maintain fire safety without the use of flame retardants in gyms, and then worked with a gym to replace their foam pit with flame retardant free foam and found a subsequent significant reduction in gymnast exposure.

Fire safety can be maintained without the use of halogenated flame retardants and safer alternatives for electronics are available but will not be widely or equitably adopted without the proposed rule.

I cannot overstate what a serious problem widespread use of halogenated flame retardants and PFASs have created. Among the most highly exposed include infants, young children, workers including fire fighters and construction workers, and indigenous populations. We are all initially exposed in the womb, then via breast milk and in our homes through our products. We are all secondarily exposed through their ubiquitous presence in our outdoor environment where they migrate and accumulate in our foods – crops, livestock, fish and seafood. PFAS additionally travel with the water cycle into our drinking water, aquaculture, and agriculture.

Widespread exposure and health effects of phthalates, phenols, halogenated flame retardants and PFAS are well documented and it's time to take decisive action. I support the proposed rule and recommend its full adoption.

BIFMA

Thank you for the opportunity to provide comments on Chapter 173-337 WAC Safer Products Restrictions and Reporting. The Business and Institutional Furniture Manufacturers Association (BIFMA) supports over 200 businesses including ~100 small businesses - all are impacted by the proposed rule.

BIFMA and its members have a rich history proactively supporting sustainable regulations and voluntary programs such as USGBC's LEED and IWBI's WELL. We strive to work with government and NGOs to implement practical, attainable requirements that drive consistency amongst the variety of regulations.

The following comments reflect the views of BIFMA's membership.

WAC 173-337-060 (2)(a)(i) Reporting requirements ♦ The timing indicates a start date of January 31st of the year after the effective date. We request a minimum of 12 months after the effective date to ensure adequate understanding and implementation time to meet the requirements. As written, it's possible an effective date could be September 2023 therefore less than 6 months to meet the requirements.

WAC 173-337-060 (3)(b)(i) Reporting requirements ♦ Our experience indicates in many cases details such as CAS# and/or names of the chemicals are withheld by the supplier to protect proprietary information. We recommend a tiered reporting approach that requests CAS level information but allows chemical class level reporting and/or hazard level reporting (e.g. Greenscreen information).

WAC 173-337-060 (3)(b)(i) Reporting requirements ♦ Please confirm the product category "brick" level can be the highest level given a product such as seating may be marketed in several ways (uses).

WAC 173-337-060 (3)(b)(v) Reporting requirements ♦ As noted above, confidentiality may restrict specific ppm levels to be disclosed. BIFMA recommends broader ranges to protect confidentiality often imposed by the supply chain.

WAC 173-337-065 Confidential business information ♦ Can you explain the process to protect CBI from FOIA or other means to gain access to CBI? BIFMA appreciates the right to protect CBI however it is unlikely to help a manufacturer gain that information from the suppliers who adamantly oppose sharing their CBI for competitive reasons.

WAC 173-337-110 PFAS (3)(c)(i) ♦ Restriction ♦♦ BIFMA recommends an exception and/or other language to address materials including, but not limited to, recycled plastic bottles that contain PFAS. We believe although intentionally added during it's first use, the use of recycled content should not be considered intentionally added.

WAC 173-337-110 PFAS (4)(B)(b) ♦ Compliance Schedule ♦ BIFMA request additional

time between enacting the regulations and meeting the deadline. We consider January 1, 2024 or a date less than a year to be difficult to meet given supply chain constraints and due diligence needed to confirm the absence of PFAS in a product. BIFMA recommends January 2026 as the compliance date for reporting.

WAC 173-337-110 PFAS (4)(ii)(B) ♦ Reporting ♦ Please clarify "credible evidence".

Thank you for the opportunity to provide these comments. We welcome the opportunity to discuss further and provide additional information as needed. Please contact Steve Kooy, BIFMA Technical Director Health and Sustainability, at skooy@bifma.org or 1.616.443.5053, for further discussions, questions, etc.

Sincerely,

Steve Kooy
Technical Director Health and Sustainability
BIFMA



1250 CONNECTICUT AVENUE, NW, SUITE 700, WASHINGTON, DC 20036
(202) 539-4060

INFO@APERC.ORG

February 5, 2023

Safer Products for Washington Team
Hazardous Waste and Toxics Reduction Program
Department of Ecology
Olympia, Washington

Submitted via: Safer Products for Washington Rulemaking Proposal Public Comment Form

Subject: Comments on Safer Products for Washington Rulemaking Proposal

The Alkylphenols & Ethoxylates Research Council (APERC) appreciates this opportunity to comment on the proposed regulation, Chapter 173-337 – Safer Products Restrictions and Reporting, particularly as the proposed regulation relates to the restriction of alkylphenol ethoxylate (APE) surfactants in laundry detergent.

APERC is a North American research-based trade association representing manufacturers of nonylphenol (NP), 4-tert-octylphenol (OP) and their APE derivatives. For more than twenty years, APERC and its member companies have been actively engaged in the conduct and review of the toxicity, ecotoxicity, environmental fate, occurrence and risk assessment of nonylphenol ethoxylates (NPEs), octylphenol ethoxylates (OPEs) and their degradation intermediates.¹

The proposed regulation relates to priority consumer products that are in the view of the Department of Ecology (DoE) and the Department of Health (DoH) a “significant source or use” of priority chemicals that were specifically identified in the Safer Products for Washington Act.² At this time there is no guidance provided to inform the determination of “significant source or use” under the new Safer Products for Washington regulatory process. DoE reasoning to support “significant sources” appears to have been developed on a case-by-case basis.

The proposed regulation includes a restriction on the use of APEs in laundry detergent with a limit of 0.1% APEs by weight (1,000 ppm). The limit of 0.1% by weight limit in the preliminary regulation is based on the limit specified in the European Union for NPEs in laundry detergent under REACH Annex XVII.³

APERC has previously submitted extensive comments that indicate that screening level consumer, occupational and environmental risk evaluations do not suggest any source or use of

¹ Members of APERC are The Dow Chemical Company, SI Group, Inc., and Dover Chemical Corporation.

² Washington State Pollution Prevention for Healthy People and Puget Sound Act, May 2019.

³ <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:164:0007:0031:EN:PDF>

NPEs or OPEs poses significant exposure or risk in Washington State.⁴ Available data on the environmental occurrence and concentrations of NPE, OPE and their environmental degradants, NP and OP, in the State of Washington over a twenty-one-year period between 1997 and 2018 indicate that these compounds are predominantly undetected, and when they were detected, their concentrations are well below US EPA Water Quality Criteria (WQC) for NP in fresh and marine water and relevant PNECs for NP in sediment. Overall, monitoring data do not suggest any uses of NPE or OPE over the twenty-one-year sample period resulted in environmental exposures sufficient to result in risk to the environment in the State of Washington.⁵ In addition, data were provided that showed that US EPA and other screening assessments found high Margins of Exposure (MoE) and low potential for risk to laundry workers and consumers from the use of NPE in laundry detergent and assessments of source- and use- specific human exposure and aggregate human exposure, as measured by human biomonitoring studies indicate reasonable certainty of no harm.⁶

For the above reasons, APERC does not support the restriction of APEs in laundry detergent as proposed in this proposed regulation and views a reporting requirement as a more proportional regulatory tool to accomplish the goals of the underlying legislation. Safer Products for Washington regulations should reflect the least burdensome regulatory alternatives in order to achieve the general goals of the law.

⁴ Alkylphenols & Ethoxylates Research Council (2020, March 2) Comments on Draft Report on Priority Products.

⁵ APERC. (2020, March 2).

⁶ APERC. (2020, March 2).

Green Science Policy Institute

Please see attached file.

Comment on Chapter 173-337 WAC – Safer Products Restrictions and Reporting

Green Science Policy Institute scientists collaborate with academic scientists to develop and communicate peer-reviewed research about chemicals of concern and translate technical information for decision-makers. The Institute's research and policy work has reduced the use of harmful chemicals, including flame retardants and PFAS, in consumer products worldwide.

To reduce American's exposure to harmful chemicals, protect ecological health, and encourage manufacturers to stop the use of harmful chemicals in consumer products, we support the Safer Products for Washington proposed rule, Chapter 173-337 WAC.

We support restricting organohalogen flame retardants because their exposure is associated with cancer as well as hormonal and neurological health harm. The burning of products containing organohalogen chemicals leads to increased smoke and toxic gases, making escape more difficult and fires more dangerous. These harms are clearly demonstrated in the cost-benefit analysis conducted by the Washington Department of Ecology.

When used in electronics, organohalogen flame retardants can result in serious health harm for product users and workers. The lifecycle associated with flame retardant chemical production, use, and disposal can harm ecosystems and the environment. The European Union and New York State have already implemented restrictions on organohalogen flame retardants in electronics, so precedence for this restriction already exists.

It is scientifically sound and appropriate to group all organohalogen flame retardants together as a class due to the presence of halogen atoms bonded to carbon atoms. Banning one chemical at a time can result in replacement chemicals similar in structure, function and harm. For a circular economy, the phase-out of organohalogen flame retardants in electronics will avoid recycling plastic enclosures with halogenated flame retardants into other consumer products like kitchen utensils.

Flame retardant exposure is also of concern in recreational polyurethane foam products. As there are no significant fire risks in facilities that use these foams, flame retardants are not necessary. Rather, the use of flame retardants in these foams only harms users, who are often children most susceptible to the health harms of flame retardants. Smoke alarms, sprinkler systems, and evacuation plans are all safer and more effective ways of preventing fire injuries in such facilities.

We also support the proposed restrictions on carpets and rugs, indoor furnishings, and aftermarket stain- and water-resistant treatments containing PFAS as this would reduce direct consumer exposure to this harmful chemical class. We suggest that PFAS be restricted in outdoor furnishings rather than reported on. All such uses are unnecessary as safer alternatives already exist. Similarly, the chemical classes of bisphenols and phthalates are also harmful and should be restricted to only essential uses where safer alternatives do not exist. The proposed actions regarding flooring, personal care products, can linings, and thermal paper will protect health and the environment from harm. We suggest that manufacturers implement these changes as quickly as possible.

In summary, the Green Science Policy Institute supports the proposed rule. Restricting the listed priority chemicals will improve the health of people and the environment.

For further information, please contact Lydia Jahl, Lydia@GreenSciencePolicy.org.

Mobilizing Scientists, Government, Industry, and Consumers to Reduce Toxics

RE Sources

Please see attached comment letter.

To: Stacey Callaway
Rulemaking Lead
SaferProductsWA@ecy.wa.gov

Transmitted Via Public Comment Form: <https://hwtr.ecology.commentinput.com/?id=EPWsm>

3 Feb 2023

RE: Chapter 173-337 WAC - Safer Products Restrictions and Reporting Rule

Dear Ms. Callaway,

Thank you for taking the time to consider our comments and suggestions on the Safer Products Restrictions and Reporting Rule. We support all of the proposed regulations that are in this rule. We also appreciate Ecology's work on gaining control and creating regulations for the reckless manufacturing and overuse of toxic chemicals that is commonplace in the United States today and is undoubtedly wreaking havoc on people's health and wellbeing.

RE Sources is a non-profit organization located in northwest Washington and founded in 1982. We mobilize people in Northwest Washington to build just and thriving communities and to protect the land, water and climate on which we all depend. Our priority programs include Protecting the Salish Sea, Freshwater Restoration, Climate Action, and Fighting Pollution—all critical issues affecting our region. Our North Sound Baykeeper is also a member of the Waterkeeper Alliance, with over 300 organizations in 34 countries around the world that promote fishable, swimmable, drinkable water. RE Sources has thousands of supporters in Whatcom, Skagit, and San Juan counties, and we submit these comments on their behalf.

We would like Ecology to take a precautionary approach when determining which manufactures are required to report the use of priority chemicals. Washingtonians have the right to know what products may or may not contain toxic materials in everything they purchase. Biosolids created in Washington State, for example, are known to contain PFAS compounds.¹ Consumers need to be made aware of this before purchasing or using biosolids on their property or ingesting food grown in biosolids because even very small amounts of some PFAS molecules are dangerous to human health.²

If Ecology can not restrict and regulate all sources of priority chemicals in consumer products then, at minimum, they should provide a mechanism for people to learn what products do or do not contain toxic chemicals. Creating a searchable database could be an effective tool. Likewise, it would also be helpful for Ecology to provide guidance to people who have toxic products in their households who do not have the means to replace them



2309 Meridian St
Bellingham, WA 98225
(360) 733-8307
re-sources.org

immediately such as treated outdoor furniture, waterproof clothing, electronics, and cookware. Are there mechanisms that could help minimize exposure to these products such as covering outdoor furniture when it is raining? Washing waterproof clothing in a specific manner? Etc...

We also have concerns that this rule, in regards to PFAS, "does not apply to premarket topical chemical treatments applied during the manufacturing process". We feel that this could be missing important sources of PFAS discharges and would like to know how Ecology plans to address this.

Our organization focuses on local environmental issues and we have become aware that Bellingham Bay has elevated levels of PFAS in the water.³ While source control, in theory, *should* work to reduce these PFAS levels we feel that source identification should also be carried out. Persistent chemicals can linger in the environment for a very long time, as exemplified by studies done on PCB levels in Puget Sound.⁴ By understanding where these chemicals are coming from will help us know where to focus our energy and limited budget. For example, if the PFAS is mainly coming from our effluent we could look into additional filtration at our waste water treatment plants. If, however, the PFAS is coming from stormwater pipes then we need to investigate up-the-pipe for point sources.

This rule focuses on consumer products and we are wondering if non-consumer products will be addressed soon? While these products may not come into contact with people as readily they do have the potential to contaminate the environment through sewer or stormwater. We would also like to see more manufacturer responsibility. Industries and companies who have been using toxic chemicals for years should be held accountable for removing them from our environment. Currently, it is the consumer who has unfairly faced this burden.

Thank you for moving forward on this important work and we support all of the restrictions and reporting requirements in this proposed rule. We look forward to seeing additional work that will continue to protect humans, wildlife, and the environment from toxic chemicals.

Sincerely,

Kirsten McDade
Pollution Prevention Specialist

¹Sierra Club and Ecology Center. 2021. Sludge in the Garden: Tox PFAS in home fertilizers made from sewage sludge. Retrieved from:
<https://www.sierraclub.org/sludge-garden-toxic-pfas-home-fertilizers-made-sewage-sludge>

²EPA. 2022. Drinking Water Health Advisories for PFOA and PFOS. Retrieved from:
<https://www.epa.gov/sdwa/drinking-water-health-advisories-pfoa-and-pfos>

³Langness, M. 2022. Occurrence and distribution of contaminants of emerging concern in the PUGET Sound nearshore using a marine mussel monitoring program. Salish Sea Ecosystem Conference (virtual).

⁴West, J., O'Neill, S., Ylitalo, G. 2017. Time Trends of Persistent Organic Pollutants in Benthic and Pelagic Indicator Fishes from PUGET Sound, Washington, USA. Arch Environ Contam Toxicol 73, 207-229 (2017). <https://doi.org/10.1007/s00244-017-0383-z>



February 5, 2023

Marissa Smith
Washington Department of Ecology
300 Desmond Drive SE, Lacey, WA 98503

Re: Safer Products for Washington Regulatory Program

Ms. Smith,

Thank you for allowing the Whirlpool Corporation to provide further feedback on the Department of Ecology's (Department) implementation of the Safer Products for Washington Regulatory Program. We appreciate the Department listening to stakeholder input and working with manufacturers to ensure these regulations are targeted to addressing safety concerns. Our comments focus on the Organohalogen Flame Retardant (HFR) proposal.

Scope of Products

The proposal requires clarification of the criteria to define the parts in scope. It would be useful to have a clear and robust rationale to identify which parts should be in scope. This could be accomplished through either compiling a comprehensive list of all parts subject to the regulation or by defining the scope based on items or components with shared characteristics (i.e. frequency of touch or consumer exposure).

It is also important to understand the distinction between flame retardants used in the different products the Department is seeking to restrict. The current proposal assumes that OFRs in all products pose the same level of risk, even though there is clear evidence of differentiated exposures. Consumers cannot normally access the flame retardants used in electronic enclosures unless there is a maintenance issue with that specific part, unlike other products the Department seeks to regulate. This suggests flame retardants in electronic enclosures should be regulated differently than other household products rather than using a one-size-fits-all approach.

The organohalogen flame retardant class of chemicals that the Department intends to ban is also too broad for regulation. A broad restriction, like the Department proposes, is unlike any other such restriction currently in place. For example, the RoHS Directive restricts only certain HFRs that manufacturers are able to test for and certify compliance with. By banning the entire class of HFRs, manufacturers will not be able to survey their suppliers and expect complete confidence in their

certification. The lack of alignment between the Department's proposal and international standards on HFRs will force the entire global supply chain to test products separately for the Washington market, which is not feasible. This can be resolved through both compiling a comprehensive list of all parts subject to the regulation and specifying individual flame retardants by CAS Registry Number that it plans to regulate for each material.

We urge the department to narrow the scope of the regulatory proposal by 1) specifying individual OFRs by CAS Registry Number (CAS RN) that it plans to regulate and 2) specifying individual finished electronic and electrical products that it plans to regulate. Further, the lack of clarity regarding the definitions that the Department has included in the Draft Rule could cause confusion for product manufacturers who may be uncertain as to whether their products fall within the regulatory scope or not. The Department not providing a complete list of chemicals and products that the Department intends to regulate limits our ability to provide valuable feedback regarding design, feasibility of alternatives, and other considerations as part of an overall approach to product safety.

Replacement Parts Exclusion

Whirlpool appreciates the Department's decision to exclude repair or replacement parts manufactured before the compliance schedules. However, we believe the exclusion for these parts must encompass the full useful life of products manufactured prior to the enforcement date. For any SKU that falls under the restriction, it would be impractical to make new replacement parts that conform to the restriction after a product is already in use. For example, a refrigerator purchased in 2025 that is not yet subject to the restriction has a specific set of replacement parts for that SKU. Should the refrigerator require a repair on an area that contains FRs after the restriction goes into effect, it will be extremely burdensome for a manufacturer to construct a new replacement part that meets the new HFR criteria to fit into an old SKU. As a result, the availability of spare parts to address maintenance requests for older products is likely to be negatively impacted. All replacement parts for products sold prior to the restriction date must be grandfathered in for the useful life of the appliance, otherwise consumers would not be able to purchase any replacement parts that are impacted by the restriction.

Lack of Technical Alternatives

Whirlpool is active in the sustainability space with several initiatives, including migration towards more environmentally-friendly materials and chemicals. The

company has been actively addressing the identification of alternative flame retardant plastic solutions for the enclosures of our products in North America which are designed to accept up to twice the amount of current/ampereage compared to European electrical devices. Below is a summary of the key learnings obtained so far from this program:

- Over the last five years of continuous development activity involving our entire supply base across multiple regions, the company has not been able to identify halogen free flame retardant alternatives that meet the specifications required in terms of flame rating, IEC standards, mechanical properties (impact resistance, durability, etc.) and aesthetics requirements.
- One key concern is the effect of humidity, which decreases FR properties of halogen free FRs especially if they are phosphorus-based.
- Another key finding is the poor mechanical properties and aesthetic appearances achieved with the majority of the halogen free FRs in commerce. Parts break very easily and show significant surface defects such as shadows, blushes, and areas of low gloss.
- Whirlpool has confirmed there are currently no viable alternatives through constant work with our suppliers all over the world.

Extended Timeline

When a regulation would require manufacturers to change an integral part of a product, the timeline required to retool and reapprove appliances for mass production is extensive, especially considering that the Department's proposed alternatives are restricted in other states. Thus, manufacturers will first need a sufficient transition time to find an alternative followed by extensive product testing and potential re-tooling. In order to meet UL flammability standards compliance, manufacturers will need a least three to five years to prove out alternatives and to achieve re-certification to energy, performance and safety requirements. There is precedent for a 48-month compliance timeframe under both the RoHS 2 and REACH regulations. With this additional time comes extra costs for the manufacturers and potential increased costs on consumers. We also encourage the compliance date to be based on the date of manufacturing, similar to what we see in Department of Energy efficiency standards.

PVC

PVC is a halogenated material because its molecule is based on chlorine which is in the halogen family. PVC is commonly considered a concern for health and the

environment if it's not properly disposed of at the end of life but rather incinerated. In this instance, there is a release of chlorinated substances which are harmful to humans and the environment. PVC has not shown health concerns tied to its intended use in consumer products.

The end of life collection of appliances and recycling/handling of materials are normally managed via robust recollection schemes in all US states. Since appliances are disposed of properly, and considering the safety advantages and low toxicity concerns of PVC for such applications, there should be a discussion on removing it from the scope of the regulation. Particularly as PVC is often used in other applications, like windows and flooring, that present a much higher consumer exposure to surfaces and an increased probability of creating dust that the regulation intends to limit.

Conclusion

No other regulatory authority, either domestically or internationally, has proposed regulations for HFRs in casings and enclosures for electronic and electrical equipment as broad or with as condensed a timeline as Washington has. This regulation will cause serious disruptions for the appliance industry and will drastically reduce appliance product availability. We hope the State of Washington reconsiders moving forward on any regulations where appliance safety and availability is potentially threatened.

Whirlpool appreciates the opportunity to provide comments on the proposal and highlight the need for further clarification. Please do not hesitate to contact me at luke_m_harms@whirlpool.com or 202-286-9308 if you have any questions or need additional information.

Sincerely,
Luke Harms
Director, Government Relations

Alliance for Automotive Innovation

See attached file.



Submitted electronically to: <https://hwtr.ecology.commentinput.com/?id=EPWsm>

February 5, 2023

Ms. Laura Watson, Director
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Ms. Stacey Callaway
Department of Ecology Hazardous Waste & Toxics Reduction Program
Safer Products for Washington
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Watson and Ms. Callaway:

The Alliance for Automotive Innovation¹ (Auto Innovators) appreciates the opportunity to provide comments to the Washington State Department of Ecology (Ecology) on its Safer Products Restrictions and Reporting (WAC 173-337) proposed rule.² Published on December 7, 2022, this proposed rule puts forward a regulatory program to implement the Pollution Prevention for Healthy People and Puget Sound Act (Chapter 70A.350 RCW) with an initial focus on ten product categories that Ecology presented to the Washington State Legislature in June 2022. These ten product categories include:

- PFAS in aftermarket stain- and water-resistance treatments, carpets and rugs, and leather and textile furnishings.
- Ortho-phthalates in personal care products (fragrances) and vinyl flooring.
- Organohalogen flame retardants in electric and electronic products.
- Flame retardants (as defined in RCW 70A.350.010) in recreational polyurethane foam.
- Phenolic compounds in laundry detergent, food and drink can linings and thermal paper.

We understand that Ecology has decided to move forward with its proposed regulatory approach without waiting for feedback and approval from the Washington State Legislature. In the event that the legislature does not approve each of Ecology's proposed chemical / product categories, Ecology will need to reevaluate and repropose parts or potentially all of this rulemaking. While we recognize Ecology's desire to move forward, we hope that Ecology recognizes the investment of resources not only from Ecology but also from the regulated community in furtherance of this effort. We would recommend that Ecology wait to hear from the legislature before further actions on this proposal are taken.

Our comments and recommendations focus on the first category, PFAS in aftermarket products, and more generally on a few precedent-setting issues that this proposed rule introduces. These include exemptions for replacement parts; a clarification of the definition of carpets and rugs; the need to provide CAS numbers for all PFAS chemicals subject to the rule; and Ecology's interpretation of preemption.

¹ From the manufacturers producing most vehicles sold in the U.S. to autonomous vehicle innovators to equipment suppliers, battery producers and semiconductor makers – Alliance for Automotive Innovation represents the full auto industry, a sector supporting 10 million American jobs and five percent of the economy. Active in Washington, D.C. and all 50 states, the association is committed to a cleaner, safer and smarter personal transportation future. www.autosinnovate.org.

² Available at <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf> (hereinafter Proposed Rule).

I. Exemptions for replacement parts

The Washington State legislature has exempted motorized vehicles from designation as a priority consumer product under the Safer Products Restrictions and Reporting program:

Except as provided in (b) of this subsection, the department may not identify the following as priority consumer products under this section: . . . (vi) Motorized vehicles, including on and off-highway vehicles, such as all-terrain vehicles, motorcycles, side-by-side vehicles, farm equipment, and personal assistive mobility devices[.]³

Auto Innovators notes that this draft proposes to exclude “[p]riority consumer product repair and replacement parts manufactured before the effective date of the restriction.”⁴

However, it remains unclear to Auto Innovators how automotive replacement parts, service chemicals, and automotive accessories manufactured after the effective date of this rule would be treated. Obviously, replacement parts, accessories, and service chemicals will need to be manufactured for each model year of a vehicle well beyond the effective date of this proposed restriction. We assume that because vehicles are exempt from the scope of this program, that parts manufactured to replace parts in the original vehicle are also exempt. We request that Ecology make this clear in future iterations of this proposal or in the final rule. This would ensure consistency with federal regulations that require that replacement parts be available to repair vehicles for a minimum period of fifteen years.⁵ Clearly, consumers in the state of Washington will expect that they will be able to maintain their vehicles in safe and effective operating condition.

II. Clarification of the definition of carpets and rugs

We further request that Ecology clarify its definition of carpets and rugs to make clear that floor mats installed in vehicles and sold as replacement mats for vehicles are likewise exempt from this regulation. “Carpets and rugs” is currently defined to include: “(i) Carpets intended for indoor use or intended for outdoor use. (ii) Rugs intended for indoor use or intended for outdoor use, including carpeted mats.”⁶ Ecology further defines “intended for indoor use” to mean “a product designed primarily for use or storage inside buildings.”⁷ From this, it appears that vehicle carpets are not intended to be included; we suggest that this be explicitly clear in the definition of “carpets and rugs” itself.

We recommend the approach that California has adopted for its Safer Consumer Products Program, defining the “carpets and rugs” of interest as “any consumer product made from natural or synthetic fabric intended to be used as a floor covering inside commercial or residential buildings.”⁸ California additionally specifically excludes from the definition “[c]arpets and rugs intended solely for use inside airplanes, trains, ships, automobiles, light duty trucks, vans, buses, or any other vehicles, as well as aftermarket or replacement parts marketed solely for use in vehicles.”⁹ This more precise definition is being adopted by most states considering regulation of carpets and rugs containing PFAS chemicals, and excludes carpeting used in vehicles as well as replacement parts marketed solely for use in vehicles.

³ RCW 70A.350.030(5)(a).

⁴ Proposed Rule.

⁵ See 49 U.S.C. § 30120(a), (g).

⁶ Proposed Rule.

⁷ *Id.* (emphasis added).

⁸ 22 Cal. Code Regs. § 69511.4(a)(1) (emphasis added).

⁹ *Id.* at (a)(2)(b).

III. Need to provide CAS numbers for all PFAS chemicals subject to the rule

Ecology has provided CAS numbers for the chemicals proposed to be included in all other product categories except for the PFAS category. By providing CAS numbers, Ecology has made clear which chemicals, especially those within a larger class of chemicals, need to be reported.

Ecology proposes to define PFAS chemicals as follows: “Perfluoroalkyl and polyfluoroalkyl substances’ or ‘PFAS’ means a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom.”¹⁰ This definition is overly broad and could encompass thousands of individual chemicals, many of which have not been assessed for exposure or hazard potential and a large percentage of which have not been assigned individual CAS numbers.

We recommend that Ecology limit the scope of covered chemicals to a specified list that contains CAS numbers and make expressly clear that chemicals without CAS numbers are not subject to this chapter. By providing CAS numbers, Ecology will clearly define the universe of chemicals that require notification and further clarify reporting and restriction requirements. CAS numbers are critical to ensuring compliance with the notification requirements. Additionally, in order to provide both Ecology and the public with useful information, we suggest that if Ecology moves forward with this proposal, it is imperative that Ecology focus its activities on those PFAS chemicals that are of high concern and exclude those that have been determined to be of low concern. For example, Ecology should exclude substances with low exposure potential. This will also ensure that Ecology’s program is targeted and effective.

IV. Ecology’s interpretation of preemption

In its preliminary draft rule language, Ecology lays out the impact of federal preemption on chemicals subject to proposed rulemaking: “If either of the preemptive federal regulatory actions described in subsection (1) of this section occurs, manufacturers will, starting on the date of the relevant federal agency action, be subject to the requirements of WAC 173-337-060 [the reporting provision] with regard to the affected priority chemical in the affected priority consumer product, instead of the restriction imposed by this chapter.”¹¹

We believe this provision is overly burdensome and places a reporting requirement on the regulated community that could be duplicative of information submitted to the federal government and accessible to Ecology. We request that the proposed requirement be modified to reflect that if similar information is available from the federal government, then Ecology will access that information rather than requiring manufacturers to report it. Only if information is not available should Ecology consider a reporting requirement for actions that have been preempted by federal law.

V. Conclusion

In closing, Auto Innovators urges you to adopt these recommendations, many of which were included in our August 2022 comments to Ecology on its preliminary draft rule language for the potential new regulatory chapter, Chapter 173-337 Washington Administrative Code, Safer Products Restrictions and Reporting. Clarifying the exemption of motor vehicle replacement parts and accessories is critical. Without clarification, replacement parts could be subject to frivolous lawsuits and the ability of Washington state residents to repair their vehicles could be jeopardized. Similarly, the definition of carpets and rugs should clearly exclude automotive carpeting and mats. Our recommendation that Ecology specify CAS numbers for PFAS chemicals suggests a workable approach for identifying subject chemicals and allowing Ecology to focus on PFAS chemicals of known concern rather than a vast universe of chemicals, many of which have not been evaluated for exposure potential or toxicity. If Ecology chooses to collect information on all PFAS chemicals that fall within its broad definition, then it will need to assess the risk associated with each and every one to provide the public with meaningful

¹⁰ Proposed Rule.

¹¹ Proposed Rule.

information. And finally, we question Ecology's approach to preemption and request that Ecology avoid duplicative reporting.

We would be happy to discuss this recommendation further.

Sincerely,



Catherine M.W. Palin
Senior Attorney & Director of Environmental Policy



USA WTO TBT Enquiry Point, National Institute of Standards and Technology

These comments are submitted on behalf of the Government of Korea, which appreciates the opportunity to provide comments regarding the "Proposed Rule of Safer Products Restrictions and Reporting of the state of Washington", notified by the United States under the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) as G/TBT/N/USA/1958.

Korea WTO TBT Enquiry Point
Korean Agency for Technology and Standards
Ministry of Trade, Industry and Energy
Republic of Korea
www.kats.go.kr



To: Standards Coordination Office **Email:** usatbtep@nist.gov

Number of Pages: 1+1 **Date:** 2023.2.1

From: Korea WTO TBT Enquiry Point

Subject : Comments from the Republic of Korea with respect to Proposed Rule of 'Safer Products Restrictions and Reporting' of the State of Washington, USA (G/TBT/N/USA/1958)

Message:

Dear USA TBT Enquiry Point,

Attached is a formal letter from Korea about the “Proposed Rule of 'Safer Products Restrictions and Reporting' of the State of Washington, USA (G/TBT/N/USA/1958)”.

Please convey the attached comments to the competent authorities. Acknowledgment of this letter would be appreciated.

Yours faithfully,

A handwritten signature in black ink, reading "진민영" (Jun Min-yung).

Jun Min-yung
Director, TBT Division
Korean Agency for Technology and Standards
Ministry of Trade, Industry and Energy

~~~~~

93 Isu-ro, Maengdong-myeon, Eumseong-gun, Chungcheongbuk-do 27737, Republic of Korea

Tel : +82-43-870-5521~8 Fax : +82-43-870-5682 Email : [tbt@korea.kr](mailto:tbt@korea.kr)



**<Comments from the Republic of Korea with respect to Proposed Rule of  
'Safer Products Restrictions and Reporting' of the State of Washington,  
USA (G/TBT/N/USA/1958)>**

The Korean government appreciates this opportunity to submit its comments on the proposed rule of 'Safer Products Restrictions and Reporting,' which was notified by the USA as G/TBT/N/USA/1958 on 6 January 2023.

With regard to the restriction of flame retardants in electric and electronic products specified in the proposed rule of 'Safer Products Restrictions and Reporting' (hereinafter, the "proposed rule") published by the government of Washington state, the following concerns have been raised from the related industries in Korea.

We would like to request the withdrawal of the provisions\* related to the restriction of flame retardants that are expected to be applied to most electric and electronic products, including electronic display products for following reasons.

\* WAC 173-337-112

According to the provisions, the restriction of flame retardants applies to electric and electronic products intended for indoor use that are powered by either Standard 120 volt outlets (and designed for up to 20 amp circuit) or by batteries. This means that almost all electric and electronic products for indoor use are affected. However, currently neither the U.S. Environment Agency (EPA), states outside of Washington, nor any other country has wide restrictions on flame retardant use.

In addition, if the provisions are implemented as they are, the discrepancy in the level of regulation between Washington states and other states/Federal government may cause a reduced range of purchasable products available for Washington residents. Further, electric and electronic products with limited application of flame retardant may be more vulnerable to fire hazard.

Not only will the extensive restriction on flame retardants in electric and electronic products impose an overly burdensome requirement on the manufacturers, but it will also diminish the product's fire safety properties. Therefore, we request that the Washington state consider withdrawing aforementioned provisions.

We would appreciate a quick reply and a positive consideration of our request. Do not hesitate to contact us if you have any questions.

# Can Manufacturers Institute

Greetings.

Please see attached CMI comments on the WA Safer Products proposed rule. Please confirm receipt.

Best regards,  
Derek



**Derek D. Swick, PHD, MPP**

Vice President of Regulatory and  
Technical Affairs

1730 Rhode Island Avenue, NW  
Washington, DC 20036  
USA

Telephone 202-232-4677

Email dswick@cancentral.com  
www.cancentral.com

**VIA EMAIL:** SaferProductsWA@ecy.wa.gov

February 2, 2023

Department of Ecology  
State of Washington  
PO Box 47600  
Olympia, WA  
98504-7600

**Re: Proposed Rule - Safer Products Restrictions and Reporting (WAC 173-337)**

Dear Sir or Madam:

The Can Manufacturers Institute (CMI) is the national trade association of the metal can manufacturing industry and its suppliers in the United States (U.S.). The can industry accounts for the annual domestic production of approximately 130.7 billion food, beverage, aerosol, and general line cans; employs more than 28,000 people with plants in 33 states, Puerto Rico, and American Samoa; and generates about \$15.7 billion in direct economic activity.

CMI appreciates the opportunity to provide comments to the Washington Department of Ecology ("Ecology") on the proposed rule for Safer Products Restrictions and Reporting (WAC 173-337)—in particular the proposed rule language in section 114 on "Bisphenols," which would impose a restriction on drink can linings and a reporting requirement for food can linings. CMI hopes to contribute to a dialogue that will enhance shared understanding of the safety of can linings in the U.S., current can lining technology, and the most appropriate regulatory framework for ensuring the safety of food packaging materials.

As a general matter, it is not necessary for a state to regulate a food contact product that is already strictly regulated by the U.S. Food and Drug Administration (FDA) under the authority of the Federal Food, Drug, and Cosmetic Act. The FDA regulatory framework assures the safety of food contact materials including food and beverage can linings.

Globally, food packaging regulators employ comprehensive risk assessments to determine safety. A hazard-based assessment process alone (such as the Cradle to Cradle Certified™ process used to develop the proposal) is insufficient to determine the safety of food packaging. CMI welcomes the dissemination and use of certification methodologies as appropriate, but they are voluntary and often commercialized

processes, not risk determinations or de facto regulatory processes. They also tend to change over time. It is not appropriate for a state to promulgate requirements based on such a methodology for food packaging, which is subject to comprehensive risk-based federal requirements.

Now that Ecology has issued a proposed rule that includes the provisions on food and drink can linings, CMI asks Ecology to consider the following two suggestions:

1. **Clarify the applicability of the requirements, focusing on retailers.** Within the respective supply chains, a can liner or can manufacturer does not necessarily know the actual usage of the liner or can for specific food or drink products. Food or drink fillers do not know exactly which products are being sold in Washington. The retailer is the party with the knowledge of what is sold in Washington.

CMI suggests that the appropriate point for application of all obligations is at the retailer, as retailers are responsible for selling the product to the consumer. Retailers can request any necessary assurances and information from suppliers, which they do already for other purposes.

The proposed rule is confusing regarding applicability. Draft WAC 173-337-114(1)(a)(i) and (2)(a)(i) designate the priority consumer products to be “Drink can linings” and “Food can linings.” Proposed provisions at WAC 173-337-114(1)(c)(i) are that no person may manufacture, sell, or distribute a covered product—“drink can lining”—that contains a bisphenol-based epoxy can liner, excluding TMBPF-based epoxy can liners. Proposed provisions at WAC 173-337-114(2)(c) require the manufacturer to provide notice that the priority product—“food can lining”—contains a bisphenol-based epoxy can liner. This circular language obfuscates what entities are subject to the responsibility for the prohibition and the notification—is it the producer of the lining, producer of the unfilled can, producer of the filled can food or drink product, or the retailer? The final rule needs to be clear on who has obligations under the requirements, which should be the retailer.

2. **Consider removing the “detection” presumption, although the proposed rule is an improvement over the previous draft.**

The proposed rule at WAC 173-337-114(1)(c)(ii) and WAC 173-337-114(2)(c)(i) says that Ecology presumes the “detection” of a bisphenol indicates the use of a bisphenol-based epoxy can liner. However, there is no definition of “detection,” the draft rule is silent on detection method, and it is not clear at what point in the product life cycle the “detection” applies (i.e., to a coating, an unfilled can, or a filled can).

CMI notes and appreciates that the proposed rule regulatory language at proposed WAC 173-337-114(1)(c)(iii) and WAC 173-337-114(2)(c)(ii) is much improved compared to the earlier draft that Ecology released. The provisions allow a manufacturer to rebut the presumption that detection of a bisphenol indicates a bisphenol-based epoxy can liner with at a statement and supporting

evidence that the product does not contain a bisphenol-based epoxy can liner. This is a necessary provision if there is a presumption that any "detection" indicates a bisphenol-based epoxy can liner and should be retained if the detection presumption remains. However, ideally there would not be this presumption. It is not necessary and has the potential to be problematic for interpretation and implementation of the requirements.

CMI has previously provided input to Ecology on this matter, including commenting on the draft regulatory determinations, participating in the webinar meetings on the topic in June and August 2022 and January 2023, and submitting comments on the Preliminary Draft Rule Language (August 24, 2022). In those communications, we offered the following overarching points, which we ask Ecology to take into consideration and reflect in any information it disseminates:

- Bisphenol A (BPA) is almost entirely phased out of domestic production of food cans. Food cans are not a significant source of exposure to BPA in the U.S.
- Can lining applications involve a cured film that does not present significant potential for migration of components to food or beverage, thus preventing potential significant exposure to components of the linings.
- Discussion of the safety of the can needs to take into consideration the overall safety and sustainability profile of the packaging, including the role of cans in ensuring a safe food supply and the superior recycling rate of metal cans.

CMI appreciates full transparency and continued opportunity for stakeholder input, including this opportunity to comment on the proposed rule. Thank you for your consideration of our input. Please do not hesitate to contact me if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "David A. And".

# Outdoor Power Equipment Institute

Please see the attached comments of the Outdoor Power Equipment Institute. Thank you for the consideration.

# Outdoor Power Equipment Institute

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February 3, 2023

Stacey Callaway  
Department of Ecology  
Hazardous Waste and Toxics Reduction Program  
PO Box 47600  
Olympia, WA 98504-7600

RE: Draft Rule for Safer Products for Washington – Cycle 1 and flame retardants in plastic external enclosures for electric and electronic products; Reporting requirement for OFRs used in casings & enclosures for OUTDOOR EEE products

Dear Ms. Callaway:

The Outdoor Power Equipment Institute (“OPEI”) submits the following comments regarding Washington Department of Ecology’s (“Department” or “Ecology”) Draft Rule (“Draft Rule”) as part of Safer Products for Washington – Cycle 1.<sup>1</sup> The comments of OPEI focus on the Draft Rule regarding the use of organohalogen flame retardants (OFRs) in plastic casings and enclosures for electronic and electrical equipment, and specifically the reporting requirement for OFRs used in casings & enclosures for outdoor EEE products.

OPEI requests an exemption of industry products from this proposed regulation.

## **1. Background on OPEI and the Outdoor Power Equipment Industry**

OPEI is an international trade association representing the manufacturers and their suppliers of:

- Non-road gasoline and diesel powered engines;
- Utility terrain vehicles / all-terrain vehicles / side-by-sides;
- Golf cars, and;
- Consumer and commercial lawn & garden equipment and outdoor power equipment (e.g., lawnmowers, garden tractors, trimmers, edgers, chain saws, snow throwers, tillers, leaf blowers, pressure washers).

Collectively industry products are classified as non-road mobile machinery (“NRMM”).<sup>2</sup>

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<sup>1</sup> Washington Department of Ecology, *Chapter 173-337 Washington Administrative Code (WAC): Safer Products for Restrictions and Reporting*, December 2022, <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf>.

<sup>2</sup> European Union defines ‘non-road mobile machinery’ as any mobile machine, transportable equipment, or vehicle with or without bodywork or wheels, not intended for the transport of passengers or goods on roads, and includes machinery installed on the chassis of vehicles intended for the transport of passengers or goods on roads. See Article 3 – Definitions – of the [EU Stage V emissions regulations \(2016/1628\)](#). Thus, the NRMM broadly applies to off-road machinery that includes small gardening and handheld equipment (lawn mowers, chainsaws, etc.),



Some of these products have gasoline-powered engines. Others are powered by battery, AC (electric), diesel, propane and other sources. For many of these products there are hundreds if not thousands of different models. They are ubiquitous to both households and businesses alike as essential products.

These products are sold through a diverse retail network that includes “big-box” home improvement stores, hardware stores, contracted dealers, and e-commerce. These comments refer to all such products as NRMM.

Generally, OPEI members manufacture complex durable goods with tens of thousands of spare/service parts. They share common supply chains, in both substance and complexity, with the heavy non-road equipment and automotive sectors. However, unlike those sectors, OPEI members include some small-to-medium size businesses with limited resources to address many of the challenges posed by the proposed rule and compliance deadline of January 1, 2025.

The U.S. facilities of OPEI member companies employ roughly 75,000 workers and contribute \$16 billion to annual U.S. GDP.

## **2. Request for exemption of NRMM from reporting requirement for OFRs used in casings & enclosures for OUTDOOR EEE products**

OPEI requests exemption of non-road mobile machinery, including spare parts, from the reporting requirement for OFRs used in casings & enclosures for OUTDOOR EEE products.

The exemption of NRMM would be consistent with the existing exemption of motorized vehicles (such as cars), since the supply chains and product performance and safety requirements of these two industries are very much aligned. OPEI believes that the exemption of motorized vehicles in the absence of an exemption of NRMM will make OPEI member compliance with the proposed reporting requirement infeasible.

OPEI suggests that this change be effected by adding a new subsection WAC 173-337-112(2)(a)(ii)(E): *“Non-road mobile machinery.”* The following definition of “non-road mobile machinery” could be added to WAC 173-337-025: *“any mobile machine, transportable equipment or vehicle with or without bodywork or wheels, not intended for the transport of passengers or goods on roads, and includes machinery installed on the chassis of vehicles intended for the transport of passengers or goods on roads.”* This is the same definition for this term as found in the EU regulations linked in Footnote 2.

The non-road mobile machinery industry faces many of the same safety, design, manufacturing, and purchasing issues that other adjacent industries face. This means OPEI member supply chains often overlap with much larger industries, such as the automotive and aerospace sectors. An Association of Equipment Manufacturers’ survey of their members’ supply chain, including input from OPEI members, found that 61% of the surveyed suppliers also provided parts and materials to the automotive industry.

OPEI understands that many of the articles processed and distributed by member companies incorporate the same types of flame retardants commonly used in the heavy non-road equipment, automotive, and power tool sectors. Examples of shared components with common performance and

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construction machinery (such as excavators, loaders, bulldozers, and others), agricultural & farming machinery (including harvesters, cultivators, and others), and to railcars, locomotives and inland waterway vessels.



safety characteristics include body panels, wiring, lubricants, seats, lights, headlamps, foam, gaskets, seals, coatings, and windshield wipers.

For example, power harnesses used for automobiles are also used in the non-road mobile machinery that OPEI members assemble (process) and distribute (including engines), such as recreational off-highway vehicles (ROVs), multipurpose off-highway utility vehicles (MOHUVs), golf cars, and other non-road mobile machinery.<sup>3</sup> But because the suppliers of automotive parts are covered by the exemption, they have no incentive to assist OPEI members in complying with the proposed reporting requirement for those parts, or from technically similar parts manufactured by the same suppliers, even though the outdoor power equipment industry also relies on those parts.

Neither OPEI members nor members of the auto industry manufacture power harnesses, electronic control modules, or electrical emission control components. Instead, specialized manufacturers, often outside the United States, manufacture these components. These manufacturers respond to market conditions. Since the vast majority of their products go into automobile manufacturing, and only a small percentage go into outdoor power equipment, these manufacturers respond more readily to their automotive customers than to OPEI members.

Because of the motor vehicle exemption, automobile manufacturers have no incentive to push their suppliers of power harnesses and other critical components to assist with compliance to the proposed reporting requirement. This leaves OPEI members in a dilemma. They have limited market power to influence these suppliers, and they have no ability to source these parts from other suppliers.

### **3. Conclusion**

The Draft Rule covers an extremely broad range of products and product categories. Moreover, performance and design considerations for electronic and electrical equipment encompasses a variety of factors. It is therefore reasonable for the Department to work in a timely but deliberate manner to help ensure that any regulations for flame retardants in enclosures for electric and electronic products is supported by the best available information.

Unfortunately, the regulatory proposal lacks definitions that would provide valuable information to the electric and electronic product supply chain and help companies better understand their compliance obligations as part of any new regulations. Moreover, the Department's continued insistence on NOT specifying individual products or flame retardants to be regulated could create confusion for downstream users seeking to comply with any regulations. It is also important that any regulations not create unnecessary trade barriers.

Implementation of any regulations for flame retardants in enclosures for electric and electronic products should also better align with existing regulations at the state, federal, and international levels for such products. The state of the science does not support the Department's current regulatory approach. The NAS does not recommend assessing OFRs as a single class as the Department has done.

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<sup>3</sup> A power harness, often referred to as a cable harness, wire harness, or wiring assembly, is a systematic and integrated arrangement of cables within an insulated material. The purpose of the assembly is to transmit signal or electrical power. Cables are bound together with straps, cable ties, cable lacing, sleeves, electrical tape, conduit, or a combination thereof. The power harness simplifies the connection to larger components by integrating the wiring into a single unit for "drop-in" installation.

OPEI requests exemption of non-road mobile machinery, including spare parts, from the reporting requirement for OFRs used in casings & enclosures for OUTDOOR EEE products in alignment with the existing exemption of motor vehicles.

Thank you for consideration of these comments and I am happy to address any questions you may have.

Best regards,

A handwritten signature in black ink, reading "Daniel J. Mustico". The signature is written in a cursive style with a large, stylized 'D' and 'M'.

Daniel J. Mustico  
Senior Vice President, Government & Market Affairs  
dmustico@opei.org

# Association for Contract Textiles

Please see the uploaded file for our comments.



association  
for contract  
textiles

January 27, 2023

Stacey Callaway, Rulemaking Lead  
Safer Products for WA  
Hazardous Waste and Toxics Reduction Program  
WA Department of Ecology  
PO Box 47600  
Olympia, WA 98504-7600

Dear Stacey,

On behalf of the Association for Contract Textiles (ACT), I am writing to express our association's comments regarding Chapter 173-337 WAC – Safer Products Restrictions and Reporting.

ACT is a professional not-for-profit trade association comprised of companies involved in the design, development, production, application, and promotion of textiles for commercial interiors. Our membership includes all major contract textile distributors in North America, as well as furniture manufacturers, weaving mills, fiber/yarn manufacturers, fabric finishers, testing labs, textile designers and others throughout the industry supply chain. We represent a diverse industry that sources textiles both domestically and internationally. For more information about ACT and our membership, see [www.contracttextiles.org](http://www.contracttextiles.org).

**1. WAC 173-337-060 Reporting requirements. (1) Applicability. (c) Reporting party.**

We appreciate the fact that only one reporting entity is required to submit a notification. The following complexity needs to be taken into consideration: a fabric is reported by its manufacturer (primary responsible party) but sold by a distributor into the State of Washington under a different fabric sku/name. It is crucial for the state's reporting system to 1) connect the dots and 2) protect confidential business information.

**2. WAC 173-337-060 Reporting requirements. (3) Notification Contents. (b) (ii)**

Our members sell fabrics that are marketed for outdoor use, but they do not know where and how the fabrics will be used; therefore, they are unable to determine which "brick(s)" is(are) appropriate. Their fabrics can be used in diverse locations (e.g., offices, hotels, hospitals, homes) and for diverse applications (e.g., upholstered seating, awnings, window treatments). We request further guidance from the State of Washington to help our members select the accurate brick(s).

**3. WAC 173-337-060 Reporting requirements. (3) Notification Contents. (b) (v)**

Do these reporting ranges relate to individual PFAS chemicals by CAS number or to total fluorine content? We recommend reporting total fluorine content because testing and reporting for individual PFAS is prohibitively expensive and time consuming, doesn't provide meaningful information, and may not even be possible.

In general, the concentration ranges are acceptable as long as they apply only to *intentionally* added PFAS; however, we suggest removing Category A (less than 100 ppm) to be consistent with the State of Washington Children's Safe Products Act.

P.O. Box 101981  
Fort Worth, TX 76185  
tel 817.924.8048  
fax 817.924.8050  
[www.contracttextiles.org](http://www.contracttextiles.org)



association  
for contract  
textiles

**4. WAC 173-337-110 PFAS. (3) (iii) (B)**

We request clarification on what will be accepted as credible evidence. Chemical analysis testing for unintentionally added PFAS is time and cost prohibitive.

When a company recycles plastic bottles and/or existing products that were previously treated with PFAS, the recycled fabric that is produced will have residual PFAS from the original material. Will the State of Washington consider this residual PFAS “intentionally added”?

**5. WAC 173-337-110 PFAS. (4) (b)**

We recommend changing the compliance date for reporting to January 2026, which will enable our members to focus their resources on removing PFAS from their products instead of expending their efforts on reporting.

The Association for Contract Textiles and our member companies are committed to working with you toward the shared goal of safe, continued, uninterrupted manufacturing to provide products in a manner that protects human health and the environment in accordance with the State of Washington. We thank you for considering the perspectives of all stakeholders, including North American textile producers, furniture manufacturers, and distributors.

Sincerely,

Janan Rabiah  
Executive Director  
Association for Contract Textiles, Inc.



February 5, 2023

Stacey Callaway  
Hazardous Waste and Toxics Reduction Program  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Dear Ms. Callaway:

Thank you for the opportunity to provide input on the proposed regulation to implement the landmark 2019 Safer Products for Washington law, which is the strongest law in the nation to address harmful chemicals in products.

**The agency is breaking new ground with this program and is proposing significant bans on four classes of chemicals in ten product categories. This is an excellent step forward, and we appreciate all the work that went into this important rule.**

**We support the proposed restrictions. Ecology identified safer, feasible and available alternatives and is proposing to restrict the following chemicals in products:**

- Organohalogen flame retardants in electric & electronic products with plastic external enclosures intended for indoor use and certain flame retardants in recreational polyurethane foam (excluding wall padding; organohalogen flame retardants and flame retardants identified in RCW 70A.430.01011);
- PFAS in carpet, rugs, and indoor leather and textile furnishings and in aftermarket stain- and water- resistance treatments;
- Orthophthalates in fragrances of beauty and personal care products and in vinyl flooring;
- Bisphenols in drink cans and thermal paper; and
- Alkylphenol ethoxylates (APEs) in laundry detergent.

The agency's December 2022 proposed rule, published under Phase 4 implementation of the landmark Safer Products for Washington (RCW 70.350), is a critical step to protect sensitive populations and species in the state and establish a path toward clean and healthy materials used in homes, schools, and workplaces.

The Safer Products for Washington law is our best opportunity to prevent pollution at the source from the toxic chemicals in millions of products and their packaging that contaminate our homes, drinking water, communities, food, waterways, and wildlife. The actions under this rule pave the way for important outcomes:

- **Stopping the contamination of breast milk and protecting the most vulnerable.** A recent peer-reviewed study found per- and polyfluorinated substances (PFAS) in 100% of breast milk samples tested from 50 women in Washington, and showed that detections of newer forms of PFAS, including some found in textiles, are doubling every four years.<sup>i</sup>
- **Ending toxic pollution from products that contaminates communities, drinking water, and wildlife saving money.** PFAS contaminates drinking water throughout Washington state, from Whidbey Island to Spokane. The costs of cleaning up PFAS are rising, and spending has reached more than \$64 million in Washington State.<sup>ii</sup> Banning PFAS and other persistent, bioaccumulative, toxic chemicals in products will keep them out of surface water bodies, sewage treatment plants, and biosolids spread on forests, farms, and gardens.

Strong, enforceable chemical bans work. Importantly, though, both the class-based approach and the tools to identify safer solutions used in the Safer Products for Washington program are critical to prevent regrettable substitutes. For example, when PBDE flame retardants were banned in Washington, scientists recorded levels of these chemicals decreasing in harbor seals, Pacific herring, and English sole.<sup>iii</sup> However, replacement flame retardants used since are also brominated and also persist and build up in wildlife. Restricting all organohalogen flame retardants (based on chlorine, bromine, or fluorine chemistries), which all pose health concerns, is the most effective strategy to decrease their levels in both humans and wildlife.

Manufacturers that use highly hazardous, persistent, and often the cheapest chemicals externalize the staggering cost of the impacts of those chemicals to taxpayers, ratepayers, health-care patients, and their families, and to future generations.

While toxic chemicals impact everyone, vulnerable populations such as low-income communities and communities of color, particularly women of color, are disproportionately impacted. This leads to intergenerational harm as their children can carry the burden of negative health effects from toxics.

Protecting the most vulnerable, including highly impacted communities, is core to the law: environmental justice cannot be an add-on. To accomplish this, it is critical that the restrictions are stringent, with no loopholes or broad exemptions, that phaseout timelines are short, and that enforcement happens. If the restrictions are not strong or well-enforced, the burden will be on already overburdened individuals and communities to protect themselves, which will only continue and exacerbate the injustice that exists.

### **General Comments on the proposed SPW Rule**

**Comment:** Enforcement thresholds for restrictions should be lower than those for PCBs and as close to zero as possible.

**Rationale:** Persistent, bioaccumulative, toxic chemicals, such as those addressed in the proposed regulation:

- do not break down as products are recycled or as these chemicals migrate from products into the environment,
- are extremely expensive and difficult to clean up,
- bioaccumulate from extremely low levels to detrimental levels through the food web, and

- harm both humans and animals.

For these reasons, limits on priority chemicals need to be set as close to zero as possible.

PCBs offer a cautionary tale of this need particularly relevant for Washington State. Like the chemicals addressed in the proposed regulation, PCBs are persistent, bioaccumulative, and toxic. While their production in the United States was banned in 1979 under the Toxics Substances Control Act, some inadvertently generated PCBs are still allowed in products at concentrations of up to 50 ppm, with the exception of detergent bars, where concentrations must be less than 5 ppm.<sup>iv</sup>

PCBs occur in inks and dyes, which are applied to paper products. When paper products are recycled, PCBs migrate from the paper pulp to wastewater, which is discharged into water bodies. EPA has set the limit for PCB discharges to water from recyclable paper at 3 ppb total Aroclors, which are defined PCB mixtures.<sup>v</sup>

While the discharge limit is low, EPA has set the water quality standard several orders of magnitude lower. The National Aquatic Life Criterion for total PCBs for freshwater is 0.014 µg/L (ppb) and 0.03 µg/L (ppb) for saltwater.<sup>vi</sup> These limits were deemed necessary to protect human and environmental health; they are so low precisely because PCBs are persistent, bioaccumulative and toxic.

However, the PCB limit of 50 ppm in inks and dyes has proven insufficient to allow paper recyclers to meet their wastewater discharge limits of 3 ppb. SB 5369, currently before the Legislature, states that water quality standards “cannot be achieved with currently available water treatment technology if the waste stream continues to include new sources of PCBs allowable under the toxic substances control act at levels measured in products such as paints, inks, and pigments....Therefore, the legislature finds that nonlegacy PCB contamination may most effectively be managed upstream at the product and process source as opposed to downstream facilities at the end of the product life cycle. The toxic substances control act standard for inadvertent PCBs does not reflect current science on limits needed to protect human health and the environment and is overdue for revision.”<sup>vii</sup>

The limits on PCBs in products are more than an order of magnitude lower than those proposed in the proposed regulation for ortho-phthalates in vinyl flooring, halogenated flame retardants in indoor electronics and recreational foam, and APEs in detergent and one quarter of the limit proposed for bisphenols in thermal paper. While migration routes from products to the environment may vary, all of the chemicals in the proposed regulation, like PCBs, are persistent, bioaccumulative, and toxic. It is critical that lessons from the failure of limits on PCBs in products be applied to the current regulation.

### **Specific Comments on the proposed SPW Rule**

#### **WAC 173-337-050 Equity and environmental justice. (1)(e)**

**Comment:** To the sentence, “This includes, but is not limited to, considering overburdened communities and low-income populations' ability to access safer consumer product,” we suggest adding, “as a result of regulatory action.”

**Rationale:** Access to safer consumer products does not occur in isolation. Government regulation sets the baseline for product safety for all communities; the proposed amendment recognizes this fact.



Regulation through Safer Products for Washington is critical to leveling the playing field for access to safer consumer products by overburdened communities.

**WAC 173-337-110 PFAS.**

**Comment:** We strongly support the proposed restrictions on PFAS in rugs, carpets, indoor textile furnishings, and aftermarket treatments.

**Rationale:** The agency's November 2021 report demonstrates that it has met the legal requirements in RCW 70A.350 to ban PFAS in rugs, carpets, textile furnishing and aftermarket treatments. Specifically, it has identified safer, feasible, and available alternatives using criteria in the statutory language, and determined that the proposed regulatory action will reduce a significant source or use of the priority chemical. See RCW 70A 350.010 (13), 350.030(2)(f).

- The agency's determinations meet statutory criteria, RCW 70A 350.030(2)(a - c). This is supported by recent research conducted by Toxic-Free Future that confirms the widespread use of PFAS in home furnishings, including bedding, tablecloths, and napkins marketed as stain- or water-resistant. Our testing of 40 home-furnishing items found the following:
  - PFAS were detected in 9 of 13 bedding items marketed as stain- or water-resistant.
  - PFAS were detected in 10 of 14 tablecloths and napkins with stain or water resistance claims.<sup>viii</sup>

These results indicate that PFAS are commonly added by manufacturers to achieve stain or water resistance. As Ecology identified safer, available alternatives, this underscores the urgency of Ecology's action to restrict PFAS in home furnishings.

- The agency's determinations meet statutory criteria, RCW 70A 350.030(2)(f). This is supported by the fact that more and more companies are making commitments to end their use of PFAS, and new alternatives are entering the market rapidly. The following additional information supplements and supports Ecology's report:
  - Leading brands such as H&M, IKEA, KEEN, and Levi's have eliminated PFAS in all of their textiles.
  - In 2019, The Home Depot and Lowe's ended the sale of all carpets and rugs containing PFAS.
  - A year later, after 3M reformulated and eliminated PFAS in its consumer Scotchgard aftermarket treatment products, Lowe's announced it was ceasing the sale of all aftermarket treatment sprays containing PFAS.
  - In December 2022, 3M, a major manufacturer of PFAS, announced that it would exit all PFAS manufacturing by the end of 2025,<sup>ix</sup> following estimates that its total liability in PFAS-related lawsuits may reach \$30 billion.<sup>x</sup>

**Comment:** We support the agency's approach that detecting Total Organic Fluorine (TOF) indicates PFAS.

**Rationale:** This is prudent given that state and federal drinking water levels are being set in the parts per trillion.<sup>xi,xii</sup> To truly keep these chemicals out of the environment, the levels in products need to be as close to zero as possible.

#### **WAC 173-337-111 Ortho-phthalates.**

**Comment:** We strongly support the proposed restrictions on ortho-phthalates in fragrances and personal care products and vinyl flooring.

**Rationale:** The agency has met the legal requirements in RCW 70A.350 to ban phthalates in fragrances and personal care products and in vinyl flooring. Specifically, it has identified safer, feasible, and available alternatives using criteria based on guidance in the statutory language and determined that the proposed regulatory action will reduce a significant source or use of the priority chemical. See RCW 70A 350.010 (13), 350.030(2)(f). As noted in the report, most major home improvement and flooring chains have already banned ortho-phthalates as a class in flooring, including The Home Depot, Lowe's, Lumber Liquidators, Ace Hardware, Floor & Decor, and Menards.

**Comment:** Enforcement thresholds for restrictions on ortho-phthalates should be lower than 50 ppm, the limit for PCBs, and as close to zero as possible.

**Rationale:** We support the restriction on ortho-phthalates in vinyl flooring and the limit applying to any ortho-phthalate, individually or combined. However, the 1000 ppm limit is too high. We are very concerned that vinyl flooring can contain recycled content, and that phthalates should not be recycled. The limit should be set much lower to address this, particularly given that vinyl floors are low-cost and used widely in affordable housing.

#### **WAC 173-337-112 Flame retardants. (1) Electric and electronic products with plastic external enclosures, intended for indoor use.**

**Comment:** We strongly support the proposed restrictions on organohalogen flame retardants in external plastic casings of indoor electric and electronic products.

**Rationale:** Safer Products for Washington, RCW 70A.350, requires the agency to take regulatory action that will 1) increase transparency about the use of toxic chemicals in products and, 2) reduce the use of priority chemicals in priority consumer products. The agency's November 2021 report demonstrates that it has met the legal requirements in RCW 70A.350 to ban organohalogen flame retardants (OFRs) in electric and electronic equipment with plastic enclosures.

- The agency's determination meets statutory criteria, RCW 70A 350.030(2)(e). This action is consistent with legal requirements already adopted in Europe and most recently in New York. The New York ban goes into effect on January 1, 2024. Given that New York is the third-largest economy in the nation and the EU accounts for around 15% of the world's trade in goods, this will increase even further the availability and feasibility of OFR-free plastics used for electronics.

Further, the Consumer Product Safety Commission (CPSC) voted in 2017 issued guidance for manufacturers, retailers, and consumers, especially those with young children or who are pregnant, to avoid these chemicals in electronics enclosures and other product categories.

- The agency's determination meets statutory criteria, RCW 70A 350.010 (13), 350.030(2)(f). Ecology has identified safer, feasible, and available alternatives using criteria based on guidance in the statutory language and determined that the proposed regulatory action will reduce a significant source or use of the priority chemical. The Department of Ecology's 2009 report on safer alternatives for flame retardants in television housings concluded non-halogenated, safer substitutes were available. Ecology's 2021 report identified the same safer alternative, and the action is long overdue.

Further support for the agency's determination under RCW 70A 350.010 (13), 350.030(2)(f) is provided by observations of the marketplace:

- Best Buy, one of the United States' largest retailers of consumer electronics, announced on January 21, 2022, that its Exclusive Brand (ExB) televisions will comply with Europe's ban on organohalogen flame retardants for all newly designed models.<sup>xiii</sup> Best Buy will be using GreenScreen Benchmark 3 flame retardants, which meet Ecology's definition for "safer".<sup>xiv</sup>
- No Sony television enclosures currently manufactured, sold, or distributed within North America contain intentionally added OFRs.<sup>xv</sup>
- LG is also working to phase out OFRs starting in 2021 for Europe and beginning to consider a phase-out for the U.S.<sup>xvi</sup>
- As noted in the agency's report, TCO Certified, the leading third-party certification for IT products, requires that plastic enclosures use flame retardants that are not only simply not organohalogens, but meet GreenScreen Benchmark 2 or higher. Over 3800 product models produced by over 25 brands, including HP, Samsung, Phillips, and others, are currently certified by TCO.<sup>xvii</sup>

It is especially important that the restriction is comprehensive of indoor electronics. People are exposed to flame retardants from many types of indoor electronics, not just TVs, including kitchen appliances, phones, hair dryers, etc. Flame retardants cannot be contained in any of these products; they migrate from the products to indoor dust and air, to water, wildlife, and people.

We would like to emphasize that restricting OFRs is needed to protect the health of humans and the environment and will not impact fire safety. The Ecology report details how fire safety standards can be met with alternative materials or safer chemicals. Companies are already doing this, and fire safety won't be compromised by banning OFRs. Please also consider that the chemical industry has, for decades, made deceptive claims about fire safety, which drove the use of dangerous chemicals that now contaminate our homes, breast milk, and wildlife. Their use has also put the lives of firefighters and other first responders at risk. The International Association of Fire Fighters and the Washington State Association of Fire Fighters have been calling for bans on OFRs in products, including electronics, for years.<sup>xviii, xix, xx, xxi, xxii, xxiii, xxiv</sup>

**Comment:** The organohalogen flame retardant restriction for indoor electronics should be more stringent, given experience with previous laws.

**Rationale:** In our testing, we have seen that companies will continue to produce casings for electronics that contain banned flame retardants at significant levels, many years after the ban went into place.

These are chemicals that at least for some time will continue to be produced and used in other jurisdictions and allowing their presence at a relatively high level incentivizes companies to continue allowing their presence and maintain sloppy production practices. In addition, the enforcement level should apply to the total content at the homogenous material level, not the product level; that is, if a casing is made of multiple materials, each one must meet the limit. It is an approach consistent with Europe.

- **Experience from the PBDE ban shows us that more stringent requirements are needed.** Washington's PBDE law banned TV electronic enclosures from containing deca-BDE in 2011 after identifying safer alternatives.<sup>xxv</sup> The law excluded recycled plastic content. Testing of TVs in 2017 by Toxic-Free Future found deca-BDE in three televisions along with an array of other flame retardants at a variety of levels.<sup>xxvi</sup> Follow-up testing published in 2019 again found deca-BDE in televisions.<sup>xxvii</sup> There is no way to tell how the deca-BDE or the array of flame retardants ended up in the TV so the standard should apply to any flame retardants, not just intentionally added ones.
- **Recycling of electronics demands strict restrictions far below 1000 ppm.** To keep organohalogen flame retardants out of recycled products, restrictions need to be set as close to zero as is practical. In a 2022 study, the International POPs Elimination Network (IPEN) tested for brominated flame retardants in black plastic items from China, Russia, and Indonesia that were not required to meet fire safety standards. They found brominated flame retardants in children's toys, office supplies, hair accessories, and kitchen utensils. Some products the contained brominated flame retardants in the hundreds of parts per million.<sup>xxviii</sup> Their findings suggest that the presence of brominated flame retardants was due to unregulated e-waste recycling.

When flame retardants from TVs are recycled into children's toys, it poses threats to the health of children. A May 2022 study found that flame retardants migrated from children's toys into children's saliva.<sup>xxix</sup>

#### **WAC 173-337-112 Flame retardants. (1)(b), sections (iii) and (iv)**

**Comment:** We recommend amending the compliance schedules for Group 1 and Group 2 by adding the words "but is not limited to" immediately before the bulleted lists that begin with all-in-one video conference systems and end with virtual reality headsets.

**Rationale:** This change will not alter the intent of the restriction, but will clarify it, making explicit that the four categories of electronic products listed are not the only ones covered by the restriction.

#### **WAC 173-337-112 Flame retardants. (3) and (4) Recreational products made from polyurethane foam.**

**Comment:** We strongly support the proposed restrictions and disclosure requirements for flame retardants in recreational polyurethane foam.

**Rationale:** Safer alternatives are foam products without added flame retardants. Flame retardants are not needed in this category of foam products and pose an unnecessary exposure to sensitive

populations, including young people, workers, pregnant women, and women of childbearing age in facilities using recreational foam.

**WAC 173-337-114 Bisphenols. (1) Drink can linings and (3) Thermal paper**

**Comment:** We strongly support the proposed restrictions on bisphenols in drink can linings and thermal paper.

**Rationale:** The agency has met the legal requirements in RCW 70A.350 to ban bisphenols (BPA) in both drink cans and thermal paper. Specifically, it has identified safer, feasible, and available alternatives using criteria based on guidance in the statutory language and determined that the proposed regulatory action will reduce a significant source or use of the priority chemical. See RCW 70A 350.010 (13), 350.030(2)(f). The agency's determinations meet additional statutory criteria, RCW 70A 350.030(2)(e), because they are supported by recent governmental and market policies and research that are aligned with the regulatory determinations.

**WAC 173-337-113 Alkylphenol ethoxylates. Laundry detergent.**

**Comment:** We strongly support the proposed restrictions on alkylphenol ethoxylates in laundry detergent.

**Rationale:** The agency has met the legal requirements in RCW 70A.350 to ban alkylphenol ethoxylates in laundry detergent. Specifically, it has identified safer, feasible, and available alternatives using criteria based on guidance in the statutory language and determined that the proposed regulatory action will reduce a significant source or use of the priority chemical. See RCW 70A 350.010 (13), 350.030(2)(f). The agency's determinations meet additional statutory criteria, RCW 70A 350.030(2)(e), because they are supported by recent governmental and market policies and research that are aligned with the regulatory determinations.

**Comment:** APE limits should be lower than 5 ppm, consistent with limits on PCBs in detergent bars.

**Rationale:** We support the ban on APEs in laundry detergents; however, the 1000 ppm threshold is too high. Ecology identified safer, feasible, and available alternatives certified by the EPA in its Safer Choice program. There is no reason for APES to be used in detergents, so the levels should be much closer to zero.

EPA set the limit for PCBs in detergent bars as less than 5 ppm. Like PCBs, APEs are persistent, bioaccumulative, and toxic. Like detergent bars, laundry detergent is designed to be mixed with and discharged in wastewater. The limit for APEs in laundry detergent should therefore be aligned with the limit on PCBs in detergent bars.

Congratulations to Ecology's staff on an extraordinary body of work over the first four phases of implementing the Safer Products for Washington Law. This regulation, grounded in both sound science and market realities, has the potential to provide critically needed protections for Washington's residents, especially those most vulnerable, and its environment. Please feel free to contact us with any questions regarding our comments.

Sincerely,

Cheri Peele  
Senior Project Manager  
Toxic-Free Future

Mark Rossi  
Executive Director  
Clean Production Action

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Thomas Osimitz

February 2, 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

Please see uploaded PDF. Thank you.



February 2, 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 the Department of Ecology:

My name is Thomas Osimitz. By way of background, I have a doctorate degree in toxicology and am certified in toxicology by the American Board of Toxicology (DABT). I am quite familiar with the environmental and human health issues associated with flame retardants. I am Chair of the Science Advisory Council (SAC) of the North American Flame Retardant Alliance (NAFRA) which operates under the auspices of the American Chemistry Council (ACC). The opinions I express below are mine and not necessarily those of ACC.

I am submitting the following comments on Washington Department of Ecology's ("Department" or "Ecology") Draft Rule ("Draft Rule") as part of Safer Products for Washington – Cycle 1.<sup>1</sup> The comments focus on the Draft Rule regarding the use of organohalogen flame retardants (OFRs) in plastic casings and enclosures for electronic and electrical equipment.

My comments focus on the following topics:

- Failure to Consider Exposure and Risk
- Inappropriately Assuming that all OFRs Pose the Same Hazard
- Applying Inconsistent Criteria in Assessment of Alternatives

**Failure to Consider Exposure and Risk**

The Department's regulatory approach incorrectly assumes that all OFRs used in enclosures for electrical and electronic products pose the same level of risk even though no assessment supports this approach. Risk to humans and/or the environment is a function of both toxicity, a property inherent to the chemical, and the extent of exposure that a human or environmental species receives. We are exposed to many chemicals every day, including some naturally occurring molecules that in several cases look chemically very similar to synthetic flame retardants and that have inherent toxicity. But because of the level of exposure and/or our body's ability to detoxify many of these chemicals, risk is low or nonexistent.

The current state of the science does not support this regulatory proposal. While there are data demonstrating some level of specific OFRs both in various media and in the environment, this is

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<sup>1</sup> Washington Department of Ecology, *Chapter 173-337 Washington Administrative Code (WAC): Safer Products for Restrictions and Reporting*, December 2022, <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf>.

not the case for all OFRs, and the Department has not established that plastic casings and enclosures for electronic and electrical equipment are a significant source of any potential releases. Even the presence of a chemical in blood or urine detected in biomonitoring studies needs to be considered in relation to actual levels that might cause adverse effects to human health. As the Centers for Disease Control and Prevention makes clear in its National Report on Human Exposure to Environmental Chemicals:

“The presence of an environmental chemical in people’s blood or urine does not mean that it will cause effects or disease. The toxicity of a chemical is related to its dose or concentration, in addition to a person’s individual susceptibility. Small amounts may be of no health consequence, whereas larger amounts may cause adverse health effects.”<sup>2</sup>

The primary value of a risk assessment is to aid in the establishment of priority for action. Some exposures to certain populations may warrant potential management such as regulation, labeling or restrictions, whereas others may not require any action. Declaring all OFR molecules as unacceptable is not a reasonable approach and will lead to the elimination of molecules that pose no risk whatsoever. Moreover, this approach essentially forestalls innovation for new products using halogen-containing molecules.

### **Inappropriately Assuming that all OFRs Pose the Same Hazard**

As scientist, I encourage the Department to carefully consider the recent report by the National Academy of Sciences<sup>3</sup> that recommends *against* assessing OFRs as one single class. Important excerpts from their extensive review and analysis of OFR toxicology:

“The committee conducted its own analysis to determine whether OFRs can be treated as a single class. It first created an inventory of 161 OFRs from several sources and then identified analogues on the basis of functional, structural, and predicted bioactivity information. To evaluate similarity, the committee compared the OFR inventory to the analogues and found that the OFRs cannot be treated as a single class for the purposes of a CPSC hazard assessment. The OFRs can, however, be divided into sub-classes on the basis of chemical structure, physicochemical properties, and predicted biologic activity. The committee identified 14 subclasses that can be used to conduct a class-based hazard assessment and concluded that the best approach is to define subclasses as broadly as is feasible for the analysis; defining subclasses too narrowly could defeat the purpose of a class approach to hazard assessment.”

Furthermore:

“The committee hopes that the scoping plan that it has described will give CPSC a means to use a class approach to assessing the hazards posed by OFRs. A class approach will likely result in increases in efficiency and decreases in cost compared with the traditional approach of evaluating individual chemicals.

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<sup>2</sup> Fourth National Report on Human Exposure to Environmental Chemicals, 2009, Executive Summary, p. 3.

<sup>3</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>

Although the challenges to a class approach might appear daunting, the alternative -- individual assessments of hundreds of chemicals—is unrealistic. The only possible practical approach for a set of chemicals as large as the OFRs is a class approach.”

Despite this highly rigorous assessment, the Department proposes to implement a regulatory action that does not differentiate OFRs by any specific mechanism of action.

### **Applying Inconsistent Criteria in Assessment of Alternatives**

The assessment approach being used as a justification for proposed regulations was not applied evenly for OFRs and identified alternatives. In many instances, the Department has used environmental measurements of a subclass of older flame retardants, the polybrominated diphenyl ethers (PBDEs) – which were used in textiles, upholstered furniture, and electronics – as a proxy for other flame retardants.<sup>4</sup> These data should not serve as a basis for making conclusions about other flame retardants, much less an entire class of flame retardants. The Department itself stated in earlier assessments that, other than PBDEs, actual monitoring data indicate that some of the other referenced 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>5</sup>

Most notably, The Department’s approach to regulating OFRs as a class essentially deems all OFRs to be unacceptable. However, it seems that the Department has applied a lower level of rigor to identified alternatives. The Department has identified a Benchmark 2 score as meeting its minimum criteria for safer designation. Even if, under their Working Criteria for “Feasible and Available”<sup>6</sup>, an OFR scores Benchmark 2 GreenScreen® Assessment, it still may not meet “safer” criteria. This is because the Department claims such chemicals may fail additional within-class criteria.<sup>7</sup> They have 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 57583-54-7) – meet the minimum criteria for “safer” and have a Benchmark 2 score as part of a GreenScreen® Assessment.<sup>8</sup>

By contrast, GreenScreen® Assessments for two OFRs – decabromodiphenyl ethane (DBDPE) (CAS RN 84852-53-9) and 1,3,5-triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (TTBPT) (CAS RN 25713-60-4) – were conducted and submitted to the Department with each chemical assigned a

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<sup>4</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.

<sup>5</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>6</sup> Regulatory Determinations Report at pages 301-305.

<sup>7</sup> Regulatory Determinations Report at page 42.

<sup>8</sup> Regulatory Determinations Report at pages 64 - 65.

Benchmark 2 score.<sup>9,10</sup> However, since DBDPE and TTBPT are OFRs, additional within-class criteria apply and both DBDPE and TTBPT fail this additional test as part of the Department's assessment process. This means that OPFRs with Benchmark 2 scores are being considered "safer" by the Department while OFRs with Benchmark 2 scores are not being considered "safer" by the Department. This is a biased application of the criteria. However, if the same within-class criteria approach were applied to TPP and RDP just as it has for DBDPE and TTBPT, both phosphorus compounds would not meet the Department's criteria for "safer" designation. This highlights the need for a revised process that consistently assesses existing chemicals and identified alternatives.

## Conclusions

Please consider my comments as a toxicologist in the following areas:

- Failure to Consider Exposure and Risk
- Inappropriately Assuming that all OFRs Pose the Same Hazard
- Applying Inconsistent Criteria in Assessment of Alternatives

Addressing the issues noted above will better ground the rule in science and focus everyone's resources to better protect public health and the environment.

I appreciate the opportunity to comment on the Department's Draft Rule. If you have questions, please contact me at [tom@sciencestrategies.com](mailto:tom@sciencestrategies.com)

Sincerely,

Thomas G. Osimitz, PhD  
Diplomate, American Board of Toxicology  
Principal Toxicologist  
Science Strategies, LLC

[tom@sciencestrategies.com](mailto:tom@sciencestrategies.com)

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

<sup>10</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.

# Alaska Community Action on Toxics

Please see our comments as an attached pdf document.



1225 E. International Airport Road, Suite 220  
Anchorage, Alaska 99518

[www.akaction.org](http://www.akaction.org)

February 5, 2023

### **Comments on Safer Products for Washington Proposed Rule**

Alaska Community Action on Toxics (ACAT) is a non-profit environmental health and justice research and advocacy organization based in Anchorage, Alaska. We believe everyone has a right to clean air, clean water, and toxic-free food. Driven by a core belief in environmental justice, ACAT empowers communities to eliminate exposure to toxics through collaborative research, shared science, education, organizing, and advocacy. We work to achieve health protective policies at the local, state, national, and international levels. Since 2005, I have served as a principal investigator for community-based research projects addressing toxic chemical exposure in Indigenous communities in Alaska, supported by the National Institute of Environmental Health Sciences ("NIEHS"). I have also authored or co-authored numerous papers concerning our community-based participatory research, which have been published in peer-reviewed scientific literature, including investigations concerning presence and effects of organohalogen flame retardants and PFAS.

ACAT supports the proposed Safer Products for Washington rule (Chapter 173-337 WAC) because it will lead to reduced exposures for wildlife and people, provide protections for the health of vulnerable populations, and provide incentives for manufacturers to stop the use of hazardous chemicals in products. Exposures to organohalogen flame retardants pose heightened risks to infants and children—who tend to inhale and ingest more of the chemical in their homes and schools and are more vulnerable to its health effects—as well as Indigenous and other communities that practice subsistence fishing and hunting, communities where products containing OHFRs are processed or disposed of, and workers who manufacture or work with products that contain these chemicals. Exposure to OHFRs can result in adverse health outcomes including neurodevelopmental harm, endocrine disruption (particularly the thyroid axis), and certain cancers. It is time to stop the use of organohalogen flame retardants in electronics and other applications in order to prevent further harm to present and future generations. Phase-outs of organohalogen flame retardants will also avoid the recycling of plastics containing organohalogens in electronics into other household products. Fire safety without the use of additive organohalogen flame retardants can be achieved through better product design and use of safer materials.

We are particularly concerned about disproportionate exposures in Indigenous populations because of their reliance on traditional foods for physical, cultural, and spiritual sustenance.

Because OHFRs are not chemically bound to the materials in products, they can easily migrate out of products and into the surrounding environment. Use and disposal of OHFRs disproportionately affects Indigenous peoples, including Tribal Nations in Washington State, as well as Canada's First Nations and Alaska's northern and Arctic Indigenous Nations, because OHFRs migrate on atmospheric and water currents and accumulate in fish and marine mammals that are vital and traditional food sources for Indigenous peoples. Northern and Arctic ecosystems are hemispheric sinks for persistent and bioaccumulative chemicals such as OHFRs. The harvest and consumption of traditional foods is central to the nutritional, cultural, and economic health of Indigenous peoples. In the indoor environment, OHFRs migrate from consumer products into household dust, which can then be breathed in, ingested, or dermally absorbed. In cold environments such as the Pacific Northwest and Alaska, household exposures are likely higher because of the greater time that people spend indoors, and with homes that are insulated against the cold and less well ventilated. Landfills are also an important source of contamination from the disposal of household electronics and other products and may be upgradient from water and food sources.

As a crucial environmental justice issue, the proposed rule must take into consideration the disproportionate exposures through traditional foods as well as household products and harmful effects of OHFRs on Indigenous populations in Washington as well as those of more northern Indigenous populations. As one of our board members, Violet Yeaton (Sugpiaq) states: "We don't eat just one chemical, we eat the whole fish." Indigenous peoples are exposed to a range of legacy and currently used chemicals, including OHFRs, such that cumulative and synergistic exposures and effects must be taken into account when finalizing the proposed rule.

We support proposed the restrictions on OHFRs in electronics as well as in recreational polyurethane foam products. We also support the proposed restrictions on the use of PFAS in carpets, rugs, indoor furnishings, and stain- and water-resistant treatments. It is important to eliminate all non-essential uses of the chemicals included in this proposed rule. We urge the Washington Department of Ecology to enact the proposed rule in an expeditious manner. It will set a precedent for other states as well as protect vulnerable populations within Washington as well as outside its borders. Chemicals don't respect political boundaries.

For further information, please contact Pamela Miller, Executive Director of Alaska Community Action on Toxics, [pamela@akaction.org](mailto:pamela@akaction.org).

Published papers of our community-based research team:

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# National Marine Manufacturers Association

Please see the attached comments. Thank you



02/03/2023

Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
PO Box 47600  
Olympia, WA 98504-7600

**RE: Proposed Rule: Department of Ecology, Chapter 173-337 WAC -- Safer Products Restrictions and Reporting**

The National Marine Manufacturers Association (NMMA) appreciates the opportunity to provide comments to the Washington State Department of Ecology (Ecology) regarding the Proposed Rule: "Safer Products Restrictions and Reporting" ("Safer Products Rule" or "Proposed Rule").

NMMA is the trade association for the U.S. recreational boating industry, representing nearly 1,500 marine businesses, including recreational boat, marine engine, and accessory manufacturers. Our members are often U.S.-based small businesses, many of which are family owned. NMMA members collectively manufacture more than 85 percent of the marine products sold in the U.S. Furthermore, the recreational boating industry has a \$170 billion impact on the nation's economy and in communities across the country, with nearly 700,000 American jobs across 35,000 U.S.-based marine businesses.<sup>1</sup> In the state of Washington, recreational boating drives almost \$7 Billion dollars toward the economy, supports over 22,000 jobs, and 1,433 marine related businesses.

NMMA and our members in Washington State have serious concerns with the Proposed Rule because it will create undue hardship on marine businesses and marine retailers, especially small business owners. Marine manufacturers are generally assemblers of articles that are installed in recreational boats and **should be included in the exemptions** provided within RCW 70A.350.030 5 (a) (vi). These exemptions already include: *motorized vehicles, including on and off-highway vehicles, such as all-terrain vehicles, motorcycles, side-by-side vehicles, farm equipment, and personal assistive mobility devices*. The US Environmental Protection Agency (USEPA) has already set a precedent in including marine vessels in its broad definition of "vehicles" in its recent ruling of phenol propylated phosphate 3:1 (PIP 3:1)<sup>2</sup>; we urge Ecology use the same logic here.

The recreational marine industry is very fragmented compared to other industries and is often comprised of many small businesses that assemble boats from a variety of purchased components. The same person that orders supplies may also oversee payroll, for example. An

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<sup>1</sup> <https://www.bea.gov/news/2022/outdoor-recreation-satellite-account-us-and-states-2021>.

<sup>2</sup> <https://www.federalregister.gov/documents/2022/03/08/2022-04945/regulation-of-persistent-bioaccumulative-and-toxic-chemicals-under-tsca-section-6h-phenol>.

extensive tracking system to fully account for all chemicals used throughout today's complex, international and multi-tiered supply chains is simply beyond the capabilities of these businesses.

Under the current draft of the Proposed Rule, boat builders are considered manufacturers because they manufacture, sell, and distribute a consumer product (a boat) that *may* contain a priority chemical in Washington State. If manufacturers at the start of the supply chain have not completed their reporting, then boat builders would need to disassemble every component that is listed as a priority product and send them out to a laboratory for third-party testing. For complex durable goods such as boats, there are literally thousands of components.

Once test results are available, the boat builder will then need to report on the amount of priority chemicals contained within each of those components. Since many boat builders simply select products to install in the boat, it is often the case that no two boats are the same in terms of the types of products selected for use. This further complicates the situation as every selected component that is on the priority list would need to be tested, tracked, and reported.

Although the Proposed Rule in Washington State is more specific to a limited list of priority products, it is important to highlight some of the challenges associated with tracking specific chemicals used within components across the marine supply chain. Boat builders may be able to acquire safety data sheets (SDS) data on some materials, but SDSs are not available for chemicals found within parts and components.

If there is SDS data, calculation of specific quantities and concentrations is not a simple task. To illustrate the challenge for our members, a common 20-foot open bow runabout or small fishing boat can have over a thousand stock keeping units (SKUs). Identifying the chemicals in the parts or components of larger boats with accessories required for galleys, heads, salons, and sleeping quarters is beyond comprehension. One boat manufacturer informed NMMA that its outboard powered 23-foot runabout has 1,013 distinct SKUs. A 35-foot cabin cruiser produced by the same manufacturer has 2,516 individual SKUs. Many of these accessories and components are often manufactured outside the U.S. Even if these boat builders could acquire this information, they would have to purchase special software and hire additional, dedicated staff to track, monitor, and report this information. This process is further complicated when there are no Chemical Abstract Service (CAS) numbers provided by the regulating agency to help companies identify the unique chemical(s) in question.

In addition to the complexities described above, marine vehicles serve and support many critical functions including those for government agencies, including the military; law enforcement, first responders, and public safety; food and agriculture, including commercial fishing and sea farming; energy; transportation and logistics, including for commuting and for island residents; public works and infrastructure support services; critical manufacturing; defense industrial base; and conservation.<sup>3</sup> Often, the health, safety, and the functioning of society depends on NMMA member products for which alternatives are not reasonably available. Burdensome regulations could impair our sector's ability to meet these needs.

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<sup>3</sup> Guidance on the Essential Critical Infrastructure Workforce: Ensuring Community and National Resilience in COVI-19 Response Version 2.0 (March 28, 2020).

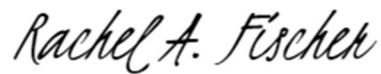
In conclusion, the diverse community of boat builders have unique challenges. Generally, the marine vessel supply chain is simultaneously global and many tiers deep, but predominantly comprised of small businesses with limited resources and capabilities for the emerging and numerous burdens of chemical regulations. These companies have unique challenges in obtaining chemical information across the numerous components used in recreational boats. We urge Ecology to include marine vehicles in the same category with the other motorized vehicles already afforded exemptions under the Proposed Rule. Lastly, marine vehicles serve important critical functions that should not be impaired by overly restrictive mandates.

Therefore, we respectfully ask that recreational marine finished goods, products, accessories, and articles be included in the exemptions within RCW 70A.350.030 5 (a) (vi). Please do not hesitate to reach out to NMMA for further information.

Sincerely,



Jeff R. Wasil  
Director - Environmental, Health, and Safety  
National Marine Manufacturers Association  
202-737-9762  
[jwasil@nmma.org](mailto:jwasil@nmma.org)



Rachel Fischer  
Western Policy and Engagement Manager  
National Marine Manufacturers Association  
(202) 737-9766  
[rfischer@nmma.org](mailto:rfischer@nmma.org)

# Alliance for Telomer Chemistry Stewardship

February 5, 2023

Ms. Irina Makarow  
Washington State Department of Ecology  
Hazardous Waste & Toxics Reduction Program  
300 Desmond Drive SE  
Lacey, WA 98503

Submitted via email: [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

RE: Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4

Dear Ms. Makarow:

The Alliance for Telomer Chemistry Stewardship (ATCS ) appreciates this opportunity to provide comments on the Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4 as it relates to per- and polyfluoroalkyl substances (PFAS). ATCS is a global organization that advocates on behalf of C6 fluorotelomer-based products. Our members are leading manufacturers of fluorotelomers in North America, Europe and Japan. Our mission is to promote the responsible production, use and management of fluorotelomers, while also advocating for a sound science- and risk-based approach to regulation.

We understand the important issues facing Washington regarding determining how to address levels of certain PFAS compounds in the State. Further, we appreciate the significant efforts the Departments of Ecology and Health have put into implementing the Safer Products for Washington program (SPW) and developing this draft rule. However, to ensure the success and viability of SPW, it is crucial that the Departments pursue a science- and fact-based approach to implementation. For products containing PFAS, this requires a thorough understanding of the broad family of PFAS compounds, assigning correct definitions, including their potential hazards and other characteristics as compared to available alternatives.

As drafted, however, the Preliminary Draft Language presents an inaccurate picture of the potential hazards associated with the PFAS-containing priority products addressed in the draft rule and it makes unsupported assumptions regarding the availability of suitable alternatives to replace those priority products. Because of this flawed analysis and inaccurate definitions, the recommendations in the draft rule are inappropriate and should be revised. Specifically, as discussed in more detail in the attached comments, the draft rule should be revised based on the science to recommend the restriction of long-chain PFAS, coupled with a notification requirement for the use of PFAS other than long chains in the Priority Products.

Outlined in the accompanying attachment are ATCS' specific comments on the draft language. We would welcome the opportunity to discuss these comments with you further.

Thank you for your consideration, and please let me know if we can provide any additional information or answer any questions regarding our comments.

Sincerely,

Shawn Swearingen  
Director, Alliance for Telomer Chemistry Stewardship

ATCS Comments on PFAS-Related Aspects of the Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4.

Per- and polyfluoroalkyl substances (PFAS), is a catch-all term that is used as a shorthand to refer to a widely diverse universe of chemistries, many of which are critical to making the products that power our lives – from cellphones and tablets, to alternative energy sources, to life-saving medical devices. However, all PFAS are not the same. Individual PFAS chemistries (and groups of similar PFAS chemistries) have their own unique properties and uses, as well as disparate environmental, health and safety profiles.

According to the U.S. Environmental Protection Agency, "approximately 600 PFAS are manufactured (including imported) and/or used in the United States." Among these 600 are substances in the solid (e.g., fluoropolymers), liquid (e.g., fluorotelomer alcohols) and gaseous (e.g., hydrofluorocarbon refrigerants) forms. Some of these substances are soluble in water and may be mobile in the environment, while others are not. Some are very large, stable molecules that are too large to be bioavailable, while others are comprised of relatively small molecules. These very distinct physical and chemical properties illustrate how varied PFAS substances are and why it is not appropriate to regulate all members of the category as if they were the same -- without examining the specific characteristics of the particular PFAS compounds (or categories of PFAS compounds) that are used in the priority product undergoing evaluation.

A scientific consensus is emerging that it is not appropriate or even possible to group all PFAS chemistries together for the purpose of regulation. Indeed, state and federal entities that have explored the possibilities of a class-based approach have recognized the significant challenges. For instance:

- ECOS, the Environmental Council of the States, which represents state and territorial environmental agency leaders, has acknowledged that, "Many regulators and subject-matter experts advise against grouping PFAS as an entire class."
- The Vermont Department of Environmental Conservation, which was specifically charged by the legislature to develop a class regulation or to explain why such a regulation wasn't possible said, "The Review Team spent over a year deliberating, researching, and discussing the potential to regulate PFAS as a Class. After reviewing the current peer-reviewed literature, as well as the available toxicology data for PFAS, the Review Team determined that at the current time it is not feasible to regulate PFAS as a Class."
- Federal scientists participating in a workshop convened last fall by the National Academies of

Science, Engineering and Medicine (NASEM) to review the federal PFAS research program acknowledged the broad diversity of properties within this group of substances, concluding that "PFAS substances thus present unique challenges for grouping into classes for risk assessment." US EPA's Roadmap also recognizes this distinction within the broad class of PFAS and reflects EPA's intent to regulate PFAS based on sub-categories of PFAS chemistries that share certain fundamental properties .

#### The Draft Rule Should Focus on the Specific PFAS Compounds Used in the Priority Products Under Consideration

While the underlying statute identifies PFAS as a chemical class and defines PFAS broadly, Ecology should focus its Phase 3 implementation efforts on the specific PFAS substances or subcategories that are actually used in the priority products being evaluated. Indeed, the statute itself recognizes that when a priority chemical is a "chemical class" rather than a single chemical substance, it is appropriate to examine individual members of the class when determining whether restriction is appropriate for a priority product. Thus, for example, RCW 70A § 1454(3) provides in relevant part that the "department may restrict or prohibit a priority chemical or members of a class of priority chemicals" if certain conditions are met (emphasis added). Accordingly, in evaluating whether restriction or some other regulatory determination is warranted for PFAS-containing priority products, the Department should focus its analysis on the specific PFAS chemicals or subcategories – i.e., the "members of the class" of PFAS chemicals -- that are actually used in those priority products.

With respect to textile and leather furnishings, the vast majority of PFAS treatments fall into a single sub-subcategory of PFAS chemicals, referred to as "side-chain" fluorinated polymers. In general, side-chain fluorinated polymers are characterized as being either "short chain" polymers or "long chain" polymers, depending on the number of carbon atoms in their side chains. In developing regulatory determinations for these priority products, Ecology should have examined the specific hazards associated with side-chain fluorinated polymers to assess whether the alternatives under consideration are, in fact, "safer" than side-chain fluorinated polymers. Similarly, the Department should have compared the efficacy of side chain polymers to the performance of potential alternatives to assess whether those alternatives perform suitably for their intended uses. Ecology's failure to analyze hazard and performance in this manner is a serious shortcoming that must be remedied in the final rule.

#### The Draft Rule Reflects a Flawed and Overly Simplistic Approach to Assessing Hazards

In evaluating the hazards of PFAS compounds compared to potential alternatives, Ecology relied almost exclusively on two tools: (i) pre-existing, available GreenScreen® assessments and (ii) third party lists of "safer" chemicals. Crucially, Ecology made no effort to ascertain what types of PFAS substances are used in the priority products being considered; nor did Ecology examine the available hazard data for the PFAS substances used in those priority products or comparable data on the proposed alternatives. As a consequence, Ecology's assessment does not accurately reflect the best available science nor does it present an accurate picture of the PFAS compounds that may be found in the priority products.

As discussed above, the PFAS compounds used in the manufacture of textile or leather furnishings belong to the category of side-chain fluorinated polymers. In the United States, Japan and Europe, all of the leading manufacturers of this category of compounds have transitioned to produce only



short-chain polymers (also referred to as "C6" polymers). Therefore, to the extent that PFAS chemicals are utilized in the manufacture of leather or textile furnishings in these regions of the world, the PFAS chemicals that are utilized are almost certainly "short chain" or "C6" side-chain polymer products. Products that fall within this category have been thoroughly reviewed by regulators prior to introduction into commerce, are subject to ongoing review and are supported by a robust body of rigorous scientific health and safety data.

Because side-chain polymers themselves are not bioavailable, health and safety assessments of these compounds have included review of hypothetical breakdown (degradation) products. As reflected in the published scientific literature, studies have found that one of the primary potential breakdown products of C6 side-chain polymers, perfluorohexanoic acid (PFHxA or C6 acid), does not cause cancer (NTP 2018; Klaunig et al. 2015; Loveless et al. 2009); does not disrupt endocrine activity (Borghoff et al. 2018); does not cause reproductive or developmental harm (Loveless et al. 2009; Iwai et al. 2019, Iwai and Hoberman 2014); does not build up in the human body and does not become concentrated in the bodies of living organisms (Chengelis et al. 2009b; Iwai and Hoberman 2014; Russell et al. 2013, 2015; Nilsson et al. 2010, 2013; Fujii et al. 2015; Guruge et al. 2016; Gannon et al. 2011, 2016). However, to our knowledge, these data were not reviewed by Ecology or addressed in the draft rule; nor did Ecology review comparable data on the proposed alternatives.

In addition to the robust body of data on PFHxA summarized above, a certified GreenScreen® assessment conducted by an independent Licensed GreenScreen® Profiler, is available for a representative short chain side-chain fluorinated polymer. The GreenScreen® assessment assigned a benchmark score of "2" to this short-chain polymer product. A copy of that GreenScreen® report is included with these comments as "Attachment A." Under the rubric utilized by Ecology for the SPW program, products with a GreenScreen® benchmark score of "2" satisfy the minimum criteria for being considered "safer." Thus, the subcategory of PFAS compounds actually used in treated textile and leather furnishings in the US (i.e., C6 side-chain polymers) satisfy the minimum criteria to be considered "safer" for purposes of the SPW program. This determination refutes the draft rule's conclusion that PFAS, as a class, do not meet the minimum criteria for safer.

As the foregoing discussion demonstrates, side-chain polymers are the subcategory of PFAS compounds that are used in the treatment of textile and leather furnishings. C6 side-chain polymers, in particular, are data rich; and those data support the conclusion that C6 side-chain polymer products used in leather and textile furnishings meet the minimum criteria to be considered "safer" for purposes of the SPW program.

#### The Draft Rule's Assessment of the "Feasibility" of Alternatives is Incomplete and Unreliable

The draft rule focuses almost entirely on the ease of cleaning and associated aesthetic value of the water and oil repellency imparted by "PFAS" (i.e., C6 side-chain) leather and textile treatments, but it ignores other benefits that are equally if not more important. These include: resistance to contamination by biological fluids, including those that may be vectors of disease, and increased durability – resulting in the generation of less waste and the consumption of fewer resources. In addition, Ecology failed to adequately address how different degrees of performance may be necessary, depending on specific conditions of use (e.g., heavily trafficked public spaces versus private indoor spaces).

The rule fails to assess, in an objective and measurable way, whether the proposed alternatives provide the same benefits and the same level of performance as C6 short-chain products under all relevant conditions of use. Instead, Ecology largely relies on advertising and promotional materials, and other subjective measures, to conclude that alternatives are "feasible and available."

However, empirical data indicate that at least for some applications (e.g., outdoor furnishings) available alternatives do not provide an adequate level of performance, as compared to C6 side chain polymers. For example, in comments recently submitted to the European Chemicals Agency (ECHA), the European Apparel and Textile Industry Confederation (EURATEX) reported on the results of testing conducted on potential alternatives to fluorinated treatment products. One research program being carried out by a consortium of textile and related organizations, called MIDWOR-LIFE, found that "alternative products achieved a water repellence matching the performance of conventional fluorinated products; however [their] performance against oil did not reach an acceptable level." As noted by EURATEX, pollution is one of several factors that contribute to the degradation of outdoor furnishings, and oil resistance is essential to providing protection against pollution.

EURATEX also reports on testing of potential alternatives to C6 side-chain polymers conducted by a French manufacturer of upholstery fabric for outdoor use. Testing of ten alternative formulations (from an initial suite of 22 potential alternatives) showed that while performance, other than oil resistance, was acceptable initially, overall performance rapidly declined to unacceptable levels following weathering. According to EURATEX, because of these unacceptable results, the manufacturer is currently investigating new formulations for testing.

As this example illustrates, assessing whether an alternative is "feasible" for a product requires more than an examination of the claims that are made for a commercial product or the successful marketing of a product that touts some of the broad benefits imparted by C6 side chain polymers. To ensure that a potential alternative is actually "feasible" – and that products with important functionalities are not removed from the market without a suitable alternative -- it is essential for Ecology to fully examine both the specific contexts within which treated-furnishings are used (e.g., heavily trafficked spaces; indoor spaces, such as nursing homes, with special health-related considerations; outdoor spaces vulnerable to air pollution, etc.) as well as the particular functionality provided by the C6 short chain product in each specific context. Then, as a second step, Ecology must examine objective data to assess whether, for each relevant use scenario, the potential alternative provides equivalent functionality as compared to the C6 side chain product. To the extent that Ecology does not currently possess all of the information needed to perform this analysis, the Department should utilize the authority provided in RCW 70A.350.040 to collect such information from manufacturers.

### The Draft Rule's Recommendations Should be Revised

In light of the deficiencies discussed above, the Recommendations in the draft rule are inappropriate and should be revised. In particular, the proposed restrictions are inappropriate for C6 side chain polymer products, since (i) those products satisfy the SPW minimum criteria for being "safer" and (ii) Ecology has failed to adequately assess whether, for leather and textile furnishings, alternative products or processes are suitable for all relevant use scenarios. Instead, for leather and textile furnishings, Ecology should consider the following recommendations:

- Utilizing the authority provided in RCW 70A.350.040 to collect the information needed to conduct a thorough assessment of the feasibility of alternatives to C6 side-chain polymer products.
- Adopting a notification requirement for leather and textile furnishings manufactured using C6 side-chain polymers, so that purchasers can choose alternative products if they do not require the

functionality provided by C6 side-chain polymer products.

- Imposing restrictions on leather and textile furnishings manufactured using long-chain PFAS compounds, which have not been shown to meet the SPW minimum criteria for safer.



February 5, 2023

Ms. Irina Makarow  
Washington State Department of Ecology  
Hazardous Waste & Toxics Reduction Program  
300 Desmond Drive SE  
Lacey, WA 98503

*Submitted via email:* [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

RE: Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4

Dear Ms. Makarow:

The Alliance for Telomer Chemistry Stewardship (ATCS<sup>1</sup>) appreciates this opportunity to provide comments on the Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4 as it relates to per- and polyfluoroalkyl substances (PFAS). ATCS is a global organization that advocates on behalf of C6 fluorotelomer-based products. Our members are leading manufacturers of fluorotelomers in North America, Europe and Japan. Our mission is to promote the responsible production, use and management of fluorotelomers, while also advocating for a sound science- and risk-based approach to regulation.

We understand the important issues facing Washington regarding determining how to address levels of certain PFAS compounds in the State. Further, we appreciate the significant efforts the Departments of Ecology and Health have put into implementing the Safer Products for Washington program (SPW) and developing this draft rule. However, to ensure the success and viability of SPW, it is crucial that the Departments pursue a science- and fact-based approach to implementation. For products containing PFAS, this requires a thorough understanding of the broad family of PFAS compounds, assigning correct definitions, including their potential hazards and other characteristics as compared to available alternatives.

As drafted, however, the Preliminary Draft Language presents an inaccurate picture of the potential hazards associated with the PFAS-containing priority products addressed in the draft rule and it makes unsupported assumptions regarding the availability of suitable alternatives to replace those priority products. Because of this flawed analysis and inaccurate definitions, the recommendations in the draft rule are inappropriate and should be revised. Specifically, as discussed in more detail in the attached comments, the draft rule should be revised based on the science to recommend the restriction of long-chain PFAS, coupled with a notification requirement for the use of PFAS other than long chains in the Priority Products.

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<sup>1</sup> AGC Chemicals Americas, Daikin American Incorporated, Dynax Corporation and Johnson Controls (JCI)

Outlined in the accompanying attachment are ATCS' specific comments on the draft language. We would welcome the opportunity to discuss these comments with you further.

Thank you for your consideration, and please let me know if we can provide any additional information or answer any questions regarding our comments.

Sincerely,

Shawn Swearingen  
Director, Alliance for Telomer Chemistry Stewardship

## **ATCS Comments on PFAS-Related Aspects of the Preliminary Draft Rule Language: Safer Products for Washington Implementation Phase 4.**

Per- and polyfluoroalkyl substances (PFAS), is a catch-all term that is used as a shorthand to refer to a widely diverse universe of chemistries, many of which are critical to making the products that power our lives – from cellphones and tablets, to alternative energy sources, to life-saving medical devices. However, all PFAS are not the same. Individual PFAS chemistries (and groups of similar PFAS chemistries) have their own unique properties and uses, as well as disparate environmental, health and safety profiles.

According to the U.S. Environmental Protection Agency, “approximately 600 PFAS are manufactured (including imported) and/or used in the United States.” Among these 600 are substances in the solid (e.g., fluoropolymers), liquid (e.g., fluorotelomer alcohols) and gaseous (e.g., hydrofluorocarbon refrigerants) forms. Some of these substances are soluble in water and may be mobile in the environment, while others are not. Some are very large, stable molecules that are too large to be bioavailable, while others are comprised of relatively small molecules. These very distinct physical and chemical properties illustrate how varied PFAS substances are and why it is not appropriate to regulate all members of the category as if they were the same -- without examining the specific characteristics of the particular PFAS compounds (or categories of PFAS compounds) that are used in the priority product undergoing evaluation.

A scientific consensus is emerging that it is not appropriate or even possible to group all PFAS chemistries together for the purpose of regulation. Indeed, state and federal entities that have explored the possibilities of a class-based approach have recognized the significant challenges. For instance:

- ECOS, the Environmental Council of the States, which represents state and territorial environmental agency leaders, has acknowledged that, “Many regulators and subject-matter experts advise against grouping PFAS as an entire class.”<sup>2</sup>
- The Vermont Department of Environmental Conservation<sup>3</sup>, which was specifically charged by the legislature to develop a class regulation or to explain why such a regulation wasn’t possible said, “The Review Team spent over a year deliberating, researching, and discussing the potential to regulate PFAS as a Class. After reviewing the current peer-reviewed literature, as well as the available toxicology data for PFAS, the Review Team determined that at the current time it is not feasible to regulate PFAS as a Class.”
- Federal scientists participating in a workshop convened last fall by the National Academies of Science, Engineering and Medicine (NASEM) to review the federal PFAS research program acknowledged the broad diversity of properties within this group of substances, concluding that<sup>4</sup> “PFAS substances thus present unique challenges for grouping into classes for risk assessment.” US EPA’s Roadmap also recognizes this distinction within the broad class of PFAS and reflects

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<sup>2</sup> ECOS. Processes & Considerations for Setting State PFAS Standards (February 2020).

<sup>3</sup> <https://dec.vermont.gov/sites/dec/files/PFAS/20180814-PFAS-as-a-Class.pdf>

<sup>4</sup> NASEM. Workshop on Federal Government Human Health PFAS Research, October 26-27. Board on Environmental Studies and Toxicology (2020). <https://www.nap.edu/read/26054/chapter/1>

EPA's intent to regulate PFAS based on sub-categories of PFAS chemistries that share certain fundamental properties<sup>5</sup>.

### **The Draft Rule Should Focus on the Specific PFAS Compounds Used in the Priority Products Under Consideration**

While the underlying statute identifies PFAS as a chemical class and defines PFAS broadly, Ecology should focus its Phase 3 implementation efforts on the specific PFAS substances or subcategories that are actually used in the priority products being evaluated. Indeed, the statute itself recognizes that when a priority chemical is a “chemical class” rather than a single chemical substance, it is appropriate to examine individual **members** of the class when determining whether restriction is appropriate for a priority product. Thus, for example, RCW 70A § 1454(3) provides in relevant part that the “department may restrict or prohibit a priority chemical or **members of a class** of priority chemicals” if certain conditions are met (emphasis added). Accordingly, in evaluating whether restriction or some other regulatory determination is warranted for PFAS-containing priority products, the Department should focus its analysis on the specific PFAS chemicals or subcategories – i.e., the “members of the class” of PFAS chemicals -- that are actually used in those priority products.

With respect to textile and leather furnishings, the vast majority of PFAS treatments fall into a single sub-subcategory of PFAS chemicals, referred to as “side-chain” fluorinated polymers.<sup>6</sup> In general, side-chain fluorinated polymers are characterized as being either “short chain” polymers or “long chain” polymers, depending on the number of carbon atoms in their side chains. In developing regulatory determinations for these priority products, Ecology should have examined the specific hazards associated with side-chain fluorinated polymers to assess whether the alternatives under consideration are, in fact, “safer” than side-chain fluorinated polymers. Similarly, the Department should have compared the efficacy of side chain polymers to the performance of potential alternatives to assess whether those alternatives perform suitably for their intended uses. Ecology's failure to analyze hazard and performance in this manner is a serious shortcoming that must be remedied in the final rule.

### **The Draft Rule Reflects a Flawed and Overly Simplistic Approach to Assessing Hazards**

In evaluating the hazards of PFAS compounds compared to potential alternatives, Ecology relied almost exclusively on two tools: (i) pre-existing, available GreenScreen® assessments and (ii) third party lists of “safer” chemicals. Crucially, Ecology made no effort to ascertain what types of PFAS substances are used in the priority products being considered; nor did Ecology examine the available hazard data for the PFAS substances used in those priority products or comparable data on the proposed alternatives. As a consequence, Ecology's assessment does not accurately reflect the best available science nor does it present an accurate picture of the PFAS compounds that may be found in the priority products.

As discussed above, the PFAS compounds used in the manufacture of textile or leather furnishings belong to the category of side-chain fluorinated polymers. In the United States, Japan and Europe, all of the leading manufacturers of this category of compounds have transitioned to produce only **short-chain**

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<sup>5</sup> Goodrum PE et al. Application of a framework for grouping and mixtures toxicity assessment of PFAS: a closer examination of dose additivity approaches. *Toxicol Sci*: 1-19 (2020). <https://doi.org/10.1093/toxsci/kfaa123>

<sup>6</sup> We understand that PFAS compounds are no longer used to treat carpets and rugs manufactured in the US. (Personal communication with the Carpet and Rug Institute.) Accordingly, our comments focus primarily on leather and textile furniture and furnishings.

polymers (also referred to as “C6” polymers). Therefore, to the extent that PFAS chemicals are utilized in the manufacture of leather or textile furnishings in these regions of the world, the PFAS chemicals that are utilized are almost certainly “short chain” or “C6” side-chain polymer products.<sup>7</sup> Products that fall within this category have been thoroughly reviewed by regulators prior to introduction into commerce, are subject to ongoing review and are supported by a robust body of rigorous scientific health and safety data.

Because side-chain polymers themselves are not bioavailable, health and safety assessments of these compounds have included review of hypothetical breakdown (degradation) products. As reflected in the published scientific literature, studies have found that one of the primary potential breakdown products of C6 side-chain polymers, perfluorohexanoic acid (PFHxA or C6 acid), does not cause cancer (NTP 2018; Klaunig et al. 2015; Loveless et al. 2009); does not disrupt endocrine activity (Borghoff et al. 2018); does not cause reproductive or developmental harm (Loveless et al. 2009; Iwai et al. 2019, Iwai and Hoberman 2014); does not build up in the human body and does not become concentrated in the bodies of living organisms (Chengelis et al. 2009b; Iwai and Hoberman 2014; Russell et al. 2013, 2015; Nilsson et al. 2010, 2013; Fujii et al. 2015; Guruge et al. 2016; Gannon et al. 2011, 2016). However, to our knowledge, these data were not reviewed by Ecology or addressed in the draft rule; nor did Ecology review comparable data on the proposed alternatives.<sup>8</sup>

In addition to the robust body of data on PFHxA summarized above, a certified GreenScreen® assessment conducted by an independent Licensed GreenScreen® Profiler, is available for a representative short chain side-chain fluorinated polymer. The GreenScreen® assessment assigned a benchmark score of “2” to this short-chain polymer product.<sup>9</sup> A copy of that GreenScreen® report is included with these comments as “Attachment A.” Under the rubric utilized by Ecology for the SPW program, products with a GreenScreen® benchmark score of “2” satisfy the minimum criteria for being considered “safer.” Thus, the subcategory of PFAS compounds *actually used* in treated textile and leather furnishings in the US (i.e., C6 side-chain polymers) satisfy the minimum criteria to be considered “safer” for purposes of the SPW program.<sup>10</sup> This determination refutes the draft rule’s conclusion that PFAS, as a class, do not meet the minimum criteria for safer.

As the foregoing discussion demonstrates, side-chain polymers are the subcategory of PFAS compounds that are used in the treatment of textile and leather furnishings. C6 side-chain polymers, in particular, are data rich; and those data support the conclusion that C6 side-chain polymer products used in leather and textile furnishings meet the minimum criteria to be considered “safer” for purposes of the SPW program.

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<sup>7</sup> By contrast, priority products that originate from other regions of the world might incorporate “long chain” fluorinated polymers, including polymers that may degrade to perfluorooctanoic acid (PFOA) or perfluorooctanesulfonic acid (PFOS).

<sup>8</sup> By comparison, the hazard data for long-chain breakdown products, such as PFOA, are less favorable. For example, studies indicate that PFOA bioaccumulates and there is “suggestive evidence of carcinogenic potential.” See, USEPA, Health Effects Support Document for Perfluorooctanoic Acid (PFOA) (May 2016).

<sup>9</sup> Although the specific short-chain product evaluated in the GreenScreen assessment is not intended for use in treating textile or leather furnishings, the compound that was evaluated is typical of C6 side-chain compounds, including those that are used as leather or textile treatments.

<sup>10</sup> See Draft Report at 237.



## The Draft Rule's Assessment of the "Feasibility" of Alternatives is Incomplete and Unreliable

The draft rule focuses almost entirely on the ease of cleaning and associated aesthetic value of the water and oil repellency imparted by "PFAS" (i.e., C6 side-chain) leather and textile treatments, but it ignores other benefits that are equally if not more important. These include: resistance to contamination by biological fluids, including those that may be vectors of disease, and increased durability – resulting in the generation of less waste and the consumption of fewer resources. In addition, Ecology failed to adequately address how different degrees of performance may be necessary, depending on specific conditions of use (e.g., heavily trafficked public spaces versus private indoor spaces).

The rule fails to assess, in an objective and measurable way, whether the proposed alternatives provide the same benefits and the same level of performance as C6 short-chain products under all relevant conditions of use. Instead, Ecology largely relies on advertising and promotional materials, and other subjective measures, to conclude that alternatives are "feasible and available."

However, empirical data indicate that at least for some applications (e.g., outdoor furnishings) available alternatives do not provide an adequate level of performance, as compared to C6 side chain polymers. For example, in comments recently submitted to the European Chemicals Agency (ECHA), the European Apparel and Textile Industry Confederation (EURATEX) reported on the results of testing conducted on potential alternatives to fluorinated treatment products. One research program being carried out by a consortium of textile and related organizations, called MIDWORLD, found that "alternative products achieved a water repellence matching the performance of conventional fluorinated products; however [their] performance against oil did not reach an acceptable level."<sup>11</sup> As noted by EURATEX, pollution is one of several factors that contribute to the degradation of outdoor furnishings, and oil resistance is essential to providing protection against pollution.<sup>12</sup>

EURATEX also reports on testing of potential alternatives to C6 side-chain polymers conducted by a French manufacturer of upholstery fabric for outdoor use.<sup>13</sup> Testing of ten alternative formulations (from an initial suite of 22 potential alternatives) showed that while performance, other than oil resistance, was acceptable initially, overall performance rapidly declined to unacceptable levels following weathering.<sup>14</sup> According to EURATEX, because of these unacceptable results, the manufacturer is currently investigating new formulations for testing.

As this example illustrates, assessing whether an alternative is "feasible" for a product requires more than an examination of the claims that are made for a commercial product or the successful marketing of a product that touts some of the broad benefits imparted by C6 side chain polymers. To ensure that a potential alternative is actually "feasible" – and that products with important functionalities are not removed from the market without a suitable alternative -- it is essential for

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<sup>11</sup> See EURATEX contribution to the SEAC public consultation: Comments on SEAC Draft Opinion on the proposed restriction for PFHxA, its salts and related substances (September 2021) at page 8, accessible through the following url: <https://echa.europa.eu/registry-of-restriction-intentions/-/dislist/details/0b0236e18323a25d> under the heading "ORCOM part 2."

<sup>12</sup> *Id.*

<sup>13</sup> *Id.* at p 9.

<sup>14</sup> *Id.*

Ecology to fully examine both the specific contexts within which treated-furnishings are used (e.g., heavily trafficked spaces; indoor spaces, such as nursing homes, with special health-related considerations; outdoor spaces vulnerable to air pollution, etc.) as well as the particular functionality provided by the C6 short chain product in each specific context. Then, as a second step, Ecology must examine objective data to assess whether, for each relevant use scenario, the potential alternative provides equivalent functionality as compared to the C6 side chain product. To the extent that Ecology does not currently possess all of the information needed to perform this analysis, the Department should utilize the authority provided in RCW 70A.350.040 to collect such information from manufacturers.

### **The Draft Rule's Recommendations Should be Revised**

In light of the deficiencies discussed above, the Recommendations in the draft rule are inappropriate and should be revised. In particular, the proposed restrictions are inappropriate for C6 side chain polymer products, since (i) those products satisfy the SPW minimum criteria for being “safer” and (ii) Ecology has failed to adequately assess whether, for leather and textile furnishings, alternative products or processes are suitable for all relevant use scenarios. Instead, for leather and textile furnishings, Ecology should consider the following recommendations:

- Utilizing the authority provided in RCW 70A.350.040 to collect the information needed to conduct a thorough assessment of the feasibility of alternatives to C6 side-chain polymer products.
- Adopting a notification requirement for leather and textile furnishings manufactured using C6 side-chain polymers, so that purchasers can choose alternative products if they do not require the functionality provided by C6 side-chain polymer products.
- Imposing restrictions on leather and textile furnishings manufactured using long-chain PFAS compounds, which have not been shown to meet the SPW minimum criteria for safer.

# Consumer Technology Association

Comments uploaded to file

February 5, 2023

Washington Department of Ecology  
Hazardous Waste and Toxics Reduction Program  
P.O. Box 47600  
Olympia, WA 98504-7600

Re: CTA Comments on Proposed Rule Making Chapter 173-337 WAC – Safer Products Restrictions and Reporting

To the Washington Department of Ecology and the Safer Products for Washington Program:

On behalf of the Consumer Technology Association (CTA), we respectfully submit these comments on the [Rulemaking Proposal for Chapter 173-337 WAC – Safer Products Restrictions and Reporting](#) (Proposed Rule). We appreciate the opportunity to submit these comments and Ecology's engagement with stakeholders throughout this multiyear process.

CTA is North America's largest technology trade association. Our members are the world's leading innovators – from startups to global brands – helping support more than 18 million American jobs. Our member companies have long been recognized for their commitment and leadership in innovation and sustainability, often taking measures to exceed regulatory requirements on environmental design and product stewardship.

Our comments are organized in order based on sections within the Proposed Rule:

**WAC 173-337-015 Applicability**

We appreciate that the Proposed Rule does not apply to priority consumer product repair and replacement parts manufactured before the effective date of the restriction. However, we also believe that replacement parts which are manufactured *after* the effective date but intended for use in products which were manufactured prior to the effective date may still need to contain restricted substances. This would allow for the continued service and repair of older finished goods without having to generate unnecessary waste.

In order to minimize the generation of unnecessary waste, companies should be able to continue selling spare parts to service products that were manufactured prior to the effective date. Ecology should incorporate the “repair as produced” principle that is reflected in EU RoHS. EU RoHS exempts cables or spare parts for the repair, reuse, and updating of

products placed on the market before the phase-out date of the restriction.<sup>1</sup> To apply this principle, CTA suggests the following alternate language for WAC 173-337-015(d) and (e):

*(d) Repair and replacement parts to service priority consumer products that were placed on the market prior to the effective date of the restriction.*

*(e) Refurbished priority consumer products where the priority consumer products were first placed on the market prior to the effective date of the restriction.*

### **WAC 173-337-020 Requesting an Exemption**

We appreciate the creation of an exemption process within this Proposed Rule. This allows needed flexibility given the wide-ranging restrictions proposed in the regulation.

Section 173-337-020(5) states that a person who submits a request for exemption must comply with the requirements of the rule until Ecology approves the exemption request. The Proposed Rule creates a situation where a company who submits a request would have to stop all distribution of their product(s) until any exemption is approved. This could result in significant supply chain disruptions. We respectfully request that the Proposed Rule default to allowing the company requesting an exemption to continue selling the covered product until Ecology makes a final decision regarding a request for exemption. We also ask that the Proposed Rule provide a specific time in which the Department must issue a decision on an exemption request. We recommend replacing WAC 173-337-020(5) with the following:

*(5) If a person submits a request a request for exemption to Ecology, the effectiveness of this rule as applicable to that person shall be stayed until Ecology approves or denies their request.*

### **WAC 173-337-025 Acronyms and Definitions**

**Electronic displays.** We thank Ecology for including a definition for “electronic displays” since this device category is treated differently in the Proposed Rule from other electronic product categories. The initial definition used in 173-337-025 is similar to the definition used in other jurisdictions regulating flame retardants in electronic displays, but it is not fully aligned with the definitions used in New York and the European Union. For clarity, we ask that the definitions be aligned exactly. We propose the following definition used in New York:<sup>2</sup>

*“Electronic display” means a 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. Electronic display shall 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*

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<sup>1</sup> EU RoHS Article 4 Annex II <https://echa.europa.eu/restricted-subs-referred-art-4-rohs> and [EC RoHS FAQ](#) including repair parts “Following the principle of ‘repair as produced,’ spare parts for the specific products already on the market before the dates mentioned above are exempted.”

<sup>2</sup> New York Regulation of Chemicals in Upholstered Furniture, Mattresses, and Electronic Enclosures: <https://www.nysenate.gov/legislation/laws/ENV/37-1001>

*with appliances and are not available for purchase as separate products by end-users.*

**External enclosures.** CTA recommends the following definition for external enclosures which reflects that enclosures can be composed of multiple parts (pluralizing parts) and that enclosures should be defined around finished products:

*“External enclosures” means the plastic external **parts** of the **finished** product that renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock or retards propagation of flame initiated by electrical disturbances occurring within.*

**Flame retardants.** During Ecology’s information session on January 18<sup>th</sup>, staff said verbally that organohalogen flame retardants do not include PFAS chemicals for the purposes of this rulemaking. If Ecology does indeed wish to distinguish PFAS and organohalogen flame retardants for this rulemaking, then we suggest including the statement that “flame retardants do not include PFAS” in the definition and remove WAC 173-337-112(1)(c)(ii)(C) and 112(2)(c)(i)(C).

**Inaccessible electronic component.** To provide additional clarity, we would like to propose that the term “consumer” be included as part of this definition. The proposed definition also includes access during any reasonably foreseeable use or abuse of the product. Reasonably foreseeable use is designed into the product, but the extent of abuse is not reasonably foreseeable as it is driven by the intent of the user. Hence, we recommend removing “abuse” from the definition. Given these concerns, we recommend the following definition:

*“Inaccessible electronic component” means a part or component of an electronic product that is located inside and entirely enclosed within another material and is not capable of coming out of the product or being accessed during any reasonably foreseeable consumer use of the product.*

**Intended for indoor/outdoor use.** The definitions for these terms potentially conflict. While the definition of “indoor” says a product “designed primarily for use or storage inside buildings,” the definition for “outdoor” specifies a product designed to maintain functionality after extended exposure to outdoor elements. It is possible for a product to meet both definitions. There is a critical need for clear, specific definitions for these two product categories. If a product falls within both categories, it could result in a situation where a manufacturer must meet both the reporting and prohibition requirements. Manufacturers should not have to comply with both parts of the regulation because some products can fit both definitions. We respectfully ask that Ecology make these definitions clearer and eliminate potential situations where a product could meet both definitions. If the definition of “outdoor” includes exposure to UV light, water, or immersion for an extended time, we ask that “extended time” be clearly defined. We recommend that the definition of “indoor” be altered to say “intended **only** for use or storage inside buildings.”

**Intentionally added chemical.** The Proposed Rule defines “intentionally added chemical” as “a chemical that serves its intended function in the final product **or in the manufacturing of** the product or part of the product.” This definition is far too broad. The inclusion of chemicals which serve an intended function during the manufacturing process goes beyond the common definition for an intentionally added chemical. Typically, this definition would only include chemicals which have an intended function for the finished product.<sup>3</sup> We ask that Ecology align Washington with other states who do not include chemicals used solely to serve a function in the manufacturing process. We respectfully suggest adopting the following definition:

*“Intentionally added chemical” means a chemical that is deliberately used in the manufacture of a product or product component where the continued presence is desired in the final product to serve its intended function.*

#### **WAC 173-337-055 Previously Owned Priority Consumer Products**

We thank Ecology for exempting the resale of previously-owned products which were manufactured prior to the effective date of the restrictions in this Proposed Rule. This will allow increased reuse of products and supports a circular economy. However, we ask that the prohibition on selling previously owned priority consumer products not apply to all repair parts or replacement parts for products manufactured before the effective date. In addition to supporting a circular economy, this will avoid the unintentional application of this chapter to individual citizens. We refer you to our comments above on WAC 173-337-015 “Applicability” for similar comments on the need for exempting all replacement parts regardless of manufacture date which are used to repair products manufactured prior to the effective date.

#### **WAC 137-337-112 Flame Retardants**

**Inaccessible components and parts 112(1)(a)(iii).** We recommend a few small changes to the language in this section for clarity:

- (iii) This subsection does not apply to the following parts of the priority consumer products described in (a) of this subsection*
- (A) Inaccessible electronic component **or parts**, such as printed circuit boards and internal fans.*
- (B) Internal parts that **may be** ~~are~~ removable and replaceable, but not accessible once the product is **in use** in its fully assembled and functional form.*

The addition of “in use” is to clarify that internal parts which extend the life of products such as maintenance or upgrade parts, consumables, or replacement batteries are considered

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<sup>3</sup> For examples for how “intentionally added chemical” is defined in other states, below are links to a range of other state definitions. None of these definitions is as broad as the one in the Proposed Rule.

California: <https://www.law.cornell.edu/regulations/california/22-CCR-69501.1>

Vermont: <https://legislature.vermont.gov/Documents/2022/Docs/CALENDAR/hc210430.pdf>

Rhode Island: <http://webserver.rilin.state.ri.us/BillText/BillText20/HouseText20/H7834.pdf>

Maine: <https://www.mainelegislature.org/legis/statutes/32/title32ch26-B.pdf>

inaccessible. The addition of “or parts” is to reflect that inaccessible parts may refer to the interior of plastic external enclosures that are not accessible during the use of the product.

**Minimum weight.** Section 173-337-112(1)(a)(iii)(C) limits the product scope to plastic external enclosure parts that weigh 0.5g or more. We request that this minimum weight instead be 25g to reflect the minimum weight in 4.1.4.1 of IEEE Standard 1680.1-2018. This is also the minimum weight in the EPEAT Computers and Displays Category. Given that the Proposed Rule is applicable to an incredibly wide range of electronic products, we believe it best to adopt a minimum weight in line with these industry thresholds.

**WAC 173-337-112(1)(b) Compliance schedule.** We respectfully ask that Ecology alter 112(1)(b) to take effect on June 1, 2027 for all products instead of 2026 for some businesses. For manufacturers to transition to the proposed alternatives, any regulation should establish a compliance timeframe of at least 48 months after the effective date of final rule adoption. There is precedent for a 48-month compliance timeframe under both the RoHS 2 and REACH regulations. For an in-depth discussion for why 48 months is necessary, we incorporate CTA’s comments to Ecology from January 2022, comments to Ecology from August 2022, and CTA’s comments submitted to EPA in 2021.<sup>4</sup>

**WAC 173-337-112(2)(b) Compliance schedule.** For Section 112(2)(b) regarding plastic external enclosures for electronic products for outdoor use, the Proposed Rule says that the reporting takes effect January 1, 2024. However, WAC 173-337-060 says that reporting must be submitted January 31<sup>st</sup> of the year *after* the effective date. It is our understanding that this means notification must first be made for this section by January 31, 2025. If this is not the case, we ask that Ecology make the reporting timelines clearer.

**Applicability for displays.** WAC 173-337-112(1)(b)(ii)-(iv) treats displays with all-in-one video systems, certain displays integrated with appliances, projectors and virtual reality headsets differently than other displays and on a different timeline than other displays. We believe this was specific language was meant to align with regulations in the EU and New York State. However, New York also exempts displays with a screen area smaller than or equal to one hundred square centimeters from their law. We ask that Ecology include this size limitation within this category.<sup>5</sup> We also discuss this in the suggested definition for “electronic display” above.

**WAC 173-337-112(1)(c) Restriction and presumptions regarding total chemical concentrations.** The Proposed Rule states a presumption that the presence of certain

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<sup>4</sup> CTA comments to Ecology January 2022: [https://scs-public.s3-us-gov-west-1.amazonaws.com/env\\_production/oid100/did200002/pid\\_202268/assets/merged/li03ii2\\_document.pdf?v=953QVP6SW](https://scs-public.s3-us-gov-west-1.amazonaws.com/env_production/oid100/did200002/pid_202268/assets/merged/li03ii2_document.pdf?v=953QVP6SW)

CTA, IPC, and ITI comments to EPA on TSCA regulations: <https://www.regulations.gov/comment/EPA-HQ-OPPT-2021-0202-0148>

<sup>5</sup> New York Regulation of Chemicals in Upholstered Furniture, Mattresses, and Electronic Enclosures: <https://www.nysenate.gov/legislation/laws/ENV/37-1001>



halogens indicates that they are used as organohalogen flame retardants. Using analytical methods for determining the total bromine or other elements would not differentiate the use of halogens as organohalogen flame retardants versus some other use. For example, if a product used fluorinated coatings, the total fluorine test would identify the use of fluorine and this would lead to an inaccurate assumption that it is from an organohalogen flame retardant.

In addition, Ecology has acknowledged that some flame retardants which could replace organohalogen flame retardants may require the use of an anti-drip agent that may contain fluorine. Thus, it would be improper to presume that the presence of total fluorine above a threshold amount indicates the presence of organohalogen flame retardants. We request that Ecology delete proposed WAC 173-337-112(1)(c)(ii)(C) and (2)(c)(i)(C).

**De minimis concentrations.** We request adequate de minimis concentrations be established for the restriction. While intentionally-added flame retardants are within scope of the regulation with a limit of 1000 ppm (0.1% by weight), these intentional additions have included impurities, byproducts, and recycled materials not being regulated. The electronics industry needs appropriate thresholds to properly manage chemicals of concern across the supply chain. We request Ecology set the threshold to 1000 ppm (or 0.1% by weight) which is the same level set for brominated flame retardants PBB and PBDE by the EU RoHS Directive.

**Homogeneous material.** As we discuss above, we oppose the use of the total concentrations presumptions outlined in WAC 173-337-112. However, if Ecology does continue with this presumption in their Rule, we encourage the Department to include the definition and term “homogeneous material” to better align with existing EU law. Under the current Proposed Rule, it could be interpreted that the 1,000 ppm concentration applies to the entire complex article. We recommend that Ecology instead align with EU RoHS which restricts “concentration value by weight in homogeneous materials.”<sup>6</sup> Therefore, if Ecology is going to use this presumption, we propose the following for WAC 173-337-112(1)(c)(ii)(A)-(C):

*(ii) Ecology presumes the detection of:*

*(A) Total bromine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants **within homogeneous material**.*

*(B) Total chlorine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants **within homogeneous material**.*

*(C) Total fluorine concentrations above 1,000 ppm with less than 5,000 ppm total phosphorus indicate intentionally added organohalogen flame retardants **within homogeneous material**.*

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<sup>6</sup> Directive 2011/65/EU on RoHS Article 4(2) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02011L0065-20221001>

And we propose the following for WAC 173-337-112(2)(c)(i)(A)-(C):

(A) Total bromine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants *within homogeneous material*.

(B) Total chlorine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants *within homogeneous material*.

(C) Total fluorine concentrations above 1,000 ppm with less than 5,000 ppm total phosphorus indicate intentionally added organohalogen flame retardants *within homogeneous material*.

Finally, we recommend the following definition for “homogeneous material” that comes from 2011/65/EU RoHS Directive:<sup>7</sup>

*“Homogeneous Material” means one material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes.”*

### **Additional Comments on Proposed Rule**

**Recycled plastic.** The Proposed Rule does not provide any reference to the use of recycled plastic in manufacturing covered products. It is possible that recycled older electronics would contain restricted substances in some amount and could end up in recycled plastic used to make new devices. We think it important to encourage recycling by exempting articles which are made from recycled plastic, so long as no new prohibited chemicals are added during the recycling or production process. EPA has issued rules with similar language under TSCA containing exemptions for products and articles from recycled plastic.<sup>8</sup> The restriction on using recycled materials disrupts manufacturers’ efforts for a circular economy.

**Ecology should provide CAS Registry Numbers for all proposed restrictions.** It is essential that the Department of Ecology provide CAS RNs on any chemical it restricts in consumer products. It should provide a full list of all flame retardants it is restricting in covered plastic electronic enclosures. As manufacturers communicate across the supply chain, referring to these identification numbers is the most effective way to accurately ensure compliance. If companies are to change their products to comply with any chemical regulation in a timely manner, the Department providing CAS RNs would make it significantly easier and more efficient to accomplish.

**Research and development.** Any restriction on electronics enclosures should include an exemption for research and development purposes. Manufacturers need the freedom to innovate, particularly in the constantly evolving technology and electronics sector. Without the ability to conduct research and development of products and articles within the United

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<sup>7</sup> Directive 2011/65/EU on RoHS Article 3(20) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02011L0065-20221001>

<sup>8</sup> EPA’s rules for [DecaBDE](#) and [PIP \(3:1\)](#) in 2021 provide exemptions for articles and products made from recycled chemical-containing plastic provided no new amounts of that chemical is added during the recycling process or added to the articles and products made from the recycled plastic.

States, it would be very difficult for manufacturers to meet the advanced technical performance specifications of their products. Responsible chemicals management programs should be permitted and encouraged. Commercial manufacture, import, and distribution of electronic external device enclosures including organohalogen flame retardants for R&D purposes such as prototypes should be exempted from restriction. At minimum, the following should be excluded: (1) when a limited number of articles are used for research and development activities in the state, and (2) when products are responsibly recovered after use in research and development activities.

**PFAS.** The Proposed Rule includes PFAS as a priority chemical class, and while electronic products are not included as priority products, we would like to comment briefly given the possible precedential nature of including this priority chemical class. The definition of PFAS proposed would encompass thousands of chemical compounds which is far too broad a scope. Instead, it should focus on narrower subclasses of PFAS. We are also concerned with the conclusion that a detection of total fluorine equates to the intentional addition of PFAS. Fluorine may be present in products for reasons other than PFAS. Finally, the lack of CAS RNs provided by the Department will create concerns like we mention above with flame retardants.

**Bisphenols and thermal paper.** We respectfully ask that FDA-regulated medical devices be exempt from the restriction on bisphenols and thermal paper. We also ask that Ecology regulate “intentionally added” bisphenols and remove the 200 ppm threshold. Bisphenols may be present as impurities or contaminants. The proposed rule already exempts FDA-regulated medical devices in the sections regarding flame retardants. Alternatively, we ask that manufacturers be given at least five-year phase-in time for this restriction to allow manufacturers time to identify feasible alternatives.

### **Conclusion**

Thank you again for the opportunity to provide these comments on the Rulemaking Proposal for the Safer Products Restrictions and Reporting. If you have any questions about our comments, please do not hesitate to contact me at [dmoyer@cta.tech](mailto:dmoyer@cta.tech).

Sincerely,

Dan Moyer  
Sr. Manager, Environmental Law & Policy  
Consumer Technology Association



201 S. Jackson Street, Suite 5600, Seattle, WA 98104  
[www.kingcountyhazwastewa.gov](http://www.kingcountyhazwastewa.gov)

January 24, 2023

Stacey Callaway  
Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Support for Draft Rule – Chapter 173-337 WAC

Dear Ms. Callaway:

The Hazardous Waste Management Program (Haz Waste Program) would like to thank the Washington State Department of Ecology (Ecology) for the opportunity to comment on Ecology's Draft Rule, Chapter 173-337 WAC, Safer Products Restrictions and Reporting.

The Haz Waste Program is a coalition of local governments comprised of King County, the City of Seattle, 37 other cities, and two tribes, all located in King County. Together the Program represents more than 2.3 million Washington state residents. The Haz Waste Program works to protect and enhance public health and environmental quality by reducing the threat posed by the production, use, storage, and disposal of hazardous materials, many of which are found in common household products and small businesses.

**The Haz Waste Program strongly supports the language in the draft regulations, with one exception. We ask for elimination of the exemption in WAC 173-337-055(b) that enables secondhand stores to continue selling the restricted consumer products if they were manufactured before the effective date of the rule.**

As a Program charged with protecting both human and environmental health, we believe that it is vital these products be taken off the market, including the secondhand market. The exemption in WAC 173-337-055(b) means that Washington residents will continue to be exposed, including the underserved and vulnerable populations that often shop at secondhand markets.


While we recognize that this current set of priority products may be unlikely to be sold at secondhand retailers, we still believe that the exemption should be removed. Ecology needs authority to prohibit the secondhand sale of these products should they learn that it is occurring. Products that are more likely to be sold on the secondhand market may be added to the rule in the future.

Stacey Callaway  
January 24, 2023  
Page 2

Leaving the exemption in place puts a second generation of users at risk of exposure to hazardous materials. Additionally, if secondhand marketplaces are more likely to serve low income and other historically marginalized populations, this exemption may perpetuate disproportionate exposures to toxics in consumer products. It must be removed, and Ecology should provide education and outreach to secondhand retailers.

The Haz Waste Program thanks you for this opportunity. We look forward to future collaboration on this important topic. If you have questions regarding the comments above, please contact Policy and Planning Advisor Ashley Evans, Hazardous Waste Management Program, at [ashley.evans@kingcounty.gov](mailto:ashley.evans@kingcounty.gov) or 206-263-3777.

Sincerely,

DocuSigned by:  
  
D5213392EB3345B...

Maythia Airhart  
Interim Director  
Hazardous Waste Management Program

## The Japanese electric and electronic industrial associations - JEITA, CIAJ, JBMIA and JEMA

JEITA (Japan Electronics & Information Technology Industries Association) on behalf of the four Japanese electric and electronic industrial associations - JEITA, CIAJ, JBMIA and JEMA\* would like to submit our comments to this proposed rule language for Safer Products for Washington published in December, 2022 in addition to previous comments submitted three times so far (at draft regulatory determination issued in December, 2021, regulatory determinations issued in June, 2022, and preliminary draft issued on August, 2022).

We hope our comments would provide substantive information to the final rule language on HFRs in EEE that Ecology plans to adopt by June 1, 2023.

We sincerely hope to collaborate with Ecology to ensure that the HFRs restrictions are implemented in a manner that reduces risks to humans and the environment while preserving social benefits for the present and future generations in Washington State.

If you have any questions, please let me know without any hesitation.

\*Four Japanese Electric and Electronic Industrial Associations are as follows:

JEITA (Japan Electronics & Information Technology Industries Association),

CIAJ (Communications and Information Network Association of Japan),

JBMIA (Japan Business Machine and Information System Industries Association) and

JEMA (Japan Electrical Manufacturers' Association).



February 1, 2023

Hazardous Waste and Toxics Reduction Program, Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504 -7696

**Re: Japan 4EE Comments on Proposed Rule of Safer Products for Washington**

JEITA (Japan Electronics & Information Technology Industries Association)  
CIAJ (Communications and Information Network Association of Japan)  
JBMIA (Japan Business Machine and Information System Industries Association)  
JEMA (The Japan Electrical Manufacturers' Association)

We, Japanese electric and electronic industrial associations (JEITA, CIAJ, JBMIA and JEMA) (hereinafter, Japan 4EE), thank the Washington Department of Ecology (hereinafter, Ecology) very much for providing the opportunity for public comments on Proposed Rule of Safer Products for Washington program.

We have been vigorously committed to improve energy efficiency and to comply with chemical regulations set by other countries, including Europe, the U.S. and China, etc.

We support the basic policy of “the Safer Products for Washington program” as electric and electronic equipment (hereinafter, EEE) industry, because it would protect the consumers’ health and environment based on risk assessment by identifying and managing the priority chemicals and priority consumer products which may be main sources of exposure to such substances.

However, we would like to emphasize again that EEE operators will be extremely difficult to comply with the regulation if all HFRs in class are regulated for all EEE enclosures, and conversely, it may cause an adverse effect to the citizens of the State of Washington. Therefore, we would like to request you to revise the regulations to make it practicable, referring to the comments below.

We also would like to offer comments on regulating thermal paper which is used as a consumable item in some products but not in the EEE itself.

We would appreciate your consideration.

## **I. Regulation of Organohalogen flame retardants (HFR) in EEE enclosures**

In response to the Preliminary draft rule published in August, 2022, Japan 4EE submitted you the following comments on August 31.

- 1) Limit the covered HFRs to those recognized as harmful in other countries
- 2) Limit the covered EEE enclosures to TVs, displays and stands, harmonizing with the EU LOT 5 and NY state laws.
- 3) Set appropriate thresholds (e.g., 0.1%)
- 4) Set the appropriate grace period (at least four years)
- 5) Set the enforcement date based on manufacturing date
- 6) Set exclusions for spare parts, repair and refurbishment parts, and research and development use.
- 7) When more than 1000 ppm of halogen is detected by elemental analysis, the assumption of that HFRS were intentionally added is an issue.

However, with the exception of 5) stated the above, the Proposed Rule barely reflects the above requests and still aims to regulate all HFRs in all EEE enclosures without proper risk assessment. Even with the current industry technologies, it is extremely difficult for operators to follow such laws and regulations, so the proposal is not realistic as a regulatory requirement.

In addition, since the manufacture and sale of EEE cannot normally be controlled exclusively for a specific state, the impact of the proposal will be extended to virtually all products destined for the United States. Although it is known that HFRs are widely used in parts and materials of EEE, most HFRs have not been found to be hazardous, and any information on HFRs has not been communicated through the supply chain, so that it is difficult to grasp the information of HFRs contained in EEE, and any discussion on alternative substances has not been started yet.. Therefore, we are concerned that the hasty implementation of this regulation will prevent EEE from being distributed to the State of Washington and, as a result, which will have a serious negative impact on the citizens of the State of Washington, the people in America and the economy.

Furthermore, as HFRs are essential chemicals used to prevent the spread of EEE and protect human lives in the event of a fire, implementation of hasty regulation of all HFRs would put the lives of citizens and citizens at risk, so that extremely careful consideration is required to ban HFRs. Although Ecology states that there are alternative flame retardants to HFRs, we understand that it simply means that an alternative candidate flame retardant is available. A long-term study is needed to confirm that a wide variety of EEE enclosures with different applications and environments can meet all requirements for EEE, including not only flame retardancy but also initial characteristics and reliability.

Based on the above issues, we would like to offer our comments.

In order to make the proposed rule appropriate in which consideration of both risks to people and the environment and economic benefits are reflected, we will add comments to the proposed rule after re-requesting items not reflected in the proposed rule published on DEC. 7, 2022 stated above in 1) to 7). Finally, we would like to propose you an amendment based on our request.



[Notes]

•In particular, as for 1) and 2) , we requested you total 3 times for previous public comments because they are essential to making the rule appropriate. Therefore, we hope that Ecology will consider and reflect them to the rule this time.

•We would like to comment on the proposed ban on products intended for indoor use.

We request you to remove the provision of any information on products intended for outdoor use.

It is easy to deduce that the risk of exposure from products used outdoors in the first place is negligibly small without an exposure assessment. As mentioned above, many HFRs are not restricted because their hazards are unconfirmed, nor is information gathered through the broad supply chain. Therefore, despite the considerable effort involved in gathering information for reporting, it is unlikely to directly contribute to protecting consumer health and the environment from hazardous chemicals, which is the purpose of this regulation.

1) Limit the covered HFRs to those recognized as harmful in other countries:

In the first place, the evaluation that led Ecology to conclude in December 2021 that it is reasonable to regulate EEE enclosures collectively as a class for all HFRs, was not satisfactory. If HFRs are to be restricted on the basis of the results of the Ecology assessment, consistency with the regulations of the preceding country/region is desirable, and it is appropriate to limit HFRs to those recognized as harmful, regulated, or under consideration for regulation in other countries (For example, SCCP, TCEP, TDCPP).

- Short chain chlorinated paraffins (SCCP) 85535-84-8
- Tris(2-chloroethyl) phosphate (TCEP) 115-96-8
- Tris(1,3-dichloro-2-propyl) phosphate (TDCPP) 13674-87-8

Alternatively, limit the use to HFRs with the following hazard classes that may affect humans.

- Carcinogenic Carc. 1A, 1B
- Germline mutagenic Muta. 1A, 1B
- Reproductive toxicity Repr 1A, 1B

In limiting the HFRs, it is essential to specify the CAS RN of the target substances.

In the absence of a CAS RN designation, chemical management in a complex and long supply chain such as an EEE is not possible. Thereby at least provide an exhaustive list with a CAS RN specified when limiting HFRs.

2) Limit the covered EEE enclosures to TVs, displays and stands, harmonizing with the EU LOT 5 and NY state laws:

For the purposes of the rule, rather than all EEE enclosures being subject to regulation, each candidate product should first be limited after assessing the risk of exposure to humans and the environment. In the first place, the components that make up the EEE, including the enclosures, are designed so that the HFRs contained in the product during use are not released into the environment in order to maintain the required flame retardant function, and it is inconceivable that HFRs from the product to human and the environment will be exposed.

However, if Ecology believes that it is absolutely necessary to regulate a specific EEE enclosures, it is desirable that the rule is harmonized with the regulations of the preceding other country/region, and it is also appropriate to limit the covered EEE enclosures to TVs, consumer electronic display harmonizing with the New York law (Section 4630 B/A 5418 B<sup>1</sup>) promulgated in January 2022 and the EU LOT5 (Revised eco-design regulation for TV/Display (EU 2019/2021<sup>2</sup>)).

Although the Proposed Rule would limit prohibited products from January 1, 2025 to “electronic displays”, we request you to amend the definition of "electronic display" in 173 -337-025 to the following, harmonizing with the New York law or the EU LOT5:

“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. Electronic display shall 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.

In addition, although you have planned that the Proposed Rule also would prohibit products other than electronic displays from January 1, 2026, we strongly ask you to reconsider it.

Even if, based on an appropriate exposure risk assessment, it is concluded that some specific products other than electronic displays should also be banned in the future, an sufficient grace period should be provided, with careful communication with relevant stakeholders. Generally, EEE requires at least a four-year grace period. Please refer to 4) stated below for the reasons.

We also request you that the definition of target products be reconsidered to avoid confusion. As stated in the Proposal Notice, we understand that EEE plastic device casings are covered. In the proposed rule, the preferred consumer products are defined as "EEE with plastic external enclosure" and excluded products include cables, batteries and light bulbs. However, since some of these excluded products do not fit the definition of an EEE external enclosure, we are concerned that components not included in the definition of an "EEE external enclosure" but not listed in the excluded products could be construed as regulated.

To avoid such concerns, we suggest, for example, designating the preferred consumer product as an "EEE external enclosure" and removing excluded products, or providing a non-exhaustive list of examples, such as cables, batteries, and light bulbs. Alternatively, we would like to propose you the following changes to components/parts that are excluded (based on Section 173 -337 -112 (a) (iii)) in order to clearly determine whether each component used in a product is deemed an EEE external enclosure.

(iii) This subsection does not apply to the following parts of the priority consumer products described in (a) of this subsection.

<sup>1</sup> <https://www.governor.ny.gov/news/governor-hochul-signs-legislation-protect-new-yorkers-harmful-flame-retardant-chemicals>

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R2021&from=EN>

(A) Inaccessible electronic component or parts\*, such as printed circuit boards and internal fans.

\*Inaccessible parts may refer to the interior of plastic external enclosures that are not accessible during use of the product.

(B) Internal parts that may be are removable and replaceable, but not accessible once the product is in its fully assembled and functional form.

In addition, we would like to propose you a modification to the following definition of an external enclosure.

“External enclosures mean the plastic enclosure and stands of electronic displays.”

3) Set appropriate thresholds (e.g., 0.1%)

Although the proposed rule limits the scope of regulation to intentionally added HFRs, we request you that an appropriate threshold (e.g., 0.1%) be established.

Limitations to intentional additions have led to the inclusion of HFRs as impurities, by-products, and recycled materials not being regulated, but the EEE industry needs to set appropriate thresholds to manage chemicals of concern across the supply chain.

It is reasonable to set the threshold at 0.1% by weight that is the same level set for brominated flame retardants PBB and PBDE by the EU RoHS Directive banning certain flame retardants in EEE. These two groups of substances are among the most hazardous of HFRs, but at this threshold they have been able to significantly reduce the risk without compromising consumer benefits. Additionally, in the case of setting the threshold at 0.1% by weight, we would like to highlight again that HFRs contained in recycled materials should be exempted from the restriction because such HFRs in recycled materials are not intentionally added by manufacturers of the products.

4) Set the appropriate grace period (4 years or more)

EEE consists of a large number of components and is manufactured in complex global supply chains around the world. Therefore, the control of controlled substances in products is not possible by EEE manufacturers alone, and the substances are controlled through communication within the supply chain. The method is internationally standardized, and a common list of controlled substances is used in industries. The EEE industry uses IEC 62474 “Material Declaration for products of and for the electrical industry” as a common standard.

Substitution of functional substances in EEE takes a long time. The EU RoHS Directive, for example, clearly identifies controlled substances, sets the threshold at 0.1%, and gives about four years to prepare for the designation of new controlled substances, even when suitable alternative substances are already available. In view of the smooth implementation of compliance of goods in the United States, we request you a grace period of at least four years for substitution of substances in consumer EEE.

For reference, the outline dates for the process our members will undertake to phase chemicals out of the supply chain are as follows:

The fastest time frame is stated for each step when the target substance and threshold are set appropriately; however, the entire process has barely been completed in the shortest time, therefore, at least a grace period of four years is necessary. Individual steps and time frames may vary from company to company.

- Procurement and evaluation of replacement parts with suppliers: at least six months, usually longer. If there is no suitable replacement, it stops at this step in the first place.
- Internal quality assessment: a minimum of 3 months, usually longer.
- Quality and safety certification: a minimum of six months, usually longer.
- Supplier adjustments and manufacturing changes: a minimum of 6 months, usually longer.
- Shipping, importing, and delivery in the US: a minimum of 3 months

5) Set the enforcement date based on manufacturing date

Our request has been reflected in the proposed rule. We appreciate it.

6) Set exclusions for spare parts, repair and refurbishment parts, and R & D uses

6-1) Exclusion of spare parts and repair and refurbishment parts for products manufactured before enforcement of the rule

We appreciate that the amendment excludes spare parts and refurbished parts manufactured before the effective date.

However, as the proposed rule is insufficient, spare and refurbished parts for use in products manufactured before the effective date should be excluded indefinitely.

EEE manufacturers have an obligation to supply spare parts and consumables to customers over time and must store them for certain period in warehouses as spare parts, parts and raw materials because manufacturing of some of the parts and raw materials that make up the spare parts and consumables may be discontinued.

In addition, the production of spare and refurbished parts for this EEE shall continue even after the enforcement of the EEE regulations in order to keep the covered EEE usable for as long as possible.

Therefore, spare and refurbished parts for use in EEE manufactured before the enforcement date of the regulations should be excluded indefinitely from the scope. The EU RoHS also allows this exemption, and it makes sense to do so in light of the global trend of efficient use of resources.

6-2) Exclusion of research and development products

Research and development activities in the United States are important for the people in the world to develop and introduce cutting-edge technologies and products, including fighting against COVID-19 and exploring alternative materials as substitutes for goods manufactured or imported for use in the United States.

Without the ability to conduct research and development of such products and articles in the United States, it is essentially impossible for industrial member companies to meet the advanced technical performance specifications of their products. Responsible chemicals management programs should be permitted and encouraged. Commercial manufacture/import/distribution of EEE external device enclosures including HFRs for research and development activities such as prototypes should be excluded. At a minimum, the following should be excluded:

- (i) When a limited number of articles are used for research and development activities in the United States (e.g., 100 or fewer)
- (ii) Products recovered after use in research and development activities and shipped outside the United States

7) When more than 1000 ppm of halogen is detected by elemental analysis, the assumption of that HFRs were intentionally added is an issue.

Elemental analysis can only confirm the presence of halogens, not uses of the halogens. Halogens from unintentional additions, such as recycled materials, impurities, and by-products, as well as halogens from blame-retardant agents, such as antioxidants and electricity-imparting materials, are often used in EEE. In actual elemental analysis, it is easy to expect that halogens will be frequently detected.

If the manufacturer is asked to rebut whenever halogen is detected, the manufacturer will incur a great burden in preparing documents for the rebuttal. It would also be a heavy burden for Ecology who would need to seek to disprove the evidence.

Therefore, this provision should be deleted, and after limiting the covered HFRs as described in 1) above, manufacturers should be given an opportunity to rebut after detecting restricted HFRs individually.

#### 8) Clarification of unclear descriptions

##### 8-1) Intended for Indoor/Outdoor Use

In the current draft, some EEEs can fall into both the Intended for Indoor and Outdoor Use categories, while Section 173 -337 -112 (2) (a) (ii) (A) indicates that the provisions for electronic products intended for outdoor use do not apply to products intended for indoor use. We propose you that the definition of “intended for outdoor use” be changed as follows to clarify which of these products falls under:

“Intended for Outdoor Use” means a product designed ~~to maintain functionality~~ solely for use after outdoor exposure to ultraviolet (UV) light, water, or immersion ~~—when used outdoors for an extended time.~~

##### 8-2) “Intentionally added chemical”

We would like to request you the exclusion of intentionally added chemicals that are added during the manufacture of the product in order to perform their intended function. Therefore, we propose you to change the definition as follows:

“Intentionally added chemical” means a chemical that serves an intended function in the final product ~~or in the manufacturing of the product or part of the product.~~

#### 9) Other

##### 9-1) Set exclusions for enclosures weighting less than 25 g

The amendment excludes enclosures weighing less than 0.5 g, however, we request you that enclosures weighing less than 25 g be excluded in accordance with EPEAT Computers and Displays Category criteria based on 4.1.5.1 of IEEE Std 1680.1a™-2020<sup>3</sup>.

##### 9-2) Delete the setting of the enforcement date according to the enterprise classification.

Although the proposed rule classifies companies into Group 1 and Group 2 according to their size and the

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<sup>3</sup> Standard can be downloaded from <https://www.epeat.net/about-epeat>

enforcement date changes according to this classification, this is meaningless.

It is understandable that this division was established to reduce the burden on small and medium-sized enterprises (SMEs), however it is inconceivable that the law-abiding period varies depending on the size of the enterprise, and many Group 1 companies use Group 2 products to manufacture their own products, and even if Group 2's enforcement schedule is pushed back, it will not reduce the burden on SMEs because Group 2 will also have to adhere to Group 1's schedule.

Therefore, in order to reduce the burden on SMEs, it is appropriate to align the enforcement date with Group 2.

#### 9-3) Request for exemption

Currently, it is required to comply with the requirements of the rules until the DOE grants an exemption. In that case, all distribution, including downstream suppliers, would have to stop until the DoE grants it. To avoid such supply chain disruptions, we request you that the company be allowed to continue selling its products until the DOE makes a final decision on the exemption application.

#### 9-4) Previously-owned priority consumer products

As for the exclusion of "previously owned products," we would like you to consider adopting the "exemption for products owned/sold prior to the effective date" as stated in TSCA.

### Conclusion

In summarizing our requests stated above, it is appropriate to amend the legal text as follows, for example:

**WAC 173-337-025 Acronyms and definitions.** Unless ecology determines the context requires otherwise, the following definitions apply for the purposes of this chapter.

"Electronic display" means 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.

Electronic display shall 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.

"External enclosures" means ~~the plastic external part of the product that renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock or retards propagation of flame initiated by electrical disturbances occurring within~~ the plastic enclosure and stands of electronic displays.

"Intended for Outdoor Use" means a product designed ~~to maintain functionality~~ solely for use after outdoor exposure to ultraviolet (UV) light, water, or immersion ~~when used outdoors for an extended time.~~

"Intentionally added chemical" means a chemical that serves an intended function in the final product ~~or in the manufacturing of the product or part of the product."~~

## **WAC 173-337-112 Flame retardants.**

### **(1) Electric and electronic products with plastic external enclosures, intended for indoor use.**

#### (a) Applicability.

(i) Priority consumer products. This subsection applies to enclosure of electric and electronic products ~~with plastic external enclosures~~, intended for indoor use that are powered by either of the following:

(A) Standard 120 volt outlets and designed for up to 20 amp circuit;

(B) Battery.

(ii) This subsection does not apply to:

(A) Electric and electronic products with plastic external enclosures, intended for outdoor use.

(B) Consumer products that receive power only when they are hardwired into and permanently part of the fixed electrical wiring of a building. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment.

(C) Products regulated by the FDA as medical devices.

(D) Products designed to use nonelectric heating energy sources, such as natural gas.

(iii) This subsection does not apply to the following parts of the priority consumer products described in (a) of this subsection.

(A) Inaccessible electronic component or parts, such as printed circuit boards and internal fans.

\*Inaccessible parts may refer to the interior of plastic external enclosures that are not accessible during use of the product.

(B) Internal parts that may be are removable and replaceable, but not accessible once the product is in its fully assembled and functional form.

(C) Plastic external enclosure parts that weigh less than ~~0.5~~25 grams.

(D) Screens. This subsection does apply to the plastic enclosure surrounding the screen.

~~(E) Wires, cords, cables, switches, light bulbs, and connectors.~~

#### (b) Compliance schedule.

##### ~~(i) Group definitions.~~

~~(A) "Group 1" means a person or entity whose gross sales equal or exceed \$1,000,000,000 in 2022.~~

~~(B) "Group 2" means a person or entity whose gross sales are less than \$1,000,000,000 in 2022.~~

##### (ii) Electronic displays and televisions compliance schedule.

(A) The restriction in (c) of this subsection takes effect ~~on January 1, 2025~~ [4 years after issuance of this rule], for persons or entities in Group 1 or Group 2 who manufacture, sell, or distribute:

- Electronic displays described in (a) of this subsection;
- Televisions described in (a) of this subsection.

(B) This does not include the following priority consumer products:

- All-in-one video conference systems;
- Displays that are integrated with appliances and are not available for purchase as separate products by end-users;

- Projectors;
- Virtual reality headsets.

~~(iii) Group 1 compliance schedule.—~~

~~(A) The restriction in (c) of this subsection takes effect on January 1, 2026, for persons or entities in Group 1 who manufacture, sell, or distribute a priority consumer product described in (a) of this subsection.—~~

~~This includes:—~~

- ~~• All in one video conference systems;—~~
- ~~• Displays that are integrated with appliances and are not available for purchase as separate products by end users;—~~
- ~~• Projectors;—~~
- ~~• Virtual reality headsets.—~~

~~(B) This does not include the following priority consumer products described in (a) of this subsection:—~~

- ~~• Electronic displays described in (a) of this subsection;—~~
- ~~• Televisions described in (a) of this subsection.—~~

~~(iv) Group 2 compliance schedule.—~~

~~(A) The restriction in (c) of this subsection takes effect on January 1, 2027, for persons or entities in Group 2 who manufacture, sell, or distribute a priority consumer product described in (a) of this subsection.—~~

~~This includes:—~~

- ~~• All in one video conference systems;—~~
- ~~• Displays that are integrated with appliances and are not available for purchase as separate products by end users;—~~
- ~~• Projectors;—~~
- ~~• Virtual reality headsets.—~~

~~(B) This does not include the following priority consumer products described in (a) of this subsection:—~~

- ~~• Electronic displays described in (a) of this subsection;—~~
- ~~• Televisions described in (a) of this subsection.—~~

(c) Restriction.

(i) No person may manufacture, ~~sell, or distribute~~ a priority consumer product described in (a) of this subsection that has a plastic external enclosure that contains intentionally added organohalogen flame retardants described in (d) of this section.

This does not apply to a:

(A) Priority consumer product described in (a) of this subsection manufactured before the applicable compliance schedules in (b) of this subsection;

(B) Repair part or replacement part used for the products manufactured before the applicable compliance schedules in (b) of this subsection;

(C) Priority consumer product refurbished with repair or replacement parts for the products manufactured before the applicable compliance schedules in (b) of this subsection.



(d) Organohalogen flame retardants covered in this section

Short chain chlorinated paraffins (SCCP) 85535-84-8

Tris(2-chloroethyl) phosphate (TCEP) 115-96-8

Tris(1,3-dichloro-2-propyl) phosphate (TDCPP) 13674-87-8

~~(ii) Ecology presumes the detection of:—~~

~~(A) Total bromine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants.—~~

~~(B) Total chlorine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants.—~~

~~(C) Total fluorine concentrations above 1,000 ppm with less than 5,000 ppm total phosphorus indicate intentionally added organohalogen flame retardants.—~~

~~(iii) Manufacturers may rebut this presumption by submitting a statement to ecology that includes the following information:—~~

~~(A) The name and address of the person submitting the statement;—~~

~~(B) A statement that an organohalogen flame retardant was not intentionally added. Provide credible evidence supporting that statement and include information, data, or sources relevant to demonstrate that an organohalogen flame retardant was not intentionally added.~~

~~**(2) Electric and electronic products with plastic external enclosures, intended for outdoor use.**~~

**II. Regulation of Bisphenols in Thermosensitive Paper**

In response to the Preliminary draft rule published in August, four Japanese electrical and electronics organizations submitted the following comments on August 31.

- 1) Set appropriate thresholds (e.g. 0.02%) and identification of controlled substances
- 2) Set an appropriate grace period (36 months or more)
- 3) Set the effective date based on the "date of manufacture"

As for the thresholds in 1) above and 3) above, which are reflected in the proposed rules, we would like you to consider the following proposals, which are essential to make the regulations realistic considering social interests.

- 1) Set appropriate thresholds and identification of controlled substances

We appreciate the proposed amendment setting the threshold at 0.02%, however, we request you to identify certain bisphenols to be restricted.

In order to implement regulations smoothly, it is desirable to align the regulations with those that precede them in other countries. Although there are no regulations for bisphenol as a class of thermal paper in

other countries, there are many regulations for thermal paper (or receipts) containing bisphenol A (or BPA). The European Union limits the concentration of BPA in thermal paper products to 0.02% by weight, and Switzerland limits alternative bisphenol S (or BPS) to a similar concentration.

Efficient management of substances in goods manufactured through the supply chain requires simplicity and clarity that can be understood by manufacturers in any part of the world. Since the types of bisphenols used in thermal paper are limited, it is desirable to clearly identify controlled substances with identifiers such as CAS RN.


2) Exclude FDA-regulated medical devices

We request you that medical devices regulated by the FDA be exempted from the regulation of bisphenols in thermal paper as well as from the regulation of OFR.

3) Set an appropriate grace period (36 months or more)

There was a 36-month grace period for BPA restrictions after the EU REACH regulation came into force. In view of the smooth implementation of compliance for goods in the EU, we would like to request you to set a grace period of at least 36 months.

Sincerely yours,



Tsukasa Kimura  
Senior Manager for Environmental  
Business Development Department  
Business Strategy Division  
Japan Electronics and Information Technology Industries Association (JEITA)  
Ote Center Bldg., 1-1-3, Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan  
TEL +81-70-3297-8700  
[t-kimura@jeita.or.jp](mailto:t-kimura@jeita.or.jp)

## About Japanese electric and electronic (E & E) industrial associations:

### About JEITA

The objective of the Japan Electronics and Information Technology Industries Association (JEITA) is to promote the healthy manufacturing, international trade and consumption of electronics products and components in order to contribute to the overall development of the electronics and information technology (IT) industries, and the very future Japan's economic development and cultural productivity.

### About CIAJ

Mission of Communications and Information network Association of Japan (CIAJ). With the cooperation of member companies, CIAJ is committed to the healthy development of info-communication network industries through the promotion of info-communication technologies (ICT), and contributions to the realization of more enriched lives in Japan as well as the global community by supporting widespread and advanced uses of information in socio-economic and cultural activities.

### About JBMIA

Japan Business Machine and Information System Industries Association (JBMIA) is the industry organization which aims to contribute the development of the Japanese economy and the improvement of the office environment through the comprehensive development of the Japanese business machine and information system industries and rationalization theory.

### About JEMA

The Japan Electrical Manufacturers' Association (JEMA) The Japan Electrical Manufacturers' Association (JEMA) consists of major Japanese companies in the electrical industry including: power & industrial systems, home appliances and related industries. The products handled by JEMA cover a wide spectrum; from boilers and turbines for power generation to home electrical appliances. Membership of 291 companies, <http://www.jema-net.or.jp/English/>



1111 19th Street NW > Suite 402 > Washington, DC 20036  
t 202.872.5955 f 202.872.9354 www.aham.org

February 5, 2023

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

Re: Safer Products for Washington- Chapter 173-337 WAC, Safer Products Restrictions and Reporting

To whom it may concern:

On behalf of the Association of Home Appliance Manufacturers (AHAM), I would like to raise the following points concerning the proposed recommendations for products with flame retardants under Safer Products for Washington.

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's membership includes over 150 companies throughout the world. In the U.S., AHAM members employ tens of thousands of people and produce more than 95% of the household appliances shipped for sale. In Washington, the home appliance industry is a significant and critical segment of the economy. The total economic impact of the home appliance industry to Washington is \$2.2 billion, nearly 13,000 direct and indirect jobs, \$381.8 million in state tax revenue and more than \$763 million in wages. The factory shipment value of these products is more than \$30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

AHAM is also a standards development organization, accredited by the American National Standards Institute (ANSI). The Association authors numerous appliance performance testing standards used by manufacturers, consumer organizations and governmental bodies to rate and compare appliances. With respect to safety standards, we work closely with Underwriters Laboratory (UL), CSA, and other safety standards developers around the world. AHAM's consumer safety education program has educated millions of consumers on ways to properly and safely use appliances such as cooking products, portable heaters, and clothes dryers.

AHAM's members produce hundreds of millions of products each year. They design and build products at the highest levels of quality and safety. As such, AHAM members have demonstrated their commitment to strong internal design for safety procedures, monitoring, and evaluation/failure analysis systems. AHAM supports the petitioners' intent to protect consumers against all unreasonable risks, including those associated with the exposure to potentially harmful chemicals. AHAM also firmly supports the appropriate use of flame retardant chemicals in electronic and electrical devices. Together with industry test requirements, safety mechanisms and internal design for safety procedures, flame retardant chemicals play an important role in the safety of household appliances. Publically available field incident data shows that fire retardant enclosures reduce the severity and number of electrical appliance/device caused fires from a failure of an electrical component. That is why the use of flame retardants in electronic devices is essential to meet consensus safety standards including, for example, safety standards for clothes dryers (UL 2158), household electric ranges (UL 858), electric room heaters (UL1278) and electric coffee makers (UL1082).

Recent regulations such as PIP (3:1) risk management at the federal level, copper boat paint restrictions in Washington State, and PFAS reporting requirements in Maine suggest that simple substitution may not always be possible and that sufficient time is needed to comply with these regulations.

### **Inaccessible Electronic Component Exclusion**

Through the rulemaking process, AHAM has raised several concerns specific to how home appliances would be included in the broad categories of "electronic devices" or "electronic device casings." **AHAM appreciates the exclusion of inaccessible components, such as printed circuit boards and internal fans as plastics devices used in appliances often are inaccessible to consumers and contain qualitatively low amount of flame retardant materials.** In addition, internal parts that are removable and replaceable, but not accessible once the product is in its fully assembled and functional forms would be excluded from the restrictions. However, AHAM asks for clarifying language around "functional form" (WAC 173-337-112(a)(iii)(b)) as this could mean the entire appliance or could mean a service part such as a fan or pump. It also raises question on whether flame retardants on the back of the appliance would be in scope. The rear side of an appliance is generally not accessible under general use, but it could still be considered external enclosure under this proposal.

AHAM also appreciates the exclusion from repair parts or replacement parts manufactured before the compliance schedules. It is crucial that this exclusion also encompasses all components that are accessible for servicing/repair in order to allow service providers to handle and fix these components that may contain flame retardants. However, we believe the exclusion for these parts must encompass the full useful life of products manufactured prior to the enforcement date. It will be extremely burdensome for a manufacturer to construct a new replacement part that meets the new HFR criteria to fit into an old SKU. Finally, we do ask that the exclusion for plastic external

enclosures (WAC 173-337-112(a)(iii)(c)) that weigh less than 0.5 grams expand up to 25 grams as very few products would fall under this exemption.

## **Electronic Display**

Under the proposed rule, *an electronic displays means a display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources*. This definition is important in regards to the potential restriction compliance date of January 1, 2025. During the public hearings, it was articulated that this language seeks to harmonize with New York law. Under the New York law<sup>1</sup> there is a clear exemption for appliances, “Electronic display shall not include: (a)... or (e) displays that are integrated with appliances and are not available for purchase as separate products by end-users.” This exclusion follows Europe’s regulation in this area which excludes electronic displays that are component or sub-assemblies of products, e.g. displays integrated into appliances. We would request clear harmonization with New York requirements.

## **Product Scope Consideration**

If the State of Washington continues to investigate the use of OFRs in the outer casings of electronic devices, the Department of Ecology should first clarify the scope of the work. The Department does not define either electrical products or electronic products. 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> Does outer casing mean the most outer casing or any internal casings housing electrical items or any parts of an outer casing? Having this answer, the proper parties can participate as required. However, due to the broad nature of the current proposal, it could potentially incorporate parts that consumers buy commercially including spare parts as well as service parts. Thus, the Department should clarify its intent and scoping process before moving forward with any rulemaking. The “organohalogen” family is extremely wide and inconsistent with the regulatory framework anywhere else in the world. For example, the RoHS Directive restricts only certain HFRs that manufacturers are able to test for and certify compliance with because it is not possible to search for all the chemicals of the organohalogen flame retardant family. This highlights the challenges of a broad restrictions on organohalogen flame retardants. This problem could be resolved through both compiling a comprehensive list of all parts subject to the regulation and specifying individual flame retardants by CAS Registry Number that it plans to regulate for each material. Without this information, manufacturers will have a difficult time surveying their supply chains to evaluate the

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<sup>1</sup> New York [S4630B](#)

<sup>2</sup>Chapter 70A.350.010 Recorded Codes of Washington (RCW), <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.350.010>.

enclosure for compliances. This information is needed to alleviate confusion and avoid potential supply chain disruptions that could harm availability of some electronic and electrical products available for purchase in Washington State.

In addition to a vague and potentially overly broad definition of electronic devices, it is important to acknowledge the difference between electronic devices and the other proposed categories of products. The use of flame retardant chemicals in children's products, stuffed furniture, and mattresses and mattresses covers are to prevent those items from becoming fuel for a fire cause by some external source. The purpose of flame retardant chemicals in electronics is to prevent those electronics from becoming the source of a fire and also to assure containment of a fire. All electrical devices inherently have some risk of starting a fire. AHAM's members work tirelessly to reduce these risks for home appliances. Nevertheless, the risk of fire inherent in all electrical components is a primary reason that electronics are contained in fire resistant enclosures. The protection from fire risks provided by electronic device enclosures is meaningfully different from preventing household goods from becoming additional fuel for a fire started by some other means. Back in 2018, United States Consumer Product Safety Commission (CPSC) held technical workshops to learn more about flame retardants in plastic enclosures for electronics. CPSC staff concluded that the Petition failed to show a connection between the exposure to a substance and personal injury or harm from that exposure. Thus, appliances were not included in the scope for enclosures of electronics. Similarly, the Department must consider this type of fire protection and safety considerations.

### **External Enclosure Clarifying Definition**

Under the proposed rule, *an external enclosure means the plastic external part of the product that renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock or retards propagation of flame initiated by electrical disturbances occurring within.* This definition specifically mentions that the scope of the enclosure is to "retards propagation of flame." As articulated in the comments, the purpose of flame retardant chemicals in electronics is to prevent those electronics from becoming the source of a fire and also to assure containment of a fire. By removing these flame retardants from electronics, one is potentially making the products that Washington families use every day less safe.

The Department of Ecology should default to what UL has defined as definitions of external enclosures as that is what the product will be certified to. If the State of Washington definitions are stricter than UL, that will require individual certification to the State of Washington before a product can enter the state for commerce. Potential redesign could take several years before the product to get back into market after UL certification.

### **Greater Consideration for Product Design & Viable Alternatives**

As acknowledged in the regulatory analysis, it is expected that these requirements will result in additional costs to manufacturers, sellers, and distributors of priority consumer products containing



priority chemicals in Washington State. Transitioning to alternatives could have a different price for each appliance as one manufacturer may use one alternative while other manufacturers may use alternatives to meet specific product requirements. The costs would occur because manufacturers would have to reorient their production and investment patterns, and some would have to integrate or develop new chemistries, redesign, or reformulate the product, and recertify new products to meet safety standards, performance requirements, and aesthetic preferences.

AHAM members have been actively addressing the identification of alternative flame retardant plastics solutions for the enclosures. Going through their global supply chain, many manufacturers have not found it possible to replace these flame retardants that meet the necessary specifications required in terms of flame rating, IEC standards, mechanical properties (impact resistance, moisture resistance, humidity resistance, durability) and aesthetics requirements. This is especially important for products where moisture is a concern (dishwashers, washing machines, refrigerators), where the only option is using flame retardants to achieve the desired level of performance. Simple substitution is just not possible as product manufacturers need a broad array of material choices for differing product design needs. Non-PFAS flame retardant additives, including potentially transition from plastic to metal would be a significant redesign and would lead to compromises in the inability to reach proper flame ratings, lower heat resistance, and lower water resistance. Most importantly, is that the preferred alternative chemicals being proposed for use by Washington State are also restricted in some other jurisdiction including in Maine (PFAS alternative) and in New York and are proposed for restriction in the Europe Union. Effective January 1, 2030, the state of Maine will prohibit the use of any PFAS in any product in any amount, unless the state's Department of Environmental Protection issues an exemption by notice and comment rulemaking.<sup>3</sup> Meaning, if electronics manufacturers wanted to sell products in Washington, the Ecology proposed rulemaking would potentially force them to design and build products with alternative materials that are restricted elsewhere. Ecology's current framework underweights the fire safety hazards of products that can be mitigated with the use of OFRs, and bears the burden, under the statute<sup>4</sup>, for demonstrating that a replacement chemical, or redesigned product, is safer.

Under the Proposed Rule, flame retardants used in plastic casings intended for outdoor use are subject to a reporting requirement, and not restrictions, due to weathering concerns. In this instance, the Department consider design considerations and performance criteria in developing its regulatory proposal. A consistent standard should be applied to both OFRs and identified alternatives. The Department should similarly consider product performance and design of

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<sup>3</sup> 38 Maine Rev. Stat. Ann. 1614.

<sup>4</sup> RCW 70A.350.040(3).



household products, including the potential for fire risk or the containment of fires, as it finalizes possible regulatory actions for flame retardants used in plastic casings intended for indoor use.

Finally, the proposed end product requirements may be considered above and beyond the current safety requirements and through possible unintended consequences these new requirements may actually reduce safety levels. The appropriate method for requesting changes like these is requesting updates to the end product safety standards through UL and CSA. The proposed change then would have a deliberate, rigorous and thorough review by a Standards Technical Panel (STP) of experts to assure there is no loss of safety levels.

### **Alignment with Product Safety Standards**

Together with industry test requirements, safety mechanisms and internal design for safety procedures, flame retardant chemicals play an important role in the safety of household appliances. Publically available field incident data shows that fire retardant enclosures reduce the severity and number of electrical appliance/device caused fires from a failure of an electrical component. That is why the use of flame retardants in electronic devices is essential to meet consensus safety standards including, for example, safety standards for clothes dryers (UL 2158) household electric ranges (UL 858), electric room heaters (UL1278) and electric coffee makers (UL1082). This proposal may make it more challenging for product manufacturers to meet flammability requirements including UL 746C (Safety standard for polymeric materials). Electronic and electrical products can be required by UL 746C to undergo a specific test that assumes a flame threat occurs outside of the enclosure that the product must not propagate. In these instances, enclosures meeting specific size criteria must pass a larger scale fire test. Using an interior fire barrier (possibly metal) with a horizontal burn “shell” may not be enough to satisfy these additional requirements.

Fire safety standards should be viewed as minimum requirements for flammability and products can go beyond those standards. UL 746H, which certifies plastics to either be non-halogenated or non-chlorine and non-bromine. Electronic and electrical products can be required by UL 746C to undergo a specific test that assumes a flame threat occurs outside of the enclosure that the product must not propagate. In these instances, enclosures meeting specific size criteria must pass a larger scale fire test. Using an interior fire barrier (possibly metal) with a horizontal burn “shell” may not be enough to satisfy these additional requirements. The suggestion to require manufacturers to employ a change in process or design that reduces the flammability requirement of the exterior electric or electronic enclosure through the use of an internal fire barrier would be quite burdensome to manufacturers.

It is common for 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, UL 2158 Standard for Safety: 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. End-product standards that require higher-rated flame ratings for polymeric materials (e.g. 5VA or V0 materials) indirectly require the use of flame retardants for polymeric materials to meet the end-product flammability requirements.

Ecology's proposal for OFR limits in casings and enclosures of electronic and electrical equipment intended for indoor use does not adequately consider that indoor products may have various design and performance criteria – such as moisture considerations – that make UL 746H an unsuitable option. Exemptions should be considered for the use of UL 746C instead of UL746H and for those end product standards that contain additional or stricter requirements than UL 746C.

The National Electrical Code requires all electrical products to be listed which requires certification to the appropriate safety standard. If the revised products meet the Washington requirements but do not meet the safety requirements required for certification and listing then these appliances won't be approved for use in the State of Washington. Ceasing production of their already third-party safety certified product would be the only option if there are no viable and non-burdensome alternatives. AHAM urges the State of Washington to take a more robust and complete approach for assessing alternatives, which takes into account overall safety, performance, innovation, and sustainability factors.

### **Reporting Requirements Clarifying Language**

AHAM also asks for clarifying language in Section WAC 173-337-112(c) regarding PPM limits. It could be read that the restriction applies to the product as a whole, not just to its external enclosure. PPM limits of 1000 – 1500 for just the external enclosure would not allow sufficient flame retardancy for equipment with external plastic enclosures to comply with UL Listing requirements nor the building codes that incorporate those UL standards. Alternate flame retardants may exist, but their ability to meet the wide variety of uses and performance requirements for durable products and their supply availability is undetermined.

### **Exemptions**

We appreciate the creation of an exemption process within this proposed Rule and just want to ensure a clear appeal process as well. This will allow for needed flexibility given the wide-ranging restrictions proposed in the Rule. Over the last few years, many appliance manufacturers have gone through their entire supply base across multiple regions and have been unable to identify any halogen-free flame retardant alternatives that meet the specifications required in terms on flame rating, IEC standards, and mechanical properties (UL 2158, dryer safety). There may be circumstances like these in the future where Ecology's proposed alternatives are not feasible and/or not available.

## **Extended Timeline Requirement**

When a regulation would require manufacturers to change an integral part of a product, the amount of time that is required to retool and reapprove appliances for mass production would take an extended period of time, especially considering that the proposed alternatives are restricted in other states. This is because the appliance supply chain is global and complex. Appliances have thousands of product SKU's. Thus, manufacturers will first need a sufficient transition time to find an alternative followed by extensive product testing and potential re-tooling. In order to meet UL flammability standards compliance, manufacturers will need a least three to five years to prove out alternatives and to achieve re-certification to energy, performance and safety requirements. There is precedent for a 48-month compliance timeframe under both the RoHS 2 and REACH regulations. With this additional time comes extra costs for the manufacturers and potential increased costs on consumers. We would also encourage that compliance would be effective based on date of manufacturing, similar to what we see in Department of Energy efficiency standards.

## **PVC**

Polyvinyl Chloride (PVC) is commonly considered a concern for health and the environment if it's not properly disposed of at the end of life. The end of life collection of appliances are normally managed via robust recollection schemes in all U.S. states. Since appliances are disposed of properly, and considering the safety advantages and low toxicity concerns of PVC for such applications, there should be a consideration on removing it from the scope of the regulation.

## **Conclusion**

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 proposed rule and would make Washington an outlier. An abrupt prohibition, unique to the State of Washington that is not appropriately targeted will cause serious disruptions for the appliance industry and will drastically reduce appliance product availability. We hope the State of Washington reconsiders moving forward on any regulations where if appliance safety and availability is potentially threatened. Thank you for considering our views and please contact me at [jkeane@aham.org](mailto:jkeane@aham.org) or 202-872-5955 if you would like to discuss in more detail.

Respectfully submitted,



John Keane  
Manager of Government Relations

# BASF Corporation

Please see the attached file.



We create chemistry

February 3, 2023

Submitted online and via email: [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

### **Comments: Proposed Rule and Preliminary Regulatory Analyses**

BASF appreciates the opportunity to comment on the Proposed Rule and Preliminary Regulatory Analyses.<sup>1</sup> The following comments are submitted to reemphasize and complement points in our substantive submission from January 28, 2022. Our concerns focus on the following points:

- Regulation of ortho-phthalates as a class.
- Comments on toxicology and exposure to specific ortho-phthalates.
- Comments on publications used to support the cost/benefits analysis.

### **Ortho-phthalates should not be regulated as a class**

As stated in previous BASF comments to Washington Department of Ecology (DOE), and as also noted by DOE, the vinyl flooring market has moved away from ortho-phthalates to alternative plasticizers. To our knowledge ortho-phthalates have largely been replaced in this application; however, some high molecular weight phthalate esters (HMWPE)<sup>2</sup> are particularly important for a number of applications such as wire and cable insulation, roofing membranes, automotive materials, and others. In addition, assessments by regulatory agencies show there is little risk for their use in these “technical” applications.

Reproductive and development effects on the developing male rat fetus that were observed with some ortho-phthalates have been the primary driver of recent regulatory action in North America and Europe. The following table summarizes the results of Furr et al. (2014). US EPA in this paper reported the results of a screening test for effects on fetal testosterone levels in developing rats. The lower molecular weight products (DMP and DEP) and HMWPE products were inactive or less active (DINP), while those with a C3 – C6 carbon backbone were active and led to a decrease in testosterone levels. Those that were active also are classified in Europe for reproductive and developmental toxicity and are substances of very high concern (SVHC).

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<sup>1</sup> BASF manufactures a number of plasticizers including DOTP, DINCH, high molecular weight ortho-phthalates, adipates, and trimellitates. BASF Corporation is a subsidiary of BASF SE.

<sup>2</sup> HMWPE in this case applies to esters of phthalic anhydride with alcohol primary chain lengths of 7 carbons or greater (Fabjan 2006), such as DINP, DIDP, DPHP, and predominately linear esters such as di-nonyl,undecyl- (911P), and diundecyl phthalate (11P).



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**Observed effect on rat fetal testis testosterone production (Furr et al. 2014)**

| Plasticizers                       | Alcohol      |            | Outcome       |
|------------------------------------|--------------|------------|---------------|
|                                    | Carbon chain | C Backbone |               |
| DMP                                | 1            | 1          | Negative      |
| DEP                                | 2            | 2          | Negative      |
| DIBP                               | 4            | 3          | Positive      |
| DBP                                | 4            | 4          | Positive      |
| BBP                                | 4/7          | 4          | Positive      |
| DPenP                              | 5            | 5          | Positive      |
| DHexP                              | 6            | 6          | Positive      |
| DEHP                               | 8            | 6          | Positive      |
| DINP                               | 9            | 6-9        | Weak positive |
| DPHP                               | 10           | 7          | Negative      |
| DIDP                               | 10           | 7-9        | Negative      |
| Alternatives (non-ortho-phthalate) |              |            |               |
| TOTM                               | 8            | 6          | Negative      |
| DINCH                              | 9            | 7-9        | Negative      |
| DOTP/DEHT                          | 8            | 6          | Negative      |

In addition, the ECHA risk assessment committee (RAC) concluded in 2018 that no classification was necessary for DINP (ECHA 2018). A recent publication (van den Driesche et al., 2020) reported a clear differentiation regarding effects from DBP and DINP. US CPSC, based on the absence or expected absence of anti-androgen effects, removed DIDP and DnOP from their list of phthalates restricted in toys and childcare articles and also decided no action was necessary for DPHP and several alternative plasticizers (CPSC 2017).

It is not appropriate to regulate all ortho-phthalates as one class based the known structure activity relationships (Fabjan et al., 2006). In addition, owing to the replacement of ortho-phthalates in vinyl flooring, this action by DOE is arguably a purely “intellectual” exercise without merit but creates a poor precedent with a potential impact on other important markets and applications.

### **Comments on toxicology and exposure to ortho-phthalates**

As noted in our comments from January 2022, the details of assessments for di (2-propylheptyl) phthalate (DPHP), dimethyl phthalate (DMP), and diethyl phthalate (DEP), by Scivera and ToxServices do not appear to be publicly available, so it is difficult to comment on their conclusions. We understand that these consultants and others provide the assessments as part of a subscription or other paid access models; however, given their roles in potential regulatory action by the state, this lack of transparency is unacceptable. We find the non-governmental hazard assessment methodologies quite helpful, but the quality of the “screening” process by various profilers may result in incorrect classifications due to the lack of experience of those doing the



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work and to the limited time allotted for the assessments (e.g., Harmon and Otter, 2018). The lack of a robust scientific assessment process by Washington DOE makes any conclusions to support regulation of chemicals as a class less credible and unacceptable as a basis for regulatory action.

Humans are exposed to a several ortho-phthalates as reported in human biomonitoring studies (HBM). As noted in the Preliminary Regulatory Analyses report (PRA), exposures to some products have decreased while others have increased. For example, DEHP exposures have decreased over the past 15 years, and exposures to other ortho-phthalates such as DINP and alternative plasticizers have increased. (CDC, 2021) It is essential also to understand that the replacements have a lower toxicity profile, which results in lower overall risk. US CPSC reported this in their recent Hazard Index (HI) calculations that were part of their cumulative risk assessment for ortho-phthalates. (CPSC, 2017)

Detection of ortho-phthalates in HBM studies, in analyses of indoor dust samples, or in various consumer products do not necessarily indicate any health risks nor are they sufficient alone to support regulatory action similar to what is proposed by DOE. One must consider the context, including the exposures levels relative to established tolerable daily intake (TDI) and NOAELs, as well as whether reported levels in dust, for example, are bioavailable.

We again would like to point to studies cited in our January 2022 comments on ortho-phthalates in house dust that suggest the phthalates found in the dust may not be bioavailable (i.e., DEHP in dust did not correlate at all to urinary metabolite levels, (Becker et al., 2004) and are only a minor source of ortho-phthalate exposure (Fromme et al., 2003). In addition, Edwards et al. 2021 reported on concentrations of ortho-phthalates and replacement plasticizers in fast food items such as hamburgers and chicken burritos. As already noted, these authors provided no context with respect to regulatory limits (e.g., EFSA) for the levels of ortho-phthalates and other plasticizers found. The concentrations of ortho-phthalates and the alternative plasticizers measured in this study were well below established regulatory thresholds (e.g., EFSA TDI). Two recent publications present a critique of the Edwards, et al. paper and other papers written for the purpose of advocacy and only present a very limited interpretation of the data without any context (Harmon and Otter, 2022; Adenuga, 2022).

Epidemiological studies have been published in recent years that suggest a link between ortho-phthalate exposure and various illnesses. While one must look at these studies seriously, we are reminded of the famous quote from Lloyd Tapper, formerly Commissioner for Science at US FDA, that “DEHP is an etiology in search of a disease.” The quote is from the early 1970’s and represents a long history of speculation about possible health effects from DEHP and other ortho-phthalates. Unfortunately, most of the epidemiological work to date has involved small cohorts and may be in conflict with the results of more robust animal studies. Such associations of exposure to chemicals with selected effects would need a mode of action and a clear dose-response. To our knowledge, there have been very limited or no use of these studies as a basis for



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regulatory action on ortho-phthalates in North America or Europe. We suggest reviewing the summary of the epidemiological data for DEHP in the most recent SCENIHR report on DEHP and other plasticizers in medical device applications (SCENIHR, 2016). Their conclusions for the various health effects are summarized in the table below:

| Epidemiological finding                                           | SCENIHR Conclusion                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effects on testosterone production                                | Weak association with considerable variation and inconsistency of results for DEHP.                                                                                                                                                                                                                                                     |
| Breast tumors                                                     | Weak association in one study with DEHP and contrasting results for other phthalate metabolites.                                                                                                                                                                                                                                        |
| Hypospadias and cryptorchidism                                    | No association.                                                                                                                                                                                                                                                                                                                         |
| Decreased anogenital distance                                     | Inconsistent evidence.                                                                                                                                                                                                                                                                                                                  |
| Mother/infant exposure levels                                     | Some studies show association between phthalate exposure and low birth weight. Other studies do not.                                                                                                                                                                                                                                    |
| Childhood growth and pubertal development                         | No evidence of anti-androgenic effects in healthy boys.<br>Boys - no association with pubertal timing, testosterone levels or pubertal gynaecomastia.<br>Girls - no association and age of menarche or onset of breast development. Two studies showed no association with precocious puberty; one other showed a positive association. |
| Endometriosis                                                     | Inconclusive evidence.                                                                                                                                                                                                                                                                                                                  |
| Effect of DEHP metabolites on neurobehavior                       | Inconsistent evidence.                                                                                                                                                                                                                                                                                                                  |
| Association with obesity, insulin resistance, and Type-2 diabetes | Inconsistent evidence. Recent meta-analysis of 18 studies concluded there was no association.                                                                                                                                                                                                                                           |

As noted above, we believe these types of studies must be considered carefully; however, publications with conclusions such as weak association, no association, or inconsistent evidence, hardly are sufficient as a justification for regulatory action on specific ortho-phthalates or this whole class of chemicals. More recently, the EU Risk Assessment Committee (RAC) disregarded the epidemiological associations in the DINP Classification and Labelling decision with the following rationale: “RAC noted that no clear cut conclusions can be drawn from the epidemiological studies presented in the CLH report. Among a large number of possible associations between exposure levels and reproductive endpoints some positive associations were found which **were possibly due to random error.**” (ECHA 2018)

### Comments on cost/benefit analyses

We were disappointed in the quality of the analyses described in Section 4.2.1.2, Hazards of ortho-phthalates, of the PRA report. It appears to be an “extrapolation of extrapolations” from a few speculative studies of questionable credibility and also has some errors in the citations.<sup>3</sup>

Previously, we raised serious concerns about Trasande, et al. (2022) and stated that it should be viewed with some skepticism and caution. The authors concluded that phthalates were associated

<sup>3</sup> Trasande (vs. Trassande) is misspelled on p. 48. Engel (vs. Engle) is misspelled on p. 46. Some incomplete citations are used such as Ref 40 (NAS, 2008) and Ref 41 (Wang et al., 2019); i.e., which Wang publication and NAS report are cited here. We assume these are the publications cited in the Final Regulatory Report from June 2022, but this should be more clear and transparent.





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with “all-cause and cardiovascular mortality”. The critical commentary by Gregory Bond (2021) provides some context and rational perspective on this paper. In addition, a colleague calculated that according to the Trasande report, phthalates potentially contribute to almost half of all deaths caused by heart disease, cerebrovascular diseases, and cancer in the 55 – 64-year-old group in the U.S. – this is nonsense, and it is unlikely that any reasonable person would view this as credible.

As noted in the previous section, exposure via dust is likely a minimal contributor to ortho-phthalate exposure, and the ortho-phthalates detected may not be bioavailable to a relevant proportion. In addition, the epidemiological studies must be looked at seriously but also must be viewed with some caution and skepticism.

The PRA report describes regulation of vinyl flooring with ortho-phthalates as a “potential” benefit because of uncertainty around the link with asthma. While some papers suggest a link, others such as Odebeatu, et al. (2019) do not for most ortho-phthalates, and earlier studies concluded that common ortho-phthalates do not show a consistent and proven ability to enhance allergic sensitization under conditions that are relevant for human health (Kimber and Dearman, 2010).

Benefits for restricting ortho-phthalates in fragrances in the PRA report was based on the detection of mono-ethyl phthalate (MEP), a metabolite of diethyl phthalate (DEP), in human biomonitoring studies and the “potential reductions in endocrine-related diseases and reproductive and developmental health improvements.” (PRA, p. 48) The publication of NHANES and other HMN data over 20 years ago created much media attention, particularly for DEP; however, David (2000) calculated intake levels from the human urinary metabolite levels and compared them to previous estimates from various risk assessments. For example, the mean for DEP was 12.34 mg/kg-bw/day versus a previous estimate of 57 mg/kg-bw/day and the EPA RfD of 800 mg/kg-bw/day. Similar mean intake levels calculated by NIEHS and CDC and in Europe (Kohn et al., 2000; Koch, et al., 2003) ranged from 2.32 mg/kg-bw/day in the European study to 12.3 mg/kg-bw/day for the U.S. (identical to the results from David, 2000). We do not believe this is evidence of high exposure and concern, particularly since the manufacture and use of DEP has decreased over the past 20 years.<sup>4</sup>

The proposed reduction in health costs appears to be based on the assumption that low molecular weight ortho-phthalates such as DEP act as endocrine disruptors. DOE is aware of but apparently ignored the EPA publication, Furr et al. (2014), that showed no effect on fetal testosterone production for DMP and DEP in their screening study. The European Community Rolling Action Plan (CoRAP) conclusion in 2015 for DEP also was ignored; this assessment concluded that no

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<sup>4</sup> IHS Chemical Economics Handbook reports the U.S. production of DEP has decreased from 5 kmt to 0 kmt from 2000 to 2020; consumption was around 2 kmt in 2020 based on import statistics (BASF analysis). Zota, Calafat, Woodruff (2014) showed a corresponding decrease in MEP urinary metabolite levels in human biomonitoring data.



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classification for fertility effects was justified and “existing information on DEP is sufficient to conclude that DEP does not exhibit endocrine disrupting effects in humans similar to those observed with other phthalate diesters.” (ECHA, 2015) A few epidemiological studies have suggested a weak association between DEP and some health effects; however, as noted above, these studies are quite limited in their validity for regulatory determinations and are not suitable for use in justifying regulatory action.

The PRA estimated an aggregate cost of between \$798 and 942 million in lost productivity in Washington due to the use of ortho-phthalates in vinyl flooring and fragrances. We find this estimate highly speculative and, frankly, absurd. This estimate appears to be based on conclusions from one of several questionable publications by Trasande, et al. (2022), common exposure to phthalates in dust and other indoor air sources, the potential impact of phthalates on asthma, and *extrapolation of extrapolated estimates* of the impact of EDC from Europe. This is clearly not a credible analysis of potential costs due to ortho-phthalate exposure. In addition, if established NOAELs and TDIs are considered along with the extensive database from HBM studies, indicating very low exposure levels for the general public including sensitive subpopulations, there are most likely no actual costs to be expected for adverse health effects due to ortho-phthalate exposure, and certainly not due to those that have no hazard classifications with no evidence of anti-androgenic or other effects related to endocrine disruption.

## Conclusions

1. **Ortho-phthalates must not be regulated as a class.** This is not supported by the scientific evidence and is inconsistent with conclusions from other relevant government agencies such as US CPSC, Environment Canada and Climate Change, and ECHA.
2. **The full hazard assessments by non-governmental organizations such as SciVera and ToxServices must be made publicly available and subject to scientific scrutiny if they are intended to be part of the basis for regulatory action by the DOE.** These types of assessments are quite helpful to companies such as BASF and our customers; however, if used as part of the regulatory process, transparency is a mandatory requirement. **Once these are available, an extended public comment period should be opened to allow time for review and comment.**
3. **The cost/benefit analysis for ortho-phthalates must be revised or retracted owing to the use of highly speculative publications to support the conclusions by DOE.** DOE might consider a retraction of this analysis altogether based on the circular rational described in the PRA report:

*Ecology determined that a restriction on the use of ortho-phthalates in vinyl flooring would reduce a significant source of ortho-phthalate exposure. Most vinyl flooring no longer contains ortho-phthalates. However, vinyl flooring*



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*remains a significant source of potential exposure to ortho-phthalates for people using and purchasing vinyl flooring products that contain ortho-phthalates. (PRA, p. 47)*

This is a quite strange and circular argument since ortho-phthalates have been largely replaced by alternative plasticizers in vinyl flooring, supporting our suggestion above that this is simply an intellectual exercise.

Please contact me if there are any questions at [patrick.harmon@basf.com](mailto:patrick.harmon@basf.com) or 346-252-4123.

*Patrick Harmon*

J. Patrick Harmon  
Industry Manager Industrial Petrochemicals  
BASF Corporation

Copies to:

Rainer Otter  
Vice President – Regulatory Affairs and Advocacy, Industrial Petrochemicals Europe  
BASF SE

John Erickson  
Associate General Counsel  
BASF Corporation

Martha Landwehr, J.D.  
Senior Manager, State Government Affairs - TX & Western Region  
BASF Corporation



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## USA WTO TBT Enquiry Point, National Institute of Standards and Technology (NIST)

These comments, which do not include any confidential business information (CBI), were provided to NIST (as the USA Notification Authority under the World Trade Organization Agreement on Technical Barriers to Trade - WTO TBT Agreement) by Ms. Emi Yamamoto of the secretariat of JEITA (Japan Electronics & Information Technology Industries Association) on behalf of four Japanese electric and electronic industrial associations (JP4EE). The Safer Products for Washington Rulemaking Proposal was notified by the United States per obligation under the WTO TBT Agreement, and circulated by the WTO under the symbol G/TBT/N/USA/1958.

The input/comments provided by JP4EE is based on their knowledge as EEE manufacturers, and they would very much appreciate careful consideration of their input.

The Four Electrical and Electronics Associations that comprise JP4EE are as follows:

JEITA (Japan Electronics & Information Technology Industries Association)  
JEMA (Japan Electrical Manufacturers' Association)  
CIAJ (Communications and Information Network Association of Japan)  
JBMIA (Japan Business Machine and Information System Industries Association)

Kind regards,

Emi Yamamoto  
Deputy Manager,  
Technical Strategy Department  
Business Development and Strategy Division  
Japan Electronics and Information Technology Industries Association (JEITA)



February 1, 2023

Hazardous Waste and Toxics Reduction Program, Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504 -7696

**Re: Japan 4EE Comments on Proposed Rule of Safer Products for Washington**

JEITA (Japan Electronics & Information Technology Industries Association)  
CIAJ (Communications and Information Network Association of Japan)  
JBMIA (Japan Business Machine and Information System Industries Association)  
JEMA (The Japan Electrical Manufacturers' Association)

We, Japanese electric and electronic industrial associations (JEITA, CIAJ, JBMIA and JEMA) (hereinafter, Japan 4EE), thank the Washington Department of Ecology (hereinafter, Ecology) very much for providing the opportunity for public comments on Proposed Rule of Safer Products for Washington program.

We have been vigorously committed to improve energy efficiency and to comply with chemical regulations set by other countries, including Europe, the U.S. and China, etc.

We support the basic policy of “the Safer Products for Washington program” as electric and electronic equipment (hereinafter, EEE) industry, because it would protect the consumers’ health and environment based on risk assessment by identifying and managing the priority chemicals and priority consumer products which may be main sources of exposure to such substances.

However, we would like to emphasize again that EEE operators will be extremely difficult to comply with the regulation if all HFRs in class are regulated for all EEE enclosures, and conversely, it may cause an adverse effect to the citizens of the State of Washington. Therefore, we would like to request you to revise the regulations to make it practicable, referring to the comments below.

We also would like to offer comments on regulating thermal paper which is used as a consumable item in some products but not in the EEE itself.

We would appreciate your consideration.

## **I. Regulation of Organohalogen flame retardants (HFR) in EEE enclosures**

In response to the Preliminary draft rule published in August, 2022, Japan 4EE submitted you the following comments on August 31.

- 1) Limit the covered HFRs to those recognized as harmful in other countries
- 2) Limit the covered EEE enclosures to TVs, displays and stands, harmonizing with the EU LOT 5 and NY state laws.
- 3) Set appropriate thresholds (e.g., 0.1%)
- 4) Set the appropriate grace period (at least four years)
- 5) Set the enforcement date based on manufacturing date
- 6) Set exclusions for spare parts, repair and refurbishment parts, and research and development use.
- 7) When more than 1000 ppm of halogen is detected by elemental analysis, the assumption of that HFRS were intentionally added is an issue.

However, with the exception of 5) stated the above, the Proposed Rule barely reflects the above requests and still aims to regulate all HFRs in all EEE enclosures without proper risk assessment. Even with the current industry technologies, it is extremely difficult for operators to follow such laws and regulations, so the proposal is not realistic as a regulatory requirement.

In addition, since the manufacture and sale of EEE cannot normally be controlled exclusively for a specific state, the impact of the proposal will be extended to virtually all products destined for the United States. Although it is known that HFRs are widely used in parts and materials of EEE, most HFRs have not been found to be hazardous, and any information on HFRs has not been communicated through the supply chain, so that it is difficult to grasp the information of HFRs contained in EEE, and any discussion on alternative substances has not been started yet.. Therefore, we are concerned that the hasty implementation of this regulation will prevent EEE from being distributed to the State of Washington and, as a result, which will have a serious negative impact on the citizens of the State of Washington, the people in America and the economy.

Furthermore, as HFRs are essential chemicals used to prevent the spread of EEE and protect human lives in the event of a fire, implementation of hasty regulation of all HFRs would put the lives of citizens and citizens at risk, so that extremely careful consideration is required to ban HFRs. Although Ecology states that there are alternative flame retardants to HFRs, we understand that it simply means that an alternative candidate flame retardant is available. A long-term study is needed to confirm that a wide variety of EEE enclosures with different applications and environments can meet all requirements for EEE, including not only flame retardancy but also initial characteristics and reliability.

Based on the above issues, we would like to offer our comments.

In order to make the proposed rule appropriate in which consideration of both risks to people and the environment and economic benefits are reflected, we will add comments to the proposed rule after re-requesting items not reflected in the proposed rule published on DEC. 7, 2022 stated above in 1) to 7). Finally, we would like to propose you an amendment based on our request.



[Notes]

•In particular, as for 1) and 2) , we requested you total 3 times for previous public comments because they are essential to making the rule appropriate. Therefore, we hope that Ecology will consider and reflect them to the rule this time.

•We would like to comment on the proposed ban on products intended for indoor use.

We request you to remove the provision of any information on products intended for outdoor use.

It is easy to deduce that the risk of exposure from products used outdoors in the first place is negligibly small without an exposure assessment. As mentioned above, many HFRs are not restricted because their hazards are unconfirmed, nor is information gathered through the broad supply chain. Therefore, despite the considerable effort involved in gathering information for reporting, it is unlikely to directly contribute to protecting consumer health and the environment from hazardous chemicals, which is the purpose of this regulation.

1) Limit the covered HFRs to those recognized as harmful in other countries:

In the first place, the evaluation that led Ecology to conclude in December 2021 that it is reasonable to regulate EEE enclosures collectively as a class for all HFRs, was not satisfactory. If HFRs are to be restricted on the basis of the results of the Ecology assessment, consistency with the regulations of the preceding country/region is desirable, and it is appropriate to limit HFRs to those recognized as harmful, regulated, or under consideration for regulation in other countries (For example, SCCP, TCEP, TDCPP).

- Short chain chlorinated paraffins (SCCP) 85535-84-8
- Tris(2-chloroethyl) phosphate (TCEP) 115-96-8
- Tris(1,3-dichloro-2-propyl) phosphate (TDCPP) 13674-87-8

Alternatively, limit the use to HFRs with the following hazard classes that may affect humans.

- Carcinogenic Carc. 1A, 1B
- Germline mutagenic Muta. 1A, 1B
- Reproductive toxicity Repr 1A, 1B

In limiting the HFRs, it is essential to specify the CAS RN of the target substances.

In the absence of a CAS RN designation, chemical management in a complex and long supply chain such as an EEE is not possible. Thereby at least provide an exhaustive list with a CAS RN specified when limiting HFRs.

2) Limit the covered EEE enclosures to TVs, displays and stands, harmonizing with the EU LOT 5 and NY state laws:

For the purposes of the rule, rather than all EEE enclosures being subject to regulation, each candidate product should first be limited after assessing the risk of exposure to humans and the environment. In the first place, the components that make up the EEE, including the enclosures, are designed so that the HFRs contained in the product during use are not released into the environment in order to maintain the required flame retardant function, and it is inconceivable that HFRs from the product to human and the environment will be exposed.

However, if Ecology believes that it is absolutely necessary to regulate a specific EEE enclosures, it is desirable that the rule is harmonized with the regulations of the preceding other country/region, and it is also appropriate to limit the covered EEE enclosures to TVs, consumer electronic display harmonizing with the New York law (Section 4630 B/A 5418 B<sup>1</sup>) promulgated in January 2022 and the EU LOT5 (Revised eco-design regulation for TV/Display (EU 2019/2021<sup>2</sup>)).

Although the Proposed Rule would limit prohibited products from January 1, 2025 to “electronic displays”, we request you to amend the definition of "electronic display" in 173 -337-025 to the following, harmonizing with the New York law or the EU LOT5:

“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. Electronic display shall 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.

In addition, although you have planned that the Proposed Rule also would prohibit products other than electronic displays from January 1, 2026, we strongly ask you to reconsider it.

Even if, based on an appropriate exposure risk assessment, it is concluded that some specific products other than electronic displays should also be banned in the future, an sufficient grace period should be provided, with careful communication with relevant stakeholders. Generally, EEE requires at least a four-year grace period. Please refer to 4) stated below for the reasons.

We also request you that the definition of target products be reconsidered to avoid confusion. As stated in the Proposal Notice, we understand that EEE plastic device casings are covered. In the proposed rule, the preferred consumer products are defined as "EEE with plastic external enclosure" and excluded products include cables, batteries and light bulbs. However, since some of these excluded products do not fit the definition of an EEE external enclosure, we are concerned that components not included in the definition of an "EEE external enclosure" but not listed in the excluded products could be construed as regulated.

To avoid such concerns, we suggest, for example, designating the preferred consumer product as an "EEE external enclosure" and removing excluded products, or providing a non-exhaustive list of examples, such as cables, batteries, and light bulbs. Alternatively, we would like to propose you the following changes to components/parts that are excluded (based on Section 173 -337 -112 (a) (iii)) in order to clearly determine whether each component used in a product is deemed an EEE external enclosure.

(iii) This subsection does not apply to the following parts of the priority consumer products described in (a) of this subsection.

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<sup>1</sup> <https://www.governor.ny.gov/news/governor-hochul-signs-legislation-protect-new-yorkers-harmful-flame-retardant-chemicals>

<sup>2</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R2021&from=EN>

(A) Inaccessible electronic component or parts\*, such as printed circuit boards and internal fans.

\*Inaccessible parts may refer to the interior of plastic external enclosures that are not accessible during use of the product.

(B) Internal parts that may be are removable and replaceable, but not accessible once the product is in its fully assembled and functional form.

In addition, we would like to propose you a modification to the following definition of an external enclosure.

“External enclosures mean the plastic enclosure and stands of electronic displays.”

3) Set appropriate thresholds (e.g., 0.1%)

Although the proposed rule limits the scope of regulation to intentionally added HFRs, we request you that an appropriate threshold (e.g., 0.1%) be established.

Limitations to intentional additions have led to the inclusion of HFRs as impurities, by-products, and recycled materials not being regulated, but the EEE industry needs to set appropriate thresholds to manage chemicals of concern across the supply chain.

It is reasonable to set the threshold at 0.1% by weight that is the same level set for brominated flame retardants PBB and PBDE by the EU RoHS Directive banning certain flame retardants in EEE. These two groups of substances are among the most hazardous of HFRs, but at this threshold they have been able to significantly reduce the risk without compromising consumer benefits. Additionally, in the case of setting the threshold at 0.1% by weight, we would like to highlight again that HFRs contained in recycled materials should be exempted from the restriction because such HFRs in recycled materials are not intentionally added by manufacturers of the products.

4) Set the appropriate grace period (4 years or more)

EEE consists of a large number of components and is manufactured in complex global supply chains around the world. Therefore, the control of controlled substances in products is not possible by EEE manufacturers alone, and the substances are controlled through communication within the supply chain. The method is internationally standardized, and a common list of controlled substances is used in industries. The EEE industry uses IEC 62474 “Material Declaration for products of and for the electrical industry” as a common standard.

Substitution of functional substances in EEE takes a long time. The EU RoHS Directive, for example, clearly identifies controlled substances, sets the threshold at 0.1%, and gives about four years to prepare for the designation of new controlled substances, even when suitable alternative substances are already available. In view of the smooth implementation of compliance of goods in the United States, we request you a grace period of at least four years for substitution of substances in consumer EEE.

For reference, the outline dates for the process our members will undertake to phase chemicals out of the supply chain are as follows:

The fastest time frame is stated for each step when the target substance and threshold are set appropriately; however, the entire process has barely been completed in the shortest time, therefore, at least a grace period of four years is necessary. Individual steps and time frames may vary from company to company.

- Procurement and evaluation of replacement parts with suppliers: at least six months, usually longer. If there is no suitable replacement, it stops at this step in the first place.
- Internal quality assessment: a minimum of 3 months, usually longer.
- Quality and safety certification: a minimum of six months, usually longer.
- Supplier adjustments and manufacturing changes: a minimum of 6 months, usually longer.
- Shipping, importing, and delivery in the US: a minimum of 3 months

5) Set the enforcement date based on manufacturing date

Our request has been reflected in the proposed rule. We appreciate it.

6) Set exclusions for spare parts, repair and refurbishment parts, and R & D uses

6-1) Exclusion of spare parts and repair and refurbishment parts for products manufactured before enforcement of the rule

We appreciate that the amendment excludes spare parts and refurbished parts manufactured before the effective date.

However, as the proposed rule is insufficient, spare and refurbished parts for use in products manufactured before the effective date should be excluded indefinitely.

EEE manufacturers have an obligation to supply spare parts and consumables to customers over time and must store them for certain period in warehouses as spare parts, parts and raw materials because manufacturing of some of the parts and raw materials that make up the spare parts and consumables may be discontinued.

In addition, the production of spare and refurbished parts for this EEE shall continue even after the enforcement of the EEE regulations in order to keep the covered EEE usable for as long as possible.

Therefore, spare and refurbished parts for use in EEE manufactured before the enforcement date of the regulations should be excluded indefinitely from the scope. The EU RoHS also allows this exemption, and it makes sense to do so in light of the global trend of efficient use of resources.

6-2) Exclusion of research and development products

Research and development activities in the United States are important for the people in the world to develop and introduce cutting-edge technologies and products, including fighting against COVID-19 and exploring alternative materials as substitutes for goods manufactured or imported for use in the United States.

Without the ability to conduct research and development of such products and articles in the United States, it is essentially impossible for industrial member companies to meet the advanced technical performance specifications of their products. Responsible chemicals management programs should be permitted and encouraged. Commercial manufacture/import/distribution of EEE external device enclosures including HFRs for research and development activities such as prototypes should be excluded. At a minimum, the following should be excluded:

- (i) When a limited number of articles are used for research and development activities in the United States (e.g., 100 or fewer)
- (ii) Products recovered after use in research and development activities and shipped outside the United States

7) When more than 1000 ppm of halogen is detected by elemental analysis, the assumption of that HFRs were intentionally added is an issue.

Elemental analysis can only confirm the presence of halogens, not uses of the halogens. Halogens from unintentional additions, such as recycled materials, impurities, and by-products, as well as halogens from blame-retardant agents, such as antioxidants and electricity-imparting materials, are often used in EEE. In actual elemental analysis, it is easy to expect that halogens will be frequently detected.

If the manufacturer is asked to rebut whenever halogen is detected, the manufacturer will incur a great burden in preparing documents for the rebuttal. It would also be a heavy burden for Ecology who would need to seek to disprove the evidence.

Therefore, this provision should be deleted, and after limiting the covered HFRs as described in 1) above, manufacturers should be given an opportunity to rebut after detecting restricted HFRs individually.

#### 8) Clarification of unclear descriptions

##### 8-1) Intended for Indoor/Outdoor Use

In the current draft, some EEEs can fall into both the Intended for Indoor and Outdoor Use categories, while Section 173 -337 -112 (2) (a) (ii) (A) indicates that the provisions for electronic products intended for outdoor use do not apply to products intended for indoor use. We propose you that the definition of “intended for outdoor use” be changed as follows to clarify which of these products falls under:

“Intended for Outdoor Use” means a product designed ~~to maintain functionality~~ solely for use after outdoor exposure to ultraviolet (UV) light, water, or immersion ~~—when used outdoors for an extended time.~~

##### 8-2) “Intentionally added chemical”

We would like to request you the exclusion of intentionally added chemicals that are added during the manufacture of the product in order to perform their intended function. Therefore, we propose you to change the definition as follows:

“Intentionally added chemical” means a chemical that serves an intended function in the final product ~~or in the manufacturing of the product or part of the product.~~

#### 9) Other

##### 9-1) Set exclusions for enclosures weighting less than 25 g

The amendment excludes enclosures weighing less than 0.5 g, however, we request you that enclosures weighing less than 25 g be excluded in accordance with EPEAT Computers and Displays Category criteria based on 4.1.5.1 of IEEE Std 1680.1a™-2020<sup>3</sup>.

##### 9-2) Delete the setting of the enforcement date according to the enterprise classification.

Although the proposed rule classifies companies into Group 1 and Group 2 according to their size and the

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<sup>3</sup> Standard can be downloaded from <https://www.epeat.net/about-epeat>

enforcement date changes according to this classification, this is meaningless.

It is understandable that this division was established to reduce the burden on small and medium-sized enterprises (SMEs), however it is inconceivable that the law-abiding period varies depending on the size of the enterprise, and many Group 1 companies use Group 2 products to manufacture their own products, and even if Group 2's enforcement schedule is pushed back, it will not reduce the burden on SMEs because Group 2 will also have to adhere to Group 1's schedule.

Therefore, in order to reduce the burden on SMEs, it is appropriate to align the enforcement date with Group 2.

#### 9-3) Request for exemption

Currently, it is required to comply with the requirements of the rules until the DOE grants an exemption. In that case, all distribution, including downstream suppliers, would have to stop until the DoE grants it. To avoid such supply chain disruptions, we request you that the company be allowed to continue selling its products until the DOE makes a final decision on the exemption application.

#### 9-4) Previously-owned priority consumer products

As for the exclusion of "previously owned products," we would like you to consider adopting the "exemption for products owned/sold prior to the effective date" as stated in TSCA.

### Conclusion

In summarizing our requests stated above, it is appropriate to amend the legal text as follows, for example:

**WAC 173-337-025 Acronyms and definitions.** Unless ecology determines the context requires otherwise, the following definitions apply for the purposes of this chapter.

"Electronic display" means 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.

Electronic display shall 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.

"External enclosures" means ~~the plastic external part of the product that renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock or retards propagation of flame initiated by electrical disturbances occurring within~~ the plastic enclosure and stands of electronic displays.

"Intended for Outdoor Use" means a product designed ~~to maintain functionality~~ solely for use after outdoor exposure to ultraviolet (UV) light, water, or immersion ~~when used outdoors for an extended time.~~

"Intentionally added chemical" means a chemical that serves an intended function in the final product ~~or in the manufacturing of the product or part of the product."~~

## **WAC 173-337-112 Flame retardants.**

### **(1) Electric and electronic products with plastic external enclosures, intended for indoor use.**

#### (a) Applicability.

(i) Priority consumer products. This subsection applies to enclosure of electric and electronic products ~~with plastic external enclosures~~, intended for indoor use that are powered by either of the following:

(A) Standard 120 volt outlets and designed for up to 20 amp circuit;

(B) Battery.

(ii) This subsection does not apply to:

(A) Electric and electronic products with plastic external enclosures, intended for outdoor use.

(B) Consumer products that receive power only when they are hardwired into and permanently part of the fixed electrical wiring of a building. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment.

(C) Products regulated by the FDA as medical devices.

(D) Products designed to use nonelectric heating energy sources, such as natural gas.

(iii) This subsection does not apply to the following parts of the priority consumer products described in (a) of this subsection.

(A) Inaccessible electronic component or parts, such as printed circuit boards and internal fans.

\*Inaccessible parts may refer to the interior of plastic external enclosures that are not accessible during use of the product.

(B) Internal parts that may be are removable and replaceable, but not accessible once the product is in its fully assembled and functional form.

(C) Plastic external enclosure parts that weigh less than ~~0.5~~25 grams.

(D) Screens. This subsection does apply to the plastic enclosure surrounding the screen.

~~(E) Wires, cords, cables, switches, light bulbs, and connectors.~~

#### (b) Compliance schedule.

##### ~~(i) Group definitions.~~

~~(A) "Group 1" means a person or entity whose gross sales equal or exceed \$1,000,000,000 in 2022.~~

~~(B) "Group 2" means a person or entity whose gross sales are less than \$1,000,000,000 in 2022.~~

##### (ii) Electronic displays and televisions compliance schedule.

(A) The restriction in (c) of this subsection takes effect ~~on January 1, 2025~~ [4 years after issuance of this rule], for persons or entities in Group 1 or Group 2 who manufacture, sell, or distribute:

- Electronic displays described in (a) of this subsection;
- Televisions described in (a) of this subsection.

(B) This does not include the following priority consumer products:

- All-in-one video conference systems;
- Displays that are integrated with appliances and are not available for purchase as separate products by end-users;

- Projectors;
- Virtual reality headsets.

~~(iii) Group 1 compliance schedule.—~~

~~(A) The restriction in (c) of this subsection takes effect on January 1, 2026, for persons or entities in Group 1 who manufacture, sell, or distribute a priority consumer product described in (a) of this subsection.—~~

~~This includes:—~~

- ~~• All in one video conference systems;—~~
- ~~• Displays that are integrated with appliances and are not available for purchase as separate products by end users;—~~
- ~~• Projectors;—~~
- ~~• Virtual reality headsets.—~~

~~(B) This does not include the following priority consumer products described in (a) of this subsection:—~~

- ~~• Electronic displays described in (a) of this subsection;—~~
- ~~• Televisions described in (a) of this subsection.—~~

~~(iv) Group 2 compliance schedule.—~~

~~(A) The restriction in (c) of this subsection takes effect on January 1, 2027, for persons or entities in Group 2 who manufacture, sell, or distribute a priority consumer product described in (a) of this subsection.—~~

~~This includes:—~~

- ~~• All in one video conference systems;—~~
- ~~• Displays that are integrated with appliances and are not available for purchase as separate products by end users;—~~
- ~~• Projectors;—~~
- ~~• Virtual reality headsets.—~~

~~(B) This does not include the following priority consumer products described in (a) of this subsection:—~~

- ~~• Electronic displays described in (a) of this subsection;—~~
- ~~• Televisions described in (a) of this subsection.—~~

(c) Restriction.

(i) No person may manufacture, ~~sell, or distribute~~ a priority consumer product described in (a) of this subsection that has a plastic external enclosure that contains intentionally added organohalogen flame retardants described in (d) of this section.

This does not apply to a:

(A) Priority consumer product described in (a) of this subsection manufactured before the applicable compliance schedules in (b) of this subsection;

(B) Repair part or replacement part used for the products manufactured before the applicable compliance schedules in (b) of this subsection;

(C) Priority consumer product refurbished with repair or replacement parts for the products manufactured before the applicable compliance schedules in (b) of this subsection.



(d) Organohalogen flame retardants covered in this section

Short chain chlorinated paraffins (SCCP) 85535-84-8

Tris(2-chloroethyl) phosphate (TCEP) 115-96-8

Tris(1,3-dichloro-2-propyl) phosphate (TDCPP) 13674-87-8

~~(ii) Ecology presumes the detection of:—~~

~~(A) Total bromine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants.—~~

~~(B) Total chlorine concentrations above 1,000 ppm indicate intentionally added organohalogen flame retardants.—~~

~~(C) Total fluorine concentrations above 1,000 ppm with less than 5,000 ppm total phosphorus indicate intentionally added organohalogen flame retardants.—~~

~~(iii) Manufacturers may rebut this presumption by submitting a statement to ecology that includes the following information:—~~

~~(A) The name and address of the person submitting the statement;—~~

~~(B) A statement that an organohalogen flame retardant was not intentionally added. Provide credible evidence supporting that statement and include information, data, or sources relevant to demonstrate that an organohalogen flame retardant was not intentionally added.~~

~~**(2) Electric and electronic products with plastic external enclosures, intended for outdoor use.**~~

**II. Regulation of Bisphenols in Thermosensitive Paper**

In response to the Preliminary draft rule published in August, four Japanese electrical and electronics organizations submitted the following comments on August 31.

- 1) Set appropriate thresholds (e.g. 0.02%) and identification of controlled substances
- 2) Set an appropriate grace period (36 months or more)
- 3) Set the effective date based on the "date of manufacture"

As for the thresholds in 1) above and 3) above, which are reflected in the proposed rules, we would like you to consider the following proposals, which are essential to make the regulations realistic considering social interests.

- 1) Set appropriate thresholds and identification of controlled substances

We appreciate the proposed amendment setting the threshold at 0.02%, however, we request you to identify certain bisphenols to be restricted.

In order to implement regulations smoothly, it is desirable to align the regulations with those that precede them in other countries. Although there are no regulations for bisphenol as a class of thermal paper in

other countries, there are many regulations for thermal paper (or receipts) containing bisphenol A (or BPA). The European Union limits the concentration of BPA in thermal paper products to 0.02% by weight, and Switzerland limits alternative bisphenol S (or BPS) to a similar concentration.

Efficient management of substances in goods manufactured through the supply chain requires simplicity and clarity that can be understood by manufacturers in any part of the world. Since the types of bisphenols used in thermal paper are limited, it is desirable to clearly identify controlled substances with identifiers such as CAS RN.

2) Exclude FDA-regulated medical devices

We request you that medical devices regulated by the FDA be exempted from the regulation of bisphenols in thermal paper as well as from the regulation of OFR.

3) Set an appropriate grace period (36 months or more)

There was a 36-month grace period for BPA restrictions after the EU REACH regulation came into force. In view of the smooth implementation of compliance for goods in the EU, we would like to request you to set a grace period of at least 36 months.

Sincerely yours,



Tsukasa Kimura  
Senior Manager for Environmental  
Business Development Department  
Business Strategy Division  
Japan Electronics and Information Technology Industries Association (JEITA)  
Ote Center Bldg., 1-1-3, Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan  
TEL +81-70-3297-8700  
[t-kimura@jeita.or.jp](mailto:t-kimura@jeita.or.jp)

## About Japanese electric and electronic (E & E) industrial associations:

### About JEITA

The objective of the Japan Electronics and Information Technology Industries Association (JEITA) is to promote the healthy manufacturing, international trade and consumption of electronics products and components in order to contribute to the overall development of the electronics and information technology (IT) industries, and the very future Japan's economic development and cultural productivity.

### About CIAJ

Mission of Communications and Information network Association of Japan (CIAJ). With the cooperation of member companies, CIAJ is committed to the healthy development of info-communication network industries through the promotion of info-communication technologies (ICT), and contributions to the realization of more enriched lives in Japan as well as the global community by supporting widespread and advanced uses of information in socio-economic and cultural activities.

### About JBMIA

Japan Business Machine and Information System Industries Association (JBMIA) is the industry organization which aims to contribute the development of the Japanese economy and the improvement of the office environment through the comprehensive development of the Japanese business machine and information system industries and rationalization theory.

### About JEMA

The Japan Electrical Manufacturers' Association (JEMA) The Japan Electrical Manufacturers' Association (JEMA) consists of major Japanese companies in the electrical industry including: power & industrial systems, home appliances and related industries. The products handled by JEMA cover a wide spectrum; from boilers and turbines for power generation to home electrical appliances. Membership of 291 companies, <http://www.jema-net.or.jp/English/>



## King County

Department of Natural Resources and Parks

### Wastewater Treatment Division

King Street Center, KSC-NR-5501  
201 South Jackson Street  
Seattle, WA 98104-3855

February 2, 2023

Stacey Callaway

Hazardous Waste and Toxics Reduction Program, Washington Department of Ecology

P.O. Box 47600

Olympia, WA 98504-7696

c/o [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

RE: Support for new rule on Safer Products for Washington - Chapter 173-337 WAC – Safer Products Restrictions and Reporting

Dear Ms. Callaway:

Thank you for the opportunity to support Washington State Departments of Ecology's (Ecology) new rule, Chapter 173-337 WAC – Safer Products Restrictions and Reporting. We appreciate the work that Ecology is undertaking to address several classes of pervasive and persistent chemicals found in common products, in support of human and environmental health.

King County's Wastewater Treatment Division (WTD) serves about 1.8 million people within a 424 square mile service area including most urban areas of King County and parts of Snohomish and Pierce Counties. In 2021, our three regional treatment plants and two smaller treatment plants treated a combined daily average of 178 million gallons of wastewater, and together produced 116,000 wet tons of biosolids that were land applied to forests and farms in Washington as a beneficial soil amendment.

**WTD supports the new rule and chapter, which aims to reduce toxic chemicals in consumer products, supporting source control of priority chemicals.**

As the largest wastewater treatment utility in the state, we support regulations and programs that result in fewer chemicals in the wastewater stream as a positive step. Wastewater should not be viewed a "source" of these chemicals, instead it receives the chemicals that are produced or used in our homes and businesses. Wastewater treatment is designed to remove pathogens, but not chemicals. Therefore, source control is the most efficient and effective action mechanism to control exposure for humans and the environment. We look forward to working with Ecology and others to prevent and mitigate impacts to water quality and public health.

Thank you for the opportunity to commend your work and express support.

Sincerely,

DocuSigned by:

Kamron Guroi

Division Director



**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*

980.299.5628

[bob.miller@albemarle.com](mailto:bob.miller@albemarle.com)

## 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 PTFE 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',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.



February 5, 2023

Safer Products for WA  
Hazardous Waste and Toxics Reduction Program  
WA Department of Ecology  
PO Box 47600  
Olympia, WA 98504-7600

RE: Proposed Rule - Chapter 173-337 WAC Safer Products Restrictions and Reporting

Dear State of Washington Department of Ecology,

The American Chemistry Council's (ACC) High Phthalates Panel appreciates this opportunity to comment on the Washington Department of Ecology's (Ecology) proposed regulations to implement the Safer Products for Washington (SPW) Program, Chapter 173-337 WAC - Safer Products Restrictions and Reporting (Proposed Rule) section 111(2) as it pertains to ortho-phthalates in vinyl flooring. As the restrictions on ortho-phthalates in the Proposed Rule remain the same as those in the preliminary draft rule language, we are resubmitting our comments from August 29, 2022 regarding the Washington State Department of Ecology's Safer Products for Washington Program's Preliminary Draft Rule Language for renewed consideration.

As we noted previously, Washington State law RCW § 70A.350.040(3) authorizes Ecology to restrict or prohibit a priority chemical or members of a class of priority chemicals in a priority consumer product when it determines:

- (a) Safer alternatives are feasible and available; and
- (b) (i) The restriction will reduce a significant source of or use of a priority chemical; or
- (ii) The restriction is necessary to protect the health of sensitive populations or sensitive species.

We again contend that none of the criteria in RCW § 70A.350.040(3)(b) have been met in general, and that none of the criteria have been met specifically with respect to high molecular weight phthalates like DINP and DIDP. In the attached comments, we provide detail to demonstrate that vinyl flooring is a negligible use or source of phthalates; that evaluations of human exposures to phthalates in dust and indoor air show these exposures do not pose a health concern to sensitive subpopulations; and that per Ecology's own report, vinyl flooring will account for <1% of total environmental phthalates release, and thus the restriction is not necessary to protect the health of sensitive species. Thus, there is no basis for the restriction of phthalates in vinyl flooring as set forth in the Draft Rule.



Thank you for this opportunity to comment. For more information, or any questions about this submission please contact me at [eileen\\_conneely@americanchemistry.com](mailto:eileen_conneely@americanchemistry.com).

Sincerely,  
*Eileen Conneely*

Eileen Conneely  
Senior Director, Chemical Products & Technology

Attachment:

ACC High Phthalates Panel August 29, 2022 Comments on Safer Products for Washington Program's Preliminary Draft Rule Language





August 29, 2022

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

Via email to: [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

The American Chemistry Council's (ACC) High Phthalates Panel appreciates this opportunity to submit the following comments regarding the Washington State Department of Ecology's Safer Products for Washington Program's Preliminary Draft Rule Language as it pertains to ortho-phthalates in vinyl flooring.

### Background

Washington State Department of Ecology (Ecology) is soliciting comments on preliminary draft rule language for the Safer Products for Washington program, Chapter 173-337 Washington Administrative Code (WAC), Safer Products Restrictions and Reporting. Section 111(2) proposes a restriction of the use of any ortho-phthalate in vinyl flooring at levels >1000 ppm, individually or combined.

Washington State law RCW § 70A.350.040(3) authorizes Ecology to restrict or prohibit a priority chemical or members of a class of priority chemicals in a priority consumer product when it determines:

- (a) Safer alternatives are feasible and available; and
- (b) (i) The restriction will reduce a significant source of or use of a priority chemical; or
- (ii) The restriction is necessary to protect the health of sensitive populations or sensitive species.

We contend that none of the criteria in RCW § 70A.350.040(3)(b) have been met in general, and that none of the criteria have been met specifically with respect to high molecular weight phthalates like DINP and DIDP. Thus there is no basis for the restriction of phthalates in vinyl flooring.

Although there is no basis for enacting the proposed restriction on ortho-phthalates in vinyl flooring, if the proposed rule moves forward, Ecology should include the phrase "intentionally added," as used in section 111(1)(c)(i): "No person may manufacture, sell (including but not limited to wholesale, online, or retail), or distribute a consumer product described in (a) of this subsection that contains an *intentionally added* (emphasis added) ortho-phthalate used as a solvent or fixative for fragrance ingredients."

Thus, the language for section 111(2)(c), if used, would be:



(c) Restriction. No person may manufacture, sell (including but not limited to wholesale, online, or retail), or distribute a consumer product described in (a) of this subsection that contains more than 1,000 ppm of any **intentionally added** ortho-phthalate, individually or combined.

*Table 1: Evaluation of criteria stipulated in RCW § 70A.350.040(3)(b), with respect to phthalate use in vinyl flooring*

| Criteria                                                                                           | Evaluation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Will the restriction reduce a <b>significant source</b> of or use of phthalates in vinyl flooring? | <p><b>No.</b></p> <p><i>We note that the legislation uses the term “significant source of or use...” and not “zero source of or use...”</i></p> <p><b>- Ecology has not demonstrated significant use:</b></p> <p>The DoE published a data call to US vinyl flooring manufacturers in 2020. The response, as noted by Ecology, indicated that <u>12 of 14 manufacturers confirmed that they completely phased out the use of phthalates in vinyl flooring in the United States, between 2013 and 2016.</u><sup>1</sup> The results of the DoE’s data call is confirmed by findings of the Ecology Center, a US consumer advocacy group. A survey of 26 vinyl flooring tiles from US retail stores found <u>zero</u> phthalate use in any of the samples at concentrations above 1%.<sup>2</sup></p> <p>While Ecology indicates that there is still some use for phthalates in vinyl flooring, Ecology does not clarify whether this use represents “significant use” or not, for example what market volume this use represents. However, based on the responses from the flooring manufacturers, and the blanket ban on sales of vinyl flooring containing phthalates by US big box retailers since 2016,<sup>3</sup> this volume is unlikely to represent “significant use.”</p> <p>This conclusion is supported by vinyl flooring manufacturers. We note that Armstrong Flooring and Mohawk, in their February 2020 comments to Ecology, reported that <i>“because of these retail store policies, the vast majority of vinyl flooring sold in the state of Washington (and throughout the United States) is now manufactured without ortho-phthalates.”</i><sup>4 5</sup> Additionally, with</p> |

<sup>1</sup> [VinylFlooring\\_ManufacturerData \(wa.gov\)](https://www.wa.gov/VinylFlooring_ManufacturerData)

<sup>2</sup> [Success! - Home improvement retailers follow through on commitments to remove phthalates from flooring \(saferchemicals.org\)](https://saferchemicals.org/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring)

<sup>3</sup> This includes Home Depot, Lowes, [Ace Hardware](https://www.acehardware.com), Menards, Lumber Liquidators and [Floor&Decor](https://www.flooranddecor.com). [Home Depot leads chemical cleanup of flooring | Greenbiz](https://www.home.com)

<sup>4</sup> [w01kt8i05\\_document.pdf \(scs-public.s3-us-gov-west-1.amazonaws.com\)](https://scs-public.s3-us-gov-west-1.amazonaws.com/w01kt8i05_document.pdf)

<sup>5</sup> [zh1kv8iqc\\_document.pdf \(scs-public.s3-us-gov-west-1.amazonaws.com\)](https://scs-public.s3-us-gov-west-1.amazonaws.com/zh1kv8iqc_document.pdf)



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|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>the elimination of phthalate use in vinyl flooring, as older flooring is replaced, the amount of material released into the environment will continue to decrease.</p> <p><b>- Ecology has not demonstrated significant source:</b></p> <p>Ecology provides an estimate of total phthalate release to the environment from vinyl flooring in its 2020 and 2022 Priority Consumer Products Reports to the legislature.<sup>6 7</sup> Overall, Ecology estimates a total of 10 million - 37 million lbs. in vinyl flooring purchased in Washington annually and 374 lbs. released to the environment.</p> <p>These estimates are based on improper assumptions:</p> <ol style="list-style-type: none"> <li>1. Ecology uses sales data for resilient flooring from 2016-2019. We note that most of the vinyl flooring manufacturers reporting data to Ecology confirmed that they had removed phthalates from new flooring between 2013 and 2016. Hence sales data for resilient flooring from 2016-2019 that is mostly phthalate free cannot provide a basis for Ecology's estimates of potential phthalate release to the environment.</li> <li>2. Ecology assumes that at least 58% of flooring sold would contain phthalates. This rate is derived from the study published by the Ecology Center.<sup>8</sup> However, Ecology is aware that the follow-up testing of phthalate content in vinyl flooring in 2019 resulted in a 0% detection rate.</li> <li>3. The amount released to the environment is based on Ecology's 2011 report indicating that vinyl flooring contributes ~1.4% of total phthalates to the environment. Considering the significant phase-out of phthalate use in vinyl flooring since 2013, this fraction is expected to be considerably smaller. Thus, vinyl flooring would be expected to contribute &lt;&lt;374 lbs. of phthalates to the environment annually.</li> </ol> <p>In its 2022 Priority Consumer Products Reports to the legislature, Ecology cites national sales figures from a 2021 copy of Floor Covering Weekly suggesting rapid growth in sales of luxury vinyl flooring (LVT).<sup>9</sup> Ecology uses this data</p> |
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<sup>6</sup> [Priority Consumer Products - Report to the Legislature \(wa.gov\)](#)

<sup>7</sup> [Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3](#)

<sup>8</sup> See footnote 2.

<sup>9</sup> [Floor Covering Weekly : The Statistical Report 2020 \(e-ditionsbyfry.com\)](#)



|                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | <p>to conclude that “<i>vinyl flooring remains a significant source of potential exposure to ortho-phthalates.</i>” We reviewed this data. We note that the 34% rapid growth (in square feet) referenced by Ecology is specific for rigid core LVT (see Chart 17). As noted by the Resilient Floor Covering Association (RFCI),<sup>10</sup> rigid core LVT manufacturers predominantly now adhere to the Assure Certified™ standard, which requires that products cannot contain individual or total ortho-phthalates at levels greater than 1000 ppm. In other words, a rapid growth in rigid core LVT would be expected to lead to <b>vinyl flooring becoming an insignificant source of potential exposure to phthalates.</b></p> <p>Vinyl flooring is a negligible use or source of phthalates and hence the criteria in RCW § 70A.350.040(3)(b)(i) is not met.</p> |
| Is the restriction necessary to protect the health of sensitive populations? | <p><b>No.</b></p> <p>Ecology has failed to present any evidence to indicate that its action is in response to any health concerns specifically related to phthalate use in vinyl flooring. <u>Existing scientific evaluations of human exposures to phthalates in dust and indoor air show that exposure to phthalates in dust and indoor air do not pose a health concern to sensitive subpopulations.</u><sup>11 12 13 14 15</sup></p> <p>In addition, California’s Office of Environmental Health and Hazard Assessment (OEHHA) has issued safe use determinations (SUDs) for the use of DINP in certain vinyl flooring applications for residential use.<sup>16</sup></p>                                                                                                                                                                                            |

<sup>10</sup> [4v0iit\\_document.pdf](https://www.fda.gov/oc/foia/4v0iit_document.pdf) ([scs-public.s3-us-gov-west-1.amazonaws.com](https://www.fda.gov/oc/foia/4v0iit_document.pdf))

<sup>11</sup> Scientific Committee on Health and Environmental Risks (SCHER). Opinion on risk assessment on indoor air quality (2007) - [https://ec.europa.eu/health/ph\\_risk/committees/04\\_scher/docs/scher\\_o\\_055.pdf](https://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_055.pdf).

<sup>12</sup> European Chemicals Agency (2013) - Evaluation of new scientific evidence concerning DINP and DIDP in relation to entry 52 of Annex XVII to REACH Regulation (EC) No 1907/2006. Final review report. <https://echa.europa.eu/documents/10162/31b4067e-de40-4044-93e8-9c9ff1960715>.

<sup>13</sup> Christia C, Poma G, Harrad S, de Wit CA, Sjoström Y, Leonards P, Lamoree M, Covaci A (2019) Occurrence of legacy and alternative plasticizers in indoor dust from various EU countries and implications for human exposure via dust ingestion and dermal absorption. *Environmental Research* 171: 204-212.

<sup>14</sup> Kim H-H, Yang J-Y, Kim S-D, Yang S-H, Lee C-S, Shin D-C, Lim Y-W (2011) Health Risks Assessment in Children for Phthalate Exposure Associated with Childcare Facilities and Indoor Playgrounds. *Environ Anal Health Toxicol* 26: e2011008.

<sup>15</sup> Hammel SC, Levasseur JL, Hoffman K, Phillips AL, Lorenzo AM, Calafat AM, Webster TF, Stapleton HM: Children's exposure to phthalates and non-phthalate plasticizers in the home: The TESIE study. *Environment International* 2019, 132:105061.

<sup>16</sup> [Issuance of a Safe Use Determination for Exposure to Residents to Diisononyl Phthalate in Vinyl Flooring Products](https://oehha.ca.gov/assessments/substances/dinp/sud) - OEHHA (ca.gov)





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|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                          | DINP and DIDP continue to be used safely in vinyl flooring across numerous other regions, including Europe <sup>17</sup> and Canada.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Is the restriction necessary to protect the health of sensitive species? | <p><b>No.</b></p> <p>Since PVC flooring will account for &lt;1% of total environmental release to phthalates (well below Ecology's estimate of 374 lbs./year), this restriction is not expected to make any difference with respect to protecting the health of sensitive species.</p> <p>In addition, there is strong evidence that DINP<sup>18</sup> and DIDP<sup>19</sup> are <b>not</b> persistent, bioaccumulative or toxic to the environment. Hence, a restriction on use in vinyl flooring provides no benefit to the health of sensitive species.</p> |

## Conclusions

Overall, the criteria set out in RCW § 70A.350.040(3)(b) necessary to restrict DINP and DIDP use have not been met with respect to phthalate use in vinyl flooring. The proposed restriction offers no human health or environmental benefits.

As noted by RFCI, in its January 2022 comments on the Draft Regulatory Determinations Report to the Legislature,<sup>20</sup> there is strong evidence that vinyl flooring manufacturers no longer use phthalates, and that vinyl flooring containing phthalates is not sold at big box retail stores (since 2016). Ecology notes that DEHP and DINP are still used in a subset of products. If this is true, this subset is unlikely to represent any more than a negligible fraction of vinyl flooring. RFCI provides environmental product declaration (EPD) transparency summaries on its website,<sup>21</sup> covering all vinyl flooring types, including heterogeneous and homogenous vinyl flooring, rigid core flooring, rubber flooring, vinyl tile and vinyl composite tile. **No vinyl flooring type on the site contains a phthalate.**

We urge Ecology to determine that no regulatory restrictions are necessary to address the use of phthalates in vinyl flooring. There is precedent for this type of action. Due to the lack of phthalate use in vinyl flooring, California's Department of Toxic Substances Control (DTSC)

<sup>17</sup> See footnote 4. For example - "ECHA concluded that dermal exposure (from articles which are in direct contact with the skin such as garments, plastic bags, shower curtains etc.) to DINP and DIDP are not expected to result in a risk for adults or the developing foetus in pregnant women."

<sup>18</sup> Munn S; Allanou R; Aschberger K; Berthault F; De Bruijn J; Musset C; O`Connor S; Pakalin S; Pellegrini G; Scheer S; Vegro S *European Union Risk Assessment Report. DINP, CAS No. 68515-48-0 and 28553-12-0, EINECS No. 271-090-9 and 249-079-5. EUR 20784 EN.*; European Commission: 2003.

<sup>19</sup> Munn S; Allanou R; Aschberger K; Berthault F; De Bruijn J; Musset C; O`Connor S; Pakalin S; Pellegrini G; Scheer S; Vegro S *European Union Risk Assessment Report. DIDP, CAS No. 68515-49-1 and 26761-40-0, EINECS nO. 271-091-4 and 247-977-1. EUR 20785 EN.*; European Commission: 2003.

<sup>20</sup> See footnote 10.

<sup>21</sup> [Environmental Product Declaration - RFCI](#)



removed vinyl flooring as a priority product under its Safer Consumer Products program in 2018.<sup>22</sup>

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<sup>22</sup> DTSC, Draft Three Year Priority Product Work Plan (2018-2020) (February 2018) (removing “vinyl flooring” as a priority product; noting on page 16: “Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment”); DTSC, Three Year Priority Product Work Plan (2018-2020) (May 1, 2018).



# USA WTO TBT Enquiry Point, National Institute of Standards and Technology (NIST)

These comments are submitted on behalf of P.R. China regarding the "Proposed Rule of Safer Products Restrictions and Reporting of the state of Washington", notified by the United States under the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) as G/TBT/N/USA/1958.

ZHAOMINGGANG

China WTO/TBT National Notification & Enquiry Center

# 中国 WTO/TBT 国家通报咨询中心

## China WTO/TBT National Notification & Enquiry Center

No.20,Hepingli East Street, Dongcheng District, Beijing,China,Tel: 86-10-57954638 Fax:86-10-57954689

### FAX

|                                                                                                                                                   |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>TO:</b><br>USA WTO/TBT Enquiry Point                                                                                                           | <b>Email:</b><br>usatbtep@nist.gov                                       |
| <b>Date:</b> Feb.3, 2023                                                                                                                          | Number of pages: 2+2                                                     |
| <b>Copies:</b>                                                                                                                                    |                                                                          |
| Department for WTO Affairs, Ministry of Commerce of P.R. China                                                                                    | Fax: +86 10 65197726;65128304<br>E-mail: dingtao@mofcom.gov.cn           |
| Permanent Mission of P. R. of China to WTO                                                                                                        | Fax: +41-22-9097688<br>E-mail: bizhonglin@126.com                        |
| <b>From:</b>                                                                                                                                      |                                                                          |
| China WTO/TBT National Notification & Enquiry Center.                                                                                             | Tel: 86-10-57954638<br>Fax: 86-10-57954689<br>E-mail: tbt@customs.gov.cn |
| <b>Subject:</b><br><br><b>Comments from P. R. China on USA Notification<br/>G/TBT/N/USA/1958</b><br><br>Safer Products Restrictions and Reporting |                                                                          |

## **Comments from P. R. China on USA Notification**

### **G/TBT/N/USA/1958**

Safer Products Restrictions and Reporting

Dear Sir or Madam,

We appreciate the opportunity to submit comments on the notified draft proposed by United States of America.

Enclosed please find comments in English and Chinese.

Please acknowledge receipt of the comments by e-mail to [tbt@customs.gov.cn](mailto:tbt@customs.gov.cn).

Thank you very much in advance for United States of America taking into account comments from P.R. China. Your formal reply will be appreciated.

Best regards,

Zhao Minggang

A handwritten signature in black ink, appearing to be 'Zhao Minggang', with a long horizontal stroke extending to the left.

Deputy Director General  
China WTO/TBT National Notification & Enquiry Center  
No.20, Hepingli East Street, Dongcheng District, Beijing  
Post Code: 100013  
Tel: 86-10-57954605  
Fax: 86-10-57954683  
E-mail: [tbt@customs.gov.cn](mailto:tbt@customs.gov.cn)

## Comments from P. R. China on USA Notification

### G/TBT/N/USA/1958

#### Safer Products Restrictions and Reporting

The People's Republic of China appreciates United States of America for fulfilling the transparency obligation under WTO, as well as for the opportunities for other WTO Members to make comments on the notification G/TBT/N/USA/1958. According to Article 2.9.4 of the WTO/TBT Agreement "without discrimination, allow reasonable time for other Members to make comments in writing, discuss these comments upon request, and take these written comments and the results of these discussions into account", China would like to put forward the following comments on the notified regulations and hope United States of America take these comments into consideration. The detail comments as follows:

**1. China suggests US should not control OFRs as a family. US should specify which OFR subgroup to be restricted based on scientific assessment not only in hazard but also in technical feasibility of alternatives as well as impacts on the industry. Below are the reasons:**

There are totally over 100 types of OFRs, and no more than 10 types are restricted currently. US National Academies of Sciences, Engineering and Medicine (NASEM) released a study report in 2019, pointing out that OFRs used in consumer products cannot be made hazardous assessment as a single group; instead they should be sorted into 14 subgroups based on chemical structure, physicochemical properties, and predicted biologic activity, and then they should be assessed not only in hazard but also in technical feasibility of alternatives as well as impacts on the industry. Thus, to avoid unnecessary barrier to trade, it is not desirable to conduct "one size fits all" control over OFRs without sufficient science-based assessment; instead, subgroup-based control should be adopted.

**2. China suggests that US should grant exemption to those EEE products which do not have alternatives to OFRs temporarily. Below are the reasons:**

Restricting the use of OFRs is aimed to achieve "Safer Products". Although in some instances there might be alternatives to some sub-groups of OFRs for use in indoor EEE casings, alternatives are not always available. If product manufacturers are forced to use alternatives not well proven, it will undermine fireproof performance of the indoor EEE products and jeopardize consumers' life and property. From the perspective of circular economy, on the other hand, the plastics with OFRs actually has its unique advantage in recycling and carbon footprint given consideration to its comparatively high thermal stability. Thus it is suggested that US should grant exemption to those EEE products which do not have alternatives to OFRs temporarily.

**3. China suggests that US should specify the names of toxic chemicals and the scope of EEE products.**

On one hand, the proposed rule should specify individual electronic and electrical

products that it plans to regulate, and on the other hand it should specify individual OFRs by CAS Registry Number that it plans to regulate. This information is needed to alleviate confusion and avoid potential supply chain disruptions that could harm supply of EEE products in Washington State.

**Comments in Chinese are in below:**

### **中国对 G/TBT/N/USA/1958 通报的评议意见**

中国政府赞赏美国履行 WTO 透明度义务，给予其他 WTO 成员评议 G/TBT/N/USA/1958 号通报的机会，根据 WTO/TBT 协定 2.9.4 条“无歧视地给予其他成员合理的时间以提出书面意见，并对这些书面意见和讨论的结果予以考虑的规定”，请美国对中方的评议意见予以考虑并做出答复。中方具体意见如下：

**一、中方建议美国不应将 OFR 作为一个整体进行管控，应根据科学的危害评估、替代技术可行性评估和对产业的影响评估，明确所要限制使用的是哪一种 OFR 的子类而不是限制所有 OFR 的使用。理由如下：**

有机卤素阻燃剂有一百多种，目前限制使用的不到 10 种。美国国家科学院（NASEM）2019 年发布研究报告中也提出，消费品中使用的 OFR 不能作为一个单一类别进行危害评估；而应根据化学结构、物理化学特性和预期生物活性分为 14 个子类，进行危害评估、替代技术可行性评估和对产业的影响评估。因此，为避免给贸易带来不必要的障碍，在没有充分科学评估依据的情况下，不应应对 OFR 进行“一刀切”管控，而应实施分类管理。

**二、中方建议美国对暂时没有 OFR 替代品的电子电器设备予以豁免。理由如下：**

限制 OFR 使用的目标是获得“更安全的产品”，在某些情况下，室内电子设备塑料外壳中的某些 OFR 子类可能有替代品，但替代品并不能用于所有场合。如果电子电器制造商被迫采用不成熟的无卤替代品，可能降低阻燃水平，从而放大室内火灾风险，威胁消费者的生命和财产安全。而且，从循环经济的角度而言，含 OFR 的塑料因为热稳定性相对其他阻燃剂较高，所以在回收和碳足迹方面具有独特优势。因此，建议美国对暂时没有 OFR 替代品的电子电器设备予以豁免。

**三、中方建议美国明确所限制的有害化学品名称和电子电器产品范围。**

一方面，要明确所针对的具体的电子电器产品名称；另一方面，要明确所限制的具体 OFR 的名称及 CAS 注册编号。这样可以减少误解，避免供应链中断影响华盛顿州电子电器产品的市场供应。

# ACC North American Flame Retardant Alliance

Please find the attached comments from the American Chemistry Council's (ACC) North American Flame Retardant Alliance (NAFRA) regarding the Draft Rule for Safer Products for Washington – Cycle 1.



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 American Chemistry Council's (ACC) North American Flame Retardant Alliance (NAFRA)<sup>1</sup> submits the following comments regarding the Washington Department of Ecology's (Department or Ecology) Draft Rule for Safer Products for Washington – Cycle 1 (Draft Rule).<sup>2</sup> NAFRA'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. For broader issues related to the Draft Rule, NAFRA refers the Department to comments submitted by ACC on behalf of the association as a whole.

NAFRA 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 [ben\\_gann@americanchemistry.com](mailto:ben_gann@americanchemistry.com) or 202-249-7000.

Sincerely,



Ben Gann  
Director  
American Chemistry Council

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<sup>1</sup> The American Chemistry Council's North American Flame Retardant Alliance represents the leading producers of flame retardants used in wide variety of industrial and consumer applications. NAFRA members represent cutting edge fire-safety chemistry and technology and are dedicated to improving fire safety performance in key product applications. NAFRA members are Albemarle Corporation, ICL Industrial Products, and Lanxess. For more information on NAFRA, visit <https://www.americanchemistry.com/industry-groups/north-american-flame-retardant-alliance-nafra>.

<sup>2</sup> Washington Department of Ecology, Chapter 173-337 Washington Administrative Code (WAC): Safer Products for Restrictions and Reporting (Draft Rule), December 2022, <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf>.

## 1. Introduction and Overview

NAFRA 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.

Washington State's regulatory proposal for the use of chemical in electronic casings is incredibly broad and would restrict thousands of products with broad implications for the electronics and electrical equipment sectors. Given the breadth of this proposal, the lack of clarity about which chemicals are being proposed for regulation and the lack of clarity and the complex nature of the EE&E supply chains many in the value-chain are unaware and/or do not have the necessary information to determine if they are indeed impacted by the proposal.

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>3</sup> Washington State should take a more targeted approach in its policy recommendations by enhancing its evaluation of OFRs, focusing on appropriate subclasses/subcategories 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. NAFRA highlights the following recommendations to improve the Department's Draft Rule for OFRs in enclosures of electric and electronic products.

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<sup>3</sup> Chapter 70A.350 Recorded Codes of Washington (RCW), <https://app.leg.wa.gov/rcw/default.aspx?cite=70A.350>.

- Align regulations with other jurisdictions, including the need to consider conflicting regulatory requirements in other jurisdictions;
- Apply assessment criteria consistently and evenly for OFRs and potential alternatives;
- 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 consider less burdensome regulatory approaches and 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 as required by statute.<sup>4</sup>

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 electric 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. In addition, the proposed regulations are in some cases in direct conflict with existing or proposed regulations in other jurisdictions.

Although Ecology has identified some relevant regulations from other jurisdictions, 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 Washington 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>5</sup> While RoHS applies to numerous electronic

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<sup>4</sup> Chapter 70A.350.080(2)(c) RCW.

<sup>5</sup> Directive (EU) 2015/863. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32015L0863&from=EN>.

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>6</sup> All 27 EU member countries comply with RoHS to aid market compliance. Any business that manufactures or sells 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 and stands of electronic displays, which includes televisions, monitors, and digital signage displays.<sup>7</sup> The rationale for the restriction was not based on the toxicological profile of OFRs, but rather the disproven claim that OFRs hinder recycling of plastics from electronic products. 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>8</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>9</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>10</sup> Restrictions on the use of OFRs in electronic displays take effect on December 1, 2024.<sup>11</sup>

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<sup>6</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>.

<sup>7</sup> Regulation (EU) 2019/2021. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R2021&from=EN>

<sup>8</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>9</sup> New York Environmental Conservation Law, § 37-1001.

<sup>10</sup> Ibid.

<sup>11</sup> New York Environmental Conservation Law, § 37-1007.

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 timelines proposed for compliance. The aforementioned regulations are all more narrowly tailored than what has been outlined in the 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.

Finally, there have been important market, policy, and scientific developments that have occurred since publication of the Final Regulatory Determinations Report<sup>12</sup> in June 2022 that need to be further evaluated before finalizing any regulation for electronic and electrical equipment. Most importantly, the identified alternative chemicals being proposed for use by Washington State are restricted or proposed for restriction in some other jurisdictions. So if electronics manufacturers want to sell products in Washington State, the Draft Rule would potentially force them to design and build products with alternative materials that are restricted elsewhere. Any regulation for electric and electronic products needs to reconcile conflicting regulatory developments in other jurisdictions and ensure that manufacturers can meet required safety and performance standards while having access to alternative materials. This also has implications for Washington State markets and consumers. Faced with restrictions and reporting requirements for OFRs in enclosures of electric and electronic products offered for sale in the state that are out of step with regulations elsewhere, it is unclear how manufacturers will react and whether they will continue to offer the same quantity of electric and electronic products for sale in the state.

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

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. In its present form it could cause confusion and disruption for electric and electronic product supply chains. The Department does not clearly define either electrical products or electronic products. The underlying statute for Safer Products for Washington defines electronic product<sup>13</sup> in a manner which includes fewer products than Ecology has indicated that it intends to regulate.

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<sup>12</sup> Washington Department of Ecology, *Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3*, June 6, 2022, <https://apps.ecology.wa.gov/publications/documents/2204018.pdf>

<sup>13</sup> Chapter 70A.350.010 RCW.

Electronic product is defined in 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>14</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>15</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 electric and products for purchase in Washington State.

This is critical since given the complex supply chains for electronic and electrical equipment, it will be difficult if not impossible for manufacturers to identify within their supply chains whether the broad class of OFRs is used. There needs to be greater transparency and clarity for end use manufacturers regarding regulation of OFRs in enclosures of electric and electronic products.

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 chemical classes.<sup>16</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>17</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,

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<sup>14</sup> Ibid.

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

<sup>16</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>17</sup> Ibid.



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>18</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 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 no drop in replacements for OFRs, as a 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 regulation should also be narrowed by more appropriately defining the term “consumer product”<sup>19</sup> so it does not apply to products used in commercial and industrial settings.

**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 prohibit the use of PFAS substances in any product as of January 1, 2030. In Michigan, Executive Directive 2021-08 requires the state to purchase PFAS-free products whenever possible.<sup>20</sup> And other states and international jurisdictions have proposed their own regulations for PFAS substances. Another issue is that one of the chemical substances Ecology has identified as a “safer” alternative is currently undergoing

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<sup>18</sup> Chapter 173-337-060 WAC

<sup>19</sup> Chapter 70A.350.010(1) RCW

<sup>20</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).

a risk evaluation by EPA under the Toxic Substances Control Act (TSCA),<sup>21</sup> which has the potential to lead to regulations regarding the use of this chemical.

Each of the chemicals Ecology identified as a “safer” alternative to OFRs is an organophosphate flame retardant (OPFR).<sup>22</sup> Ecology outlines 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 the addition of fluoroorganic additives (e.g., polytetrafluoroethylene (PTFE)) to the enclosure material.”<sup>23</sup> Some jurisdictions have classified PTFE as a PFAS substance for regulation.

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>24</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 and not considered the conflict with regulations in other jurisdictions.

Additionally, one of the chemicals Ecology identified as a “safer” alternative – triphenyl phosphate – is undergoing a TSCA risk evaluation by EPA.<sup>25</sup> One of the conditions of use EPA is considering as part of the risk evaluation is use in electrical and electronic products.<sup>26</sup> If EPA concludes that this use presents an unreasonable risk, EPA could exercise its TSCA authority to regulate its use thereby impacting the feasibility and availability of a alternative identified by Ecology.<sup>27</sup>

Electronic product manufacturers design their products for worldwide compliance. These are complex products that require multiple years for product design, testing, and certification; so more rigor needs to be applied to the alternative assessment for this complex product category. It would not be feasible, for example, for a manufacturer to formulate a Washington-compliant product and a different product for other states. Under such a scenario, in order to avoid conflict with Washington State law it is entirely

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<sup>21</sup> Triphenyl phosphate (CAS RN 115-86-6) is currently in the TSCA risk evaluation process.

<sup>22</sup> Regulatory Determinations Report at pages 64-67.

<sup>23</sup> Regulatory Determinations Report at page 68.

<sup>24</sup> Regulatory Determinations Report at page 68.

<sup>25</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>26</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>27</sup> TSCA Section 6(a); 15 USC 2605(a).



foreseeable that manufacturers would need to stop selling some electronic products in the state. Likewise, forced substitution to an alternative that could also be regulated in the near future would require manufacturers to implement multi-year product redesign efforts only to have those not be consistent with new regulatory requirements. These are specific examples demonstrating how the proposed rulemaking is inconsistent with existing and anticipated regulations in other jurisdictions and could thereby create an untenable and unworkable scenario for product manufacturers.

**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 U.S. Commerce Department.<sup>28</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>29</sup> This includes notification for technical regulations of governments at the level directly below that of the central government.<sup>30</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.

**e. States have historically recognized the benefits of flame retardants in electronics**

Even policymakers in states that have enacted restrictions on flame retardants in products such as upholstered furniture, mattresses, and children's products, have recognized the benefits that flame retardants can have in electronics for regulated products. Circuit boards and other interior parts like fans, cables, and connectors carry electrical currents. These currents generate heat and can be an internal ignition source, which is why flame retardants are used to mitigate the risk of fire and to help meet flammability standards.

Several states with flame retardant restrictions have still allowed flame retardants that are polymeric. Large, stable, inert polymeric molecules are generally too large to cross biological membranes and therefore will not present a potential risk to human health or the environment. The large size of polymeric flame retardants also generally inhibits their migration out of the substrate and therefore present little potential for human or

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<sup>28</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>29</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>30</sup> WTO TBT Agreement, Article 3.2.

environmental exposure. A comprehensive assessment of flame retardants through the EPA's Design for the Environment Program readily demonstrates the lower mobility, volatility, and bioavailability of reactive flame retardants.<sup>31</sup> Yet, this has been ignored by Washington State. NAFRA suggests the Department consider such a distinction as it explores regulatory options for OFRs in enclosures for electric and electronic products.

### **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 about whether additional criteria applied to OFRs, and not the alternatives, was intended 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 at a minimum needless and costly – substitution.

Under Ecology's Working Criteria for Feasible and Available<sup>32</sup> if an OFR achieves a Benchmark 2 score as part of a GreenScreen Assessment, it still may not meet its "safer" criteria. This is because such chemicals can fail additional within-class criteria established by the Department only for priority chemicals and not for chemicals it has identified as alternatives.<sup>33</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>34</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>35</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

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<sup>31</sup> US EPA Design for the Environment, Flame Retardants Used in Flexible Polyurethane Foam: An Alternatives Assessment Update, EPA 744-R-15-002, August 2015, Page 3-2, [https://www.epa.gov/sites/default/files/2015-08/documents/ffr\\_final.pdf](https://www.epa.gov/sites/default/files/2015-08/documents/ffr_final.pdf).

<sup>32</sup> Regulatory Determinations Report at pages 301-305.

<sup>33</sup> Regulatory Determinations Report at page 42.

<sup>34</sup> Gradient. GreenScreen® Assessment for [Decabromodiphenyl ethane; DBDPE (CAS # 84852-53- 9)]; Prepared for: American Chemistry Council: December 2021.

<sup>35</sup> Ibid.

score.<sup>36</sup> Both DBDPE and TTBPT 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. Both DBDPE and TTBPT score 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>37</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>38 39</sup> and another alternative scores high for persistence.<sup>40 41</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, not degrade during the life of the product, and allow for recycle or reuse of the plastic at the end of the product life cycle. NAFRA 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.

**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

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<sup>36</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>37</sup> Regulatory Determinations Report at pages 64 - 65.

<sup>38</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>39</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>

<sup>40</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>41</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.

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>42</sup>

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>43</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 by the Department 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-disrupting (CMRDE), and thus meet the Ecology's minimum criteria for safer.<sup>44</sup> This further reinforces that the Department's assessment criteria should be the same for priority chemicals and any alternatives it identifies.

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<sup>42</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).

<sup>43</sup> Ibid.

<sup>44</sup> Ibid.

**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>45</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 0.5%) required to provide the anti-drip function.<sup>46</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 its alternatives assessment for OFRs used 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,

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<sup>45</sup> Regulatory Determinations Report at page 68.

<sup>46</sup> Ibid.

upholstered furniture, and electronics – as a proxy for other flame retardants.<sup>47</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 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>48</sup>

**b. Regulatory proposal does not consider the risk that OFRs help mitigate**

The underlying statute for Safer Products for Washington defines a “safer alternative” as “an alternative that is less hazardous to humans or the environment than the existing chemical or chemical process.”<sup>49</sup> The Legislature did not limit the hazards to those Ecology believes are posed by the priority chemical itself, but Ecology’s current criteria for “safer” does not appear to adequately account for the hazards that flame retardants help mitigate.

The risk posed by fire remains a public health concern for Washington State residents. In 2021, the last year that data is publicly available, there were 5,342 residential structure fires (one every 98 minutes) resulting in \$205 million in property loss.<sup>50</sup> In addition, consumer products are sometimes recalled due to fire or shock risk. In 2021, the U.S. Consumer Product Safety Commission (CPSC) recalled over 6.2 million units due to fire and shock hazards.<sup>51</sup>

Ecology’s bears the burden under the statute, for demonstrating that a replacement chemical or redesigned product is safer,<sup>52</sup> but their current framework fails to do so because it does not sufficiently consider the fire safety hazards of products that can be mitigated with the use of OFRs. That analysis must include not only a toxicological perspective but a fire safety perspective as well, which includes the efficacy of OFRs and alternatives. The Department should balance any hazards associated with the priority chemical within the product, with the hazards that the chemical helps to address.

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<sup>47</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.

<sup>48</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>49</sup> Chapter 70A.350.010(13) RCW.

<sup>50</sup> Washington State Fire Marshal’s Office, “2021 Fire in Washington,” April 2022, page 13, [https://www.wsp.wa.gov/wp-content/uploads/2022/04/Fire\\_in\\_Washington\\_Report.pdf](https://www.wsp.wa.gov/wp-content/uploads/2022/04/Fire_in_Washington_Report.pdf).

<sup>51</sup> U.S. CPSC, 2021 Product Recall Data, found at <https://www.cpsc.gov/Recalls>.

<sup>52</sup> Chapter 70A.350.040(3) RCW.

**c. 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>53</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>54</sup>

**d. 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>55</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.<sup>56</sup> 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® 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 all OFRs in casings and enclosures unnecessarily lumps together a diverse range of compounds intended to improve fire safety and product

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<sup>53</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>54</sup> Regulatory Determinations Report at page 45.

<sup>55</sup> Regulatory Determinations Report at page 44.

<sup>56</sup> Ibid.



performance. This could stifle innovation and lead to the use of alternatives that are less desirable in terms of both toxicological profile and product performance.

NAFRA recommends that Ecology separately consider additive and reactive flame retardants in order to avoid overstating exposure risk. Taking this approach would allow Ecology to make regulatory decisions regarding flame retardants with more readily identifiable exposure risks and prevent unnecessary risk management measures for flame retardants that present low or no exposure risk. Ecology already recognizes in its criteria for safer products that chemicals being bound or encapsulated, or behind a functional barrier, could impact exposure magnitude.<sup>57</sup> NAFRA recommends that the Department apply this same reasoning to flame retardants in enclosures for electric and electric products, acknowledge that most flame retardants are embedded within the polymer matrix, and therefore unlikely to result in significant exposure.

## **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. Not all resins and not all flame retardants are the same. Different resin systems and different flame retardants have implications for overall product design performance – influencing other factors such as thermal stability, corrosivity, appearance, resistance to ultraviolet light, electrical properties, and circularity.

Manufacturers may also design their products for performance beyond minimum standards, therefore it is not accurate or appropriate to assume that the ability to meet

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<sup>57</sup> Regulatory Determinations Report at page 284.



certain standards is sufficient for all product design and performance scenarios, including overall product safety.

**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>58</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>59</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>60</sup> microwave cooking appliances,<sup>61</sup> and toasters<sup>62</sup>) and as such may require the use of OFRs to meet or exceed relevant product safety standards.

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<sup>58</sup> UL 746H is an optional non-halogenated certification ratings requirement that uses combustion-ion chromatography.

<sup>59</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>60</sup> UL 858 is the standard for household electric ranges.

<sup>61</sup> UL 923 is the standard for microwave cooking appliances.

<sup>62</sup> UL 1026 is the standard for electric household cooking and food serving appliances.

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>63</sup>

**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.

**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

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<sup>63</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.

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>64</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, power 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 (e.g., garage) or outdoors (e.g., driveway). This raises the question as to how the Department intends to regulate products that are designed to withstand outdoor exposure but can be installed and used indoors.

**b. Provide a definition for “small business”**

The Department should more clearly distinguish between small businesses and large businesses in considering compliance dates. The Department proposes that companies of all sizes must not manufacture, sell, or distribute electronic displays or televisions containing OFRs in enclosures starting on January 1, 2025. Additionally, the Department proposes that companies whose gross sales equal or exceed \$1 million in 2022 shall not manufacture, sell, or distribute indoor electric and electronic products (excluding electronic displays and televisions) containing OFRs in the enclosure starting on January 1, 2026. Companies with gross sales of less than \$1 million in 2022 have an additional year, until January 1, 2027, to comply.<sup>65</sup>

Increasing the threshold to qualify as a large business will allow more retailers time to comply with any new regulations for indoor products. However, the current approach is grouping companies by revenue rather than clearly defining criteria to qualify as a small business. NAFRA suggests providing a clear definition of small business that can serve as a basis to assist in meeting any regulatory requirements.

**c. 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

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<sup>64</sup> Chapter 173-337-025 WAC.

<sup>65</sup> Chapter 173-337-112 WAC.

with another legally imposed requirement, and 3) an unforeseen event or circumstance limited the availability of alternatives.<sup>66</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. NAFRA 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 bases, 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 the Pollution Control Hearings Board for penalties.<sup>67</sup> NAFRA suggests that the Department reinstate the Appeals section that was part of the Preliminary Draft Rule<sup>68</sup> and include the following language, “a manufacturer may appeal any adverse Ecology decision under this chapter to the pollution control hearings board.” In addition, any manufacturer requesting an exemption should be allowed to continue use of the OFR in question while the request for an exemption, and any subsequent appeal, is being considered.

Given the complexity of electric and electronic product supply chains, as well as length of time required for product design, testing, and certification for this complex product category, more time and process clarity needs to be provided for how exemptions will be considered and granted.

#### **d. Need for clarifying definitions**

NAFRA offers the following comments seeking clarity for some definitions included in the Draft Rule, as well as the need for additional definitions to improve regulatory compliance.

*Definition of Electronic Product:* The Department does not define electronic product in the Draft Rule. The underlying statute for Safer Products for Washington does define electronic product,<sup>69</sup> but includes a narrower set of products than what Ecology has indicated that intends to regulate. Electronic product is defined under the statute as

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<sup>66</sup> Chapter 173-337-020 WAC.

<sup>67</sup> Chapter 173-337-030 WAC.

<sup>68</sup> Preliminary Draft Rule at page 6, proposed Chapter 173-337-035 WAC, [https://www.ezview.wa.gov/Portals/\\_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage\\_Cycle1\\_August2022.pdf](https://www.ezview.wa.gov/Portals/_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage_Cycle1_August2022.pdf).

<sup>69</sup> Chapter 70A.350.010 Recorded Codes of Washington (RCW), <https://app.leg.wa.gov/RCW/default.aspx?cite=70A.350.010>.

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>70</sup> This suggests that the legislative intent of the regulatory program was for the regulation of chemicals in electronics to apply only to the universe of products defined under the statute, not a broader segment of electric and electronic products.

*Definition of Electric Product:* The Department also does not define electric product, and the underlying statute for Safer Products for Washington does not define it either. As an initial matter, this raises the question regarding legislative intent to regulate electric products. At minimum, Ecology should provide a definition for electrical product to foster needed clarity regarding the product scope for any regulations.

*Definition of Electronic Display:* In the Draft Rule, “electronic display” is defined as a display screen and associated electronics that, as its primary function, displays visual information from wired or wireless sources.<sup>71</sup> The Department may want to refer to the definition of electronic display used by New York State, which defines it 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. Electronic display shall 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>72</sup>

*Definition of External Enclosure:* In the Draft Rule “external enclosure” is defined as “the plastic external part of the product that renders inaccessible all or any parts of the equipment that may otherwise present a risk of electric shock or retards propagation of flame initiated by electrical disturbances occurring within.”<sup>73</sup> NAFRA suggests aligning with UL’s definition for external enclosures to simplify compliance.

*Definition of Inaccessible Electronic Component:* In the Draft Rule, “inaccessible electronic component” is defined as “a part or component of an electronic product that is located inside and entirely enclosed within another material and is not capable of coming out of the product or being accessed during any reasonably foreseeable use or abuse of the product.” NAFRA seeks clarifying language around “functional form” to

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<sup>70</sup> Ibid.

<sup>71</sup> Chapter 173-337-025 WAC.

<sup>72</sup> New York Environmental Conservation Law, § 37-1001.

<sup>73</sup> Chapter 173-337-025 WAC.

alleviate confusion concerning when internal components may be inaccessible once the product is in its fully assembled and functional form.<sup>74</sup>

*Definition of intended for indoor use:* In the Draft Rule, “intended for indoor use” is defined as “a product designed primarily for use or storage inside buildings.”<sup>75</sup> It lacks sufficient detail and raises questions regarding what is the regulatory intent. For example, by stating that products that are “designed primarily for...storage inside buildings” are covered, the Department may be scoping in products such as lawn mowers, leaf blowers, and string trimmers that are used outdoors but often stored indoors.

*Definition of intended for outdoor use:* In the Draft Rule, “intended for outdoor use” is defined as “a product designed to maintain functionality after exposure to ultraviolet (UV) light, water, or immersion when used for an extended time.”<sup>76</sup> As mentioned earlier, some products are marketed and intended for both indoor and outdoor use. The Department has not offered a meaningful way for manufacturers of such products that are affected by the proposal to determine their regulatory obligation.

**e. Timing of reporting requirements for outdoor products**

NAFRA recommends delaying the effective date for reporting requirements for OFRs in enclosures of outdoor electric and electronic products set to take effect on January 1, 2025. Based on the current regulatory timing, a final rule will be published in June 2023, with reporting requirements beginning in 2025 for covered outdoor products offered for sale during the 2024 calendar year. In practice, affected businesses would need to begin their compliance obligations seven months after a final rule – starting in January 2024 – to track covered products offered for sale in Washington State.

Additionally, manufacturers of indoor electric and electronic products need more time as well in complying with proposed OFR restrictions. The implementation timeline proposed for restrictions of indoor electric and electronic products ignores the amount of time it takes for product manufacturers to reformulate and recertify. It can often take a minimum of several years for electric and electronic product manufacturers to certify a product. And that assumes that an alternative resin system and flame retardant exists that meets the design and performance requirements for the product. If such an alternative combination does not exist, it would take even longer to recertify the product.

NAFRA asserts that more time is needed to educate the value chain once the rule is finalized and before any reporting requirements, or restrictions, take effect to foster better

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<sup>74</sup> Chapter 173-337-112 WAC.

<sup>75</sup> Chapter 173-337-025 WAC.

<sup>76</sup> Ibid.

coordinated regulatory compliance. This is further reinforced by the lack of clarity about which specific chemicals and products are covered and the process for product manufacturers to request exemptions.

**f. Considerations for Confidential Business Information**

The Department should ensure that all confidential business information (CBI) submitted is afforded the protection described in the December 2020 Ecology document Information for Businesses Submitting Confidential Business Information to Ecology under Chapter 70A.350 RCW.<sup>77</sup> This includes: 1) ensuring that any of Ecology's contractors that review the information do so under a separate confidentiality agreement; 2) Ecology notifying the submitter if the Department believes any information submitted as CBI does not meet required criteria for protection; and 3) Ecology requesting a protective order for any documents reviewed by a court to confirm they are CBI.

The Department should also understand that companies strictly protect certain formulation information from each other. This safeguard is necessary to drive innovation and protect competitive advantages, which are the reasons the Legislature enacted the CBI protections in Chapter 43.21A.160 RCW. Because companies keep this information from each other, it can be difficult for a submitter to determine whether a certain process is "unique" to the submitter under that statutory provision. However, a submitter still qualifies for CBI protection if it can show that the disclosure of information "may affect adversely [its] competitive position."<sup>78</sup> Information regarding product formulation is generally considered CBI that would harm a company's competitive position if released.

**g. 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>79</sup> and to the TSCA quadrennial Chemical Data Reporting rule requirements.<sup>80</sup> It would be unreasonable to hold industry to a strict liability standard, especially for very complex products like electric and electronic products.

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<sup>77</sup> Available at [https://www.ezview.wa.gov/Portals/\\_1962/Documents/saferproducts/CBI\\_Process\\_SaferProductsWA.pdf](https://www.ezview.wa.gov/Portals/_1962/Documents/saferproducts/CBI_Process_SaferProductsWA.pdf).

<sup>78</sup> Chapter 43.21A.160 RCW, <https://app.leg.wa.gov/RCW/default.aspx?cite=43.21A.160>.

<sup>79</sup> 86 FR 33926 (proposing to require manufacturers to report certain information "to the extent known to or reasonably ascertainable by them").

<sup>80</sup> 40 CFR 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").

**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 Regulatory Determinations Report, Ecology states that it will consider cost for scenarios like this. Washington State requires that a significant legislative rule, such as Safer Products for Washington – Cycle 1, include a cost-benefit analysis of the rule and be the least burdensome alternative.<sup>81</sup>

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 State 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>82</sup> In the Final Determinations Report, Ecology claimed that products may be redesigned so that no flame retardants need to be used.<sup>83</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>84</sup> With

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<sup>81</sup> Chapter 34.05.328 RCW, <https://app.leg.wa.gov/rcw/default.aspx?cite=34.05.328>.

<sup>82</sup> Chapter 70A.350.040(3)(a) RCW.

<sup>83</sup> Regulatory Determinations Report at pages 68-72.

<sup>84</sup> Regulatory Determinations Report at pages 68, 70, 72.



regards to non-flammable enclosures, Ecology stated that this is something that manufacturers should consider when designing electric and electronic products.<sup>85</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>86</sup> Ecology also failed to consider important design and safety considerations for alternative materials, including weight and increased shock hazard.

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>87</sup> Ecology's current feasibility analysis does not adequately consider this variation (e.g., portability), and instead takes a one size fits all approach. NAFRA recommends that Ecology reassess the feasibility of its suggested alternative 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>88</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>89</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.

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<sup>85</sup> Regulatory Determinations Report at page 72.

<sup>86</sup> Ibid.

<sup>87</sup> See Chapters 84-85 of the Harmonized Tariff Schedule of the United States, available at <https://hts.usitc.gov/current>.

<sup>88</sup> Chapter 70A.350.040(3)(a) RCW

<sup>89</sup> Regulatory Determinations Report at page 301.

**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>90</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>91</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>92</sup> An alternative chemical that presents an increased fire safety risk in a product cannot be considered “safer.” NAFRA urges Ecology to equally consider consumer fire safety when assessing what is a “safer” alternative.

For instance, proposed alternatives are more likely to degrade in high heat environments and/or over extended periods of time. Degradation products of the alternatives can lead to electronic failures due to corrosion 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.

**e. Ecology has not meaningfully considered cost**

The State of Washington 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>93</sup> To that end, the Department conducted a cost-benefit analysis as part of its Preliminary Regulatory Analyses.<sup>94</sup> Ultimately, Ecology concluded that the benefits associated with reduction in exposure and releases to the environment from OFRs outweigh the costs to manufacturers.<sup>95</sup>

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<sup>90</sup> Regulatory Determinations Report at 279.

<sup>91</sup> Chapter 70A.350.010(13) RCW.

<sup>92</sup> Hirschler, M. M. (2015). Flame retardants and heat release: review of traditional studies on products and on groups of polymers. *Fire and Materials*, 39(3), 207-231.

<sup>93</sup> Chapter 34.05.328 RCW.

<sup>94</sup> Washington Department of Ecology, Preliminary Regulatory Analyses, Publication 22-04-042, December 2022, pages 58-61, <https://apps.ecology.wa.gov/publications/documents/2204042.pdf>.

<sup>95</sup> Preliminary Regulatory Analyses at page 61.

The Department relied on the dollar amount of the U.S. sale for NAICS groupings corresponding with the priority consumer product categories to estimate cost impacts.<sup>96</sup> The “electric and electronic products” category is quite broad. Unless the Department looked at each NAICS code for each product covered under the restriction for “electric and electronic products”, it is unlikely that Ecology’s cost estimate accurately reflects the costs manufacturers will face complying with the proposed rule.

In addition, the finding for sales losses for the electronic product categories appears to be at odds with the cost-benefit comparison. Maximum sales losses for the electronic product categories are estimated to be \$286 million over five years.<sup>97</sup> In addition, the number of businesses affected is estimated to be 3,388, which means each affected business could face up to \$84,511 in additional costs over the five-year period based on this analysis.<sup>98</sup>

Recognizing that the aforementioned estimate represents a worst-case scenario by the Department regarding the regulation of flame retardants in the enclosures of electric and electronic products, it is still puzzling how Ecology estimated that the best case cost-benefit scenario assumes that the annual costs of the regulation could be \$0.<sup>99</sup> Especially when the low-end of the range for costs is zero and the low-end of the range for benefits is \$780 million.<sup>100</sup>

A more rigorous and thorough cost-benefit analysis is needed for a rulemaking of this significance. It should demonstrate that the actions being proposed represent the least burdensome alternative to achieve the overall objectives of the regulation. However, such analysis is missing. The Preliminary Regulatory Analyses should be redone, and any final rules for flame retardants in enclosures for electric and electronic products should not move forward until appropriate analyses can be conducted to better inform the regulatory decision making process.

NAFRA has previously sent recommendations to the Department regarding best practices for the cost-benefit analysis and least-burdensome alternative analysis. Those recommendations are included in Appendix I of these comments. In conducting its cost-benefit analysis, the Department should utilize the established principles and practices outlined in guidance for federal regulatory agencies: Executive Order 12866,<sup>101</sup> Executive

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<sup>96</sup> Preliminary Regulatory Analyses at page 28.

<sup>97</sup> Preliminary Regulatory Analyses at page 37.

<sup>98</sup> Ibid.

<sup>99</sup> Preliminary Regulatory Analyses at page 13.

<sup>100</sup> Ibid.

<sup>101</sup> 76 FR 3821; January 21, 2011, <https://www.govinfo.gov/content/pkg/FR-2011-01-21/pdf/2011-1385.pdf>.

Order 13563,<sup>102</sup> and Office of Management and Budget (OMB) Circular A-4.<sup>103</sup> In addition, as part of its least-burdensome alternative analysis, Ecology must adequately evaluate alternative, less burdensome regulatory approaches.

**f. Ecology has not meaningfully considered less burdensome regulatory approaches**

The Department is required for significant legislative rules (e.g., Safer Products for Washington) as part of its least-burdensome alternative analysis to evaluate alternative, less burdensome regulatory approaches.<sup>104</sup> Throughout the regulatory process, NAFRA has provided recommendations for alternative approaches that 1) more directly addresses the stated objectives for the priority product area, and 2) provides for overall less burden on the state, consumers, and producers, with equivalent environmental, health and safety benefits. Those recommendations are also included in Appendix I and are reiterated here as part of these comments. Ecology should evaluate each of these alternative approaches and clearly indicate why these less burdensome approaches were not considered.

**8. Other regulatory efforts relevant to Safer Products for Washington**

**a. Washington State**

Prior regulatory experiences in Washington State highlight the importance of considering the true impact of requiring substitutions. In 2011, Washington State adopted the Antifouling Paints Law<sup>105</sup> to gradually phase out antifouling paints containing copper used for recreational water vessels, such as boats. As originally enacted, starting in 2018, new boats sold in Washington State were required to not have antifouling paint containing copper, and starting in 2020 existing boats were required to not have antifouling paint containing copper. The law also required the Department of Ecology to survey the types of antifouling paints sold in Washington, study how antifouling paints affect marine life, and present the findings to the Legislature by the end of 2017.

The Department's review of studies and available science on non-copper antifouling boat paints raised concerns that in trying to move away from antifouling paint containing copper, it would push the boating industry toward regrettable substitutes that could worsen environmental degradation.<sup>106</sup> As such, Ecology recommended delaying the copper boat

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<sup>102</sup> 58 FR 51735; October 4, 1993, [https://archives.federalregister.gov/issue\\_slice/1993/10/4/51724-51752.pdf#page=12](https://archives.federalregister.gov/issue_slice/1993/10/4/51724-51752.pdf#page=12).

<sup>103</sup> White House Office of Management and Budget, OMB Circular A-4, [https://www.whitehouse.gov/wp-content/uploads/legacy\\_drupal\\_files/omb/circulars/A4/a-4.pdf](https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A4/a-4.pdf).

<sup>104</sup> Chapter 34.05.328 RCW.

<sup>105</sup> Chapter 70.300 RCW. It was recodified as Chapter 70A.445 RCW.

<sup>106</sup> Washington Department of Ecology, Report to the Legislature on Non-copper Antifouling Paints for Recreational Vessels in Washington, Publication 17-04-039, December 2017, <https://apps.ecology.wa.gov/publications/documents/1704039.pdf>.

paint ban, giving it time to study the relative impacts of copper versus non-copper biocides.<sup>107</sup>

Consequently, in 2018, changes were made to the law.<sup>108</sup> If the Department finds safer alternatives that are feasible, reasonable, and readily available by June 30, 2024, Washington law will restrict the use of most copper-based antifouling paints beginning on January 1, 2026.<sup>109</sup> However, if safer and effective alternatives are not identified by then, the ban will not take effect, and the Department will continue to study the issue and submit a new report by June 30, 2029.<sup>110</sup> The Antifouling Paints Law provides a valuable case study for Washington State regarding regrettable substitution and the need for robust analysis to support regulatory actions.

In another regulatory action, Washington State enacted restrictions on the use of PBDEs in products.<sup>111</sup> As part of the restrictions, a person cannot manufacture, knowingly sell, or distribute products containing PBDEs for use in the state. Several types of products are exempted from this prohibition, including aviation, military or federally funded space program application, vehicles, medical devices, and certain recycled materials.<sup>112</sup> As part of the law, restrictions for decaBDE were phased-in more gradually than for other PBDEs.<sup>113</sup> Despite the exemptions, because of the restrictions in Washington State and elsewhere, decaBDE became scarce for exempted industries. The regulations put in place for decaBDE over 15 years ago serve as a reminder that simply allowing the continued use of restricted substances for some industries does not ensure that they will remain available once restrictions take effect.

#### **b. Other state regulatory efforts**

Challenges that other states have experienced in implementing more narrow and targeted flame retardant regulations than what has been proposed for Safer Products for Washington – cycle 1 are also instructive. As mentioned previously, New York State enacted regulations for OFRs in enclosures and stands of electronic displays in December 2021 that also requires manufacturers of affected electronic displays to submit an annual report to the New York Department of Environmental Conservation (DEC) identifying all OFRs used in the enclosure or stand.

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<sup>107</sup> Ibid.

<sup>108</sup> Chapter 70A.445 RCW, <https://apps.leg.wa.gov/rcw/default.aspx?cite=70A.445>.

<sup>109</sup> Chapter 70A.445.020 RCW.

<sup>110</sup> Ibid.

<sup>111</sup> Chapter 70.76 RCW, Recodified as Chapter 70A.405 RCW.

<sup>112</sup> Chapter 70A.405.020 RCW.

<sup>113</sup> Chapter 70A.405.030 RCW.

DEC is now required to accept reports between November 1 and December 31 annually, which must cover the products sold or offered for sale, or products that will be offered for sale, during the current calendar year.<sup>114</sup> The reporting requirement took effect on January 1, 2023.<sup>115</sup> However, a regulatory proposal was not published until September 2022<sup>116</sup> and was not finalized until November 30, 2022.<sup>117</sup> This left little time for affected manufacturers to put systems in place to manage compliance, and serves as a reminder that even for implementation of less restrictive risk management measures such as reporting requirements, time is needed to seek stakeholder feedback, educate those affected regarding their compliance obligations, and allow the regulated community time to implement processes to satisfy the compliance obligations.

A separate law in Massachusetts enacted on January 1, 2021, prohibits a manufacturer or retailer from selling, offering, or manufacturing for sale, distributing in commerce, or importing bedding, carpeting, children's products, residential upholstered furniture, and window treatments that contain specified flame retardants. Despite requiring restrictions on the distribution and sales of affected products manufactured after December 31, 2021,<sup>118</sup> the Massachusetts Department of Environmental Protection did not publish a regulatory proposal until September 16, 2022<sup>119</sup> and has still not finalized a regulation.

Moreover, the broad definition of window treatments has placed unprecedented restrictions on flame retardants used in a segment of products that previously had not been subject to such restrictions. Consequently, this has created a new and unfamiliar compliance obligation for the window treatment supply chain. Window treatment manufacturers can use flame retardants to meet independent flammability requirements, and the regulatory approach in Massachusetts may be in conflict with requirements by local jurisdictions, public entities such as schools, or hospitals. The proposed regulation in Massachusetts demonstrates that when a state seeks to restrict a substance in a product where it has not previously been restricted, sufficient time is needed to check if the proposal conflicts with other regulations and to assist the regulated community with compliance.

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<sup>114</sup> New York Department of Environmental Conservation (DEC), DMM-6 / Guidelines for Annual Reporting of Organohalogen Flame Retardants per ECL 37-1009, November 30, 2022, [https://www.dec.ny.gov/docs/materials\\_minerals\\_pdf/flameretardantform.pdf](https://www.dec.ny.gov/docs/materials_minerals_pdf/flameretardantform.pdf).

<sup>115</sup> New York DEC, DMM-6 at page 1.

<sup>116</sup> New York Department of Environmental Conservation (DEC), Notice of Availability: Division of Materials Management (DMM) Program Policy on Flame Retardants in the Enclosure or Stand of Electronic Displays: DMM-6 Guidelines for Annual Reporting of Organohalogen Flame Retardants per ECL 37-1009, September 7, 2022, [https://www.dec.ny.gov/enb/20220907\\_not0.html](https://www.dec.ny.gov/enb/20220907_not0.html).

<sup>117</sup> New York DEC, DMM-6.

<sup>118</sup> Massachusetts General Laws, Part 1 Title II, Chapter 21A, § 28, <https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter21A/Section28>.

<sup>119</sup> Massachusetts Department of Environmental Protection, 310 CMR 78.00: Distribution and Sales Ban of covered Products Containing Certain Flame Retardants, <https://www.mass.gov/doc/310-cmr-7800-proposed-ban-if-covered-products-containing-certain-flame-retardants/download>

### c. Federal regulatory efforts

Restricting the use of a chemical without sufficient time for product manufacturers to find alternatives can lead to challenges with regulatory implementation. For example, on January 6, 2021, EPA announced risk management rules for a chemical, isopropylated phosphate (3:1),<sup>120</sup> better known as PIP (3:1), despite it not ever being evaluated for risk by the Agency. Product manufacturers across many sectors were surprised by EPA's announcement banning the processing and distribution of products containing PIP (3:1) after March 8, 2021.

Due to the incredibly short compliance window initially proposed by the Agency, it was a challenge for product manufacturers to identify its potential presence in supply chains. Consequently, EPA twice had to postpone the compliance date for PIP (3:1) restrictions and eventually had to push out the compliance date several years until October 31, 2024.<sup>121</sup> The extensions were created to ensure that critical supply chains were not disrupted for key consumer and commercial goods.

PIP (3:1) provides an interesting case study for proposed regulations in the state of Washington. The supply chain confusion resulting from EPA's original announcement regarding risk management rules for PIP (3:1) occurred in part because the Agency did not have a full understanding of the impact the prohibition would cause. Notably, this confusion was caused by restrictions for one chemical, and by contrast the Department of Ecology has proposed restrictions and reporting requirements for an entire class of chemicals.

On another federal regulatory matter with direct applicability to the Draft Rule for OFRs in enclosures for electric and electronic products in Washington State, CPSC continues its work studying the use of additive, non-polymeric OFRs in upholstered furniture, mattresses, children's products, and plastic casings surrounding electronic devices, which has been informed by recommendations from the NAS.

CPSC staff have developed a plan to assess the 14 subclasses of OFRs identified by the NAS. For the current federal fiscal year (Fiscal Year 2023, which ends on September 30, 2023), CPSC staff will prepare scoping documents for each of the subclasses, which will identify the chemicals in the class, health effects, and product types that will be included in the risk assessment. The scoping documents will also help to prioritize assessment of the subclasses.<sup>122</sup>

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<sup>120</sup> 86 FR 894

<sup>121</sup> 87 FR 12875

<sup>122</sup> US CPSC, Fiscal Year 2023 Operating Plan, October 26, 2022, page 17, <https://www.cpsc.gov/s3fs-public/FY2023CPSCOperatingPlan.pdf?VersionId=Z.vZzSezwTIX224uG66J5fHTkFcIvL.G>.



CPSC has worked with contractors to assist with the effort. This includes efforts to 1) characterize the use of OFR chemistries in the U.S. and international markets,<sup>123</sup> 2) perform a scientific literature survey of OFRs,<sup>124</sup> 3) draft scoping reports for each of the 14 OFR subclasses,<sup>125</sup> 4) offer read-across approaches to address data gaps in subclasses,<sup>126</sup> 5) provide a process guide and case study application for up to two subclasses to inform assessment approaches,<sup>127</sup> 6) consult and scope technical support activities for chemical hazards of consumer products,<sup>128</sup> and 7) exposure assessment of the polyhalogenated organophosphate subclass using human biomonitoring data.<sup>129</sup> To date, CPSC has awarded over \$2 million to contractors to assist the government agency in its assessment of OFRs.

Considerable work has already been undertaken with respect to CPSC's OFR assessment, but additional work is still needed before CPSC staff will consider whether the risks from OFRs in electronic casings are sufficient to recommend a rulemaking. The Department of Ecology may want to wait for CPSC to regulate the use of OFRs in electronic casings, or at a minimum collaborate with the federal agency, to avoid regulatory duplication, inconsistencies, or reliance on incomplete science in developing regulations.

## 9. Recommendations and Conclusions

NAFRA has serious concerns with the Draft Rule for OFRs in enclosures of electric and electronic products, 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. This should include a more complete cost-benefit analysis and that considers less burdensome regulatory approaches as required by the underlying statute.<sup>130</sup>

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<sup>123</sup> US CPSC contract with Industrial Economic, Incorporated,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320621F0021\\_6100\\_47QRAA20D0044\\_4732](https://www.usaspending.gov/award/CONT_AWD_61320621F0021_6100_47QRAA20D0044_4732).

<sup>124</sup> US CPSC contracts with the University of Cincinnati,  
<https://www.usaspending.gov/search/?hash=86ad97cb32642761602d6033b390f65d>.

<sup>125</sup> US CPSC contract with ICF Incorporated, LLC,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320622F2013\\_6100\\_61320622A0005\\_6100](https://www.usaspending.gov/award/CONT_AWD_61320622F2013_6100_61320622A0005_6100).

<sup>126</sup> US CPSC contract with ICF Incorporated, LLC,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320622F2011\\_6100\\_61320622A0005\\_6100](https://www.usaspending.gov/award/CONT_AWD_61320622F2011_6100_61320622A0005_6100).

<sup>127</sup> US CPSC contract with ICF Incorporated, LLC,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320622F2012\\_6100\\_61320622A0005\\_6100](https://www.usaspending.gov/award/CONT_AWD_61320622F2012_6100_61320622A0005_6100).

<sup>128</sup> US CPSC contract with ICF Incorporated, LLC,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320622F2014\\_6100\\_61320622A0005\\_6100](https://www.usaspending.gov/award/CONT_AWD_61320622F2014_6100_61320622A0005_6100).

<sup>129</sup> US CPSC contract with the University of Cincinnati,  
[https://www.usaspending.gov/award/CONT\\_AWD\\_61320622F1004\\_6100\\_CPSCD170001\\_6100](https://www.usaspending.gov/award/CONT_AWD_61320622F1004_6100_CPSCD170001_6100).

<sup>130</sup> Chapter 70A.350.080 RCW.



Suggested areas for improvement include 1) aligning any regulations with relevant state, federal, and international laws, including consideration of conflicting regulatory requirements in other jurisdictions, 2) narrowing the scope of products and chemicals subject to regulation, 3) applying assessment criteria consistently and evenly for OFRs and potential alternatives, 4) recognizing the diversity of OFRs as part of any regulations, 5) giving greater recognition of the need for options in product design, including fire safety and overall product performance, and 6) redoing the Preliminary Regulatory Analyses and delaying any final rules for OFRs in enclosures for electric and electronic products until a more thorough cost-benefit analysis and least-burdensome alternative analysis is conducted to better inform the rulemaking.

December 5, 2022

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

Submitted via: [SaferProductsWA@ecy.wa.gov](mailto:SaferProductsWA@ecy.wa.gov)

**Re: Rulemaking on organohalogen flame retardants in external device casings for electronic and electrical equipment intended for indoor use and intended for outdoor use**

The American Chemistry Council's North American Flame Retardants Alliance (NAFRA) offers the following public comments to inform Washington Department of Ecology ("Department" or "Ecology") and its cost-benefit analysis (CBA) and least-burdensome alternative analysis (LBA) for the proposed rulemaking under Cycle 1 of Safer Products for Washington (SPW).

While some of these comments apply to the overall regulatory process and requirements for SPW, the particular focus is on the proposed regulations for organohalogen flame retardants (OFRs) in external device casings for electronic and electrical equipment both intended for indoor use and intended for outdoor use.

Consistent with regulations made pursuant to the Washington Administrative Procedures Act (APA), Revised Code of Washington (RCW) 34.05.328,<sup>1</sup> and when proposing or adopting rules under SPW, the Department is required to identify the expected costs and benefits of the rules to both State agencies to administer and enforce, and private persons or businesses, by category of type of person or business affected. Consistent with conducting a CBA, Ecology must determine that:

- The rule is needed to achieve the goals and objectives, analyze alternatives to rulemaking, and the consequences of not adopting the rule.
- The probable benefits of the rule are greater than its probable costs, considering both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.
- The rule to be adopted is the least burdensome alternative for those required to comply with that will achieve the general goals and specific objectives.

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<sup>1</sup> RCW 34.05.328, Significant Legislative Rules, Other Selected Rules.  
<https://apps.leg.wa.gov/rcw/default.aspx?cite=34.05.328>

In conducting its CBA analysis, the Department should utilize the established principles and practices outlined in guidance for federal regulatory agencies: Executive Order 12866,<sup>1</sup> Executive Order 13563,<sup>2</sup> and Office of Management and Budget (OMB) Circular A-4.<sup>3</sup>

Appendix 1 provides additional information and recommendations to inform Ecology's cost benefit and least burdensome alternative analyses, but the proposed rulemaking for OFRs in external plastic device casings for electric and electronic products should address the following:

- The overall costs and benefits of the proposed regulations for all OFRs, including the relevant supply chain costs noted below.
  - Costs, availability, and required volumes of potential alternatives;
  - Costs, availability and required volumes of the different plastic resin systems that are necessary for the use for the potential alternatives;
  - Cost to end users and suppliers of product redesign, testing and recertification using potential alternatives;
  - Costs to consumers of the modified end products using potential alternatives;
  - Market size and availability of potential alternatives, including supply chain considerations such as sourcing from other countries; and,
  - Relative socioeconomic costs and benefits of potential alternatives, including consideration of relevant environmental, health and safety factors, efficacy, energy efficiency, resource utilization and climate change.
- Overall costs and benefits of the proposed reporting requirements for outdoor products, including the extensive supply chain costs for generating such information.
- Potential impact on overall product design and safety including product performance, fire safety, etc.
- Cost to the state in terms of employment, tax revenue, and availability of products in the state.
- Costs to the State in terms of monitoring and enforcing compliance of the proposed regulations, including ensuring protection of appropriate proprietary and confidential business information.
- Benefits of regulating all OFRs as opposed to the specific OFRs found in the Washington environment and which are the stated objective of the proposed regulations.

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<sup>2</sup> 76 FR 3821; January 21, 2011, <https://www.govinfo.gov/content/pkg/FR-2011-01-21/pdf/2011-1385.pdf>.

<sup>3</sup> 58 FR 51735; October 4, 1993, [https://archives.federalregister.gov/issue\\_slice/1993/10/4/51724-51752.pdf#page=12](https://archives.federalregister.gov/issue_slice/1993/10/4/51724-51752.pdf#page=12).

<sup>4</sup> White House Office of Management and Budget, OMB Circular A-4, [https://www.whitehouse.gov/wp-content/uploads/legacy\\_drupal\\_files/omb/circulars/A4/a-4.pdf](https://www.whitehouse.gov/wp-content/uploads/legacy_drupal_files/omb/circulars/A4/a-4.pdf).

In addition, as part of its LBA, Ecology must adequately evaluate alternative, least burdensome regulatory approaches. The above-mentioned CBA considerations should be fully evaluated against other available regulatory approaches.

Throughout the regulatory process, NAFRA has provided recommendations for alternative approaches that 1) more directly addresses the stated objectives for the priority product area, and 2) provides for overall less burden on the state, consumers, and producers with equivalent environmental, health and safety benefits. Specific alternative approaches that the Department should evaluate in the proposed rulemaking include:

- Regulating specific OFRs identified as being present in the Washington State environment and which are a priority.
- Identifying individual chemicals by Chemical Abstract Services Registry Number to guide implementation as opposed to identifying all OFRs.
- Focusing on additive, non-polymeric OFRs.
- Focusing on specific products as opposed to all plastic casings and enclosures for electrical and electronic equipment.
- Utilizing existing codes and standards, including those suggested by NAFRA, as a mechanism to minimize exposure of OFRs.
- Establishing expanded monitoring as a mechanism to further guide the scoping of any rulemaking and to measure its effectiveness.

NAFRA offers this input, to help inform and enhance the quality of the Department's proposed rulemaking consistent with adopting a significant legislative rule under RCW 34.05.328. Please let us know if you have any questions or if we can provide additional information to help inform Ecology's work.

Sincerely,

A handwritten signature in black ink, appearing to read "Ben Gann", written in a cursive style.

Ben Gann  
Director  
American Chemistry Council

## APPENDIX 1: RECOMMENDATIONS FOR COST BENEFIT ANALYSIS

This appendix provides recommendations for regulators and for legislators. Its purpose is to improve the design and implementation of state laws designed to regulate chemicals in commerce. Each recommendation reflects established principles of sound regulation and guidance for cost-benefit analysis (CBA).

### **Recommendations for Regulators**

*Follow best practices for CBA* – Use long-established principles of good regulation and guidance for regulatory analysis (e.g., CBA).<sup>5</sup> For example, start with defining the problem. If the problem relates to a commercial chemical product, a focus on risk, not hazard, is appropriate. Defer to federal regulation when the problem can best be addressed at that level (e.g., when the problem relates to interstate commerce). When constructing the baseline (of how the world will behave in the absence of a regulation), include all important anticipated actions, such as existing or future regulatory restrictions, including restrictions in other nations or regions of the world. When identifying a manageable number of regulatory alternatives, adjust the scope to focus narrowly on the problem and leverage the use of informational approaches, including consensus standards. Differentiate the expected impact to citizens of the state from citizens of other states or countries.

*Allow adequate time for markets to adjust to restrictions* – Any restriction that changes the composition of commercial products will take a certain amount of time to implement. For products with longer and complicated supply chains, more time will be needed. For example, producers of a consumer product consisting of multiple components employ a 15-step process (e.g., formulation, chemical testing, modify manufacturing process, etc.) before substituting one chemical for another. This process often takes years. Information on the expected timeframe for compliance is only known to affected firms, and therefore regulators should solicit this information early in the regulatory development process.

### **Recommendations for Legislators**

*Be wary about regulating competitive markets* – Competitive markets are a powerful tool for allocating scarce resources because they reflect aggregate actions and voluntary choice. Government intervention, including regulation, may be appropriate in the presence of a market failure or when the goal is to improve an existing governmental activity. Even when regulation is necessary, state regulation may not be appropriate if the activity is primarily a local, regional, or federal issue.

*The goal should be risk reduction, not hazard reduction* – If the purpose of the law is to improve the environment, safety, or human health, the appropriate goal is to reduce risk (which comprises

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<sup>5</sup> These principles are embodied in federal guidance for federal regulatory agencies: Executive Orders 12866 and 13563, and OMB Circular A-4.

both hazard and exposure) to an acceptable level. When chemicals are the subject of concern, regulation based on hazard alone is likely to have unanticipated consequences.

*Perform CBA earlier in the process* – If the law impacts commerce, it should be informed by benefit-cost analysis, and this analysis should be done before a regulatory recommendation is made, not after. BCA can save regulators' time by focusing attention on the problem and informing promising regulatory recommendations.

*Leverage the power of markets with information approaches* – When a law impacts a competitive market, often the best way to regulate is to leverage information (through required labeling, reporting, and/or disclosure, etc.) over more intrusive interventions (bans, restrictions, etc.). Information allows market participants (producers and consumers) to adjust without constraining choice.

*Allow adequate time for markets to respond* – When a law imposes requirements for commercial establishments to undertake, allow sufficient time for implementation and compliance. An arbitrary effective date could have unintended consequences. It may be reasonable to allow years for markets to comply with a new law or regulation. Market participants should be consulted when determining the appropriate time for compliance.

*Include a sunset clause and a requirement for periodic retrospective review* – When the purpose of the law is to intervene in markets, lawmakers are wise to include a sunset clause coupled with periodic retrospective review—a mandatory look back at the law/regulation by qualified professionals to ensure the impact is what legislators/regulators intended. If the regulation is working as intended, the legislature can extend the sunset date until the next retrospective review.

# American Chemistry Council

Attached are comments from the American Chemistry Council (ACC). Thank you in advance for considering our views.

# Proposed Rule - Chapter 173-337 WAC Safer Products Restrictions and Reporting

## Comments of the American Chemistry Council

February 5, 2023

### Introduction

The American Chemistry Council (ACC)<sup>1</sup> is pleased to submit these comments on the Washington Department of Ecology's (Ecology) proposed regulations to implement the Safer Products for Washington (SPW) Program, Chapter 173-337 WAC – Safer Products Restrictions and Reporting (Draft Rule), as part of the second phase of this rulemaking which opens the formal public comment period.

ACC supports strong, science-based regulations that support product safety and the protection of human health and the environment, but we continue to have serious concerns with the implementation of this new program, including the inconsistencies in this proposal with some of the criteria and requirements outlined in the underlying statute (Chapter 70A.350 RCW).

In addition to these overarching comments, other ACC product groups will be submitting specific comments about how these issues are more directly relevant for specific priority chemicals/chemistries and proposed priority product categories.

We urge Ecology to consider the following comments on the Draft Rule.

#### **I. Ecology's [Final Determinations](#), which provide a legal basis for Ecology to proceed with this rulemaking, remain flawed.**

Ecology is only authorized to implement material restrictions under the SPW program under specific circumstances. Prior to implementing such restrictions, Ecology must determine both that: 1) safer alternatives are feasible and available; and 2) the restriction will reduce a significant source of or use of a priority chemical; or the restriction is necessary to protect the health of sensitive species or sensitive populations.<sup>2</sup> In this case, Ecology's determinations on both counts were fatally flawed. This calls into question Ecology's basis for this rulemaking.<sup>3</sup>

ACC incorporates into these comments by reference its previous public comments issued during Ecology's determinations process and attached here for reference. This includes serious flaws

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<sup>1</sup> The American Chemistry Council (ACC) represents the leading companies engaged in the multibillion-dollar business of chemistry. ACC members apply the science of chemistry to make innovative products, technologies and services that make people's lives better, healthier and safer. ACC is committed to improved environmental, health, safety and security performance through Responsible Care®; common sense advocacy addressing major public policy issues; and health and environmental research and product testing. ACC members and chemistry companies are among the largest investors in research and development, and are advancing products, processes and technologies to address climate change, enhance air and water quality, and progress toward a more sustainable, circular economy.

<sup>2</sup> RCW 70A.350.040(3).

<sup>3</sup> See, e.g., *Swinomish Indian Tribal Cmty. v. Washington State Dep't of Ecology*, 178 Wash. 2d 571, 586, 311 P.3d 6, 13 (2013) ("Ecology's interpretation of the statute is not consistent with the statute and must be rejected."); *Bostain v. Food Express, Inc.*, 159 Wash.2d 700, 715, 153 P.3d 846 (2007) (Rules that are not consistent with the statutes that they implement are invalid).



ACC pointed out in Ecology’s “safer alternatives” analysis. For example, each flame retardant Ecology identified as a “safer alternative” would require the use of products restricted in other jurisdictions. Not only does that render the alternatives infeasible but it ignores the legislature’s admonition for Ecology to consider whether a “restriction would be consistent with regulatory actions taken by another state or nation.”<sup>4</sup>

Ecology’s analysis was also inconsistent with the state of the science. Ecology proceeded with regulating organohalogen flame retardants (OFRs) despite the National Academy of Sciences (NAS) concluding that these chemicals should not be assessed as a single class. Instead, NAS has recommended that OFRs be sorted into 14 subgroups based on chemical structure, physicochemical properties, and predicted biological activity.<sup>5</sup> Similarly, Ecology continues to restrict the use of high molecular weight phthalates in vinyl flooring despite the results of Ecology’s data call-in demonstrating that vinyl flooring manufacturers largely phased out phthalate use between 2013 and 2016, and despite Ecology’s own 2011 report indicating that the release of phthalates to Puget Sound from PVC flooring accounts for <1% of total phthalate environmental release to the environment.

Ecology also used an improperly narrow view of what makes chemicals “safer.” For example, Ecology’s criteria for “safer” did not sufficiently account for hazards that flame retardants mitigate in electronics, such as inhibiting or suppressing the combustion process, reducing the heat released from a combustion event, or minimizing the potential for fire to spread.<sup>6</sup> Nor did Ecology’s analysis take into account broader product design and performance factors. As ACC has noted in its previous comments, Ecology’s review would also be well-informed by a multifactorial approach that includes careful consideration and integration of other elements of alternatives life-cycle thinking and analysis, a critical tool that helps with the evaluation of sustainability and environmental trade-offs. Even if the function of a priority product is equivalent or better with the use of an alternative chemistry, substitution can have unwanted or adverse sustainability impacts that should be carefully evaluated. A substitute chemistry may require long distance transport, process changes, increased energy use or greenhouse gas emissions across its lifecycle, for example.

## **II. Ecology has not met its APA burden of showing that the benefits of the Draft Rule exceed its costs.**

The Regulatory Reform Act of 1995 amended the Washington Administrative Procedure Act (APA) to require that Ecology, before adopting the Draft Rule, prepare a preliminary cost-benefit

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<sup>4</sup> RCW 70A.350.040(4).

<sup>5</sup> National Academies of Sciences, Engineering, and Medicine. 2019. A Class Approach to Hazard Assessment of Organohalogen Flame Retardants, <https://nap.nationalacademies.org/catalog/25412/a-class-approach-to-hazard-assessment-of-organohalogen-flame-retardants>.

<sup>6</sup> For a depiction of the importance of flame retardants to product safety, see this video: <https://www.youtube.com/watch?v=8sXmxrxipVI>.

analysis.<sup>7</sup> Based on that analysis, Ecology must determine before adopting the Draft Rule that the probable benefits of the rule exceed its probable costs.<sup>8</sup>

**A. Ecology’s cost-benefit analysis does not meaningfully consider the cost of compliance associated with the Draft Rule.**

Ecology’s analysis did not fully consider how restrictions will require manufacturers to redesign products adequately, which will significantly increase costs. It failed to meaningfully assess the costs associated with using alternative or replacement priority chemicals. Ecology significantly understated the costs of the Draft Rule by relying on NAICS groupings as opposed to NAICS codes to estimate costs. Ecology simply relied on the dollar amount of the U.S. sale for NAICS groupings corresponding with the priority consumer product categories to attempt to estimate cost impacts. This approach is flawed. For example, the “electric and electronic products” category is quite broad. Therefore, unless Ecology evaluated each NAICS code for each product covered under the restriction for “electric and electronic products,” Ecology’s cost estimate does not accurately reflect the costs manufacturers will face complying with the Draft Rule.

**B. Ecology did not follow best practices in developing its cost-benefit analysis.**

Ecology is required to “[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.” RCW 34.05.328(1)(d).

Table 1 compares best practices with Ecology’s analysis. The best practices are derived from standard textbooks on cost-benefit analysis, and OMB Circular A-4, which provides guidance to federal agencies on conducting regulatory analysis, including cost-benefit analysis required of all major federal rulemakings.<sup>9</sup>

**Table 1. Evaluation of Key Components of Ecology’s Cost-Benefit Analysis**

| <i><b>Component</b></i> | <i><b>Best Practice(s)</b></i>                                                                                                                                                                                                                      | <i><b>Ecology’s Analysis</b></i>                                                                                                                                                                                                                                                      |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Baseline</b>         | Cost-benefit analysis requires construction of a baseline, which reflects the status quo in the absence of the restrictions in the Draft Rule. For each chemical of concern, a historical trend of consumption (volume) over time, and a projection | Ecology’s analysis requires the public to infer that the baseline reflects the status quo (i.e., sales value) from the most recent year in which data are available. This value is projected forward for 20 years. <u>Ecology’s baseline understates both the costs and benefits.</u> |

<sup>7</sup> RCW 34.05.328(1)(c).

<sup>8</sup> RCW 34.05.328(1)(d); *see also* RCW 70A.350.080(2)(a) (“When proposing or adopting rules to implement regulatory determinations specified in this subsection, the department must identify the expected costs and benefits of the proposed or adopted rules to state agencies to administer and enforce the rules and to private persons or businesses, by category of type of person or business affected.”).

<sup>9</sup> [https://obamawhitehouse.archives.gov/omb/circulars\\_a004\\_a-4/](https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/)

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                 | of this historical trend into the future based on expected economic growth.                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Changes in Consumer and Producer Surplus</b> | Compare status quo with regulation from consumer perspective. From a cost-benefit perspective, regulation of commercial products will change the welfare of both consumers and producers (referred to as the change in consumer surplus and producer surplus, respectively). Quantifying and monetizing this change in welfare requires knowledge of supply and demand curves. | Ecology's analysis presumes that there will be no change in consumer surplus, that is, no change in prices for consumers and no change in consumer welfare. <u>This is a significant error, and calls into question Ecology's entire analysis.</u> Chemicals in commercial products are selected based on numerous factors, driven largely by consumer preferences. Ecology's assumption that consumer preferences will not change when products are reformulated is not realistic. An economist would expect to see a loss in consumer surplus as a result of governmental intervention that restricts consumer choice in competitive markets. To presume otherwise requires substantial evidence and market-relevant data, which is absent in Ecology's analysis.                                                                      |
| <b>Externality</b>                              | <p>Estimate change in risk to non-market participants from environmentally relevant exposures.</p> <p>To properly estimate benefits from restricting these chemicals requires a quantification of adverse effects expected at environmentally relevant levels of exposure (in other words, risk).</p>                                                                          | Ecology presumes proportionate decline in disease associated with chemical of concern to exposed populations. Not only does the analysis ignore risk, but it also includes the following unsupported statement: "if we were to use risk instead of hazard...it would be less protective of people and the environment." <u>This statement, along with others found throughout the document, suggest that the analysis does not estimate "probable" impacts, contrary to the statute.</u> The estimate of benefits in Ecology's analysis is improbable. One cannot presume that illnesses associated (non-causally) with a chemical of concern can be reduced through regulatory restrictions absent information on environmentally relevant exposure (and therefore risk) reductions and absent information on the risk of alternatives. |
| <b>Analysis of regulatory alternatives</b>      | Quantify the net benefits of alternative regulatory actions, including no action and reporting-only.                                                                                                                                                                                                                                                                           | Ecology provides limited rationale. No explanation is given for choice of reporting versus restrictions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|                      |                                                                                                                                                                                                                                                               |                                                                                                                                                                        |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | The analysis should include a monetization of net benefits for various alternative regulatory actions. The analysis also should have presented some evidence that each proposed regulatory action was the least cost alternative.                             |                                                                                                                                                                        |
| <b>Discount Rate</b> | Best practice requires use of multiple discount rates that are higher in magnitude. The standard 3% and 7% are used to reflect, respectively, the real rate of return on long-term government debt and the historical before-tax return on corporate capital. | Ecology’s analysis uses a discount rate of 0.89%, which reflects the average return on U.S. Treasury notes since 1998.                                                 |
| <b>Uncertainty</b>   | Best practice is to identify the specific assumptions that most impact the final results and include a sensitivity analysis based on alternative assumptions.                                                                                                 | Minimum costs are zero, yet minimum benefits are non-zero. Ecology provides no indication of which assumptions/data contribute most to quantification of net benefits. |

**III. Ecology violated SEPA by failing to adequately consider whether the Draft Rule has any probable significant adverse environmental impacts.**

Although the goal of the Draft Rule is to reduce hazards of chemicals in priority consumer products, Ecology fails to consider the environmental impacts from the Draft Rule, including increased fire risks to Washington consumers. These risks create significant adverse environmental impacts that require analysis under the State Environmental Policy Act (SEPA), Ch. 43.21C RCW, through the preparation of an environmental impact statement (EIS).

**A. The information contained in Ecology’s SEPA Checklist is not reasonably sufficient to evaluate the Draft Rule’s environmental impacts.**

SEPA requires state agencies to identify and evaluate possible environmental impacts resulting from major government actions, including this significant new rulemaking. The purpose of SEPA review is to ensure that agencies fully disclose and carefully consider a proposal’s environmental impacts before adopting it and “at the earliest possible stage.” Under SEPA review, an agency must make a “threshold determination” of whether the proposal will have a “probable significant adverse environmental impact.”

The first step in the SEPA analysis is for Ecology to make a threshold determination as to whether an EIS is required.<sup>10</sup> A Determination of Nonsignificance (DNS) “must be based upon information reasonably sufficient to evaluate the environmental impact of a proposal.”<sup>11</sup>

<sup>10</sup> WAC 197-11-310(1), -797.

<sup>11</sup> *PT Air Watchers v. State, Dep’t of Ecology*, 179 Wn.2d 919, 927 (2014) (quoting *Moss v. City of Bellingham*, 109 Wn.App. 6, 14, 31 P.3d 703 (2001)).

Ecology's SEPA Checklist does not contain enough information to sufficiently analyze the environmental impact of its Draft Rule. For example, neither the SEPA Checklist, nor its referenced documents, adequately discuss the cumulative impacts of the Draft Rule.

Restricting the use of a priority chemical, such as flame retardants, can significantly impact the user's safety and interaction with the priority consumer product. Throughout the Safer Products rulemaking process, however, Ecology failed to adequately account for the hazards that flame retardants mitigate, and subsequently how these mitigating factors help protect the environment. Flame retardants, for example, reduce the risk of fire and combustion, which protects not only the user, but minimizes the risk of large-scale fires that release toxins into the air and water that can impact the surrounding environment as well as the health of emergency response teams and nearby communities exposed to the fire. Likewise, Ecology failed to consider broader design and performance factors which could also influence environmental impacts.

By failing to consider these possible adverse environmental impacts, Ecology lacked a sound basis for concluding that adopting this Draft Rule does not require an EIS. Ecology thus violated its duty to engage in a robust threshold determination process under SEPA. ACC urges Ecology to undertake a revised SEPA review and make a new threshold determination—and, if necessary, perform an EIS—before finalizing this sweeping, far-reaching Draft Rule.

#### **B. Ecology's DNS and SEPA Checklist lacks a meaningful analysis of alternatives.**

SEPA requires Ecology to “[s]tudy, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.”<sup>12</sup> Ecology's failure to consider alternatives to regulating priority chemicals is the type of unresolved conflict that triggers an alternatives analysis under SEPA.<sup>13</sup> By choosing to regulate priority chemicals as a class, Ecology precluded the chemicals within that class from being safely used in priority consumer products, and from being considered as safer alternatives.

Moreover, the decision on whether or not to regulate chemicals by a class or individually is unsettled among stakeholders.<sup>14</sup> Since the beginning of the Safer Products rulemaking process, stakeholders have disagreed as to whether chemicals should be regulated as a class or individually. For example, with regards to flame retardants, while some stakeholders advocate for regulating OFRs as a class, others note that the National Academy of Sciences found that OFRs cannot be treated as a single class, and instead recommends that OFRs be sorted into subgroups.<sup>15</sup> Ecology should have analyzed alternatives to regulating priority chemicals when fulfilling its SEPA requirements.

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<sup>12</sup> RCW 43.21C.030(2)(e); *see also Wild Fish Conservancy v. Wash. Dep't of Fish and Wildlife*, 198 Wn.2d 846, 862 (2022).

<sup>13</sup> *Wild Fish Conservancy*, 198 Wn.2d at 863 (“[A]n alternatives analysis is appropriate when a proposal involves a competition over the use of a resource whereby selecting one manner of using the resource will preclude all other uses.”).

<sup>14</sup> *Id.* at 864 (“Finally, this competition must be unsolved, unsettled, or, in other words, actively in dispute.”).

<sup>15</sup> *See, e.g., A Class Approach to Hazard Assessment of Organohalogen Flame Retardants*, National Academies of Sciences, Engineering, and Medicine (2019) <https://doi.org/10.17226/25412>.

#### **IV. The Draft Rule should be revised to comply with the APA “least burdensome alternative” requirement.**

Ecology’s Draft Rule does not comply with the goals of the Regulatory Reform Act. The 1995 Regulatory Reform Act requires Ecology not only to determine that the benefits of the Draft Rule exceed its costs, but also to determine that the rule being adopted is the least burdensome alternative for those required to comply that will achieve the general goals and the specific directives of the statute that the rule implements.<sup>16</sup>

Ecology’s Draft Rule is not the least burdensome alternative. For example, when making this determination Ecology should have analyzed how restrictions that require manufacturers to redesign products would affect cost, performance, or desirability of a product. The closest Ecology came to assessing these costs is in its brief consideration of costs associated with “safer” alternatives. However, even this analysis is cursory and unconvincing. Ecology’s Least Burdensome Alternative analysis stated that Ecology did not consider cost because cost information is not transparent and depends on a number of variables, which make it difficult to use in decision-making.<sup>17</sup>

As a result, Ecology looked at whether alternatives were already used for the application of interest and assumed that manufacturers would not use prohibitively expensive chemicals.<sup>18</sup> Ecology concluded that the law requires it to determine the availability and feasibility of safer alternatives and does not focus on the cost of alternatives.<sup>19</sup> Even if this interpretation were correct, it would not alter the prohibition against Ecology implementing a rule where the costs outweigh the benefits.<sup>20</sup>

Ecology failed to recognize how restrictions might require manufacturers to requalify parts or products that contain alternatives, which would affect costs, performance, or desirability. Consumer products are designed for worldwide compliance. Companies do not, and simply cannot, requalify parts or products for every jurisdiction they operate in.

ACC and its various product groups have provided recommendations for alternative approaches throughout the regulatory process that 1) more directly address the stated objectives for the various priority product areas, and 2) provide for overall less burden on the state, consumers, and producers with equivalent environmental, health and safety benefits. Ecology should evaluate and consider each of these alternative approaches in the final rulemaking or clearly indicate why these less burdensome approaches were not considered.

#### **V. Any future environmental justice obligations stemming from SPW program rules should be effectuated through formal rulemaking procedures.**

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<sup>16</sup> RCW 34.05.328(1)(e).

<sup>17</sup> See Preliminary Regulatory Analyses, Department of Ecology State of Washington, p 65, December 2022 <https://apps.ecology.wa.gov/publications/documents/2204042.pdf>.

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> RCW 34.05.328(1).

ACC members are committed to continual improvement in both environmental performance and impacts from their facilities and surrounding areas. As part of that commitment, ACC and its members support the overall goals of the Draft Rule's provision on "Equity and Environmental Justice" to promote environmental justice considerations and enable, among other things, increased engagement of all stakeholders, including communities that may face disproportionately negative impacts.

While, as written, the Draft Rule does not impose any additional environmental justice obligations on the regulated community, it states that Ecology will take sweeping, largely undefined steps to incorporate environmental justice considerations into its implementation of the Draft Rule. ACC supports Ecology's efforts to ensure meaningful and inclusive community engagement and to equitable access to safe consumer products. However, any additional obligations that Ecology ultimately creates through WAC 173-337-050 should occur through formal rulemaking procedures. To the extent any requirements derived from WAC 173-337-050 impact permitting considerations, ACC encourages Ecology to ensure such permitting processes are clear, flexible, risk-based, and not duplicative. As Ecology provides additional detail about any such requirements in advance of implementation, ACC encourages Ecology to evaluate any stressors and associated impacts on public health or the environment utilizing clear criteria and definitions that articulate scientifically credible risks.

#### **VI. CBI must be protected from public disclosure.**

It is critical that all confidential business information (CBI) provided to Ecology be protected from public disclosure. Ecology should ensure that all CBI submitted to Ecology under the SPW program be afforded protection described in the December 2020 Ecology document Information for Businesses Submitting Confidential Business Information to Ecology Under RCW 70A.350.<sup>21</sup> This includes: 1) ensuring that any of Ecology's contractors that review the information do so under a separate confidentiality agreement; 2) Ecology notify the submitter if it believes any information submitted as CBI does not meet the required criteria for protection; and 3) Ecology requesting a protective order for any documents reviewed by a court to confirm they are CBI.

Ecology should also understand that companies strictly protect certain formulation information from each other in addition to from other entities. This safeguard is necessary to drive innovation and protect competitive advantages, which are the reasons the Legislature enacted the CBI protections of RCW 43.21A.160. Because companies keep this information from each other, it can be difficult for a submitter to determine whether a certain process is "unique" to the submitter under that statutory provision. However, a submitter still qualifies for CBI protection if it can show that the disclosure of information "may affect adversely [its] competitive position."<sup>22</sup> Information regarding product formulation is generally considered CBI that would harm a company's competitive position if released.

#### **VII. Used products should be out of scope of the program.**

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<sup>21</sup> Available at

[https://www.ezview.wa.gov/Portals/\\_1962/Documents/saferproducts/CBI\\_Process\\_SaferProductsWA.pdf](https://www.ezview.wa.gov/Portals/_1962/Documents/saferproducts/CBI_Process_SaferProductsWA.pdf).

<sup>22</sup> RCW 43.21A.155.



The Draft Rule contains only a limited exemption for previously owned products, but Ecology should enact a full exemption. Under the Draft Rule, if a company “know[s]” that previously owned products do not conform to material restrictions in the regulations, that company may not sell or distribute the products. This prohibition would not apply to products or repair/replacement parts manufactured before the effective date of the material restriction.

There are strong public policy reasons supporting a full exemption for used products. The limited exemption, as currently written, could suppress sales of used products, resulting in premature obsolescence. This would cause unnecessary use of natural resources and generation of waste. The limited exemption also may unintentionally subject individual citizens to potential liability.

There is also good legal precedent for a full exemption for used products. For example, the Toxic Substances Control Act Persistent, Bioaccumulative, and Toxic rules exempt products or articles previously sold or supplied to end-users.<sup>23</sup> In order to effect this change, proposed WAC 173-337-055 should be replaced with the following: “The requirements of this chapter do not apply to priority consumer products that have previously been sold or supplied to an end user.”

#### **VIII. Ecology should provide clarity on how any civil penalties would be calculated.**

Ecology’s Draft Rule would authorize civil penalties up to \$5,000 “for each violation in the case of a first offense” and up to \$10,000 “for each repeat offense.” The Draft Rule does not define “violation” or “repeat offense” and so it is not clear how Ecology would be authorized to calculate penalties. For example, each day that a non-conforming product is sold could be viewed as a separate offense or, in an extreme example, each non-conforming unit sold could be a separate offense. Ecology should provide more certainty to regulated entities.

\* \* \*

Thank you for the opportunity to comment on the Draft Rule. For any questions about this submission, please contact Suzanne Hartigan, Senior Director, Regulatory and Scientific Affairs, [Suzanne\\_Hartigan@americanchemistry.com](mailto:Suzanne_Hartigan@americanchemistry.com), or Tim Shestek, Senior Director, State Affairs, [Tim\\_Shestek@americanchemistry.com](mailto:Tim_Shestek@americanchemistry.com).

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<sup>23</sup> 40 C.F.R. § 751.401(b)(1).



# **Draft Regulatory Determinations Report to the Legislature Safer Products for Washington Implementation Phase 3**

## **Comments of the American Chemistry Council**

**January 28, 2022**

### **Introduction**

On behalf of the American Chemistry Council (ACC),<sup>1</sup> we are pleased to submit these comments to the Washington State Department of Ecology's (Ecology) Draft Regulatory Determinations Report to the Legislature: Safer Products for Washington Implementation Phase 3 (Draft Report).<sup>2</sup> ACC supports strong, science-based regulations that are protective of human health and the environment. Regulatory decision making and reviews of chemistries should be evidence-based, efficient, effective, scientifically driven and risk based, best-evidence based reviews of chemistries. Increasingly, achieving social justice and environmental objectives are being taken into account as part of these processes. Likewise, the business of chemistry is at the forefront of driving innovative solutions in chemistry and plastics that enable a variety of applications that help save energy and reduce emissions every day as part of the broader climate dialogue – from solar panels and wind turbines to electric and fuel-efficient vehicles, high-performance building materials, advanced batteries, energy efficient lighting, and more.

ACC recognizes that alternatives assessment is an important science policy field, and generally supports application of the framework approach and principles set out in the National Academies of Sciences' Framework to Guide Selection of Chemical Alternatives.<sup>3</sup> "Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives"<sup>4</sup> is a more recent publication by The Organization for Economic Co-operation and Development, (OECD), an intergovernmental collaborative of 37 industrialized countries. The NAS and OECD frameworks contain important policy considerations, science elements, and sequencing that can help inform Ecology's approach as it implements the Safer Products program.

As part of the Safer Products program, the agency (based on direction from the Legislature) identified five priority chemicals/chemical classes for alternatives assessment: flame retardants; PCBs; PFAS; phenolic compounds (alkylphenol ethoxylates); phenolic compounds (bisphenols); and phthalate (esters). The Phase 2 report for priority products identifies a range of consumer products and food packaging that contain one or more of the priority chemicals. By statute, a final report on regulatory determinations is

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<sup>1</sup> The American Chemistry Council represents the leading companies engaged in the business of chemistry in the United States. ACC members apply the science of chemistry to make innovative products, technologies and services that make people's lives better, healthier, and safer. ACC is committed to improved environmental, health, safety, and security performance through Responsible Care®, common sense advocacy addressing major public policy issues, and health and environmental research and testing. ACC members and chemical companies are among the largest investors in research and development, and are advancing products, processes and technologies to address climate change, enhance air and water quality, and progress toward a more sustainable, circular economy. These comments incorporate the comments of several groups participating at ACC that represent specific chemistries.

<sup>2</sup> This report is made pursuant to the Pollution Prevention for Healthy People and Puget Sound Act (the "Act"), codified at 70A.350 RCW. The law directs Ecology to consult with the State Department of Health to implement a regulatory program to reduce toxic chemicals in consumer products. The implementation program is referred to as the Safer Products for Washington program.

<sup>3</sup> National Research Council 2014. A Framework to Guide Selection of Chemical Alternatives. Washington DC: The National Academies Press. <https://doi.org/10.17226/18872>.

<sup>4</sup> Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives, OECD 2021.

due to the Legislature by June 1, 2022. The comment period on a draft rule as part of Phase 3 is expected to be late 2022-2023. Regulatory options available by statute include taking no action; requiring reporting from manufacturers to collect or generate additional data; and restricting a chemical in a product in all eleven of the identified priority consumer products, or a subset thereof. The State may of course, in addition to any of these paths, choose to lead or participate in product and chemistry innovations, testing of labeling and instructions, piloting of handling and/or training and certification programs, and private sector standard development.

Inputs as part of the Phase 3 process will help Ecology assess whether safer alternatives are feasible and available. This will be followed by a determination of whether a restriction or reporting requirement, or no action, or a request for additional research, should be issued. In order to proceed with a restriction, Ecology must complete analyses that show that a safer alternative:

- Is feasible;
- Is available;
- Will reduce a significant source of or use of a priority chemical (or is necessary to protect the health of sensitive species or populations);
- Delivers benefits that outweigh the costs; and
- Determine that the proposed restriction is the least burdensome alternative.

Ecology's review would also be well-informed by careful consideration and integration of other elements of alternatives life-cycle thinking and analysis, a critical tool that helps with the evaluation of sustainability and environmental trade-offs. Even if the function of a priority product is equivalent or better with the use of an alternative chemistry, substitution can have unwanted or adverse sustainability impacts that should be carefully evaluated. A substitute chemistry may require long distance transport, process changes, increased energy use or greenhouse gas emissions across its lifecycle, for example. Global markets and supply chain impacts and disruptions should also be included in the availability and benefit-cost analysis, as we have seen play out in the recent pandemic where products and materials sourced from facilities outside the United States have been stressed with various availability constraints and delays. Social justice considerations may also be a relevant factor. For example, President Biden signed the Uyghur Forced Labor Prevention Act into law on December 23, 2021, which could ultimately affect imports from that region.<sup>5</sup>

We present below general comments with respect to Ecology's approach to alternatives assessment in Section I, and specific comments with respect to the approach taken for the 5 classes of priority products in Section II. Our comments here include comments of ACC's High Phthalates Panel and Polycarbonate-BPA Global Alliance. ACC also notes, supports, and incorporates by reference here, several sets of separately filed comments:

- The separate submission by the North American Flame Retardant Alliance (NAFRA). The NAFRA comments relative to organohalogen flame retardants (FRs) in plastic casings for electronics and electrical equipment reinforce many of the points raised in the ACC comments and the proposed recommendations relative to the extremely broad range of electronics and electrical equipment.

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<sup>5</sup> For example, Table 10-3 of the NAS Framework set out a number of social impact categories that could be possible characterization factors, including labor practices, work conditions, and violation of property rights including those of U.S. companies and individuals. In an availability analysis, for example, criteria excluding sourcing from venues that fail to meet selected minimum social impact criteria that could be relevant.

- The separate submission by the Alliance for Telomer Chemistry Stewardship (ATCS). ATCS is a global organization that advocates on behalf of C6 fluorotelomer-based products. ATCS promotes the responsible production, use and management of fluorotelomers, while also advocating for a sound science- and risk-based approach to regulation.
- The separate submission of the FluoroCouncil, which represents a diverse range of fluorinated chemistries. These chemistries play a wide range of roles in many products, including products that consumers rely on every day, from cell phones and fuel-efficient cars to solar panels and stain-resistant furniture.

We urge Ecology to take these comments into consideration for these important and complex product categories.

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## I. General Comments

### A. The Feasibility Analysis Should Clarify that Both Technical and Economic Feasibility are Required and Take Additional Factors into Account.

Under Ecology's criteria, for an alternative to be feasible, it must meet at least one of the following criteria:

- Already used for the application of interest or a similar application;
- Marketed for the application of interest or a similar application; or
- Identified as feasible by an authoritative body.

"Feasibility" under the NAS Framework includes an analysis of both technical feasibility and economic feasibility. The criteria should specify that both technical and economic feasibility must be evaluated and satisfied.

Technical feasibility requires a demonstration that a substitute chemistry or formulation provides equivalent or better performance for the relevant performance criteria for a particular product. As presented, these criteria do not support a robust review of the feasibility of substituting a particular chemistry, as used in a particular application, with a substitute chemistry. In any given class of chemistry, different individual chemistries may be used or marketed for different applications with different levels of necessary performance. A marine paint; an outdoor paint for a bridge; an outdoor paint for a building; and an interior paint for a kitchen, for example, may have performance requirements that differ significantly.

To continue the paint example, to complete a feasibility analysis, there should be careful consideration of how the alternative affects formulation of a stable product, product performance, specific or niche uses cases, or customer preferences. For example, Ecology found paints with lower (or no) concentrations of PCBs safer than paints with higher concentrations of PCBs. In its analysis, Ecology noted that PCB concentrations in children's paint, spray paint, road paint, and building paint range approximately from zero to 100 ppb. Ecology also noted that of the 105 paint samples tested, 89% had PCB concentrations under 25 ppb, and 78% had concentrations under 10 ppb. To support its conclusion that paints with lower PCB concentrations are feasible and available, Ecology noted that paints with low concentrations of PCBs were sold at stores and marketed as paints. Ecology's analysis did not discuss or consider performance of any of these low PCB paints in any of the paint use categories. Similarly, Ecology proposed using

untreated leather, or inherently stain-resistant materials, such as wool, polyester, or polypropylene, as alternatives to leather treated with PFAS. Ecology failed to analyze the impact these suggested alternatives may have on the product's performance or consumer desirability. Ecology's analysis of alternative products should explicitly consider these factors as they speak directly to the question of whether the alternative is feasible.

We are concerned that both the "already used" criteria, and the "marketed for the application of interest" criteria, are insufficiently robust to support alternatives assessment under the Safer Products program. For example, an identified use of the substitute chemistry may still be in a pilot or test market phase where it is unclear that the performance of the substitute meets consumer or user needs. Undesirable substitutions that affect product performance, including the stability, look, feel, sound, or smell of a product, can affect consumer acceptance of a product and can result in different use patterns and even adherence to safety and use instructions. An unacceptable product may result in rejection and drive consumers to use less sustainable products.

Likewise, we are concerned that the "marketed for the application of interest" is insufficiently robust to support conclusions about feasibility. A manufacturer trying to enter a new market may itself not have sufficiently tested performance and consumer uptake with customers. A product with sustainability trade-offs, such that if a product containing the substitute is no longer eligible for a sustainability claim important to the customer base for example, may not get market uptake at all. The "similar application" language further weakens this provision, as it is unclear what a "similar application" is – in other words, what degree of similarity is required, and does this take into account different regulatory, code-based, standards, and customer performance requirements.

The third criteria, identified as feasible by an authoritative body, should be refined. We believe there to be very few bodies that can conduct an in-product equivalency performance review, including testing. Reviews based on performance standards, with testing and certification by accredited third party laboratories, of specific chemistries in specific products could be a useful indication of feasibility, but we suggest the criteria be rephrased to make this clarification. A statement by a non-consensus based organization that it is feasible to replace a particular chemistry or class with another, without a robust technical foundation to support this conclusion, should not be used as an authoritative body. In addition, the criteria should make clear that no party can "self-certify" the feasibility of a substitute chemistry or class; only independent, consensus-based standard and certification systems should be accepted, or the conclusion of a comprehensive review by a government conducting an alternatives assessment based on NAS Framework principles.

**B. The Availability Analysis Criteria Should Take Current Market Factors and other Externalities into Consideration, Including Production Scale and Globally Supply Chain Issues.**

The Draft Report indicates that for an alternative to be available, it must meet at least one of the following criteria:

- Currently used for the application of interest.
- Offered for sale at a price that is close to the current.

For an alternative chemical, process, or material not in use to be considered feasible it would need to meet at least one of a number of criteria. Some of these criteria would include:

- An authoritative body identified the alternative as favorable with some indications that it might not perform as well, but the difference in performance is not crucial to the product.

- An authoritative body identified the alternative as unfavorable, i.e., not a viable alternative based on performance. However, modifications to the process could make the alternative feasible.
- An authoritative body identified the alternative as unfavorable, but the application is not identical to the application of interest, and the process or product can be modified to accommodate the alternative.

This approach presents a number of shortcomings that point to an incomplete, and insufficiently robust, economic feasibility analysis. The mere fact that a particular chemical is in use in an application of interest does not mean that global supply chains can provide the substitute chemical in the volumes and delivery times needed to support substitution. If global supply chain disruption occurs where a chemical is sole-sourced from an importer or US facilities do not have sufficient capacity to meet US market needs, availability is adversely impacted and the substitute chemistry is not economically available. In addition, the availability/economic feasibility analysis must take into consideration costs other than price as part of the availability analysis. A substitute chemistry may require process or equipment changes; labor force changes; raw material sourcing changes; and so forth that impact the total cost of the substitution well beyond what an equivalent or similar price is for purchase of the chemical would be.

While consideration of cost is listed in Ecology's criteria for feasible and available, cost is not discussed in any of Ecology's determinations regarding priority chemicals. In other words, Ecology has failed in every case to actually apply the benchmarks it set for itself. As a result, it is unclear to what extent Ecology actually considered cost and what data it will rely on when considering cost in the future. For example, in the electronics section, five phosphate flame retardant alternatives are put forth but cost is not mentioned, nor does Ecology claim that all five alternatives are currently used in the plastic enclosures of electronics. Similarly, in the bisphenols section, Ecology identifies a certain product as a feasible and safer alternative for BPA and BPS in thermal paper and that the product is available online, but Ecology does not mention the cost of substituting the product for current bisphenols in thermal paper. In some instances, Ecology suggests that a safer alternative is a change of process or design, rather than the use of an alternative chemical. For example, for PFAS, Ecology suggests using untreated leather, textiles, or other materials to replace or cover products treated with PFAS. Ecology also suggests using inherently stain-resistant materials, such as wool, or polyester, or using removable upholstery that can be machine washed. However, Ecology's analysis does not mention the costs associated with switching to untreated fabrics or materials, nor does Ecology consider the costs associated with changing its design or processes to accommodate a new material. Similarly, in the flame retardants section, Ecology states that "another alternative for meeting flammability requirements is using an internal enclosure made of inherently flame-resistant material (e.g., metal) to serve the function of a fire enclosure[.]" Nowhere in this analysis does Ecology mention the associated costs to the electronics industry if it switched from using plastic enclosures to an entirely different material (e.g., metal). Moreover, Ecology fails to recognize the implausibility of the entire electronics industry switching to a different enclosure material within the short time frame. Ecology even concedes that switching to an inherently flame-resistant material, such as metal, is not feasible in some applications. When Ecology finalizes the determinations, it must appropriately consider costs.

In addition to production scale and global supply chain issues, Ecology should consider regulatory barriers. Ecology's proposed alternatives include chemicals that other agencies are either currently or are actively considering regulating. Further, although Ecology purports to analyze the commercial availability of a chemical, it has failed to consider whether that chemical will be available at production scales in order to support an entire industry switching from one chemical to another. Consumer products are designed for worldwide compliance. Companies do not, and simply cannot, design products tailored to different regulatory environments. Thus, if a chemical Ecology regards as a feasible alternative were to be restricted by another agency – whether foreign or domestic – Ecology's conclusion that the chemical was a feasible alternative would be inaccurate.

It is important to assess whether chemicals Ecology identifies as alternatives are regulated elsewhere and factor this into its assessment. The draft determination does not do so. To illustrate this point, a cursory (not exhaustive) regulatory review of the potential alternatives Ecology has identified in the draft report reveal troubling results. This speaks not only to the over-simplicity of Ecology's feasibility determinations, but the potential for this oversimplicity to lead to regrettable substitution. One chemical Ecology holds out as a potential alternative to halogenated flame retardants is triphenyl phosphate (TPP). This chemical is currently undergoing a risk evaluation under the U.S. Toxic Substances Control Act. Ecology also notes that many or most applications that use organophosphate flame retardants must also use an anti-drip additive, such as a fluoroorganic additives. This is necessary to prevent "flaming drips" during a fire event. As Ecology points out elsewhere in the draft determination fluoroorganic chemicals are already highly regulated and becoming even more so. For instance, Maine recently enacted a wholesale ban on products that contain perfluoroalkyl and polyfluoroalkyl substances (PFAS), effective January 1, 2030. Ecology identified benzyl alcohol as a safer alternative for phthalates in beauty products. However, benzyl alcohol is listed in Annex III of EU Regulation.

Ecology has also failed to consider whether the potential alternatives it has put forth will be available at scale during any phase-out period Ecology enacts. If an entire industry were to switch on a short time-scale from one chemical to another, this would create significant scale-up pressures on existing manufacturers. Ecology has not established that such scale-up, at a reasonable cost, would be feasible.

We note a recent supply chain challenge regarding the chemical PIP (3:1). Subject to a risk management action under TSCA, the agency moved earlier this year to a restriction with a phase-out schedule that could not be met by global supply chains. PIP (3:1) was present in manufactured durable goods, like washing machines, and electronics that have multi-year sell inventory and sell-through schedules. The risk of global supply chain disruption from discontinuation of the availability of a commercially important chemical without adequate due diligence with respect to the availability of alternatives can have real, and significant consequences as this example illustrates.

This is even more relevant for complex products like electronics and electrical equipment which have multiple components and require product testing to ensure they meet designated safety and performance standards. In these cases, product must be carefully redesigned, reengineered and recertified. Such product redesign and recertification processes for complex sectors like electronics may take several years so the lead time for these changes needs to be factored into the assessment.

### **C. Ecology Should Perform a Least Burdensome Analysis.**

When promulgating a significant legislative rule, Washington's Administrative Procedure Act (APA) requires Ecology to determine that the rule to be adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives. Although that test is applicable to the end restrictions that Ecology will apply after the conclusion of the next phase of its rulemaking (rather than to the regulatory determinations phase), the choices that Ecology has made in its interpretations and analytical framework make it unlikely that Ecology will be able to meet its "least burdensome" analysis burden. For example, Ecology suggests that products be redesigned without analysis of how that redesign would affect cost, performance, or desirability. Ecology also suggests chemical alternatives that would create regulatory problems in other jurisdictions without analysis of cost.

A proposed rule restricting the use of flame retardants could require manufacturers to use new materials (i.e., metal instead of plastic in electronics) that may be inconsistent with product performance and consumer preference (e.g., for low product weight), and would likely increase costs. This would be

burdensome on manufacturers by increasing costs (both for product redesign and during production) and affecting sales, as well as on consumers for affecting product weight.

Likewise, a requirement for manufacturers to redesign flame retardant material (i.e., an internal enclosure) would likely increase costs to manufacturers and could also affect availability of products to consumers during the redesign process. It could require industry to requalify parts or products that contain safer alternative chemicals for the relevant existing flammability standards. This would be burdensome on manufacturers because it requires them to complete new assessments, and would create a backlog of products that need to be requalified, which would decrease the number and variety of products available to consumers.

The suggestion to require manufacturers to employ a change in process or design that reduces the flammability requirement of the exterior electric or electronic enclosure through the use of an internal fire barrier would be quite burdensome to manufacturers. It would increase costs, perhaps significantly, and it could limit the type and number of product manufacturers can make available to consumers.

We also recommend that Ecology consider at least screening-level cost-benefit review early in the process, and preceding any recommendation of a restriction. An analysis of substitution risk<sup>6</sup> can help determine if adoption of a preferred alternative would do more good than harm. This will first entail some effort to understand the expected behavioral response of the market to the proposed restriction. For example, suppose it is expected that a producer will simply and easily substitute a priority chemical with a safer alternative chemical, with no change in prices or consumer welfare. The agency could then employ a screening-level risk assessment to see whether each preferred alternative is likely to pose risks of concern. If no concerns arise from this screening level assessment, the agency can move forward with a proposed restriction, subject to opportunity for notice and comment and a more robust cost-benefit review.

#### **D. Ecology Should Apply a Reasonable, Common-Sense Definition of Consumer Product.**

The statute defines “consumer product” as “any item, including any component parts and packaging, sold for residential or commercial use.” The breadth of this definition allows for varying interpretations of what a consumer product is. For example, there is no distinction between commercial products and industrial products used within the production chain. Thus far, Ecology has not provided a detailed interpretation of this term. When it finalizes the determinations document, Ecology should clarify that “sold for residential or commercial use” is limited to products designed for use in a home or commercial (i.e., office) setting. This would include, for example, table-top coffee makers and personal computers in scope of the “consumer product” definition. Ecology should clarify that products intended for professional use or use only in an industrial setting (e.g., factory equipment, large-scale fixed installations, enterprise electronics, equipment used only for research and development, etc.) are not “consumer products.” This interpretation would comport with both the statutory definition of “consumer product” and a common-sense understanding of the term. Providing this clarification now would ease Ecology’s burden in enacting the statute by reducing the scope of interested stakeholders.

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<sup>6</sup> Economists refer to *ancillary benefits* and *ancillary costs*, the indirect impacts of a regulation that can influence net benefits. *Substitution risk*, which is a type of ancillary benefit (disbenefit), is not uncommon when a regulation has the effect of causing market participants to switch from a regulated activity to one that is not regulated. When the purpose of a regulation is to reduce risk of a product, analysis of substitution risk is often important to determine if the regulation is warranted on a net basis.

**E. Ecology's Chemical Class Approach Is Unworkable and Will Lead to Inconsistent Application of its Hazard Criteria.**

Ecology's flawed chemical class approach has led to inconsistent application of its hazard criteria. Ecology has chosen an approach that assumes all chemicals within an identified priority chemical class (even a class containing a large number of chemicals) will not qualify as safer. Conversely, in its desire to find acceptable alternatives, Ecology has applied a lower level of scrutiny to other chemicals. This is likely to lead to regrettable – or, at best, needless and costly – substitution that is not supported by the available science. For example, Ecology concluded that two halogenated flame retardants do not meet its “safer” criteria despite having achieved a GreenScreen score of BM-2. This is because, Ecology claims, those chemicals fail the within-class criteria. However, Ecology also concluded that two non-halogenated flame retardants (triphenyl phosphate (TPP); and resorcinol bis(diphenyl phosphate) (RDP)) may meet the “safer” criteria for the sole reason that they have achieved the same GreenScreen score. For instance, regarding RDP, Ecology states that “RDP scored BM-2 in a GreenScreen(R) assessment, and the assessment was reviewed by TCO Certified. This meets our minimum criteria for safer...”.

Similarly, regarding bisphenols, Ecology found that while tetramethyl bisphenol F (TMBPF) scored a BM-2 and that it meets the minimum criteria, it fails to meet the within-class criteria that a chemical score low for endocrine disruption, reproductive toxicity, and developmental toxicity. TMBPF scored moderate for both endocrine activity and developmental toxicity. Ultimately, Ecology concluded that TMBPF does not meet the within-class criteria for safer if it is intentionally added or present as a residual monomer above 100ppm. The safer alternative proposed scored moderate for developmental toxicity, and there was a data cap noted for endocrine activity. Ecology concluded that this met their minimum requirements for safer. Ecology's key rationale for the class approach is to avoid regrettable substitution. By applying a lower level of scrutiny to proposed alternatives than to chemicals already in use, Ecology risks that very result. Additionally, Ecology evaluates chemical classes based on several chemicals within the class that are “data rich,” and does not perform a review of all data from the priority chemical class. For example, if some data rich chemicals within the chemical class do not meet Ecology's criteria for safer, but the class also includes some chemicals that are poorly characterized, then Ecology will classify the class as potentially hazardous based on the data rich chemicals. Ecology argues that this approach avoids assuming chemicals with no data are not hazardous. In practice, however, this approach builds in an inherent bias towards a more hazardous finding because the data rich chemicals are the most studied and already identified as hazardous. By taking this approach, Ecology does not appropriately consider the newer alternatives, and instead compares new alternatives that have similar functional chemistry to older chemicals already considered to be some of the most hazardous chemicals.

The current class approach is likely to be arbitrary in both application and in results. Ecology should reconsider moving the program to the NAS Framework approach. The simplest and perhaps most effective approach to alternatives assessment for a given chemical is to identify a single, discrete chemical substance for an alternatives assessment, sometimes called a single chemical substitution.<sup>7</sup> This makes comparison with a defined range of alternatives a complex task, but the most straightforward. A single chemical, for example, can be evaluated against others in its own (same) appropriately defined and bounded category. A chemical category is a group of chemicals whose physiochemical and human health and/or ecotoxicological properties are likely to be similar or follow a regular pattern, usually as a result of structural similarity.<sup>8</sup> The mere condition of sharing one or more of these properties, however, is not sufficient, nor is structural similarity sufficient, to support a category by itself. For example, the

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<sup>7</sup> See, e.g., Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives, OECD 2021 at 11.

<sup>8</sup> Grouping of Chemicals: Chemical Categories and Read-Across, available at [OECD.org](https://www.oecd.org/).



classification, “solid at room temperature,”<sup>9</sup> while describing a group of chemicals with one similar characteristic, does not by itself predict similar or patterned physiochemical, human health, and ecotoxicological properties. (Chemicals that are solid at room temperature include quartz, carbon, salt (NaCl), and gold). Attempting to group solely by functional category for chemicals – e.g., colorants, antioxidants, flame retardants – is generally too broad a descriptor to arrive at a category with similar or patterned phys/chem, health, and ecotox properties.

The NAS framework takes the most straightforward approach to alternatives assessment. Step 1 of the framework is to identify a specific chemical of concern for entry into the framework. A selected chemical then moves to a scoping and problem formulation step, establishing the scope of assessment and plan for assessment. The assignment of a unique CAS (Chemical Abstracts Service) or IUPAC (International Union of Pure and Applied Chemistry) number is generally indicative of a unique chemical substance, as CAS will register unique chemical substances that can be represented by completely defined molecular structures (i.e., all atoms and the chemical bonds joining them are known). Notably, CAS excludes substance classes from routine registration (e.g., silver compounds).<sup>10</sup>

The categories set out in the Draft Report are too broad to characterize distinct chemical properties that can be readily compared in an alternatives assessment. This includes hazard. ACC recommends that Ecology apply the NAS framework to selection of chemicals for entry into the alternatives assessment process.

#### **F. Ecology Must Take Hazard, Exposure, and Risk into Account in its Alternatives Assessment Process.**

The OECD framework defines “safer alternative” to mean “a chemical, product, or technology that is preferable, in terms of both hazard and potential for exposure to humans and the environment, than the existing option. Evaluating comparative hazard and exposure is an element of the process.”<sup>11</sup> The OECD notes that the “process of determining whether a chemical, product, or technology is “safer” consists of three steps: comparative hazard assessment, comparative exposure assessment, and integration of hazard and exposure information.”<sup>12</sup> An alternatives assessment framework also considers broader sustainability factors and evaluates performance, technical feasibility, and economic feasibility before a conclusion may be reached regarding a preferred alternative.<sup>13</sup> A hazard-only approach, as Ecology takes in the Draft Report, is not a best practice for alternative assessment.

Under the statute, Ecology may restrict or prohibit a priority chemical in a priority consumer product when it determines, among other things, that the restriction is necessary to protect the health of sensitive populations or sensitive species and when safer alternatives are feasible and available. A hazard-only approach may result in regrettable substitution, with increased danger to those sensitive populations or sensitive species. For example, early air conditioners and refrigerators used acutely toxic ammonia, methyl chloride or sulfur dioxide as refrigerants. Due to human safety concerns, these were replaced by chlorofluorocarbons -- lower toxicity, highly stable, non-flammable and noncorrosive substances -- which ended up damaging the ozone layer.

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<sup>9</sup> Descriptions of the state of matter – freezing point, melting point, and boiling point, are all universally recognized physical properties.

<sup>10</sup> See generally, CAS (Chemical Abstracts Service) Registration Criteria-Overview, available at [cas.org](http://cas.org).

<sup>11</sup> Guidance on Key Considerations for the Identification and Selection of Safer Chemical Alternatives, OECD 2021 at 12.

<sup>12</sup> *Id.* at 15.

<sup>13</sup> *Id.* at 16.

To avoid such regrettable outcomes, both the OECD and NAS alternative assessment frameworks recommend the use of comparative exposure assessment. Comparative exposure assessments help to determine the differences in human and environmental exposure potential of alternatives versus the priority chemical over their lifecycles and thus whether the alternative is preferable, equivalent to, or potentially worse than the priority chemical given the potential for exposure.<sup>14</sup> Comparative exposure assessments can be accomplished by looking at the outputs of simple exposure models or comparing key physical-chemical properties of the alternatives. Exposure models for various consumer products are widely available. Physical-chemical properties are generally available for most substances and can be used to compare exposure potential for both human and environmental receptors.<sup>15</sup> The exposure assessment should be integrated with the hazard assessment to identify safer alternatives. If the exposure potential of an alternative is preferable this can add further rationale for its selection.

#### **G. Use of Default Lists, Such as the GreenScreen List Translator, Should be Avoided.**

DOE's use of the GreenScreen list translator (GSLT) is problematic because GSLT relies, in part, on third-party generated chemical "red lists" for score assessment rather than actual toxicology data. A hazard-only based list used as part of the chemical identification process for input into an alternative assessment, or in initial screening, can have value. As the NAS and OECD frameworks both indicate, however, the AA process itself must include the comparative hazard assessment, and the comparative exposure assessment, and an integration step of the hazard and exposure information to help characterize risk. Hazard lists have no place in the assessment itself and cannot substitute for current data.

An alternative assessment that forms the basis of a regulatory determination must be based on reliable, quality data, including best available science and information that is up to date. Both hazard and exposure data, and the data integration, should be informed by best available science. Over time, chemistries may undergo additional toxicological testing or be informed by new epidemiological data, for example, so while hazard classifications for data-rich chemicals tend to be relatively static as new data comes in, there can be important changes over time, and third-party managed lists are lagging indicators. Exposure profiles can certainly change over time, as use patterns, treatment methods, market patterns, and other variables shift. Something as simple as a YouTube video, for example, can change consumer purchase and use patterns or safety practices in a short period. Manufacturer changes in product concentration, coating and encapsulation, and packaging can directly affect exposure scenarios. So too can innovated new product entries into the market; new standards and certification requirements; and new regulatory requirements.

Using chemical lists in lieu of data leads to overbroad assumptions that lack information specific to a given use that can provide important context on the risk that a chemical may present. In addition to the possibility that the list is outdated, incorrect, or does not apply the best available science to the hazard assessment and classification, use of hazard-based red lists fails to take exposure data and scenarios into account. Hazard and exposure data cannot be integrated of course if the exposure data is entirely lacking. Relying on GSLT alone to characterize the inherent hazard of a chemical or to avoid making a risk-based assessment does not represent the best available science.

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<sup>14</sup> National Research Council 2014. A Framework to Guide Selection of Chemical Alternatives at 71.

<sup>15</sup> Gregg et al, Qualitative Approach to comparative Exposure in Alternatives Assessment, IEAM, 15(6), 880-894 <https://doi.org/10.1002/ieam.4070>.

## II. Specific Comments

### A. Bisphenol-A

Bisphenols are listed as a priority chemical class by the Washington State Legislature and discussed in Chapter 4 of the Draft Regulatory Determinations Report to the Legislature: Safer Products for Washington Implementation Phase 3. Bisphenol A (BPA) is an extraordinarily well studied, building block chemical used in the manufacture of epoxy resins. The Draft Report fails to address the largest study ever conducted on BPA, the CLARITY Study. Chapter 4 should be revised to incorporate the results of the CLARITY Study so that any regulatory determinations about BPA are based on the best available science.

The Consortium Linking Academic and Regulatory Insights on BPA Toxicity (CLARITY-BPA) program was developed to assess the potential health effects of long-term exposure to BPA.<sup>16</sup> CLARITY was a multi-year collaborative effort involving the U.S. Food and Drug Administration (FDA), the National Toxicology Program (NTP) and the National Institute of Environmental Health Sciences (NIEHS). The FDA is responsible for regulating BPA in food contact materials.

CLARITY is an important piece of research and should be included in any assessment of BPA hazard. The methodology for conducting the CLARITY Core Study was consistent with established testing guidelines and the study was conducted according to Good Laboratory Practice requirements to ensure study quality. Importantly, the draft report was peer-reviewed by a panel of independent scientists convened by NTP. After a thorough review of the draft report, the panel discussed their findings in a public meeting and issued a report with their recommendations. In general, the panel endorsed the design and execution of the study as well as FDA's interpretation of the results. Their recommendations to improve the report were incorporated into the final report, released in 2018. The results of the CLARITY Core Study confirm that there is no risk of health effects from BPA at typical human exposure levels, even if people are exposed to BPA throughout their lives.<sup>17</sup>

U.S. government reviews have concluded consumer exposure to BPA is extremely low and that BPA is rapidly eliminated from the body. Based on these results, in combination with the results of the CLARITY Core Study, BPA is unlikely to cause health effects.<sup>18 19 20</sup>

The results of the CLARITY Study, along with many others, support the Q&A on FDA's website regarding the safety of BPA: "Is BPA safe?" – "Yes."<sup>21</sup> FDA further states, "FDA's current perspective, based on its most recent safety assessment, is that BPA is safe at the current levels occurring in foods.

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<sup>16</sup> <https://ntp.niehs.nih.gov/whatwestudy/topics/bpa/index.html>

<sup>17</sup> [https://ntp.niehs.nih.gov/ntp/about\\_ntp/rrprp/2018/april/peerreview\\_20180426\\_508.pdf](https://ntp.niehs.nih.gov/ntp/about_ntp/rrprp/2018/april/peerreview_20180426_508.pdf)

<sup>18</sup> Centers for Disease Control and Prevention (CDC). Fourth National Report on Human Exposure to Environmental Chemicals. Updated Tables, 2019. [online] Available at URL: <https://www.cdc.gov/exposurereport/>.

<sup>19</sup> Thayer KA, Doerge DR, Hunt D, Schurman SH, Twaddle NC, Churchwell MI, Garantziotis S, Kissling GE, Easterling MR, Bucher JR, Birnbaum LS. Pharmacokinetics of bisphenol A in humans following a single oral administration. *Environ Int.* 2015 Oct;83:107-15. doi: 10.1016/j.envint.2015.06.008. Epub 2015 Jun 24. PMID: 26115537; PMCID: PMC4545316.

<sup>20</sup> Teeguarden JG, Twaddle NC, Churchwell MI, Yang X, Fisher JW, Seryak LM, Doerge DR. 24-hour human urine and serum profiles of bisphenol A following ingestion in soup: Individual pharmacokinetic data and emographics. *Data Brief.* 2015 Mar 17;4:83-6. doi: 10.1016/j.dib.2015.03.002. PMID: 26217767; PMCID: PMC4510366.

<sup>21</sup> <https://www.fda.gov/food/food-additives-petitions/questions-answers-bisphenol-bpa-use-food-contact-applications>

Based on FDA’s ongoing safety review of scientific evidence, the available information continues to support the safety of BPA for the currently approved uses in food containers and packaging.”<sup>22</sup>

Replacing BPA with an alternative that is not as well studied would be potentially regrettable. It is not likely that any alternative has been as thoroughly tested and frequently reviewed by government agencies as BPA. The scientific evidence supporting the safety of BPA speaks for itself and should not be dismissed.

## **B. Phthalate Esters**

With respect to phthalate esters, Ecology has not established a sound basis for proposing a restriction on phthalates in vinyl flooring. As noted above, the Washington State Legislature identified phthalates as a priority chemical class, with Washington Ecology and Health identifying vinyl flooring products containing phthalates as one of its priority products. Pursuant to RCW § 70A.350.040(3), in order to restrict or prohibit priority chemicals in priority products, Ecology must demonstrate that:

- The restriction will reduce a significant source or use of a priority chemical, or
- The restriction is necessary to protect the health of sensitive populations or sensitive species.

### **Ecology’s Underlying Assumptions And Calculations About Phthalate Esters Are Incorrect.**

There is sufficient evidence to indicate that vinyl flooring is not a significant source or use of phthalates, and therefore any restriction will not reduce a significant source or use of phthalates, as a priority chemical. Furthermore, the low levels of use and exposure to phthalates in vinyl flooring, coupled with rapid biodegradability in the environment, means that phthalates release from vinyl flooring is unlikely to pose a health concern to sensitive subpopulations and the environment.

Ecology estimates that approximately 10 – 37 million pounds of phthalates are sold in new vinyl flooring each year in Washington State. Ecology has derived that estimate based on the following assumptions:

- Approximately 90,000 metric tons (100 million square feet) of vinyl flooring are sold in Washington annually;
- Flooring contains 9 – 32 % by weight of phthalates; and
- Roughly half of all vinyl flooring sold in Washington State annually contains phthalates.

Based on the above assumptions, Ecology estimated that 0.17 metric tons (374 pounds or approx. 170 kg) of phthalates are released to the environment in Washington from vinyl flooring annually.<sup>23</sup> The basis for Ecology’s assumption that roughly half of all vinyl flooring sold annually in Washington State contains phthalates, however, is outdated. Ecology based this assumption on a non-peer reviewed study by The Ecology Center (2015) that found phthalates in 38 of 65 vinyl flooring tiles tested, or 58%.<sup>24</sup> The Ecology Center conducted a follow-up study in 2019. As noted in Ecology’s Priority Consumer Products Report to the Legislature, the follow-up study found that none of the 26 samples (0%) tested contained phthalates at concentrations above 1% (including the top and bottom layers).<sup>25</sup> In January 2022, Ecology published the results of its data call from manufacturers on types of plasticizers currently used in vinyl flooring.<sup>26</sup> Of 14

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<sup>22</sup> <https://www.fda.gov/food/food-additives-petitions/bisphenol-bpa-use-food-contact-application>

<sup>23</sup> Department of Ecology. July 2020. [Priority Consumer Products – Report to the Legislature \(wa.gov\)](#)

<sup>24</sup> [New Study Finds Toxic Chemicals Widespread in Vinyl Flooring | Ecology Center \(ecocenter.org\)](#)

<sup>25</sup> Department of Ecology. July 2020. [Priority Consumer Products – Report to the Legislature \(wa.gov\)](#)

<sup>26</sup> [VinylFlooring\\_ManufacturerData \(wa.gov\)](#)

manufacturers who responded to the data call, 12 manufacturers confirmed that they have phased out the use of ortho-phthalates, most between 2013 and 2016. No manufacturer reported exclusively using ortho-phthalates. Ecology confirmed that the “vast majority of flooring products did not use ortho-phthalates.” In addition, Ecology acknowledged that “we expect ortho-phthalate use is lower than the estimate in our 2020 Priority Products Report to the Legislature.” As a result, we can conclude that the 58% assumption (proportion of vinyl flooring using ortho-phthalates), on which Ecology based its initial calculations of the amount of phthalates released into the environment annually from vinyl flooring (approx. 170 kg) is grossly over-estimated. Hence, it is reasonable to assume that the amount of phthalates released from vinyl flooring annually would be significantly less than 170 kg.

### **The Draft Report Deviates, Without Grounds, From Ecology’s Previous Report, Which Found Vinyl Flooring To Be A Minor Source Of Phthalate Release To The Environment.**

In its draft report, Ecology cites its 2011 report estimating vinyl flooring contributes 220 pounds (0.1 metric tons) of phthalate chemicals to Puget Sound annually.<sup>27</sup> This value appears to come from Figure 40 in the 2011 report, containing a breakdown of the major releases of DEHP from primary sources (Ecology assumes that DEHP is the dominant phthalate used as a plasticizer, accounting for approximately 40% of total annual release in 2011). Notably, the 2011 Puget Sound report by Ecology concludes that release of phthalates to Puget Sound from PVC flooring accounts for <1% of the total phthalates release (both via release to air and fugitive dust) (see Table C-1). By comparison, the Puget Sound report indicates that personal care products, industrial and institutional point sources, vehicles and roads, lacquers and paints account for 32%, 28%, 10% and 5%, respectively. Considering that more than 10 years have passed since that report was issued, and the majority of vinyl flooring manufacturers no longer use phthalates in vinyl flooring,<sup>28</sup> we would expect vinyl flooring to account for an even smaller proportion of the annual phthalate release to Puget Sound today.

In summary, we conclude the following:

- Ecology’s 2011 Puget Sound report confirms that vinyl flooring is not a significant source of phthalate release to the environment. The Draft Report should be revised to adopt the 2011 conclusions.
- Ecology’s manufacturer data call confirms that vinyl flooring is not a significant source or use of phthalates.

### **Ecology Has Not Adequately Demonstrated That Restricting Use Of Phthalates In Vinyl Flooring Will Reduce A Significant Source Or Use Of Phthalates, In Order To Justify A Restriction.**

#### **The Proposed Restriction Does Not Protect The Health Of Sensitive Populations Or Sensitive Species.**

There is no evidence that phthalate exposure in dust and indoor air is a human health concern to children. Ecology indicates that the proposed restriction will protect the health of sensitive subpopulations (infants and children), exposed to phthalates via direct exposure to residential air and dust. However, Ecology failed to cite any study that justifies this purported concern. By contrast, several published studies have confirmed that exposure to phthalates in dust and indoor air do not pose a health concern to sensitive

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<sup>27</sup> Control of Toxic Chemicals in Puget Sound Assessment of Selected Toxic Chemicals in the Puget Sound Basin, 2007-2011. Department of Ecology, State of Washington. Publication No. 11-03-055. [1103055.pdf \(wa.gov\)](http://www.ecy.wa.gov/publications/1103055.pdf)

<sup>28</sup> See discussion above.

subpopulations.<sup>29,30,31,32</sup> One of the studies cited by Ecology reached the same conclusion. For example, in quantifying the level of BBP (and other phthalates) present in dust and indoor air in vinyl flooring in the home, Hammel et al., (2019)<sup>33</sup> found that the highest range (95<sup>th</sup> percentile) of BBP exposure in the urinary metabolites of children ages 3 – 4 years was approximately 25-times below the safe threshold. In other words, regardless of the potential hazard of the substance, the levels of exposure were too low to be of any health concern and banning the use of vinyl flooring in those homes would have had no protective effect on the health of children.

### **Phthalate Release From Vinyl Flooring Does Not Pose An Environmental Concern.**

As noted above, vinyl flooring is not a significant source of phthalate exposure to the environment, as phthalates are rapidly degraded in the environment, including sediments.<sup>34</sup> For example, in its 2015 State of the Science Report on DINP, Health Canada concluded that DINP is readily biodegradable, has low bioaccumulation and biomagnification potential and is not expected to persist in the environment.<sup>35</sup> Similarly, Canada's State of the Science report notes that DIDP is rapidly biodegraded in aerobic conditions (and even under conditions of low oxygen), with 68% removal within 1 day and 90-100% removal of parent substance within 10-28 days. With respect to bioaccumulation, Canada states, "Empirical bioconcentration factors (BCFs) of <14 and 147 L/Kg wet weight and biota-soil/sediment accumulation factors (BSAFs) of 0.015 and 0.16 suggest that DIDP has low potential to bioaccumulate in aquatic and terrestrial organisms."<sup>36</sup> Thus, it is unlikely that phthalates pose any significant source of harm to the environment.

We conclude the following:

- Ecology has offered no evidence showing that phthalate exposure in dust and indoor air has been proven to be harmful in children. It must be stressed that mere presence is not evidence of harm.

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<sup>29</sup> Scientific Committee on Health and Environmental Risks (SCHER). Opinion on risk assessment on indoor air quality (2007) – [https://ec.europa.eu/health/ph\\_risk/committees/04\\_scher/docs/scher\\_o\\_055.pdf](https://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_055.pdf).

<sup>30</sup> European Chemicals Agency (2013) – Evaluation of new scientific evidence concerning DINP and DIDP in relation to entry 52 of Annex XVII to REACH Regulation (EC) No 1907/2006. Final review report. <https://echa.europa.eu/documents/10162/31b4067e-de40-4044-93e8-9c9ff1960715>.

<sup>31</sup> Christia C, Poma G, Harrad S, de Wit CA, Sjöström Y, Leonards P, Lamoree M, Covaci A (2019) Occurrence of legacy and alternative plasticizers in indoor dust from various EU countries and implications for human exposure via dust ingestion and dermal absorption. *Environmental Research* **171**: 204-212.

<sup>32</sup> Kim H-H, Yang J-Y, Kim S-D, Yang S-H, Lee C-S, Shin D-C, Lim Y-W (2011) Health Risks Assessment in Children for Phthalate Exposure Associated with Childcare Facilities and Indoor Playgrounds. *Environ Anal Health Toxicol* **26**: e2011008.

<sup>33</sup> Hammel SC, Levasseur JL, Hoffman K, Phillips AL, Lorenzo AM, Calafat AM, Webster TF, Stapleton HM: Children's exposure to phthalates and non-phthalate plasticizers in the home: The TESIE study. *Environment International* 2019, 132:105061.

<sup>34</sup> Otton SV, Sura S, Blair J, Ikonomou MG, Gobas FAPC: **Biodegradation of mono-alkyl phthalate esters in natural sediments**. *Chemosphere* 2008, **71**(11):2011-2016.

<sup>35</sup> Environment Canada and Health Canada State of the Science Report. 2015. Phthalate Substance Grouping: 1, 2-Benzenedicarboxylic acid, diisononyl ester 1, 2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich (Diisononyl Phthalate; DINP). [Screening Assessment Report Template \(ec.gc.ca\)](#)

<sup>36</sup> Environment Canada and Health Canada State of the Science Report. 2015. Phthalates Substance Grouping: Long-chain Phthalate Esters, 1,2-Benzenedicarboxylic acid, diisodecyl ester (diisodecyl phthalate; DIDP) and 1,2-Benzenedicarboxylic acid, diundecyl ester (diundecyl phthalate; DUP). [Environment and Climate Change Canada - State of the Science Report - Phthalates Substance Grouping - Long-chain Phthalate Esters](#)

- Available evidence, from independent risk assessors and peer-reviewed literature, confirms that phthalate exposure in dust and indoor air is low and is not a human health concern.
- Available evidence confirms that phthalate release to the environment in Washington is low ( $\ll 170$  kg annually), and that phthalates do not bioaccumulate and are rapidly biodegraded in the environment.

Ecology has not demonstrated that restricting the use of phthalates in vinyl flooring will have any impact in protecting the health of sensitive populations or sensitive species.

**WA Ecology Should Wait To Act Until The EPA Risk Evaluation Process Is Completed.**

U.S. EPA is currently conducting risk evaluations on five phthalates it designated as High Priority, several of which have been identified by Washington State as used in vinyl flooring, including DBP, BBP, and DEHP. Under federal law, state level restrictions are paused to provide EPA sufficient time to conduct its risk evaluations. Additionally, EPA is conducting risk evaluations on DINP and DIDP. EPA's final determinations on the phthalates it is currently evaluating may have a permanently preemptive effect on Washington state restrictions. Thus, it may be more prudent for the State to give EPA sufficient time to complete its review of certain phthalates (expected by December 2022 or mid-2023, if EPA takes a six-month extension) before deciding what type of action to take with respect to individual phthalates in vinyl flooring.

We request that Ecology reconsider its proposal to restrict phthalates in vinyl flooring, at a minimum waiting for EPA to complete its review of certain phthalates before taking any further action.

\* \* \*

Thank you for the opportunity to comment on the Draft Report. For any questions about this submission, please contact Karyn Schmidt, Senior Director, Regulatory and Scientific Affairs, [Karyn\\_Schmidt@americanchemistry.com](mailto:Karyn_Schmidt@americanchemistry.com), or Tim Shestek, Senior Director, State Affairs, [Tim\\_Shestek@americanchemistry.com](mailto:Tim_Shestek@americanchemistry.com).

**Preliminary Draft Rule Language  
Safer Products for Washington Implementation Phase 4  
Comments of the American Chemistry Council  
August 31, 2022**

On behalf of the American Chemistry Council (ACC), we are submitting comments on the preliminary draft rule language for the Safer Products for Washington (SPW) program. ACC supports strong, science-based regulations that support product safety and the protection of human health and the environment, but we continue to have serious concerns with the way this new program is being implemented and believe that both the final regulatory determination and this preliminary proposed rulemaking is inconsistent with some of the criteria and requirements outlined in the underlying statute (Chapter 70A.350 RCW).

ACC is filing these more general comments but several of ACC's product groups will be submitting more specific comments about how these issues are more directly relevant for specific priority chemicals/chemistries and proposed priority product categories,

While we appreciate the efforts that the Department of Ecology (Department) has made to solicit and address some stakeholder feedback, we urge the Department to address the following key issues in the development of the final rulemaking:

- 1. Demonstrate that the proposed regulations “will reduce a significant source of or use of a priority chemical; or the restriction is necessary to protect the health of sensitive populations or sensitive species.”**
  - The Department did not demonstrate that exposure to the priority chemicals in certain priority product categories met statutory criteria.
- 2. Distinguishing between different subcategories within the broad class of chemistries identified for regulation.**

The proposed rulemaking does not make this important distinction despite clear evidence from authoritative bodies demonstrating that there are clear subcategories with very different characteristics and profiles. Where possible and appropriate, the Department should focus on specific sub-categories or sub-classes that meet the key criteria for the SPW program. Likewise, the Department should tailor its regulations to specific chemicals within a class, such as higher hazard, rather than applying regulations on an overbroad, class-wide basis.

- 3. Conduct a more robust and comprehensive alternatives assessment process that considers critical issues related to product design, performance, safety, sustainability and innovation. Failure to do so will set a misguided precedent for the future regulation of chemicals and products under this new program and could also lead to regrettable substitution.**

As stated in our earlier comments, the Department's review would also be well-informed by careful consideration and integration of other elements of alternatives life cycle thinking and analysis, a critical tool that helps with the evaluation of sustainability and environmental factors. Even if the function of a priority product is equivalent or better with the use of an alternative chemistry, substitution can have unwanted or adverse sustainability impacts that should be



carefully evaluated. A substitute chemistry may require long distance transport, process changes, increased energy use or greenhouse gas emissions across its lifecycle, for example. Global markets and supply chain impacts and disruptions should also be included in the availability and benefit-cost analysis. The importance of these recommended considerations has been demonstrated through the challenges we have seen play out in the recent pandemic where products and materials sourced from facilities outside the United States have been stressed with various availability constraints and delays.

Technical feasibility requires a demonstration that a substitute chemistry or formulation provides equivalent or better performance for a particular product. As presented, these criteria do not support a robust review of the feasibility of substituting a particular chemistry, as used in a particular application. In any given class of chemistry, different individual chemistries may be used or marketed for different applications with different levels of necessary performance. Marine paint; outdoor paint for a bridge; outdoor paint for a building; and interior paint for a kitchen, for example, may have performance requirements that differ significantly.

We are concerned that both the “already used” criteria, and the “marketed for the application of interest” criteria, are insufficiently robust to support alternatives assessment under the SPW program. For example, an identified use of the substitute chemistry may still be in a pilot or test market phase where it is unclear that the performance of the substitute meets consumer or user needs. Undesirable substitutions that affect product performance, including the stability, look, feel, sound, or smell of a product, can affect consumer acceptance of a product and can result in different use patterns and even adherence to safety and use instructions. An unacceptable product may drive consumers to reject the substitute or use less sustainable products.

Likewise, we are concerned that the “marketed for the application of interest” is insufficiently robust to support conclusions about feasibility. A manufacturer trying to enter a new market may not have sufficiently tested performance and uptake with customers. A product with sustainability tradeoffs, such that if a product containing the substitute is no longer eligible for a sustainability claim important to the customer base for example, may not get market uptake at all. The “similar application” language further weakens this provision, as it is unclear what a “similar application” is. In other words, what degree of similarity is required and does this factor in different regulatory, code-based standards, and customer performance requirements?

**4. Demonstrate that “the benefits of the proposed regulations outweigh the anticipated costs”, including the consideration of product redesign and recertification.**

While consideration of cost is listed in the Department’s criteria for feasible and available, cost is not discussed in any of the determinations regarding priority chemicals. In other words, the Department has failed in every case to apply the benchmarks it set for itself. As a result, it is unclear to what extent the Department has considered cost and what data it will rely on when considering cost in the phase of the rulemaking as required. Furthermore, the consideration of cost should factor in product redesign considerations including the time for supply chains to assess, redesign, test, recertify and scale-up the manufacturing of products. This is particularly relevant for complex supply chains like the electronics category where the current approach is incredibly complex and will impose significant time and resource impacts downstream.

Further, although the Department purports to analyze the commercial availability of a chemical, it has failed to consider whether that chemical will be available at production scales in order to support an entire industry switching from one chemical to another. Consumer products are designed for worldwide compliance. The Department needs to consider the real-world consequences if it mistakenly assumes companies can feasibly manufacture products for a specific state. Companies do not, and simply cannot, design products tailored to a vast number of different regulatory environments.

Likewise, the evaluation of benefits of the proposed priority product regulations needs to be specific in terms of how the proposed regulations would advance the SPW objectives using concrete data, and any consideration of benefits also need to factor in the potential impact on product performance particularly if the proposed regulations have the potential to lower or affect product performance in some applications.

**5. Demonstrate that the proposed regulation is the least burdensome alternative.**

The Department's assessment should explicitly include a review of alternative approaches, including those suggested by stakeholders, and why these were not selected or considered as "less burdensome". The cost benefit considerations noted above are also directly relevant here.

The Department must perform a Least Burdensome Analysis. When promulgating a significant legislative rule, Washington's Administrative Procedure Act (APA) requires the Department of Ecology to determine that the rule to be adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives.

**6. Address the inconsistency with existing federal, state, and international regulatory requirements and avoid regulations that contribute to a patchwork of laws.**

While the preliminary rulemaking clearly considered consistency of federal regulations for some priority chemicals and products (e.g., PCBs), it fails to do so in other areas particularly the electronics product category. The Department's proposed alternatives include chemicals that other agencies are either currently or are actively considering regulating. It is important to assess whether chemicals the Department identifies as alternatives are regulated elsewhere and factor this into its assessment. The draft determination does not do so. This should include a determination that a proposed rule does not require those who must comply with it to violate other state or federal law.

**7. Ensure that any new environmental justice (EJ) provisions promote a streamlined regulatory process that does not duplicate existing requirements or result in unnecessary burdens to regulated entities.**

In its draft rule language, the Department notes that it plans to address EJ when implementing, administering, and enforcing Chapter 70A.350 RCW and solicits input on how the rule should address and incorporate EJ in its implementation. As stated above, ACC continues to stress in this context the critical importance of implementation of the Department's rule in a manner that promotes a streamlined regulatory process that is based on the best available science, avoids duplication with existing requirements, and provides full consideration of the range of

environmental sources and potential stressors, particularly those external to directly regulated entities. ACC notes that any new regulatory requirements should not create unreasonable additional hurdles that hinder an already cumbersome regulatory framework.

For example, at RCW 70A.02.100 and 110, Washington administers EJ provisions in existing laws, including requirements for stakeholder consultation, community engagement, and the administration of a state environmental justice council, among others. Without careful consideration of current practices, new requirements contemplated by the Department risk the creation of overly burdensome regulatory processes that are unnecessarily onerous, inconsistent, and arbitrary in application. As the Department shifts to implementation, ACC encourages the state to develop processes that consider EJ issues in ways that are clear, flexible, risk-based, and refrain from duplicative or overly burdensome requirements. We further recommend that the Department evaluate identified EJ stressors and associated impacts on public health or the environment utilizing clear criteria and definitions that articulate scientifically credible risks. To avoid unnecessary duplication throughout the regulatory process, the Department should ensure that its new rule requirements also clearly reference existing RCW provisions that already address EJ concerns.

We would also like to reiterate our previously provided comments which urge the Department to consider the factors outlined above earlier in the SPW process. Waiting until final rulemaking to evaluate these factors and the requirements in the underlying statute is not optimal and ultimately wastes limited resources while contributing to potentially regrettable substitution. Consideration of these critical factors earlier in the process will support more informed rulemaking and avoid some of the concerns noted above.

Advancing chemical and product safety is a shared objective and we urge the Department to take these comments into consideration as it develops its final rulemaking proposals as well as future evaluations under the new SPW program.

\* \* \*

Thank you for the opportunity to provide these comments. For any questions about this submission, please contact Suzanne Hartigan, Senior Director, Regulatory and Scientific Affairs, [suzanne\\_hartigan@americanchemistry.com](mailto:suzanne_hartigan@americanchemistry.com), or Tim Shestek, Senior Director, State Affairs, [Tim\\_Shestek@americanchemistry.com](mailto:Tim_Shestek@americanchemistry.com).

# People's Republic of China

Dear USA WTO/TBT Enquiry Point:

Please find attached the Comments from P. R. China on Notification G/TBT/N/USA/1958.

Please acknowledge receipt of this email by return message.

Many thanks for your consideration of these comments.

Thank you.

Yours faithfully

ZHAOMINGGANG

China WTO/TBT National Notification & Enquiry Center

# 中国 WTO/TBT 国家通报咨询中心

## China WTO/TBT National Notification & Enquiry Center

No.20,Hepingli East Street, Dongcheng District, Beijing,China,Tel: 86-10-57954638 Fax:86-10-57954689

### FAX

|                                                                                                                                                   |                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>TO:</b><br>USA WTO/TBT Enquiry Point                                                                                                           | <b>Email:</b><br>usatbtep@nist.gov                                       |
| <b>Date:</b> Feb.3, 2023                                                                                                                          | Number of pages: 2+2                                                     |
| <b>Copies:</b>                                                                                                                                    |                                                                          |
| Department for WTO Affairs, Ministry of Commerce of P.R. China                                                                                    | Fax: +86 10 65197726;65128304<br>E-mail: dingtao@mofcom.gov.cn           |
| Permanent Mission of P. R. of China to WTO                                                                                                        | Fax: +41-22-9097688<br>E-mail: bizhonglin@126.com                        |
| <b>From:</b>                                                                                                                                      |                                                                          |
| China WTO/TBT National Notification & Enquiry Center.                                                                                             | Tel: 86-10-57954638<br>Fax: 86-10-57954689<br>E-mail: tbt@customs.gov.cn |
| <b>Subject:</b><br><br><b>Comments from P. R. China on USA Notification<br/>G/TBT/N/USA/1958</b><br><br>Safer Products Restrictions and Reporting |                                                                          |

## **Comments from P. R. China on USA Notification**

### **G/TBT/N/USA/1958**

Safer Products Restrictions and Reporting

Dear Sir or Madam,

We appreciate the opportunity to submit comments on the notified draft proposed by United States of America.

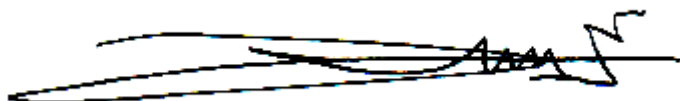
Enclosed please find comments in English and Chinese.

Please acknowledge receipt of the comments by e-mail to [tbt@customs.gov.cn](mailto:tbt@customs.gov.cn).

Thank you very much in advance for United States of America taking into account comments from P.R. China. Your formal reply will be appreciated.

Best regards,

Zhao Minggang

A handwritten signature in black ink, appearing to be 'Zhao Minggang', with a long horizontal stroke extending to the left.

Deputy Director General  
China WTO/TBT National Notification & Enquiry Center  
No.20, Hepingli East Street, Dongcheng District, Beijing  
Post Code: 100013  
Tel: 86-10-57954605  
Fax: 86-10-57954683  
E-mail: [tbt@customs.gov.cn](mailto:tbt@customs.gov.cn)

## Comments from P. R. China on USA Notification

### G/TBT/N/USA/1958

#### Safer Products Restrictions and Reporting

The People's Republic of China appreciates United States of America for fulfilling the transparency obligation under WTO, as well as for the opportunities for other WTO Members to make comments on the notification G/TBT/N/USA/1958. According to Article 2.9.4 of the WTO/TBT Agreement "without discrimination, allow reasonable time for other Members to make comments in writing, discuss these comments upon request, and take these written comments and the results of these discussions into account", China would like to put forward the following comments on the notified regulations and hope United States of America take these comments into consideration. The detail comments as follows:

**1. China suggests US should not control OFRs as a family. US should specify which OFR subgroup to be restricted based on scientific assessment not only in hazard but also in technical feasibility of alternatives as well as impacts on the industry. Below are the reasons:**

There are totally over 100 types of OFRs, and no more than 10 types are restricted currently. US National Academies of Sciences, Engineering and Medicine (NASEM) released a study report in 2019, pointing out that OFRs used in consumer products cannot be made hazardous assessment as a single group; instead they should be sorted into 14 subgroups based on chemical structure, physicochemical properties, and predicted biologic activity, and then they should be assessed not only in hazard but also in technical feasibility of alternatives as well as impacts on the industry. Thus, to avoid unnecessary barrier to trade, it is not desirable to conduct "one size fits all" control over OFRs without sufficient science-based assessment; instead, subgroup-based control should be adopted.

**2. China suggests that US should grant exemption to those EEE products which do not have alternatives to OFRs temporarily. Below are the reasons:**

Restricting the use of OFRs is aimed to achieve "Safer Products". Although in some instances there might be alternatives to some sub-groups of OFRs for use in indoor EEE casings, alternatives are not always available. If product manufacturers are forced to use alternatives not well proven, it will undermine fireproof performance of the indoor EEE products and jeopardize consumers' life and property. From the perspective of circular economy, on the other hand, the plastics with OFRs actually has its unique advantage in recycling and carbon footprint given consideration to its comparatively high thermal stability. Thus it is suggested that US should grant exemption to those EEE products which do not have alternatives to OFRs temporarily.

**3. China suggests that US should specify the names of toxic chemicals and the scope of EEE products.**

On one hand, the proposed rule should specify individual electronic and electrical

products that it plans to regulate, and on the other hand it should specify individual OFRs by CAS Registry Number that it plans to regulate. This information is needed to alleviate confusion and avoid potential supply chain disruptions that could harm supply of EEE products in Washington State.

**Comments in Chinese are in below:**

### **中国对 G/TBT/N/USA/1958 通报的评议意见**

中国政府赞赏美国履行 WTO 透明度义务，给予其他 WTO 成员评议 G/TBT/N/USA/1958 号通报的机会，根据 WTO/TBT 协定 2.9.4 条“无歧视地给予其他成员合理的时间以提出书面意见，并对这些书面意见和讨论的结果予以考虑的规定”，请美国对中方的评议意见予以考虑并做出答复。中方具体意见如下：

**一、中方建议美国不应将 OFR 作为一个整体进行管控，应根据科学的危害评估、替代技术可行性评估和对产业的影响评估，明确所要限制使用的是哪一种 OFR 的子类而不是限制所有 OFR 的使用。理由如下：**

有机卤素阻燃剂有一百多种，目前限制使用的不到 10 种。美国国家科学院（NASEM）2019 年发布研究报告中也提出，消费品中使用的 OFR 不能作为一个单一类别进行危害评估；而应根据化学结构、物理化学特性和预期生物活性分为 14 个子类，进行危害评估、替代技术可行性评估和对产业的影响评估。因此，为避免给贸易带来不必要的障碍，在没有充分科学评估依据的情况下，不应应对 OFR 进行“一刀切”管控，而应实施分类管理。

**二、中方建议美国对暂时没有 OFR 替代品的电子电器设备予以豁免。理由如下：**

限制 OFR 使用的目标是获得“更安全的产品”，在某些情况下，室内电子设备塑料外壳中的某些 OFR 子类可能有替代品，但替代品并不能用于所有场合。如果电子电器制造商被迫采用不成熟的无卤替代品，可能降低阻燃水平，从而放大室内火灾风险，威胁消费者的生命和财产安全。而且，从循环经济的角度而言，含 OFR 的塑料因为热稳定性相对其他阻燃剂较高，所以在回收和碳足迹方面具有独特优势。因此，建议美国对暂时没有 OFR 替代品的电子电器设备予以豁免。

**三、中方建议美国明确所限制的有害化学品名称和电子电器产品范围。**

一方面，要明确所针对的具体的电子电器产品名称；另一方面，要明确所限制的具体 OFR 的名称及 CAS 注册编号。这样可以减少误解，避免供应链中断影响华盛顿州电子电器产品的市场供应。





### NOTIFICATION

The following notification is being circulated in accordance with Article 10.6

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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. Notifying Member:</b> <u>UNITED STATES OF AMERICA</u><br><b>If applicable, name of local government involved (Article 3.2 and 7.2):</b> State of Washington                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>2. Agency responsible:</b><br>Department of Ecology, State of Washington [1989]<br><b>Name and address (including telephone and fax numbers, email and website addresses, if available) of agency or authority designated to handle comments regarding the notification shall be indicated if different from above:</b><br>Please submit comments to: USA WTO TBT Enquiry Point, Email: <a href="mailto:usatbtep@nist.gov">usatbtep@nist.gov</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>3. Notified under Article 2.9.2 [ ], 2.10.1 [ ], 5.6.2 [ ], 5.7.1 [ ], 3.2 [X], 7.2 [ ], other:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>4. Products covered (HS or CCCN where applicable, otherwise national tariff heading. ICS numbers may be provided in addition, where applicable):</b> Toxic chemicals in consumer products; Environmental protection (ICS code(s): 13.020); Domestic safety (ICS code(s): 13.120); Products of the textile industry (ICS code(s): 59.080); Leather products (ICS code(s): 59.140.35); Production in the chemical industry (ICS code(s): 71.020); Products of the chemical industry (ICS code(s): 71.100); Furniture (ICS code(s): 97.140); Non-textile floor coverings (ICS code(s): 97.150)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>5. Title, number of pages and language(s) of the notified document:</b> Safer Products Restrictions and Reporting; (17 page(s), in English)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>6. Description of content:</b> Proposed rule - The Washington Department of Ecology proposes a new rule, Chapter 173-337 WAC – Safer Products Restrictions and Reporting; Washington Administrative Code (WAC). This new chapter aims to reduce toxic chemicals in consumer products and implements <a href="#">Chapter 70A.350 RCW</a> ; Revised Code of Washington (RCW). Ecology started the second phase of this rulemaking which opens the formal public comment period.<br>This rulemaking proposes to: <ul style="list-style-type: none"><li>• Implement regulatory actions reported to the Washington State Legislature in June 2022. <a href="#">Review the Final Regulatory Determinations Report</a>.</li><li>• Create reporting requirements or restrictions that apply to priority consumer products that contain priority chemicals. These include:<ul style="list-style-type: none"><li>○ PFAS in aftermarket stain- and water-resistance treatments, carpets and rugs, and leather and textile furnishings.</li><li>○ Ortho-phthalates in personal care products (fragrances) and vinyl flooring.</li><li>○ Organohalogen flame retardants in electric and electronic products.</li></ul></li></ul> |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>○ Flame retardants (as defined in RCW 70A.350.010) in recreational polyurethane foam.</li> <li>○ Phenolic compounds in laundry detergent, food and drink can linings, and thermal paper.</li> <li>• Include provisions for repair and replacement parts, refurbished products, and previously owned products.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p><b>7. Objective and rationale, including the nature of urgent problems where applicable:</b> Prevention of deceptive practices and consumer protection; Protection of human health or safety; Protection of the environment</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p><b>8. Relevant documents:</b></p> <p>Chapter 173-337 WAC – Safer Products Restrictions and Reporting<br/> <a href="https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-337">https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-337</a></p> <p><b>Rule proposal documents:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">Proposal Notice – CR-102 form</a></li> <li>• <a href="#">Proposed rule language</a> (attached as WA_Safer_Products_Restrictions_and_Reporting.pdf)</li> <li>• <a href="#">Preliminary Regulatory Analyses</a></li> <li>• <a href="#">SEPA Determination of Nonsignificance (DNS) and Environmental Checklist (draft)</a></li> </ul> <p>Washington Administrative Code Department of Ecology, Title 173:<br/> <a href="https://app.leg.wa.gov/wac/default.aspx?dispo=true&amp;cite=173">https://app.leg.wa.gov/wac/default.aspx?dispo=true&amp;cite=173</a></p> <p>WTO Members and their stakeholders are asked to submit comments to the <a href="#">USA TBT Enquiry Point</a>. Comments received by the USA TBT Enquiry Point from WTO Members and their stakeholders by <a href="#">4pm Eastern Time</a> on 5 February 2023 will be shared with the regulator.</p> |
| <p><b>9. Proposed date of adoption:</b> To be determined</p> <p><b>Proposed date of entry into force:</b> To be determined</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p><b>10. Final date for comments:</b> 5 February 2023</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p><b>11. Texts available from: National enquiry point [ ] or address, telephone and fax numbers and email and website addresses, if available, of other body:</b></p> <p><a href="https://members.wto.org/crnattachments/2023/TBT/USA/23_0249_00_e.pdf">https://members.wto.org/crnattachments/2023/TBT/USA/23_0249_00_e.pdf</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

# Resilient Floor Covering Institute

Attached please find comments submitted on behalf of the Resilient Floor Covering Institute (RFCI). Thank you for your consideration of these comments.



February 3, 2023

Submitted via e-mail to **SaferProductsWA@ecy.wa.gov**

Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Re: Comments of the Resilient Floor Covering Institute (“RFCI”) on the Safer Products for Washington Priority Consumer Products Proposed Rule

To whom it may concern:

The Resilient Floor Covering Institute (“RFCI”) submits these comments to the State of Washington Department of Ecology (“Ecology” or the “Department”) on Ecology’s proposal for a new chapter 173-337 of the Washington Administrative Code, to be titled “Safer Products Restrictions and Reporting” (the “Proposed Rule”) issued on December 7, 2022.<sup>1</sup> RFCI appreciates the opportunity to comment on the Proposed Rule and to continue its participation in the rulemaking process for the Safer Products for Washington (“SPW”) program.

RFCI represents the interests of the resilient floor covering industry. Virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. Resilient flooring is a top consumer choice for hard surface flooring, and in recent years the product category—in particular, luxury vinyl tile (“LVT”)—has seen tremendous growth<sup>2</sup> as consumers opt for the sustainability, durability, and aesthetics of this flooring option.

RFCI has long been an advocate of sustainable product selection and sustainable building practices based on life-cycle assessment, sound science, and risk assessments. RFCI and its

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<sup>1</sup> Available online at <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf> (current as of February 3, 2023).

<sup>2</sup> See, e.g., Verified Market Research, *Global Luxury Vinyl Tile-LVT Market Size By Type (Rigid, Flexible), By End-Use Sector (Residential, Non-Residential), By Geographic Scope and Forecast*, Report ID 25815 (Sep. 2022), available online at <https://www.verifiedmarketresearch.com/product/luxury-vinyl-tile-lvt-market/> (LVT market valued at \$16.11 billion in 2020, projected to reach \$37.92 billion by 2028) (current as of February 3, 2023); see also MarketsandMarkets Research, *Luxury Vinyl Tiles (LVT) Flooring Market by Type (Rigid, Flexible), End-Use Sector (Residential, Non-residential), and Region (North America, Asia Pacific, Europe, Middle East & Africa, and South America) – Global Forecast to 2024*, available online at <https://www.marketsandmarkets.com/Market-Reports/lvt-flooring-market-105150640.html> (current as of February 3, 2023).

members therefore appreciate Ecology’s goals in developing and implementing the SPW program under the Pollution Prevention for Healthy People and Puget Sound Act of 2019 (the “Act”).<sup>3</sup>

As it relates to the presence of ortho-phthalates in vinyl flooring, the Proposed Rule is substantively the same as the preliminary draft rule language Ecology released in August 2022. Accordingly, RFCI reiterates and incorporates by reference the comments submitted by RFCI to Ecology on August 31, 2022 in response to the preliminary draft rule language,<sup>4</sup> as well as the comments submitted by RFCI to Ecology on January 28, 2022 on the Department’s Draft Regulatory Determinations Report to Legislature.<sup>5</sup> As noted in those prior comments, RFCI believes that the overwhelming shift away from the use of ortho-phthalates in new vinyl flooring products that has occurred over the past decade renders regulatory restrictions for this particular priority product unnecessary and a misdirected use of critical and limited agency resources. Industry’s voluntary shift has removed any perceived risk associated with the presence of ortho-phthalates in vinyl flooring and has been acknowledged even by the consumer advocacy group that led the public outcry regarding perceived health risks of vinyl flooring manufactured with ortho-phthalates.<sup>6</sup> RFCI maintains that Ecology should focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment and that continue to be manufactured on a regular basis and broad scale.

RFCI further reiterates that any restrictions imposed on vinyl flooring—as with all restrictions adopted under this novel regulatory program—be based on sound science, practically achievable, and designed to position the Act and its implementing regulations as a meaningful and useful consumer benefit. Ecology should avoid adoption of any regulatory restrictions that are based on anecdotal, unsubstantiated, or discredited information, as this could lead to confusion in the marketplace while unduly burdening manufacturers and limiting consumer choice. Regulatory restrictions proposed under the Act for vinyl flooring must be narrowly tailored to address the risk the Department has identified in connection with exposure to ortho-phthalates, to the extent those chemicals may be present in vinyl flooring products today. In addition, RFCI urges Ecology to consider the impacts its proposed regulatory restrictions would have on the ability to incorporate recycled content into new vinyl flooring, as addressed in more detail below.

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<sup>3</sup> See RCW 70A.350 (2022).

<sup>4</sup> See **Exhibit A** attached hereto (main body of comments only; appendices not included herein).

<sup>5</sup> See **Exhibit B** attached hereto.

<sup>6</sup> See Toxic-Free Future, *Success!—Home improvement retailers follow through on commitments to remove phthalates from flooring* (June 27, 2019), available online at <https://saferchemicals.org/2019/06/27/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/> (discussing how top retailers of flooring have honored their commitments to eliminate ortho-phthalates from flooring, which has been further confirmed by testing) (current as of February 3, 2023).

Section I of these comments briefly summarizes information previously provided to Ecology regarding some of the benefits and positive attributes of vinyl flooring. Section II addresses the specific provisions of the Proposed Rule that are related to vinyl flooring.

**I. Vinyl Flooring Is a Safe, Sustainable Choice and Manufacturers Have Transitioned Away From the Use of Ortho-Phthalates in New Products**

RFCI's previous comments submitted to Ecology in connection with the SPW program have provided important information on the safety, sustainability, and performance benefits of vinyl flooring. As noted above, those comments are incorporated herein and RFCI directs the agency's attention to those previous submissions for a detailed explanation on these topics. In summary:

- Vinyl flooring provides substantial health, safety, and performance benefits over other flooring options because it is durable and easily cleaned, rendering the product ideal for use in a variety of settings including kitchens, school lunchrooms, and hospitals. In addition, vinyl flooring's durability—experience shows the products typically last for thirty to fifty years—cuts down on waste in landfills and leads to conservation of raw materials, making these products a sustainable choice.
- Multiple independent studies have demonstrated that exposure to ortho-phthalates in vinyl flooring and other similar products is *de minimis* if not non-existent.<sup>7</sup> Multiple studies have considered the inhalation, dermal contact, and ingestion pathways and have repeatedly found no unacceptable risk from the studied ortho-phthalates.<sup>8</sup> This includes a 2015 *Consumer Reports* study which considered high exposure scenarios (for example, a baby crawling on the vinyl flooring) and determined that ortho-phthalate exposure levels “were very low” and that even in instances where “there may be considerable amounts of [ortho-]phthalates in the composition of the [vinyl flooring] material itself, ... [the] tests show that very little came out in the air or on the wipes themselves.”<sup>9</sup>

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<sup>7</sup> See, e.g., United States Consumer Products Safety Commission, *Chronic Hazard Advisory Panel Report on DINP* (2001); see also National Industrial Chemicals Notification and Assessment Scheme (“NICNAS”) of the Australian Government Department of Health and Ageing, Existing Chemicals Information Sheet: *Diisononyl Phthalate (DINP) Factsheet* (2012); National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, *NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Di-isononyl Phthalate (DINP)* (2003); European Chemicals Bureau, *European Union Risk Assessment Report: DINP* (2003).

<sup>8</sup> See, e.g., European Commission (EC), *Phthalates entry 52 – Commission conclusions on the review clause and next steps* at 4 (Jan. 15, 2014); European Chemicals Agency (ECHA), *Evaluation of New Scientific Evidence Concerning DINP and DIDP* (Aug. 2013).

<sup>9</sup> Consumer Reports, *Vinyl Flooring Safety Questions Answered*, available online at <https://www.consumerreports.org/video/view/home-garden/news/4397736200001/vinyl-flooring-safety-questions-answered/> (current as of February 3, 2023).

- Taken as a whole, these studies make clear that ortho-phthalates, as used in vinyl flooring products (including in-place legacy products), do not concentrate in indoor air, cannot be readily absorbed by the skin, and do not present an ingestion risk from hand-to-mouth activity.
- While RFCI maintains that concerns regarding health risks associated with exposure to ortho-phthalate-containing vinyl flooring are misguided, the vinyl flooring manufacturing sector has swiftly and resoundingly responded to the public perception and market changes largely driven by advocacy groups over the past decade. As a result of the shift in market demand towards ortho-phthalate-free vinyl flooring, manufacturers of vinyl flooring moved away from the use of ortho-phthalates and towards alternatives including terephthalates.<sup>10</sup>
- California’s Department of Toxic Substances Control (“DTSC”)—an agency widely renowned for its aggressive approach to consumer product regulation—considered information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates and *removed* vinyl flooring from its 2018-2020 Priority Product Work Plan, pointing to “progress made by manufacturers” as a basis for revising its focus on particular categories of building products.<sup>11</sup> In fact, DTSC’s Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an “implementation success” of the Priority Products program.<sup>12</sup> More recently, the Green Chemistry and Commerce

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<sup>10</sup> Terephthalates, while similar in name to ortho-phthalates, are very different from a chemistry perspective. The term “phthalates” is generally understood to refer to what are in fact ortho-phthalates. Unlike ortho-phthalates, however, terephthalates are not derived from phthalic acid (and therefore do not fall within the Act’s definition of “phthalate” and/or “priority chemical”), and are structurally significantly different from ortho-phthalates, with a significantly different toxicological profile corresponding to a low hazard profile. *See, e.g.,* W.D. Faber *et al.*, *Developmental toxicity and uterotrophic studies with di-2-ethylhexyl terephthalate*, Birth Defects Res. B. Dev. Reprod. Toxicol. (Oct. 2007); U.S. Consumer Product Safety Commission, Staff Statement on University of Cincinnati Report “Toxicity Review for Di-2-ethylhexyl Terephthalate (DEHT)” (Oct. 2018), available online at <https://www.cpsc.gov/s3fs-public/Toxicity%20Review%20of%20DEHT.pdf?FObpBBqgypVtw7gIEGMFXHN5H7vbeEz> (current as of February 3, 2023).

<sup>11</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing “vinyl flooring” as a priority product and noting on page 16: “Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment”), available online at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft_2018-2020_Priority_Product_Work_Plan.pdf); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018), available online at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final_2018-2020_Priority_Product_Work_Plan.pdf) (current as of February 3, 2023).

<sup>12</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.



Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that “[f]or the U.S. market, the switch ... is essentially complete.”<sup>13</sup>

## **II. RFCI Comments on Specific Substantive Aspects of the Proposed Rule**

RFCI provides the following comments on the portions of the Proposed Rule related to vinyl flooring:

### **RFCI Supports Ecology’s Clarification of the Definition of “Phthalates” Within This Regulatory Context**

RFCI agrees with Ecology’s clarification during the course of this regulatory process that the term “phthalate” in the Act applies only to ortho-phthalates and we appreciate Ecology’s use of the term “ortho-phthalate” throughout the Proposed Rule (as opposed to the generic term “phthalate”) as this helps to avoid unnecessary confusion and is consistent with the Act. We urge the Department to maintain this approach in the final rule.

### **RFCI Supports an Applicability Threshold of 1,000 ppm for Total Ortho-Phthalate Content for Newly Manufactured Vinyl Flooring Products**

In the Proposed Rule, Ecology establishes an applicability threshold of 1,000 ppm total ortho-phthalate content for vinyl flooring (meaning the contemplated regulatory restriction would apply only to vinyl flooring containing ortho-phthalates at or above this concentration).

RFCI maintains that the movement away from use of ortho-phthalates in the manufacture of new vinyl flooring products renders any regulatory restriction under the Act unnecessary. However, should Ecology proceed to promulgate regulatory restrictions on the sale of ortho-phthalate-containing vinyl flooring in the state of Washington, RFCI supports this 1,000 ppm applicability threshold (with the caveats noted in connection with recycled content in the next subsection of these comments). As explained by Ecology in various public meetings and outreach documents issued in connection with the SPW program, this 1,000 ppm level is consistent with standards for total ortho-phthalate content established in consensus-based, voluntary industry certification programs such as ASSURE CERTIFIED<sup>TM</sup> and NSF/ANSI 332.<sup>14</sup> These consensus-

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<sup>13</sup> Green Chemistry and Commerce Council, “Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution” (Dec. 2021), available online at <https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf> (current as of February 3, 2023).

<sup>14</sup> See SCS-0011, *Rigid Core Flooring Certification Standard* (May 1, 2020), available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (current as of February 3, 2023); and NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, available online at



based industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, a standardized method for measuring ortho-phthalates). RFCI appreciates Ecology considering these existing standards to inform the Proposed Rule.

RFCI notes, however, that these are *voluntary* industry standards. While a product that has been certified to meet either of these standards would not be subject to the regulatory restrictions for vinyl flooring (since such certification confirms the product falls below the threshold of 1,000 ppm for total ortho-phthalate content), a product would not *have* to certify to either standard for the restriction not to apply provided the product's total ortho-phthalate content was below 1,000 ppm. RFCI believes this to be clear in the text of the Proposed Rule but to avoid any confusion RFCI urges the Department to make this clear when discussing the connection between the proposed applicability threshold and the industry standard levels for ortho-phthalates in the context of public webinars or any similar guidance or outreach materials.

*RFCI Urges Ecology to Allow for Flexibility in Addressing Applicability to Vinyl Flooring Made with Recycled Vinyl Content*

While as a general matter, RFCI supports the 1,000 ppm applicability threshold as it applies to newly manufactured vinyl flooring products manufactured without recycled content, RFCI urges Ecology to consider the net benefits of allowing a higher applicability threshold for products manufactured with recycled content. The inclusion of pre-consumer and post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products and to further other Department priorities (including promoting sustainability, reducing the use of virgin resin, and reducing the amount of discarded product sent to landfills). However, recycled post-consumer vinyl flooring may contain legacy chemicals, including ortho-phthalates. As RFCI has explained to representatives of Ecology,<sup>15</sup> RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. But overly restrictive and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts. Specifically, the 1,000 ppm threshold will likely prove impractical when considered in the context of vinyl flooring made with ortho-phthalate-containing legacy product.<sup>16</sup>

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[https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtime=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtime=20200716160801&focal=none). (current as of February 3, 2023).

<sup>15</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022).

<sup>16</sup> The Department's Preliminary Regulatory Analyses accompanying the Proposed Rule notes that the SPW program considered and rejected a ban on the use of recycled material that contain restricted chemicals because such a ban could result in manufacturers "avoiding the use of recycled content altogether" which "could have unintended consequences on waste reduction efforts." Ecology, Preliminary Regulatory Analyses (Pub. 22-04-042) at p. 68, available online at <https://apps.ecology.wa.gov/publications/documents/2204042.pdf> (current as of February 3,

At a minimum, if the Department does not proceed with establishing a higher applicability threshold for vinyl flooring made with (perhaps some threshold amount of) recycled content, we urge the Department to build flexibility into the regulations that will allow the Department to modify the restriction's applicability to recycled content, or to make more tailored exceptions or approvals, that may be appropriate in the context of vinyl flooring made with pre-consumer and post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material). This would avoid the unintended and unfortunate effect that the general 1,000 ppm applicability level could have of discouraging recycling initiatives and would allow the Department to adapt the regulatory restriction as appropriate, based on available information as recycling experience and knowledge continues to grow.

*To the Extent Ecology Promulgates Restrictions, RFCI Supports an Effective Date of January 1, 2025 for Vinyl Flooring Products*

The Act provides that a “rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). The Proposed Rule includes an effective date of January 1, 2025 for restrictions on vinyl flooring products. *See* Proposed WAC 173-337-111(2)(b). If and to the extent the Department proceeds with promulgating regulatory restrictions for vinyl flooring, RFCI supports this effective date and is hopeful that it will allow the industry an appropriate timeframe to incorporate any necessary formulation modifications and quality control measures into the manufacturing process.

*RFCI Supports the Proposed Exemption for Existing Stock of Vinyl Flooring Products*

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>17</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. Nevertheless, an exemption for products manufactured as of the effective date will remove significant cost and

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2023). But, as currently proposed—with no exception for or accommodation of flooring made with recycled content—the Proposed Rule will likely have the very chilling effect on recycling initiatives that Ecology seeks to avoid. Specifically, the difficulty of ensuring that new products manufactured with recycled content are consistently below the 1,000 ppm total ortho-phthalate content level will discourage and actively disincentivize manufacturers' recycling efforts. This reality for products sold in Washington state will create significant obstacles to recycling efforts for products sold nationwide, stifling or even precluding what would be safe, beneficial, and sustainable reuse while diverting more usable material to landfills.

<sup>17</sup> RCW 70A.350.040(5).

logistical challenges—with no associated increase in risk. This is consistent with the Act’s directive. RFCI therefore supports the exemptions in the Proposed Rule for vinyl flooring manufactured before January 1, 2025, as well as the exemptions for repair/replacement parts and product that is refurbished with repair or replacement parts manufactured before January 1, 2025.<sup>18</sup>

### **III. Conclusion**

Thank you for the opportunity to provide these comments in connection with the SPW program. RFCI appreciates Ecology’s goals in developing and implementing this program and its members share the Department’s goals of protecting human health and the environment. We look forward to addressing any questions you might have regarding these comments and are happy to provide additional information that may be useful to Ecology in moving towards issuance of a final rule. If you have any questions regarding these comments, please contact Bill Blackstock, RFCI President and CEO ([Bill.Blackstock@RFCI.com](mailto:Bill.Blackstock@RFCI.com)) or RFCI counsel Allison Foley, Venable LLP ([ADFoley@Venable.com](mailto:ADFoley@Venable.com)).

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<sup>18</sup> In the event Ecology finalizes an effective date earlier than January 1, 2025 (which RFCI would not support), RFCI urges the Department to nonetheless extend the exemption to products manufactured before January 1, 2025 in order to allow a reasonable compliance timeframe.

# Exhibit A



August 31, 2022

Submitted via e-mail to **SaferProductsWA@ecy.wa.gov**

Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Re: Comments of the Resilient Floor Covering Institute (“RFCI”) on the Safer Products for Washington Priority Consumer Products Preliminary Draft Rule Language

To whom it may concern:

The Resilient Floor Covering Institute (“RFCI”) submits these comments to the State of Washington Department of Ecology (“Ecology” or the “Department”) on Ecology’s Preliminary Draft Rule Language for a potential new chapter 17-337 of the Washington Administrative Code, to be titled “Safer Products Restrictions and Reporting” (the “Preliminary Draft”).<sup>1</sup> RFCI appreciates the opportunity to comment on this important interim step as the Department prepares its draft regulatory text for the forthcoming formal notice and comment period anticipated at the end of this year. RFCI further appreciates that Ecology extended the deadline for comment on the Preliminary Draft from August 24, 2022 to August 31, 2022<sup>2</sup> given the very short window allowed for public review and input during this interim step in the statutorily driven rulemaking process.<sup>3</sup>

RFCI represents the interests of the resilient floor covering industry. Virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. RFCI has long been an advocate of sustainable product selection and sustainable building practices based on life-cycle assessment, sound science, and risk assessments. RFCI and its members therefore appreciate Ecology’s goals in developing and implementing the Safer Products for Washington (“SPW”) program under the 2019 Safer Products for Washington Act (the “Act”).<sup>4</sup>

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<sup>1</sup> Available online at [https://www.ezview.wa.gov/Portals/\\_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage\\_Cycle1\\_August2022.pdf](https://www.ezview.wa.gov/Portals/_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage_Cycle1_August2022.pdf) (current as of August 31, 2022).

<sup>2</sup> Ecology formally announced the extension of this comment window during its August 16, 2022 webinar on the Preliminary Draft; prior to that webinar, on an August 15, 2022 telephone call, Ms. Lauren Tamboer of the Department of Ecology communicated to RFCI counsel Allison Foley that Ecology would accept comments through the end of the month.

<sup>3</sup> The Preliminary Draft Rule Language was posted to the Department of Ecology website on August 9, 2022 with an email alerting interested parties to availability of the text sent on the evening of August 9, 2022.

<sup>4</sup> See 70.365.010 RCW *et seq.* (2019).

As a threshold matter, RFCI reiterates and incorporates by reference the comments submitted by RFCI to Ecology on January 28, 2022 on the Department's Draft Regulatory Determinations Report to Legislature ("Draft Determinations"). Specifically, RFCI believes that the overwhelming shift away from the use of ortho-phthalates in new vinyl flooring products that has occurred over the past decade renders regulatory restrictions for this priority product unnecessary and a misdirected use of critical and limited agency resources. Ecology has made clear that it wishes to implement the SPW program and craft any regulations thereunder in a manner that will provide meaningful benefit to the health and safety of Washington consumers and to the environment. One of the goals of the SPW program is the shift towards alternatives deemed safer than the priority chemicals identified in the Act and/or by Ecology; in the case of vinyl flooring manufactured with ortho-phthalates, the data are clear that the presence of ortho-phthalates does not pose a health or safety risk to consumers. Moreover, the reality is that manufacturers have nonetheless already shifted en masse to an alternative product (*i.e.*, vinyl flooring manufactured with alternatives to ortho-phthalates, including terephthalates) without the need for regulatory intervention. This development has been acknowledged even by the consumer advocacy group that led the public outcry regarding perceived health risks of vinyl flooring manufactured with ortho-phthalates.<sup>5</sup> Ecology should therefore focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment—that is, priority products that continue to be manufactured with priority chemicals on a regular basis and broad scale.

These comments are based on the understanding that the Department has finalized its recommendations to the legislature to promulgate regulatory restrictions applicable to the vinyl flooring category. If Ecology moves forward with crafting regulatory restrictions for vinyl flooring, it is critical that any such restrictions—as with all restrictions adopted under this novel regulatory program—be based on sound science, practically achievable, and designed to position the Act and its implementing regulations as a meaningful and useful consumer benefit. Ecology should avoid adoption of any regulatory restrictions that are based on anecdotal, unsubstantiated, or discredited information, as this could lead to confusion in the marketplace while unduly burdening manufacturers and limiting consumer choice. Regulatory restrictions proposed under the Act for vinyl flooring, if any, must be narrowly tailored to address the risk the Department has identified in connection with exposure to ortho-phthalates to the extent those chemicals may be present in vinyl flooring products today. In addition, RFCI urges Ecology to consider the limiting effect its proposed regulatory restrictions would have on the ability to incorporate recycled content into new vinyl flooring, as addressed in more detail below.

Section I of these comments addresses the significant benefits of vinyl flooring as a consumer product option and discusses the shift away from the use of ortho-phthalates that has already occurred in the vinyl flooring manufacturing industry. Section II of these comments

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<sup>5</sup> See *e.g.*, Toxic-Free Future, *Success!—Home improvement retailers follow through on commitments to remove phthalates from flooring* (June 27, 2019), available online at <https://toxicfreefuture.org/blog/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/> (discussing how top retailers of flooring have honored their commitments to eliminate ortho-phthalates from flooring, which has been further confirmed by testing) (current as of August 31, 2022).

addresses an important terminology distinction regarding the use of the term “phthalates” in the Preliminary Draft and related Ecology guidance and outreach materials. Section III of these comments addresses specific substantive aspects of the Preliminary Draft.

**I. Vinyl Flooring Is a Safe, Sustainable Choice, and Manufacturers Have Transitioned Away from the Use of Ortho-Phthalates in New Products**

*Vinyl Flooring Has Long Been a Sustainable Choice for Consumers*

Vinyl flooring, with multiple product categories to address different design objectives and consumer priorities, is the number one choice for hard surface flooring in the United States.<sup>6</sup> Vinyl flooring provides substantial health, safety, and performance benefits over other flooring options because it is durable and easily cleaned, rendering the product ideal for use in a variety of settings including kitchens, school lunchrooms, and hospitals. In addition, vinyl flooring’s durability—experience shows the products typically last for thirty to fifty years—cuts down on waste in landfills and leads to conservation of raw materials, making these products a sustainable choice.

As RFCI explained in comments submitted to Ecology on March 1, 2020, and in earlier comments submitted to California’s Department of Toxic Substances Control (“DTSC”) in response to DTSC’s initial listing of vinyl flooring-phthalates as a priority product-chemical combination under California’s Safer Consumer Products program, multiple independent studies have demonstrated that exposure to ortho-phthalates in vinyl flooring and other similar products is *de minimis* if not non-existent.<sup>7</sup> (Notably, California *removed* this product-chemical combination from the 2018-2020 Priority Products Work Plan (“PPWP”) in response to information provided by the flooring industry.<sup>8</sup>) Multiple studies have considered the inhalation, dermal contact, and ingestion pathways and have repeatedly found no unacceptable risk from the studied ortho-phthalates.<sup>9</sup> Taken as a whole, these studies make clear that ortho-phthalates, as

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<sup>6</sup> See, e.g., *The ReCo Market Intelligence Report*, FLOOR COVERING WEEKLY, June 28, 2021, at 10, available online at <https://bt.editionsbyfry.com/publication/?m=26543&i=712790&p=10&ver=html5> (current as of August 31, 2022).

<sup>7</sup> See, e.g., United States Consumer Products Safety Commission, *Chronic Hazard Advisory Panel Report on DINP* (July 2014); see also National Industrial Chemicals Notification and Assessment Scheme (“NICNAS”) of the Australian Government Department of Health and Ageing, *Diisononyl Phthalate (DINP) Factsheet* (2012); National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, *NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Di-isononyl Phthalate (DINP)* (2003); European Chemicals Bureau, *European Union Risk Assessment Report DINP* (2003).

<sup>8</sup> DTSC’s decision to remove the vinyl flooring-phthalates product-chemical combination from the 2018-2020 PPWP was consistent with the 2016 decision of its sister agency, the California Office of Environmental Health Hazard Assessment (“OEHHA”), to issue Safe Use Determinations under California’s Proposition 65 for exposure to diisononyl phthalate (“DINP”) in vinyl flooring products (see OEHHA, Safe Use Determination Letter: Issuance of a SUD for exposure to diisononyl phthalate in vinyl flooring products, issued to Resilient Floor Covering Institute (June 24, 2016), available online at <https://oehha.ca.gov/proposition-65/crn/issuance-safe-use-determination-exposure-residents-diisononyl-phthalate-vinyl> (current as of August 31, 2022)).

<sup>9</sup> See, e.g., European Commission (EC), *Phthalates entry 52 – Commission conclusions on the review clause and next steps* at 4 (Jan. 15, 2014); European Chemicals Agency (ECHA), *Evaluation of New Scientific Evidence Concerning DINP and DIDP* (Aug. 2013).



used in vinyl flooring products (including in-place legacy products), do not concentrate in indoor air, cannot be readily absorbed by the skin, and do not present an ingestion risk from hand-to-mouth activity.

More recent studies have continued to demonstrate the low risk profile of ortho-phthalates as used in vinyl flooring, even as public perception shifted to align with purported risks of these products. For example, in 2015, *Consumer Reports* published a study focused on potential exposure to ortho-phthalates in seventeen vinyl flooring products and considered inhalation exposure and direct dermal contact (for example, a baby crawling on the vinyl floor).<sup>10</sup> The study concludes that “[ortho-]phthalate levels were very low,”<sup>11</sup> explaining that, even in instances where “there may be considerable amounts of [ortho-]phthalates in the composition of the [vinyl flooring] material itself, ... our tests show that very little came out in the air or on the wipes themselves.”<sup>12</sup> As discussed below, the resilient flooring market has shifted away from the use of ortho-phthalates towards alternatives; however, the findings of this study underscore that, even to the limited extent that ortho-phthalates may still be found in vinyl flooring offered for sale (potentially including vinyl flooring containing recycled vinyl content, addressed in more detail in Section III below), these products result in little to no exposure to ortho-phthalates. (Additional information regarding these studies finding that ortho-phthalates as used in vinyl flooring present no significant risk to human health is set forth in Attachment A to these comments.)

*The Vinyl Flooring Industry Has Shifted Away from the Use of Ortho-Phthalates In the Manufacture of New Vinyl Flooring Products.*

Developments in the flooring market over the past several years render the discussion of risks from ortho-phthalates in vinyl flooring moot, particularly in the context of a program like Washington’s, which is intended to focus administrative resources on consumer products posing the greatest risk to human health and the environment and to promote the use of alternatives to those products. Since the Department first began public outreach regarding its implementation of the Act’s requirements, Ecology representatives have consistently made clear that the Department is not considering any hazard or risk information related to the products it is considering for designation as priority products. However, as a practical matter—regardless of whether ortho-phthalate-containing vinyl flooring poses any significant risk—flooring manufacturers have already shifted to the use of alternatives including terephthalates (which are structurally very different from the ortho-phthalates upon which the listing of “phthalates” as a priority chemical class under the SPW program is based<sup>13</sup>).

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<sup>10</sup> Consumer Reports, *Vinyl Flooring Safety Questions Answered* (Aug. 6, 2015), available online at <https://www.consumerreports.org/video/view/home-garden/news/4397736200001/vinyl-flooring-safety-questions-answered/> (current as of August 31, 2022).

<sup>11</sup> *Id.* at 0:52.

<sup>12</sup> *Id.* at 0:43.

<sup>13</sup> Terephthalates, while similar in name to ortho-phthalates, are very different from a chemistry perspective. The term “phthalates” is generally understood to refer to what are in fact ortho-phthalates. Unlike ortho-phthalates, however, terephthalates are not derived from phthalic acid (and therefore do not fall within the Act’s definition of “phthalate” and/or “priority chemical”), and are structurally significantly different from ortho-phthalates, with a significantly



While RFCI maintains that concerns regarding health risks associated with exposure to ortho-phthalate-containing vinyl flooring are misguided, the vinyl flooring manufacturing sector has swiftly and resoundingly responded to the public perception and market changes largely driven by advocacy groups over the past decade. As a result of the shift in market demand towards ortho-phthalate-free vinyl flooring, manufacturers of vinyl flooring moved away from the use of ortho-phthalates and towards alternatives including terephthalates.

As noted above in these comments, California's DTSC—an agency widely renowned for its aggressive approach to consumer product regulation—considered information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates and *removed* vinyl flooring from its 2018-2020 PPWP, pointing to “progress made by manufacturers” as a basis for revising its focus on particular categories of building products.<sup>14</sup> In fact, DTSC's Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an “implementation success” of the Safer Consumer Product program.<sup>15</sup> More recently, the Green Chemistry and Commerce Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that “[f]or the U.S. market, the switch is > 95% and essentially complete.”<sup>16</sup>

RFCI encourages Ecology to take a similar approach as DTSC, which has focused its limited agency resources on those product-chemical combinations that continue to be manufactured and are proven to present a risk to consumers. Any restrictions Ecology moves forward with proposing should be narrowly tailored to actual exposure.

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different toxicological profile corresponding to a low hazard profile. *See, e.g.,* W.D. Faber *et al.*, *Developmental toxicity and uterotrophic studies with di-2-ethylhexyl terephthalate*, Birth Defects Res. B. Dev. Reprod. Toxicol. (Oct. 2007); U.S. Consumer Product Safety Commission, Staff Statement on University of Cincinnati Report “Toxicity Review for Di-2-ethylhexyl Terephthalate (DEHT)” (Oct. 2018), available online at <https://www.cpsc.gov/s3fs-public/Toxicity%20Review%20of%20DEHT.pdf?FObpuBBqgypVtw7gIEGMFXHN5H7vbeEz> (current as of August 31, 2022).

<sup>14</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing “vinyl flooring” as a priority product; noting on page 16: “Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment”), available at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft_2018-2020_Priority_Product_Work_Plan.pdf) (current as of August 31, 2022); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018), available at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final_2018-2020_Priority_Product_Work_Plan.pdf) (current as of August 31, 2022).

<sup>15</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.

<sup>16</sup> Green Chemistry and Commerce Council, “Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution” (Dec. 2021), available online at <https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf> (current as of August 31, 2022).

## **II. Ecology Has Appropriately Provided Clarity Regarding Its Use of the Term “Phthalates” as Defined By the Act.**

The Act directs Ecology to consider six specific classes of “priority chemicals” (in addition to other chemicals the Department may identify as priority chemicals), including “phthalates.”<sup>17</sup> The Act defines “phthalates” as “synthetic chemical esters of phthalic acid.”<sup>18</sup> As Ecology explained in its Draft Determinations earlier this year:

RCW 70A.350.010 defines phthalates as a class as “synthetic esters of phthalic acid” based on their chemical structure. The National Library of Medicine (NLM) defines the term phthalic acid as a “benzenedicarboxylic acid consisting of two carboxy groups at ortho positions.” This definition does not include benzenedicarboxylic acid with two carboxy groups in either the meta or para configurations (e.g., isophthalic acid or terephthalic acid).

Thus, the definition of this priority chemical class can be clarified to include only ortho-phthalates. Subsequent references to “phthalates” in this chapter refer specifically to ortho-phthalates.<sup>19</sup>

RFCI agrees with Ecology that the definition of “phthalates” under the Act and in related scientific literature limits the scope of this defined term to ortho-phthalates. RFCI appreciates that Ecology refers consistently to “ortho-phthalates” in the Preliminary Draft and urges Ecology to maintain this approach in the regulatory text and related guidance and outreach materials as the Department refines and moves towards formal proposal of these regulations.

## **III. RFCI Comments on Specific Substantive Aspects of the Preliminary Draft**

### ***RFCI Supports an Applicability Threshold of 1,000 ppm for Total Ortho-Phthalate Content for Newly Manufactured Vinyl Flooring Products***

In the Preliminary Draft, Ecology establishes an applicability threshold of 1,000 ppm total ortho-phthalate content for vinyl flooring (meaning the contemplated regulatory restriction would apply only to vinyl flooring containing ortho-phthalates at or above this concentration).

RFCI maintains that the movement away from use of ortho-phthalates in the manufacture of new vinyl flooring products renders any regulatory restriction under the Act unnecessary. However, should Ecology proceed to propose and ultimately promulgate regulatory restrictions on the sale of ortho-phthalate-containing vinyl flooring in the state of Washington, RFCI supports

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<sup>17</sup> RCW 70A.350.010(12).

<sup>18</sup> *Id.* at 70A.350.010(10).

<sup>19</sup> Draft Determinations at 140 (internal citations omitted).

this 1,000 ppm applicability threshold (with the caveats noted in connection with recycled content in the next sub-section of these comments). As explained by Ecology in various public meetings and outreach documents issued in connection with the SPW program, this 1,000 ppm level is consistent with standards for total ortho-phthalate content established in consensus-based, voluntary industry certification programs such as ASSURE CERTIFIED™ and NSF/ANSI 332.<sup>20</sup> These consensus-based industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, a standardized method for measuring ortho-phthalates). RFCI appreciates Ecology considering these existing standards to inform their decision-making as the Department crafts any potential restrictions imposed on vinyl flooring products under the Act.

RFCI notes, however, that these are *voluntary* industry standards. While a product that has been certified to meet either of these standards would not be subject to the regulatory restrictions for vinyl, a product would not *have* to certify to either standard for the restriction not to apply provided the product's total ortho-phthalate content was below 1,000 ppm. RFCI believes this to be clear in the text of the Preliminary Draft but to avoid any confusion RFCI urges the Department to make this clear in the context of public webinars or any similar guidance or outreach materials when discussing the connection between the proposed applicability threshold and the industry standard levels for ortho-phthalates.

*RFCI Urges Ecology to Allow for Flexibility in Addressing Applicability to Vinyl Flooring Made with Recycled Vinyl Content*

While as a general matter, RFCI supports the 1,000 ppm applicability threshold as it applies to newly manufactured vinyl flooring products manufactured without recycled content, RFCI urges Ecology to consider the net benefits of allowing a higher applicability threshold for products manufactured with recycled content. As discussed in RFCI's March 2022 comments on the Preliminary Determinations, the inclusion of post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products and to further other Department priorities (including promoting sustainability, reducing the use of virgin resin, and reducing the amount of discarded product sent to landfill). However, recycled post-consumer vinyl flooring may contain legacy chemicals, including ortho-phthalates. As RFCI has explained to representatives of Ecology,<sup>21</sup> RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. But overly restrictive

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<sup>20</sup> See *Rigid Core Flooring Certification Standard*, SCS-0011 (May 1, 2020), available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (current as of August 31, 2022) (note: updated revision slated for 2022 publication); NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, available online at [https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtm\\_e=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtm_e=20200716160801&focal=none). (current as of August 31, 2022).

<sup>21</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022).

and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts. Specifically, the 1,000 ppm threshold will likely prove impractical when considered in the context of vinyl flooring made with ortho-phthalate-containing legacy product.

At a minimum, if the Department does not proceed with proposing a higher applicability threshold for vinyl flooring made with (perhaps some threshold amount of) recycled content, we urge the Department to build flexibility into the regulations that will allow the Department to modify the restriction's applicability to recycled content, or to make more tailored exceptions or approvals, that may be appropriate in the context of vinyl flooring made with post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material). This would avoid the unintended and unfortunate effect that the general 1,000 ppm applicability level could have of discouraging recycling initiatives and would allow the Department to adapt the regulatory restriction as appropriate, based on available information as recycling experience and knowledge continues to grow.

*To the Extent Ecology Promulgates Restrictions Along the Lines of Those Described in the Preliminary Draft, RFCI Supports an Effective Date of January 1, 2025 for Vinyl Flooring Products*

The Act provides that a “rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). In the Preliminary Draft, Ecology has suggested an effective date of January 1, 2025 for restrictions on vinyl flooring products. If and to the extent the Department proceeds with proposing and promulgating regulatory restrictions for vinyl flooring, RFCI supports this effective date and is hopeful that it will allow the industry an appropriate timeframe to incorporate any necessary formulation modifications and quality control measures into the manufacturing process.

*RFCI Supports an Exemption for Existing Stock of Vinyl Flooring Products*

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>22</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. An exemption for products manufactured as of the effective date will remove significant cost and logistical challenges with no associated increase in risk, and is consistent with the Act's directive. RFCI

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<sup>22</sup> RCW 70A.350.040(5).

therefore supports an exemption from any regulatory restrictions for vinyl flooring manufactured prior to January 1, 2025 (or such later effective date as Ecology may ultimately establish).<sup>23</sup>

#### **IV. Conclusion**

RFCI appreciates Ecology's goals in developing and implementing the SPW program. RFCI and its members share many of the objectives that are at the heart of this regulatory initiative and the underlying Act, and the actions of RFCI members—including the voluntary, proactive shift towards the use of alternatives to ortho-phthalates—demonstrates a continued commitment to the production of safe, sustainable products. Moreover, RFCI members share the goal of improving transparency regarding product composition, safety, and sustainability. However, it remains critical that any regulatory restrictions imposed on priority products under the Act address actual exposure risk and do not discourage environmentally beneficial recycling efforts.

Thank you for the opportunity to provide these comments in connection with this important regulatory initiative. We look forward to addressing any questions you might have regarding these comments, and we are happy to provide additional information that may be useful to Ecology in reviewing and revising its Preliminary Draft and moving towards issuance of a formal proposal. If you have any questions regarding these comments, please contact Bill Blackstock, RFCI President and CEO (Bill.Blackstock@RFCI.com) or RFCI counsel Allison Foley, Venable LLP (ADFoley@Venable.com).

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<sup>23</sup> In the event Ecology proposes an effective date earlier than January 1, 2025, RFCI urges the Department to nonetheless extend the exemption to products manufactured before January 1, 2025 in order to allow a reasonable compliance timeframe.

# **Exhibit B**



**COMMENTS OF THE RESILIENT FLOOR COVERING INSTITUTE  
ON THE WASHINGTON DEPARTMENT OF ECOLOGY'S  
DRAFT REGULATORY DETERMINATIONS – REPORT TO LEGISLATURE  
SAFER PRODUCTS FOR WASHINGTON PROGRAM**

**SUBMITTED TO THE  
WASHINGTON DEPARTMENT OF ECOLOGY**

**January 28, 2022**

**RESILIENT FLOOR COVERING INSTITUTE:**

Bill Blackstock, President and CEO  
Dean Thompson, President Emeritus  
115 Broad Street  
Suite 201  
LaGrange, GA 30240  
[Bill.Blackstock@RFCI.com](mailto:Bill.Blackstock@RFCI.com)

**OF COUNSEL:**

Allison D. Foley  
John B. Mavretich  
Venable LLP  
600 Massachusetts Avenue, N.W.  
Washington, DC 20001  
[ADFoley@Venable.com](mailto:ADFoley@Venable.com)  
[JBMavretich@Venable.com](mailto:JBMavretich@Venable.com)



The Resilient Floor Covering Institute (“RFCI”) appreciates the opportunity to comment on the Washington Department of Ecology’s (“Ecology” or the “Department”) Draft Regulatory Determinations Report to the Legislature (“Draft Determinations”)<sup>1</sup> issued in connection with Implementation Phase 3 of Ecology’s Safer Products for Washington Program (the “Program”), as authorized by the Pollution Prevention for Healthy People and Puget Sound Act of 2019 (the “Act”).<sup>2</sup> RFCI supports Ecology’s efforts to reduce the use of toxic chemicals in household products through implementation of the Program; as described in greater detail below, RFCI member companies have long sought to assess and improve their products, including by proactively shifting away from ortho-phthalates in the manufacture of vinyl flooring products. RFCI applauds Ecology’s efforts in implementing the Program, in particular the Department’s commitment to meaningful dialogue with public interest groups, the manufacturer community, and other interested stakeholders as Ecology evaluates priority products and considers appropriate regulatory responses consistent with the Act’s mandate.

RFCI represents the interests of the resilient floor covering industry; virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. Resilient flooring is currently the number one consumer choice for hard surface flooring, and in recent years the product category—in particular, luxury vinyl tile (“LVT”)—has seen tremendous growth<sup>3</sup> as consumers opt for the sustainability, durability, and aesthetics of this flooring option. Given the popularity of resilient flooring and the many benefits it offers to the consumer, it is important that this product category remain an available and affordable option in the Washington market.

RFCI has long been an advocate of sustainable product selection and building practices based on life-cycle assessment, sound science, and risk assessments. Ecology has made clear that it wishes to implement the Program and craft any regulations thereunder in a manner that will provide meaningful benefit to the health and safety of Washington consumers and to the environment. Ecology should therefore focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment—that is, priority products that continue to be manufactured on a regular basis and broad scale with priority chemicals. Similarly, Ecology should avoid any regulatory requirements that are overly broad or based on an over-

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<sup>1</sup> Washington Department of Ecology (“Ecology”), Draft Regulatory Determinations Report to the Legislature, Safer Products for Washington, Implementation Phase 3, Publication 21-04-047 (Nov. 2021) (“Draft Determinations”).

<sup>2</sup> S.S.B. 5135 (2019); RCW 70A.350.010 *et seq.* (2020) (formerly RCW 70.365.010 *et seq.* (2019)).

<sup>3</sup> See, e.g., Verified Market Research, *Global Luxury Vinyl Tile-LVT Market Size By Type, By End-Use Sector, By Geographic Scope and Forecast*, Report ID 25815 (July 2021), available online at <https://www.verifiedmarketresearch.com/product/luxury-vinyl-tile-lvt-market/> (LVT market valued at \$16.11 billion in 2020, projected to reach \$37.92 billion by 2028); see also “Luxury Vinyl Tiles (LVT) Flooring Market by Type (Rigid, Flexible), End-Use Sector (Residential, Non-residential), and Region (North America, Asia Pacific, Europe, Middle East & Africa, and South America) – Global Forecast to 2024,” available online at <https://www.marketsandmarkets.com/Market-Reports/lvt-flooring-market-105150640.html>.



inclusive approach which—even if well-intentioned—would lead to consumer confusion, frustrating the goals of the Act.

As Ecology considers public input on the Draft Determinations and begins to develop more concrete regulatory requirements, RFCI urges the Department to ensure that any regulatory action ultimately taken under the Program is based on the best available scientific information and considers current market conditions. To achieve these goals and to promote clarity in the final recommendations, and to ensure that any forthcoming regulatory requirements represent an efficient use of administrative resources that will provide a meaningful health or environmental benefit, RFCI urges Ecology to consider the following:

- To avoid confusion among consumers and other members of the public, and to promote clarity regarding risk findings and regulatory requirements, Ecology should provide greater clarity regarding the meaning of “phthalates” under the Program. While the term “phthalates” is clearly defined under the statute and used by Ecology to mean ortho-phthalates—a category of chemicals with a distinct chemical structure and chemical characteristics—this term is sometimes, due to the similar nomenclature, misunderstood by the general public to include terephthalates. As discussed in greater detail below, Ecology should make clearer at the outset of its Regulatory Determinations and related reports to the legislature and/or the public that “phthalates” (*i.e.*, ortho-phthalates) are distinct from, behave differently from, and do not include terephthalates.
- Given the widespread and well-documented shift away from the use of ortho-phthalates in the manufacture of new vinyl flooring products that has already occurred, regulatory restrictions under the Program are not warranted for vinyl flooring products; Ecology’s finite resources would provide more meaningful public benefit, consistent with the legislative objectives of the Act, if focused on priority products that continue to be manufactured with priority chemicals.
- Regulatory restrictions proposed under the Act for resilient vinyl flooring, if any, must be narrowly tailored to address the risk identified in connection with exposure to ortho-phthalates as those chemicals may be present in vinyl flooring products; any such regulatory restrictions must be based on sound science and further must be practically achievable.
- The significant environmental and sustainability benefits associated with the responsible recycling of vinyl flooring products far outweigh any potential, and likely *de minimis*, risk associated with low levels of unintentionally added ortho-phthalates that may be present in some recycled vinyl flooring products; Ecology should consider the benefits of vinyl flooring recycling—which are consistent with and further Ecology goals under other programs—in developing any regulatory restrictions under the Act.

Each of these comments is discussed in greater detail below.

**I. DTSC Should Provide Greater Clarity Regarding Its Use of the Term “Phthalates.”**

The Act directs Ecology to consider six specific classes of “priority chemicals” (in addition to other chemicals the Department may identify as priority chemicals), including “phthalates.”<sup>4</sup> The Act defines “phthalates” as “synthetic chemical esters of phthalic acid.”<sup>5</sup> As Ecology explains in the Draft Determinations:

RCW 70A.350.010 defines phthalates as a class as “synthetic esters of phthalic acid” based on their chemical structure. The National Library of Medicine (NLM) defines the term phthalic acid as a “benzenedicarboxylic acid consisting of two carboxy groups at ortho positions.” This definition does not include benzenedicarboxylic acid with two carboxy groups in either the meta or para configurations (e.g., isophthalic acid or terephthalic acid).

Thus, the definition of this priority chemical class can be clarified to include only ortho-phthalates. Subsequent references to “phthalates” in this chapter refer specifically to ortho-phthalates.<sup>6</sup>

RFCI agrees with Ecology that the definition of “phthalates” under the Act and in related scientific literature limits the scope of this defined term to ortho-phthalates. RFCI appreciates the clarification offered by the above-quoted text; however, as this explanation is provided at about the halfway point of the over three-hundred-page report, readers of the report may miss this point. RFCI encourages Ecology to update the discussion of the term “phthalates” found on page 28 of the report to include the same explanation (including, specifically, the clarification that the term—as used in the Act, in the Draft Determinations, or otherwise—does *not* include terephthalates. This portion of the report may be further strengthened by an acknowledgment that terephthalates, while similar in name to ortho-phthalates, have a different chemical structure and toxicological profile from ortho-phthalates.<sup>7</sup>

For the sake of clarity, RFCI uses the term “ortho-phthalates” throughout these comments. This term is intended to be synonymous with the term “phthalates” as used by Ecology in the Draft Determinations.

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<sup>4</sup> RCW 70A.350.010(12).

<sup>5</sup> *Id.* at 70A.350.010(10).

<sup>6</sup> Draft Determinations at 140 (internal citations omitted).

<sup>7</sup> Consumer advocacy groups including the Healthy Building Network have acknowledged, in the context of bis(2-ethylhexyl) terephthalate (commonly abbreviated as DEHT or DOTP), that “no reproductive or developmental toxicity or endocrine disrupting effects have been observed in studies on DEHT.” Sarah Lott, Healthy Building Network, “Phthalate-free Plasticizers in PVC”, v2 (Sept. 2014), available online at <https://fdocuments.in/document/phthalate-free-plasticizers-in-pvc-s3-phthalate-free-plasticizers-in-pvc.html>.

## **II. Manufacturers Have Already Ceased Using Ortho-Phthalates in the Manufacture of New Resilient vinyl flooring Products; No Regulatory Intervention is Warranted.**

Ecology states in the Draft Determinations that “the use of phthalates in vinyl flooring is significant and vinyl flooring represents a significant source of phthalates,” concluding that “restricting the use of phthalates in vinyl flooring will reduce a significant source of phthalate exposure to people and the environment.”<sup>8</sup> RFCI disagrees with this conclusion, as the underlying assumption—that “the use of ortho-phthalates in vinyl flooring is significant”—is faulty. Specifically, RFCI believes that existing data clearly demonstrate that actions *already taken* by resilient vinyl flooring manufacturers have already successfully reduced human and environmental exposure to ortho-phthalates from resilient vinyl flooring. Moreover, all available information indicates that this trend will only continue, with the already significantly reduced amounts of ortho-phthalates in resilient vinyl flooring continuing to steadily decrease over time. There is therefore no basis for any regulatory intervention; regulations are not necessary to prompt a development that is already, as a result of actions taken by manufacturers over the past several years, in motion. Below we provide more detail regarding the industry shift away from the use of ortho-phthalates.

Over the past decade, state regulatory agencies and consumer advocacy groups have focused on purported health risks associated with ortho-phthalates. As a result of the corresponding shift in market demand towards vinyl flooring that is free of ortho-phthalates, manufacturers of vinyl flooring have moved away from the use of ortho-phthalates and towards alternatives including terephthalates and bio-based plasticizers. These developments predate Ecology’s implementation of the Program, and even enactment of the Act itself. Specifically, by 2015, the three largest home improvement chains in the United States (Home Depot, Lowes, and Menards), as well as Lumber Liquidators, had all adopted policies to phase out ortho-phthalate-containing PVC flooring (not including vinyl flooring composed of recycled PVC content, which account for only a very small fraction of domestic vinyl flooring sales; however, Lumber Liquidators ceased sale of all vinyl flooring containing reprocessed plastics, including recycled vinyl flooring, by the end of 2015<sup>9</sup>). Ecology acknowledges these developments in the Draft Determinations.<sup>10</sup> The success of these corporate policies is underscored by a 2019 study performed by a collection of environmental advocacy groups: the study sampled twenty-five vinyl

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<sup>8</sup> Draft Determinations at 151.

<sup>9</sup> Safer Chemicals Healthy Families, “Lumber Liquidators commits to selling vinyl flooring made without reprocessed plastic” (Nov. 17, 2015), available online at <https://saferchemicals.org/2015/11/17/lumber-liquidators-commits-to-selling-vinyl-flooring-made-without-reprocessed-plastic/>.

<sup>10</sup> Draft Determinations at Table 91.

flooring products collected from Home Depot, Lowes, and Lumber Liquidators and found that none of the samples contained any ortho-phthalates above laboratory detection limits.<sup>11</sup>

Because of these ortho-phthalate bans by major domestic retailers and in response to evolving public concerns, the vinyl flooring industry moved away from ortho-phthalate plasticizers and towards alternatives including terephthalate plasticizers years ago. By early 2018, California's Department of Toxic Substances Control ("DTSC") had taken note of this shift in the context of its Safer Consumer Products ("SCP") program, analogous to the Washington Program. In its initial development of a Priority Product Work Plan under the SCP, DTSC included the "vinyl flooring"- "phthalate" product-chemical combination in its Priority Product Work Plan for 2015-2017.<sup>12</sup> However, upon considering information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates, DTSC *removed* vinyl flooring from its 2018-2020 Priority Product Work Plan, pointing to "progress made by manufacturers" as a basis for revising its focus on particular categories of building products.<sup>13</sup>

DTSC—an agency widely renowned for its aggressive approach to consumer product risk—appears to agree that this consumer product does not warrant regulatory attention under a program intended to address meaningful consumer product risk. In fact, DTSC's Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an "implementation success" of the Safer Consumer Product program.<sup>14</sup> More recently, the Green Chemistry and Commerce Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that "[f]or the U.S. market, the switch to alternatives is essentially complete."<sup>15</sup>

This trend away from ortho-phthalates and towards alternative materials, including terephthalates, was further documented in the survey data provided by RFCI members to Ecology in connection with the Department's evaluation of vinyl flooring. As Ecology acknowledges in

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<sup>11</sup> Safer Chemicals Healthy Families, "Success! – Home improvement retailers follow through on commitments to remove phthalates from flooring" (June 27, 2019), available online at <https://saferchemicals.org/2019/06/27/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/>.

<sup>12</sup> California Department of Toxic Substances ("DTSC"), 2015-2017 Priority Product Work Plan Sections 4.2.1, 4.7, and Table 8 (identifying "vinyl flooring" and "phthalates" as a priority product-chemical combination).

<sup>13</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing "vinyl flooring" as a priority product; noting on page 16: "Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment"); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018).

<sup>14</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.

<sup>15</sup> Green Chemistry and Commerce Council, "Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution" (Dec. 2021), available online at (<https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf>).

the Draft Determinations: “In data we received from manufacturers to date, the majority reported using alternative plasticizers and were no longer using phthalates.”<sup>16</sup> While Ecology states that survey data provided by vinyl flooring manufacturers showed “that both DEHP and DINP are still used in a subset of products,” RFCI expects, based on member experience and input, that this diminishing subset of products represents only a small portion of the vinyl flooring industry. Moreover, we further expect that the level of ortho-phthalates in this subset of product is far below Ecology’s estimate of 9-32% by weight. This percentage range appears to be based on studies largely conducted prior to 2015—that is, prior to the developments that prompted the large-scale shift away from use of ortho-phthalates in vinyl flooring products.<sup>17</sup> As explained above and as documented in the data submitted by RFCI members to Ecology, vinyl flooring products being sold today have shifted away from the use of ortho-phthalates; the range cited by Ecology no longer represents an accurate assessment of the formulations used in today’s marketplace.

For these reasons, Ecology should determine that no regulatory restrictions are necessary to address ortho-phthalates in vinyl flooring. This is within the Department’s discretion in implementing the Act’s mandate. Specifically, the Act provides Ecology with discretion to select the appropriate regulatory action with regard to priority chemicals in priority consumer products from the following options: (1) take no regulatory action, (2) require notice, or (3) implement a restriction or prohibition of a priority chemical in a consumer product.<sup>18</sup> Because vinyl flooring products are now being manufactured without ortho-phthalates, the appropriate agency action would be a determination that no regulatory action is warranted as it relates to ortho-phthalates in vinyl flooring. This outcome would be sound from a risk-based perspective since manufacturers of vinyl flooring have already—in the absence of any legally enforceable mandate—proactively moved away from the use of ortho-phthalates in vinyl flooring products. Ecology’s finite resources would be put to better use, and yield more meaningful protection for both public health and the environment, if focused on priority products that result in more significant exposure to health/the environment—including those priority products for which manufacture continues to rely on the use of priority chemicals.

A determination that no regulatory action is required is appropriate not only from a common sense perspective but also from a statutory perspective. The Act requires that any restrictions or prohibitions imposed on a priority chemical in a priority consumer product must be based on a determination by Ecology that safer and feasible alternatives are available and that (1) the restriction will reduce a significant source of or use of a priority chemical or (2) the restriction is necessary to protect the health of sensitive populations or sensitive species. A restriction of ortho-phthalates in vinyl flooring satisfies neither (1) or (2). First, as discussed throughout these

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<sup>16</sup> Draft Determinations at 152.

<sup>17</sup> Ecology, Priority Consumer Products Report to the Legislature, Safer Products for Washington Implementation Phase 2 (July 2020, Publication 20-04-019), Table 15 (cataloguing studies (one from 2004, four from 2014, and two from 2016) related to phthalate concentrations in vinyl flooring).

<sup>18</sup> RCW 70A.350.040(1).

comments and RFCI's previous submissions, vinyl flooring is not a significant source of ortho-phthalates as such chemicals are no longer utilized in the manufacturing process. Second, a restriction or prohibition is not necessary to protect exposure of sensitive populations or sensitive species to ortho-phthalate-containing vinyl flooring, since manufacturers have already moved away from the use of ortho-phthalates.

### **III. Ecology Should Balance Any Potential Exposure to Low Levels of Ortho-Phthalates in Recycled Vinyl Flooring Content Against the Significant Environmental and Sustainability Benefits of Recycled Products.**

As a result of the formulation changes noted above for vinyl flooring products, as a general matter, ortho-phthalates are no longer added to new vinyl flooring products. However, as Ecology notes in the Draft Determinations, ortho-phthalates may unintentionally be introduced into new vinyl flooring products through the utilization of recycled materials.<sup>19</sup> However, recent survey data from RFCI members indicate that the likelihood of this potential outcome is low. As shown in the survey data recently submitted to the Department (the "RFCI Survey"),<sup>20</sup> only one RFCI flooring manufacturer survey respondent utilizes post-consumer product as recycled content in new flooring, and, based on follow-up discussions with RFCI members, that post-consumer content is most likely filler (*e.g.*, gypsum board) and *not* vinyl with plasticizer content. As demonstrated by the survey results, the only product type including post-consumer product content was vinyl composition tile ("VCT"), which uses a higher percentage of filler, and a lower percentage of vinyl resin and plasticizer, than other types of vinyl flooring products. Therefore, the post-consumer content would not include vinyl resin or ortho-phthalate plasticizer.

Seven out of fifteen of the flooring manufacturer respondents indicated that they utilize pre-consumer content. Typically, where manufacturers use regrind from another production line and/or plant location in another product type, the regrind would be considered pre-consumer content. Discussions with RFCI members in the wake of the RFCI Survey revealed that recycled content containing ortho-phthalates would typically not be used in new resilient flooring product formulations.

As time goes on, it will become increasingly likely that pre-consumer content would have been manufactured after the point at which manufacturers began phasing out ortho-phthalates. As development of various recycling means and methods of post-consumer—including methodologies to screen for and remove chemicals of concern in accordance with performance-based standard requirements—continues, this will give rise to additional opportunities for the uptake and use of post-consumer content. This in turn will expand the universe of available

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<sup>19</sup> Draft Determinations at 309.

<sup>20</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022), and attachment thereto (the "RFCI Survey").

opportunities for post-consumer recycling of resilient flooring product, furthering both Ecology's and the resilient flooring industry's objectives.

Even where small amounts of ortho-phthalates may unintentionally be added to resilient vinyl flooring that includes recycled content, it is critical that Ecology weigh any related consumer health or safety risk associated with such recycled content against the significant environmental and sustainability benefits associated with utilizing recycled content for beneficial use—including reductions in the rate of landfilling of these materials. If Ecology imposes overly burdensome restrictions on vinyl flooring products, the result could be a decrease in the beneficial reuse of recycled vinyl product and an increase in landfilling of such product, which is in direct opposition to the goals of the Program.

The utilization of pre-consumer and post-consumer recycled content in vinyl flooring products provides significant opportunity for continual improvement from a sustainability perspective. RFCI flooring manufacturer and supply chain members are investing substantial resources into research and development to determine how to improve the means and methods of recycling processes that chemically remove ortho-phthalates and heavy metals from recycled content—predominantly post-consumer recycled content—through performance-based standard testing. In order to ensure that regulatory burden does not become a roadblock to this innovation, Ecology should clarify that any restrictions imposed under the Program (such as limits on ortho-phthalate content for vinyl flooring products sold in Washington) relate only to *intentionally added* ortho-phthalates and are not applicable to any ortho-phthalates that are *unintentionally added* as a result of utilizing recycled content. Moreover, if Ecology does impose any such content limitations for intentionally added ortho-phthalates, the Department should evaluate whether a higher level is justified in the case of ortho-phthalate-containing recycled content, due to the various benefits of recycling and landfill avoidance.

#### **IV. Regulatory Restrictions on Vinyl Flooring, If Any, Must Be Narrowly Tailored and Implementable.**

If Ecology does move forward with a regulatory restriction related to ortho-phthalates, any such restrictions should be narrowly tailored to focus on actual risk. In addition, in crafting any such regulations, Ecology should consider the operational and logistical challenges manufacturers will face in ensuring that their products are compliant with the Program's requirements.

#### **Regulatory Restrictions Should Be Tailored to Address High-Exposure Scenarios.**

As noted throughout these comments and documented by the data submitted by RFCI members to Ecology, vinyl flooring generally no longer utilizes ortho-phthalates in the manufacturing process. And it is a poor use of Ecology's resources to expend effort related to regulating those vinyl flooring products that do contain low levels of unintentionally added ortho-phthalates. Instead, Ecology should utilize existing standards and work with stakeholders to establish a threshold amount in connection with any restriction.

Existing consensus standards that measure and limit the use of ortho-phthalates are already in widespread use; these standards should inform any regulatory effort that Ecology undertakes. For example, RFCI's *Rigid Core Flooring Certification Standard*, SCS-0011 (May 1, 2020)<sup>21</sup> (known as "Assure Certified<sup>TM</sup>") requires that products be tested in accordance with CPSC-CH-C1001-09.4 or GB/T 22048-2015 and further requires that "[p]roducts cannot exceed 1,000 PPM for individual or total ortho-phthalates." Similarly, NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, incorporates the same content threshold of 1,000 PPM for ortho-phthalates.<sup>22</sup> ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, provides a standardized method for measuring ortho-phthalate concentrations in vinyl flooring products.

These consensus and industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, a standardized method for measuring ortho-phthalates). Ecology should utilize these existing standards to inform their decision-making as it relates to any potential restrictions imposed on vinyl flooring products under the Program.

#### Ecology Should Consider Indirect Environmental and Sustainability Impacts of Any Regulations.

As noted in Section III above, the inclusion of pre-consumer and post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products. RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. However, overly restrictive and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts.

RFCI and its members look forward to continuing work with Ecology to identify modifications to its regulatory efforts that may be appropriate in the context of resilient vinyl flooring that includes pre-consumer and post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material).

#### Ecology Should Allow a Reasonable Timeframe for Implementation of Compliance Programs.

The Act provides that a "rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority

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<sup>21</sup> Available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (note: updated revision slated for 2022 publication).

<sup>22</sup> Available online at [https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtime=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtime=20200716160801&focal=none).



consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). Ecology should utilize an extended timeline for compliance (*e.g.*, five years from promulgation of final regulations) to ensure that industry has an appropriate timeline to incorporate any necessary formulation modifications into the manufacturing process. Moreover, this will provide increased assurance that both pre-consumer and post-consumer content included in resilient vinyl flooring products would not include ortho-phthalates.

Ecology Should Grandfather Manufactured/In Production Products.

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>23</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. An exemption for already manufactured products as well as for products that are already in production (*i.e.*, at the time of promulgation of regulations) will remove significant cost and logistical challenges with no associated increase in risk, and is consistent with the Act’s directive.

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RFCI appreciates this opportunity to comment on Ecology’s Draft Determinations. We thank the Department for its continued engagement with RFCI, its members, and other stakeholders. We reiterate that, in light of the significant progress that has been made over the past decade in eliminating ortho-phthalates from the manufacture of new resilient vinyl flooring, no regulatory restrictions are necessary in the case of resilient vinyl flooring. Nonetheless, we look forward to continuing to work with the Department as it finalizes its regulatory determinations and begins crafting regulatory restrictions for resilient vinyl flooring, should any such regulations be deemed necessary.

Please contact RFCI counsel Allison D. Foley ([adfoley@venable.com](mailto:adfoley@venable.com); 202-344-4416) with questions regarding these comments.

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<sup>23</sup> RCW 70A.350.040(5).

# Resilient Flooring Covering Institute

Attached please find comments of the Resilient Floor Covering Institute on the Department of Ecology's proposed rule in connection with the Safer Products for Washington program. We also submitted these comments today through Ecology's online portal.

Please let us know if you have any questions.

Thank you



February 3, 2023

Submitted via e-mail to **SaferProductsWA@ecy.wa.gov**

Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Re: Comments of the Resilient Floor Covering Institute (“RFCI”) on the Safer Products for Washington Priority Consumer Products Proposed Rule

To whom it may concern:

The Resilient Floor Covering Institute (“RFCI”) submits these comments to the State of Washington Department of Ecology (“Ecology” or the “Department”) on Ecology’s proposal for a new chapter 173-337 of the Washington Administrative Code, to be titled “Safer Products Restrictions and Reporting” (the “Proposed Rule”) issued on December 7, 2022.<sup>1</sup> RFCI appreciates the opportunity to comment on the Proposed Rule and to continue its participation in the rulemaking process for the Safer Products for Washington (“SPW”) program.

RFCI represents the interests of the resilient floor covering industry. Virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. Resilient flooring is a top consumer choice for hard surface flooring, and in recent years the product category—in particular, luxury vinyl tile (“LVT”)—has seen tremendous growth<sup>2</sup> as consumers opt for the sustainability, durability, and aesthetics of this flooring option.

RFCI has long been an advocate of sustainable product selection and sustainable building practices based on life-cycle assessment, sound science, and risk assessments. RFCI and its

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<sup>1</sup> Available online at <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf> (current as of February 3, 2023).

<sup>2</sup> See, e.g., Verified Market Research, *Global Luxury Vinyl Tile-LVT Market Size By Type (Rigid, Flexible), By End-Use Sector (Residential, Non-Residential), By Geographic Scope and Forecast*, Report ID 25815 (Sep. 2022), available online at <https://www.verifiedmarketresearch.com/product/luxury-vinyl-tile-lvt-market/> (LVT market valued at \$16.11 billion in 2020, projected to reach \$37.92 billion by 2028) (current as of February 3, 2023); see also MarketsandMarkets Research, *Luxury Vinyl Tiles (LVT) Flooring Market by Type (Rigid, Flexible), End-Use Sector (Residential, Non-residential), and Region (North America, Asia Pacific, Europe, Middle East & Africa, and South America) – Global Forecast to 2024*, available online at <https://www.marketsandmarkets.com/Market-Reports/lvt-flooring-market-105150640.html> (current as of February 3, 2023).

members therefore appreciate Ecology's goals in developing and implementing the SPW program under the Pollution Prevention for Healthy People and Puget Sound Act of 2019 (the "Act").<sup>3</sup>

As it relates to the presence of ortho-phthalates in vinyl flooring, the Proposed Rule is substantively the same as the preliminary draft rule language Ecology released in August 2022. Accordingly, RFCI reiterates and incorporates by reference the comments submitted by RFCI to Ecology on August 31, 2022 in response to the preliminary draft rule language,<sup>4</sup> as well as the comments submitted by RFCI to Ecology on January 28, 2022 on the Department's Draft Regulatory Determinations Report to Legislature.<sup>5</sup> As noted in those prior comments, RFCI believes that the overwhelming shift away from the use of ortho-phthalates in new vinyl flooring products that has occurred over the past decade renders regulatory restrictions for this particular priority product unnecessary and a misdirected use of critical and limited agency resources. Industry's voluntary shift has removed any perceived risk associated with the presence of ortho-phthalates in vinyl flooring and has been acknowledged even by the consumer advocacy group that led the public outcry regarding perceived health risks of vinyl flooring manufactured with ortho-phthalates.<sup>6</sup> RFCI maintains that Ecology should focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment and that continue to be manufactured on a regular basis and broad scale.

RFCI further reiterates that any restrictions imposed on vinyl flooring—as with all restrictions adopted under this novel regulatory program—be based on sound science, practically achievable, and designed to position the Act and its implementing regulations as a meaningful and useful consumer benefit. Ecology should avoid adoption of any regulatory restrictions that are based on anecdotal, unsubstantiated, or discredited information, as this could lead to confusion in the marketplace while unduly burdening manufacturers and limiting consumer choice. Regulatory restrictions proposed under the Act for vinyl flooring must be narrowly tailored to address the risk the Department has identified in connection with exposure to ortho-phthalates, to the extent those chemicals may be present in vinyl flooring products today. In addition, RFCI urges Ecology to consider the impacts its proposed regulatory restrictions would have on the ability to incorporate recycled content into new vinyl flooring, as addressed in more detail below.

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<sup>3</sup> See RCW 70A.350 (2022).

<sup>4</sup> See **Exhibit A** attached hereto (main body of comments only; appendices not included herein).

<sup>5</sup> See **Exhibit B** attached hereto.

<sup>6</sup> See Toxic-Free Future, *Success!—Home improvement retailers follow through on commitments to remove phthalates from flooring* (June 27, 2019), available online at <https://saferchemicals.org/2019/06/27/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/> (discussing how top retailers of flooring have honored their commitments to eliminate ortho-phthalates from flooring, which has been further confirmed by testing) (current as of February 3, 2023).

Section I of these comments briefly summarizes information previously provided to Ecology regarding some of the benefits and positive attributes of vinyl flooring. Section II addresses the specific provisions of the Proposed Rule that are related to vinyl flooring.

**I. Vinyl Flooring Is a Safe, Sustainable Choice and Manufacturers Have Transitioned Away From the Use of Ortho-Phthalates in New Products**

RFCI's previous comments submitted to Ecology in connection with the SPW program have provided important information on the safety, sustainability, and performance benefits of vinyl flooring. As noted above, those comments are incorporated herein and RFCI directs the agency's attention to those previous submissions for a detailed explanation on these topics. In summary:

- Vinyl flooring provides substantial health, safety, and performance benefits over other flooring options because it is durable and easily cleaned, rendering the product ideal for use in a variety of settings including kitchens, school lunchrooms, and hospitals. In addition, vinyl flooring's durability—experience shows the products typically last for thirty to fifty years—cuts down on waste in landfills and leads to conservation of raw materials, making these products a sustainable choice.
- Multiple independent studies have demonstrated that exposure to ortho-phthalates in vinyl flooring and other similar products is *de minimis* if not non-existent.<sup>7</sup> Multiple studies have considered the inhalation, dermal contact, and ingestion pathways and have repeatedly found no unacceptable risk from the studied ortho-phthalates.<sup>8</sup> This includes a 2015 *Consumer Reports* study which considered high exposure scenarios (for example, a baby crawling on the vinyl flooring) and determined that ortho-phthalate exposure levels “were very low” and that even in instances where “there may be considerable amounts of [ortho-]phthalates in the composition of the [vinyl flooring] material itself, ... [the] tests show that very little came out in the air or on the wipes themselves.”<sup>9</sup>

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<sup>7</sup> See, e.g., United States Consumer Products Safety Commission, *Chronic Hazard Advisory Panel Report on DINP* (2001); see also National Industrial Chemicals Notification and Assessment Scheme (“NICNAS”) of the Australian Government Department of Health and Ageing, Existing Chemicals Information Sheet: *Diisononyl Phthalate (DINP) Factsheet* (2012); National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, *NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Di-isononyl Phthalate (DINP)* (2003); European Chemicals Bureau, *European Union Risk Assessment Report: DINP* (2003).

<sup>8</sup> See, e.g., European Commission (EC), *Phthalates entry 52 – Commission conclusions on the review clause and next steps* at 4 (Jan. 15, 2014); European Chemicals Agency (ECHA), *Evaluation of New Scientific Evidence Concerning DINP and DIDP* (Aug. 2013).

<sup>9</sup> Consumer Reports, *Vinyl Flooring Safety Questions Answered*, available online at <https://www.consumerreports.org/video/view/home-garden/news/4397736200001/vinyl-flooring-safety-questions-answered/> (current as of February 3, 2023).

- Taken as a whole, these studies make clear that ortho-phthalates, as used in vinyl flooring products (including in-place legacy products), do not concentrate in indoor air, cannot be readily absorbed by the skin, and do not present an ingestion risk from hand-to-mouth activity.
- While RFCI maintains that concerns regarding health risks associated with exposure to ortho-phthalate-containing vinyl flooring are misguided, the vinyl flooring manufacturing sector has swiftly and resoundingly responded to the public perception and market changes largely driven by advocacy groups over the past decade. As a result of the shift in market demand towards ortho-phthalate-free vinyl flooring, manufacturers of vinyl flooring moved away from the use of ortho-phthalates and towards alternatives including terephthalates.<sup>10</sup>
- California’s Department of Toxic Substances Control (“DTSC”)—an agency widely renowned for its aggressive approach to consumer product regulation—considered information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates and *removed* vinyl flooring from its 2018-2020 Priority Product Work Plan, pointing to “progress made by manufacturers” as a basis for revising its focus on particular categories of building products.<sup>11</sup> In fact, DTSC’s Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an “implementation success” of the Priority Products program.<sup>12</sup> More recently, the Green Chemistry and Commerce

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<sup>10</sup> Terephthalates, while similar in name to ortho-phthalates, are very different from a chemistry perspective. The term “phthalates” is generally understood to refer to what are in fact ortho-phthalates. Unlike ortho-phthalates, however, terephthalates are not derived from phthalic acid (and therefore do not fall within the Act’s definition of “phthalate” and/or “priority chemical”), and are structurally significantly different from ortho-phthalates, with a significantly different toxicological profile corresponding to a low hazard profile. See, e.g., W.D. Faber *et al.*, *Developmental toxicity and uterotrophic studies with di-2-ethylhexyl terephthalate*, Birth Defects Res. B. Dev. Reprod. Toxicol. (Oct. 2007); U.S. Consumer Product Safety Commission, Staff Statement on University of Cincinnati Report “Toxicity Review for Di-2-ethylhexyl Terephthalate (DEHT)” (Oct. 2018), available online at <https://www.cpsc.gov/s3fs-public/Toxicity%20Review%20of%20DEHT.pdf?FObpBBqgypVtw7gIEGMFXHN5H7vbeEz> (current as of February 3, 2023).

<sup>11</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing “vinyl flooring” as a priority product and noting on page 16: “Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment”), available online at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft_2018-2020_Priority_Product_Work_Plan.pdf); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018), available online at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final_2018-2020_Priority_Product_Work_Plan.pdf) (current as of February 3, 2023).

<sup>12</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.

Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that “[f]or the U.S. market, the switch ... is essentially complete.”<sup>13</sup>

## **II. RFCI Comments on Specific Substantive Aspects of the Proposed Rule**

RFCI provides the following comments on the portions of the Proposed Rule related to vinyl flooring:

### **RFCI Supports Ecology’s Clarification of the Definition of “Phthalates” Within This Regulatory Context**

RFCI agrees with Ecology’s clarification during the course of this regulatory process that the term “phthalate” in the Act applies only to ortho-phthalates and we appreciate Ecology’s use of the term “ortho-phthalate” throughout the Proposed Rule (as opposed to the generic term “phthalate”) as this helps to avoid unnecessary confusion and is consistent with the Act. We urge the Department to maintain this approach in the final rule.

### **RFCI Supports an Applicability Threshold of 1,000 ppm for Total Ortho-Phthalate Content for Newly Manufactured Vinyl Flooring Products**

In the Proposed Rule, Ecology establishes an applicability threshold of 1,000 ppm total ortho-phthalate content for vinyl flooring (meaning the contemplated regulatory restriction would apply only to vinyl flooring containing ortho-phthalates at or above this concentration).

RFCI maintains that the movement away from use of ortho-phthalates in the manufacture of new vinyl flooring products renders any regulatory restriction under the Act unnecessary. However, should Ecology proceed to promulgate regulatory restrictions on the sale of ortho-phthalate-containing vinyl flooring in the state of Washington, RFCI supports this 1,000 ppm applicability threshold (with the caveats noted in connection with recycled content in the next subsection of these comments). As explained by Ecology in various public meetings and outreach documents issued in connection with the SPW program, this 1,000 ppm level is consistent with standards for total ortho-phthalate content established in consensus-based, voluntary industry certification programs such as ASSURE CERTIFIED<sup>TM</sup> and NSF/ANSI 332.<sup>14</sup> These consensus-

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<sup>13</sup> Green Chemistry and Commerce Council, “Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution” (Dec. 2021), available online at <https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf> (current as of February 3, 2023).

<sup>14</sup> See SCS-0011, *Rigid Core Flooring Certification Standard* (May 1, 2020), available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (current as of February 3, 2023); and NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, available online at



based industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, a standardized method for measuring ortho-phthalates). RFCI appreciates Ecology considering these existing standards to inform the Proposed Rule.

RFCI notes, however, that these are *voluntary* industry standards. While a product that has been certified to meet either of these standards would not be subject to the regulatory restrictions for vinyl flooring (since such certification confirms the product falls below the threshold of 1,000 ppm for total ortho-phthalate content), a product would not *have* to certify to either standard for the restriction not to apply provided the product's total ortho-phthalate content was below 1,000 ppm. RFCI believes this to be clear in the text of the Proposed Rule but to avoid any confusion RFCI urges the Department to make this clear when discussing the connection between the proposed applicability threshold and the industry standard levels for ortho-phthalates in the context of public webinars or any similar guidance or outreach materials.

*RFCI Urges Ecology to Allow for Flexibility in Addressing Applicability to Vinyl Flooring Made with Recycled Vinyl Content*

While as a general matter, RFCI supports the 1,000 ppm applicability threshold as it applies to newly manufactured vinyl flooring products manufactured without recycled content, RFCI urges Ecology to consider the net benefits of allowing a higher applicability threshold for products manufactured with recycled content. The inclusion of pre-consumer and post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products and to further other Department priorities (including promoting sustainability, reducing the use of virgin resin, and reducing the amount of discarded product sent to landfills). However, recycled post-consumer vinyl flooring may contain legacy chemicals, including ortho-phthalates. As RFCI has explained to representatives of Ecology,<sup>15</sup> RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. But overly restrictive and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts. Specifically, the 1,000 ppm threshold will likely prove impractical when considered in the context of vinyl flooring made with ortho-phthalate-containing legacy product.<sup>16</sup>

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[https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtime=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtime=20200716160801&focal=none). (current as of February 3, 2023).

<sup>15</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022).

<sup>16</sup> The Department's Preliminary Regulatory Analyses accompanying the Proposed Rule notes that the SPW program considered and rejected a ban on the use of recycled material that contain restricted chemicals because such a ban could result in manufacturers "avoiding the use of recycled content altogether" which "could have unintended consequences on waste reduction efforts." Ecology, Preliminary Regulatory Analyses (Pub. 22-04-042) at p. 68, available online at <https://apps.ecology.wa.gov/publications/documents/2204042.pdf> (current as of February 3,



At a minimum, if the Department does not proceed with establishing a higher applicability threshold for vinyl flooring made with (perhaps some threshold amount of) recycled content, we urge the Department to build flexibility into the regulations that will allow the Department to modify the restriction's applicability to recycled content, or to make more tailored exceptions or approvals, that may be appropriate in the context of vinyl flooring made with pre-consumer and post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material). This would avoid the unintended and unfortunate effect that the general 1,000 ppm applicability level could have of discouraging recycling initiatives and would allow the Department to adapt the regulatory restriction as appropriate, based on available information as recycling experience and knowledge continues to grow.

*To the Extent Ecology Promulgates Restrictions, RFCI Supports an Effective Date of January 1, 2025 for Vinyl Flooring Products*

The Act provides that a “rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). The Proposed Rule includes an effective date of January 1, 2025 for restrictions on vinyl flooring products. *See* Proposed WAC 173-337-111(2)(b). If and to the extent the Department proceeds with promulgating regulatory restrictions for vinyl flooring, RFCI supports this effective date and is hopeful that it will allow the industry an appropriate timeframe to incorporate any necessary formulation modifications and quality control measures into the manufacturing process.

*RFCI Supports the Proposed Exemption for Existing Stock of Vinyl Flooring Products*

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>17</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. Nevertheless, an exemption for products manufactured as of the effective date will remove significant cost and

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2023). But, as currently proposed—with no exception for or accommodation of flooring made with recycled content—the Proposed Rule will likely have the very chilling effect on recycling initiatives that Ecology seeks to avoid. Specifically, the difficulty of ensuring that new products manufactured with recycled content are consistently below the 1,000 ppm total ortho-phthalate content level will discourage and actively disincentivize manufacturers' recycling efforts. This reality for products sold in Washington state will create significant obstacles to recycling efforts for products sold nationwide, stifling or even precluding what would be safe, beneficial, and sustainable reuse while diverting more usable material to landfills.

<sup>17</sup> RCW 70A.350.040(5).

logistical challenges—with no associated increase in risk. This is consistent with the Act’s directive. RFCI therefore supports the exemptions in the Proposed Rule for vinyl flooring manufactured before January 1, 2025, as well as the exemptions for repair/replacement parts and product that is refurbished with repair or replacement parts manufactured before January 1, 2025.<sup>18</sup>

### **III. Conclusion**

Thank you for the opportunity to provide these comments in connection with the SPW program. RFCI appreciates Ecology’s goals in developing and implementing this program and its members share the Department’s goals of protecting human health and the environment. We look forward to addressing any questions you might have regarding these comments and are happy to provide additional information that may be useful to Ecology in moving towards issuance of a final rule. If you have any questions regarding these comments, please contact Bill Blackstock, RFCI President and CEO ([Bill.Blackstock@RFCI.com](mailto:Bill.Blackstock@RFCI.com)) or RFCI counsel Allison Foley, Venable LLP ([ADFoley@Venable.com](mailto:ADFoley@Venable.com)).

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<sup>18</sup> In the event Ecology finalizes an effective date earlier than January 1, 2025 (which RFCI would not support), RFCI urges the Department to nonetheless extend the exemption to products manufactured before January 1, 2025 in order to allow a reasonable compliance timeframe.

# **Exhibit A**



August 31, 2022

Submitted via e-mail to **SaferProductsWA@ecy.wa.gov**

Hazardous Waste and Toxics Reduction Program  
Washington State Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7696

Re: Comments of the Resilient Floor Covering Institute (“RFCI”) on the Safer Products for Washington Priority Consumer Products Preliminary Draft Rule Language

To whom it may concern:

The Resilient Floor Covering Institute (“RFCI”) submits these comments to the State of Washington Department of Ecology (“Ecology” or the “Department”) on Ecology’s Preliminary Draft Rule Language for a potential new chapter 17-337 of the Washington Administrative Code, to be titled “Safer Products Restrictions and Reporting” (the “Preliminary Draft”).<sup>1</sup> RFCI appreciates the opportunity to comment on this important interim step as the Department prepares its draft regulatory text for the forthcoming formal notice and comment period anticipated at the end of this year. RFCI further appreciates that Ecology extended the deadline for comment on the Preliminary Draft from August 24, 2022 to August 31, 2022<sup>2</sup> given the very short window allowed for public review and input during this interim step in the statutorily driven rulemaking process.<sup>3</sup>

RFCI represents the interests of the resilient floor covering industry. Virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. RFCI has long been an advocate of sustainable product selection and sustainable building practices based on life-cycle assessment, sound science, and risk assessments. RFCI and its members therefore appreciate Ecology’s goals in developing and implementing the Safer Products for Washington (“SPW”) program under the 2019 Safer Products for Washington Act (the “Act”).<sup>4</sup>

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<sup>1</sup> Available online at [https://www.ezview.wa.gov/Portals/\\_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage\\_Cycle1\\_August2022.pdf](https://www.ezview.wa.gov/Portals/_1962/Documents/saferproducts/PreliminaryDraftRuleLanguage_Cycle1_August2022.pdf) (current as of August 31, 2022).

<sup>2</sup> Ecology formally announced the extension of this comment window during its August 16, 2022 webinar on the Preliminary Draft; prior to that webinar, on an August 15, 2022 telephone call, Ms. Lauren Tamboer of the Department of Ecology communicated to RFCI counsel Allison Foley that Ecology would accept comments through the end of the month.

<sup>3</sup> The Preliminary Draft Rule Language was posted to the Department of Ecology website on August 9, 2022 with an email alerting interested parties to availability of the text sent on the evening of August 9, 2022.

<sup>4</sup> See 70.365.010 RCW *et seq.* (2019).

As a threshold matter, RFCI reiterates and incorporates by reference the comments submitted by RFCI to Ecology on January 28, 2022 on the Department's Draft Regulatory Determinations Report to Legislature ("Draft Determinations"). Specifically, RFCI believes that the overwhelming shift away from the use of ortho-phthalates in new vinyl flooring products that has occurred over the past decade renders regulatory restrictions for this priority product unnecessary and a misdirected use of critical and limited agency resources. Ecology has made clear that it wishes to implement the SPW program and craft any regulations thereunder in a manner that will provide meaningful benefit to the health and safety of Washington consumers and to the environment. One of the goals of the SPW program is the shift towards alternatives deemed safer than the priority chemicals identified in the Act and/or by Ecology; in the case of vinyl flooring manufactured with ortho-phthalates, the data are clear that the presence of ortho-phthalates does not pose a health or safety risk to consumers. Moreover, the reality is that manufacturers have nonetheless already shifted en masse to an alternative product (*i.e.*, vinyl flooring manufactured with alternatives to ortho-phthalates, including terephthalates) without the need for regulatory intervention. This development has been acknowledged even by the consumer advocacy group that led the public outcry regarding perceived health risks of vinyl flooring manufactured with ortho-phthalates.<sup>5</sup> Ecology should therefore focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment—that is, priority products that continue to be manufactured with priority chemicals on a regular basis and broad scale.

These comments are based on the understanding that the Department has finalized its recommendations to the legislature to promulgate regulatory restrictions applicable to the vinyl flooring category. If Ecology moves forward with crafting regulatory restrictions for vinyl flooring, it is critical that any such restrictions—as with all restrictions adopted under this novel regulatory program—be based on sound science, practically achievable, and designed to position the Act and its implementing regulations as a meaningful and useful consumer benefit. Ecology should avoid adoption of any regulatory restrictions that are based on anecdotal, unsubstantiated, or discredited information, as this could lead to confusion in the marketplace while unduly burdening manufacturers and limiting consumer choice. Regulatory restrictions proposed under the Act for vinyl flooring, if any, must be narrowly tailored to address the risk the Department has identified in connection with exposure to ortho-phthalates to the extent those chemicals may be present in vinyl flooring products today. In addition, RFCI urges Ecology to consider the limiting effect its proposed regulatory restrictions would have on the ability to incorporate recycled content into new vinyl flooring, as addressed in more detail below.

Section I of these comments addresses the significant benefits of vinyl flooring as a consumer product option and discusses the shift away from the use of ortho-phthalates that has already occurred in the vinyl flooring manufacturing industry. Section II of these comments

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<sup>5</sup> See *e.g.*, Toxic-Free Future, *Success!—Home improvement retailers follow through on commitments to remove phthalates from flooring* (June 27, 2019), available online at <https://toxicfreefuture.org/blog/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/> (discussing how top retailers of flooring have honored their commitments to eliminate ortho-phthalates from flooring, which has been further confirmed by testing) (current as of August 31, 2022).

addresses an important terminology distinction regarding the use of the term “phthalates” in the Preliminary Draft and related Ecology guidance and outreach materials. Section III of these comments addresses specific substantive aspects of the Preliminary Draft.

**I. Vinyl Flooring Is a Safe, Sustainable Choice, and Manufacturers Have Transitioned Away from the Use of Ortho-Phthalates in New Products**

*Vinyl Flooring Has Long Been a Sustainable Choice for Consumers*

Vinyl flooring, with multiple product categories to address different design objectives and consumer priorities, is the number one choice for hard surface flooring in the United States.<sup>6</sup> Vinyl flooring provides substantial health, safety, and performance benefits over other flooring options because it is durable and easily cleaned, rendering the product ideal for use in a variety of settings including kitchens, school lunchrooms, and hospitals. In addition, vinyl flooring’s durability—experience shows the products typically last for thirty to fifty years—cuts down on waste in landfills and leads to conservation of raw materials, making these products a sustainable choice.

As RFCI explained in comments submitted to Ecology on March 1, 2020, and in earlier comments submitted to California’s Department of Toxic Substances Control (“DTSC”) in response to DTSC’s initial listing of vinyl flooring-phthalates as a priority product-chemical combination under California’s Safer Consumer Products program, multiple independent studies have demonstrated that exposure to ortho-phthalates in vinyl flooring and other similar products is *de minimis* if not non-existent.<sup>7</sup> (Notably, California *removed* this product-chemical combination from the 2018-2020 Priority Products Work Plan (“PPWP”) in response to information provided by the flooring industry.<sup>8</sup>) Multiple studies have considered the inhalation, dermal contact, and ingestion pathways and have repeatedly found no unacceptable risk from the studied ortho-phthalates.<sup>9</sup> Taken as a whole, these studies make clear that ortho-phthalates, as

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<sup>6</sup> See, e.g., *The ReCo Market Intelligence Report*, FLOOR COVERING WEEKLY, June 28, 2021, at 10, available online at <https://bt.e-ditionsbyfry.com/publication/?m=26543&i=712790&p=10&ver=html5> (current as of August 31, 2022).

<sup>7</sup> See, e.g., United States Consumer Products Safety Commission, *Chronic Hazard Advisory Panel Report on DINP* (July 2014); see also National Industrial Chemicals Notification and Assessment Scheme (“NICNAS”) of the Australian Government Department of Health and Ageing, *Diisononyl Phthalate (DINP) Factsheet* (2012); National Toxicology Program Center for the Evaluation of Risks to Human Reproduction, *NTP-CERHR Monograph on the Potential Human Reproductive and Developmental Effects of Di-isononyl Phthalate (DINP)* (2003); European Chemicals Bureau, *European Union Risk Assessment Report DINP* (2003).

<sup>8</sup> DTSC’s decision to remove the vinyl flooring-phthalates product-chemical combination from the 2018-2020 PPWP was consistent with the 2016 decision of its sister agency, the California Office of Environmental Health Hazard Assessment (“OEHHA”), to issue Safe Use Determinations under California’s Proposition 65 for exposure to diisononyl phthalate (“DINP”) in vinyl flooring products (see OEHHA, Safe Use Determination Letter: Issuance of a SUD for exposure to diisononyl phthalate in vinyl flooring products, issued to Resilient Floor Covering Institute (June 24, 2016), available online at <https://oehha.ca.gov/proposition-65/crn/issuance-safe-use-determination-exposure-residents-diisononyl-phthalate-vinyl> (current as of August 31, 2022)).

<sup>9</sup> See, e.g., European Commission (EC), *Phthalates entry 52 – Commission conclusions on the review clause and next steps* at 4 (Jan. 15, 2014); European Chemicals Agency (ECHA), *Evaluation of New Scientific Evidence Concerning DINP and DIDP* (Aug. 2013).

used in vinyl flooring products (including in-place legacy products), do not concentrate in indoor air, cannot be readily absorbed by the skin, and do not present an ingestion risk from hand-to-mouth activity.

More recent studies have continued to demonstrate the low risk profile of ortho-phthalates as used in vinyl flooring, even as public perception shifted to align with purported risks of these products. For example, in 2015, *Consumer Reports* published a study focused on potential exposure to ortho-phthalates in seventeen vinyl flooring products and considered inhalation exposure and direct dermal contact (for example, a baby crawling on the vinyl floor).<sup>10</sup> The study concludes that “[ortho-]phthalate levels were very low,”<sup>11</sup> explaining that, even in instances where “there may be considerable amounts of [ortho-]phthalates in the composition of the [vinyl flooring] material itself, ... our tests show that very little came out in the air or on the wipes themselves.”<sup>12</sup> As discussed below, the resilient flooring market has shifted away from the use of ortho-phthalates towards alternatives; however, the findings of this study underscore that, even to the limited extent that ortho-phthalates may still be found in vinyl flooring offered for sale (potentially including vinyl flooring containing recycled vinyl content, addressed in more detail in Section III below), these products result in little to no exposure to ortho-phthalates. (Additional information regarding these studies finding that ortho-phthalates as used in vinyl flooring present no significant risk to human health is set forth in Attachment A to these comments.)

*The Vinyl Flooring Industry Has Shifted Away from the Use of Ortho-Phthalates In the Manufacture of New Vinyl Flooring Products.*

Developments in the flooring market over the past several years render the discussion of risks from ortho-phthalates in vinyl flooring moot, particularly in the context of a program like Washington’s, which is intended to focus administrative resources on consumer products posing the greatest risk to human health and the environment and to promote the use of alternatives to those products. Since the Department first began public outreach regarding its implementation of the Act’s requirements, Ecology representatives have consistently made clear that the Department is not considering any hazard or risk information related to the products it is considering for designation as priority products. However, as a practical matter—regardless of whether ortho-phthalate-containing vinyl flooring poses any significant risk—flooring manufacturers have already shifted to the use of alternatives including terephthalates (which are structurally very different from the ortho-phthalates upon which the listing of “phthalates” as a priority chemical class under the SPW program is based<sup>13</sup>).

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<sup>10</sup> Consumer Reports, *Vinyl Flooring Safety Questions Answered* (Aug. 6, 2015), available online at <https://www.consumerreports.org/video/view/home-garden/news/4397736200001/vinyl-flooring-safety-questions-answered/> (current as of August 31, 2022).

<sup>11</sup> *Id.* at 0:52.

<sup>12</sup> *Id.* at 0:43.

<sup>13</sup> Terephthalates, while similar in name to ortho-phthalates, are very different from a chemistry perspective. The term “phthalates” is generally understood to refer to what are in fact ortho-phthalates. Unlike ortho-phthalates, however, terephthalates are not derived from phthalic acid (and therefore do not fall within the Act’s definition of “phthalate” and/or “priority chemical”), and are structurally significantly different from ortho-phthalates, with a significantly



While RFCI maintains that concerns regarding health risks associated with exposure to ortho-phthalate-containing vinyl flooring are misguided, the vinyl flooring manufacturing sector has swiftly and resoundingly responded to the public perception and market changes largely driven by advocacy groups over the past decade. As a result of the shift in market demand towards ortho-phthalate-free vinyl flooring, manufacturers of vinyl flooring moved away from the use of ortho-phthalates and towards alternatives including terephthalates.

As noted above in these comments, California's DTSC—an agency widely renowned for its aggressive approach to consumer product regulation—considered information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates and *removed* vinyl flooring from its 2018-2020 PPWP, pointing to “progress made by manufacturers” as a basis for revising its focus on particular categories of building products.<sup>14</sup> In fact, DTSC's Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an “implementation success” of the Safer Consumer Product program.<sup>15</sup> More recently, the Green Chemistry and Commerce Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that “[f]or the U.S. market, the switch is > 95% and essentially complete.”<sup>16</sup>

RFCI encourages Ecology to take a similar approach as DTSC, which has focused its limited agency resources on those product-chemical combinations that continue to be manufactured and are proven to present a risk to consumers. Any restrictions Ecology moves forward with proposing should be narrowly tailored to actual exposure.

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different toxicological profile corresponding to a low hazard profile. *See, e.g.,* W.D. Faber *et al.*, *Developmental toxicity and uterotrophic studies with di-2-ethylhexyl terephthalate*, Birth Defects Res. B. Dev. Reprod. Toxicol. (Oct. 2007); U.S. Consumer Product Safety Commission, Staff Statement on University of Cincinnati Report “Toxicity Review for Di-2-ethylhexyl Terephthalate (DEHT)” (Oct. 2018), available online at <https://www.cpsc.gov/s3fs-public/Toxicity%20Review%20of%20DEHT.pdf?FObpuBBqgypVtw7gIEGMFXHN5H7vbeEz> (current as of August 31, 2022).

<sup>14</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing “vinyl flooring” as a priority product; noting on page 16: “Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment”), available at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Draft_2018-2020_Priority_Product_Work_Plan.pdf) (current as of August 31, 2022); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018), available at [https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final\\_2018-2020\\_Priority\\_Product\\_Work\\_Plan.pdf](https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/10/Final_2018-2020_Priority_Product_Work_Plan.pdf) (current as of August 31, 2022).

<sup>15</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.

<sup>16</sup> Green Chemistry and Commerce Council, “Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution” (Dec. 2021), available online at <https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf> (current as of August 31, 2022).



## **II. Ecology Has Appropriately Provided Clarity Regarding Its Use of the Term “Phthalates” as Defined By the Act.**

The Act directs Ecology to consider six specific classes of “priority chemicals” (in addition to other chemicals the Department may identify as priority chemicals), including “phthalates.”<sup>17</sup> The Act defines “phthalates” as “synthetic chemical esters of phthalic acid.”<sup>18</sup> As Ecology explained in its Draft Determinations earlier this year:

RCW 70A.350.010 defines phthalates as a class as “synthetic esters of phthalic acid” based on their chemical structure. The National Library of Medicine (NLM) defines the term phthalic acid as a “benzenedicarboxylic acid consisting of two carboxy groups at ortho positions.” This definition does not include benzenedicarboxylic acid with two carboxy groups in either the meta or para configurations (e.g., isophthalic acid or terephthalic acid).

Thus, the definition of this priority chemical class can be clarified to include only ortho-phthalates. Subsequent references to “phthalates” in this chapter refer specifically to ortho-phthalates.<sup>19</sup>

RFCI agrees with Ecology that the definition of “phthalates” under the Act and in related scientific literature limits the scope of this defined term to ortho-phthalates. RFCI appreciates that Ecology refers consistently to “ortho-phthalates” in the Preliminary Draft and urges Ecology to maintain this approach in the regulatory text and related guidance and outreach materials as the Department refines and moves towards formal proposal of these regulations.

## **III. RFCI Comments on Specific Substantive Aspects of the Preliminary Draft**

### ***RFCI Supports an Applicability Threshold of 1,000 ppm for Total Ortho-Phthalate Content for Newly Manufactured Vinyl Flooring Products***

In the Preliminary Draft, Ecology establishes an applicability threshold of 1,000 ppm total ortho-phthalate content for vinyl flooring (meaning the contemplated regulatory restriction would apply only to vinyl flooring containing ortho-phthalates at or above this concentration).

RFCI maintains that the movement away from use of ortho-phthalates in the manufacture of new vinyl flooring products renders any regulatory restriction under the Act unnecessary. However, should Ecology proceed to propose and ultimately promulgate regulatory restrictions on the sale of ortho-phthalate-containing vinyl flooring in the state of Washington, RFCI supports

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<sup>17</sup> RCW 70A.350.010(12).

<sup>18</sup> *Id.* at 70A.350.010(10).

<sup>19</sup> Draft Determinations at 140 (internal citations omitted).

this 1,000 ppm applicability threshold (with the caveats noted in connection with recycled content in the next sub-section of these comments). As explained by Ecology in various public meetings and outreach documents issued in connection with the SPW program, this 1,000 ppm level is consistent with standards for total ortho-phthalate content established in consensus-based, voluntary industry certification programs such as ASSURE CERTIFIED™ and NSF/ANSI 332.<sup>20</sup> These consensus-based industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, a standardized method for measuring ortho-phthalates). RFCI appreciates Ecology considering these existing standards to inform their decision-making as the Department crafts any potential restrictions imposed on vinyl flooring products under the Act.

RFCI notes, however, that these are *voluntary* industry standards. While a product that has been certified to meet either of these standards would not be subject to the regulatory restrictions for vinyl, a product would not *have* to certify to either standard for the restriction not to apply provided the product's total ortho-phthalate content was below 1,000 ppm. RFCI believes this to be clear in the text of the Preliminary Draft but to avoid any confusion RFCI urges the Department to make this clear in the context of public webinars or any similar guidance or outreach materials when discussing the connection between the proposed applicability threshold and the industry standard levels for ortho-phthalates.

*RFCI Urges Ecology to Allow for Flexibility in Addressing Applicability to Vinyl Flooring Made with Recycled Vinyl Content*

While as a general matter, RFCI supports the 1,000 ppm applicability threshold as it applies to newly manufactured vinyl flooring products manufactured without recycled content, RFCI urges Ecology to consider the net benefits of allowing a higher applicability threshold for products manufactured with recycled content. As discussed in RFCI's March 2022 comments on the Preliminary Determinations, the inclusion of post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products and to further other Department priorities (including promoting sustainability, reducing the use of virgin resin, and reducing the amount of discarded product sent to landfill). However, recycled post-consumer vinyl flooring may contain legacy chemicals, including ortho-phthalates. As RFCI has explained to representatives of Ecology,<sup>21</sup> RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. But overly restrictive

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<sup>20</sup> See *Rigid Core Flooring Certification Standard*, SCS-0011 (May 1, 2020), available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (current as of August 31, 2022) (note: updated revision slated for 2022 publication); NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, available online at [https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtm\\_e=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtm_e=20200716160801&focal=none). (current as of August 31, 2022).

<sup>21</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022).

and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts. Specifically, the 1,000 ppm threshold will likely prove impractical when considered in the context of vinyl flooring made with ortho-phthalate-containing legacy product.

At a minimum, if the Department does not proceed with proposing a higher applicability threshold for vinyl flooring made with (perhaps some threshold amount of) recycled content, we urge the Department to build flexibility into the regulations that will allow the Department to modify the restriction's applicability to recycled content, or to make more tailored exceptions or approvals, that may be appropriate in the context of vinyl flooring made with post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material). This would avoid the unintended and unfortunate effect that the general 1,000 ppm applicability level could have of discouraging recycling initiatives and would allow the Department to adapt the regulatory restriction as appropriate, based on available information as recycling experience and knowledge continues to grow.

*To the Extent Ecology Promulgates Restrictions Along the Lines of Those Described in the Preliminary Draft, RFCI Supports an Effective Date of January 1, 2025 for Vinyl Flooring Products*

The Act provides that a “rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). In the Preliminary Draft, Ecology has suggested an effective date of January 1, 2025 for restrictions on vinyl flooring products. If and to the extent the Department proceeds with proposing and promulgating regulatory restrictions for vinyl flooring, RFCI supports this effective date and is hopeful that it will allow the industry an appropriate timeframe to incorporate any necessary formulation modifications and quality control measures into the manufacturing process.

*RFCI Supports an Exemption for Existing Stock of Vinyl Flooring Products*

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>22</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. An exemption for products manufactured as of the effective date will remove significant cost and logistical challenges with no associated increase in risk, and is consistent with the Act's directive. RFCI

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<sup>22</sup> RCW 70A.350.040(5).

therefore supports an exemption from any regulatory restrictions for vinyl flooring manufactured prior to January 1, 2025 (or such later effective date as Ecology may ultimately establish).<sup>23</sup>

#### **IV. Conclusion**

RFCI appreciates Ecology's goals in developing and implementing the SPW program. RFCI and its members share many of the objectives that are at the heart of this regulatory initiative and the underlying Act, and the actions of RFCI members—including the voluntary, proactive shift towards the use of alternatives to ortho-phthalates—demonstrates a continued commitment to the production of safe, sustainable products. Moreover, RFCI members share the goal of improving transparency regarding product composition, safety, and sustainability. However, it remains critical that any regulatory restrictions imposed on priority products under the Act address actual exposure risk and do not discourage environmentally beneficial recycling efforts.

Thank you for the opportunity to provide these comments in connection with this important regulatory initiative. We look forward to addressing any questions you might have regarding these comments, and we are happy to provide additional information that may be useful to Ecology in reviewing and revising its Preliminary Draft and moving towards issuance of a formal proposal. If you have any questions regarding these comments, please contact Bill Blackstock, RFCI President and CEO (Bill.Blackstock@RFCI.com) or RFCI counsel Allison Foley, Venable LLP (ADFoley@Venable.com).

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<sup>23</sup> In the event Ecology proposes an effective date earlier than January 1, 2025, RFCI urges the Department to nonetheless extend the exemption to products manufactured before January 1, 2025 in order to allow a reasonable compliance timeframe.

# **Exhibit B**



**COMMENTS OF THE RESILIENT FLOOR COVERING INSTITUTE  
ON THE WASHINGTON DEPARTMENT OF ECOLOGY'S  
DRAFT REGULATORY DETERMINATIONS – REPORT TO LEGISLATURE  
SAFER PRODUCTS FOR WASHINGTON PROGRAM**

**SUBMITTED TO THE  
WASHINGTON DEPARTMENT OF ECOLOGY**

**January 28, 2022**

**RESILIENT FLOOR COVERING INSTITUTE:**

Bill Blackstock, President and CEO  
Dean Thompson, President Emeritus  
115 Broad Street  
Suite 201  
LaGrange, GA 30240  
[Bill.Blackstock@RFCI.com](mailto:Bill.Blackstock@RFCI.com)

**OF COUNSEL:**

Allison D. Foley  
John B. Mavretich  
Venable LLP  
600 Massachusetts Avenue, N.W.  
Washington, DC 20001  
[ADFoley@Venable.com](mailto:ADFoley@Venable.com)  
[JBMavretich@Venable.com](mailto:JBMavretich@Venable.com)

The Resilient Floor Covering Institute (“RFCI”) appreciates the opportunity to comment on the Washington Department of Ecology’s (“Ecology” or the “Department”) Draft Regulatory Determinations Report to the Legislature (“Draft Determinations”)<sup>1</sup> issued in connection with Implementation Phase 3 of Ecology’s Safer Products for Washington Program (the “Program”), as authorized by the Pollution Prevention for Healthy People and Puget Sound Act of 2019 (the “Act”).<sup>2</sup> RFCI supports Ecology’s efforts to reduce the use of toxic chemicals in household products through implementation of the Program; as described in greater detail below, RFCI member companies have long sought to assess and improve their products, including by proactively shifting away from ortho-phthalates in the manufacture of vinyl flooring products. RFCI applauds Ecology’s efforts in implementing the Program, in particular the Department’s commitment to meaningful dialogue with public interest groups, the manufacturer community, and other interested stakeholders as Ecology evaluates priority products and considers appropriate regulatory responses consistent with the Act’s mandate.

RFCI represents the interests of the resilient floor covering industry; virtually all RFCI flooring manufacturing members produce vinyl flooring, and RFCI associate members provide raw materials and sundry products for the manufacture and use of vinyl flooring. Resilient flooring is currently the number one consumer choice for hard surface flooring, and in recent years the product category—in particular, luxury vinyl tile (“LVT”)—has seen tremendous growth<sup>3</sup> as consumers opt for the sustainability, durability, and aesthetics of this flooring option. Given the popularity of resilient flooring and the many benefits it offers to the consumer, it is important that this product category remain an available and affordable option in the Washington market.

RFCI has long been an advocate of sustainable product selection and building practices based on life-cycle assessment, sound science, and risk assessments. Ecology has made clear that it wishes to implement the Program and craft any regulations thereunder in a manner that will provide meaningful benefit to the health and safety of Washington consumers and to the environment. Ecology should therefore focus any regulatory requirements on priority products that present an ongoing risk to consumers or the environment—that is, priority products that continue to be manufactured on a regular basis and broad scale with priority chemicals. Similarly, Ecology should avoid any regulatory requirements that are overly broad or based on an over-

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<sup>1</sup> Washington Department of Ecology (“Ecology”), Draft Regulatory Determinations Report to the Legislature, Safer Products for Washington, Implementation Phase 3, Publication 21-04-047 (Nov. 2021) (“Draft Determinations”).

<sup>2</sup> S.S.B. 5135 (2019); RCW 70A.350.010 *et seq.* (2020) (formerly RCW 70.365.010 *et seq.* (2019)).

<sup>3</sup> See, e.g., Verified Market Research, *Global Luxury Vinyl Tile-LVT Market Size By Type, By End-Use Sector, By Geographic Scope and Forecast*, Report ID 25815 (July 2021), available online at <https://www.verifiedmarketresearch.com/product/luxury-vinyl-tile-lvt-market/> (LVT market valued at \$16.11 billion in 2020, projected to reach \$37.92 billion by 2028); see also “Luxury Vinyl Tiles (LVT) Flooring Market by Type (Rigid, Flexible), End-Use Sector (Residential, Non-residential), and Region (North America, Asia Pacific, Europe, Middle East & Africa, and South America) – Global Forecast to 2024,” available online at <https://www.marketsandmarkets.com/Market-Reports/lvt-flooring-market-105150640.html>.

inclusive approach which—even if well-intentioned—would lead to consumer confusion, frustrating the goals of the Act.

As Ecology considers public input on the Draft Determinations and begins to develop more concrete regulatory requirements, RFCI urges the Department to ensure that any regulatory action ultimately taken under the Program is based on the best available scientific information and considers current market conditions. To achieve these goals and to promote clarity in the final recommendations, and to ensure that any forthcoming regulatory requirements represent an efficient use of administrative resources that will provide a meaningful health or environmental benefit, RFCI urges Ecology to consider the following:

- To avoid confusion among consumers and other members of the public, and to promote clarity regarding risk findings and regulatory requirements, Ecology should provide greater clarity regarding the meaning of “phthalates” under the Program. While the term “phthalates” is clearly defined under the statute and used by Ecology to mean ortho-phthalates—a category of chemicals with a distinct chemical structure and chemical characteristics—this term is sometimes, due to the similar nomenclature, misunderstood by the general public to include terephthalates. As discussed in greater detail below, Ecology should make clearer at the outset of its Regulatory Determinations and related reports to the legislature and/or the public that “phthalates” (*i.e.*, ortho-phthalates) are distinct from, behave differently from, and do not include terephthalates.
- Given the widespread and well-documented shift away from the use of ortho-phthalates in the manufacture of new vinyl flooring products that has already occurred, regulatory restrictions under the Program are not warranted for vinyl flooring products; Ecology’s finite resources would provide more meaningful public benefit, consistent with the legislative objectives of the Act, if focused on priority products that continue to be manufactured with priority chemicals.
- Regulatory restrictions proposed under the Act for resilient vinyl flooring, if any, must be narrowly tailored to address the risk identified in connection with exposure to ortho-phthalates as those chemicals may be present in vinyl flooring products; any such regulatory restrictions must be based on sound science and further must be practically achievable.
- The significant environmental and sustainability benefits associated with the responsible recycling of vinyl flooring products far outweigh any potential, and likely *de minimis*, risk associated with low levels of unintentionally added ortho-phthalates that may be present in some recycled vinyl flooring products; Ecology should consider the benefits of vinyl flooring recycling—which are consistent with and further Ecology goals under other programs—in developing any regulatory restrictions under the Act.

Each of these comments is discussed in greater detail below.



**I. DTSC Should Provide Greater Clarity Regarding Its Use of the Term “Phthalates.”**

The Act directs Ecology to consider six specific classes of “priority chemicals” (in addition to other chemicals the Department may identify as priority chemicals), including “phthalates.”<sup>4</sup> The Act defines “phthalates” as “synthetic chemical esters of phthalic acid.”<sup>5</sup> As Ecology explains in the Draft Determinations:

RCW 70A.350.010 defines phthalates as a class as “synthetic esters of phthalic acid” based on their chemical structure. The National Library of Medicine (NLM) defines the term phthalic acid as a “benzenedicarboxylic acid consisting of two carboxy groups at ortho positions.” This definition does not include benzenedicarboxylic acid with two carboxy groups in either the meta or para configurations (e.g., isophthalic acid or terephthalic acid).

Thus, the definition of this priority chemical class can be clarified to include only ortho-phthalates. Subsequent references to “phthalates” in this chapter refer specifically to ortho-phthalates.<sup>6</sup>

RFCI agrees with Ecology that the definition of “phthalates” under the Act and in related scientific literature limits the scope of this defined term to ortho-phthalates. RFCI appreciates the clarification offered by the above-quoted text; however, as this explanation is provided at about the halfway point of the over three-hundred-page report, readers of the report may miss this point. RFCI encourages Ecology to update the discussion of the term “phthalates” found on page 28 of the report to include the same explanation (including, specifically, the clarification that the term—as used in the Act, in the Draft Determinations, or otherwise—does *not* include terephthalates. This portion of the report may be further strengthened by an acknowledgment that terephthalates, while similar in name to ortho-phthalates, have a different chemical structure and toxicological profile from ortho-phthalates.<sup>7</sup>

For the sake of clarity, RFCI uses the term “ortho-phthalates” throughout these comments. This term is intended to be synonymous with the term “phthalates” as used by Ecology in the Draft Determinations.

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<sup>4</sup> RCW 70A.350.010(12).

<sup>5</sup> *Id.* at 70A.350.010(10).

<sup>6</sup> Draft Determinations at 140 (internal citations omitted).

<sup>7</sup> Consumer advocacy groups including the Healthy Building Network have acknowledged, in the context of bis(2-ethylhexyl) terephthalate (commonly abbreviated as DEHT or DOTP), that “no reproductive or developmental toxicity or endocrine disrupting effects have been observed in studies on DEHT.” Sarah Lott, Healthy Building Network, “Phthalate-free Plasticizers in PVC”, v2 (Sept. 2014), available online at <https://fdocuments.in/document/phthalate-free-plasticizers-in-pvc-s3-phthalate-free-plasticizers-in-pvc.html>.

## **II. Manufacturers Have Already Ceased Using Ortho-Phthalates in the Manufacture of New Resilient vinyl flooring Products; No Regulatory Intervention is Warranted.**

Ecology states in the Draft Determinations that “the use of phthalates in vinyl flooring is significant and vinyl flooring represents a significant source of phthalates,” concluding that “restricting the use of phthalates in vinyl flooring will reduce a significant source of phthalate exposure to people and the environment.”<sup>8</sup> RFCI disagrees with this conclusion, as the underlying assumption—that “the use of ortho-phthalates in vinyl flooring is significant”—is faulty. Specifically, RFCI believes that existing data clearly demonstrate that actions *already taken* by resilient vinyl flooring manufacturers have already successfully reduced human and environmental exposure to ortho-phthalates from resilient vinyl flooring. Moreover, all available information indicates that this trend will only continue, with the already significantly reduced amounts of ortho-phthalates in resilient vinyl flooring continuing to steadily decrease over time. There is therefore no basis for any regulatory intervention; regulations are not necessary to prompt a development that is already, as a result of actions taken by manufacturers over the past several years, in motion. Below we provide more detail regarding the industry shift away from the use of ortho-phthalates.

Over the past decade, state regulatory agencies and consumer advocacy groups have focused on purported health risks associated with ortho-phthalates. As a result of the corresponding shift in market demand towards vinyl flooring that is free of ortho-phthalates, manufacturers of vinyl flooring have moved away from the use of ortho-phthalates and towards alternatives including terephthalates and bio-based plasticizers. These developments predate Ecology’s implementation of the Program, and even enactment of the Act itself. Specifically, by 2015, the three largest home improvement chains in the United States (Home Depot, Lowes, and Menards), as well as Lumber Liquidators, had all adopted policies to phase out ortho-phthalate-containing PVC flooring (not including vinyl flooring composed of recycled PVC content, which account for only a very small fraction of domestic vinyl flooring sales; however, Lumber Liquidators ceased sale of all vinyl flooring containing reprocessed plastics, including recycled vinyl flooring, by the end of 2015<sup>9</sup>). Ecology acknowledges these developments in the Draft Determinations.<sup>10</sup> The success of these corporate policies is underscored by a 2019 study performed by a collection of environmental advocacy groups: the study sampled twenty-five vinyl

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<sup>8</sup> Draft Determinations at 151.

<sup>9</sup> Safer Chemicals Healthy Families, “Lumber Liquidators commits to selling vinyl flooring made without reprocessed plastic” (Nov. 17, 2015), available online at <https://saferchemicals.org/2015/11/17/lumber-liquidators-commits-to-selling-vinyl-flooring-made-without-reprocessed-plastic/>.

<sup>10</sup> Draft Determinations at Table 91.

flooring products collected from Home Depot, Lowes, and Lumber Liquidators and found that none of the samples contained any ortho-phthalates above laboratory detection limits.<sup>11</sup>

Because of these ortho-phthalate bans by major domestic retailers and in response to evolving public concerns, the vinyl flooring industry moved away from ortho-phthalate plasticizers and towards alternatives including terephthalate plasticizers years ago. By early 2018, California's Department of Toxic Substances Control ("DTSC") had taken note of this shift in the context of its Safer Consumer Products ("SCP") program, analogous to the Washington Program. In its initial development of a Priority Product Work Plan under the SCP, DTSC included the "vinyl flooring"- "phthalate" product-chemical combination in its Priority Product Work Plan for 2015-2017.<sup>12</sup> However, upon considering information regarding the flooring market shift to use of terephthalates rather than ortho-phthalates, DTSC *removed* vinyl flooring from its 2018-2020 Priority Product Work Plan, pointing to "progress made by manufacturers" as a basis for revising its focus on particular categories of building products.<sup>13</sup>

DTSC—an agency widely renowned for its aggressive approach to consumer product risk—appears to agree that this consumer product does not warrant regulatory attention under a program intended to address meaningful consumer product risk. In fact, DTSC's Green Ribbon Science Panel has cited this shift away from ortho-phthalates as an "implementation success" of the Safer Consumer Product program.<sup>14</sup> More recently, the Green Chemistry and Commerce Council, a multi-stakeholder collaborative driving commercial adoption of green chemistry, identified luxury vinyl tile as a case study for successful transition from ortho-phthalates to alternatives, noting that "[f]or the U.S. market, the switch to alternatives is essentially complete."<sup>15</sup>

This trend away from ortho-phthalates and towards alternative materials, including terephthalates, was further documented in the survey data provided by RFCI members to Ecology in connection with the Department's evaluation of vinyl flooring. As Ecology acknowledges in

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<sup>11</sup> Safer Chemicals Healthy Families, "Success! – Home improvement retailers follow through on commitments to remove phthalates from flooring" (June 27, 2019), available online at <https://saferchemicals.org/2019/06/27/success-home-improvement-retailers-follow-through-on-commitments-to-remove-phthalates-from-flooring/>.

<sup>12</sup> California Department of Toxic Substances ("DTSC"), 2015-2017 Priority Product Work Plan Sections 4.2.1, 4.7, and Table 8 (identifying "vinyl flooring" and "phthalates" as a priority product-chemical combination).

<sup>13</sup> DTSC, *Draft Three Year Priority Product Work Plan (2018-2020)* (February 2018) (removing "vinyl flooring" as a priority product; noting on page 16: "Note that the Building Products category in the 2015-2017 Work Plan ... focused on painting products, adhesives, sealants, and flooring. ... Although this category has been broadened from the prior Work Plan, we believe there is ample opportunity to streamline decision-making by leveraging progress made by manufacturers, retailers, large institutional buyers ..., and non-governmental agency efforts in reducing harmful chemical content in the built environment"); DTSC, *Three Year Priority Product Work Plan (2018-2020)* (May 1, 2018).

<sup>14</sup> DTSC Green Ribbon Science Panel, Background Document for Feb. 12-13, 2018 Meeting.

<sup>15</sup> Green Chemistry and Commerce Council, "Landscape Analysis of Drivers, Enablers, and Barriers to Plasticizer Substitution" (Dec. 2021), available online at (<https://greenchemistryandcommerce.org/documents/GC3-Plasticizer-Report-Case-Studies-Dec-2021.pdf>).

the Draft Determinations: “In data we received from manufacturers to date, the majority reported using alternative plasticizers and were no longer using phthalates.”<sup>16</sup> While Ecology states that survey data provided by vinyl flooring manufacturers showed “that both DEHP and DINP are still used in a subset of products,” RFCI expects, based on member experience and input, that this diminishing subset of products represents only a small portion of the vinyl flooring industry. Moreover, we further expect that the level of ortho-phthalates in this subset of product is far below Ecology’s estimate of 9-32% by weight. This percentage range appears to be based on studies largely conducted prior to 2015—that is, prior to the developments that prompted the large-scale shift away from use of ortho-phthalates in vinyl flooring products.<sup>17</sup> As explained above and as documented in the data submitted by RFCI members to Ecology, vinyl flooring products being sold today have shifted away from the use of ortho-phthalates; the range cited by Ecology no longer represents an accurate assessment of the formulations used in today’s marketplace.

For these reasons, Ecology should determine that no regulatory restrictions are necessary to address ortho-phthalates in vinyl flooring. This is within the Department’s discretion in implementing the Act’s mandate. Specifically, the Act provides Ecology with discretion to select the appropriate regulatory action with regard to priority chemicals in priority consumer products from the following options: (1) take no regulatory action, (2) require notice, or (3) implement a restriction or prohibition of a priority chemical in a consumer product.<sup>18</sup> Because vinyl flooring products are now being manufactured without ortho-phthalates, the appropriate agency action would be a determination that no regulatory action is warranted as it relates to ortho-phthalates in vinyl flooring. This outcome would be sound from a risk-based perspective since manufacturers of vinyl flooring have already—in the absence of any legally enforceable mandate—proactively moved away from the use of ortho-phthalates in vinyl flooring products. Ecology’s finite resources would be put to better use, and yield more meaningful protection for both public health and the environment, if focused on priority products that result in more significant exposure to health/the environment—including those priority products for which manufacture continues to rely on the use of priority chemicals.

A determination that no regulatory action is required is appropriate not only from a common sense perspective but also from a statutory perspective. The Act requires that any restrictions or prohibitions imposed on a priority chemical in a priority consumer product must be based on a determination by Ecology that safer and feasible alternatives are available and that (1) the restriction will reduce a significant source of or use of a priority chemical or (2) the restriction is necessary to protect the health of sensitive populations or sensitive species. A restriction of ortho-phthalates in vinyl flooring satisfies neither (1) or (2). First, as discussed throughout these

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<sup>16</sup> Draft Determinations at 152.

<sup>17</sup> Ecology, Priority Consumer Products Report to the Legislature, Safer Products for Washington Implementation Phase 2 (July 2020, Publication 20-04-019), Table 15 (cataloguing studies (one from 2004, four from 2014, and two from 2016) related to phthalate concentrations in vinyl flooring).

<sup>18</sup> RCW 70A.350.040(1).

comments and RFCI's previous submissions, vinyl flooring is not a significant source of ortho-phthalates as such chemicals are no longer utilized in the manufacturing process. Second, a restriction or prohibition is not necessary to protect exposure of sensitive populations or sensitive species to ortho-phthalate-containing vinyl flooring, since manufacturers have already moved away from the use of ortho-phthalates.

### **III. Ecology Should Balance Any Potential Exposure to Low Levels of Ortho-Phthalates in Recycled Vinyl Flooring Content Against the Significant Environmental and Sustainability Benefits of Recycled Products.**

As a result of the formulation changes noted above for vinyl flooring products, as a general matter, ortho-phthalates are no longer added to new vinyl flooring products. However, as Ecology notes in the Draft Determinations, ortho-phthalates may unintentionally be introduced into new vinyl flooring products through the utilization of recycled materials.<sup>19</sup> However, recent survey data from RFCI members indicate that the likelihood of this potential outcome is low. As shown in the survey data recently submitted to the Department (the "RFCI Survey"),<sup>20</sup> only one RFCI flooring manufacturer survey respondent utilizes post-consumer product as recycled content in new flooring, and, based on follow-up discussions with RFCI members, that post-consumer content is most likely filler (*e.g.*, gypsum board) and *not* vinyl with plasticizer content. As demonstrated by the survey results, the only product type including post-consumer product content was vinyl composition tile ("VCT"), which uses a higher percentage of filler, and a lower percentage of vinyl resin and plasticizer, than other types of vinyl flooring products. Therefore, the post-consumer content would not include vinyl resin or ortho-phthalate plasticizer.

Seven out of fifteen of the flooring manufacturer respondents indicated that they utilize pre-consumer content. Typically, where manufacturers use regrind from another production line and/or plant location in another product type, the regrind would be considered pre-consumer content. Discussions with RFCI members in the wake of the RFCI Survey revealed that recycled content containing ortho-phthalates would typically not be used in new resilient flooring product formulations.

As time goes on, it will become increasingly likely that pre-consumer content would have been manufactured after the point at which manufacturers began phasing out ortho-phthalates. As development of various recycling means and methods of post-consumer—including methodologies to screen for and remove chemicals of concern in accordance with performance-based standard requirements—continues, this will give rise to additional opportunities for the uptake and use of post-consumer content. This in turn will expand the universe of available

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<sup>19</sup> Draft Determinations at 309.

<sup>20</sup> See email from Jane Rohde, RFCI Technical Consultant, to Lauren Tamboer, State of Washington Department of Ecology, re: "RFCI Survey Letter and Survey Results" (Jan. 27, 2022), and attachment thereto (the "RFCI Survey").

opportunities for post-consumer recycling of resilient flooring product, furthering both Ecology's and the resilient flooring industry's objectives.

Even where small amounts of ortho-phthalates may unintentionally be added to resilient vinyl flooring that includes recycled content, it is critical that Ecology weigh any related consumer health or safety risk associated with such recycled content against the significant environmental and sustainability benefits associated with utilizing recycled content for beneficial use—including reductions in the rate of landfilling of these materials. If Ecology imposes overly burdensome restrictions on vinyl flooring products, the result could be a decrease in the beneficial reuse of recycled vinyl product and an increase in landfilling of such product, which is in direct opposition to the goals of the Program.

The utilization of pre-consumer and post-consumer recycled content in vinyl flooring products provides significant opportunity for continual improvement from a sustainability perspective. RFCI flooring manufacturer and supply chain members are investing substantial resources into research and development to determine how to improve the means and methods of recycling processes that chemically remove ortho-phthalates and heavy metals from recycled content—predominantly post-consumer recycled content—through performance-based standard testing. In order to ensure that regulatory burden does not become a roadblock to this innovation, Ecology should clarify that any restrictions imposed under the Program (such as limits on ortho-phthalate content for vinyl flooring products sold in Washington) relate only to *intentionally added* ortho-phthalates and are not applicable to any ortho-phthalates that are *unintentionally added* as a result of utilizing recycled content. Moreover, if Ecology does impose any such content limitations for intentionally added ortho-phthalates, the Department should evaluate whether a higher level is justified in the case of ortho-phthalate-containing recycled content, due to the various benefits of recycling and landfill avoidance.

#### **IV. Regulatory Restrictions on Vinyl Flooring, If Any, Must Be Narrowly Tailored and Implementable.**

If Ecology does move forward with a regulatory restriction related to ortho-phthalates, any such restrictions should be narrowly tailored to focus on actual risk. In addition, in crafting any such regulations, Ecology should consider the operational and logistical challenges manufacturers will face in ensuring that their products are compliant with the Program's requirements.

#### **Regulatory Restrictions Should Be Tailored to Address High-Exposure Scenarios.**

As noted throughout these comments and documented by the data submitted by RFCI members to Ecology, vinyl flooring generally no longer utilizes ortho-phthalates in the manufacturing process. And it is a poor use of Ecology's resources to expend effort related to regulating those vinyl flooring products that do contain low levels of unintentionally added ortho-phthalates. Instead, Ecology should utilize existing standards and work with stakeholders to establish a threshold amount in connection with any restriction.

Existing consensus standards that measure and limit the use of ortho-phthalates are already in widespread use; these standards should inform any regulatory effort that Ecology undertakes. For example, RFCI's *Rigid Core Flooring Certification Standard*, SCS-0011 (May 1, 2020)<sup>21</sup> (known as "Assure Certified™") requires that products be tested in accordance with CPSC-CH-C1001-09.4 or GB/T 22048-2015 and further requires that "[p]roducts cannot exceed 1,000 PPM for individual or total ortho-phthalates." Similarly, NSF/ANSI 332, *Sustainability Assessment for Resilient Floor Coverings*, incorporates the same content threshold of 1,000 PPM for ortho-phthalates.<sup>22</sup> ASTM F3414-20, *Standard Test Method for Determining Ortho-phthalate Concentration in Flooring Containing Polyvinyl Chloride*, provides a standardized method for measuring ortho-phthalate concentrations in vinyl flooring products.

These consensus and industry standards have already established thresholds for the use of ortho-phthalates in vinyl flooring products (and, in ASTM F3414-20, a standardized method for measuring ortho-phthalates). Ecology should utilize these existing standards to inform their decision-making as it relates to any potential restrictions imposed on vinyl flooring products under the Program.

#### Ecology Should Consider Indirect Environmental and Sustainability Impacts of Any Regulations.

As noted in Section III above, the inclusion of pre-consumer and post-consumer recycled content into new vinyl flooring represents a significant opportunity to enhance the environmental and sustainability benefits of vinyl flooring products. RFCI members continue to invest substantial resources into new technology to determine how to encourage widespread use of recycled product in a safe and efficient manner. However, overly restrictive and unduly burdensome regulations could have a chilling effect, causing manufacturers to shy away from these efforts.

RFCI and its members look forward to continuing work with Ecology to identify modifications to its regulatory efforts that may be appropriate in the context of resilient vinyl flooring that includes pre-consumer and post-consumer recycled content (including, but not limited to, substituting a reporting requirement for such products in place of a restriction that might apply to products composed only of virgin material).

#### Ecology Should Allow a Reasonable Timeframe for Implementation of Compliance Programs.

The Act provides that a "rule adopted to implement a regulatory determination involving a restriction on the manufacture, wholesale, distribution, sale, retail sale, or use of a priority

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<sup>21</sup> Available online at [https://cdn.scsglobalservices.com/files/program\\_documents/SCS\\_STD\\_RigidCoreFlooring\\_V1-0\\_050620\\_0.pdf](https://cdn.scsglobalservices.com/files/program_documents/SCS_STD_RigidCoreFlooring_V1-0_050620_0.pdf) (note: updated revision slated for 2022 publication).

<sup>22</sup> Available online at [https://d2evkimvhatqav.cloudfront.net/documents/SU\\_NSF\\_332\\_Flooring\\_Insert\\_LT\\_EN\\_LSU27100812.pdf?mtime=20200716160801&focal=none](https://d2evkimvhatqav.cloudfront.net/documents/SU_NSF_332_Flooring_Insert_LT_EN_LSU27100812.pdf?mtime=20200716160801&focal=none).

consumer product containing a priority chemical may take effect no sooner than three hundred sixty-five days after the adoption of the rule.” RCW 70A.350.080(2)(b). Ecology should utilize an extended timeline for compliance (*e.g.*, five years from promulgation of final regulations) to ensure that industry has an appropriate timeline to incorporate any necessary formulation modifications into the manufacturing process. Moreover, this will provide increased assurance that both pre-consumer and post-consumer content included in resilient vinyl flooring products would not include ortho-phthalates.

Ecology Should Grandfather Manufactured/In Production Products.

The Act provides that a “restriction or prohibition on a priority chemical in a consumer product may include exemptions or exceptions, including exemptions to address existing stock of a product in commerce at the time that a restriction takes effect.”<sup>23</sup> As noted throughout these comments, vinyl flooring products presently in the market are not a significant source of ortho-phthalates and do not pose a health or safety risk to consumers or the environment. An exemption for already manufactured products as well as for products that are already in production (*i.e.*, at the time of promulgation of regulations) will remove significant cost and logistical challenges with no associated increase in risk, and is consistent with the Act’s directive.

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RFCI appreciates this opportunity to comment on Ecology’s Draft Determinations. We thank the Department for its continued engagement with RFCI, its members, and other stakeholders. We reiterate that, in light of the significant progress that has been made over the past decade in eliminating ortho-phthalates from the manufacture of new resilient vinyl flooring, no regulatory restrictions are necessary in the case of resilient vinyl flooring. Nonetheless, we look forward to continuing to work with the Department as it finalizes its regulatory determinations and begins crafting regulatory restrictions for resilient vinyl flooring, should any such regulations be deemed necessary.

Please contact RFCI counsel Allison D. Foley ([adfoley@venable.com](mailto:adfoley@venable.com); 202-344-4416) with questions regarding these comments.

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<sup>23</sup> RCW 70A.350.040(5).



# Chemical Users Coalition

The Chemical Users Coalition appreciates the opportunity to provide our feedback on the Washington Department of Ecology's Proposed Rule - Chapter 173-337 WAC - Safer Products Restrictions and Reporting. Our comments are attached.

February 3, 2023

Washington Department of Ecology  
Hazardous Waste and Toxics Reduction  
Program  
Safer Products for WA  
PO BOX 47600  
Olympia, WA 98504-7600

Re: Proposed Rule - Chapter 173-337 WAC - Safer Products Restrictions and  
Reporting

To Whom It May Concern:

The Chemical Users Coalition<sup>1</sup> (“CUC”) appreciates the opportunity to provide our feedback on the Washington Department of Ecology (“Department”)’s Proposed Rule implementing part of the Safer Products for Washington legislation. CUC is an association of companies from diverse industries that are interested in chemical management policy from the perspective of those who use, rather than manufacture, chemical substances. CUC encourages the development of chemical regulatory policies that protect human health and the environment while simultaneously fostering the pursuit of technological innovation. Aligning these goals is particularly important in the context of chemical management policy in a global economy.

CUC Members have been actively engaged on the Safer Products for Washington Program, including our comments submitted in response to prior actions taken by the Department in the development of the Proposed Rule, which we reiterate and incorporate by reference here.

CUC acknowledges the efforts of the Department to address comments that CUC previously submitted (enclosed), as well as those of many other stakeholders. CUC would

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<sup>1</sup> The members of CUC are Airbus S.A.S., The Boeing Company, Carrier Corporation, HP Incorporated, IBM Company, Intel Corporation, Lockheed Martin Corporation, National Electrical Manufacturers Association, Raytheon Technologies Corporation, Sony Electronics Inc., and TDK U.S.A. Corporation.

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like to note that we recognize that the definition of consumer products under RCW 70A.350.010 includes products sold for commercial use. The Proposed Rule imposes sweeping new restrictions of many products. Accordingly, CUC believes the Department should first focus regulatory efforts on personal, family, and household use products. Once those measures are in force, the Department can then determine if regulation of business uses is warranted.

In addition to this general comment, the CUC believes that there are still a number of areas that the Department should address to ensure that the regulation is clear and easily understood and will not unduly burden the regulated community. Our comments on specific provisions in the Proposed Rule follow.

## **WAC 173-337-015 Applicability**

CUC believes that the Department should exclude manufacturers of products solely for research and development purposes; doing so could contribute to the further development of science and technology and enable research during the development of suitable substitutes for products that are subject to restrictions. Accordingly, the Department should include a provision that states that the chapter does not apply to priority consumer products that contain a priority chemical that is manufactured, sold, or distributed solely for research and development purposes.

Furthermore, CUC believes that it would be helpful if the regulations clarify that the statutory exemption for “finished products certified or regulated by the FAA or DOD ... including parts, materials and processes” applies to the parts of such products even prior to the completion of the manufacture of the finished product. In the case of complex aerospace and defense equipment, manufacturing may take months to produce a “finished” product. Therefore, CUC suggests that the proposed regulations make clear that the exemption covers “products that, when finished, are subject to certification or regulation by the Federal Aviation Administration or the Department of Defense, or both.” In addition, we suggest that the regulations clarify that when the statute says the exemption applies to parts, materials, and processes when used to manufacture or maintain “any regulated or certified products,” it includes parts and materials used to repair such products as well.

CUC believes that the Department should exempt products or replacement parts manufactured from recycled materials which may contain priority chemicals but to which no new priority chemicals were added during the product or replacement part manufacture. Prohibiting products made from recycled materials could result in very high costs associated with testing and compliance assurance and would discourage recycling.

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## WAC 173-337-020 Requesting an Exemption

The Proposed Rule states that a person who submits a request for an exemption must comply with the requirements under the rule until the exemption is approved. The Proposed Rule does not provide for any timetable or deadlines by which the Department must act on a request for an exemption. Under the provision as proposed, the company requesting an exemption, as well as all downstream entities distributing that company's products, must temporarily stop all distribution until the exemption is approved, even if any delay in acting on an exemption request is due to the Department. To prevent such a significant supply chain disruption, CUC recommends that this provision be changed to allow for the continued sale of the product until the Department makes a final decision regarding the request for exemption. If the Department denies the exemption request, the Department will need to provide for adequate time for the manufacturer and downstream users to adjust for the restriction.

## WAC 173-337-025 Definitions

- **Consumer Products:** The proposed definition for "Consumer Products" includes the packaging of the product. CUC believes that packaging should be excluded from the definition. The manufacturer of an item will be responsible for the compliance of the product with the regulations. The manufacturer of the packaging should be a separate responsible entity, and packaging should be regulated separately.
- **Electronic Display:** CUC believes that the Department should align the definition of "electronic display" with that of similar laws, such as the EU's Ecodesign Directive (2009/125/EC) and New York's law regulating organohalogen flame retardants in electric enclosures (NY ECL 37-1001). The definition used in those contexts is "*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. Electronic display shall 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.*" The use of one consistent definition will make compliance simpler for industry and reduce potential confusion.

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- **External Enclosures:** CUC believes the proposed definition unintentionally includes components that should be excluded, such as external cables and cords. The definition in the preliminary draft indicated that cables and cords were not included within the definition. However, the current definition, by referring to a “plastic external part,” could include components such as cables and cords. CUC believes that the following language conveys the Department’s true intent for this term: “External enclosures means the plastic enclosure and stands of electronic displays.”
- **Inaccessible Electronic Component:** CUC believes that this definition should be modified to address reasonably foreseeable access to parts in a repair or commercial setting. Accordingly, CUC proposes that definition read “not capable of being removed from the product or being accessed during any reasonably foreseeable **consumer** use or abuse of the product.”
- **Intended for Indoor/Outdoor Use:** Based on how the definitions are currently drafted, electronics products likely fall into both categories. Being that WAC 173-337-112(2)(a)(ii)(A) indicates that the provision for electronic products intended for outdoor use does not apply to products intended for indoor use, CUC believes that further clarification is needed to distinguish true outdoor use products. CUC suggests the following definition: “Intended for Outdoor Use” means a product designed to maintain functionality when used after outdoor exposure to ultraviolet (UV) light, water, or immersion when used outdoors for an extended time due to its primary use in the outdoors.
- **Intentionally Added Chemical:** CUC believes that substances used in manufacturing a product but not part of the product itself not be included within the scope of the law or regulations. Accordingly, CUC suggests that the definition be changed to “a chemical that serves an intended function in the final product or part of the product.”
- **Organohalogen:** The definition is broad and unspecific, which may lead to compliance challenges. CUC believes that the Department should provide the CASRNs for the substances the Department intends to include.
- **PFAS:** The definition is broad and unspecific, which may lead to compliance challenges. CUC believes that the Department should provide the CASRNs for the substances the Department intends to include.

## WAC 173-337-055 Previously Owned Priority Consumer Products

CUC appreciates the Department’s proposal to exempt products manufactured before the start of restrictions. To implement such a requirement, the Department should consider adding a definition of “manufacture” to make clear when a product is considered to have been “manufactured” for purposes of qualifying for the exemption. For complex

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equipment, such as aerospace and defense systems, there may be a long period between the onset of the manufacturing process and the completed product. Accordingly, CUC believes that any product or equipment for which the manufacturing process has begun as of the effective date of the regulations should be exempt. The CUC also recommends that the Department should establish that there will be no time limitations or similar restrictions placed on the continued “sell through” of any regulated product that was manufactured before a specified date.

Furthermore, CUC believes that the exemption of replacement parts for consumer products should apply regardless of the date of the replacement part’s manufacture. This would allow for the continued service and repair of the finished goods, without having to unnecessarily dispose of regulated products before the end of their useful lives.

## **WAC 173-337-110 PFAS**

CUC believes that the Department should allow for refurbishments of products manufactured before the effective date regardless of whether the repair/replacement parts themselves are manufactured before or after the effective date.

CUC believes that presumption of PFAS content based on the detection of total fluorine should be removed. To date, there are few standardized and verified tests that can be used in all matrices to accurately detect PFAS. Furthermore, there aren’t any standardized test methods for PFAS that can be used for complex articles. Should the Department proceed with testing for total fluorine, the likelihood is that such testing will generate false positives. This would cause a waste of resources for both the state and the regulated community.

## **WAC 173-337-112 Flame Retardants**

As mentioned before, the scope of the Proposed Rule differs from New York’s and the EU’s restrictions on flame retardants in electronics casing. CUC asks that the Department harmonize the scope of the restriction with that of the existing regulatory structures to ease compliance and reduce confusion.

CUC believes that the Department should allow for refurbishment of products manufactured before the effective date regardless of whether the repair/replacement parts themselves are manufactured before or after the effective date.

CUC requests that the exemption list be expanded to include “sensors, dimmers and controllers” in the list of exempt parts, so that the complete list would read: “(E)

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Wires, cords, cables, switches, **sensors, dimmers, controllers**, light bulbs, and connectors.” There are battery-powered and plug-in devices that function in a similar critical nature as switches but provide other automatic functions required by the system, primarily in commercial buildings. These functions include dimming, occupancy sensing, daylight sensing, water presence sensing, and countless other performance-related characteristics to help with energy savings and occupant safety. In addition, systems often require special-purpose distributed controllers for proper functioning.

Networked control systems for building operation often require supporting devices that are battery powered or 120V plug-in due to practical concerns. The same devices would be exempted if they were hard-wired, but hard-wired devices may add cost to the product as well as cost and complexity related to the installation of additional electrical infrastructure. CUC therefore requests that the exemption relating to hard-wired products be changed to read as follows: “(B) Consumer products that receive power only when they are hard-wired into and permanently part of the fixed electrical wiring of a building, **or products that are not hard-wired but are necessary for the intended performance of the hard-wired products**. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment.”

Both REACH and ROHS 2 used a 48-month compliance timeframe. CUC requests that 48 months be the minimum compliance timeframe for electronics with plastic enclosures.

WAC 173-337-060(2)(a)(i) provides that reports must be submitted by January 31 of the year after the effective date of the reporting requirement. The reporting requirement for electronics for outdoor use is January 1, 2024. CUC requests clarification from the Department as to the initial reporting deadline: is the initial reporting deadline January 31, 2024, or January 31, 2025?

The Department should exclude plastic casings manufactured from recycled plastic which may contain organohalogen flame retardants but to which no new organohalogen flame retardant was added during the component [casing] manufacture. Prohibiting products with recycled plastic could result in very high costs associated with testing and compliance assurance and would discourage plastic recycling.

## **WAC 173-337-114 Bisphenols**

Bisphenols may be present as impurities in thermal films. Thermal films used in the medical industry are typically handled in files and in sleeves and should not be in frequent contact with people. Should medical application of thermal films be restricted

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due to bisphenol presence, it may take approximately five years to identify alternative materials to create new thermal films. This is because the material used is necessary in the gradation expression of the film.

To address these concerns, CUC believes that the 200-ppm limit be replaced with a prohibition on “intentionally added” bisphenols. Another alternative is that the Department can exempt such medical uses similar to the way Food and Drug Administration-regulated medical devices are exempt from the regulations for organohalogen flame retardants.

## **Conclusion**

CUC appreciates the Department’s consideration of these, as well as our previously submitted, comments. CUC looks forward to additional opportunities during the regulatory process to discuss the concerns mentioned both in this letter and in our prior submission. If you have questions or need clarification of any matter in either of CUC’s submissions, please feel free to contact me.

Sincerely,



Judah Prero



Enclosure

August 31, 2022

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

Re: Preliminary Draft Rule Language: Safer Products for Washington

To Whom It May Concern:

The Chemical Users Coalition (“CUC”) appreciates the opportunity to provide our feedback on the Washington Department of Ecology’s (“Department”) Preliminary Draft Rule implementing part of the Safer Products for Washington legislation. CUC is an association of companies from diverse industries that are interested in chemical management policy from the perspective of those who use, rather than manufacture, chemical substances. CUC encourages the development of chemical regulatory policies that protect human health and the environment while simultaneously fostering the pursuit of technological innovation. Aligning these goals is particularly important in the context of chemical management policy in a global economy.

CUC acknowledges the efforts of the Department to address comments that CUC previously submitted (enclosed), as well as those of many other stakeholders. We look forward to further interactions with the Department when the proposal is issued more formally later this year. In the meantime, CUC would like to note that there are still a number of areas that we believe the Department should address to ensure that the regulation, when proposed, is clear, easily understood, and will not unduly burden the regulated community.

- Although CUC recognizes that the definition of consumer products under RCW 70A.350.010 includes products sold for commercial use, CUC believes the Department should first focus regulatory efforts on personal, family, and household use products. Once those measures are in force, the Department can then determine if regulation of business uses is warranted.
- CUC appreciates the Department’s proposal to exempt products manufactured before the start of restrictions. To implement such a requirement, the Department should consider adding a definition of “manufacture” to make clear when a product is considered to have been “manufactured” for purposes of qualifying for the exemption. For complex equipment, such as aerospace and defense systems, there may be a long period between the onset of the

manufacturing process and the completed product. Accordingly, CUC believes that any product or equipment for which the manufacturing process has begun as of the effective date of the regulations should be exempt. The proposed rule should also establish that there will be no time limitations or similar restrictions placed on the continued “sell through” of any regulated product that was manufactured before a specified date. Furthermore, CUC believes that the exemption of replacement parts for consumer products should apply regardless of the date of the replacement part’s manufacture. This would allow for the continued service and repair of the finished goods, without having to unnecessarily dispose of regulated products before the end of their useful lives.

- CUC believes that the current definitions of “indoor” and “outdoor” use are not sufficiently specific, and most consumer electronics would fall under the category of “indoor use.” CUC suggests that the term “intended for indoor use,” be revised to “intended ONLY for indoor use.” The Department also should provide examples of products that are considered for “indoor” and “outdoor” use.
- CUC believes that refurbished and repaired products should be explicitly exempt from the restrictions. Furthermore, CUC believes that previously-owned products also should be exempt from the regulations, as has been provided in recently-issued federal regulations, 40 CFR 751.401(b)(1). Based on the current draft, it appears that previously-owned priority consumer products (that contain restricted priority chemicals) would be within the scope of the restrictions. However, such a restriction would prohibit restricted products that were previously owned from being sold by charitable institutions or at “yard sales.” Previously-owned products should be exempt as well as products that were manufactured prior to the restriction dates. Thus, CUC requests the Department clarify its intent with regard to previously-owned priority consumer products in the proposed rule.
- CUC believes that it would be helpful if the regulations clarify that the statutory exemption for “finished products certified or regulated by the FAA or DOD...including parts, materials and processes” applies to the parts of such products even prior to the completion of the manufacture of the finished product. In the case of complex aerospace and defense equipment, manufacturing may take months to produce a “finished” product. Therefore, CUC suggests that the proposed regulations make clear that the exemption covers “products that, when finished, are subject to certification or regulation by the Federal Aviation Administration or the Department of Defense, or

both...”. In addition, we suggest that the regulations clarify that when the statute says the exemption applies to parts, materials, and processes when used to manufacture or maintain “any regulated or certified products,” it includes parts and materials used to *repair* such products as well.

- CUC believes that the Department should provide manufacturers with an exemption for research and development purposes; doing so could contribute to the further development of science and technology and enable research during the development of suitable substitutes for products that are subject to restrictions.
- CUC recommends that the Department define “electronic displays” in a manner consistent with the European Union’s EcoDesign regulation<sup>1</sup> and New York’s OFR law<sup>2</sup> to promote harmonization and to avoid a patchwork of laws.
- CUC believes that the Department should differentiate between individual flame retardants by identifying the substances within scope using specific chemical names/CAS numbers, and gradually impose any needed restrictions on that basis, as opposed to regulating all OFRs simultaneously as an ill-defined category.
- Likewise, CUC believes that the Department should differentiate between individual PFAS by specifically identifying the substances within scope by their chemical names/CAS number, and gradually impose any needed restrictions as opposed to regulating all PFAS as a broad category simultaneously.
- CUC appreciates the Department incorporating provisions that allow manufacturers to request exemptions. However, further clarity will be needed to understand how the process would work. For example, once an exemption request has been submitted, can the manufacturer continue selling those products until the Department decides whether to grant/reject the exemption? When should manufacturers submit requests for exemptions?

CUC appreciates your consideration of these, as well as our previously submitted, comments. CUC looks forward to additional opportunities during the regulatory process to discuss the concerns mentioned both in this letter and those in our prior submission. If

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<sup>1</sup> COMMISSION REGULATION (EU) 2019/2021 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02019R2021-20210501>

<sup>2</sup> NY ECL 37-1001(4)

# Arnold & Porter

Washington Department of Ecology  
August 31, 2022  
Page 4

you have questions or need clarification on any matter in either of CUC's submissions,  
please feel free to contact me.

Sincerely,

  
Lawrence E. Culleen

Enclosure

**Before the Washington State Department of Ecology  
Safer Products for Washington  
Draft Report to the Legislature on Regulatory Determinations:  
Comments of the Chemical Users Coalition**

Chemical Users Coalition (“CUC”)<sup>1</sup> appreciates the opportunity to provide these comments regarding the Washington State Department of Ecology’s (“DOE”) recent report, which contained a variety of regulatory recommendations including to restrict the use of organohalogen flame retardants (“OFRs”) in plastic device casings for electronic and electrical equipment. CUC’s comments focus primarily on DOE’s proposed OFR restrictions.

CUC is an association of companies from diverse industries that typically acquire and use, rather than manufacture or import, chemical substances. Our members depend on the availability of certain existing substances for which there are not technically feasible substitutes, and our members depend on a reliable pipeline for innovative new chemistries to be able to thrive in a competitive, global economy. Thus, CUC supports measures that foster product safety and protect health and the environment in a manner that enables the regulated community to pursue technological innovation simultaneously with economic development in the United States. This is critical in the area of chemical regulatory policy, which necessarily addresses emerging information about health and environmental risk.

**Background**

The Washington Legislature enacted the Pollution Prevention for Healthy People and Puget Sound Act (Chapter 70A.350 RCW) in 2019. The Act directs DOE to implement a program to reduce priority chemicals in consumer products, including all OFRs and several other flame retardants, as classified in Washington’s Children’s Safe Products Act. DOE’s regulatory program to implement the 2019 law is called “Safer Products for Washington.” As part of this program, DOE is evaluating whether to restrict the use of OFRs in electronic and electrical equipment. In its report sent to the Legislature in July 2020, DOE identified the use of OFRs in “plastic device casings” for electronic and electrical equipment as one of 11 priority product categories.

The Department published its Draft Regulatory Determinations Report to the Legislature on November 17, 2021, and is accepting stakeholder comments until January 28, 2022. In this report, DOE is proposing restrictions on OFRs in device casings for electrical and electronic equipment. The proposed restrictions would apply to numerous consumer/professional electronic and household items, including but not limited to televisions, laptops, mobile phones, and various appliances.

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<sup>1</sup> CUC’s Members include Airbus S.A.S., The Boeing Company, Carrier Corporation, HP Incorporated, IBM Company, Intel Corporation, Lockheed Martin Corporation, Raytheon Technologies Corporation, Sony Electronics, Inc., and TDK U.S.A. Corporation.

CUC members assemble, manufacture, and distribute exceptionally complex products, including those used in a variety of essential sectors of the US economy, such as the aerospace and defense industries; medical, commercial, and industrial equipment; vehicles and other forms of transportation; consumer appliances; and electronics and their components. Electronic products (which can include critical components in items used in each of the previously-mentioned commercial sectors) are unique in many respects because they may have a potential ignition source that can be generated by the essential components of the product – circuit boards, transformers, batteries, connectors, and many other such parts. Consequently, the use of flame retardants in the manufacture of electronics is essential to society, as one of the most important benefits of flame retardants in product design is that they can stop small ignition incidents from becoming larger fire events. Because manufacturers, such as CUC members, serve the industrial, defense, aerospace, automotive, and consumer sectors, they must balance increased demand for smaller, lighter, and more powerful electronics, while still ensuring that those devices and their component parts meet safety and technical performance standards, which can range from military specifications to UL certification requirements such as achieving a V-0 rating under UL 94.<sup>2</sup> Such manufacturers use plastics in enclosures to help meet performance goals, including protection from fire and shock risk. If left untreated, most plastics can be flammable, so flame retardants can provide an important layer of fire safety.

Unfortunately, the approach to regulation adopted by DOE in its report raises many serious issues and will have a drastic effect on the ability of electronics manufacturers to continue developing and selling the consumer products that are vital to today's society. Furthermore, the methodology employed in the report runs counter to accepted science and uses a vastly oversimplified approach to evaluating feasibility and availability of alternatives. Accordingly, CUC must disagree with the conclusions and recommendations of the report and encourage DOE to rescind the current recommendations, pending further analysis and input from the regulated community. Should DOE decide to proceed with the current recommendations, CUC strongly encourages DOE to consider the exemptions and clarifications discussed later in these comments. We would welcome the opportunity to work through the issues with DOE so that a final proposal can meet the goals of the Safer Products program while still ensuring product availability, safety, and performance.

### **The single class approach is not supported by science and should not be utilized**

In the report, DOE states that it defines OFRs “as meeting both of the following criteria:

1. The chemical is used with the intended function of slowing ignition and progression of fires.
2. The chemical contains one or more halogen elements bonded to carbon.”

This simplistic definition fails to acknowledge differences between the numerous substances that fall within the description. In 2015, the U.S. Consumer Product Safety Commission (CPSC or Commission) received a request from a number of organizations to promulgate a rule

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<sup>2</sup> UL-94 is the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances. To attain the UL 94 V-0 standard, samples must have met the following criteria: Burning combustion is not sustained for more than 10 seconds after applying controlled flame.

under the Federal Hazardous Substances Act (FHSA) prohibiting children's products, upholstered furniture, mattresses/mattress pads, and casings surrounding electronics containing nonpolymeric, additive OFRs. CPSC staff, in recommending that the request be denied, [stated](#) that

OFRs ... represent a broad class of chemicals defined largely by their functional use and the presence of a halogen, such as a bromine or chlorine. The limited data on OFRs show varying toxicity and exposure potential among individual OFR compounds. These varying properties of individual OFR compounds indicate that OFRs, in fact, represent several subclasses of chemicals that should be examined separately. . . . Due to the varying toxicological properties... staff believes that insufficient data exist to assess OFRs as a class under the FHSA, and one cannot conclude that they all would be considered "hazardous substances."<sup>3</sup>

Despite this recommendation, the CPSC voted to grant the request. This action required the CPSC staff to proceed with the hazard assessment of the whole chemical class. Because of the inherent complexities of an assessment of this chemical class, CPSC asked the National Academies of Sciences, Engineering, and Medicine (NASEM) to develop a scoping plan to conduct the hazard assessment for OFRs as a chemical class. As a result of the request, NASEM convened the Committee to Develop a Scoping Plan to Assess the Hazards of Organohalogen Flame Retardants.

NASEM, in its 2019 [report](#),<sup>4</sup> concluded that the OFRs cannot be treated as a single class for the purposes of a CPSC hazard assessment. The report noted that OFRs can, however, be divided into subclasses based on chemical structure, physicochemical properties, and predicted biologic activity. The committee identified 14 subclasses that can be used to conduct a subclass-based hazard assessment. The CPSC is currently using this subclass approach for the ongoing hazard assessment.

DOE, however, has proposed to adopt the OFR definition that has been rejected by both CPSC staff and NASEM—an approach that focuses primarily on chemical function (suppressing combustion and increasing the probability of escape from fire)—rather than on any specific toxicity characteristic or chemical feature, other than presence of a halogen. As CPSC and NASEM found, it is not scientifically accurate or appropriate to treat all organohalogen flame retardants the same. DOE's approach is simply not founded on the best available science.

Furthermore, banning the use of all OFRs in the applications DOE proposes will have significant consequences for product availability. Manufacturers of the affected products will first need significant time to work with all the entities in the supply chain, which may include thousands of upstream entities, to ascertain if OFRs are used. Since many OFRs are not currently restricted or regulated for such a wide range of products, the task of determining which products are affected by a ban will be painstaking and substantial, requiring significant time and resources. Unless the scope of affected substances is limited or significant lead time is given prior to regulations taking affect, manufacturers will be compelled to simply not supply affected electronic products to the

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<sup>3</sup> United States Consumer Product Safety Commission, Staff Briefing Package in Response to Petition HP15-1, Requesting Rulemaking on Certain products Containing Organohalogen Flame Retardants, May 24, 2017

<sup>4</sup> The National Academies of Sciences, Engineering, and Medicine 2019. *A Class Approach to Hazard Assessment of Organohalogen Flame Retardants*.



State of Washington. Furthermore, downstream users of components containing OFRs, including the aerospace and defense industry, could see significant supply chain disruptions and other matters related to product obsolescence. This is, of course, not feasible given the nation-wide nature of retail distribution channels for commercial and consumer electronics.

As noted, many OFRs are not restricted or regulated for all consumer and commercial electrical and electronic equipment. If DOE proceeds with banning all OFRs in all electronics casings, it will be adopting an approach that is not in use anywhere else: such a sweeping ban goes beyond any actions that have been taken in the United States, either federally or at the state level, nor have any comparable standards been implemented internationally. Global harmonization of regulations allows industry to function well and ensures the widest range of products are available to the widest possible population. DOE's proposed approach is simply without precedent, from both a scientific and regulatory perspective, and the disruption it may cause to the supply chain would be significant.

These concerns are not simply hypothetical. Throughout 2021, the United States Environmental Protection Agency (EPA) needed to address consequences of the ban of PIP (3:1) that EPA imposed at the beginning of the year. It quickly became clear to EPA that restricting this one chemical, which was used in countless imported electronics products, was no simple task, and the impact the ban had on industry was extremely disruptive. Consequently, EPA is still exploring the best path forward for full implementation of the ban of PIP (3:1). Now, DOE is proposing to ban an exponentially larger number of substances. DOE should take note of EPA's experience and consider how to tailor its regulatory determination to avoid unnecessary disruptions.

### **DOE must look at risk - not simply hazard properties**

DOE's report only focuses on hazard characteristics of a few OFRs. DOE's recommendation to ban all OFRs is based on alleged hazard properties of a few substances. DOE never did any analysis to determine whether the actual use of any OFR in casings poses a risk. As discussed, the proposed ban will have significant consequences on those industries that employ electronics casings, yet DOE did not perform a basic study to see if OFRs in casings even present a risk to human health or the environment. A regulator, when proposing such a wide-scale regulation of products, should make a compelling case that such regulation is truly necessary. Such demonstration is absent from DOE's report.

DOE confined the analysis it did perform to the hazard characteristics of some OFRs. DOE did not do any study to determine the hazard that could be posed by the elimination of OFRs--namely, increased flammability risk. Because of these analytical failures, it is possible that not only will the ban have no positive effect on human health or the environment, but it may even result in an increased hazard risk, due to the increased flammability of electronics products and the injury, death, and destruction that could result from a fire.

### **DOE's evaluation for alternatives and feasibility was simplistic**

To properly assess the impact of a proposed regulatory action, DOE needed to assess whether alternative substances are available to replace those being banned, and whether use of the

identified alternatives is feasible. Unfortunately, DOE's analysis was simplistic and failed to consider numerous factors.

First, the evaluation of the availability, feasibility, and equivalency of potential alternatives cannot be based solely on product marketing and sources lacking product-specific expertise. Product manufacturers operate in a complex, global regulatory environment. They are required to consider a broad range of product safety and design factors. While a substance, perhaps, could technically be replaced by another, that simple switch does not mean that the product will necessarily meet regulatory product safety requirements across the globe. Additionally, it does not mean that the product will necessarily function in the same manner as it did previously.

Furthermore, the simple availability of alternatives does not mean that the substitution is a simple process. As CUC advised EPA in the context PIP 3:1 rule<sup>5</sup>, it could take at least five months to ascertain whether the alternative meets internal quality standards, followed by up to two years to obtain the required safety and quality certifications for components, and almost three years for finished products. Once all such approvals have been secured, the new substance needs to be integrated into the manufacturing process, which itself could take up to an additional year. The resulting disruption from a requirement that bans a significant and sizable class of substances is difficult to quantify.

There are additional considerations that DOE has failed to address. When identifying alternatives and determining feasibility, DOE should consider the environmental effects of the substitution, including the impacts on circularity and the effects on disposal/recycling of the end use product. Sustainability issues such as energy efficiency, durability, and light-weighting also merit consideration. Some of the alternatives identified by DOE are already restricted or are in the process of being studied by regulators. If DOE believes feasible alternatives exist, an analysis of the safety and continued availability of these alternatives is needed.

**Any proposal to regulate should only come after DOE has fully vetted the important socio-economic considerations required under the Safer Products for Washington law and general Washington rulemaking requirements**

In developing any regulations for priority products, DOE must conduct the relevant socio-economic analyses. These include:

- A cost-benefit analysis of the proposed regulation
- An analysis regarding whether proposed regulation implements the “least burdensome alternative”
- A small business economic impact statement

While these requirements ultimately will apply to the final rulemaking phase, it is critical that these factors be considered at this stage to guide effective policy recommendations and to permit the necessary discourse with the affected industries before

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<sup>5</sup> See [http://www.chemicaluserscoalition.org/ckfinder/userfiles/files/CUC%20-%20PIP%20deadline%20extension%20proposal%20122221%20\(as%20submitted\).pdf](http://www.chemicaluserscoalition.org/ckfinder/userfiles/files/CUC%20-%20PIP%20deadline%20extension%20proposal%20122221%20(as%20submitted).pdf) (US 170972002 1).PDF

unwarranted, or ill-advised, regulatory actions are taken in final form. DOE's proposal to move ahead with unprecedented regulation needs to be fully informed by these analyses.

### Concerns About the Definition of PFAS

Although CUC members do not manufacture the priority products that would be restricted under DOE's proposals for products containing PFAS, CUC believes that the definition of PFAS being used by DOE should be one that is both scientifically relevant and consistent with the goals of the Safer Products program. DOE, in its recommendations, is using the definition contained in the Revised Code of Washington. Specifically, RCW 70A.350.01022 defines perfluoroalkyl and polyfluoroalkyl substances as a class of fluorinated organic chemicals containing at least one fully fluorinated carbon atom. This definition is extremely broad and captures many substances not generally considered to be PFAS. For example, this definition would capture hydrofluoroolefins (HFOs) which are gases or volatile liquids, and when released ultimately break down into naturally-occurring substances, that do not bioaccumulate in the environment and are not mobile in soil and water, in a matter of days. Similarly, fluoropolymers differ from significantly PFOA and PFOS in their molecular weight, toxicity, and their insolubility in water. The OECD has noted that, "*the term 'PFASs' does not inform whether a compound is harmful or not, but only communicates that the compounds under this term share the same trait for having a fully fluorinated methyl or methylene carbon moiety.*"<sup>6</sup>

CUC is concerned that the use of an overly broad definition of PFAS for regulation could lead to several unintended and unnecessary consequences,<sup>7</sup> including the eventual restriction by DOE of substances with critical uses that do not pose a risk to public health or the environment. There is also a concern that replacement ingredients for restricted PFAS would perform less effectively or be unable to provide a similar level of functionality. CUC recommends that DOE focus those PFAS that are likely to pose specific concerns to human health or the environment when part of the subject priority products as used in the state.

### Specific Recommendations

In light of the issues raised above, CUC believes the following need to be incorporated into any regulatory proposal. Specifically, DOE should:

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<sup>6</sup> Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance, Section 3.2. Practical guidance on how to identify and use suitable PFAS terms, [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/CBC/MONO\(2021\)25&docLanguage=en](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/CBC/MONO(2021)25&docLanguage=en)

<sup>7</sup> See Comments of the CUC on TSCA Section 8(a)(7) Reporting and Recordkeeping Requirements for Perfluoroalkyl and Polyfluoroalkyl Substances, [http://www.chemicaluserscoalition.org/ckfinder/userfiles/files/TSCA%20Section%208\(a\)\(7\)%20Proposed%20PFAS%20Rule%20\(092721\).pdf](http://www.chemicaluserscoalition.org/ckfinder/userfiles/files/TSCA%20Section%208(a)(7)%20Proposed%20PFAS%20Rule%20(092721).pdf)

- Differentiate between individual flame retardants with chemical/CAS number specificity.
- Perform a new review for safety that includes flammability risks posed by elimination of OFRs from products.
- Perform a new review for “alternatives” that includes technical feasibility in meeting industry safety and performance standards.
- Regulate only based on actual risk (*i.e.*, a showing of release of the substance from the casing in such quantity that a risk to human health or the environment is present).
- Establish *de minimis* or allowable quantity (*i.e.*, concentration) thresholds for restricted OFRs and the products that contain them.
- Provide ample lead time so that restricted substance use can be identified, and products can then be reengineered or redesigned without threat of non-compliance or unavailability of products.
- Allow for sell-through of existing products, both those in the marketplace and warehoused, and for use of OFRs in spare/replacement parts.
- Clarify that the proposed restrictions are to apply solely to consumer electronics.
- Clarify the scope of “inaccessible components.”
- Provide an exemption for repair and replacement parts/products, and well as an exemption for products used for research and development purposes.
- Provide guidance as to how electronics components that are used in both consumer and industrial, commercial, defense or aerospace applications will be treated.
- Ensure that its regulatory proposal aligns with other jurisdictions that currently regulate the use of OFRs for specific applications (*e.g.*, EU’s Ecodesign Directive, which regulates the use of OFRs in the enclosures and stands of electronic displays).
- Clarify that products certified or regulated by the Federal Aviation Administration and Department of Defense to meet airworthiness requirements and products that are used or manufactured in a manner that is certified or regulated by those agencies are exempt pursuant to RCW 70A.350.030(5)(a)(v).
- Employ a definition of “PFAS” that appropriately focuses on the substances that are of true concern.

In closing, CUC members appreciate the opportunity to provide input on this important proposal. CUC members would be pleased to meet with DOE personnel to discuss these comments and related issues as they move forward with the process under the Safer Products for Washington program.

# ACC North American Flame Retardant Alliance

Attached are comments from the American Chemistry Council's North American Flame Retardant Alliance.

January 18, 2023

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

**Re: Safer Products for Washington – Cycle 1 and evaluating organohalogen flame retardants in plastic casings and enclosures for electronic and electrical equipment**

To Whom It May Concern:

The American Chemistry Council's (ACC) North American Flame Retardant Alliance ("NAFRA")<sup>1</sup> is submitting new information to the Washington Department of Ecology ("Department" or "Ecology") relevant to Safer Products for Washington – Cycle 1. The new information is intended to assist the Department in its evaluation of the use of organohalogen flame retardants (OFRs) in plastic casings and enclosures for electronic and electrical equipment.

The attached information includes the following:

- Analysis from Gradient on the Department's criteria for evaluating OFRs and identified alternatives; and,
- Certified GreenScreen® Risk Assessment for 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy) (CAS RN 25713-60-4).

Gradient is a licensed GreenScreen® profiler and performed the GreenScreen® risk assessment for the OFR also known as Tris(tribromophenoxy)triazine (TTBPT). A score of Benchmark 2 has been assigned for TTBPT as part of the GreenScreen® risk assessment. Last year, NAFRA submitted to the Department a GreenScreen Risk Assessment for another OFR, decabromodiphenyl ethane (CAS RN 84852-53-9),<sup>2</sup> which was also assigned a score of Benchmark 2. The Department's minimum criteria for safer is derived from GreenScreen® Benchmark 2 criteria.<sup>3</sup>

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<sup>1</sup> The American Chemistry Council's North American Flame Retardant Alliance represents the leading producers of flame retardants used in wide variety of industrial and consumer applications. NAFRA members represent cutting edge fire-safety chemistry and technology and are dedicated to improving fire safety performance in key product applications. NAFRA members are Albemarle Corporation, ICL Industrial Products, and Lanxess. For more information on NAFRA, visit <https://www.americanchemistry.com/industry-groups/north-american-flame-retardant-alliance-nafra>.

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

<sup>3</sup> Washington Department of Ecology, Regulatory Determinations Report to the Legislature, Publication 22-04-018, June 2022, p. 289, <https://apps.ecology.wa.gov/publications/documents/2204018.pdf>

NAFRA appreciates the opportunity to provide additional information as part of Safer Products for Washington – Cycle 1 and the Department's evaluation of OFRs in casings and enclosures of electronic and electrical equipment. Separately, we plan to submit comments to Ecology on the Draft Rule<sup>4</sup> by the February 5 deadline. If you have questions or need clarification on the information provided, please contact me at [ben\\_gann@americanchemistry.com](mailto:ben_gann@americanchemistry.com) or 202-249-7000.

Sincerely,

A handwritten signature in black ink, reading "Ben Gann". The signature is fluid and cursive, with the first name "Ben" and last name "Gann" clearly distinguishable.

Ben Gann  
Director, American Chemistry Council  
On behalf of the North American Flame Retardant Alliance

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<sup>4</sup> Washington Department of Ecology, Safer Products Restrictions and Reporting, December 2022, <https://ecology.wa.gov/DOE/files/34/34868dd6-a7ea-4944-814f-010df10dde99.pdf>.

## Appendix I

January 13, 2023

Mr. Ben Gann  
Director, Chemical Products and Technology  
American Chemistry Council  
700 2nd St, NE  
Washington, DC 20002

RE: Washington Department of Ecology Evaluation of Flame Retardant Alternatives

Dear Mr. Gann:

You recently requested that Gradient review the Washington State Department of Ecology's (DOE or Ecology) evaluation of priority halogenated and organophosphate-based flame retardants under the Safer Product for Washington program. Specifically, you requested we evaluate DOE's approach for evaluating the hazards of the flame retardants in question. That evaluation is in part based on the GreenScreen™ method for evaluating specific hazards of chemicals. Gradient is an authorized GreenScreen Profiler.

After examining the DOE approach and reviewing their regulatory determination report<sup>1</sup> (DOE, 2022) we can offer the following observations and opinions:

1. DOE has adopted a hazard evaluation method informally referred to as GreenScreen Plus (note that Ecology does not appear to use this term, at least in written documentation). Essentially, this uses aspects of the GreenScreen method to establish "minimum criteria for safer" but then goes beyond it, particularly for certain chemical classes (in this case halogenated flame retardants) and imposes "additional criteria for safer". While there is nothing in the GreenScreen methodology that specifically prohibits adding other criteria, Gradient does have concerns whether DOE's new approach could undermine the acceptance of GreenScreen. That is, whether chemicals that satisfy the typical use of GreenScreen (e.g., no Benchmark 1 chemicals) will now not meet the Ecology criteria, and therefore be viewed as "bad "chemicals. Note that GreenScreen Benchmark 2 is "use but search for safer substitutes," which implies they are not optimal but also implies that we can or should use them if chemicals with Benchmark 3 or 4 are not suitable for a specific need. Various certification programs (e.g., TCO, GreenScreen Certified) use a prohibition of GreenScreen Benchmark 1 chemicals as their basis for acceptability. DOE creating a new, more stringent categorization could lead to confusion and undermine the assurance provided in the other programs that have adopted the GreenScreen methodology.
2. DOE has assessed the organohalogen flame retardants (HFRs) collectively as an overall class as required by RCW 70A.350.010. Consequently DOE imposed their additional criteria for safer on this group of chemicals and concluded that none of the HFRs they evaluated met their within-class criteria and that as a class, the HFRs are potentially hazardous. However, DOE did not take a similar approach with organophosphorus flame retardants, and reviewed them as individual chemicals using the minimum criteria for safer. A review of the GreenScreen hazard scores for a series of halogenated and organophosphate flame retardants (Table 1) shows that each category contains chemicals with a substantial number of high and very high scores as well as chemicals

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<sup>1</sup> Washington Department of Ecology, "Regulatory Determinations Report to the Legislature," June 2022, <https://apps.ecology.wa.gov/publications/documents/2204018.pdf>.



## Appendix I

with a substantial number of low and very low scores.<sup>2</sup> In looking at these GreenScreen hazard determinations, the DOE approach of treating HFRs as a class requiring additional criteria be met and not treating the organophosphate flame retardants similarly appears inconsistent. The result is that a number of lower hazard brominated flame retardants are excluded from consideration while a number of organophosphorus flame retardants with higher hazards are not excluded.

3. DOE has identified resorcinol bis diphenyl phosphate (RDP, CAS 57583-54-7) as one of the acceptable safer organophosphorous flame retardant alternatives. This conclusion was not based on a GreenScreen assessment approach, but rather on a SciVera GHS+™ determination, which concluded it was "yellow" overall, as well as a ChemFORWARD designation of hazard band C, and thus meets the minimum criteria for safer defined by DOE. We do not have the SciVera GHS+ assessment available for review, however, based on a GreenScreen for RDP that Gradient has conducted, although RDP meets DOE's minimum criteria for safer, it would not meet DOE's *additional* criteria for safer using GreenScreen hazard assignments because it scored moderate for carcinogenicity. The use of GHS+ reviews in lieu of GreenScreen evaluations introduces some inconsistency into the evaluation process since, depending on which approach is used, RDP also does not meet the additional criteria for safer defined by DOE.
4. We recently conducted GreenScreen evaluations of two halogenated flame retardants, 2,4,6-tris(2,4,6-tribromophenoxy) (CAS 25713-60-4) and decabromodiphenyl ethane (CAS 84852-53-9; results included in Table 1). Both chemicals are scored as GreenScreen Benchmark 2 chemicals, largely due to very high persistence. However, both chemicals have low bioaccumulation potential, low aquatic toxicity and are not carcinogens, mutagens, reproductive or developmental toxicants, or endocrine (CMRDE), thus they would meet the minimum criteria for safer. The fact that they meet the minimum criteria is not consistent with DOE's overall assessment of the HFR class<sup>3</sup>. As indicated in Table 2, the recent GreenScreen assessments of these chemicals suggests they are chemicals of relatively low hazard, comparable if not of lower overall hazard than two of Ecology's identified alternatives. Yet because of Ecology's approach in imposing additional criteria solely on the class of HFRs, these two relatively safer chemicals are prematurely eliminated.

Thank you for the opportunity to provide our perspectives on this matter. Please feel free to contact us if you have any further questions.

Sincerely,



Thomas A. Lewandowski, Ph.D., DABT, ATS  
Principal



Kim Reid  
Principal Scientist

<sup>2</sup> Note that these hazard scores are provided for illustration 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> "Studies associate many HFRs with carcinogenicity, mutagenicity, reproductive and developmental toxicity, or endocrine disruption (see hazards of data rich HFRs). In order to confirm that each HFR does not share these hazards, the within-class criteria requires evidence that the chemical is not associated with these endpoints." (see p. 42; DOE, 2022)

# Appendix I

**Table 1. Comparison of Hazard Summary Tables for Halogenated and Organophosphorous Flame Retardants**

| Common Name                                                               | Acronym  | CAS                       | Benchmark Score | Source              | Date | C  | M | R  | D | E  | AT | ST (SE) | ST (RE) | N (SE) | N (RE) | SnS | SnR | IrS | IrE | AA | CA | P  | B  | F | Total H in Group 1 HH Endpoints |
|---------------------------------------------------------------------------|----------|---------------------------|-----------------|---------------------|------|----|---|----|---|----|----|---------|---------|--------|--------|-----|-----|-----|-----|----|----|----|----|---|---------------------------------|
| <b>HFRs</b>                                                               |          |                           |                 |                     |      |    |   |    |   |    |    |         |         |        |        |     |     |     |     |    |    |    |    |   |                                 |
| Decabromodiphenyl ethane                                                  | DBDPE    | 84852-53-9                | 2               | Gradient            | 2021 | L  | L | M  | M | M  | L  | L       | L       | L      | L      | L   | DG  | L   | L   | L  | L  | vH | L  | L | 0                               |
| 1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy)-                        | TTBPT    | 25713-60-4                | 2               | Gradient            | 2022 | L  | L | L  | L | M  | L  | L       | L       | L      | L      | L   | L   | L   | L   | L  | L  | vH | L  | L | 0                               |
| DecaBDE                                                                   |          | 1163-19-5                 | 1               | Danish EPA          | 2016 | M  | L | L  | H | H  | L  | DG      | M       | DG     | L      | L   | DG  | L   | L   | L  | L  | vH | H  |   | 2                               |
| 2,2-Bis(chloromethyl)trimethylene bis(bis(2-chloroethyl)phosphate)        | V6       | 38051-10-4                | 2               | WA DOE <sup>b</sup> | 2014 | M  | L | L  | M | M  | L  | NA      | M       | NA     | L      | L   | DG  | M   | M   | M  | H  | vH | vL | L | 0                               |
| Tetrabromobisphenol A                                                     | TBBPA    | 79-94-7                   | 1               | WA DOE <sup>b</sup> | 2014 | M  | L | L  | M | M  | L  | NA      | L       | NA     | L      | L   | DG  | L   | M   | vH | H  | H  | M  | L | 0                               |
| Tetrabromobisphenol A                                                     | TBBPA    | 79-94-7                   | 1               | Danish EPA          | 2016 | M  | L | L  | M | H  | L  | DG      | L       | L      | L      | L   | DG  | L   | M   | vH | H  | H  | M  |   | 1                               |
| 2-Ethylhexyltetrabromobenzoate                                            | TBB      | 183658-27-7               | 2               | WA DOE <sup>b</sup> | 2014 | M  | L | M  | M | M  | L  | NA      | M       | NA     | M      | M   | DG  | M   | M   | L  | L  | H  | H  | L | 0                               |
| Bis(2-ethylhexyl) tetrabromophthalate                                     | TBPH     | 26040-51-7                | 2               | WA DOE <sup>b</sup> | 2014 | M  | M | M  | M | M  | L  | NA      | M       | NA     | M      | L   | DG  | M   | M   | L  | L  | H  | H  | L | 0                               |
| Hexabromocyclododecane                                                    | HBCDD    | 25637-99-4                | 1               | Danish EPA          | 2016 | M  | L | M  | H | H  | L  | DG      | M       | M      | M      | L   | DG  | L   | L   | vH | vH | H  | L  |   | 2                               |
| <b>OPFRs</b>                                                              |          |                           |                 |                     |      |    |   |    |   |    |    |         |         |        |        |     |     |     |     |    |    |    |    |   |                                 |
| Tetraphenyl m-phenylene bis(phosphate); resorcinol bis diphenyl phosphate | RDP      | 57583-54-7                | 2               | Gradient            | 2019 | M  | L | L  | L | M  | L  | L       | M       | NA     | L      | L   | DG  | L   | L   | L  | L  | M  | H  | L | 0                               |
| Tris(2-chloroisopropyl) phosphate                                         | TCPP     | 13674-84-5                | U <sup>a</sup>  | WA DOE <sup>b</sup> | 2014 | DG | L | M  | M | M  | L  | NA      | L       | NA     | M      | L   | DG  | L   | M   | H  | M  | vH | vL | L | 0                               |
| Tris(2-chloroisopropyl) phosphate                                         | TCPP     | 13674-84-5                | 1               | Danish EPA          | 2016 | M  | L | H  | H | M  | L  | DG      | M       | M      | M      | L   | DG  | L   | L   | M  | M  | H  | L  |   | 2                               |
| Tris(2-chloroethyl) phosphate                                             | TCEP     | 115-96-8                  | 1               | WA DOE <sup>b</sup> | 2014 | H  | M | M  | M | M  | L  | NA      | M       | vH     | M      | L   | DG  | M   | M   | H  | M  | M  | vL | L | 1                               |
| Tris(1,3-dichloro-2-propyl) phosphate                                     | TDCPP    | 13674-87-8                | 1               | WA DOE <sup>b</sup> | 2014 | H  | M | M  | M | M  | L  | NA      | M       | NA     | L      | L   | DG  | M   | M   | H  | H  | vH | L  | L | 1                               |
| Triphenyl phosphate <sup>c</sup>                                          | TPP      | 115-86-6                  | 2               | WA DOE <sup>b</sup> | 2014 | M  | L | L  | L | M  | L  | NA      | H       | NA     | L      | L   | DG  | L   | M   | vH | vH | L  | L  | L | 0                               |
| Tricresyl phosphate                                                       | TCP      | 1330-78-5 / 78-30-8       | 1               | WA DOE <sup>b</sup> | 2014 | L  | M | H  | L | M  | vH | vH      | H       | vH     | H      | M   | DG  | L   | L   | vH | vH | vL | M  | L | 1                               |
| Isopropylated triphenyl phosphate                                         | IPTPP    | 68937-41-7                | 2               | WA DOE <sup>b</sup> | 2014 | M  | L | M  | M | M  | L  | NA      | H       | H      | M      | L   | DG  | L   | M   | vH | vH | M  | H  | L | 0                               |
| Isopropyl phenyl phosphate                                                | IPTPP    | 68937-41-7                | 1               | Danish EPA          | 2015 | M  | L | H  | M | DG | L  | DG      | H       | H      | H      | L   | DG  | L   | L   | vH | vH | M  | vH |   | 1                               |
| 9,10-Dihydro-9-oxa-10phosphaphenanthren-10-oxide                          | DOPO     | 35948-25-5                | 2               | Danish EPA          | 2014 | M  | L | L  | M | DG | L  | DG      | L       | DG     | M      | M   | DG  | L   | M   | L  | M  | H  | vL |   | 0                               |
| N,N-bis-(2-hydroxyethyl) aminomethane phosphonic acid diethyl ester       |          | 2781-11-5                 | 2               | Danish EPA          | 2015 | M  | M | L  | L | DG | L  | DG      | M       | DG     | M      | M   | DG  | L   | L   | M  | L  | H  | L  |   | 0                               |
| Poly(m-phenylene methylphosphonate)                                       |          | 63747-58-0                | 1               | Danish EPA          | 2014 | L  | L | M  | M | H  | L  | DG      | M       | DG     | M      | L   | DG  | L   | L   | H  | H  | vH | H  |   | 1                               |
| Poly[phosphonate-co-carbonate]                                            |          | 77226-90-5                | 3               | Danish EPA          | 2014 | L  | L | L  | L | L  | L  | L       | L       | L      | L      | L   | DG  | L   | L   | L  | L  | vH | L  |   | 0                               |
| Triphenyl phosphate                                                       | TPHP     | 115-86-6                  | 1               | Danish EPA          | 2014 | M  | L | L  | L | H  | L  | DG      | H       | DG     | L      | L   | DG  | L   | L   | vH | vH | L  | L  |   | 1                               |
| Tricresyl phosphate                                                       | TMPP     | 1330-78-5                 | 1               | Danish EPA          | 2015 | L  | L | H  | M | DG | M  | DG      | H       | DG     | M      | M   | DG  | L   | L   | vH | H  | M  | H  |   | 1                               |
| Bisphenol A bis(diphenyl phosphate)                                       | BPA-BDPP | 5945-33-5/<br>181028-79-5 | 2               | Danish EPA          | 2014 | M  | L | DG | L | DG | L  | DG      | L       | DG     | L      | L   | DG  | L   | L   | L  | L  | H  | M  |   | 0                               |
| Melamine pyrophosphate                                                    |          | 15541-60-3                | 2               | Danish EPA          | 2016 | M  | M | L  | L | DG | L  | DG      | M       | L      | L      | L   | DG  | L   | L   | L  | L  | H  | L  |   | 0                               |

Notes:

(a) U = Unspecified due to insufficient data.

(b) GreenScreen assessments are from the IC2 Chemical Hazard Assessment Database.

(c) TPP and EHDP are OPFRs that meet WA Dept Ecology minimum criteria for Safer.

## Appendix I

**Table 2. Comparison of Washington Department of Ecology Preferred FR Alternatives to Recently Assessed FRs (Select Endpoints)**

| Flame Retardant    | GreenScreen Endpoints |   |   |   |   |    |    |    | Minimum Criteria for Safer | Additional Criteria for Safer |                        |
|--------------------|-----------------------|---|---|---|---|----|----|----|----------------------------|-------------------------------|------------------------|
|                    | C                     | M | R | D | E | AA | CA | P  | B                          |                               |                        |
| TPP <sup>1</sup>   | M                     | L | L | L | M | M  | vH | L  | L                          | Meets                         | Does Not Meet (M - C)  |
| RDP <sup>2</sup>   | M                     | L | L | L | M | L  | L  | M  | H                          | Meets                         | Does Not Meet (M – C)  |
| DBDPE <sup>2</sup> | L                     | L | M | M | M | L  | L  | vH | L                          | Meets                         | Does Not Meet (vH - P) |
| TTBPT <sup>2</sup> | L                     | L | L | L | M | L  | L  | vH | L                          | Meets                         | Does Not Meet (vH - P) |

(1) From WA DOE, 2022

(2) From Gradient GreenScreen® assessments. For review and discussion purposes only. GreenScreen benchmarks and hazard scores used in product safety claims are not valid unless accompanied by the associated full GreenScreen assessment reports.

## Report

**1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy)  
(CAS # 25713-60-4)**

**Certified GreenScreen® Assessment**

Prepared for  
Sander Kroon  
ICL Group  
Koningin Wilhelminaplein 30  
1062 KR Amsterdam

June 2, 2022



GRADIENT

[www.gradientcorp.com](http://www.gradientcorp.com)

One Beacon Street, 17<sup>th</sup> Floor  
Boston, MA 02108  
617-395-5000

## Appendix II

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## Appendix II

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# GreenScreen<sup>®</sup> Assessment for 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)

**Method Version:** GreenScreen Version 1.4<sup>1</sup>

**Assessment Type:**<sup>2</sup> Certified

**Chemical Name:** 1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)

| GreenScreen Assessment Prepared By:                                                                         | GreenScreen Assessment Quality Control Performed By: |
|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>Name:</b> Ife Bamgbose, M.S.                                                                             | <b>Name:</b> Alexander Alverson                      |
| <b>Title:</b> Environmental Scientist                                                                       | <b>Title:</b> Chemist                                |
| <b>Organization:</b> Gradient                                                                               | <b>Organization:</b> Gradient                        |
| <b>Date:</b> 6/2/2022                                                                                       | <b>Date:</b> 6/2/2022                                |
|                                                                                                             |                                                      |
| <b>Name:</b> Destiny Mims                                                                                   | <b>Name:</b> Charlotte Marsh, M.S., CPPS             |
| <b>Title:</b> Environmental Scientist                                                                       | <b>Title:</b> Toxicologist                           |
| <b>Organization:</b> Gradient                                                                               | <b>Organization:</b> Gradient                        |
| <b>Date:</b> 6/2/2022                                                                                       | <b>Date:</b> 6/2/2022                                |
|                                                                                                             |                                                      |
|                                                                                                             | <b>Name:</b> Kim Reid                                |
|                                                                                                             | <b>Title:</b> Principal Scientist                    |
|                                                                                                             | <b>Organization:</b> Gradient                        |
|                                                                                                             | <b>Date:</b> 6/2/2022                                |
|                                                                                                             |                                                      |
|                                                                                                             | <b>Name:</b> Tom Lewandowski, Ph.D., DABT, ERT, ATS  |
|                                                                                                             | <b>Title:</b> Principal                              |
|                                                                                                             | <b>Organization:</b> Gradient                        |
|                                                                                                             | <b>Date:</b> 6/2/2022                                |
|                                                                                                             |                                                      |
| <b>Assessor Type (Licensed GreenScreen Profiler, Authorized GreenScreen Practitioner, or Unaccredited):</b> | Licensed GreenScreen Profiler                        |

**Confirm Application of the Disclosure and Assessment Rules and Best Practice:**<sup>3</sup> N/A

**Chemical Name (CAS #):** 1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)

**Molecular Formula:** C<sub>18</sub>H<sub>4</sub>Br<sub>8</sub>N<sub>2</sub>O<sub>4</sub>

<sup>1</sup> Use GreenScreen Assessment Procedure (Guidance) v1.4 (January 2018).

<sup>2</sup> GreenScreen reports are either "UNACCREDITED" (by unaccredited person), "AUTHORIZED" (by Authorized GreenScreen Practitioner), "CERTIFIED" (by Licensed GreenScreen Profiler or equivalent), or "CERTIFIED WITH VERIFICATION" (Certified or Authorized assessment that has passed GreenScreen Verification Program).

<sup>3</sup> See GreenScreen Guidance v1.4.

## Appendix II

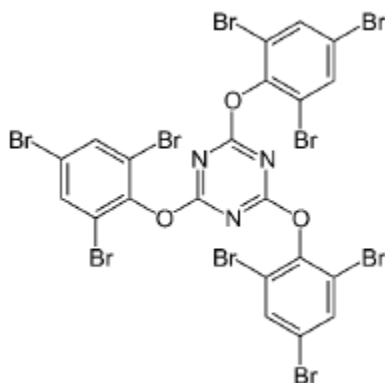
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**SMILES:** c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

**Also Called:** Tris(tribromophenoxy)triazine (TTBPT)

**Chemical Structure:**



Source: NLM (2021).

**Suitable Analogs or Moieties Used in This Assessment (CAS #s):** N/A

**Notes Related to Production-Specific Attributes:<sup>4</sup>** N/A

**For Inorganic Chemicals and Relevant Particulate Organics:** N/A

**Define Properties:**

- Particle Size:** <10 µm (4%) and 10-100 µm (63%) (NICNAS, 2006). D50 = <100 µm (ICL-IP Europe B.V., 2017). D50 = 97.9 µm (ECHA, 2021). High molecular weight (MW) = 1,067.43.
- Structure:** Solid, powder (NICNAS, 2006; ECHA, 2021).
- Mobility (e.g., Water Solubility, Volatility):**
  - Water Solubility:** <1E-3 mg/L at 20°C (NICNAS, 2006; ECHA, 2021).
  - Vapor Pressure:** 1.52E-23 kPa at 25°C (NICNAS, 2006; ICL-IP Europe B.V., 2017).
  - Adsorption/Desorption:** Log K<sub>oc</sub> = 9.53 at 35°C (ECHA, 2021). Log K<sub>oc</sub> = 7.6 (estimated) (NICNAS, 2006).
- Bioavailability:**
  - K<sub>ow</sub>:** Log P<sub>ow</sub> = 8.63 (ECHA, 2021; ICL-IP Europe B.V., 2017). Log P<sub>ow</sub> = >5.85 (NICNAS, 2006). Log K<sub>ow</sub> = >10 (estimated using KOCWIN version 2.0; US EPA, 2021a).

<sup>4</sup> Note any composition or hazard attributes of the chemical product relevant to how it is manufactured. For example, certain synthetic pathways or processes result in typical contaminants, byproducts or transformation products. Explain any differences between the manufactured chemical product and the GreenScreen assessment of the generic chemical by CAS #.



## Appendix II

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### Identify Applications/Functional Uses (e.g., Cleaning Product, TV Casing):

1. Flame retardant in electronics (NICNAS, 2006).
2. Polymer applications in acrylonitrile-butadiene-styrene (ABS) and high-impact polystyrene (HIPS) (NICNAS, 2006).

### GreenScreen Benchmark Score and Hazard Summary Table<sup>5</sup>

1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (hereafter, TTBPT) is assigned a Benchmark Score of BM-2 based on *Very High* (vH) persistence and *Moderate* (M) endocrine activity. The *Moderate* (M) score for endocrine activity is based on TTBPT's presence on the OSPAR Commission Priority PBTs and EDs and Equivalent Concern<sup>9</sup> screening list. However, the confidence in this score is low due to a lack of data to confirm the evidence of endocrine activity for TTBPT. The data requirements were met for the BM-2 classification, as shown in Table 1, below.

**Table 1 GreenScreen (v1.4) Hazard Profile Summary Table – 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)**

| Group I Human |   |   |   |   | Group II and II* Human |     |      |     |      |      |      |     | Ecotox. |    | Fate |    | Phys. |    |   |
|---------------|---|---|---|---|------------------------|-----|------|-----|------|------|------|-----|---------|----|------|----|-------|----|---|
| C             | M | R | D | E | AT                     | ST  |      | N   |      | SnS* | SnR* | IrS | IrE     | AA | CA   | P  | B     | Rx | F |
|               |   |   |   |   |                        | slg | rpt* | slg | rpt* |      |      |     |         |    |      |    |       |    |   |
| L             | L | L | L | M | L                      | L   | L    | L   | L    | L    | L    | L   | L       | L  | L    | vH | L     | L  | L |

Notes:

CAS = Chemical Abstracts Service.

Hazard levels (Very High [vH], High [H], Moderate [M], Low [L], Very Low [vL]) in *italics* reflect estimated values, authoritative B lists, screening lists, weak analogues, and lower confidence.

Hazard levels in **bold** font reflect good quality data, authoritative A lists, or strong analogues.

Group II Human Health endpoints differ from Group II\* Human Health endpoints in that they have four hazard scores (*i.e.*, vH, H, M, and L) instead of three (*i.e.*, H, M, and L) and are based on single exposures instead of repeated exposures.

Hazard endpoint acronym definitions are provided in Appendix A.

### Environmental Transformation Products and Ratings<sup>10</sup>

Identify feasible and relevant environmental transformation products (*i.e.*, dissociation products, transformation products, valence states) and/or moieties of concern (Table 2).<sup>11</sup>

<sup>5</sup> See Appendix A for a glossary of hazard endpoint acronyms.

<sup>6</sup> See Appendix B for alternative GreenScreen Hazard Summary Table (in which classifications are presented by exposure route).

<sup>7</sup> For inorganic chemicals only, see GreenScreen Guidance v1.4 Section 12. (Exceptions for Persistence).

<sup>8</sup> For systemic toxicity and neurotoxicity, repeated-exposure data are preferred. A lack of single-exposure data is not a data gap when repeated-exposure data are available. In that case, a lack of single-exposure data may be represented as NA instead of DG. See GreenScreen Guidance v1.4 Section V, Annex 2, 2.3 (A2.2.3).

<sup>9</sup> PBT = Persistent, Bioaccumulative, and Toxic. ED = Endocrine Disruptor.

<sup>10</sup> See GreenScreen Guidance v1.4 Sections 11.4 and 11.5.

<sup>11</sup> A moiety is a discrete chemical entity that is a constituent part or component of a substance. A moiety of concern is often the parent substance itself for organic compounds. For inorganic compounds, the moiety of concern is typically a dissociated component of the substance or a transformation product.

## Appendix II

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**Table 2 Environmental Transformation Products and Ratings**

| Functional Use | Life Cycle Stage | Transformation Pathway         | Environmental Transformation Products | CAS #    | Feasible and Relevant?                                | GreenScreen List Translator Score or GreenScreen Benchmark Score |
|----------------|------------------|--------------------------------|---------------------------------------|----------|-------------------------------------------------------|------------------------------------------------------------------|
| N/A            | Degradation      | Cleavage of the ether linkages | Tribromophenol (TBP)                  | 118-79-6 | Minimal breakdown product (thus of unclear relevance) | LT-1 (Likely Benchmark 1)                                        |

Notes:

CAS = Chemical Abstracts Service; N/A = Not Applicable.

Source: ECHA (2021).

## Appendix II

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# Introduction

TTBPT is a brominated flame retardant commonly used in plastics and electronics. Common applications for TTBPT-containing plastics include computer monitors, televisions, videos, remote controls, mobile phones, and office equipment. TTBPT is not sold directly to the general public and is handled in its pure form mostly in manufacturing/industrial settings (NICNAS, 2006). Table 3 summarizes the physical and chemical properties obtained for TTBPT.

**Table 3 Physical and Chemical Properties of 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy)**

| Property                                        | Value                                                                                              | Reference                                   |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------|
| Molecular Formula                               | C <sub>12</sub> H <sub>6</sub> Br <sub>9</sub> N <sub>3</sub> O <sub>3</sub>                       | Expert judgment                             |
| SMILES Notation                                 | <chem>C1=C(C=C(C(=C1Br)OC2=NC(=NC(=N2)OC3=C(C=C(C(=C3Br)Br)Br)OC4=C(C=C(C(=C4Br)Br)Br)Br)Br</chem> | NLM (2021)                                  |
| Molecular Weight                                | 1,067.4 g/mol                                                                                      | NLM (2021)                                  |
| Physical State                                  | Solid at 20°C and 1,013 hPa                                                                        | ECHA (2021)                                 |
| Appearance                                      | White solid powder                                                                                 | NICNAS (2006);<br>ECHA (2021)               |
| Melting Point                                   | 228-229°C                                                                                          | ECHA (2021)                                 |
| Vapor Pressure                                  | 0 Pa (25°C)                                                                                        | ECHA (2021)                                 |
|                                                 | 1.52E-23 kPa at 25°C                                                                               | NICNAS (2006);<br>ICL-IP Europe B.V. (2017) |
| Water Solubility                                | 0.001 mg/L (20°C)                                                                                  | NICNAS (2006);<br>ECHA (2021)               |
| Dissociation Constant                           | Not applicable                                                                                     | Expert judgment                             |
| Density/Specific Gravity                        | 2.44 g/mL (20°C)                                                                                   | ECHA (2021)                                 |
| Partition Coefficient<br>(Log K <sub>ow</sub> ) | >5.8 (20°C)                                                                                        | NICNAS (2006);<br>ECHA (2021)               |

Notes:

SMILES = Simplified Molecular-Input Line-Entry System.

Gradient assessed Chemical Name against GreenScreen version 1.4 (Clean Production Action, 2019).

## Hazard Classification Summary Section

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Hazard classifications for the GreenScreen endpoints evaluated are provided below.

### Group I Human Health Effects (Group I Human)

#### Carcinogenicity (C)

**Score (H, M, or L):** *L*

TTBPT is assigned a score of *Low (L)* for carcinogenicity, with low confidence. This score is based on negative genotoxicity data, an assessment of *in silico* predictions for carcinogenicity, and professional judgment. The chemical did not trigger any structural alerts for genotoxic or nongenotoxic carcinogenicity using Toxtree, but was determined to be of low to moderate concern for carcinogenicity based on OncoLogic. TTBPT is not present on any authoritative or screening lists. Furthermore, the chemical did not induce histopathological effects in a subchronic oral study in rats and has been shown to have limited bioavailability in rats. This classification is made with low confidence because it is not based on experimental carcinogenicity data.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

#### Studies

- TTBPT was not mutagenic in three *in vitro* studies: an Organisation for Economic Co-operation and Development (OECD) Test Guideline (TG) 471 bacterial reverse mutation assay, an OECD TG 473 mammalian chromosome aberration test, and an OECD TG 476 mammalian cell gene mutation test (ECHA, 2021).
- TTBPT did not induce histopathological changes in rats exposed to up to 1,000 mg/kg-bw/day *via* oral gavage for 13 weeks. No neoplastic or pre-neoplastic changes indicative of a carcinogenic effect were noted in this OECD guideline study (Charles River, 2009).
- Based on the chemical structure of TTBPT, it is considered a halogenated aromatic. Although a number of halogenated aromatics have been shown to be carcinogenic in experimental animals, the mechanism of their carcinogenic action is not clearly understood. The final level of carcinogenicity concern for this compound was determined to be low-moderate (US EPA, 2021b).
- TTBPT is predicted by the expert rule-based *in silico* program Toxtree version 3.1.0 (Ideconsult Ltd., 2018) to be noncarcinogenic *via* a nongenotoxic, nonmutagenic mechanism (US EPA, 2021c).

### Mutagenicity/Genotoxicity (M)

**Score (H, M, or L):** *L*

TTBPT is assigned a score of *Low (L)* for mutagenicity, with low confidence. The three *in vitro* studies reviewed indicate that TTBPT is not mutagenic or clastogenic. In addition, TTBPT is not present on any authoritative or screening lists. This classification is made with low confidence based on a lack of *in vivo* experimental studies.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

#### Studies

- **NICNAS (2006):**
  - TTBPT was not mutagenic in an *in vitro* bacterial reverse mutation assay (1997; OECD TG 471), both with and without metabolic activation (S9 mix), conducted using *Salmonella typhimurium* strains TA1535, TA1537, TA98, and TA100. TTBPT doses in this study ranged from 10 to 1,000 µg/plate. An appropriate solvent (dimethyl sulfoxide [DMSO]) and positive controls were evaluated concurrently in both the absence and presence of metabolic activation. Under the test conditions, TTBPT was negative for mutagenicity both with and without metabolic activation. No cytotoxicity was observed up to the maximum dose. Control groups responded appropriately, validating the study results.
  - TTBPT was not mutagenic in an *in vitro* mammalian cell gene mutation test (1997; OECD TG 476), both with and without metabolic activation (S9 mix), conducted using mouse lymphoma cells (L5178Y). TTBPT doses in this study ranged from 0.025 to 100 µg/mL (in DMSO). Both positive and negative control values were reported to be within acceptable limits. Under the test conditions, TTBPT was negative for mutagenicity both with and without metabolic activation. Precipitation of the test substance was reported at the maximum dose of 100 µg/mL, but no cytotoxicity was observed up to the maximum dose. Control groups responded appropriately, validating the study results.
  - TTBPT was not clastogenic in an *in vitro* chromosome aberration assay (1997; OECD TG 473), both with and without metabolic activation (S9 mix), conducted using cultured peripheral human lymphocytes. TTBPT doses in this study ranged from 0.1 to 10 µg/mL (in DMSO). Positive controls were evaluated concurrently. No cytotoxicity was observed at the highest dose tested (10 µg/mL). TTBPT did not increase the number of cells with chromosome aberrations both with and without metabolic activation. Control groups responded appropriately, validating the study results.

## Appendix II

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### Reproductive Toxicity (R)

**Score (H, M, or L):** *L*

TTBPT is assigned a score of *Low (L)* for reproductive toxicity, with low confidence. This score is based on a lack of treatment-related changes in sperm count, sperm motility, estrus cycle, or effects on reproductive organs and tissues in rats treated with up to 1,000 mg/kg-bw/day of TTBPT in comparison to control animals in an OECD guideline 90-day subchronic toxicity study in which the test substance was administered *via* the oral route. Confidence in this score is low because although the experimental data available for the test substance is reliable, the cited study is a repeated-dose toxicity study that also evaluated various reproductive parameters. There is no reproductive toxicity-specific study available or human data to support the weight of the evidence. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

#### Studies

- **ICL-IP Europe B.V. (2017) and Charles River (2009):**
  - In a subchronic repeated-dose toxicity test (2009; OECD TG 408), Sprague-Dawley rats (n = 10/sex/dose) were administered 0, 100, 350, or 1,000 mg/kg-day of TTBPT *via* oral gavage for 13 weeks, followed by a 28-day recovery period. No significant adverse effects, including effects on clinical signs, mortality, body weight, food and water consumption, ophthalmology, hematology, clinical biochemistry, organ weights, gross pathology, or histopathology, were noted. There were no effects on sperm count, sperm motility, or estrus cycle parameters. In addition, no adverse effects on reproductive organs or tissues were observed. A no observed adverse effect level (NOAEL) of greater than 1,000 mg/kg-bw/day was determined.

### Developmental Toxicity, Including Developmental Neurotoxicity (D)

**Score (H, M, or L):** *L*

TTBPT is assigned a score of **Low (L)** for developmental toxicity, with high confidence. This score is based on the lack of observed developmental effects from an OECD guideline prenatal developmental toxicity study in rats. This score is assigned with high confidence because it is based on reliable experimental data for TTBPT. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

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### Studies

#### ▪ ECHA (2021) and KTR (2013):

- In a pre-natal developmental toxicity study (OECD TG 414), pregnant Sprague-Dawley rats (n = 21 females/dose) were administered 250, 500, or 1,000 mg/kg-day of TTBPT (in carboxymethylcellulose) *via* oral gavage from gestational day 5 to 19. No changes in maternal body weight or food consumption were observed. No treatment-related changes in gravid uterine weight, numbers of corpora lutea or implantation, implantation index, or pre- or post-implantation losses were observed in any of the treatment groups. In addition, no significant treatment-related effects on embryo-fetal survival, growth, or development were noted. Based on the results of this study, a NOAEL for developmental toxicity 1,000 mg/kg-bw/day was determined.

### Endocrine Activity (E)

Score (H, M, or L): *M*

TTBPT is assigned a score of *Moderate (M)* for endocrine activity, with low confidence. This classification is based on the presence of TTBPT on a screening list for endocrine activity (OSPAR Commission Priority PBTs and EDs and Equivalent Concern). Confidence in this score is low because there is a lack of experimental data in animals for TTBPT.

### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** OSPAR – Priority PBTs & EDs & Equivalent Concern – Endocrine Disruptor – Chemical for Priority Action.

### Studies

#### ▪ US EPA (2021d):

- TTBPT has not been screened through the United States Environmental Protection Agency (US) EPA Endocrine Disruptor Screening Program (EDSP) for Estrogen Receptor Bioactivity as of December 3, 2021 (US EPA, 2021d).

### Group II and II\* Human Health Effects (Group II and II\* Human)

*Note: Group II and Group II\* endpoints are distinguished in the v1.4 Benchmark system (the asterisk indicates repeated exposure). For Systemic Toxicity and Neurotoxicity, Group II and II\* are considered sub-endpoints. When classifying hazard for Systemic Toxicity/Organ Effects and Neurotoxicity endpoints, repeated exposure results are required and preferred. Lacking repeated exposure results in a data gap. Lacking single exposure data does not result in a data gap when repeated exposure data are present (shade out the cell in the hazard table and make a note). If data are available for both single and repeated exposures, then the more conservative value is used.*

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### Acute Mammalian Toxicity (AT) Group II

**Score (vH, H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for acute mammalian toxicity, single exposure, with high confidence. This score is based on the results of two OECD guideline acute toxicity studies in which median lethal doses (LD<sub>50</sub> values) were reported at values greater than would warrant classification per Globally Harmonized System of Classification and Labeling of Chemicals (GHS) guidelines. No mortalities were observed in these studies. The oral and dermal LD<sub>50</sub> values were both >2,000 mg/kg bw and the inhalation median lethal concentration (LC<sub>50</sub>) was >1.47 mg/L (dust). Confidence in this score is high because it is based on reliable experimental data for TTBPT for all three routes of exposure. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

#### Studies

##### Oral

- **NICNAS (2006):**
  - In an acute oral toxicity study (1997; OECD TG 401), male and female Sprague-Dawley rats (n = 5/sex) were administered a single dose of 2,000 mg/kg bw TTBPT (in 1% aqueous carboxymethyl cellulose) *via* oral gavage and observed for at least 2 days. Hunched posture and was noted in all of the females and one male, and piloerection was noted in two females and one male, but these effects were reversed by day 2 of observation. No signs of systemic toxicity were observed and no mortality occurred. The LD<sub>50</sub> was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the oral route of exposure.

##### Dermal

- **NICNAS (2006):**
  - In an acute dermal toxicity study (1997; OECD TG 402), male and female Wistar rats (n = 5/sex) were administered 2,000 mg/kg bw of TTBPT (in 1% aqueous carboxymethyl cellulose) dermally (occluded). No signs of systemic toxicity were observed and no mortality occurred. The LD<sub>50</sub> was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the dermal route of exposure.

##### Inhalation

- **ECHA (2021) and ICL-IP Europe B.V. (2017):**
  - In an acute inhalation toxicity study (2011; OECD TG 403; Klimisch score [K] = 1), male and female Sprague-Dawley rats (n = 5/sex) were administered 1.47 mg/L of TTBPT *via* the nose



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only for 4 hours. No details on clinical signs observed or mortality were reported. The  $LC_{50}$  was determined to be greater than 1.47 mg/L. Due to a lack of study details, the acute toxicity of the test substance *via* the inhalation route of exposure cannot be reliably determined. However, the reported  $LC_{50}$  value of >1.47 mg/L suggests low or moderate toxicity.

### ▪ NICNAS (2006):

- According to the Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS), "TTBPT is not considered respirable, with only 4% of particles having less than 10 µm diameter" (NICNAS, 2006).

## Systemic Toxicity/Organ Effects, Including Immunotoxicity (ST)

### (ST-Single) Group II

Score (vH, H, M, or L): **L**

TTBPT is assigned a score of **Low (L)** for single-exposure systemic toxicity/organ effects, including immunotoxicity, with high confidence. This score is based on an acute oral, dermal, and inhalation toxicity studies in rats. No clinical signs or adverse pathological effects indicative of specific-target-organ toxicity were reported in these studies. Confidence in this score is high, because it is based on reliable experimental data for TTBPT for all three routes of exposure. In addition, TTBPT is not present on any authoritative or screening lists.

### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

## Studies

### Oral

### ▪ NICNAS (2006):

- In an acute oral toxicity study (1997; OECD TG 401), male and female Sprague-Dawley rats (n = 5/sex) were administered a single dose of 2,000 mg/kg bw of TTBPT (in 1% aqueous carboxymethyl cellulose) *via* oral gavage and observed for at least 2 days. Hunched posture and was noted in all of the females and one male, and piloerection was noted in two females and one male, but these effects were reversed by day 2 of observation. No signs of systemic toxicity were observed and no mortality occurred. The  $LD_{50}$  was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the oral route of exposure.

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### Dermal

#### ▪ **NICNAS (2006):**

- In an acute dermal toxicity study (1997; OECD TG 402), male and female Wistar rats (n = 5/sex) were administered 2,000 mg/kg bw of TTBPT (in 1% aqueous carboxymethyl cellulose) dermally (occluded). No signs of systemic toxicity were observed and no mortality occurred. The LD<sub>50</sub> was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the dermal route of exposure.

### Inhalation

#### ▪ **ECHA (2021) and ICL-IP Europe B.V. (2017):**

- In an acute inhalation toxicity study (2011; OECD TG 403; K = 1), male and female Sprague-Dawley rats (n = 5/sex) were administered 1.47 mg/L of TTBPT *via* the nose only for 4 hours. The LC<sub>50</sub> was determined to be greater than 1.47 mg/L, but no details on clinical signs observed, mortality, or necropsy results were reported (Weniger, 2011, as cited in ICL-IP Europe B.V., 2017).

### **(ST-Repeated) Group II\***

**Score (H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for repeated-exposure systemic toxicity/organ effects, including immunotoxicity, with high confidence. This score is based on 28-day and 90-day subchronic repeated-dose studies in rats administered TTBPT *via* oral gavage. No adverse treatment-related effects were noted in these studies at doses up to 1,000 mg/kg-bw/day. Confidence in this score is high because it based on reliable experimental data for TTBPT. In addition, TTBPT is not present on any authoritative or screening lists.

### **Authoritative and Screening Lists**

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### **Studies**

#### Oral

#### ▪ **Charles River (2009) and ICL-IP Europe B.V. (2017):**

- In a subchronic repeated-dose toxicity test (2009; OECD TG 408), Sprague-Dawley rats (n = 10/sex/dose) were administered 0, 100, 350, or 1,000 mg/kg-day of TTBPT *via* oral gavage for 13 weeks, followed by a 28-day recovery period. No significant adverse effects, including effects on clinical signs, mortality, body weight, food and water consumption, ophthalmology, hematology, clinical biochemistry, organ weights, gross pathology, or histopathology, were noted. In addition, no adverse effects on reproductive organs or tissues were observed. A

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NOAEL of greater than 1,000 mg/kg-day was established (Charles River, 2009; ICL-IP Europe B.V., 2017).

- In a non-standard 28-day oral gavage toxicity study, rats (n = 6/sex/group) were administered TTBPT at doses of 0, 10, 50, 250, or 1,000 mg/kg-bw/day for 28 days, with a 14-day follow-up period. No mortality was observed. Some incidental findings (hair loss, tail wounds, and scab formation) were noted during daily observations, but these effects were not considered treatment related. Body weight gain was not affected by the treatment. In terms of serum chemistry, a significant decrease (33%,  $p < 0.05$ ) in the liver enzyme gamma glutamyl transpeptidase (GGT) was seen in high-dose recovery males when compared to controls, but not in males at the end of treatment. A significant decrease (10%,  $p < 0.05$ ) in serum albumin/globulin ratio was observed in high-dose recovery females when compared to controls. Minor changes in hematology (*e.g.*, mean corpuscular hemoglobin levels and an increase in mean corpuscular volume) were noted, but did not show a clear dose-response pattern. Some statistically significant differences in relative adrenal, liver, and kidney weights were also observed, but these effects likewise did not follow a dose-response pattern. Overall, observed differences in hematology, blood chemistry, organ weights, clinical signs, gross pathological findings, and histopathological findings were considered unrelated to TTBPT treatment, due to the lack of clear dose-response patterns, occurrence in only one or two animals in a treatment group, and the occurrence of similar changes in controls. The NOAEL in this study was reported as 1,000 mg/kg-bw/day (Yamasaki, 1990, as cited in ICL-IP Europe B.V., 2017).

### Inhalation

- None.

### Dermal

- None.

## Neurotoxicity (N)

### Neurotoxicity (N) Group II – Single

Score (vH, H, M, or L): *L*

TTBPT is assigned a score of *Low (L)* for neurotoxicity *via* a single exposure, with low confidence. This score is based on a lack of neurotoxic effects observed in OECD guideline acute toxicity tests *via* the oral and dermal routes. Confidence in this score is low because although the experimental data for the test substance were reliable, no specific assessments of neurotoxicity were conducted in the identified studies and there is a lack of human data to support the weight of the evidence. In addition, TTBPT is not present on any authoritative or screening lists.

### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

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### Studies

#### Oral

##### ▪ NICNAS (2006):

- In an acute oral toxicity study (1997; OECD TG 401), male and female Sprague-Dawley rats (n = 5/sex) were administered a single dose of 2,000 mg/kg bw of TTBPT (in 1% aqueous carboxymethyl cellulose) via oral gavage and observed for at least 2 days. Hunched posture and was noted in all of the females and one male, and piloerection was noted in two females and one male, but these effects were reversed by day 2 of observation. No signs of systemic toxicity were observed and no mortality occurred. The LD<sub>50</sub> was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the oral route of exposure.

#### Dermal

##### ▪ NICNAS (2006):

- In an acute dermal toxicity study (1997; OECD TG 402), male and female Wistar rats (n = 5/sex) were administered 2,000 mg/kg bw of TTBPT (in 1% aqueous carboxymethyl cellulose) dermally (occluded). No signs of systemic toxicity were observed and no mortality occurred. The LD<sub>50</sub> was determined to be greater than 2,000 mg/kg bw. This study indicated that the test substance exhibits low acute toxicity *via* the dermal route of exposure.

#### Inhalation

##### ▪ ECHA (2021):

- In an acute inhalation toxicity study (2011; OECD TG 403; K = unspecified), male and female Sprague-Dawley rats (n = unspecified/sex) were administered an unknown concentration of TTBPT *via* the nose only for 4 hours. The LC<sub>50</sub> was determined to be greater than 1.47 mg/L, but no details on clinical signs observed, mortality, or necropsy results were reported.

### Neurotoxicity (N) Group II\* – Repeated

Score (H, M, or L): **L**

TTBPT is assigned a score of **Low (L)** for neurotoxicity *via* repeated exposure with high confidence. This score is based on results from a 91-day subchronic toxicity study in which no neurotoxic effects were observed in rats administered doses up to 1,000 mg/kg-day. No neurological effects were observed in this study, in which neurological endpoints were assessed (*e.g.*, *via* a functional observation battery) following repeated exposures. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

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### Studies

#### Oral

- **Charles River (2009) and ICL-IP Europe B.V. (2017):**

- In a subchronic repeated-dose toxicity test (2009; OECD TG 408), Sprague-Dawley rats (n = 10/sex/dose) were administered 0, 100, 350, or 1,000 mg/kg-day of TTBPT *via* oral gavage for 13 weeks, followed by a 28-day recovery period. In addition to systemic endpoints, neurotoxicity was also investigated following the standard study protocol. Cage-side observations, including prostration, lethargy, tremors, and convulsions, were examined once during the pretrial period (Week 1) and weekly thereafter for all of the test animals. In addition, functional tests, including grip strength, pain perception, landing foot splay, and motor activity, were performed once during the pretrial period (Week 1), during Weeks 4 and 12 of treatment, and during Week 4 of the recovery period. Repeated exposures to TTBPT did not cause any functional abnormality. The NOAEL for repeated-dose systemic toxicity was 1,000 mg/kg-day in this study (Charles River, 2009; ICL-IP Europe B.V., 2017).

### Skin Sensitization (SnS) Group II\*

#### Score (H, M, or L): **L**

TTBPT is assigned a **Low (L)** score for skin sensitization, with high confidence. This score is based on a lack of skin sensitization reactions in a guinea pig maximization test, supported by a lack of structural alerts for skin sensitization predicted using the expert rule-based *in silico* programs Toxtree and Derek Nexus. Confidence in this score is high because it is based on reliable experimental data and supported by *in silico* predictions. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### Studies

- **NICNAS (2006):**

- In a guinea pig maximization test (1997; OECD TG 406), researchers applied TTBPT to female Himalayan guinea pigs at 5% in corn oil for intradermal induction, 50% in corn oil for the topical induction, and 50% in corn oil for the topical challenge exposures. Animals were divided among two groups: test animals (n = 20) and controls (n = 10). Mortality (n = 2) was observed on days 6 and 7 of the study. Macroscopic post-mortem examination showed that both of these animals showed dark red discoloration of the lungs. Mild to moderate erythema was observed at 24 hours in one of the animals in the test group. It was noted that the same guinea pig exhibited a reaction to the vehicle (corn oil), while none of the guinea pigs in the control group exhibited any reactions. After 48 hours, there were no reactions in either group. A sensitization rate of 0-6% was reported in this study. The test substance was deemed non-sensitizing under the test conditions, based on a response rate <30%.

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### Modeled Data

- The predictive toxicology program Derek Nexus version 6.1.0 predicted TTBPT to be a non-sensitizer, with no misclassified or unclassified features (Lhasa Ltd., 2016).
- Toxtree version 3.1.0 identified no structural alerts for skin sensitization associated with the chemical structure of TTBPT (Ideaconsult Ltd., 2018).

### Respiratory Sensitization (SnR) Group II\*

**Score (H, M, or L):** *L*

TTBPT is assigned a *Low (L)* score for respiratory sensitization, with low confidence. This score is based on a lack of OECD Quantitative Structure-Activity Relationship (QSAR) Toolbox structural alerts for respiratory sensitization and a lack of experimental data on respiratory sensitization in humans or animals from TTBPT exposure. Additionally, TTBPT is not considered respirable based on the fact that 4% of its particles are less than 10 µm in diameter (NOTOX, 1997, as cited in NICNAS, 2006). Furthermore, TTBPT is not present on any authoritative or screening lists. Confidence in this score is low because the classification is based on a weight-of-evidence approach and because TTBPT lacks experimental data for this endpoint.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### Modeled Data

- No mechanism-based structural alerts were predicted by the predictive toxicology program OECD QSAR Toolbox version 4.4.1 (OECD, 2021; see Appendix D).

### Skin Irritation/Corrosivity (IrS) Group II

**Score (vH, H, M, or L):** **L**

TTBPT is assigned a score of **Low (L)** for skin irritation/corrosivity, with high confidence. This score is based on the results of a skin irritation study conducted in rabbits. Confidence in this score is high because it is based on reliable experimental data for TTBPT. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

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### Studies

- **NICNAS (2006) and ECHA (2021):**

- In a skin irritation study (1997; OECD TG 404), TTBPT (moistened with distilled water) was applied to the skin of New Zealand white rabbits (n = 3) under semi-occlusive conditions, and the animals were observed for a period of 72 hours. No dermal reactions (erythema or edema) were noted in any animals throughout the duration of the study, and the test substance was determined to be non-irritating to the skin.

### Eye Irritation/Corrosivity (IrE) Group II

**Score (vH, H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for eye irritation/corrosivity, with high confidence. This score is based on a lack of effects observed in an eye irritation study conducted in rabbits. Confidence in this score is high because it is based on reliable experimental data for TTBPT. In addition, TTBPT is not present on any authoritative or screening lists.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### Studies

- **NICNAS (2006):**

- In an eye irritation study (1997; OECD TG 405), TTBPT (undiluted) was instilled into the right eye of New Zealand white rabbits (n = 3). Observations were conducted at 24, 48, and 72 hours following test item application. Conjunctival redness (score = 2) was observed in the test animals at 24 hours, but this resolved for all of the animals by 48 hours. Conjunctival chemosis (score = 1) was observed in the test animals at 24 hours, but this also resolved for all of the animals by 48 hours. No inflammation of the iris or corneal effects were observed at any time point. Thus, TTBPT was determined to be non-irritating to the eyes of rabbits under the conditions of this study.

### Ecotoxicity (Ecotox.)

#### Acute Aquatic Toxicity (AA)

**Score (vH, H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for acute aquatic toxicity, with high confidence. This assignment is based on experimental algae, invertebrate, and fish toxicity data for TTBPT (Table 4). No adverse effects were observed at concentrations up to the water solubility of TTBPT (*i.e.*, 0.001 mg/L at 20°C). Therefore, TTBPT exhibits low acute aquatic toxicity in accordance with GreenScreen guidance. The score is assigned

## Appendix II

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with high confidence because the studies relied upon were conducted following OECD guidelines. In addition, TTBPT is not present on any authoritative or screening lists.

### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### Studies

**Table 4 Acute Aquatic Toxicity Data for 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy)**

| Trophic Level | Test Species                                        | Method      | Test Type (K)                             | Endpoint (Basis)                                       | Value (mg/L) | Source           |
|---------------|-----------------------------------------------------|-------------|-------------------------------------------|--------------------------------------------------------|--------------|------------------|
| Algae         | Algae<br>( <i>Selenastrum capricornutum</i> )       | OECD TG 201 | Static freshwater<br>(Unspecified)        | 72-hour ErC <sub>50</sub><br>(growth rate and biomass) | >1           | NICNAS<br>(2006) |
| Invertebrate  | Water Flea<br>( <i>Daphnia magna</i> )              | OECD TG 202 | Static freshwater<br>(Unspecified)        | 48-hour LC <sub>50</sub><br>(mobility)                 | >0.37        |                  |
| Fish          | Carp<br>( <i>Cyprinus carpio</i> )                  | OECD TG 203 | Static freshwater<br>(Unspecified)        | 96-hour LC <sub>50</sub>                               | >0.37        |                  |
| Algae         | Algae<br>( <i>Pseudokirchneriella subcapitata</i> ) | Unspecified | Static freshwater<br>(Unspecified)        | 72-hour ErC <sub>50</sub><br>(growth rate and biomass) | >0.013       | ECHA<br>(2021)   |
| Invertebrate  | Water Flea<br>( <i>Daphnia magna</i> )              | Unspecified | Static freshwater<br>(Unspecified)        | 48-hour EC <sub>50</sub><br>(mobility)                 | >0.013       |                  |
| Fish          | Unspecified                                         | Unspecified | Semistatic<br>freshwater<br>(Unspecified) | 96-hour LC <sub>50</sub><br>(mortality)                | >0.013       |                  |

Notes:

EC<sub>50</sub> = Median Effect Concentration; ErC<sub>50</sub> = Concentration that Results in a 50% Reduction in Growth Rate Relative to Controls; K = Klimisch Score; LC<sub>50</sub> = Median Lethal Concentration; OECD TG = Organisation for Economic Co-operation and Development Test Guideline.

### Chronic Aquatic Toxicity (CA)

**Score (vH, H, M, or L):** *L*

TTBPT is assigned a score of *Low (L)* for chronic aquatic toxicity, with low confidence, based on a study of one trophic-level (algae) with experimental toxicity data on this endpoint (Table 5), a mammalian oral absorption, distribution, metabolism, and excretion (ADME) study, and an 8-week bioaccumulation study in red killifish (*Oryzias latipes*). Confidence in this score is low because experimental data from only one trophic-level study was identified. Though both the algae study and the 8-week bioaccumulation study data for TTBPT are reliable, these studies were performed above the practical saturation limit for TTBPT. Overall, based on TTBPT's low water solubility and expected limited bioavailability, the potential for chronic aquatic toxicity is low. In addition, TTBPT is not present on any authoritative or screening lists for chronic aquatic toxicity.



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### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

### Studies

**Table 5 Chronic Aquatic Toxicity Data for 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy)**

| Trophic Level | Test Species                                        | Method      | Test Type (K)                      | Endpoint (Basis)                          | Value (mg/L) | Source         |
|---------------|-----------------------------------------------------|-------------|------------------------------------|-------------------------------------------|--------------|----------------|
| Algae         | Algae<br>( <i>Pseudokirchneriella subcapitata</i> ) | Unspecified | Static freshwater<br>(Unspecified) | 72-hour NOEC<br>(growth rate and biomass) | >0.013       | ECHA<br>(2021) |

Notes:

K = Klimisch Score; NOEC = No Observed Effect Concentration.

- **NICNAS (2006) and ICL-IP Europe B.V. (2017):**
  - In a bioaccumulation study performed using test methods for new chemical substances (Kanpogyo No. 5 Yakuhatu No. 615, 49 Kikyoku No. 392, 1974), red killifish (*Oryzias latipes*) were exposed to nominal concentrations of TTBPT (CAS # 25713-60-4) at 0.5 or 0.05 mg/L for 8 weeks using a continuous flow-through system. Analytical monitoring was performed using high-performance liquid chromatography (HPLC). The bioconcentration factors (BCFs) were determined to be <0.8-9 and 8.0-18 for 0.5 and 0.05 mg/L, respectively (Kurume Research Laboratory, 1990b, as cited in NICNAS, 2006). The study authors concluded that TTBPT is "not bioaccumulative in the food chain as the BCF criteria are not exceeded. Further, the notified chemical high molecular weight and low water solubility suggests that it is unlikely to cross biological membranes and bioaccumulate (Connell 1990). Release to the aquatic environment will be very limited from the proposed uses and thus aquatic toxicity is unlikely to occur" (NICNAS, 2006). However, according to ICL-IP Europe B.V (2017), the "[f]ish were exposed to 0.5 mg/l which is much above the maximum level of water solubility of the substance. Therefore, although no bioconcentration was observed, valid results cannot be derived due to the concentrations used."
- **ICL-IP Europe B.V. (2017) and Huntingdon Life Sciences Ltd. (2006):**
  - In a mammalian oral ADME study (OECD TG 417), Sprague-Dawley rats (n = 12/sex/dose) were administered a single dose of 50 or 1,000 mg/kg-day of radiolabeled TTBPT suspended in 0.5% carboxymethylcellulose *via* gastric intubation. The radiolabeled TTBPT was entirely excreted *via* the feces (95.4-105%), with the majority excreted within the interval of 0-48 hours. Very low amounts of radioactivity were found in the urine (0.2%), expired air (<0.1%), carcass (<0.01% of the low dose; 0.03-1.27% of the high dose), and cage washes (0.01-0.26%). The total absorption was estimated to be 0.2% of the administered dose. Based on the study findings, it was concluded that TTBPT is not likely to be absorbed or accumulate in biological tissues.

## Environmental Fate (Fate)

### Persistence (P)

**Score (vH, H, M, L, or vL): vH**

TTBPT is assigned a score of **Very High (vH)** for persistence, with high confidence. TTBPT is insoluble in water (*i.e.*, water solubility is  $<0.001$  mg/L); thus, it is not available for biotic or abiotic degradation. A biodegradation study in water found that TTBPT is neither readily nor inherently biodegradable. Due to its very low vapor pressure ( $<1 \times 10^{-5}$  Pa) and insolubility in water, air and water are not considered environmental compartments of concern for TTBPT. Given its propensity to bind to solids (experimental  $\log K_{oc} = 9.53$ ; modeled  $\log K_{oc} = 7.25$ ), TTBPT is expected to primarily amass in soil and sediment (ECHA, 2021). The modeled half-life of TTBPT in soil is 360 days, indicating high persistence. The modeled half-life of TTBPT in sediment is 1,621 days, indicating very high persistence. The soil half-life is used as the basis for the persistence hazard score, because TTBPT is predicted to primarily distribute to soil. Confidence in this score is high because it is based on both experimental studies and modeled data.

### Authoritative and Screening Lists

- **Authoritative:** None.
- **Screening:** None.

### Studies

- **ECHA (2021) and NICNAS (2006):**
  - A ready biodegradability study (1997) was conducted with TTBPT under aerobic aqueous conditions, using a domestic, nonadapted activated sludge mixture of sewage, soil, and natural water. After 28 days, an initial concentration of 100 mg/L resulted in greater than 4 but less than 6% degradation. The test substance was determined to be not readily biodegradable (Kurume Research Laboratories, 1990a, as cited in NICNAS, 2006; ECHA, 2021).
  - An inherent biodegradability study (2005; OECD TG 302 D) was conducted with TTBPT under aerobic aqueous conditions, using a buffer mineral salts medium. After 74 days, an initial concentration of 20 mg/L resulted in 4% degradation measured by carbon dioxide (CO<sub>2</sub>) evolution in sealed bottles. The test substance was determined to be not inherently biodegradable (IMI-TAMI, 2004, as cited in NICNAS, 2006; ECHA, 2021).
- **ECHA (2021):**
  - A sediment simulation study (2009; OECD TG 308) was conducted with TTBPT under aerobic aqueous conditions, using natural water and sediment. After 100 days, an initial concentration of 0.07 mg/L resulted in 17.3% degradation by radiochemical analysis. The disappearance times (DT<sub>50</sub>) in the sediment layers were 472 and 592 days, respectively.
  - A sediment simulation study (2009; OECD TG 308) was conducted with TTBPT under anaerobic aqueous conditions, using natural water and sediment. After 100 days, an initial concentration of 0.071 mg/L resulted in 19.8% degradation by radiochemical analysis. The DT<sub>50</sub> in the sediment layers were 252 and 462 days, respectively.

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### Modeled Data

Environmental partitioning behavior and half-lives for TTBPT were modeled using the Epi Suite Level III fugacity model. These values are presented in Table 6. TTBPT is expected to primarily amass in soil (92.9%) and water (4.17%). See Appendix C for modeling results.

**Table 6 Modeled Environmental Partitioning and Half-Life for 1,3,5-Triazine, 2,4,6-Tris(2,4,6-tribromophenoxy) Using EPI Suite Version 4.11**

| Compartment | Mass Amount (%) | Half-Life (Hours) | Half-Life (Days) | Model                    | Source         |
|-------------|-----------------|-------------------|------------------|--------------------------|----------------|
| Air         | 0.105           | 173               | 7.2              | Level III fugacity model | US EPA (2021a) |
| Water       | 4.17            | 4,320             | 180              |                          |                |
| Soil        | 92.9            | 8,640             | 360              |                          |                |
| Sediment    | 2.79            | 38,900            | 1,620.8          |                          |                |

Notes:

Log  $P_{ow}$  = Ratio of Equilibrium Concentrations of a Dissolved Substance in n-Octanol and Water; SMILES = Simplified Molecular-Input Line-Entry System.

Values were modeled in EPI Suite version 4.11 using the SMILES notation and modeled values for water solubility (1.849E-011 mg/L), log  $P_{ow}$  (11.46), and melting point (338°C).

### Bioaccumulation (B)

**Score (vH, H, M, L, or vL):** *L*

TTBPT is assigned a score of *Low (L)* for bioaccumulation, with low confidence, based on its molecular weight and low water solubility, as well as the results of a mammalian oral ADME study in rats, all of which indicate that TTBPT has a low bioaccumulation potential. This score is assigned with low confidence because although the reviewed fish BCF study for TTBPT indicates that it has a low bioaccumulation potential, the test concentrations were above the practical saturated limit for TTBPT. Moreover, the results of the ADME study indicate an absence of significant uptake of TTBPT (ICL-IP Europe B.V., 2017; Huntingdon Life Sciences Ltd., 2006), suggesting minimal bioaccumulation. It is noteworthy that its experimental  $K_{oc}$  (9.53) indicates that the potential for TTBPT to migrate into water is negligible, and thus, TTBPT is not likely to be bioavailable to aquatic species. Furthermore, an activated sludge respiration inhibition test and two sediment toxicity studies (OECD TGs 225 and 218) all demonstrated that TTBPT is not toxic to sediment bacteria or organisms.

TTBPT is listed as a "Registered Substances Considered Not to Be PBT/vPvB"<sup>12</sup> under the European Union's Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation 1907/2006. TTBPT is also listed as "low bioconcentration" on Japan's Chemical Substance Control Law (CSCL) List of Examined Existing Chemical Substances.

### Authoritative and Screening Lists

- **Authoritative:** None.
- **Screening:** None.

<sup>12</sup> vPvB = Very Persistent and Very Bioaccumulative.

## Studies

- **NICNAS (2006):**

- In a bioaccumulation study performed using test methods for new chemical substances (Kanpogyo No. 5 Yakuhatsu No. 615, 49 Kikyoku No. 392, 1974), red killifish (*Oryzias latipes*) were exposed to nominal concentrations of TTBPT (CAS # 25713-60-4) at 0.5 or 0.05 mg/L for 8 weeks using a continuous flow-through system. Analytical monitoring was performed using HPLC. The BCFs were determined to be <0.8-9 and 8.0-18 for 0.5 and 0.05 mg/L, respectively (Kurume Research Laboratory, 1990b, as cited in NICNAS, 2006). The study authors concluded that TTBPT is "not bioaccumulative in the food chain as the BCF criteria are not exceeded. Further, the notified chemical high molecular weight and low water solubility suggests that it is unlikely to cross biological membranes and bioaccumulate (Connell 1990). Release to the aquatic environment will be very limited from the proposed uses and thus aquatic toxicity is unlikely to occur" (NICNAS, 2006). However, according to ICL-IP Europe B.V. (2017), the "[f]ish were exposed to 0.5 mg/l which is much above the maximum level of water solubility of the substance. Therefore, although no bioconcentration was observed, valid results cannot be derived due to the concentrations used."

- **ICL-IP Europe B.V. (2017) and Huntingdon Life Sciences Ltd. (2006):**

- In a mammalian oral ADME study (OECD TG 417), Sprague-Dawley rats (n = 12/sex/dose) were administered a single dose of 50 or 1,000 mg/kg-day of radiolabeled TTBPT suspended in 0.5% carboxymethylcellulose *via* gastric intubation. The radiolabeled TTBPT was entirely excreted *via* the feces (95.4-105%), with the majority excreted within the interval of 0-48 hours. Very low amounts of radioactivity were found in the urine (0.2%), expired air (<0.1%), carcass (<0.01% of the low dose; 0.03-1.27% of the high dose), and cage washes (0.01-0.26%). The total absorption was estimated to be 0.2% of the administered dose. Based on the study findings, it was concluded that TTBPT is not likely to be absorbed or accumulate in biological tissues.

- **Zheng *et al.* (2022):**

- The potential metabolism of TTBPT was studied both using *in vitro* systems as well as *via in vivo* administration to rats. The authors reported that when incubated with human and rat liver microsomes, TTBPT was rapidly metabolized, with half-lives of 1.1 and 2.2 hours, respectively. The authors noted that tribromophenol (TBP) would be a potential metabolite of TTBPT. This *in vitro* result is not inconsistent with the results reported above, which indicated that very little TTBPT was absorbed, so metabolite formation *in vivo* would overall be very limited and unlikely to be detected. The authors also administered 250 mg/kg TTBPT to rats for 7 days and then assayed their blood for the presence of TBP. TBP was detected in the blood at a concentration of  $270 \pm 110$  µg/g lipid weight. This can be adjusted by the blood volume and blood lipid content for a rat, estimated at 0.014 g total blood lipids per rat (UCSF, 2020; Noble and Boucek, 1955). This results in 3.8 µg of TBP in the blood after exposure to 250 mg/kg (48 mg per rat, based on reported rat body weights) daily for 7 days. This represents 0.008% of the daily administered dose and suggests that the metabolism of TTBPT to TBP is not significant. Note that Zheng *et al.* (2022) stated that the "average formation rate" of TBP from TTBPT in the blood was 1.3%, but do not provide the basis for this estimate (*e.g.*, whether it is relative to the daily or cumulative administered dose or the concentration of the parent chemical in blood). In the ADME study described above, the absorption of TTBPT was found to be about 0.2% of the administered dose. If this estimate is combined with the formation rate of 1.3% given by Zheng *et al.* (2022), it yields a TBP production rate of 0.002% relative to the daily dose of TTBPT, which is similar to the 0.008% production rate derived above.

## Appendix II

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### Physical Hazards (Phys.)

#### Reactivity (Rx)

**Score (vH, H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for reactivity, with high confidence. This score is based on adequate studies of the oxidizing potential and explosiveness of TTBPT, and is supported by the use of TTBPT as a flame retardant and the fact that the chemical structure of TTBPT does not contain "chemical groups that would infer explosive properties" or "chemical groups that might act as an oxidising agent" (NICNAS, 2006). NICNAS (2006) additionally notes that TTBPT is "expected to be stable under normal use conditions," though it would decompose around 375°C and release potentially poisonous and corrosive fumes (hydrogen bromide, carbon monoxide, carbon dioxide, and nitrogen oxides) (NICNAS, 2006). This score is assigned with high confidence because it is based on experimental data in well-conducted, reliable tests.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

#### Studies

- **NICNAS (2006):**
  - TTBPT was tested in a series of experiments that assessed explosive/oxidizing properties conducted according to the EC Directive 92/69/EEC A.14 Explosive Properties method and the EC Directive 92/69/EEC A.17 Oxidising Properties (Solids) method. The results of these studies predict that TTBPT has no oxidizing properties and is nonexplosive (NOTOX, 1997g,h, as cited in NICNAS, 2006).

#### Flammability (F)

**Score (vH, H, M, or L): L**

TTBPT is assigned a score of **Low (L)** for flammability, with high confidence. This score is based on TTBPT's use as a flame retardant and the results of a preliminary screening test.

#### Authoritative and Screening Lists

- **Authoritative:** Not listed.
- **Screening:** Not listed.

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### Studies

- **NICNAS (2006):**

- TTBPT was tested in a preliminary screening test that assessed its flammability and auto-ignition temperature according to the EC Directive 92/69/EEC A.10 Flammability (Solids) method and the 92/69/EEC A.16 Relative Self-Ignition Temperature for Solids method. In terms of flammability, TTBPT emitted orange sparks and black smoke when in contact with the ignition source in a preliminary screening test. However, after the ignition source was removed, the spark extinguished immediately. Thus, no further testing was performed. No self-ignition was observed, and TTBPT melted and turned into a black residue around 400°C. Based on these findings, TTBPT was not considered highly flammable (NOTOX, 1997e,f, as cited in NICNAS, 2006).

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# Appendix A

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## Hazard Endpoint Acronyms

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# Hazard Endpoint Acronyms

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|     |                                  |
|-----|----------------------------------|
| AA  | Acute Aquatic Toxicity           |
| AT  | Acute Mammalian Toxicity         |
| B   | Bioaccumulation                  |
| C   | Carcinogenicity                  |
| CA  | Chronic Aquatic Toxicity         |
| Cr  | Corrosion/ Irritation (Skin/Eye) |
| D   | Developmental Toxicity           |
| E   | Endocrine Activity               |
| F   | Flammability                     |
| IrE | Eye Irritation/Corrosivity       |
| IrS | Skin Irritation/Corrosivity      |
| M   | Mutagenicity and Genotoxicity    |
| N   | Neurotoxicity                    |
| P   | Persistence                      |
| R   | Reproductive Toxicity            |
| Rx  | Reactivity                       |
| SnS | Sensitization – Skin             |
| SnR | Sensitization – Respiratory      |
| ST  | Systemic/Organ Toxicity          |

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# **Appendix B**

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## **PHAROS Results – Chemical Name and Associated Transformation Products**

Appendix II

Hazard Export from Pharos for "[118-79-6] 2,4,6-TRIBROMOPHENOL"  
https://pharosproject.net/chemicals/2005269  
2022-04-22

| Hazard Name                                                                                                                                                  | List Name                                                                      | Hazard Inherited From               | Endpoint                                                                                                                                                                                                                                        | Hazard Level      | GreenScreen List Translator Score | GreenScreen List Type       | Pharos Endpoint | Pharos Hazard Level | Pharos Priority | C2C Endpoint                                                 | C2C Hazard Level | HPD Priority List |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------------------|-----------------------------|-----------------|---------------------|-----------------|--------------------------------------------------------------|------------------|-------------------|
| PBT - Chemical for Priority Action                                                                                                                           | OSPAR - Priority PBTs & EDs & equivalent concern                               | BROMINATED FLAME RETARDANTS (BFR)   | PBT [Persistence, Bioaccumulation, and any of the following: Acute Aquatic Toxicity, Chronic Aquatic Toxicity, Carcinogenicity, Mutagenicity, Reproductive Toxicity, Developmental Toxicity, Systemic Toxicity/Organ Effects repeated exposure] | Unspecified       | LT-1                              | Authoritative A             | PBT             | Very High           | Purple          | Multiple Endpoints                                           | Red              | Yes               |
| Flame retardant substance class of concern for PB&T & long range transport                                                                                   | EHP - San Antonio Statement on BFRs & CFRs                                     | BROMINATED FLAME RETARDANTS (BFR)   | PBT (Persistence, Bioaccumulation & Toxicity)                                                                                                                                                                                                   | Very High         | NoGS                              | Not included in GreenScreen | PBT             | Very High           | Purple          |                                                              |                  | Yes               |
| H361 - Suspected of damaging fertility or the unborn child [Toxic to reproduction - Category 2]                                                              | GHS - Japan                                                                    |                                     | Reproductive Toxicity                                                                                                                                                                                                                           | Moderate          | LT-UNK                            | Screening A                 | REPRODUCTIVE    | Medium              | Orange          | Reproductive Toxicity (Repro + Dev)                          | Red              | No                |
| Endocrine Disruption                                                                                                                                         | ChemSec - SIN List                                                             |                                     | Endocrine Activity                                                                                                                                                                                                                              | High to Moderate  | LT-P1                             | Screening B                 | ENDOCRINE       | Medium              | Orange          | Endocrine Disruption                                         | Red or Yellow    | Yes               |
| Potential Endocrine Disruptor                                                                                                                                | TEDX - Potential Endocrine Disruptors                                          |                                     | Endocrine Activity                                                                                                                                                                                                                              | High to Moderate  | LT-P1                             | Screening B                 | ENDOCRINE       | Medium              | Orange          | Endocrine Disruption                                         | Red or Yellow    | Yes               |
| UNEP EDCs                                                                                                                                                    | UNEP EDCs                                                                      |                                     | Endocrine Activity                                                                                                                                                                                                                              | Potential Concern | NoGS                              | Not included in GreenScreen | ENDOCRINE       | Potential Concern   | Blue            |                                                              |                  | No                |
| Muta. 2; H341 - Suspected of causing genetic defects (modeled)                                                                                               | DK-EPA - Danish Advisory List                                                  |                                     | Mutagenicity/Genotoxicity                                                                                                                                                                                                                       | Potential Concern | NoGS                              | Not included in GreenScreen | GENE MUTATION   | Potential Concern   | Grey            |                                                              |                  | No                |
| H302 - Harmful if swallowed [Acute Toxicity (oral) - Category 4]                                                                                             | GHS - Japan                                                                    |                                     | Acute Mammalian Toxicity                                                                                                                                                                                                                        | Moderate          | LT-UNK                            | Screening A                 | MAMMALIAN       | Medium              | Yellow          | Oral Toxicity                                                | Yellow           | No                |
| Acute oral toxicity category 4                                                                                                                               | GHS - New Zealand                                                              |                                     | Acute Mammalian Toxicity                                                                                                                                                                                                                        | Moderate          | LT-UNK                            | Screening A                 | MAMMALIAN       | Medium              | Yellow          | Oral, Dermal, and/or Inhalative Toxicity                     |                  | No                |
| Acute Tox. 3 - Toxic if swallowed (modeled)                                                                                                                  | DK-EPA - Danish Advisory List                                                  |                                     | Acute Mammalian Toxicity                                                                                                                                                                                                                        | Potential Concern | NoGS                              | Not included in GreenScreen | MAMMALIAN       | Potential Concern   | Grey            |                                                              |                  | No                |
| H319 - Causes serious eye irritation [Serious eye damage / eye irritation - Category 2A]                                                                     | GHS - Japan                                                                    |                                     | Eye Irritation/Corrosivity                                                                                                                                                                                                                      | High              | LT-UNK                            | Screening A                 | EYE IRRITATION  | High                | Orange          | Skin, Eye, and Respiratory Corrosion/Irritation              | Yellow           | No                |
| H319 - Causes serious eye irritation (unverified) [Serious eye damage/eye irritation - Category 2A]                                                          | EU - Manufacturer REACH hazard submissions                                     |                                     | Eye Irritation/Corrosivity                                                                                                                                                                                                                      | Potential Concern | NoGS                              | Not included in GreenScreen | EYE IRRITATION  | Potential Concern   | Grey            |                                                              |                  | No                |
| H317 - May cause an allergic skin reaction [Skin sensitizer - Category 1]                                                                                    | GHS - Japan                                                                    |                                     | Skin Sensitization                                                                                                                                                                                                                              | High              | LT-UNK                            | Screening B                 | SKIN SENSITIZE  | High                | Orange          | Skin and Respiratory Sensitization                           | Red              | No                |
| H317 - May cause an allergic skin reaction (unverified) [Skin sensitization - Category 1]                                                                    | EU - Manufacturer REACH hazard submissions                                     |                                     | Skin Sensitization                                                                                                                                                                                                                              | Potential Concern | NoGS                              | Not included in GreenScreen | SKIN SENSITIZE  | Potential Concern   | Grey            |                                                              |                  | No                |
| H371 - May cause damage to organs [Specific target organs/systemic toxicity following single exposure - Category 2]                                          | GHS - Japan                                                                    |                                     | Systemic Toxicity/Organ Effects [Single Exposure] and/or Neurotoxicity [Single Exposure]                                                                                                                                                        | High              | LT-UNK                            | Screening A                 | ORGAN TOXICANT  | High                | Orange          | Oral, Dermal, and/or Inhalative Toxicity                     | Yellow           | No                |
| H373 - May cause damage to organs through prolonged or repeated exposure [Specific target organs/systemic toxicity following repeated exposure - Category 2] | GHS - Japan                                                                    |                                     | Systemic Toxicity/Organ Effects [Repeated Exposure] and/or Neurotoxicity [Repeated Exposure]                                                                                                                                                    | Moderate          | LT-UNK                            | Screening A                 | ORGAN TOXICANT  | Medium              | Yellow          | Oral, Dermal, and/or Inhalative Toxicity                     | Yellow           | No                |
| H400 - Very toxic to aquatic life [Hazardous to the aquatic environment (acute) - Category 1]                                                                | GHS - Japan                                                                    |                                     | Acute Aquatic Toxicity                                                                                                                                                                                                                          | Very High         | LT-UNK                            | Screening A                 | ACUTE AQUATIC   | Very High           | Orange          | Acute Aquatic Toxicity (Fish, Invertebrates, and/or Algae)   | Red              | No                |
| Aquatic Acute1 - Very toxic to aquatic life (modeled)                                                                                                        | DK-EPA - Danish Advisory List                                                  |                                     | Acute Aquatic Toxicity                                                                                                                                                                                                                          | Potential Concern | NoGS                              | Not included in GreenScreen | ACUTE AQUATIC   | Potential Concern   | Grey            |                                                              |                  | No                |
| Aquatic Chronic1 - Very toxic to aquatic life with long lasting effects (modeled)                                                                            | DK-EPA - Danish Advisory List                                                  |                                     | Acute Aquatic Toxicity                                                                                                                                                                                                                          | Potential Concern | NoGS                              | Not included in GreenScreen | ACUTE AQUATIC   | Potential Concern   | Grey            |                                                              |                  | No                |
| H400 - Very toxic to aquatic life (unverified) [Hazardous to the aquatic environment (acute) - Category 1]                                                   | EU - Manufacturer REACH hazard submissions                                     |                                     | Acute Aquatic Toxicity                                                                                                                                                                                                                          | Potential Concern | NoGS                              | Not included in GreenScreen | ACUTE AQUATIC   | Potential Concern   | Grey            |                                                              |                  | No                |
| H410 - Very toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment (chronic) - Category 1]                                    | GHS - Japan                                                                    |                                     | T & P and/or B [(Chronic Aquatic Toxicity and sometimes Persistence) or (Acute Aquatic Toxicity and Persistence and/or Bioaccumulation)]                                                                                                        | Unspecified       | LT-P1                             | Screening B                 | CHRON AQUATIC   | Very High           | Orange          | Chronic Aquatic Toxicity (Fish, Invertebrates, and/or Algae) |                  | No                |
| Flame Retardants                                                                                                                                             | American Apparel and Footwear Association Restricted Substance List (AAFA RSL) | Halogenated Flame Retardants (HFRs) | Restricted List                                                                                                                                                                                                                                 | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |                                                              |                  | No                |

Appendix II

| Hazard Name                                                                    | List Name                                                                                   | Hazard Inherited From               | Endpoint        | Hazard Level      | GreenScreen List Translator Score | GreenScreen List Type       | Pharos Endpoint | Pharos Hazard Level | Pharos Priority | C2C Endpoint | C2C Hazard Level | HPD Priority List |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------|-----------------|-------------------|-----------------------------------|-----------------------------|-----------------|---------------------|-----------------|--------------|------------------|-------------------|
| Core Restrictions                                                              | C2C Certified v4 Product Standard Restricted Substances List (RSL) - Effective July 1, 2021 | HALOGENATED ORGANIC COMPOUNDS       | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Candidate Chemical List                                                        | CA SCP - Candidate Chemicals                                                                |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| CoHC List (non SVHC)                                                           | CPA - Chemical Footprint                                                                    | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Substances selected for RMOA or hazard assessment                              | EU - PACT-RMOA Substances                                                                   |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Brominated Organic Compounds                                                   | GreenScreen Certified Standard for Cleaners & Degreasers RSL                                | Brominated Organic Compounds        | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Organohalogens (including chlorinated plastics)                                | GreenScreen Certified Standard for Food Service Ware                                        | HALOGENATED ORGANIC COMPOUNDS       | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Flame Retardants                                                               | GSPI - Six Classes of Problematic Chemicals                                                 | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Declarable and Reference Substance Lists (DSL and RSL)                         | IEC 62474 - Material Declaration for Products of and for the Electrotechnical Industry      |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Red List substance to avoid in Living Building Challenge V2.1 projects         | Living Building Challenge 2.1 - Red List of Materials & Chemicals                           | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Prospective Red List substances to avoid in Living Building Challenge projects | Living Building Challenge 3.0 - Red List of Materials & Chemicals                           | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Red List substances to avoid in Living Building Challenge V3 projects          | Living Building Challenge 3.0 - Red List of Materials & Chemicals                           |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Red List substances to avoid in Living Building Challenge V3.1 projects        | Living Building Challenge 3.1 - Red List of Materials & Chemicals                           |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Red List substances to avoid in Living Building Challenge V4.0 projects        | Living Building Challenge 4.0 - Red List of Materials & Chemicals                           |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Chemicals of High Concern                                                      | MDH - Chemicals of High Concern and Priority Chemicals                                      |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Precautionary list of substances recommended for avoidance                     | P&W - Precautionary List                                                                    | Halogenated Flame Retardants (HFRs) | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Substances of Very High Concern (RIVM ZZS)                                     | Substances of Very High Concern (RIVM ZZS)                                                  | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| TSCA Chemical Substance Inventory - Active                                     | TSCA Chemical Substance Inventory (Active-Inactive)                                         |                                     | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Substance to avoid to fulfill LEED Pilot Credit 11                             | USGBC - LEED Pilot Credits                                                                  | BROMINATED FLAME RETARDANTS (BFR)   | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |
| Substance to avoid to fulfill LEED Pilot Credit 54 Option 2                    | USGBC - LEED Pilot Credits                                                                  | Halogenated Flame Retardants (HFRs) | Restricted List | Potential Concern | NoGS                              | Not included in GreenScreen | RESTRICTED LIST | Potential Concern   | Blue            |              |                  | No                |

## **Appendix II**

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Content Copyright 2022 ©: GRADIENT | 1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)

## **Appendix C**

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### **EPI Suite Modeling Results**

## Appendix II

CAS Number:

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

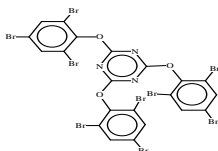
CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

### ----- EPI SUMMARY (v4.11) -----

Henry LC (atm-m3/mole) : -----  
Log Kow (octanol-water): -----  
Boiling Point (deg C) : -----  
Water Solubility (mg/L): -----  
Physical Property Inputs:  
Vapor Pressure (mm Hg) : -----  
Melting Point (deg C) : -----



KOWWIN Program (v1.68) Results:

=====

Log Kow(version 1.68 estimate): 11.46

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

| TYPE   | NUM | LOGKOW FRAGMENT DESCRIPTION                | COEFF   | VALUE   |
|--------|-----|--------------------------------------------|---------|---------|
| Frag   | 21  | Aromatic Carbon                            | 0.2940  | 6.1740  |
| Frag   | 3   | Aromatic Nitrogen                          | -0.7324 | -2.1972 |
| Frag   | 9   | -Br [bromine, aromatic attach]             | 0.8900  | 8.0100  |
| Frag   | 3   | -O- [aliphatic O, two aromatic attach]     | 0.2923  | 0.8769  |
| Factor | 1   | sym-Triazine ring correction               | 0.8856  | 0.8856  |
| Factor | 3   | Ortho-subst on di-aromatic ether (non-cyl) | -0.8396 | -2.5188 |
| Const  |     | Equation Constant                          |         | 0.2290  |

Log Kow = 11.4595

MPBPVP (v1.43) Program Results:

=====

Experimental Database Structure Match: no data

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

### ----- SUMMARY MPBVP v1.43 -----

Boiling Point: 767.73 deg C (Adapted Stein and Brown Method)

Melting Point: 349.84 deg C (Adapted Joback Method)

Melting Point: 334.62 deg C (Gold and Ogle Method)

Mean Melt Pt : 342.23 deg C (Joback; Gold,Ogle Methods)

Selected MP: 337.66 deg C (Weighted Value)

Vapor Pressure Estimations (25 deg C):

(Using BP: 767.73 deg C (estimated))

(Using MP: 337.66 deg C (estimated))

VP: 2.34E-029 mm Hg (Antoine Method)

: 3.12E-027 Pa (Antoine Method)

VP: 6.97E-019 mm Hg (Modified Grain Method)

: 9.29E-017 Pa (Modified Grain Method)

VP: 3.95E-018 mm Hg (Mackay Method)

: 5.27E-016 Pa (Mackay Method)

## Appendix II

Selected VP: 6.97E-019 mm Hg (Modified Grain Method)  
: 9.29E-017 Pa (Modified Grain Method)  
Subcooled liquid VP: 2.48E-015 mm Hg (25 deg C, Mod-Grain method)  
: 3.31E-013 Pa (25 deg C, Mod-Grain method)

| TYPE          | NUM | BOIL DESCRIPTION            | COEFF | VALUE   |
|---------------|-----|-----------------------------|-------|---------|
| Group         | 3   | -O- (nonring)               | 25.16 | 75.48   |
| Group         | 6   | CH (aromatic)               | 28.53 | 171.18  |
| Group         | 15  | -C (aromatic)               | 30.76 | 461.40  |
| Group         | 3   | N (aromatic)                | 39.88 | 119.64  |
| Group         | 9   | -Br (to aromat)             | 61.85 | 556.65  |
| *             |     | Equation Constant           |       | 198.18  |
| =====         |     |                             |       |         |
| RESULT-uncorr |     | BOILING POINT in deg Kelvin |       | 1582.53 |
| RESULT- corr  |     | BOILING POINT in deg Kelvin |       | 1040.89 |
|               |     | BOILING POINT in deg C      |       | 767.73  |

| TYPE         | NUM | MELT DESCRIPTION            | COEFF | VALUE   |
|--------------|-----|-----------------------------|-------|---------|
| Group        | 3   | -O- (nonring)               | 22.23 | 66.69   |
| Group        | 6   | CH (aromatic)               | 8.13  | 48.78   |
| Group        | 15  | -C (aromatic)               | 37.02 | 555.30  |
| Group        | 3   | N (aromatic)                | 68.40 | 205.20  |
| Group        | 9   | -Br (to aromat)             | 43.43 | 390.87  |
| *            |     | Equation Constant           |       | 122.50  |
| =====        |     |                             |       |         |
| RESULT       |     | MELTING POINT in deg Kelvin |       | 1389.34 |
| RESULT-limit |     | MELTING POINT in deg Kelvin |       | 623.00  |
|              |     | MELTING POINT in deg C      |       | 349.84  |

Water Sol from Kow (WSKOW v1.42) Results:

=====

Water Sol: 1.849e-011 mg/L

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- WSKOW v1.42 Results -----

Log Kow (estimated) : 11.46

Log Kow (experimental): not available from database

Log Kow used by Water solubility estimates: 11.46

Equation Used to Make Water Sol estimate:

Log S (mol/L) = 0.796 - 0.854 log Kow - 0.00728 MW + Correction  
(used when Melting Point NOT available)

Correction(s): Value

-----

No Applicable Correction Factors

Log Water Solubility (in moles/L) : -16.761

Water Solubility at 25 deg C (mg/L): 1.849e-011

WATERNT Program (v1.01) Results:

=====



## Appendix II

Water Sol (v1.01 est): 1.0674e-006 mg/L

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

| TYPE  | NUM | WATER SOLUBILITY FRAGMENT DESCRIPTION        | COEFF   | VALUE   |
|-------|-----|----------------------------------------------|---------|---------|
| Frag  | 6   | Aromatic Carbon (C-H type)                   | -0.3359 | -2.0152 |
| Frag  | 1   | Aromatic Nitrogen [max count of 1 allowed]   | 1.9255  | 1.9255  |
| Frag  | 9   | -Br [bromine, aromatic attach]               | -0.5661 | -5.0953 |
| Frag  | 3   | -O- [aliphatic O, two aromatic attach]       | 0.3181  | 0.9542  |
| Frag  | 15  | Aromatic Carbon (C-substituent type)         | -0.5400 | -8.0993 |
| Const |     | Equation Constant                            |         | 0.2492  |
| NOTE  |     | Minimum Solubility (log S = -12.00) Applied! |         |         |

Log Water Sol (moles/L) at 25 dec C = -12.0000  
Water Solubility (mg/L) at 25 dec C =1.0674e-006

ECOSAR Program (v1.11) Results:

ECOSAR Version 1.11 Results Page

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

CAS Num:

ChemID1:

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

Log Kow: 11.460 (EPISuite Kowwin v1.68 Estimate)

Log Kow: (User Entered)

Log Kow: (PhysProp DB exp value - for comparison only)

Melt Pt: (User Entered for Wat Sol estimate)

Melt Pt: (deg C, PhysProp DB exp value for Wat Sol estimate)

Wat Sol: 1.849E-011 (mg/L, EPISuite WSKowwin v1.43 Estimate)

Wat Sol: (User Entered)

Wat Sol: (PhysProp DB exp value)

Values used to Generate ECOSAR Profile

Log Kow: 11.460 (EPISuite Kowwin v1.68 Estimate)

Wat Sol: 1.849E-011 (mg/L, EPISuite WSKowwin v1.43 Estimate)

ECOSAR v1.11 Class-specific Estimations

Triazines, Aromatic

| ECOSAR Class        | Organism      | Duration | End Pt | Predicted mg/L (ppm) |
|---------------------|---------------|----------|--------|----------------------|
| Triazines, Aromatic | : Fish        | 96-hr    | LC50   | 4.02e-006 *          |
| Triazines, Aromatic | : Daphnid     | 48-hr    | LC50   | 0.000605 *           |
| Triazines, Aromatic | : Green Algae | 96-hr    | EC50   | 5.56e-005 *          |
| Triazines, Aromatic | : Fish        |          | ChV    | 1.65e-007 *          |
| Triazines, Aromatic | : Daphnid     |          | ChV    | 1.44e-005 *          |
| Triazines, Aromatic | : Green Algae |          | ChV    | 0.000463 *           |
| Triazines, Aromatic | : Fish (SW)   | 96-hr    | LC50   | 9.09e-005 *          |
| Triazines, Aromatic | : Mysid (SW)  | 96-hr    | LC50   | 1.05e-005 *          |

## Appendix II

|                     |              |     |             |
|---------------------|--------------|-----|-------------|
| Triazines, Aromatic | : Fish (SW)  | ChV | 0.000378 *  |
| Triazines, Aromatic | : Mysid (SW) | ChV | 7.06e-011 * |

|                                            |               |       |      |             |
|--------------------------------------------|---------------|-------|------|-------------|
| Neutral Organic SAR<br>(Baseline Toxicity) | : Fish        | 96-hr | LC50 | 2.8e-006 *  |
|                                            | : Daphnid     | 48-hr | LC50 | 3.81e-006 * |
|                                            | : Green Algae | 96-hr | EC50 | 0.000105 *  |
|                                            | : Fish        |       | ChV  | 7.67e-007 * |
|                                            | : Daphnid     |       | ChV  | 4.22e-006 * |
|                                            | : Green Algae |       | ChV  | 0.000192 *  |

Note: \* = asterisk designates: Chemical may not be soluble enough to measure this predicted effect. If the effect level exceeds the water solubility by 10X, typically no effects at saturation (NES) are reported.

### Class Specific LogKow Cut-Offs

If the log Kow of the chemical is greater than the endpoint specific cut-offs presented below, then no effects at saturation are expected for those endpoints.

#### Triazines, Aromatic:

Maximum LogKow: 5.0 (LC50)  
Maximum LogKow: 6.4 (EC50)  
Maximum LogKow: 8.0 (ChV)

#### Baseline Toxicity SAR Limitations:

Maximum LogKow: 5.0 (Fish 96-hr LC50; Daphnid LC50)  
Maximum LogKow: 6.4 (Green Algae EC50)  
Maximum LogKow: 8.0 (ChV)

### HENRYWIN (v3.20) Program Results:

Bond Est : 2.42E-012 atm-m3/mole (2.46E-007 Pa-m3/mole)  
Group Est: Incomplete

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :  
MOL FOR: C21 H6 Br9 N3 O3  
MOL WT : 1067.44

#### HENRYWIN v3.20 Results

| CLASS    | BOND CONTRIBUTION DESCRIPTION          | COMMENT | VALUE   |
|----------|----------------------------------------|---------|---------|
| HYDROGEN | 6 Hydrogen to Carbon (aromatic) Bonds  |         | -0.9258 |
| FRAGMENT | 18 Car-Car                             |         | 4.7485  |
| FRAGMENT | 9 Car-Br                               |         | 2.2084  |
| FRAGMENT | 6 Car-Nar                              |         | 9.7693  |
| FRAGMENT | 6 Car-O                                |         | 2.0836  |
| FACTOR   | 2 Additional aromatic nitrogen(s)      |         | -5.0000 |
| FACTOR   | 3 -O-carbon ortho-position to Nar      |         | -2.8800 |
| RESULT   | BOND ESTIMATION METHOD for LWAPC VALUE | TOTAL   | 10.004  |

HENRYs LAW CONSTANT at 25 deg C = 2.42E-012 atm-m3/mole  
= 9.91E-011 unitless  
= 2.46E-007 Pa-m3/mole

## Appendix II

|        | GROUP CONTRIBUTION DESCRIPTION              | COMMENT    | VALUE |
|--------|---------------------------------------------|------------|-------|
|        | 6 Car-H (Car) (Car)                         |            | 0.66  |
|        | 9 Car (Car) (Car) (Br)                      |            | 4.41  |
|        | 3 Car (Car) (Car) (O)                       |            | -1.29 |
|        | 3 Nar (Car) (Car)                           |            | 9.18  |
|        | 3 O (Car) (Car)                             | ESTIMATE   | 5.10  |
|        | MISSING Value for: Car (Nar) (Nar) (O)      |            |       |
|        | MISSING Value for: Car (Nar) (O) (Nar)      |            |       |
|        | MISSING Value for: Car (Nar) (O) (Nar)      |            |       |
| RESULT | GROUP ESTIMATION METHOD for LOG GAMMA VALUE | INCOMPLETE | 18.06 |

For Henry LC Comparison Purposes:

Exper Database: none available

User-Entered Henry LC: not entered

Henrys LC [via VP/WSol estimate using User-Entered or Estimated values]:

HLC: 5.294E-008 atm-m3/mole (5.364E-003 Pa-m3/mole)

VP: 6.97E-019 mm Hg (source: MPBPVP)

WS: 1.85E-011 mg/L (source: WSKOWWIN)

Log Octanol-Air (KOAWIN v1.10) Results:

=====

Log Koa: 21.465

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- KOAWIN v1.10 Results -----

Log Koa (octanol/air) estimate: 21.465

Koa (octanol/air) estimate: 2.915e+021

Using:

Log Kow: 11.46 (KowWin est)

HenryLC: 2.42e-012 atm-m3/mole (HenryWin est)

Log Kaw: -10.005 (air/water part.coef.)

LogKow : ---- (exp database)

LogKow : 11.46 (KowWin estimate)

Henry LC: --- atm-m3/mole(exp database)

Henry LC: 2.42e-012 atm-m3/mole (HenryWin bond estimate)

Log Koa (octanol/air) estimate: 21.465 (from KowWin/HenryWin)

BIOWIN (v4.10) Program Results:

=====

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- BIOWIN v4.10 Results -----

Biowin1 (Linear Model Prediction) : Does Not Biodegrade Fast

Biowin2 (Non-Linear Model Prediction): Does Not Biodegrade Fast

Biowin3 (Ultimate Biodegradation Timeframe): Recalcitrant

Biowin4 (Primary Biodegradation Timeframe): Recalcitrant

Biowin5 (MITI Linear Model Prediction) : Does Not Biodegrade Fast

## Appendix II

Biowin6 (MITI Non-Linear Model Prediction): Does Not Biodegrade Fast

Biowin7 (Anaerobic Model Prediction): Biodegrades Fast

Ready Biodegradability Prediction: NO

| TYPE   | NUM | Biowin1 FRAGMENT DESCRIPTION        | COEFF   | VALUE   |
|--------|-----|-------------------------------------|---------|---------|
| Frag   | 1   | Triazine ring (symmetric)           | 0.0095  | 0.0095  |
| Frag   | 9   | Aromatic bromide [-Br]              | -0.1103 | -0.9931 |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon] | 0.1319  | 0.3957  |
| MolWt  | *   | Molecular Weight Parameter          |         | -0.5082 |
| Const  | *   | Equation Constant                   |         | 0.7475  |
| RESULT |     | Biowin1 (Linear Biodeg Probability) |         | -0.3484 |

| TYPE   | NUM | Biowin2 FRAGMENT DESCRIPTION            | COEFF   | VALUE    |
|--------|-----|-----------------------------------------|---------|----------|
| Frag   | 1   | Triazine ring (symmetric)               | -5.7252 | -5.7252  |
| Frag   | 9   | Aromatic bromide [-Br]                  | -1.6779 | -15.1011 |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]     | 2.2483  | 6.7449   |
| MolWt  | *   | Molecular Weight Parameter              |         | -15.1576 |
| RESULT |     | Biowin2 (Non-Linear Biodeg Probability) |         | 0.0000   |

A Probability Greater Than or Equal to 0.5 indicates --> Biodegrades Fast

A Probability Less Than 0.5 indicates --> Does NOT Biodegrade Fast

| TYPE   | NUM | Biowin3 FRAGMENT DESCRIPTION             | COEFF   | VALUE   |
|--------|-----|------------------------------------------|---------|---------|
| Frag   | 1   | Triazine ring (symmetric)                | -0.2459 | -0.2459 |
| Frag   | 9   | Aromatic bromide [-Br]                   | -0.1360 | -1.2240 |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]      | -0.0581 | -0.1744 |
| MolWt  | *   | Molecular Weight Parameter               |         | -2.3589 |
| Const  | *   | Equation Constant                        |         | 3.1992  |
| RESULT |     | Biowin3 (Survey Model - Ultimate Biodeg) |         | -0.8039 |

| TYPE   | NUM | Biowin4 FRAGMENT DESCRIPTION            | COEFF   | VALUE   |
|--------|-----|-----------------------------------------|---------|---------|
| Frag   | 1   | Triazine ring (symmetric)               | -0.0575 | -0.0575 |
| Frag   | 9   | Aromatic bromide [-Br]                  | -0.1535 | -1.3816 |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]     | 0.0771  | 0.2314  |
| MolWt  | *   | Molecular Weight Parameter              |         | -1.5400 |
| Const  | *   | Equation Constant                       |         | 3.8477  |
| RESULT |     | Biowin4 (Survey Model - Primary Biodeg) |         | 1.0999  |

Result Classification: 5.00 -> hours 4.00 -> days 3.00 -> weeks

(Primary & Ultimate) 2.00 -> months 1.00 -> longer

| TYPE   | NUM | Biowin5 FRAGMENT DESCRIPTION             | COEFF  | VALUE   |
|--------|-----|------------------------------------------|--------|---------|
| Frag   | 1   | Triazine ring (symmetric)                | 0.1168 | 0.1168  |
| Frag   | 9   | Aromatic bromide [-Br]                   | 0.1668 | 1.5010  |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]      | 0.1952 | 0.5857  |
| Frag   | 6   | Aromatic-H                               | 0.0082 | 0.0493  |
| MolWt  | *   | Molecular Weight Parameter               |        | -3.1756 |
| Const  | *   | Equation Constant                        |        | 0.7121  |
| RESULT |     | Biowin5 (MITI Linear Biodeg Probability) |        | -0.2107 |

## Appendix II

| TYPE   | NUM | Biowin6 FRAGMENT DESCRIPTION                 | COEFF   | VALUE    |
|--------|-----|----------------------------------------------|---------|----------|
| Frag   | 1   | Triazine ring (symmetric)                    | -9.3006 | -9.3006  |
| Frag   | 9   | Aromatic bromide [-Br]                       | 1.5021  | 13.5192  |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]          | 1.3227  | 3.9681   |
| Frag   | 6   | Aromatic-H                                   | 0.1201  | 0.7208   |
| MolWt  | *   | Molecular Weight Parameter                   |         | -30.8155 |
| RESULT |     | Biowin6 (MITI Non-Linear Biodeg Probability) |         | 0.0000   |

A Probability Greater Than or Equal to 0.5 indicates --> Readily Degradable  
A Probability Less Than 0.5 indicates --> NOT Readily Degradable

| TYPE   | NUM | Biowin7 FRAGMENT DESCRIPTION           | COEFF   | VALUE   |
|--------|-----|----------------------------------------|---------|---------|
| Frag   | 1   | Triazine ring (symmetric)              | -0.0783 | -0.0783 |
| Frag   | 9   | Aromatic bromide [-Br]                 | 0.0000  | 0.0000  |
| Frag   | 3   | Aromatic ether [-O-aromatic carbon]    | 0.1780  | 0.5340  |
| Frag   | 6   | Aromatic-H                             | -0.0954 | -0.5726 |
| Const  | *   | Equation Constant                      |         | 0.8361  |
| RESULT |     | Biowin7 (Anaerobic Linear Biodeg Prob) |         | 0.7193  |

A Probability Greater Than or Equal to 0.5 indicates --> Biodegrades Fast  
A Probability Less Than 0.5 indicates --> Does NOT Biodegrade Fast

Ready Biodegradability Prediction: (YES or NO)

Criteria for the YES or NO prediction: If the Biowin3 (ultimate survey model) result is "weeks" or faster (i.e. "days", "days to weeks", or "weeks" AND the Biowin5 (MITI linear model) probability is  $\geq 0.5$ , then the prediction is YES (readily biodegradable). If this condition is not satisfied, the prediction is NO (not readily biodegradable). This method is based on application of Bayesian analysis to ready biodegradation data (see Help). Biowin5 and 6 also predict ready biodegradability, but for degradation in the OECD301C test only; using data from the Chemicals Evaluation and Research Institute Japan (CERIJ) database.

BioHCwin (v1.01) Program Results:

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br  
CHEM :  
MOL FOR: C21 H6 Br9 N3 O3  
MOL WT : 1067.44

----- BioHCwin v1.01 Results -----

NO Estimate Possible ... Structure NOT a Hydrocarbon  
(Contains atoms other than C, H or S (-S-))

AEROWIN Program (v1.00) Results:

Sorption to aerosols (25 Dec C) [AEROWIN v1.00]:  
Vapor pressure (liquid/subcooled): 3.31E-013 Pa (2.48E-015 mm Hg)  
Log Koa (Koawin est ): 21.465  
Kp (particle/gas partition coef. (m3/ug)):

## Appendix II

Mackay model : 9.07E+006  
Octanol/air (Koa) model: 7.16E+008  
Fraction sorbed to airborne particulates (phi):  
Junge-Pankow model : 1  
Mackay model : 1  
Octanol/air (Koa) model: 1

### AOP Program (v1.92) Results:

=====

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- SUMMARY (AOP v1.92): HYDROXYL RADICALS (25 deg C) -----

Hydrogen Abstraction = 0.0000 E-12 cm3/molecule-sec  
Reaction with N, S and -OH = 0.0000 E-12 cm3/molecule-sec  
Addition to Triple Bonds = 0.0000 E-12 cm3/molecule-sec  
Addition to Olefinic Bonds = 0.0000 E-12 cm3/molecule-sec  
\*\*Addition to Aromatic Rings = 1.4807 E-12 cm3/molecule-sec  
Addition to Fused Rings = 0.0000 E-12 cm3/molecule-sec

OVERALL OH Rate Constant = 1.4807 E-12 cm3/molecule-sec  
HALF-LIFE = 7.224 Days (12-hr day; 1.5E6 OH/cm3)  
HALF-LIFE = 86.684 Hrs

\*\*\*\*\* \*\* Designates Estimation(s) Using ASSUMED Value(s)

----- SUMMARY (AOP v1.91): OZONE REACTION (25 deg C) -----

\*\*\*\*\* NO OZONE REACTION ESTIMATION \*\*\*\*\*  
(ONLY Olefins and Acetylenes are Estimated)

Experimental Database: NO Structure Matches  
Fraction sorbed to airborne particulates (phi):  
1 (Junge-Pankow, Mackay avg)  
1 (Koa method)  
Note: the sorbed fraction may be resistant to atmospheric oxidation

### KOCWIN Program (v2.00) Results:

=====

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- KOCWIN v2.00 Results -----

#### Koc Estimate from MCI:

-----

First Order Molecular Connectivity Index ..... : 16.994  
Non-Corrected Log Koc (0.5213 MCI + 0.60) ..... : 9.4588  
Fragment Correction(s):  
2 Ether, aromatic (-C-O-C-) ..... : -1.3582  
1 Triazine ring ..... : -0.2257  
Corrected Log Koc ..... : 7.8750

Estimated Koc: 7.499e+007 L/kg <=====

#### Koc Estimate from Log Kow:

-----

Log Kow (Kowwin estimate) ..... : 11.46  
Non-Corrected Log Koc (0.55313 logKow + 0.9251) .... : 7.2640  
Fragment Correction(s):  
2 Ether, aromatic (-C-O-C-) ..... : 0.1118  
1 Triazine ring ..... : -0.1239

## Appendix II

Corrected Log Koc ..... : 7.2519

Estimated Koc: 1.786e+007 L/kg <=====

### HYDROWIN Program (v2.00) Results:

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- HYDROWIN v2.00 Results -----

Currently, this program can NOT estimate a hydrolysis rate constant for the type of chemical structure entered!!

ONLY Esters, Carbamates, Epoxides, Halomethanes (containing 1-3 halogens), Specific Alkyl Halides & Phosphorus Esters can be estimated!!

When present, various hydrolyzable compound-types will be identified.  
For more information, (Click OVERVIEW in Help or see the User's Guide)

\*\*\*\*\* CALCULATION NOT PERFORMED \*\*\*\*\*

### BCFBAF Program (v3.01) Results:

SMILES : c1c(cc(c(c1Br)Oc2nc(nc(n2)Oc3c(cc(cc3Br)Br)Br)Oc4c(cc(cc4Br)Br)Br)Br)Br

CHEM :

MOL FOR: C21 H6 Br9 N3 O3

MOL WT : 1067.44

----- BCFBAF v3.01 -----

#### Summary Results:

Log BCF (regression-based estimate): 1.42 (BCF = 26.4 L/kg wet-wt)  
Biotransformation Half-Life (days) : 812 (normalized to 10 g fish)  
Log BAF (Arnot-Gobas upper trophic): 3.94 (BAF = 8.77e+003 L/kg wet-wt)

Log Kow (experimental): not available from database

Log Kow used by BCF estimates: 11.46

#### Equation Used to Make BCF estimate:

Log BCF = -0.49 log Kow + 7.554 + Correction

|                            |        |
|----------------------------|--------|
| Correction(s):             | Value  |
| Aromatic sym-triazine ring | -0.517 |

Estimated Log BCF = 1.422 (BCF = 26.42 L/kg wet-wt)

### Whole Body Primary Biotransformation Rate Estimate for Fish:

| TYPE  | NUM | LOG BIOTRANSFORMATION FRAGMENT DESCRIPTION | COEFF   | VALUE   |
|-------|-----|--------------------------------------------|---------|---------|
| Frag  | 1   | Triazine ring (symmetric)                  | -0.0123 | -0.0123 |
| Frag  | 9   | Aromatic bromide [-Br]                     | 0.3964  | 3.5672  |
| Frag  | 3   | Aromatic ether [-O-aromatic carbon]        | -0.0694 | -0.2082 |
| Frag  | 6   | Aromatic-H                                 | 0.2664  | 1.5983  |
| Frag  | 3   | Benzene                                    | -0.4277 | -1.2832 |
| L Kow | *   | Log Kow = 11.46 (KowWin estimate)          | 0.3073  | 3.5220  |
| MolWt | *   | Molecular Weight Parameter                 |         | -2.7373 |
| Const | *   | Equation Constant                          |         | -1.5371 |

## Appendix II

|        |                                                   |        |
|--------|---------------------------------------------------|--------|
| RESULT | LOG Bio Half-Life (days)                          | 2.9095 |
| RESULT | Bio Half-Life (days)                              | 811.9  |
| NOTE   | Bio Half-Life Normalized to 10 g fish at 15 deg C |        |

### Biotransformation Rate Constant:

kM (Rate Constant): 0.0008538 /day (10 gram fish)  
 kM (Rate Constant): 0.0004801 /day (100 gram fish)  
 kM (Rate Constant): 0.00027 /day (1 kg fish)  
 kM (Rate Constant): 0.0001518 /day (10 kg fish)

### Arnot-Gobas BCF & BAF Methods (including biotransformation rate estimates):

Estimated Log BCF (upper trophic) = 0.451 (BCF = 2.827 L/kg wet-wt)  
 Estimated Log BAF (upper trophic) = 3.943 (BAF = 8772 L/kg wet-wt)  
 Estimated Log BCF (mid trophic) = 0.577 (BCF = 3.777 L/kg wet-wt)  
 Estimated Log BAF (mid trophic) = 3.585 (BAF = 3842 L/kg wet-wt)  
 Estimated Log BCF (lower trophic) = 0.617 (BCF = 4.142 L/kg wet-wt)  
 Estimated Log BAF (lower trophic) = 3.313 (BAF = 2056 L/kg wet-wt)

### Arnot-Gobas BCF & BAF Methods (assuming a biotransformation rate of zero):

Estimated Log BCF (upper trophic) = 0.585 (BCF = 3.845 L/kg wet-wt)  
 Estimated Log BAF (upper trophic) = 4.176 (BAF = 1.501e+004 L/kg wet-wt)

### Volatilization From Water

#### Chemical Name:

Molecular Weight : 1067.40 g/mole  
 Water Solubility : -----  
 Vapor Pressure : -----  
 Henry's Law Constant: 2.42E-012 atm-m3/mole (estimated by Bond SAR Method)

|                           | RIVER      | LAKE       |
|---------------------------|------------|------------|
|                           | -----      | -----      |
| Water Depth (meters):     | 1          | 1          |
| Wind Velocity (m/sec):    | 5          | 0.5        |
| Current Velocity (m/sec): | 1          | 0.05       |
| HALF-LIFE (hours) :       | 7.904E+008 | 8.623E+009 |
| HALF-LIFE (days) :        | 3.293E+007 | 3.593E+008 |
| HALF-LIFE (years) :       | 9.017E+004 | 9.837E+005 |

### STP Fugacity Model: Predicted Fate in a Wastewater Treatment Facility

(using 10000 hr Bio P,A,S)

#### PROPERTIES OF:

|                                                                                   |                        |
|-----------------------------------------------------------------------------------|------------------------|
| Molecular weight (g/mol)                                                          | 1067.4                 |
| Aqueous solubility (mg/l)                                                         | 0                      |
| Vapour pressure (Pa)                                                              | 0                      |
| (atm)                                                                             | 0                      |
| (mm Hg)                                                                           | 0                      |
| Henry 's law constant (Atm-m3/mol)                                                | 2.42E-012              |
| Air-water partition coefficient                                                   | 9.89708E-011           |
| Octanol-water partition coefficient (Kow)                                         | 2.88403E+011           |
| Log Kow                                                                           | 11.46                  |
| Biomass to water partition coefficient                                            | 5.76806E+010           |
| Temperature [deg C]                                                               | 25                     |
| Biodeg rate constants (h^-1), half life in biomass (h) and in 2000 mg/L MLSS (h): |                        |
| -Primary tank                                                                     | 0.00 10000.00 10000.00 |
| -Aeration tank                                                                    | 0.00 10000.00 10000.00 |



## Appendix II

|                |      |          |          |
|----------------|------|----------|----------|
| -Settling tank | 0.00 | 10000.00 | 10000.00 |
|----------------|------|----------|----------|

### STP Overall Chemical Mass Balance:

|                         | g/h       | mol/h    | percent |
|-------------------------|-----------|----------|---------|
| Influent                | 1.00E+001 | 9.4E-003 | 100.00  |
| Primary sludge          | 5.99E+000 | 5.6E-003 | 59.89   |
| Waste sludge            | 3.34E+000 | 3.1E-003 | 33.36   |
| Primary volatilization  | 1.14E-016 | 1.1E-019 | 0.00    |
| Settling volatilization | 2.52E-016 | 2.4E-019 | 0.00    |
| Aeration off gas        | 6.22E-016 | 5.8E-019 | 0.00    |
| Primary biodegradation  | 1.75E-002 | 1.6E-005 | 0.18    |
| Settling biodegradation | 4.26E-003 | 4.0E-006 | 0.04    |
| Aeration biodegradation | 5.61E-002 | 5.3E-005 | 0.56    |
| Final water effluent    | 5.96E-001 | 5.6E-004 | 5.96    |
| Total removal           | 9.40E+000 | 8.8E-003 | 94.04   |
| Total biodegradation    | 7.79E-002 | 7.3E-005 | 0.78    |

### Level III Fugacity Model (Full-Output):

```

Chem Name      :
Molecular Wt: 1067.4
Henry's LC    : 2.42e-012 atm-m3/mole (Henrywin program)
Vapor Press   : 6.97e-019 mm Hg (Mpbpwin program)
Liquid VP     : 8.62e-016 mm Hg (super-cooled)
Melting Pt    : 338 deg C (Mpbpwin program)
Log Kow       : 11.5 (Kowwin program)
Soil Koc      : 7.5e+007 (KOCWIN MCI method)
  
```

|          | Mass Amount<br>(percent) | Half-Life<br>(hr) | Emissions<br>(kg/hr) |
|----------|--------------------------|-------------------|----------------------|
| Air      | 0.105                    | 173               | 1000                 |
| Water    | 4.17                     | 4.32e+003         | 1000                 |
| Soil     | 92.9                     | 8.64e+003         | 1000                 |
| Sediment | 2.79                     | 3.89e+004         | 0                    |

|          | Fugacity<br>(atm) | Reaction<br>(kg/hr) | Advection<br>(kg/hr) | Reaction<br>(percent) | Advection<br>(percent) |
|----------|-------------------|---------------------|----------------------|-----------------------|------------------------|
| Air      | 4.98e-021         | 90.8                | 227                  | 3.03                  | 7.58                   |
| Water    | 7.04e-022         | 145                 | 903                  | 4.83                  | 30.1                   |
| Soil     | 1.41e-021         | 1.61e+003           | 0                    | 53.7                  | 0                      |
| Sediment | 1.9e-021          | 10.8                | 12.1                 | 0.359                 | 0.403                  |

```

Persistence Time: 7.21e+003 hr
Reaction Time:    1.16e+004 hr
Advection Time:   1.89e+004 hr
Percent Reacted:  61.9
Percent Advected: 38.1
  
```

### Half-Lives (hr), (based upon Biowin (Ultimate) and Aopwin):

```

Air:      173.4
Water:    4320
Soil:     8640
Sediment: 3.888e+004
Biowin estimate: -0.804 (recalcitrant)
  
```

### Advection Times (hr):

```

Air:      100
Water:    1000
Sediment: 5e+004
  
```

## Appendix II

Template Copyright © (2014 – 2018) Clean Production Action

Content Copyright 2022 ©: GRADIENT | 1,3,5-Triazine, 2,4,6-tris(2,4,6-tribromophenoxy) (CAS # 25713-60-4)

# Appendix D

---

## OECD QSAR Toolbox Version 4.4.1 Results

## Documents

Document 1  
# [C: 1;Md: 0;P: 0] CAS: 25713604

## Profiling methods

Filter endpoint tree...

Structure

- ☒ Structure info
- ☒ Parameters
- ☒ Physical Chemical Properties
- ☒ Environmental Fate and Transport
- ☒ Ecotoxicological Information
- ☒ Human Health Hazards
- ☐ Profiling
  - ☐ Endpoint Specific
    - Respiratory sensitisation

1 [target]



No alert found

Marcelo Hirschler

I am submitting comments expressing my concern about the proposed regulation and include several attachments.

## Comments on the draft rule regarding the use of organohalogen flame retardants

My name is Marcelo Hirschler and I have been an advocate for improved fire safety for many years, by working in the areas of codes and standards at various organizations (see attached recent Curriculum Vitae<sup>1</sup>).

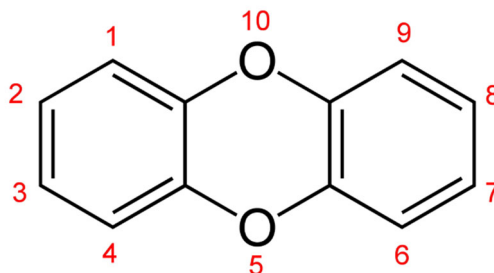
I am concerned about the proposed regulation, “Safer Products for Washington,” that would prohibit the use of organohalogen flame retardants in a variety of applications. In particular, this relates to electric and electronic products with plastic external enclosures intended for indoor use. This category includes all types of appliances (large and small) and wires and cables.

My concern relates both to the extreme scope of the proposed regulation and to its implications.

**Extreme scope of the proposed regulation:** With regard to the extreme scope, let me clarify that I am fully cognizant that some organohalogen flame retardants that had been in use for many years have since been found to be of concern. Those flame retardants (specifically, for example pentabromodiphenyl ether [also known as pentabromodiphenyl oxide or pentaBDE, octabromodiphenyl ether [also known as octabromodiphenyl oxide or octaBDE, and decabromodiphenyl ether [also known as decabromodiphenyl oxide or decaBDE]) are no longer commercial products being manufactured in the US. In place of these materials a variety of alternative flame retardants have been developed by manufacturers and have undergone a plethora of tests to assess their potential toxicity and environmental effects and been found not to be of concern. Therefore, The approach of regulating organohalogen flame retardants as a class does not have the correct scientific basis. There is much scientific rigor if every individual flame retardant of concern is identified by its individual chemical structure (and/or its CAS registry number) instead of an inappropriate broad brush approach covering every single organohalogen flame retardant irrespective of whether it is or is not of concern, particularly since most of them have been identified, as a result of all the testing, as not being of concern.

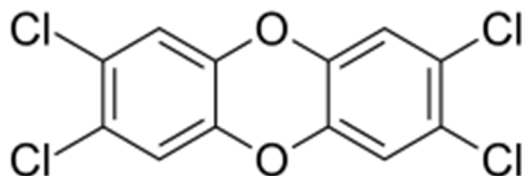
**Similar structure is not sufficient to classify generically:** It has been shown repeatedly that the vast majority of the properties of a specific material can be very significantly different in terms of their properties from those of materials with very similar chemical composition. I will provide three examples.

The first example of this are the “polychlorinated dibenzodioxins”, often simply known as “dioxins” or “PCDDs”. In PCDDs, chlorine atoms are attached to a structure of two benzene rings joined by two oxygen bridges at any of 8 different places on the molecule, at positions 1–4 and 6–9, as shown below. They are named based on at which position the chlorine atom is attached.



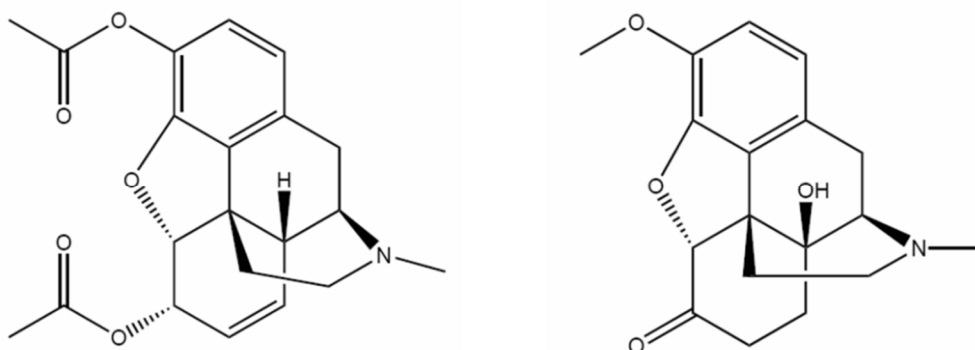
<sup>1</sup> Curriculum Vitae of Dr. Marcelo M. Hirschler, dated January 2023.

There are a total of 75 different PCDD congeners. The most widely known PCDD, the 2, 3, 7, 8 tetrachlorodibenzodioxin, shown below, is often incorrectly labeled simply as “dioxin”:



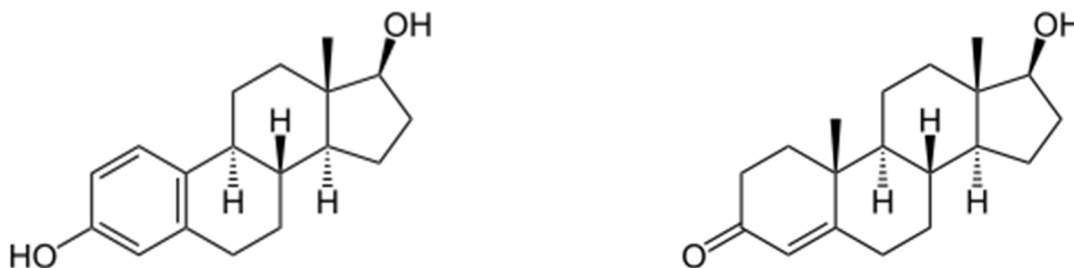
The relative toxic equivalency factor of the vast majority of these PCDDs<sup>2</sup>, when compared to the base one (2, 3, 7, 8 tetrachlorodibenzodioxin) is virtually negligible (meaning that they are virtually nontoxic), except for one that is about equally toxic (1,2,3,7,8-PeCDD), three that are 10 times less toxic, one that is 100 times less toxic and one that is 3,000 times less toxic. In spite of this scientific finding, all “dioxins” are treated as the same, when only a few of them are actually toxic. Obviously, I am not proposing that any PCDDs be allowed for use in any way. Moreover, I am not claiming that the proposed ban on the use of organohalogen flame retardants is in any way related to dioxins. However, the above is an example as to why it is important to identify materials specifically rather than dealing with them as a class.

The second example showing the fallacy of regulating all materials with similar chemical structure the same way can be found in the field of medicine. Let’s use the example of the opioids to illustrate this point. Below is shown the chemical structure of heroin (a dangerous illicit street drug; right) and of oxycodone (a prescription pain reliever medication; left). It is clear that these two drugs have very similar structures. However, one of them is dangerously toxic (and potentially lethal) while the other one is used as an effective painkiller.



<sup>2</sup> “The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds”, by Martin van den Berg, Linda S. Birnbaum, Michael Denison, Mike De Vito, William Farland, Mark Feeley, Heidelore Fiedler, Helen Hakansson, Annika Hanberg, Laurie Haws, Martin Rose, Stephen Safe, Dieter Schrenk, Chiharu Tohyama, Angelika Tritscher, Jouko Tuomisto, Mats Tysklind, Nigel Walker, and Richard E. Peterson, published in Toxicological Science 2006 Oct; 93(2): 223–241.

The third example is of two substances with very similar chemical structure but very different function. In this example there is the case of estradiol (which is a female sex hormone, on the left) and testosterone (which is a male sex hormone, on the right). They have a similar structure but very different activity.



**Not all organohalogen flame retardants are similar:** Many of the newer organohalogen flame retardants are polymeric (and not monomeric) flame retardants, with very high molecular weight, meaning that the probability of their volatilization to become airborne and cause respiratory effects is very low. Many other newer organohalogen flame retardants are reactive, and not additive, meaning that they are incorporated into the substrate (the plastic material) by covalently reacting with the plastic (or polymeric) material when the plastic material is being created. The finished material thus contains a built-in flame retardant that cannot easily migrate out (volatilize, or bloom to the surface) like the less strongly bound additive flame retardants. It is essential that any regulation of flame retardant use must take into account the difference between polymeric, oligomeric, and monomeric flame retardants and between additive and reactive flame retardants. It is also essential that the opportunity for innovation must be provided, which is not available when a full class of materials (including some that have not yet been developed) is being banned, thereby declaring as unsafe potential materials that do not yet exist.

Also, a standard has relatively recently been approved by ASTM, as ASTM D8280-20a (Standard Test Method for Determination of the Blooming of Brominated Flame Retardants onto the Surface of Plastic Materials by Ion Chromatography), which allows the quantitative determination of the bromine originating from any flame retardant that has bloomed onto the surface of the plastic after aging under specified conditions. With this test, based on the known structure of the flame retardant used, the amount of the flame retardant that bloomed can also be calculated. More importantly, the test can be used as a pass/fail assessment to determine whether or not the flame retardant actually escapes onto the surface of the material into which it has been incorporated. The use of this technique as a regulatory tool would allow brominated flame retardants that “pass” the test to be used instead of just all brominated flame retardants being lumped together .

**The proposed regulation has the potential to lower fire safety.**

**Flame retardants improve fire safety and halogenated flame retardants are very efficient**

The proposed regulation implies that any flame retardant can simply be substituted for an alternate one. There is abundant evidence that this is not a valid assumption. In particular, this will be, at least partially, of the mechanism of action of the flame retardants in question. It has been shown that brominated flame retardants (for example) act primarily in the gas phase while many phosphorus-containing flame

retardants act primarily in the condensed phase (I attach a study of mine from back in 1982<sup>3</sup>, with information that was “recent” at the time). Therefore, it is clear that replacing a brominated flame retardant by a phosphorus-containing one will not be a simple one-to-one replacement.

A few years ago (initially in 2005, and updated in 2015), for example, the US Environmental Protection Agency<sup>4</sup> conducted a study looking at replacing a halogenated flame retardant (pentabromodiphenyl ether) that was found to be undesirable and had been used to protect flexible polyurethane foam. As stated earlier, the US manufacture of pentabromodiphenyl ether has long since been discontinued. However, the reason the study is important to note is that it found that there were no easy replacements that were equally efficient in providing the needed fire performance.

Another example of the fact that direct replacement is often not possible to achieve with the same result is the case of plenum cables. In the US all electrical and optical fiber cables intended for use in plenums (which are the spaces above the dropped ceiling where the air distribution system is located, meaning heating and air conditioning) are required by the National Electrical Code and all building codes to meet a very severe flammability requirement. In spite of over 30 years of research and development it has been found that only systems that does contain halogenated materials are capable of achieving the required fire performance, in terms of flame spread and smoke release. The result of that is that, if halogenated materials were not allowed in plenum cables, a complete type of product would have to be discontinued. I understand that electrical and optical fiber cables are (fortunately) not covered by the proposed regulation.

I attach three documents that I authored demonstrating the improvements in fire safety as a result of the use of flame retardants. They are a short 2016 report on the benefits of flame retardants<sup>5</sup>, and two studies on the effects of flame retardants on heat release, published in *Fire and Materials* (a scientific journal)<sup>6,7</sup>. The studies on the effects of flame retardants on heat release are particularly important because it has been shown that heat release rate is the most critical parameter associated with fire safety<sup>8</sup>. Consequently, eliminating the use of flame retardants will lead to a significant lowering of fire safety.

Studies by the Swedish scientist Dr. Margaret Simonson on life cycle analyses (LCA) on TV sets<sup>9</sup>, cables<sup>10</sup>, and upholstered furniture<sup>11</sup> showed that flame retardants do not pose environmental damage by virtue of effectively improving fire performance and releasing much fewer polynuclear aromatic

<sup>3</sup> "Recent developments in flame-retardant mechanisms", M.M. Hirschler, in "Developments in Polymer Stabilisation, Vol. 5", Ed. G. Scott, pp. 107-52, Applied Science Publ., London, 1982.

<sup>4</sup> <https://www.epa.gov/saferchoice/flame-retardants-used-flexible-polyurethane-foam>

<sup>5</sup> "Benefits of Flame Retardants", by Marcelo Hirschler (unpublished report, January 2016).

<sup>6</sup> "Flame Retardants and Heat Release: Review of Traditional Studies on Products and on Groups of Polymers", M.M. Hirschler, *Fire and Materials* (Article published online, *Fire and Materials*, 03/11/2014, DOI: 10.1002/fam.2243), 2014 [39, 207-231, 2015].

<sup>7</sup> "Flame Retardants and Heat Release: Review of Data on Individual Polymers", M.M. Hirschler, *Fire and Materials* (Article published online, *Fire and Materials*, 03/11/2014, DOI: 10.1002/fam.2242), 2014 [39, 232-258, 2015].

<sup>8</sup> "Heat Release Rate: The Single Most Important Variable in Fire Hazard", V. Babrauskas and R.D. Peacock, *Fire Safety J.* 18, 255-272 (1992).

<sup>9</sup> "Fire-LCA Model: TV Case Study", SP Report 2000:13, Simonson, M., Blomqvist, P., Boldizar, A., Möller, K., Rosell, L., Tullin, C., Strippel, H. and Sundqvist, J.O., Swedish National Testing and Research Institute, Fire Technology (2000).

<sup>10</sup> "Fire-LCA Model: Cables Case Study" SP Report 2001:22, Simonson, M., Andersson, P., Rosell, L., Emanuelsson, V. and Strippel, H., Swedish National Testing and Research Institute, Fire Technology (2001).

<sup>11</sup> "Fire Safety of Upholstered Furniture - LCA Analysis" SP Report 2003:22, Andersson, P., Simonson, M. and Strippel, H., Swedish National Testing and Research Institute, Fire Technology (2003).



hydrocarbons (PAH). Data from these studies demonstrated that PAH emissions from the improved fire performance materials (such as TVs or upholstered furniture) were only some 3% of those from the products with low fire performance. Thus, the studies showed that a reduction in the number of fires because of the use of products containing materials with improved fire performance was associated with significant benefit to the environment as well as saving lives from fires. In fact, the studies also identified the fact that the reduction in problematic emissions of combustion products when using flame retardants also led to a significant decrease in the overall toxicity of the products emitted.

Another study of particular interest was conducted at the National Bureau of Standards (now called the National Institute of Standards and technology, NIST) published in 1988, where they compared the effect on a variety of fire safety parameters of fire retarded and non-fire retarded products<sup>12</sup>. The products involved were the following: a TV cabinet, a business machine housing, an upholstered chair, an electric cable, and an electric circuit board. Studies involved small-scale tests and room-scale tests. The conclusions were overwhelming: the fire retarded products were much safer. From the other studies mentioned above it was to be expected that the heat released by the fire retarded products was much lower than that released by the non-fire retarded ones. Of special interest, however, were the facts that the time available for escape was so much longer when the products were fire retarded (in fact 15 times longer times available for escape for the fire retarded products) as was the toxicity of the atmosphere containing the combustion products (3 times lower toxicity for the fire retarded products).

It is useful also to compare the amount of flame retardant that needs to be added to a plastic to achieve an acceptable level of fire performance. For example, inorganic halogen-free flame retardants such as alumina trihydrate needs to be used at additive levels as high as 70% for a variety of different polymeric materials while brominated flame retardants can generate similar fire performance at additive (or reactive) levels that are on the order of 10% only.

## Summary

- The proposed ban on using any halogenated fire retardants without specifying the actual material involved is technically incorrect since it does not distinguish (a) between materials that should not be used and those that are safe for use, (b) between monomeric and polymeric flame retardants and (c) between additive and reactive flame retardants.
- The proposed ban on using halogenated flame retardants has the potential for making it not possible to achieve certain levels of fire performance that may not be obtainable with other flame retardants.
- The proposed ban on using halogenated flame retardants may lead to a lowering of fire safety without any associated advantage in terms of other environmental or toxicity issues.

A handwritten signature in dark ink, reading "Marcelo M. Hirschler".

**Marcelo M. Hirschler – January 30, 2023**

<sup>12</sup> “Fire Hazard Comparison of Fire-Retarded and Non-Fire-Retarded Products (NBS Special Publication SP 749)”, Babrauskas, V., Harris, R. H., Jr., Gann, R. G., Levin, B. C., Lee, B. T., Peacock, R. D., Paabo, M., Twilley, W., Yoklavich, M. F., and Clark, H. M., National Bureau of Standards, Gaithersburg, MD (1988).

**MARCELO M. HIRSCHLER, Lic., Ph.D.****CURRICULUM VITAE****EDUCATION**

University: University of Buenos Aires 1966-70  
Licentiate in Chemistry - Major: Physical Chemistry

Post-graduate: University of Buenos Aires 1971-75  
Doctor in Chemistry - Major: Polymer Physical Chemistry

**EMPLOYMENT HISTORY**

- September 1995 -  
Fire Science Consultant/President  
GBH International, Mill Valley, California
- March 1995 - September 1995  
Fire Science Consultant  
GBH International, Rocky River, Ohio
- March 1991 - February 1995  
Fire Science Consultant  
Safety Engineering Laboratories, Inc., Rocky River, Ohio
- December 1986 - February 1991  
R & D Manager - Fire Sciences  
BFGoodrich Co. - Geon Vinyl Division, Avon Lake, Ohio
- June 1986 - December 1986  
Sr. R & D Associate - Flammability  
BFGoodrich Co. - Geon Vinyl Division, Avon Lake, Ohio
- August 1984 - June 1986  
R & D Associate - Flammability  
BFGoodrich Co. - Chemical Group, Avon Lake, Ohio
- October 1977 - July 1984  
Temporary Lecturer (Physical Chemistry)  
Department of Chemistry - The City University, London, England
- October 1975 - October 1977  
Post Doctoral Research Fellow  
School of Molecular Sciences - University of Sussex, Brighton, England

- June 1975 - October 1975  
Researcher - Physical Chemistry of Carbons  
R & D Department - ALUAR Aluminio Argentino, Buenos Aires, Argentina
- March 1971 - June 1975  
Post-graduate Research Assistant, Department of Physical Chemistry  
School of Pharmacy and Biochemistry - University of Buenos Aires  
Buenos Aires, Argentina
- March 1970 - December 1971  
Undergraduate Teaching Assistant, Department of Physical Chemistry  
School of Exact and Natural Sciences - University of Buenos Aires  
Buenos Aires, Argentina

### **SOME AWARDS**

- Interflam Trophy (UK): 1988
- ASTM E-5 Certificate of Appreciation: 1989
- Wire Association International: Best Electrical Paper 1989
- ASTM Society Frank W. Reinhardt Award for Fire Terminology: 1990
- ASTM E-5 Award of Recognition: 1995
- ASTM E-5 Award of Recognition: 1998
- Canadian Standards Association: Award of Merit: 1999
- ASTM D-9 Award of Appreciation: 2001
- ASTM E-5 Wayne Ellis Award from Society Chairman: June 2002
- ASTM E-5 Award of Appreciation: 2005
- ASTM E-5 Award of Special Recognition: 2006
- ASTM D-20 Award of Appreciation: 2006
- ASTM E-5 Award of Appreciation: 2007
- ASTM E-5 Certificate of Appreciation: 2008
- ASTM E-5 Award of Recognition: 2009
- NFPA Committee Service Award: 2011
- ASTM D-20 Award of Recognition: 2012
- ASTM E-5 Award of Recognition: 2012
- NFPA Certificate of Appreciation: 2013
- ASTM E-5 Award of Recognition: 2013
- ASTM E-5 Special Recognition Award: 2015
- ASTM E-5 Award of Recognition: 2015
- ASTM Society: Award of Merit: 2017
- ASTM D-20: Outstanding Achievement Award: 2017
- ASTM E-5 Award of Recognition: 2019

### **LANGUAGES**

English, German, Spanish, French

## **MEMBERSHIP PROFESSIONAL SOCIETIES**

- American Society for Testing and Materials (ASTM): (See below for committee details)
- Canadian Standards Association (CSA)
- Combustion Institute (Western States Section)
- Institute of Electrical and Electronics Engineers (IEEE)
- International Association for Fire Safety Science
- International Association of Plumbing and Mechanical Officials (IAPMO)
- International Code Council (ICC)
- International Heat Release Association (IHRA)
- National Fire Protection Association (NFPA) (Various Sections and committees)

## **ACTIVITIES**

### **Marcelo Hirschler Provides Technical Expertise in Fire Safety Including:**

- **Product Liability Expert Witness**
- **Codes and Standards**
- **Fire Safety Research and Testing Projects**

## **WORK ACCOMPLISHED**

- **Consultancy**

### **Product Liability: Expert Witness on Fire Safety Subjects**

- Fire safety of mattresses
- Fire safety of upholstered furniture
- Flammability of textiles, including apparel and protective clothing
- Fire safety in transportation, including especially automobiles and trains
- Fire properties and fire testing of plastics
- Fire properties and fire testing of cables
- Smoke toxicity
- Smoke corrosivity
- Fire hazard
- Codes and standards

### **Fire Research (Public Activities)**

- Manager Program for Interlaboratory Precision of Intermediate Scale Calorimeter Test Method (ASTM E1623) (1997-1998)
- Technical Coordinator, Fire Protection Research Foundation (NFPA, FPRF) Research Advisory Council on Transportation Vehicles (2002-06)
- Member of NIBS Smotox Steering Committee (1987-91)
- Member of NFPRF Risk Assessment Advisory Committee (1987-91)

- Session chairman at many fire conferences, including: Fire and Materials, Materials for Increased Fire Safety at Int. Conf. Fire Safety (Dr. C.J. Hilado), BCC Flame Retardancy, Int. Association Fire Safety Science, Combustion Institute, American Chemical Society Fire & Polymers, Fire Retardant Chemicals Association.

### **Editorial**

- Associate Editor, Fire and Materials Journal (1991-)
- Editor: Flame Retardancy News (2005)
- Editor: Fire Safety & Technology Bulletin (2006 - )
- Member Editorial Board Journal Fire Sciences, Fire Safety Journal, Fire & Flammability Bulletin (1995 to 2003), Journal of Testing and Evaluation

### **California State Fire Marshal Advisory Committees:**

- \* Member California State Fire Marshal Flame Retardant Advisory Committee (2013-5)
- \* Member California State Fire Marshal Working Group on Implementation of Assembly Bill 127 regarding flammability testing for insulation (2014-2015)
- \* Member California State Fire Marshal Working Group on Wildland Urban Interface Code (2016 through 2020, ongoing)

### **Codes and standards:**

- **International Code Council**
- \* Member International Building Code Fire Safety Code Committee (2006-7, 2008-9 and 2010-11)
- \* Proponent of code changes for IBC, IEBC, IFC, IMC, IPC, IRC, IWUIC, IgCC, at various code development cycles

- **ASTM Committee Memberships**

C16: Thermal Insulation  
 D07: Wood  
 D09: Electrical and Electronic Insulating Materials  
 D11: Rubber and Rubber-like Materials  
 D13: Textiles  
 D20: Plastics  
 E05: Fire  
 E34: Occupational Health and Safety  
 F07: Aerospace and Aircraft  
 F08: Sports Equipment, Playing Surfaces, and Facilities  
 F15: Consumer Products  
 F23: Personal Protective Clothing and Equipment  
 F24: Amusement Rides and Devices  
 F25: Ships and Marine Technology  
 F33: Detention and Correctional Facilities  
 F44: General Aviation Aircraft

- **ASTM E05 (Fire Standards):**

- \* Chairman ASTM E-5.91 and First Vice-Chairman Committee E05: Subcommittee on Fire and Planning and Review (2014 -19)
- \* Chairman ASTM E-5.15: Subcommittee on Fire and Interior Furnishings and Contents (1990-95)
- \* Chairman ASTM E-5.17: Subcommittee on Fire and Transportation (2010-15): developed ASTM E2574, new standard fire test for school bus seating
- \* Chairman ASTM E-5.21: Subcommittee on Smoke and Combustion Products (2004-9)
- \* Chairman ASTM E-5.31: Subcommittee on Fire Terminology and Editorial (2000-5)
- \* Recording Secretary ASTM E05: Committee on Fire Standards (2000-5)
- \* Member-at-large of executive subcommittee of ASTM E05 (2006 - 07)
- \* Membership Secretary ASTM E05 (2008-13)
- \* Recording Secretary ASTM E-5.15: Subcommittee on Fire and Interior Furnishings and Contents (1988-90 and 1996-2015)
- \* Recording Secretary ASTM E-5.91: Subcommittee on Planning and Review of Fire Standards (1990-1999 and 2000-14)
- \* Recording Secretary ASTM E-5.17: Subcommittee on Fire and Transportation (2003-2009)
- \* Recording Secretary ASTM E-5.21: Subcommittee on Smoke and Combustion Products (2010-17)
- \* Chairman ASTM E-5.22.02: Task Group on ASTM E84 Steiner Tunnel Mounting Methods (2002- ). Developed several tunnel testing mounting practices - including ASTM E2231, ASTM E2404, ASTM E2573, ASTM E2579 and ASTM E2599
- \* Chairman ASTM E-5.13.1: Task Group on ASTM E603, Standard Guide for Room Fire Experiments (1992-2009).
- \* Chairman ASTM E-5.13.8: Task Group on New Practice for Large Scale Heat Release Tests (1997-2009). Developed practice ASTM E2067 and test method ASTM E2257
- \* Chairman ASTM E-5.15.3: Task Group on Fire Hazard Assessment of Floor Coverings (1987-92)
- \* Chairman ASTM E-5.15.8: Task Group on Full Scale Fire Testing of Upholstered Furniture (1989- ). Developed full scale fire test methods: ASTM E1537, ASTM E1590 and ASTM E1822
- \* Chairman ASTM E-5.15.12: Task Group on Vandalized Mattresses for Correctional Institutions (1991-93).
- \* Chairman ASTM E-5.15.13: Task Group on Fire Hazard Assessment of Upholstered Furniture (1994-2009). Developed ASTM E2280, Standard guide on fire hazard assessment for health care occupancies
- \* Chairman ASTM E-5.17.94: Task Group on Fire Hazard Assessment of Rail Transportation Vehicles (1991- ). Developed ASTM E2061, new guide on fire hazard assessment of passenger rail vehicles
- \* Chairman ASTM E-5.21.13: Task Group on Smoke Toxicity for Flashover Fires (1993- )
- \* Chairman ASTM E-5.21.33: Task Group on ASTM E906 (Ohio State University Rate of Heat Release Apparatus) (1994-2004).
- \* Chairman ASTM E-5.21.34: Task Group on Intermediate Scale Calorimeter (1997-2004). Managed interlaboratory round robin for ASTM E1623 and updated standard

- \* Chairman ASTM E-5.21.35: Task Group on Rate of Heat Release Apparatus by Thermopile Method (1995- ). Developed new test method ASTM E2102
- \* Chairman ASTM E-5.21.3: Task Group on ISO (5659-2) Smoke Chamber (1995-2004) and NBS Smoke Chamber. Developed new test method ASTM E1995
- \* Chairman ASTM E-5.21.60: Task Group on cone calorimeter (ASTM E 1354) (2009- )
- \* Chairman ASTM E-5.21.80: Large scale heat release (2009- )
- \* Chairman ASTM E-5.23.1: Task Group on Non-Combustibility (2008 -12) (merged into ASTM E-5.23.2)
- \* Chairman ASTM E-5.23.2: Task Group on Alternate Method of Non-Combustibility (2007 - ): Developed Test Method ASTM E2652
- \* Chairman ASTM E-5.31/91 Task Group on Uncertainty (2002- )
- \* Chairman ASTM E-5.31 Task Group on Terminology (2014- )
- \* Chairman ASTM E-5.31 Task Group on Services/Functions Standards (2014-)
- \* Chairman ASTM E-5.32.2: Task Group on 1990 Symposium on Fire Hazard and Fire Risk Assessment (1988-1992). Editor of ASTM STP 1150 (Fire Hazard & Fire Risk Assessment)
- \* Chairman ASTM E-5.35.2: Task Group on Examples of Fire Hazard Assessment Standards (1989-91)

## ● NFPA

- \* Chairman NFPA Technical Committee on Hazard and Risk of Contents and Furnishings (2001-2013). Developed new NFPA 556, Guide on Vehicle Fire Safety, & NFPA 557, Standard on Fire Loads
- \* Chairman NFPA Technical Advisory Committee on Glossary of Terminology (2007-15)
- \* Member NFPA Life Safety Technical Committee on Furnishings and Contents (1991- )
- \* Member NFPA Building Code Technical Committee on Structures, Construction, and Materials (2014 - )
- \* Member NFPA Technical Committee on Hazard and Risk of Contents and Furnishings (1991- )
- \* Member NFPA National Electrical Code CMP 15: National Electrical Code Panel on Places of Assembly (1993-2001)
- \* Member NFPA Technical Committee on Fire Tests: (1996- )
- \* Member NFPA Technical Committee on Merchant Vessels: (1998- )
- \* Member (Alternate, for Society of the Plastics Industry) of NFPA Technical Committee on Fixed Guideway Transit Systems [Trains]: (2001)
- \* Member (for North American Flame Retardant Alliance/Plenum Cable Association) of NFPA Technical Committee on Air Conditioning [NFPA 90A-B]: (2002- )
- \* Member (for North American Flame Retardant Alliance) of NFPA Technical Committee on Fixed Guideway Transit Systems [Trains] [NFPA 130]: (2019- )



- **ASTM D09 (Electrical Insulation Materials)**

- \* Chairman ASTM D09: (2017- )
- \* Chairman ASTM D-9.94: Subcommittee on Editorial (2008- )
- \* Chairman ASTM D-9.21: Subcommittee on Fire Performance Standards (2010-6)
- \* Chairman ASTM D-9.17: Subcommittee on Fire and Thermal Properties (2016 -)
- \* Secretary ASTM D09: (2016-2017)
- \* Secretary ASTM D-9.94: Subcommittee on Terminology and Editorial for Electrical Insulation Materials (1994-2008)
- \* Chairman ASTM D-9.21.3: Task Group on Smoke Obscuration on Burning of Electrical Cables (1987-2016). Developed ASTM D5424
- \* Chairman ASTM D-9.21.7: Task Group on Rate of Heat Release from Electrical Cables (1992-2016). Developed ASTM D5537 and ASTM D6113
- \* Chairman ASTM D-9.21.1: Task Group on Fire Hazard Assessment of Electrotechnical Products (1995-2016). Developed Guide ASTM D5425
- \* Chairman ASTM D-9.97-1: Task Group on March 1999 "90th Anniversary Symposium on Electrical Insulating Materials: International Issues" (1997-1999). Editor of ASTM STP 1376 (1999)
- \* Chairman ASTM D-9.97 Task Group on ASTM D9 Symposium on Electrical Materials and Fire October 2004.

- **ASTM D20 (Plastics)**

- \* Chairman ASTM D20-20: Subcommittee on Plastic Lumber (2009- ) [Originally subcommittee on Plastic Products]
- \* Vice-chairman ASTM D20.20.03: Section on Plastics and Combustibility (2013-2017)
- \* Chairman Task Group on ASTM D4968 (Practice for Review of Test Methods and Specifications for Plastics (2015-)
- \* Chairman ASTM D20-92: Subcommittee on Terminology (2022 - )

- **ASTM F33 (Detention and Correctional Occupancies)**

- \* Chairman ASTM F33.05 Task Group on Furnishings within Detention Occupancies (1997- ). Developed test methods ASTM F1534 and F1550 and guide ASTM F1870.

- **ASTM F15, ASTM F08 and other ASTM committees:**

- \* Chairman ASTM F15.15: Subcommittee on Wall Coverings (Responsible for a standard specification and a standard classification for wall coverings)
- \* Task group chair and member various task groups.

- **CSA (Canadian Standards Association)**

- \* Chairman Task Group on Circuit Integrity for CSA C22.2 No. 0.3 (1997-2000)
- \* Member Committee CSA C22.2 No. 0.3 Wiring Test Methods (1992 -2010)
- \* Member Committee CSA C22.2 No. 239 Control & Instrumentation Cables (1995 -2010)



- **IEEE (Institution of Electrical and Electronic Engineers)**

- \* Member IEEE Technical Committee on Electrical Installations in Ships (IEEE 45) (1999-2007)
- \* Member IEEE Technical Committee on Shipboard Wire and Cable (IEEE 1580) (2000-07)
- \* Member IEEE Technical Committee on Environmental Assessment of Computer Products, Imaging Equipment and Television (IEEE 1680) (2010-2018)

- **ISO (International Organization for Standardization)**

- \* Convenor ISO TC 61 SC4 WG8 (Plastics – Burning Behavior - Ignitability and fire growth tests) (2013 - )
- \* Convenor ISO TC 92 WG8 (Fire Safety – Fire terms and definitions) (2013 - )
- \* Member ISO TC61 SC4 (Plastics Burning Behavior)
- \* Member ISO TC61 SC4 WG2 (Smoke and corrosivity) (2017 - )
- \* Member ISO TC61 SC4 WG9 (Other Products) (2017 - )
- \* Member ISO TC61 SC4 WG11 (PVC Products) (2015 -2019)
- \* Member ISO TC92 SC1 (Building Products - Reaction to fire)
- \* Member ISO TC92 SC3 (Building Products – Toxicity)

- **IEC (International Electrotechnical Commission)**

- \* Member US TAG IEC TC89 (Cables and Fire)

**Fire Safety Industrial Consultant (Public Information)**

- Consultant to the Vinyl Institute on fire and PVC (1991- )
- Consultant to the Fire Retardant Chemicals Association/American Fire Safety Council/North American Flame Retardants Alliance on codes and standards (1997 - )
- Consultant to the National Cotton Council on code issues (2003 -05)
- Expert on various fire issues, for a variety of industrial clients

## EMPLOYMENT RESPONSIBILITIES IN PREVIOUS WORK

### ■ BFGoodrich - Geon Vinyl Division (Fire Sciences Manager)

- Head of BFGoodrich fire testing laboratory: routine small-scale tests.
- Head of BFGoodrich fire research: smoke toxicity and fire hazard assessment; combustion and thermal analysis of poly(vinyl chloride) and other polymers; generation, transport and decay of hydrogen chloride; smoke corrosivity; analytical techniques for measuring combustion products. Provided a presence at national and international fire conferences, for participation and presentation of scientific work. Carried out full scale fire demonstrations, for research and public relations purposes. Supported line groups in the development of new commercial compounds.
- Technical consultant for BFGoodrich on litigation and other external affairs regarding fire and combustion toxicity
- Standards activities representing BFGoodrich: e.g. ASTM, NFPA, Canadian Standards Association.
- Vinyl industry spokesperson
- Chairman Technical Fire Sciences Subcommittee, Coordinating Committee for Fire Safety, Society of the Plastics Industry. Main spokesperson on fire activities for the plastics industry. Liaison with Center for Fire Research (National Bureau of Standards), NFPA, NIBS, etc.
- Technical Monitor SPI Carbon Monoxide and Fire Fatalities Project, etc. (1987-91)
- Chairman Combustibility Subcommittee, Vinyl Institute Technical Committee. Technical monitor of projects at Center for Fire Research (NBS), Southwest Research Institute
- Chairman ASTM E-5.15: Subcommittee on Fire and Interior Furnishings and Contents
- Secretary ASTM E-5.91: Subcommittee on Planning and Review of Fire Standards
- Chairman ASTM E-5.15.3: Task Group on Fire Hazard Assessment of Floor Coverings
- Chairman ASTM E-5.15.8: Task Group on Full Scale Fire Testing of Upholstered Furniture
- Chairman ASTM E-5.31.3: Task Group on Smoke Toxicity Definitions
- Chairman ASTM E-5.32.2: Task Group on 1990 Symposium on Fire Hazard and Fire Risk Assessment
- Chairman ASTM E-5.35.2: Task Group on Examples of Fire Hazard Assessment Standards
- Chairman ASTM D-9.21.3: Task Group on Smoke Obscuration on Burning of Electrical Cables
- Member of NIBS Smotox Steering Committee (1987-91)
- Member of NFPRF Risk Assessment Advisory Committee (1987-91)
- Session chairman on Materials for Increased Fire Safety at Int. Conf. Fire Safety (Dr. C.J. Hilado) (1987-91)
- Session chairman at Combustion Institute Eastern Section meetings
- Session Chairman at Fire Retardant Chem. Association meetings
- Member of ASTM Task Groups E-5.21.70 and D-9.21-4 (smoke corrosivity test development), ASTM E-5.21.02 and E-5.21.03 (smoke obscuration test development), and E5-21.11 (quick toxic fire hazard assessment)

■ **BFGoodrich - Chemical Group & Geon Vinyl Division**

- As subsequent job, at a lower level of responsibility.

■ **Department of Chemistry - The City University**

- Supervision of post-graduate and undergraduate research students
- Research in combustion and air pollution: medium and high molecular weight hydrocarbons, liquid fuels (gasoline, diesel efficiency and effects of additives), polymers (thermal decomposition, flammability and flame retardance: efficiency and mechanism), cellulosic materials (cellulose, cotton, cigarette paper: mechanisms and means of decreasing emissions), emission processes of gaseous pollutants, etc.
- Consultant to the "Unit for Oxidation and Combustion Technology": Ministry of Defense and industrial contract research organization.
- Consultant to the OECD (Organization for Economic Cooperation and Development; Paris, France): industrial and automotive pollution issues.

■ **School of Molecular Sciences - University of Sussex**

- Research in physical organic chemistry: syntheses and kinetics of radioactive decay by protiodetrutiation of polycyclic aromatic hydrocarbons.

■ **R & D Department - ALUAR Aluminio Argentino**

- Planning for setting up a laboratory and literature search

■ **Department of Physical Chemistry - School of Pharmacy and Biochemistry - University of Buenos Aires**

- Research into polymerization mechanisms, leading to Ph.D.

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### **Books:**

- 1) "The Combustion of Organic Polymers", C.F. Cullis and M.M. Hirschler, Oxford University Press, Oxford, UK, 1981.
- 2) "Oxidation of Organic Compounds. Solvent Effects in Radical Reactions", N.M. Emanuel, G.E. Zaikov and Z.K. Maizus, translators: A.K. Henn and I.G. Evans, translation editor: M.M. Hirschler, Pergamon Press, Oxford, UK, 1984.
- 3) "Fire hazard and fire risk assessment", ASTM STP 1150, Amer. Soc. Testing and Materials, Philadelphia, PA, US, Editor: M.M. Hirschler, (1992).
- 228) "Carbon monoxide and human lethality: Fire and non fire studies", Editor in Chief: M.M. Hirschler, Associate Editors: S.M. Debanne, J.B. Larsen and G.L. Nelson, Elsevier, New York, US, 1993.
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- 345) "Electrical Insulating Materials - International Issues", ASTM STP 1376, Amer. Soc. Testing and Materials, West Conshohocken, PA, US, Editor: M.M. Hirschler (2000).
- 453) "Practical Guide to Smoke and Combustion Products from Burning Polymers – Generation, Assessment and Control", M.M. Hirschler, S. Levchik and E.D. Weil, Smithers Rapra Technical Publications, Shawbury, UK, 2011.

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- 4) "Free radical polymerization of methyl methacrylate in the presence of benzoquinone and triethyl aluminium", J. Grotewold and M.M. Hirschler, Int. Symp. On Macromolecules, Rio de Janeiro, Brazil, July 26-31, 1974.
- 5) "Formation of a methyl methacrylate oligomer by combining triethyl aluminium and azobisisobutyronitrile", J. Grotewold and M.M. Hirschler, Kinetics and Photochemistry Symposium, Rio Cuarto (Argentina), August 6-10, 1974.

#### **1975**

- 6) "Mechanism of polymerization of methyl methacrylate in the presence of triethyl aluminium together with a typical free radical inhibitor or an initiator", Doctoral Dissertation, University of Buenos Aires.
- 7) "Report on carbons, carbonization, additives (oxidative and reductive) and polycyclic aromatic hydrocarbons", M.M. Hirschler, Internal Publication, ALUAR Aluminio Argentino, 1975.

#### **1977**

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- 11) "The formation and destruction of pentenes during the combustion of pentane", C.F. Cullis and M.M. Hirschler, Proc. Royal Soc. (London) A 364, 75-88 (1978).
- 12) "Isotopic tracer studies of the further reactions of pentenes in the combustion of pentane", C.F. Cullis and M.M. Hirschler, Proc. Royal Soc. (London) A 364, 309-29 (1978).

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## Chapter 5

### FLAME RETARDANT MECHANISMS: RECENT DEVELOPMENTS

M. M. HIRSCHLER

*Department of Chemistry, The City University, London, UK*

#### SUMMARY

*The principal mechanisms by which flame retardance is conferred on polymeric substrates are reviewed in the light of the most recent experimental work. The six elements which are the active constituents of the most widely used flame-retardant systems are chlorine and bromine (Group VII), phosphorus and antimony (Group V) and boron and aluminium (Group III).*

*Flame retardance involves the interference with one or more of the various stages involved in the complex process of polymer combustion. This action may be purely physical in nature, although it is most likely to be effective if the rate and course of some of the constituent chemical reactions are also altered.*

*Gas-phase mechanisms may involve the destruction of those species which propagate the flame reactions or simply the absorption of heat with an accompanying reduction in gas temperature.*

*Condensed-phase mechanisms usually involve changes in the rates of pyrolytic or thermo-oxidative breakdown of the polymeric structure.*

#### 1. INTRODUCTION

Natural organic polymers, principally cellulose, have been an important part of man's environment for many centuries. They have complex



structures which in general withstand well prolonged exposure to the atmosphere. Synthetic polymers are relatively new materials which have been in commercial production for only about 50 years. They are relatively simple materials composed of few different monomeric units and they have been designed for applications where some combination of mechanical properties, and perhaps colour, is vital to their effectiveness. They are however in general more susceptible to oxidative attack than natural polymers.

The prevention of the loss of the attractive properties of polymers during use is usually termed stabilisation. The processes responsible for deterioration may consist of photo-oxidative, thermo-oxidative, hydrolytic, solvolytic or other chemical degradation reactions resulting from normal exposure. They do not, in general, involve an extensive breakdown of the polymeric structure; the materials lose their effectiveness long before they have broken down completely. The additives (stabilisers) normally used for this purpose must inhibit processes which are slow but which should not be allowed to occur to any significant extent.

Although only synthetic polymers normally need stabilisation, both natural and synthetic polymeric materials are inherently flammable. The inhibition of polymer combustion involves substrates which are to be employed either under conditions where they may be exposed to local high temperatures or in applications where their breakdown may produce undesirable hazards. The conferment of flame retardance is the process by which polymers are either protected from undergoing a rather more complete destruction of the material than simple loss of mechanical properties or are forced to change the course of this decomposition so as to form products which are less hazardous.

It is not surprising that interest in treatments to reduce the flammability of organic polymers, which are entirely different from those used for their stabilisation, can be traced back to ancient times. The empirical application of additives started with the use of compounds of aluminium, which is still a constituent of one of the most widely used flame retardants. Solutions of alum (potassium aluminium sulphate) are known to have been used by the Egyptians to inhibit the combustion of wood, while nowadays many synthetic thermoplastics are treated with aluminium oxide trihydrate.<sup>1</sup>

Gay-Lussac carried out in France one of the first detailed systematic studies of the flame retardance of cellulosic textiles<sup>2</sup> and Perkin continued this work in England towards the end of the nineteenth century, although many of his results were not published until after his death.<sup>3-6</sup> These researches were, of necessity, largely empirical and it is only in the last 20

years or so that attempts have been made to elucidate the fundamental mechanisms of flame retardance. Some reviews have dealt with several aspects of this subject<sup>7-12</sup> and the next chapter deals with one aspect in some depth. The remainder of this chapter will present some recent developments.

## 2. COMBUSTION OF POLYMERS

The burning of a polymer is a complex process which involves several interrelated and interdependent stages. To understand the mechanism of flame retardance it is essential to outline these stages, even if superficially. The heat supplied to the polymer is responsible for bringing about its thermal decomposition. This can occur by several different mechanisms: scission of the main polymer chain, i.e. polymeric backbone, scission of the bonds linking the polymer chain to substituents, or cyclisation processes. If polymer chain scission takes place at the terminal unit, i.e. end-chain-scission, the result is depolymerisation to yield identical monomer-type molecules. The other modes of decomposition yield different small molecules or fragments which are liberated into the gas phase. These volatile products may subsequently ignite in admixture with the surrounding gaseous oxidant. This combustion liberates more heat which is then fed back to the solid phase of the polymer causing its further breakdown. This model of burning polymer will be discussed in more detail in Chapter 6.

Smouldering combustion occurs as an ignition of the solid char formed as a consequence of the initial thermal or thermo-oxidative decomposition, at temperatures which are frequently lower than those required for the ignition of the gaseous products. Glowing combustion is distinguished from smouldering combustion in that it is usually accompanied by a pale blue flame characteristic of the conversion of CO to CO<sub>2</sub>.

In principle it is possible to affect each one of the separate stages individually. In practice, however, the technology of flame retardance usually involves either the use of additives or the replacement of monomers by less flammable analogues. These compounds do not very often confine their action to one of the separate stages involved in polymer combustion. Many, if not most, flame retardants may function simultaneously by several different mechanisms, often depending on the nature of the organic polymer. It is, therefore, more systematic to deal with individual classes of additives, according to the principal element they include, and explain their



mechanisms of action, rather than to discuss in depth the different mechanisms by which a flame retardant may operate. Before this is attempted, however, some of the possible mechanisms of flame retardant action will be outlined.

### 3. FLAME RETARDANCE

Two distinct types of flame retardant must be recognised.

*Reactive flame retardants* are compounds usually containing a heteroelement which can be used to substitute one or more of the normal comonomers. This substituent then becomes an integral part of the repeating structural unit of the polymer. Reactive flame retardants can also be chemically incorporated, in smaller proportions, usually during the polymerisation process, so that only partial replacement is effected and only occasional structural units are altered.

*Additive flame retardants* are incorporated into polymers by being physically mixed with the polymer, normally after the polymerisation is complete. They may be more or less uniformly distributed in the bulk of the condensed polymer phase or coated on its surface but they do not affect the chemical structure of any of the monomeric units.

When the combined effect of two or more flame retardants is larger than the sum of the effects of each of the individual compounds, synergism is said to occur. Antagonism results when the combined effect of two or more flame retardants is smaller than the sum of their individual effects. Synergistic or antagonistic flame retardance can also occur as a result of the interaction of an additive with a heteroelement already present in the polymer structure.

The ideal flame-retardant polymer is one which is completely thermally stable and which does not break down at all. Although many polymers have been developed which have considerable thermal stability<sup>13-18</sup> they all eventually burn if they are basically organic in nature.<sup>19</sup> The great advantage that these materials offer is, of course, that they are very unlikely to be the material first ignited. If their decomposition products can form a flammable mixture, however, they will then eventually fuel the flames of an already existing fire. These polymers are generally very expensive to produce and do not normally possess the engineering properties which make the present high-tonnage polymers so attractive. It is therefore probable that the production of thermally stable polymers will in future remain a process of rather more academic than industrial interest, except for specific applications.

The most obvious effect of an additive is to retard the thermal decomposition of the polymer. This is, of course, similar in its effects to the preparation of an intrinsically thermally stable polymer. It is also possible, and sometimes desirable, to affect the breakdown of a polymer by increasing its rate of decomposition and thus forming a non-ignitable mixture, either because the latter is too fuel-rich or because the products formed are now intrinsically non-flammable.

The use of 'fillers' represents another flame-retardant mechanism. The inert compounds generally used are introduced into the polymer and may act as heat sinks, so that the temperature never reaches levels high enough for the polymer to suffer significant breakdown.

Another possible mechanism of action is the creation of a non-flammable protective layer which then insulates the polymer from the source of heat or excludes the gaseous oxidant from the polymer surface. If such a coating is formed only by the decomposition of the additive at high temperatures and if the char resulting from these condensed-phase reactions can trap the evolved gases and use them to cause expansion into a carbonaceous foam, then an intumescent coating results. Direct external application of a non-flammable protective surface layer results in a non-intumescent coating.

All the treatments mentioned affect mainly the thermal decomposition of the polymer. The inhibition of the flame reactions can be brought about either by chemical or by physical means. Chemical action usually involves the replacement of reactive species by less reactive ones (see Chapter 6). A physical mechanism could be the production of small non-gaseous particles (i.e. mists) which can increase the rate of chain-termination by acting as 'third bodies' or 'walls' for the destruction of radicals or may even 'smother' the flames by excluding the gaseous oxidant. Another physical mechanism involves the release from the additive of inert gases which may produce a mixture too fuel-lean to be flammable.

It should, at least in principle, be possible to inhibit the transfer of heat back from the flame to the solid polymer phase. This can be achieved in practice as a result of the endothermic decomposition of the additives or the promotion of melting and dripping following depolymerisation or by the process known as ablation where entire burning sections of the polymer 'drop off'. In all these cases a large proportion of the heat of combustion is removed from the critical zone.

The inhibition of smouldering or glowing combustion is slightly more complex than that of flaming combustion because it is more difficult to envisage well-defined separate stages. The alteration of the initial



breakdown process is analogous to the action in the case of flaming combustion, i.e. the mechanism may involve chemical inhibition, fillers or coatings. On the other hand, the burning of the char is usually inhibited by specific additives which have very little effect on luminous flames and vice versa.

The information that is most frequently sought about the mechanisms of action of specific flame retardants relates to whether they act primarily in the gas phase or in the condensed phase. It is still a matter of some controversy whether oxidative surface reactions are important in the combustion process. For some polymers (e.g. polypropylene) oxygen in the surrounding atmosphere is claimed to be involved in the initial breakdown.<sup>20,21</sup> For other polymers (e.g. polystyrene) radiant pyrolysis studies have shown that it makes no difference whether or not the surrounding atmosphere contains oxygen.<sup>22</sup>

It is widely believed that, when the action of the flame-retardant additive is affected by the structure of the polymer substrate but not by the nature of the gaseous oxidant, then the mechanism is likely to involve an alteration in the condensed-phase decomposition of the polymer. If, however, the flame-retardant action changes when the oxidising atmosphere is varied, then, although it would be expected that the additive acts in the gas phase, it may only be influencing surface oxidative reactions while acting from the condensed phase. The mechanism of action may be assumed to be predominantly gas-phase if additionally the nature of the polymer does not influence the effect of the flame retardant.

The action of those additives used for the retardation of smouldering can occur both in the gas phase (i.e. halogens or sulphur dioxide<sup>23,24</sup>) and in the condensed phase (i.e. borates or phosphates<sup>25</sup>).

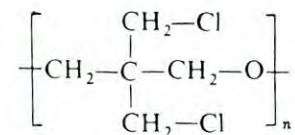
One of the tools most frequently used for elucidating flame retardant mechanisms is the determination of the limiting oxygen index (LOI), which corresponds to the minimum percentage of oxygen needed in an otherwise inert atmosphere to sustain the combustion of a polymer.<sup>26</sup> This is the basis of standard tests (ASTM D2863, BS 2782-141, ISO draft version) but is also of great value for fundamental research on account of the variety of parameters which can be altered. Typically oxygen is replaced as the oxidising gas by nitrous oxide to investigate whether there is a gas-phase mechanism of action of flame retardants.

In the following sections the effects of the most important elements with a flame-retardant action will be discussed. These are boron and aluminium (Group III), phosphorus and antimony (Group V) and chlorine and bromine (Group VII). Other elements have also been found to confer flame

retardance but they are either much less widely used or have less well-defined effects. Among these other elements mention will be made of nitrogen, molybdenum, zirconium, titanium, tin and sulphur.

#### 4. CHLORINE

The fact that chlorine exerts some kind of flame-retardant action can be deduced from the relatively low flammability of polymers containing this halogen chemically bound in their structure. The chemical nature of the environment surrounding the bonded chlorine is very important as is apparent from plots of limiting oxygen indices of chlorinated polyethylenes and polypropylenes against the chlorine content (Fig. 1).<sup>26-29</sup> When the chlorine atom is attached to a tertiary carbon atom, as in polypropylene, a large flame-retardant effect is found at very low levels of chlorine (0–5 wt %; slope 2.0). When the chlorine is attached to secondary carbon atoms, as in chlorinated polyethylene, in chlorinated alkanes used as additives incorporated into polyethylene, in poly(vinyl chloride) or in poly(vinylidene chloride), the flame retardant effect is much smaller. There is also a clear change of slope, so that at low loadings the chlorine is much less effective (slope 0.2) than at high loadings (slope 1.0). The change in slope occurs at a chlorine level which would roughly correspond to a structure such as  $C_4H_7Cl$ . For comparative purposes the limiting oxygen index of Penton (a chlorinated polyether with chlorine attached to primary carbon atoms and with the following structural formula



is plotted in the same Figure. It can be seen that the LOI is much smaller than that where the bond is to a secondary carbon atom. This strongly suggests that the mechanism of action is predominantly chemical. When hydrogen chloride or chlorine have been added to the oxidising atmosphere above burning polyethylene<sup>26</sup> and polypropylene<sup>29</sup> and found to have virtually no effect, the inference has clearly been that the action is confined to the condensed phase. Comparative studies of the LOI and of the limiting index when the oxidising gas is nitrous oxide (LNOI) have shown both curves to be parallel,<sup>27</sup> again suggesting no gas-phase effect.



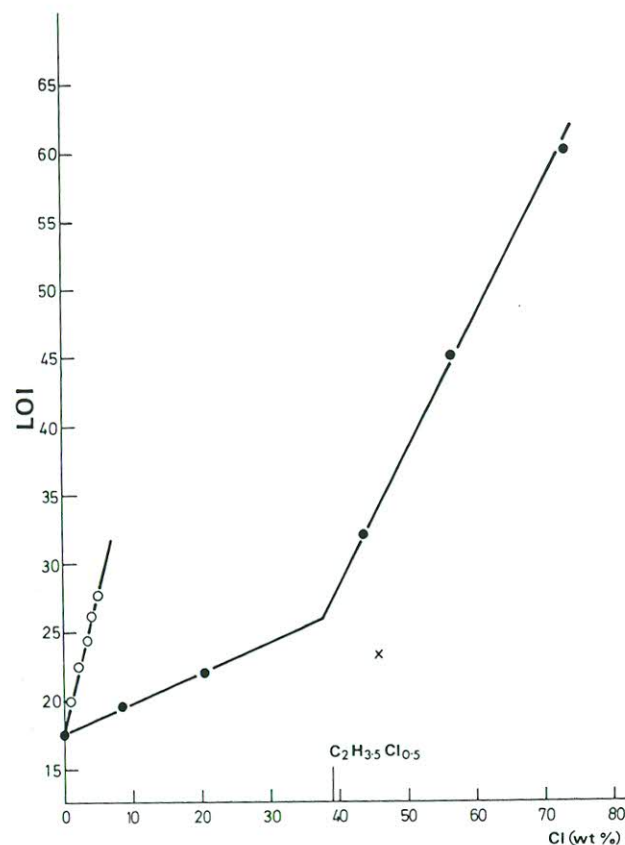


FIG. 1. Effect of chlorine, present in polymers, on their flammability: ○ polypropylene; ● polyethylene, poly(vinyl chloride) or poly(vinylidene chloride); × Penton. (Data taken from refs. 26–29.)

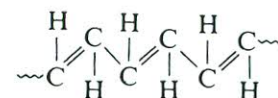
It has traditionally been assumed that chlorinated additive flame retardants act by virtue of their ease of elimination of hydrogen chloride.<sup>30</sup> This is borne out by the finding that, e.g. for polypropylene, aliphatic chlorinated hydrocarbons are ineffective flame retardants; their decomposition is so fast that they evolve hydrogen chloride during processing of the polymer.<sup>31</sup> Analogously chlorinated biphenyls or biphenyl ethers have a very strong Cl—C bond so that their decomposition is too slow to be effective. Thus compounds such as perchloropentacyclodecane with intermediate Cl—C bond strengths are found to be the most useful flame

retardants for this polymer.<sup>31</sup> In general, aromatic chlorine-containing compounds are said to perform poorly as additive flame retardants,<sup>32</sup> although little evidence is found in the literature for this statement. Thermogravimetric studies of the decomposition of liquid and solid chlorinated alkanes frequently used as flame retardants have shown that hydrogen chloride is in fact evolved, at least in the absence of polymer.<sup>33,34</sup> This suggests that HCl is later effective as a gas-phase flame inhibitor. Thus the flame chain-carriers would react with HCl and transform reactive radicals into relatively unreactive ones such as chlorine atoms. The mechanism of this action will be discussed more fully in conjunction with brominated flame retardants. Hydrogen bromide is a very efficient flame inhibitor, e.g. for polypropylene some five times more so than hydrogen chloride (on a molar basis).<sup>29</sup> When additive flame retardants containing chlorine are compared with their brominated analogues, in terms of their efficiency in reducing the LOI of polypropylene, the relative slope values are less than or equal to 2.2.<sup>29</sup>

It can thus be concluded that, although there may be some gas-phase action for chlorine compounds, it is relatively inefficient and the bulk of the flame-retardant effect takes place in the condensed phase.

An alternative theory<sup>35–38</sup> has been proposed which assumes the operative mechanism to be a purely physical dilution of the flammable mixtures or a 'blanketing' of the flames by volatile chlorinated species. This mechanism would explain the action of the large number of inorganic chlorides and oxychlorides used, particularly for cellulosic materials. These additives are usually hygroscopic and thus liberate non-flammable gases including HCl.

Before studying other flame retardant elements, it is of interest to look at the mechanism of combustion of the most important chlorinated polymer: poly(vinyl chloride) (PVC). It decomposes principally by a chain-stripping process liberating hydrogen chloride, so that a polyenic residual structure remains:



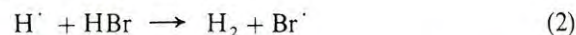
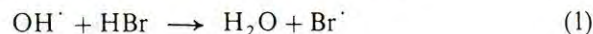
This dehydrochlorinated charry residue can be cyclised to yield benzene, a process which occurs intramolecularly and not intermolecularly.<sup>39</sup> It is also possible for some main-chain C—C scissions to occur and small C<sub>2</sub> and C<sub>3</sub> products to be formed which later yield carbon oxides as the sole oxygenated products. The formation of the char and of the aromatic



products is the reason why combustion of PVC produces large amounts of smoke.

## 5. BROMINE

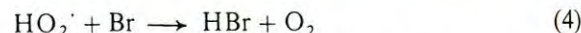
The most widely accepted mechanism for the action of bromine-containing compounds as flame retardants involves the release of volatile species, mainly hydrogen bromide, into the gas phase, where it then inhibits the flame reactions.<sup>30,32,40-48</sup> Hydrogen bromide is produced by the thermal decomposition of many organic bromine compounds; it thus interacts with the highly reactive free radicals which are the chain carriers responsible for the propagation of combustion, e.g. by reactions 1 and 2.



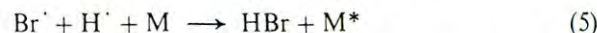
The bromine atoms formed are relatively unreactive but can still eventually abstract hydrogen from the polymeric fuel or its combustible decomposition products (RH) to regenerate hydrogen bromide by reaction 3.



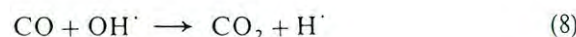
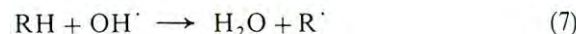
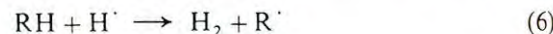
Hydrogen bromide may also be regenerated by termination reactions, either by the bimolecular reaction 4 at relatively low temperatures,<sup>47</sup>



or by the termolecular reaction 5, involving a 'third body'.<sup>45</sup>



This mechanism reduces the concentration of the oxidising hydroxyl radicals and inhibits the normal flame reactions 6 and 7 as well as the subsequent oxidation of CO to CO<sub>2</sub> (reaction 8). In the case of gaseous



premixed flames, this mechanism, or some slight variation, is well established.<sup>40</sup> Unfortunately, however, the flames above burning polymers are not premixed, although the presence of oxygen very near the surface of

some polymers, such as polypropylene,<sup>20,21</sup> and of inert gases from the atmosphere in the pre-flame region of burning poly(methyl methacrylate)<sup>49</sup> means that polymer flames may not be purely diffusional. The amount of bromomethane needed to extinguish pure diffusion and premixed flames has been found to be the same.<sup>41</sup> It is therefore reasonable to assume that, although very few studies have been made of diffusion flames, polymer flames may be very similar to fuel-rich premixed flames.<sup>47</sup>

This simple chemical mechanism suffers from the disadvantage that it does not take into account the well-known fact that, for many organic fuels, the concentration of inhibitor needed to extinguish a flame is much greater when the halogenated compound is introduced from the fuel side rather than from the oxidant side.<sup>41,50,51</sup> Any bromine introduced directly into a polymer should thus be assumed to be fairly ineffective as compared with the presence of HBr in the gas phase. In fact, however, considerable evidence suggests that the bromine present in the condensed phase which is then volatilised as hydrogen bromide has a much greater effect on flammability than if it were introduced, as hydrogen bromide or as bromine, into the gas phase from the start. For example, although it has been calculated that almost 50 wt % hexabromocyclohexane should be required to confer flame retardance on polystyrene,<sup>51</sup> it has been found experimentally that *ca* 2% is sufficient.<sup>52</sup> These discrepancies have been attributed to simple failures in the application of the appropriate aerodynamic corrections<sup>53</sup> but it may also be that the premixed character of polymer flames is much greater than is generally assumed.

It has been shown that, in the combustion of brominated polystyrenes,<sup>51</sup> brominated polyurethanes,<sup>54</sup> brominated polyethylene and polypropylene<sup>31,55,56</sup> and polyesters containing additive brominated flame retardants,<sup>57</sup> the evolution of hydrogen bromide is an essential initial step. The rate of formation of hydrogen bromide is dependent on the C—Br bond strength, as is indicated by the difference between the efficiencies of *o*- and *p*-bromostyrene comonomers in conferring flame retardance on unsaturated polyesters.<sup>58</sup> It is therefore to be expected that aromatic bromine compounds, which cannot easily split off HBr, would be much poorer flame retardants than aliphatic compounds. It has been claimed repeatedly that the liberated hydrogen bromide affects in some way the mechanism of the thermal decomposition of the polymer in the condensed phase; this is not yet altogether established. Bromine chemically incorporated into the condensed phase of polyethylene has no effect on the rate of mass loss of the polymer (Fig. 2) nor on the limiting pressure change (Fig. 3) during thermal oxidation.<sup>56</sup> It does, however, decrease the pressure



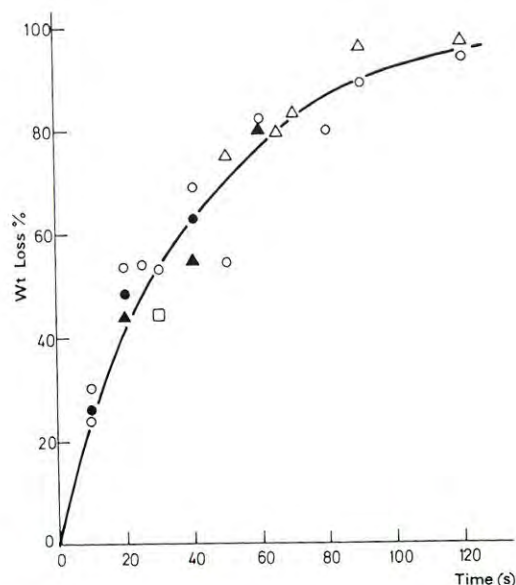


FIG. 2. Effect of chemically incorporated bromine on the rate of weight loss of polyethylene during oxidation: temperature 703 K; atmosphere 5.3 kPa  $O_2$  + 21.3 kPa  $N_2$ ; sample weight 6.4 mg;  $\circ$  untreated polymer;  $\bullet$  Br content 1.7 wt %;  $\triangle$  Br content 2.2 wt %;  $\blacktriangle$  Br content 2.6 wt %;  $\square$  Br content 6.6 wt %. (After ref. 56, reproduced by permission of The Royal Society and of Professor C. F. Cullis.)

change during the initial stages of the reaction. When, on the other hand, hydrogen bromide is added to the oxidising atmosphere, it decreases the rate of mass loss of the polymer.<sup>59</sup> Simultaneously, HBr also increases the pressure change during the initial stages of the thermo-oxidative decomposition, so that the erstwhile limiting value is reached much more rapidly, and thereafter it decreases the accompanying pressure change (Fig. 3). These findings, coupled with the fact that virtually all the hydrogen bromide can be recovered from the gas phase after a very short time, suggest that the inhibition reactions do occur mainly in the gas phase. The effects on pressure change are consistent with a rapid elimination of hydrogen bromide, which then leaves 'weak' positions in the main polymer chain, so that 'random' chain scission now occurs principally at these bonds. In this way, rather high molecular weight and relatively involatile products will be formed initially. These compounds will subsequently decompose further and form the same products which would have originated from polyethylene in the absence of bromine, i.e. low molecular weight alkanes

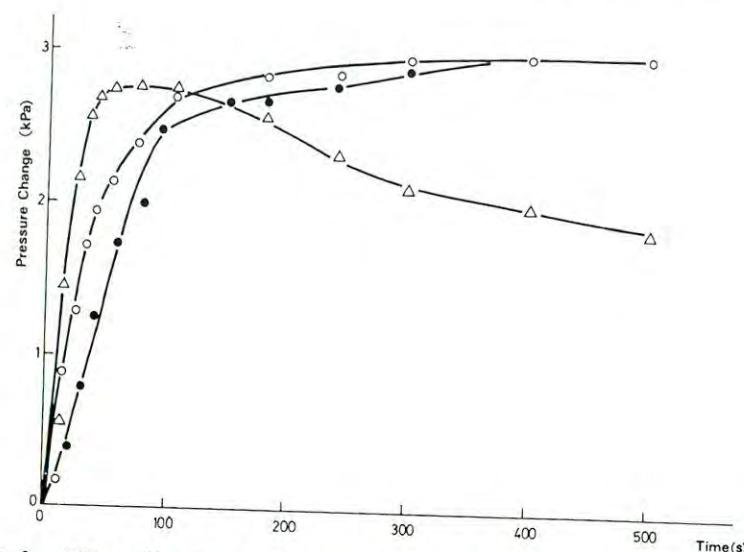
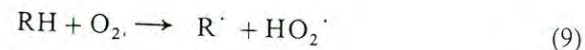


FIG. 3. Effect of bromine on the pressure change accompanying the oxidation of polyethylene: temperature 703 K; sample weight 6.4 mg;  $\circ$ : atmosphere 20.0 kPa  $O_2$  + 6.6 kPa  $N_2$ , untreated polymer;  $\bullet$ : atmosphere 20.0 kPa  $O_2$  + 6.6 kPa  $N_2$ , polymer containing 12 wt % Br;  $\triangle$ : atmosphere 20.0 kPa  $O_2$  + 5.3 kPa  $N_2$  + 1.3 kPa HBr, untreated polymer. (After ref. 56, reproduced by permission of The Royal Society and of Professor C. F. Cullis.)

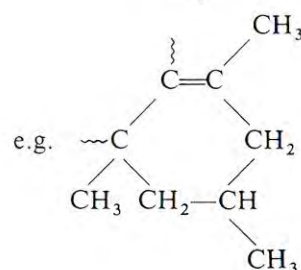
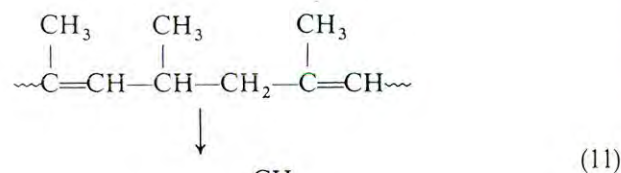
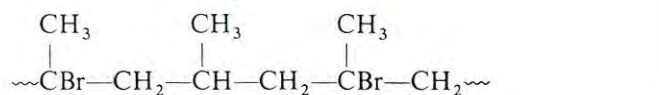
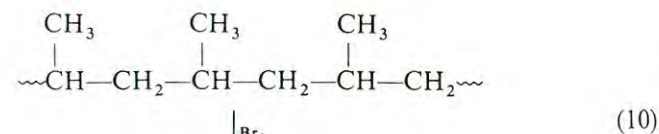
and alkenes. When HBr is already present in the gas phase, it is likely to contribute to an initial attack on the polymer chain and produce scissions which lead to gaseous products in addition to those formed by the reaction of the fuel with oxygen (reaction 9).



These reactions will soon be inhibited by the mechanism proposed earlier, so that the pressure rise decreases, i.e. there is inhibition of the flame reactions. No important condensed-phase effect can be attributed to gaseous HBr for this polymer. For polypropylene, however, gaseous hydrogen bromide accelerates thermal decomposition in inert atmospheres,<sup>55</sup> but not thermo-oxidative decomposition,<sup>56</sup> so that oxygen must react with the polymer in the condensed phase. In this same polymer, the initial pressure rise due to bromine incorporated by bromination of the substrate is identical to that of the unbrominated sample but the pressure eventually reaches a lower limiting value. This can be interpreted by



assuming that bromination occurs predominantly at the tertiary carbon atoms (reaction 10) and that these positions will be less 'weakened' by the elimination of HBr because of the positive inductive effect of the methyl group. The resulting polymer, however, after elimination of HBr, will be more susceptible to cyclisation reactions typical of polydienes (reaction 11) and will thus give rise to fewer molecules of volatile products.



Other studies have shown that it is only the bromine content and not the type of additive which is relevant to the degree of flame retardance conferred on polyesters,<sup>60</sup> poly(methyl methacrylate) and polystyrene<sup>61</sup> (Fig. 4). Many halocarbons, such as  $\text{CF}_3\text{Br}$  or  $\text{C}_2\text{F}_4\text{Br}_2$ , are extensively used as fire suppressants,<sup>62,63</sup> although they are in fact thermally very stable. In a  $\text{CF}_3\text{Br}-\text{CO}-\text{H}_2-\text{Ar}$  flame, hydrogen bromide appears before bromine atoms,<sup>64</sup> but normally it is difficult to find reactions leading to the formation of HBr from these compounds; they are however much more efficient flame suppressants than HBr itself.<sup>45</sup> To explain this mode of action it may be useful to consider an alternative purely physical

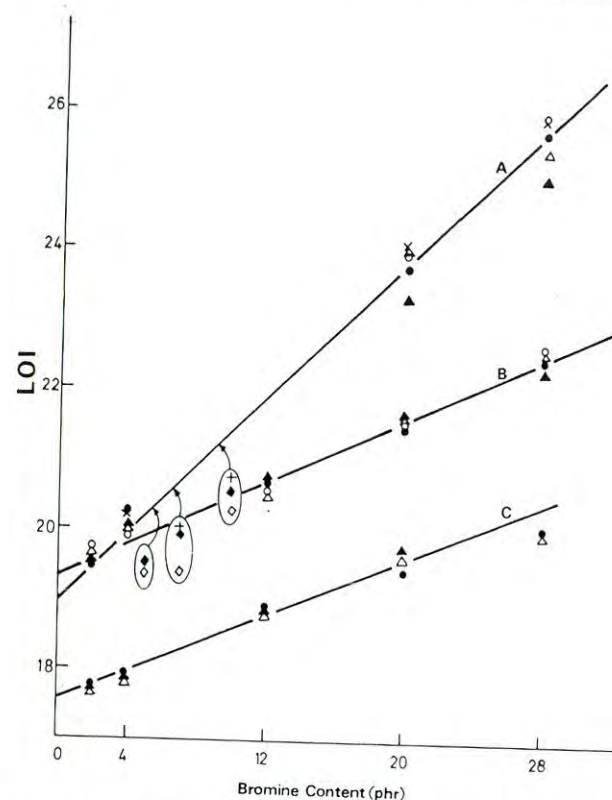


FIG. 4. Effect of bromine additives on the flammability of organic polymers: ○ tetrabromoxylene; ● 1,1,2,2-tetrabromoethene; △ tetrabromoethane; ▲ pentaerythrityl tetrabromide; × tetrabromobutane; + bis(2,3-dibromopropyl) ether; ◇ tribromoneopentyl alcohol; ◆ decabromobiphenyl ether. A, unsaturated polyester resin; B, high impact polystyrene; C, poly(methyl methacrylate). (After refs. 60 and 61, reproduced by permission of Heyden & Son Ltd.)

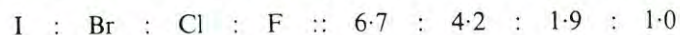
theory.<sup>35-38</sup> On re-examination of literature data, it was found that the peak effectiveness of halogen-containing organic compounds acting as flame retardants was dependent on a minimum weight of halogen of *ca* 70% in the fuel-additive mixture.

$$k = \frac{\text{wt halogen}}{\text{wt fuel} + \text{wt flame retardant}} \times 100 = 69.8 \pm 3.5$$

This percentage was found to be completely independent of the nature of



the halogen present, so that all four halogens would then have a relative effectiveness which is in direct proportion to their atomic weights, i.e.



This theory assumes that the principal role of the halogens is to increase the total mass of material that must be introduced into the gas phase per unit time, without at the same time producing an increase in the heat flux back from the flame to the polymeric fuel.<sup>38</sup>

The effectiveness of halogens, particularly bromine, as flame retardants appears to be enhanced by free-radical initiators.<sup>65</sup> It was in fact later shown that the action of the free-radical initiators was quite independent of that of the bromine.<sup>66,67</sup> The free radicals promote depolymerisation of the polymeric fuel which then melts and drips away, taking with it a large proportion of the heat evolved. There is thus no real combined effect of the free-radical promoters and bromine.

Nitrogen does increase the effect of bromine, as for example when ammonium bromide is used as an additive,<sup>68</sup> or when brominated alcohols are incorporated into polyurethane foams.<sup>54</sup> The elimination of HBr usually occurs via the formation of an electron-deficient centre. The electron-rich nitrogen atom can act as a nucleophile and stabilise the resulting intermediate structure, thus increasing the ease of elimination of hydrogen bromide.

It can be concluded that, although there may be some effect on the condensed-phase decomposition of the polymer, bromine probably acts mainly by a free-radical mechanism in the gas phase.

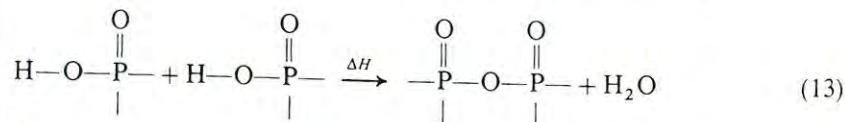
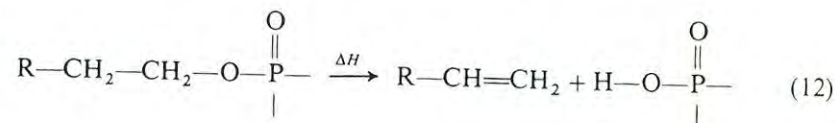
## 6. PHOSPHORUS

### 6.1. General

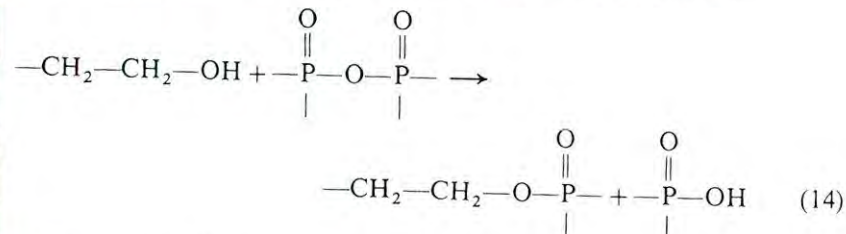
Phosphorus is one of the elements, the flame-retardant action of which is most difficult to understand. Different phosphorus compounds, or indeed even the same phosphorus compound in association with different polymer substrates, may exert modes of action ranging from condensed-phase to gas-phase and from physical to chemical mechanisms.

### 6.2. Hydroxylated Polymers

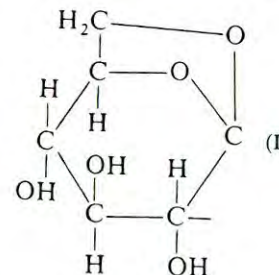
The most carefully studied systems are those where the substrate is cellulose. Phosphoric acid and its esters decompose thermally yielding polyphosphoric acids (12) and water (13).



These reactions are followed first by substitution of the free hydroxyl groups in cellulose by phosphate groups and the concurrent regeneration of phosphoric acid (reaction 14) and finally by dehydration of the resulting organic phosphates to yield an alkenic structure by reaction 12.



Account should be taken of the fact that cellulosic polymers usually decompose by two parallel routes. One of these involves depolymerisation to yield *laevo*-glucosan (I), which, in turn, breaks down to give flammable gaseous products. The other mechanism is a chain-stripping reaction



whereby the substituents on the carbon chain, mainly hydroxyl groups, are eliminated, as water, and the residue becomes an unsaturated char which smoulders or glows instead of undergoing flaming combustion. Thus, if phosphorus-containing flame retardants act by a condensed-phase mechanism such as that proposed, an increase in the amount of char would be expected. This in fact happens with cellulosic polymers.<sup>69,70</sup>



Simultaneously, however, water must be evolved. This has been shown to act, in the gas phase, to decrease the heat liberated during combustion.<sup>71</sup> Plots of the limiting oxygen index (LOI) against phosphorus content for phosphoric acid-treated cellulose have the same slope as those for the limiting nitrous oxide index (LNOI).<sup>72</sup> This suggests, then, that the effect of the water produced by reaction of phosphoric acid and cellulose, even if it occurs in the gas phase, is purely physical and will not be affected by a change in the nature of the gaseous oxidant. Further evidence in support of chemical action in the condensed phase comes from the fact that, as the level of phosphoric acid is increased, there is a steady decrease in the temperature at which the endothermic decomposition of cellulose occurs<sup>73</sup> (Fig. 5). Phosphoric acid is shown to introduce an additional stage, which is probably the phosphorylation of the hydroxyl groups in cellulose.

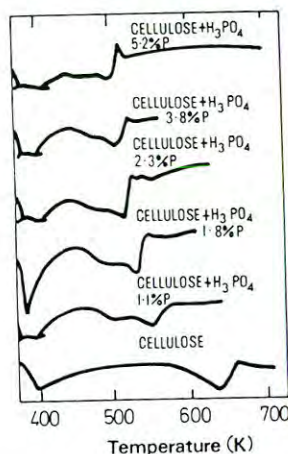


FIG. 5. Thermal analysis of cotton fabrics treated with increasing amounts of phosphoric acid. (After ref. 73, reproduced by permission of John Wiley & Sons Ltd.)

Work carried out on the thermal decomposition of other hydroxylated polymers shows that phosphorylation accelerates also the chain-stripping process as a result of the dehydration and formation of conjugated double bonds; in consequence the scission of polymer chains is inhibited.<sup>74,75</sup> The differential thermal analysis curves for poly(vinyl alcohol) and for the same polymer after phosphorylation (Fig. 6) show the various changes which phosphorus has produced in the rate of thermal degradation of the polymer, e.g. in the activation energies for the various steps.<sup>74</sup>

The mechanism of this mode of flame-retardant action by phosphoric acid and its esters on hydroxylated polymers is probably ionic, since it is a well-established fact that the hydroxyl groups in cellulose are extensively attacked by acidic catalysts, while they are not affected by neutral salts.<sup>10</sup> Acid catalysts can also induce scission of one of the two C—O bonds in epoxides. A further confirmation of this mechanism is therefore provided

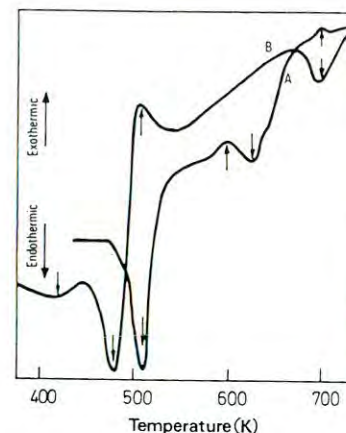


FIG. 6. Thermal analysis of poly(vinyl alcohol) (A) and phosphorylated poly(vinyl alcohol) (B). (Reproduced from ref. 74, by permission of the publishers, IPC Business Press Ltd ©.)

by the fact that studies of the LOI and LNOI of epoxy resins have shown that triphenyl phosphine does not chemically affect the gas-phase flame reactions: triphenyl phosphine produces only condensed-phase effects on the decomposition of these resins.<sup>76</sup> Epoxy coatings, modified with phosphorus esters, show an increased char-forming tendency and intumescence,<sup>77</sup> also signs of condensed-phase reactions.

The effect of phosphorus on the flame retardance of cellulosic compounds is considerably enhanced by nitrogen bases, such as urea, guanidine or dicyanodiamide. One of the main advantages of the use of nitrogen is the clearly increased ease of attachment of the phosphorus to the polymeric fabric. This reduces loss of the additive due to its solubility in water. There is abundant evidence that the minimum amount of phosphorus needed to make cotton flame-retardant decreases with increasing amounts of nitrogen.<sup>78,79</sup> It is not clear whether this is simply an effect of the better durability of the phosphorus finish, or whether it is an



additive or even synergistic effect.<sup>9</sup> The most pronounced effects have been found with nitrogen compounds containing relatively non-basic N—H groups.<sup>79</sup> The flame-retardant action is dependent, however, on various factors, such as the mode of application of the phosphorus and nitrogen compounds.<sup>80</sup> A systematic study was undertaken of nitrogen bases added to a cellulose–triphenyl phosphate system.<sup>81–82</sup> The char yields obtained increased with nitrogen content. The nitrogen compounds were also shown to interact exothermically with *laevo*-glucosan in a manner similar to that in which acids act. Transphosphorylation takes place and it was concluded that phosphoramides were formed as intermediates. The nitrogen compounds thus probably act by a nucleophilic attack on the phosphate, which results in the formation of numerous P—N bonds.<sup>72</sup> These bonds, being more polar than the original P—O bonds, result in increased electrophilic character of the P atom and the rates of acid-catalysed dehydration of cellulose are thus also higher. In this way char formation is increased at the expense of that of flammable *laevo*-glucosan. When various phosphoramides are used directly as additives, the slopes of the plots of the proportion of cellulose converted into char ( $Y(1-X)$ ), against the logarithm of the phosphorus content, are all the same, irrespective of N content, while the slope for phosphoric acid is much smaller (Fig. 7).<sup>83</sup> When a phosphoramide is cross-linked with a melamine resin, the slope still does not change but the effect is much larger. This is due to a physical rather than chemical cause: the volatility of the phosphoramide is decreased and thus more of the reagent is in contact with the cellulose during the pyrolysis. When the amido group is replaced by a methyl ester (not containing nitrogen) or by a nitrile (which is non-nucleophilic and cannot, thus, form P—N bonds), the resulting slope is the same as that for phosphoric acid. This tends to give support to the mechanism proposed.

Summing up, then, phosphorus compounds confer flame retardance on hydroxylated polymers, by a condensed-phase esterification of the hydroxyl groups as a result of acid catalysis. Water is then liberated which acts as a physical agent in the gas phase. The incorporation of nitrogen which can form P—N bonds increases the effectiveness of the esterification process.

### 6.3. Other Polymers

In the case of thermoplastic polymers, a significant proportion of the phosphorus added is lost by volatilisation prior to the breakdown of the polymer itself, so that evidently any condensed-phase action is relatively small.<sup>84</sup> Phosphorus-containing compounds are known to be gas-phase

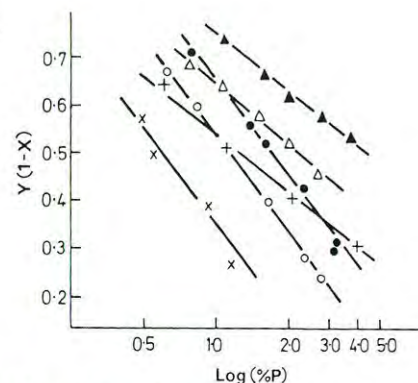
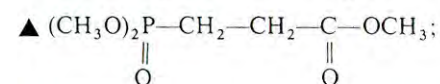
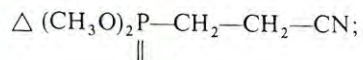
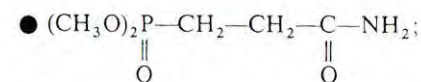
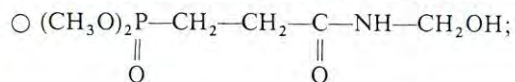


FIG. 7. Effect of different phosphorus-containing additives on the proportion of cellulose converted into char ( $Y(1-X)$ ). Additives:



×  $(\text{NHCH}_3)_3\text{P}=\text{O}$  + melamine; +  $\text{H}_3\text{PO}_4$ . (After ref. 83, reproduced by permission of the Swiss Federations of Dyers and of Chemist-Colourists and of Professor R. H. Barker.)

flame inhibitors,<sup>47</sup> and this is confirmed by the finding that various non-halogenated phosphorus compounds with the phosphorus in different oxidation states have roughly the same effect on the LOI of polyethylene,<sup>27</sup> and of poly(ethylene terephthalate) (PET).<sup>85</sup> The mechanism of action may involve the formation of heavy vapour clouds which effectively 'smother' the flame by excluding oxygen.<sup>86</sup> During the combustion of polystyrene<sup>86</sup> and of poly(ethylene terephthalate),<sup>87</sup> for example, most of the phosphorus is volatilised and almost none remains in the solid residue.

Tricresyl phosphate, which increases the limiting oxygen index of several thermoplastic polymers (polyethylene, polyoxymethylene, poly(methyl methacrylate)) to similar extents (8–15%), has a much greater effect on the LOI of poly(ethylene oxide) (+40%).<sup>27</sup> This is an indication of the importance of the substrate. Poly(ethylene oxide) is amenable to acid catalysis due to the presence of the ether oxygen atom and its rate of



decomposition is therefore probably affected by phosphorus in the condensed phase. The other polymers are, however, affected only as a result of effects on the gas-phase reactions of their decomposition products.

The combined action of phosphorus and nitrogen on the combustion of thermoplastics is occasionally antagonistic: this is the case with polymers such as polyethylene, polypropylene and poly(methyl methacrylate).<sup>9</sup> This can be explained if the acidic phosphate species changes the pattern of breakdown of poly(methyl methacrylate) (PMMA) so that it suffers chain-stripping, instead of depolymerisation to monomer, and thus yields large proportions of char.<sup>88</sup> The addition of nitrogen bases would then decrease the effectiveness of this catalytic action. In fact, however, in blends of PMMA with ammonium polyphosphate, no reaction occurs between the two components of the blend, but the organic polymer reacts with polyphosphoric acid, the breakdown product of its ammonium salt.<sup>89</sup> This chemical explanation of P-N antagonism is inconsistent with the mechanism of action proposed for thermoplastic polymers, which is mainly physical and takes place in the gas phase.

Phosphorus-based flame retardants are fairly extensively used in many nitrogen-containing polymers such as polyacrylonitrile,<sup>90</sup> natural<sup>91</sup> and synthetic<sup>92</sup> polyamides and polyurethanes,<sup>93</sup> but the mechanism of action is not yet well understood.

Studies of the combined action of phosphorus and halogens on the combustion of polyesters and polyurethanes have shown that the reaction occurs mainly in the condensed phase.<sup>87,94-96</sup> There is, generally, increased formation of char and a large proportion of the phosphorus remains in the solid residue. The main function of the halogen in halogenated phosphates is probably to prevent the volatilisation of the additive.<sup>87</sup> Thus, while trihexyl phosphate, which is non-volatile, is just as effective a flame retardant for poly(ethylene terephthalate) as a brominated phosphate, tripropyl phosphate does not significantly affect the LOI of the polymer. It is also interesting that tris(chloromethyl-2-chloroethyl) phosphate is a very much more efficient flame retardant than tris(2,3-dichloropropyl) phosphate, the only significant structural difference between the two compounds being the tertiary carbon atom in the former; this compound is thus less volatile. The suggested mechanism of action in the condensed phase involves an acid-catalysed aldol condensation. Tris(2,3-dibromopropyl) phosphate also acts in the condensed phase when conferring flame retardance on polystyrene, but the mechanism is not yet clear.<sup>97</sup> Another phosphorus-halogen system widely used, but so far little studied, comprises the phosphate plasticisers for PVC.

TABLE I  
EFFECT OF RED PHOSPHORUS ON LIMITING  
INDICES OF POLYETHYLENE TEREPHTHALATE

| Additive wt (%)   | LOI  | LNOI |
|-------------------|------|------|
| 0.0               | 20.4 | 46.4 |
| 1.0               | 23.6 | 47.9 |
| 2.0               | 25.1 | 48.7 |
| 3.0               | 27.6 | 49.3 |
| 4.0               | 30.3 | 49.9 |
| Slope (LI ÷ wt %) | 3.57 | 1.64 |

(After ref. 100.)

Finally it is of considerable interest to mention a compound which is surprisingly a very effective flame retardant, viz. red phosphorus, a polymeric form of elemental phosphorus which is quite distinct from the more common white P<sub>4</sub> molecules. It is obviously the most economical way in which phosphorus can be made to give maximum yields of the acid catalyst for condensed-phase action. Significantly, in the case of polyurethanes, the action of red phosphorus is enhanced by the presence of small amounts of halogen compounds.<sup>98,99</sup> Less easy to explain is the combined effect of red phosphorus and halogens for thermoplastic polymers such as polyolefins or PVC.<sup>99</sup> In the case of poly(ethylene terephthalate), red phosphorus is a very good flame retardant in its own right and it acts partly in the gas phase. This conclusion is confirmed by the

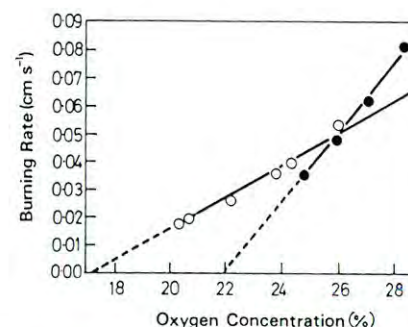


FIG. 8. Effect of oxygen content on the burning rate of poly(ethylene terephthalate): ○ untreated polymer; ● polymer + 2% red P. (After ref. 100, reproduced by permission of John Wiley & Sons Inc.)



different slopes of plots of LOI and LNOI versus phosphorus content, as described by the equation

$$LI_p = LI_0 + \text{slope} \times P^{1/2}$$

where  $LI_p$  is the limiting index (LOI or LNOI), at an additive concentration of phosphorus of  $P$  wt %, and  $LI_0$  is the same index when no phosphorus has been added<sup>100</sup> (Table 1). The presence of red phosphorus does also affect, however, the rate of burning of the polymer, so that there is probably a considerable proportion of condensed-phase action (Fig. 8).

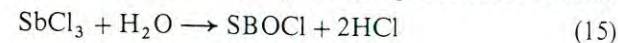
## 7. ANTIMONY

The use of metal oxides as flame retardants had already been suggested by Sir William Perkin at the turn of the century. It was not, however, until World War II that antimony trioxide began to be used<sup>101-103</sup> and it was soon shown that  $Sb_2O_3$  (or more accurately  $Sb_4O_6$ ) is generally ineffective in the absence of halogens, a finding borne out by most later studies.<sup>8,9,68,102-105</sup> In some isolated cases, however, antimony oxide may provide some degree of flame retardance on its own.<sup>106-108</sup> It is however the apparent synergism between antimony and halogens which has been the cause of the wide use of antimony as a flame retardant. The mechanism of action of antimony-halogen systems has been the subject of much research and is the butt of deep controversies. The greatest amount of work has been devoted to the identification of the active species and to the determination of the phase in which the flame-retardant action takes place.

The optimum atomic ratio for the Cl-Sb or the Br-Sb systems can now be safely assumed to be 3:1.<sup>68,102,105,109</sup> This does not however necessarily imply that volatile antimony trihalide is the active intermediate. The initial assumption made<sup>102,103</sup> was that antimony oxyhalide was the species responsible for the flame-retardant action. Studies of the thermal decomposition of antimony oxychloride ( $SbOCl$ )<sup>110</sup> do in fact show that this compound decomposes yielding, in three endothermic steps, gaseous antimony trichloride and a solid residue of  $Sb_2O_3$ . The thermogravimetric pattern of decomposition of  $SbOCl$  has a substantial overlap with that of various flexible polyurethane foams for which the Sb-Cl system had been shown to be a good flame retardant. Several other flame-retardant systems (or putative flame-retardant systems) were also studied and it was seen that those additives which had considerable thermogravimetric overlap with the foam were effective combustion inhibitors, while those which decomposed

at either substantially lower or higher temperatures than the polymer had little or no flame-retardant action. This led to the conclusion that  $SbOCl$  is formed *in situ* and then produces  $SbCl_3$ , which is the actual flame retardant.<sup>105</sup> Antimony trichloride is too unstable to be incorporated into a polymer and cannot therefore be used as a flame retardant. This means, of course, that the theory cannot be tested directly. There was, however, some earlier evidence for the gas-phase action which was taken as support for this mechanism: thus the limiting oxygen index of chlorinated polyethylene is improved by antimony trioxide but the limiting nitrous oxide index is unaffected.<sup>26,27</sup>

However, mass spectrometric studies of the flames above polymers containing antimony + chlorine have indicated that there is no  $SbCl_3$  in the flame zone,<sup>47</sup> although solid antimony monoxide ( $SbO$ ) and even metallic antimony ( $Sb$ ) can be detected. A sequence of reactions is therefore suggested, including 15 and 16. The active species proposed are thus solid



antimony monoxide and gaseous hydrogen chloride, the inhibitory action being at least partly heterogeneous. Triphenyl stibine is oxidised to  $SbO$ , probably explaining why it is effective, in the absence of halogens, in reducing the flammability of epoxy resins.<sup>76</sup>

The fact that at least 50 % of the antimony is volatilised from polymers also including halogens,<sup>111</sup> while 95 % of the antimony remains in the solid residue when halogen-free polymers are burnt,<sup>27</sup> is further evidence for a gas-phase mechanism.

Thermal analysis of antimony oxide-halogen systems in the absence of an organic polymer provides no evidence for the formation of  $SbOCl$ , but nevertheless indicates that volatilisation of chlorine and antimony<sup>33,34,112-114</sup> and indeed of bromine and antimony<sup>33,112-114</sup> occurs in a 3:1 ratio. This does not, however, appear to be the complete solution of the mechanistic problem. Thus, for instance, the synergistic effect of  $Sb_2O_3$  is much larger with solid chlorinated waxes than with liquid compounds with the same chlorine content.<sup>33,112-114</sup> This can be explained by the fact that the temperatures of decomposition of the solid additives to form  $HCl$  are much lower than their temperatures of volatilisation. The liquid additives on the other hand distil unchanged and do not decompose until fairly high temperatures are reached (Fig. 9). Antimony oxide can affect the rate of formation of volatile products ( $V$ ) from the chlorinated additives and the Sb-Cl systems can alter  $V$  for the polymeric substrate. When



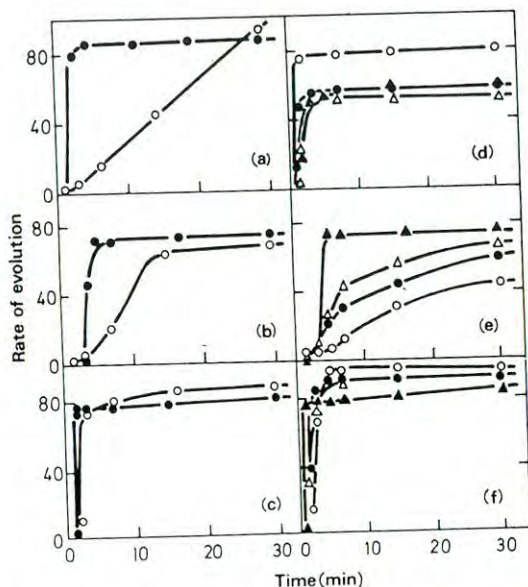


FIG. 9. Rate of formation of gaseous products from various mixtures of polyester, chlorinated paraffins and antimony trioxide: (a) ○ Dechlorane 4070; ● Dechlorane 4070 +  $\text{Sb}_2\text{O}_3$  (at 683 K); (b) ○ Cereclor 70; ● Cereclor 70 +  $\text{Sb}_2\text{O}_3$  (at 583 K); (c) ○ Cereclor 70; ● Cereclor 70 +  $\text{Sb}_2\text{O}_3$  (at 683 K); (d) ○ Cereclor 70 +  $\text{Sb}_2\text{O}_3$ ; ● Cereclor 70L +  $\text{Sb}_2\text{O}_3$ ; △ Cereclor 65L +  $\text{Sb}_2\text{O}_3$ ; ▲ Cereclor S52 +  $\text{Sb}_2\text{O}_3$  (at 583 K); (e) ○ polyester; ● polyester + 15 wt %  $\text{Sb}_2\text{O}_3$  + 15 wt % Cereclor 70 (incorporated into the substrate); △ polyester + 15 wt %  $\text{Sb}_2\text{O}_3$  + 15 wt % Cereclor 70 (physically mixed with the substrate); ▲ Cereclor 70 +  $\text{Sb}_2\text{O}_3$  (at 583 K); (f) as in (e), but at 733 K. (After ref. 33, reproduced by permission of Dr. G. S. Learmonth.)

different chlorinated paraffins are compared, a much higher temperature is required for a significant increase in the case of the liquid Dechlorane 4070 than for the solid Cereclor 70; for some liquid additives the rate always remains very low. The Sb-Cl system increases  $V$  for the polymer if the experiment is carried out at a temperature below the ignition point of the resin (723 K), while it decreases  $V$  at a higher temperature when enough flammable products would otherwise be formed from the polymer for ignition to occur. Analysis of the thermogravimetric curve of the polymer shows that the second stage of its decomposition, i.e. that in which the unsaturated polyester resin gives off most of the volatile products, is the one most affected. This is clear evidence for condensed-phase action, which probably occurs before the gas-phase reactions.

The antimony-halogen system has been found to enhance the condensed-phase formation of char, which then insulates the bulk of the polymer by the formation of a physical barrier.<sup>32,115</sup> Although the difference in thermal dehydrochlorination rates of chlorinated polyethylene in the presence and in the absence of antimony trioxide can be attributed to a condensed-phase reaction,<sup>116</sup> the opposite conclusion can be drawn from the lack of effect of Sb and Cl on the thermal decomposition of polypropylene in nitrogen.<sup>117</sup>

The system chlorinated paraffins +  $\text{Sb}_2\text{O}_3$  is very much less effective in reducing the extinction times of glass-reinforced polyester resins than pentabromotoluene (PBT) with  $\text{Sb}_2\text{O}_3$ .<sup>118</sup> If, however, even a small proportion of PBT is added to the chlorine-containing system, an effect is found which is as large as that of PBT- $\text{Sb}_2\text{O}_3$  system. This has led to the interpretation that the mechanisms of action of antimony oxide with bromine and with chlorine are qualitatively different.

In conclusion, it now seems probable that some reaction takes place in the condensed phase to produce the antimony trihalide, via the intermediate formation of a Lewis acid.<sup>119</sup> The use of Friedel-Crafts alkylation reagents in conjunction with an antimony oxide-chlorine Lewis acid precursor has, in fact, been shown to promote *in situ* charring of polystyrene.<sup>120</sup> It is however important that the halogen compound for the Sb-halogen system is one that does not volatilise prematurely. If this happens, the polymer structure would in fact be weakened and its flammability increased.<sup>111,121</sup> Once antimony halide is formed, it volatilises and breaks down rapidly in the hot pre-flame zone to produce  $\text{SbO}$  and hydrogen halide, which are the active species reaching the flame zone. It is probably the existence of the additional heterogeneous scavenging action of  $\text{SbO}$ , reminiscent of the effect of lead oxide formed from lead alkyls added to motor gasoline, that is the key factor which allows the drastic reduction in the proportion of halogen required to render a polymer flame-retardant.

## 8. BORON

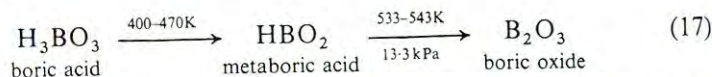
Four different mechanisms of action can be attributed to additives containing boron:

- (a) Formation at the surface of the solid polymer of 'glassy' inorganic deposits which act in a similar fashion to intumescent coatings.



- (b) Enhancement, with hydroxylated polymers, of char production at the expense of the formation of flammable gaseous products; this involves a condensed-phase mechanism whereby the boron-containing compound is first converted into boric acid and subsequently forms borate esters.
- (c) Release of water vapour into the gas phase by hydrated boron compounds (or of ammonia by ammonium borates); the water released acts both as a heat sink, reducing the amount of heat transferred back to the polymer for its continued decomposition, and as a diluent of the gaseous fuel, thus removing the composition and temperature of the gaseous mixture from within the flammability limits.
- (d) Chemical inhibition of oxidation reactions at the gas-solid interface by acting as free-radical scavengers.

Boric acid and its hydrated salts were among the first inorganic compounds to be used as flame retardants for cellulosic textiles.<sup>2</sup> They have low melting points and their thermal decomposition occurs according to the general scheme 17:<sup>8</sup>



Boric oxide becomes 'glassy' at *ca* 600 K and starts flowing above 775 K. The mixture of boric acid and borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ), which has very little tendency to crystallise out, starts losing water of hydration when contained in a cellulosic polymer at a temperature intermediate between that of the softening point of the polymer and that at which extensive thermal decomposition starts. The inorganic residue traps part of the evolved water and a portion of the polymer will expand so as to produce a surface layer which is similar to an intumescent coating and which insulates the bulk of the polymer from the external heat source. Borax, in the absence of boric acid, is an excellent inhibitor of flaming combustion, but is a catalyst for the afterglow of char residues.<sup>122</sup> This is very symptomatic because it has been found that, for cellulose, the borax added is not uniformly distributed throughout the polymer but tends to remain near the surface.<sup>123</sup> Boric acid is normally thought of as a rather poor flame retardant, which is however very effective in suppressing glowing combustion. This may be a misconception because the efficiency of boric acid in increasing the limiting oxygen index and limiting nitrous oxide index for wool passes through a maximum at *ca* 0.5 wt % of boron, while no such

effect is found for borax, a boric acid-borax mixture or ammonium fluoroborate (Fig. 10).<sup>124</sup> In none of these cases is there an apparent chemical effect in the gas phase since the LOI and LNOI vary in a similar fashion. The borax-treated wool melts and chars while no melting is observed for the boric acid-treated samples. The action of the fluoroborate has been attributed to the action of liberated boron trifluoride in the gas phase<sup>68</sup> and to a dehydration and cross-linking mechanism similar to that of borax. The results on wool tend to suggest, however, that neither

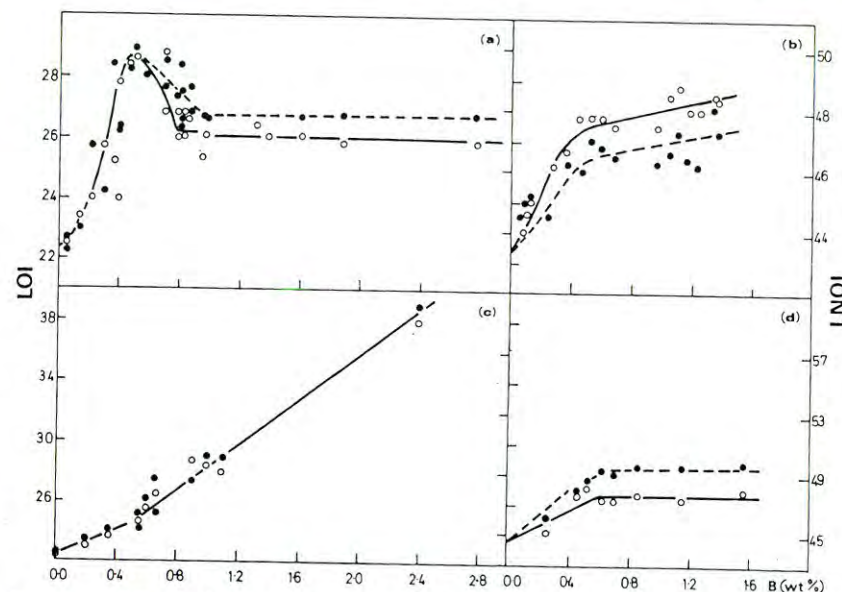
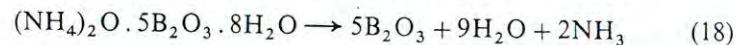


FIG. 10. Effect of boron on the flammability of wool: ○ oxidant,  $\text{O}_2$ ; ● oxidant,  $\text{N}_2\text{O}$ ; (a) boric acid; (b) borax; (c) ammonium fluoroborate; (d) borax + boric acid (7:3). (After ref. 124, reproduced by permission of the Textile Research Institute.)

mechanism is entirely correct. Several water-soluble borates have been used as flame retardants and are quite effective, their efficiency being largely dependent on the associated cation and on the ratios of metal oxide to boric oxide and of inert gases to boric oxide. In this connection, ammonium salts, e.g. ammonium pentaborate, should be mentioned because they yield additional non-flammable gases (ammonia, reaction 18) which are volatilised instead of depositing metal oxide residues.





The mechanism of char enhancement by borates for hydroxylated polymers is very similar to that exhibited by phosphates: the free hydroxyl groups are esterified, forming borate esters, and this is followed by loss of water.<sup>125</sup> Thus, in cellulose, char production is favoured at the expense of the formation of *laevo*-glucosan. Hydrated borates are more effective than the anhydrous salts,<sup>126</sup> so that the release of inert gases also occurs with borate flame retardants. Boron itself remains in the condensed phase, analysis of cellulosic char residues showing that 90% of the boron added has not volatilised.

The temperature at which the flame retardant action occurs (*ca* 535 K) is perfectly adequate for cellulose, which does not start to decompose significantly below 620 K. Another hydroxylated polymer, however, poly(vinyl alcohol), is not a good substrate for borate flame retardants, because it starts to decompose at *ca* 475 K<sup>127</sup> so that, when boric oxide is formed, the polymeric hydroxyl groups have already been eliminated. Phenolic resins are hydroxylated polymers for which borates are very efficient flame retardants.<sup>128,129</sup>

Fused boric oxide has been used as a flame retardant for cotton fabrics<sup>130</sup> and it has been found that smouldering combustion is inhibited only when the source of heat is placed above the material and not when the cellulose is heated from below. The resulting chars have been found to have a free-radical content some 2–3 times lower than those from cotton treated with lithium hydroxide or sodium chloride. This has led to the suggestion that some 'active sites' in the char are blocked chemically by volatile species acting heterogeneously by a free-radical mechanism. If an analogy were sought with other flame retardants, the action of SbO is the one that comes most clearly to mind.

Finally, the action of zinc borates (and some other insoluble borates) deserves mention. They have been extensively used as partial or total replacements for antimony oxide in conjunction with halogens.<sup>131–133</sup> The mechanism of action is probably different from that of Sb<sub>2</sub>O<sub>3</sub> but not much is yet known about it despite the fact that a number of studies have been made. There may be some interaction between the boron and the zinc.

## 9. ALUMINIUM

Aluminium oxide trihydrate is the flame retardant most abundantly used for plastics during the last few years (representing almost 44% of the total in the United States in 1978<sup>1</sup>). This implies a phenomenal rise since hydrated

alumina was introduced only around the mid-1960s as a flame retardant for unsaturated polyester resins, on account of its low cost.<sup>134</sup>

Studies of its effect on the limiting oxygen index of epoxy resins showed that, while anhydrous alumina did not markedly affect this measure of polymer flammability, the hydrated oxide produced a significant increase in the LOI and a parallel one in the LNOI (Fig. 11).<sup>76</sup> This suggests that the predominant inhibiting action occurs in the condensed phase and involves principally an endothermic dehydration. The alumina thus acts as a heat sink and prevents the flammable gases from reaching temperatures at which they would ignite, while the water vapour released simultaneously dilutes the gaseous fuel.

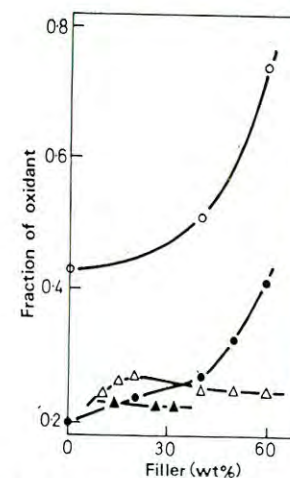


FIG. 11. Effect of alumina on the flammability of epoxy resins: ○ Al<sub>2</sub>O<sub>3</sub> · 3H<sub>2</sub>O (oxidant, N<sub>2</sub>O); ● Al<sub>2</sub>O<sub>3</sub> · 3H<sub>2</sub>O (oxidant, O<sub>2</sub>); △ Al<sub>2</sub>O<sub>3</sub> (Norton 389001) (oxidant, O<sub>2</sub>); ▲ Al<sub>2</sub>O<sub>3</sub> (Linde A) (oxidant, O<sub>2</sub>). (After ref. 49, reproduced by permission of Dr. C. P. Fenimore.)

These experiments have thus shown that the effect of hydrated alumina does not consist merely in the dilution of the solid combustible polymer by a non-flammable filler material. It thus became of interest to determine the heat that alumina trihydrate needs to absorb to lose its water of hydration. Early measurements of this heat of hydration<sup>135</sup> suggested a value of 1970 Jg<sup>-1</sup>,<sup>136–140</sup> but more recent results<sup>141–143</sup> indicate that this figure is probably too high and an average value of 1170 Jg<sup>-1</sup> has been obtained,<sup>143</sup> which is almost independent of particle size.<sup>144,145</sup>



An early source of interest in alumina trihydrate was its effect on smoke.<sup>76</sup> The hydrated material has a significantly greater effect on the reduction of smoke, as well as on flammability, than is the case for the anhydrous compound,<sup>28</sup> although the injection of water as such into the oxidant gases does not affect the amount of smoke produced.<sup>146</sup> Comparison with other fillers (e.g. hydrated silicates) shows that alumina is very much more effective than any of the others in increasing the time to reach a critical obscuration from styrene-butadiene rubber (SBR).<sup>147</sup> If another smoke parameter is analysed, i.e. maximum smoke density, alumina is not much better than other fillers.<sup>147</sup> This suggests that what is occurring is a decrease in the rate of formation of smoke, i.e. the alumina has a chemical effect on the condensed-phase mechanism of thermal decomposition. This is further confirmed by results with other polymers. The distribution of products from burning polystyrene is markedly changed by hydrated alumina, there being, for example, a considerable increase in the amount of toluene formed.<sup>148</sup> Smoke formation is thus decreased as a result of the formation of less smoky volatile intermediate products. In unsaturated polyester resins, the amounts of unburnt hydrocarbons produced are increased and the rate of smoke generation is reduced.<sup>149</sup> This decrease in the rate of smoke formation, even in the presence of smoke-enhancing brominated additives, is, as with SBR,<sup>147</sup> a much more pronounced effect than the decrease in maximum smoke density.

It having been established that alumina probably acts chemically in the condensed phase, its possible interaction with halogens will be considered. Some early evidence for a chemical mode of action has remained largely unnoticed. A combination of 16.8% alumina trihydrate and 3.4% tris(2-chloroethyl) phosphate gives excellent flame retardancy to rigid polyurethane foams,<sup>150</sup> while 20%  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  alone is ineffective in reducing the flammability of both rigid and flexible polyurethane foams.<sup>93</sup> Similarly, while the addition of fillers, such as glass fibre or calcium carbonate, increases the burning rates of chloroendic acid-based unsaturated polyester resins, this is not the case for hydrated alumina.<sup>151</sup> It has been suggested, albeit without much supporting evidence, that the reduction by alumina of the flammability of SBR rubbers in the presence of chloroparaffins is due to a formation of  $\text{AlCl}_3$  which catalyses in the solid phase the elimination of halogen radicals.<sup>8</sup> Thermogravimetric studies of mixtures of anhydrous alumina with chlorinated wax showed no volatilisation of aluminium chloride.<sup>34</sup> This only served to confirm that alumina is unlikely to act in the gas phase. Perhaps more important is the

fact that no apparent effect is found on the thermal decomposition pattern of the chlorowax. The addition of  $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$  to unsaturated polyester resins treated with a brominated additive was found to decrease the amount of hydrogen bromide liberated into the gas phase, as measured in a smoke chamber (Fig. 12).<sup>149</sup> In other work, samples of acrylonitrile-butadiene-styrene copolymer (ABS) containing decabromobiphenyl and of high density polyethylene (HDPE) containing chlorinated wax, in both cases in

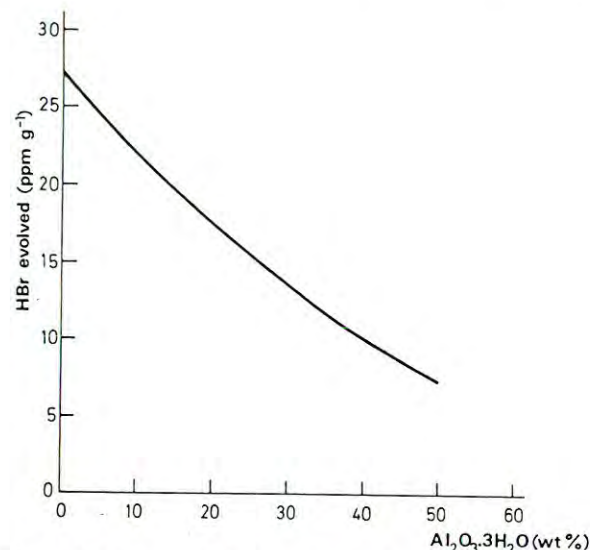


FIG. 12. Effect of alumina trihydrate on the evolution of hydrogen bromide from unsaturated polyester resins. (After ref. 149, reproduced by permission of the Society of the Plastics Institute, Inc., and of Dr. D. P. Miller.)

conjunction with either anhydrous alumina, alumina monohydrate or alumina trihydrate, were heated in the source of a mass spectrometer and the volatile products were analysed.<sup>152</sup> In no case were Al-Cl or Al-Br species found, which is further confirmation that the alumina acts primarily in the condensed phase.

The limiting oxygen indices of ABS treated with decabromobiphenyl (DBB) and with each of the aluminium oxides show very definite signs of synergism (Table 2).<sup>152</sup> The LOI of the polymer containing the mixture is compared, in Fig. 13, with the LOI which would correspond to an additive effect of the flame retardants ( $\text{LOI}_{\text{add}}$ ):

$$\text{LOI}_{\text{add}} = \text{LOI}_{\text{Br}} + \text{LOI}_{\text{Al}} - \text{LOI}_{\text{p}}$$



TABLE 2  
EFFECT OF DECABROMOBIPHENYL ON THE LIMITING OXYGEN  
INDEX OF ABS COPOLYMER TREATED WITH ALUMINA

| DBB <sup>a</sup><br>(phr) | LOI       |                      |                       |
|---------------------------|-----------|----------------------|-----------------------|
|                           | $Al_2O_3$ | $Al_2O_3 \cdot H_2O$ | $Al_2O_3 \cdot 3H_2O$ |
| 0                         | 19.2      | 18.9                 | 18.8                  |
| 5                         | 21.5      | 19.7                 | 19.7                  |
| 10                        | 22.9      | 20.9                 | 20.6                  |
| 15                        | 24.4      | 21.5                 | 21.4                  |
| 20                        | 25.8      | 22.2                 | 22.2                  |
| 25                        | 26.6      | 23.1                 | 23.1                  |
| 30                        | 27.9      | 23.8                 | 24.2                  |
| 35                        | 29.5      | 24.7                 | 25.7                  |
| 40                        | 30.9      | 25.3                 | 27.5                  |
| 45                        | 33.0      | 25.9                 | 29.0                  |
| 50                        | 36.4      | 26.4                 | 30.1                  |
| 0 <sup>b</sup>            | 18.6      | 18.6                 | 18.6                  |

(After ref. 152.)

<sup>a</sup> 10 phr alumina added in all cases.

<sup>b</sup> No additives.

where  $LOI_{Br}$  is the LOI value of the polymer containing bromine,  $LOI_{Al}$  is that of the polymer containing  $Al_2O_3$  or  $Al_2O_3 \cdot 3H_2O$  and  $LOI_p$  is that of the untreated polymer. It can be seen that with ABS a very pronounced synergism occurs between decabromobiphenyl and anhydrous alumina. This is slightly less marked with the trihydrate, where the effect occurs principally at high loadings of Br ( $Br:Al > 3:1$ ), and is much less noticeable with the monohydrate. An increase in the concentration of metal oxide does not apparently affect the LOI, when the amount of halogen is kept constant (Table 3). With HDPE some synergism is also found between anhydrous alumina and decabromobiphenyl but the effect is much smaller since the individual flame retardants are also much less effective for this polymer. Chlorinated wax does not seem to have any clear-cut synergistic effect with these metal oxides in the case of HDPE. In fact the order of effectiveness of the aluminium oxides is the order of increasing water content, the anhydrous compound being perhaps even slightly antagonistic towards the chlorinated wax.

The results with Al and Br suggest that there may be three mechanisms by which flame retardance may be conferred on the polymer. Until the

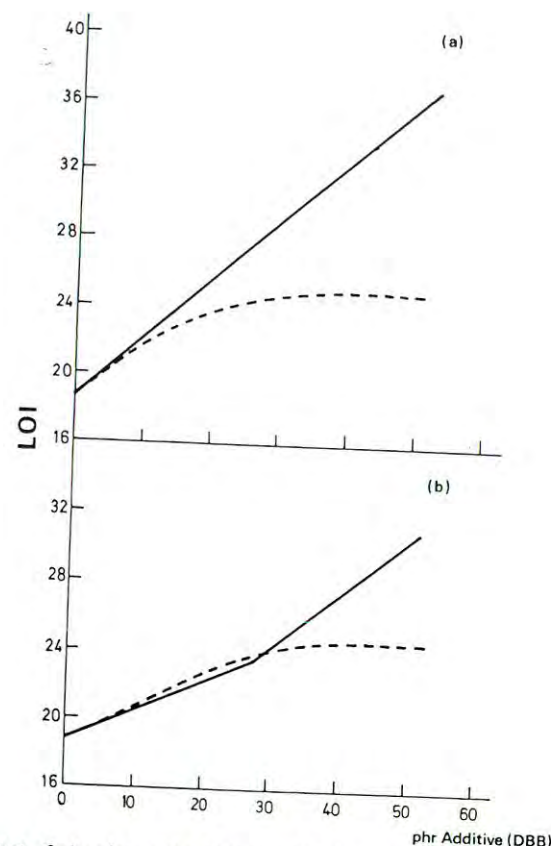


FIG. 13. Effect of alumina and decabromobiphenyl (DBB) on the flammability of acrylonitrile-butadiene-styrene copolymer: — experimental; ---- calculated assuming additive behaviour; (a)  $Al_2O_3$ ; (b)  $Al_2O_3 \cdot 3H_2O$ .

TABLE 3  
EFFECT OF ALUMINA ON THE LIMITING OXYGEN INDEX OF ABS  
COPOLYMER TREATED WITH DECABROMOBIPHENYL

| Alumina <sup>a</sup><br>(phr) | LOI       |                      |                       |
|-------------------------------|-----------|----------------------|-----------------------|
|                               | $Al_2O_3$ | $Al_2O_3 \cdot H_2O$ | $Al_2O_3 \cdot 3H_2O$ |
| 0                             | 20.5      | 20.5                 | 20.5                  |
| 10                            | 22.9      | 20.9                 | 20.6                  |
| 15                            | 22.9      | 20.9                 | 20.6                  |
| 20                            | 22.9      | 20.9                 | 20.6                  |

(After ref. 152.)

<sup>a</sup> 10 phr decabromobiphenyl added in all cases.



bromine content is such that  $\text{Br}:\text{Al} > 3:1$  with the anhydrous oxide, there is a condensed-phase reaction between Al and Br which probably inhibits the decomposition of the polymer. As the concentration of bromine increases, there is additionally an elimination of hydrogen bromide which acts in the gas phase and thus increases the slope of the variation of the LOI. With the trihydrate, the water of hydration probably partly inhibits the condensed-phase mechanism between Al and Br but exerts a positive overall flame-retardant effect on account of its own direct diluent action. The monohydrated oxide also liberates water of hydration which can inhibit the reaction between Br and Al but its overall effect is smaller than that of the trihydrate due to its lower water content.

Even though alumina seems to have a chemical mechanism of action, its efficiency in the absence of bromine is relatively low so that fairly high concentrations must normally be used as compared with those of other flame retardants. This limits its use to polymers where considerable proportions of other materials can be incorporated without causing an unacceptable alteration in the physical or mechanical properties. Its abrasiveness may also be a disadvantage during the processing of the polymer. In conjunction with bromine, addition of 10 phr of anhydrous alumina can, however, cause a significant improvement as compared with the effect observed in the absence of the metal oxide.<sup>152</sup>

Finally, aluminium oxides have also been found to be possible partial replacements for antimony oxide in the system  $\text{Sb}_2\text{O}_3\text{-Br-ABS}$ .<sup>153</sup> At equal loadings the cost is significantly reduced and the LOI is, under certain conditions, even slightly improved. The monohydrate appears to be the most effective of the three oxides.

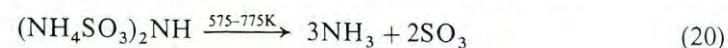
## 10. OTHER ELEMENTS

Various other elements may also prove beneficial in inhibiting polymer combustion, apart from the six already mentioned. They are however either less widely used or employed only for specific polymers, or relatively little understood as regards their mechanism of action.

Nitrogen is an element whose presence in a polymer appears to confer some degree of flame retardance, as shown by the rather low flammability of polyamides, both natural and synthetic. This may however be partly due to the ease of melting of these polymers so that the heat of combustion tends to be carried away from the flame. Many nitrogen-containing compounds are also used as reactive flame retardants, e.g. triazines, urea derivatives or

cyanuric acid derivatives, and it has been suggested that their action may be simply the eventual release of nitrogen which dilutes the gaseous products.<sup>11</sup> The action of ammonium salts and of nitrogen-phosphorus systems has already been mentioned.

Ammonium sulphates and ammonium sulphamates are also ammonia-releasing flame retardants by reactions 19 and 20. Their mechanism of



action is probably very similar to that of phosphates or borates, when used in conjunction with hydroxylated polymers like cellulose, since sulphate esters are formed in the condensed phase. Some other organic complexes have also been used for the sulphonation of cellulose, although this involves partial destruction of the polymer structure.<sup>154</sup> The effect of other inorganic sulphur-containing salts, including alum, with historical connotations, is probably not due to the sulphur but rather to the evolved gases. Many other inorganic salts have also been used such as, for example, carbonates or chromates. Those which do not yield gaseous products ( $\text{NH}_3$ ,  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ) are probably only inert fillers which dilute the solid combustible polymer and act as heat sinks. Some of them may act as catalysts for oxidative decomposition of the polymer, e.g. causing increased charring of cellulose.

Molybdenum compounds, such as molybdenum oxide or ammonium molybdate, are said to exhibit flame-retardant synergism with halogens,<sup>155,156</sup> as well as being very effective smoke suppressants. In the case of  $\text{MoO}_3$ , the metal has been found virtually quantitatively in the char, rather than in the gas phase.<sup>157</sup> The effect of molybdenum oxide on the combustion and pyrolysis of PVC is particularly interesting. Molybdenum oxide decreases the temperature for the start of the dehydrochlorination of the substrate by an ionic mechanism.<sup>158</sup> After dehydrochlorination, the additive acts as a Lewis acid to promote the isomerisation of the *cis* double bonds (formed from isotactic PVC) to *trans* double bonds.<sup>159-161</sup> In this way, the formation of aromatic products, which occurs by an intramolecular mechanism,<sup>39</sup> is inhibited. No flammable volatile products are thus formed if the heat supplied to the polymer is low, so that the molybdenum compound acts as a flame retardant. This effect does not, however, occur at the higher temperatures involved in real fires, because other volatile flammable products are then formed, mainly aliphatic straight-chain hydrocarbons; the action of the molybdenum is then



reduced to that of a smoke suppressant.<sup>161</sup> Molybdenum compounds are useful as partial replacements for antimony oxide in the presence of bromine, both for polyesters<sup>162</sup> and for ABS,<sup>153</sup> although there is probably no synergism between Sb and Mo. In the case of cotton fabrics, it has been found that for sodium molybdate the limiting oxygen index and the limiting nitrous oxide index show the same slope when plotted against molybdenum content, while for ammonium molybdate the slopes are different (Fig. 14).<sup>72</sup> Over 90 % of the molybdenum added to PVC is recovered from the char remaining after the polymer has burnt.<sup>156</sup> These findings suggest that the flame-retardant action takes place in the condensed phase but that there is some additional gas-phase effect of ammonia, particularly in nitrous oxide atmospheres. This is, of course, consistent with the other, earlier, results presented for PVC.

Hydrated tin(IV) oxide has been proposed as a good substitute for

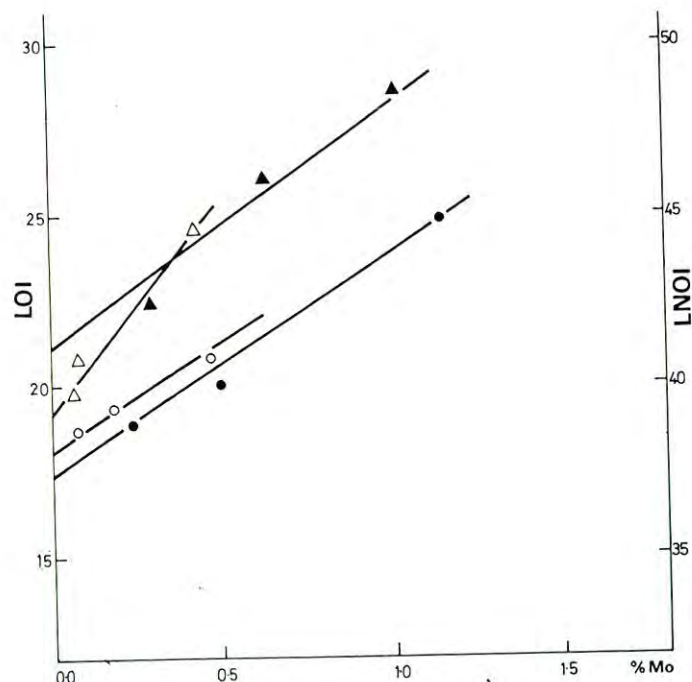


FIG. 14. Effect of molybdenum on the flammability of cotton fabrics: ○ ammonium molybdate (oxidant, O<sub>2</sub>); ● sodium molybdate (oxidant, O<sub>2</sub>); △ ammonium molybdate (oxidant, N<sub>2</sub>O); ▲ sodium molybdate (oxidant, N<sub>2</sub>O). (Reproduced from ref. 72, by courtesy of Marcel Dekker, Inc.)

antimony oxide.<sup>163</sup> It is possible that its effect is caused simply by the release of the water of hydration. The tin chloride is only partially volatilised<sup>34</sup> and, when used as a partial substitute for Sb<sub>2</sub>O<sub>3</sub>, is much less effective in increasing the LOI of ABS or of HDPE. Tin has also been used as a flame retardant for wool, particularly in the form of hexafluorostannates.<sup>124,163,164</sup> In this connection it is of interest to examine the effects of titanium and zirconium, which are also widely used for inhibiting the combustion of wool as the corresponding hexafluorometallate salts.<sup>91,165-167</sup> Titanium, zirconium, tin and chromium compounds exert their effects mainly in the condensed phase, as the results are largely independent of the oxidising atmosphere.<sup>124,168</sup> It is probable however that it is not the metal oxide itself but a complex of the metal oxide which has adsorbed oxygen which provides the catalytic species. This would explain why nitrous oxide has a greater effect on the titanium system than on the zirconium system, both metals being very similar in all respects.<sup>124</sup>

Ferrocene is a good smoke suppressant for thermoplastic polymers such as poly(vinyl alcohol)<sup>169</sup> or ABS,<sup>170</sup> where the gas-phase mechanism involves the total volatilisation of the iron. If butadiene is replaced by chloroprene in ABS to yield the chlorinated elastomer, volatilisation of the metal is still virtually total but the smoke-suppressant efficiency decreases considerably.<sup>170</sup> In PVC, however, the mechanism is a condensed-phase Lewis-acid type catalysis of dehydrochlorination,<sup>169</sup> analogous to that for the system PVC-MoO<sub>3</sub>.

This review is necessarily not comprehensive since it is almost impossible to cover all the compositions that have been claimed to be effective as flame retardants in the numerous natural and synthetic polymers. An attempt has been made to deal with only those systems where the results are relatively well documented and directly amenable to interpretation.

## 11. CONCLUSIONS

Many different mechanisms of action have been proposed for flame retardants but these can be reduced, in principle, to a few important types, at least for the active elements most widely used in this context.

All additives which decompose thermally to yield inert gases (water, ammonia, carbon dioxide, nitrogen) will affect the flame reactions as a result of the physical dilution of the gaseous fuel and of the consequent reduction in gas temperature. Thus, of course, less heat is fed back to the condensed polymer phase. Hydrated metal oxides or salts, ammonium salts, phosphates, borates, sulphates or carbonates can act in this way.



Some additives may also function by a chemical mechanism in the gas phase; highly reactive free radicals responsible for flame propagation being replaced by less reactive species. The prime example of this behaviour consists of brominated additives, which yield gaseous hydrogen bromide. Chlorine-containing additives, although much less effective, may also act by this mechanism. Antimony trioxide, which feeds antimony monoxide into the flame zone, similarly acts by heterogeneous 'scavenging' of radicals, although it generally requires the presence of halogens to facilitate its volatilisation.

Phosphorus compounds, when added to polymers not susceptible to acid catalysis, are flame inhibitors acting partly by chemical mechanisms and possibly partly by 'blanketing' the flame to exclude oxygen. In the presence of halogens, however, the mechanism, although it may also include a 'blanketing' effect, involves mainly condensed-phase reactions.

When the substrates are hydroxylated polymers (e.g. cellulose), the mechanism of action of phosphorus-, boron- or sulphur-containing additives is an acid-catalysed esterification, which alters the condensed-phase mechanism of decomposition by enhancing char formation at the expense of volatile products. The presence of nitrogen bases, which can form P—N bonds, improves the efficiency of phosphorus esters.

Chlorine and, to a much smaller extent, bromine alter the rate of thermal decomposition of the polymer, as does the antimony oxide-halogen system, before the gas-phase inhibitors (respectively HCl, HBr and SbO—HX) are liberated. Alumina also affects the condensed-phase decomposition reactions, particularly in the presence of bromine, an effect inhibited by water. Condensed-phase effects are also found with red phosphorus, molybdates and some other metals (e.g. titanium or zirconium).

Boron can also act by two additional mechanisms: a free-radical inhibition at the gas-solid interface and the formation at the surface of the polymer of inorganic B—O deposits which insulate the substrate from the heat source.

All the mechanisms described in the section are necessarily oversimplifications, although in practice these are the modes of action used to describe the flame-retardant compounds concerned. The outline presented in Section 2 has shown polymer combustion to be a complex process involving various concurrent and consecutive stages. It is therefore to be expected that an unusual selection of properties would be required for any combination of compounds to constitute a good flame retardant. It is thus very difficult, in the present state of our knowledge, to predict successfully

what future developments are likely to be involved in the formulation of new efficient flame retardant systems.

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## Benefits of Flame Retardants – Marcelo M. Hirschler - January 2016

Some of the benefits of flame retardants can be seen from the following facts.

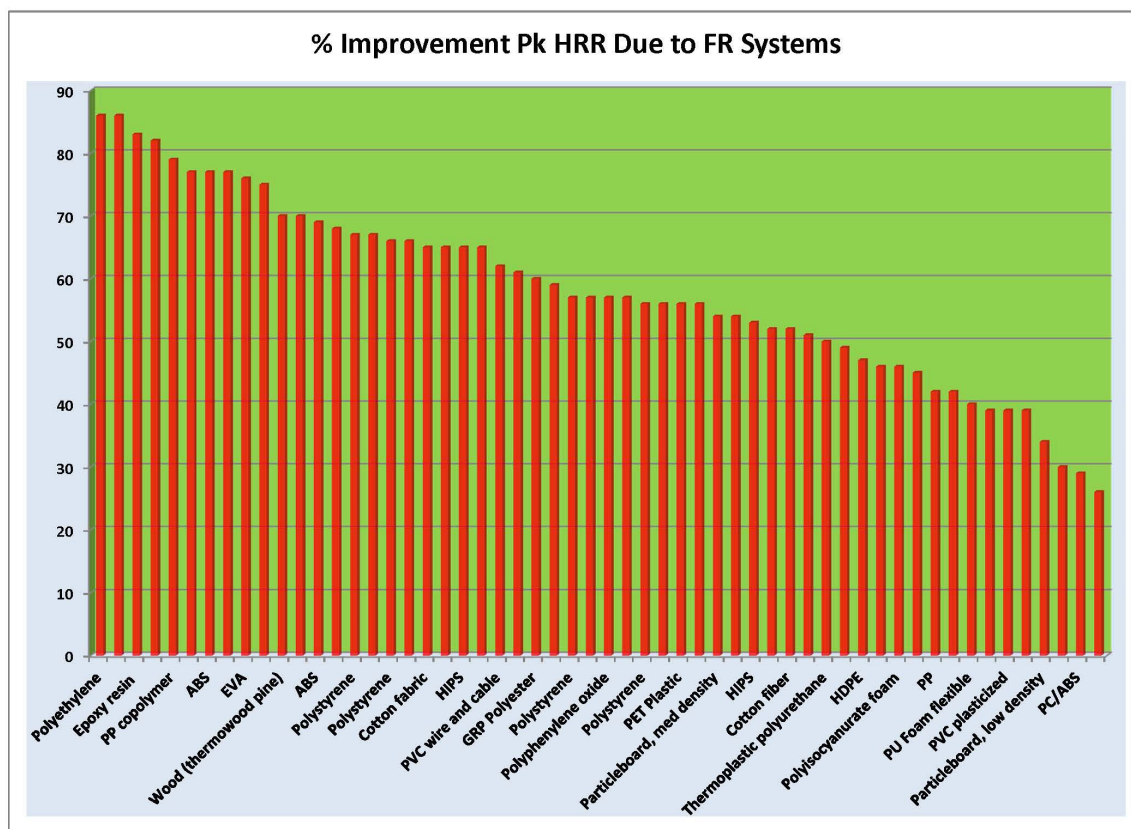
1. The use of flame retardants in combustible materials leads to a decrease in the heat released in fires.
2. The use of the correct type and amount of flame retardants improves the fire performance of the associated materials.
3. Fires with properly flame retarded products result in much fewer toxic products than fires with the same products without flame retardants.
4. Fires with properly flame retarded products result in much less destruction than fires with the same products without flame retardants.
5. Fires with properly flame retarded products result in much less flame spread to nearby products than fires with the same products without flame retardants.
6. Fires with consumer products have decreased significantly over the last 30 years or so, partially because of the increased use of flame retardants.

### 1. Flame retardants and heat release.

Flame retardants can be used to significantly decrease heat release rate of polymers, and the effectiveness of such systems can be extremely high. A set of studies [1-3] of the effects of flame retardants on the heat release of natural and synthetic combustible materials showed the effectiveness of flame retardants on heat release. The figure below [1] shows a large number of systems (a total of 56 systems) and the percentage improvement in peak heat release rate due to the addition of various flame retardant systems. The improvement can be higher than 80%.

Another study investigated the fire performance of 5 non-flame-retarded products and compared it with that of properly flame retarded alternate products [4]. The full sets of non-flame-retarded and flame retarded products were ignited in a room-corridor arrangement and the heat released by the non-flame-retarded products was 4-5 times higher than that released by the flame retarded products (1,640 kW vs. 345 kW).

The emphasis on heat release is presented because it has been demonstrated that the peak heat release rate is the key property governing the intensity of a fire [5]. Heat release rate is critical because as the heat release rate becomes greater more materials will ignite and burn and will propagate the fire. On the other hand, if heat release rate remains small, it is possible (or even likely) that the next product will not ignite and that the fire will be confined to the area (or even the object) of origin. Thus, a higher heat release rate will promote faster flame spread. On the other hand, neither increased smoke obscuration nor increased smoke toxicity will cause a fire to become bigger. It is essential to understand the concept that heat release rate is the most important fire safety property because a distinction needs to be made between: (a) the reason a fire becomes big and results in large losses (including fire fatalities, fire injuries and significant property loss) and (b) the actual “cause of death” for a fire fatality. The two are different.



## 2. Flame retardants and improved fire performance.

As discussed above, the most important means to describe fire performance is based on heat release. However, it is also clear that fire growth and flame spread are predicted by heat release rate. Two extensive research programs dealing with fire growth on combustible wall lining materials tested several wall lining materials in bench-scale and large-scale fire tests and both showed that fire growth (for example measured as flame spread) was much lower for materials that generated lower heat release [6, 7]. This led to the development of models predicting whether full room involvement (also known as flashover) results as a function of the heat released by the materials. Therefore, since flame retardants decrease heat release they also improve fire performance. including fire fatalities, fire injuries and significant property loss) and (b) the actual “cause of death” for a fire fatality. The two are different.

It is essential to note, a flame retardant system must be tailored to the substrate (or polymer) that it is used with. It is an essential requirement for an adequate flame retarded polymeric system to exhibit adequate fire performance that the flame retardant additive system appropriately improves the heat release rate of the substrate. This often requires extensive research to ensure that the right system is used for each substrate. Typically, flame retardants that are effective with a specific substrate are ineffective with alternate substrates (even if they are similar in chemical composition).

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### **3. Flame retardants and toxic product release.**

In order to understand this it is important to review the concept of flashover, which is that stage in the development of a contained fire in which all exposed surfaces reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space. In practice fire statistics classify any fire that goes beyond the room of origin as a “flashover fire” [8], because typically additional details are not available and because a fire that has gone beyond the room of origin has clearly been a very large fire. Thus, any discussion of “flashover fires” includes all fires that are either known to have gone to flashover or known to have gone beyond the room of origin, without distinction. In the US the vast majority of fire fatalities occur away from the room of fire origin (i.e. have been classified as flashover fires because they extended beyond the room of origin [8]). At the moment when fires go to flashover the concentration of combustion products (i.e. toxic gases) accelerates significantly, so that there is both a quantitative and a qualitative difference in the toxicity of the atmosphere as soon as the fire becomes a flashover fire. That is one of the key reasons why fire atmospheres are much more toxic after flashover [8].

On the other hand, the “cause of death” (in the US) is usually listed as “the effects of smoke inhalation”. This means that the listed “cause of death” is, more often than not, the direct result of insult by smoke and toxic gases, while the actual cause of death is that the fire became large (typically a flashover fire) because the heat release rate was large. It is important to note that it is now consensus in the fire safety community that the smoke toxicity of virtually all common products, whether they contain flame retardants or not and irrespective of the combustible substrate involved, have very similar smoke toxic potencies [9, 10, 11].

In the study comparing flame retarded and non-flame retarded products discussed above [4] the results showed that none of the test specimens produced smoke of extreme toxicity. The smoke from both sets of products was similar in potency and comparable to the potency of the smoke produced by materials commonly found in buildings. However, in terms of the total quantities of toxic gases produced in the room fire tests, expressed in ‘CO equivalents,’ the quantities produced by the flame retarded products were one third of the amounts of toxic products produced by the non-flame-retarded products. With regard to the overall fire hazard the study indicated that the impact of flame retardant materials on the survivability of the building occupants was also assessed by comparing the time to untenability in the burn room, which is applicable to the occupants of the burn room. The results showed that the average available escape time was more than 15-fold greater for the flame retarded products than for the non-flame-retarded products.

### **4. Flame retardants and total amounts burnt.**

Multiple studies have shown that when properly flame retarded products are involved in a fire, the fire is much less likely to spread to other products and much more likely to remain small. This means that the amount of products burnt will be much smaller. In the study discussed above [4] it was found that three of the five flame retarded products assessed would not ignite (and thus would not burn) when exposed to the same fire source that caused any one of the non-flame-retarded products to burn and be destroyed completely. Thus, the only way that the five flame retarded products could be made to burn is by using an auxiliary burner to avoid finding no flame propagation at all. The study found that the amount of material consumed in the fire tests for the flame retarded products (in spite of the additional burner) was less than half the amount lost in the tests for the non-flame-retarded products.

Interestingly, when products produce significantly lower heat release (and thus much less material destroyed or burnt) there is also usually lower smoke released, leading to better visibility for victims trying to escape or first responders trying to initiate rescue from a fire. In the study above, the amount of smoke generated from both tests was not significantly different but in 90% of studies of room-corner fire tests (where flame propagation, heat release and smoke release are assessed) the products with lower heat release also had lower smoke release [12].

## 5. Lower flame spread for properly flame retarded products.

This has been explained earlier. The lower heat release resulting from properly flame retarding products has as a consequence, lower flame spread [6, 7]. For example, building interior finishes, principally wall and ceiling coverings, can have a major impact on both fire growth and ultimate fire size [13]. Wall and ceiling coverings may act like a “fuse,” spreading flames away from fire origin to involve other objects, causing the fire to grow to large size. Interior finishes may also provide a large, unbroken surface over which flame spreads. As the wall or ceiling covering exhibits higher heat release rate, the flame spreads faster to involve greater surface area and the fire size increases. If the interior finish exhibits poor fire performance, the flames from the interior finish may release sufficient energy to cause the formation of a hot gas layer. If the wall or ceiling covering is well flame retarded the fire will stop spreading and cease being a problem. NFPA fire loss statistics show that interior wall coverings are responsible for being the item first ignited in homes in many fires and for an even larger proportion of civilian fire fatalities. The most recent statistics on home structure fires were published in 2015 [14].

## 6. Fire statistics show that fewer fires are starting at consumer products now.

Fires associated with a variety of consumer products have decreased significantly over the last 30 years or so, as shown in the following list (based on NFPA statistical data in various reports). One of the reasons for this decrease (but, of course not the only one) is the use of flame retardants improving the fire performance of consumer products.

| <b>Fires starting in various consumer products</b>                                                                                                                                                      |             |                  |                     |                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|---------------------|------------------|
|                                                                                                                                                                                                         | <b>1980</b> | <b>2010-2011</b> | <b>Decrease (%)</b> | <b>Reference</b> |
| Heating Equipment                                                                                                                                                                                       | 230,300     | 53,600           | 77                  | 15               |
| Electrical                                                                                                                                                                                              | 75,000      | 47,700           | 36                  | 16               |
| Washers & dryers                                                                                                                                                                                        | 25,000      | 16,800           | 33                  | 17               |
| Refrigerators, freezers, ice makers                                                                                                                                                                     | 3,040       | 1,680            | 45                  | 18               |
| Electronic equipment rooms                                                                                                                                                                              | 1,600       | 190              | 88                  | 19               |
| Office equipment (non-home)                                                                                                                                                                             | 1,720       | 600              | 65                  | 20               |
| Office equipment (home) *                                                                                                                                                                               | 540         | 640              | -19                 | 20               |
| * Note that the use of office equipment (computers) in homes has increased from less than 2% in 1980 to more than 75% in 2010, meaning that the proportion of fires to computers in homes has decreased |             |                  |                     |                  |

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**References 6 and 7**  
**Flame Retardants and Heat Release**  
**by**  
**Marcelo M. Hirschler**  
**(Fire and Materials Journal, 2015)**

## Flame retardants and heat release: review of traditional studies on products and on groups of polymers

Marcelo M. Hirschler<sup>\*,†</sup>

*GBH International, 2 Friars Lane, Mill Valley, CA 94941, USA*

### SUMMARY

This is part of a project considering whether flame retardants affect polymer heat release, a critical issue to assess whether adding flame retardants decreases fire hazard. The work investigated the following. (1) Fire properties affecting fire hazard, confirming that heat release rate is the key fire property most strongly influencing fire hazard. (2) Ways to assess heat release and whether full-scale fire heat release rate can be predicted from small-scale test results, confirming that cone calorimeter and Ohio State University data are adequate to predict full-scale heat release. (3) Analysis of key 1988 NBS/NIST study comparing the fire hazard of flame retarded products versus non-flame retarded products for the same application. This confirmed that the study demonstrated that flame retardants lower fire hazard and that the levels of additives in the flame retarded products used were not excessive. (4) Review of studies investigating effects of flame retardants on various polymeric systems. The overall conclusion is that flame retardants does indeed improve fire safety (when used appropriately) primarily because they decrease heat release. Part 2 of the project (separately) considers the key polymers that need to be potentially flame retarded and reviews recent studies on effects of flame retardants on heat released by such polymers. Copyright © 2014 John Wiley & Sons, Ltd.

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KEY WORDS: heat release; flame retardants; fire hazard; polymers

### 1. INTRODUCTION

Fire safety can be improved in one of two ways, or via a combination of both, as shown later. This work will address exclusively passive fire protection.

- Passive fire protection. This means using materials and products with superior fire performance so as to either minimize the probability of ignition or, if ignition does occur, minimize the damaging effects of the resulting fire.
- Active fire protection. This means relying on fire detection and suppression systems (such as smoke alarms and sprinklers). Fire detection systems alert the occupants (and/or first responders, such as fire fighters) while fire suppression systems extinguish the fire.

Flame retardants are materials that can be incorporated into combustible materials to improve their fire performance. It has been shown in many studies that flame retardants can be effective in having effects such as making materials or products less easily ignitable and/or reducing flame spread and they are extensively used to help materials and/or products meet certain fire test requirements. In view of the fact that there is no fire if ignition does not occur, a delay in ignition will improve fire safety. However, because fire hazard assumes that ignition has occurred, it is important to also study the effects of flame retardants on fire hazard, with an emphasis on the key property of heat release, as explained later.

<sup>\*</sup>Correspondence to: Marcelo M. Hirschler, GBH International, 2 Friars Lane, Mill Valley, CA 94941, USA.

<sup>†</sup>E-mail: gbhint@aol.com



Fire risk is the combination of fire hazard and of the probability of fire occurring. Fire hazard is defined as 'the potential for harm associated with fire'. Fire risk is defined as 'an estimation of expected fire loss that combines the potential for harm in various fire scenarios that can occur with the probabilities of occurrence of those scenarios'. It is essential to understand that it is possible to have high fire hazard but low fire risk because the probability of such a fire is low.

Most, if not all, solid combustible materials (plastics, wood, textiles, rubbers, and so on) are polymeric (meaning that they have a complex chemical structure, with repeating units). Many polymeric materials, whether natural or synthetic, have poor fire performance in the absence of added flame retardants. That is particularly important for those polymers that are in widest use, such as polyolefins (polyethylene or polypropylene), polyurethane, polystyrene, polyethylene terephthalate, nylon, and cotton. When a polymer is used in applications where fire safety is an important consideration, the lack of intrinsic fire safety must be addressed for ensuring passive fire protection. The following are examples of different approaches:

- adding flame retardants (i.e., using additive flame retardants),
- creating new polymers with better fire performance through syntheses of variations of the polymer (i.e., using reactive flame retardants),
- blending or otherwise compounding it with other polymers with better fire performance (i.e., creating blends or mixtures), and
- encapsulating the polymer or separating it from the potential exposure to the heat insult.

This study is looking primarily at the first aspect, namely additive flame retardants and fire hazard, mainly because more information is available on them. Information on direct comparisons of heat release between a flame retarded system with reactive flame retardants and the equivalent non-flame retarded materials is rarely published. Typical applications where fire safety can be critical are upholstered furniture, mattresses, wire and cable, interior finish, insulation, appliance and computer housings, among others.

This work presents information on a few key studies that investigated the potential effects of using flame retardants (whether additive or reactive) in order to improve the fire performance, with an emphasis on heat release, of polymeric materials. Such analyses will be primarily based on individual polymers. One portion of this study involves a new discussion of an essential study conducted at NBS (precursor of NIST) in 1988 analyzing the effects of flame retardants on the fire performance of five important consumer products: TV cabinet housings, business machine housings, upholstered chairs, cable arrays, and laminated circuit boards. This particular study has been misinterpreted recently.

A separate publication will review recent studies of heat released by individual polymers before and after the addition of flame retardants [1].

## 2. HEAT RELEASE RATE AND FIRE HAZARD

Until relatively recently, heat release rate measurements were seen by some people as just another piece of data to gather. In fact, the importance of heat release as a fundamental fire safety property is still not a full part of the public understanding of fire safety. However, fire scientists have now concluded that heat release is much more than a set of data. It has been shown by multiple analyses of fire hazard that heat release rate is the most important fire property and that the peak heat release rate is the numerical indicator of the intensity of a fire [2–8]. Key studies have demonstrated that heat release rate is much more critical than either ignitability (whether expressed as time to ignition or minimum heat flux for ignition) or smoke toxicity in affecting the probability of survival in a fire, as shown later in this work [2].

The key demonstration that heat release rate is much more important than other fire properties in terms of fire hazard can be seen from Table I [2]. In the work, a simple analysis was made (using the fire hazard zone model HAZARD I) where the authors considered variations on a fire scenario in which a single upholstered chair burns in a small room with a single doorway opening. They calculated the hazard for the scenarios in terms of the predicted time to lethality. Fire properties of the burning chair in the base case were taken directly from typical such fire properties in the NIST data base. In order to assess the relative importance of several factors, the authors studied the following variations:

Table I. Effect of individual variables on fire hazard, example of chair [2].

| Scenario                       | Predicted time to lethality (s) |
|--------------------------------|---------------------------------|
| Base case                      | Greater than 600                |
| Double heat release rate       | 180                             |
| Double material smoke toxicity | Greater than 600                |
| Halve time to ignition         | Greater than 600                |

- (1) base case, that is, a single burning chair in the room,
- (2) the same chair with double the heat release rate,
- (3) the same chair with double the smoke toxicity of the materials, and
- (4) the same chair with half the time to ignition for the burning chair (from 70 to 35 s).

The authors considered the predicted temperatures and the levels of carbon dioxide in the compartment's upper layer. They chose carbon dioxide (instead of other gas species) because it has been shown that the carbon dioxide concentration is representative of the type and shape of the concentration-time curves for other gases. The results demonstrated that, as expected, changing the heat release rate has a much greater effect on fire hazard than changing the time to ignition or the smoke toxicity. The authors note that, of course, a significant improvement in time to ignition can lead to the absence of a fire; however, that affects fire risk and not fire hazard, because fire hazard presupposes that ignition has occurred. The effects of the changes in the three variations from the base case can be seen in Table I. The conclusions of this work is that doubling the heat release rate reduces the predicted time to lethality from greater than 600 s (the total simulation time) to about one third of that time, roughly the same time as the calculated time to incapacitation for all other scenarios. On the other hand, the effects of similar changes in time to ignition and in smoke toxicity have a negligible effect on predicted time to lethality. Note, that it is, of course, not always possible (or perhaps never possible) in practice to change one of the three variables (heat release rate, time to ignition, and smoke toxic potency) completely independently, without affecting the others. However, that in no way affects the data analysis and conclusions.

In simpler terms, heat release rate is critical because, as the heat release rate becomes larger, more materials will ignite and burn and will propagate the fire. On the other hand, if heat release rate remains small, it is possible (or even likely) that the next product will not ignite and that the fire will be confined to the area (or even the object) of origin. Thus, a higher heat release rate will promote faster flame spread. On the other hand, neither increased smoke obscuration nor increased smoke toxicity will cause a fire to become bigger.

It is essential to understand the concept that heat release rate is the most important fire safety property because a distinction needs to be made between (a) the reason a fire becomes big and results in large losses (including fire fatalities, fire injuries, and significant property loss) and (b) the actual 'cause of death' for a fire fatality. The two are different.

In order to understand this, it is important to review the concept of flashover, defined by the Life Safety Code as 'A stage in the development of a contained fire in which all exposed surfaces reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space.' In actual practice, fire statistics classify any fire that goes beyond the room of origin as a 'flashover fire' [9], because typically additional details are not available and because a fire that has gone beyond the room of origin has clearly been a very large fire. Thus, it should be noted that future descriptions in this work will talk about 'flashover fires' when the fire is either known to have gone to flashover or known to have gone beyond the room of origin, without distinction. In the USA, the vast majority of fire fatalities occur away from the room of fire origin (i.e., have been classified as flashover fires because they extended beyond the room of origin [9]).

At the moment when fires go to flashover, the concentration of combustion products (i.e., toxic gases) accelerates significantly, so that there is both a quantitative and a qualitative difference in the toxicity of the atmosphere as soon as the fire becomes a flashover fire. That is one of the key reasons why the toxicity of a fire atmosphere is much more toxic after flashover [7,9].

On the other hand, the 'cause of death' (in the USA) is usually listed as 'the effects of smoke inhalation'. This means that the listed 'cause of death' is, more often than not, the direct result of insult by smoke and toxic gases, while the actual cause of death is that the fire became large (typically a flashover fire) because the heat release rate was large. Thus, the size of the heat release rate is the best predictor of the fire hazard that caused a fire to become big. If a fire stays small (i.e., has a low heat release rate), it is unlikely to lead to significant numbers of fire fatalities. Thus, the relative toxicity of the gases emitted in fires (smoke emissions) plays a small role in fire hazard. For the reason indicated earlier, the examples shown in this work will primarily address heat release.

In some publications, it is stated that smoke toxicity is a measure of fire hazard: that is incorrect. The literature shows that the principal toxicant dominating smoke toxicity is carbon monoxide, found in all fires. In that connection, it is worth looking at toxic potency of smoke data, and Figure 1 illustrates that the toxic potency of the smoke of virtually all individual polymers is within such a narrow band (in toxicological terms) as to be almost indistinguishable [10]. In particular, this work showed that the smoke toxicity of all polymeric materials (including those releasing irritants) can be assessed together based on the lethal effective dose and that there is no need to introduce the flawed concept of fractional effective concentration (which assumes that victims are *instantly* incapacitated when a certain concentration of an irritant is reached). The latter concept is used by some toxicologists as a way to deal differently with polymeric materials containing heteroatoms, such as halogens or nitrogen. While academically potentially interesting, the technical literature and the practical reality of fires show that this is a flawed concept for predicting human survivability in fires. The work mentioned earlier [10] reviewed toxicity studies, including some performed by exposure of animals and people, in the late 19th century and early 20th century, to irritant gases alone or by their exposure to smoke containing them. The critical issue found was subject behavior and whether

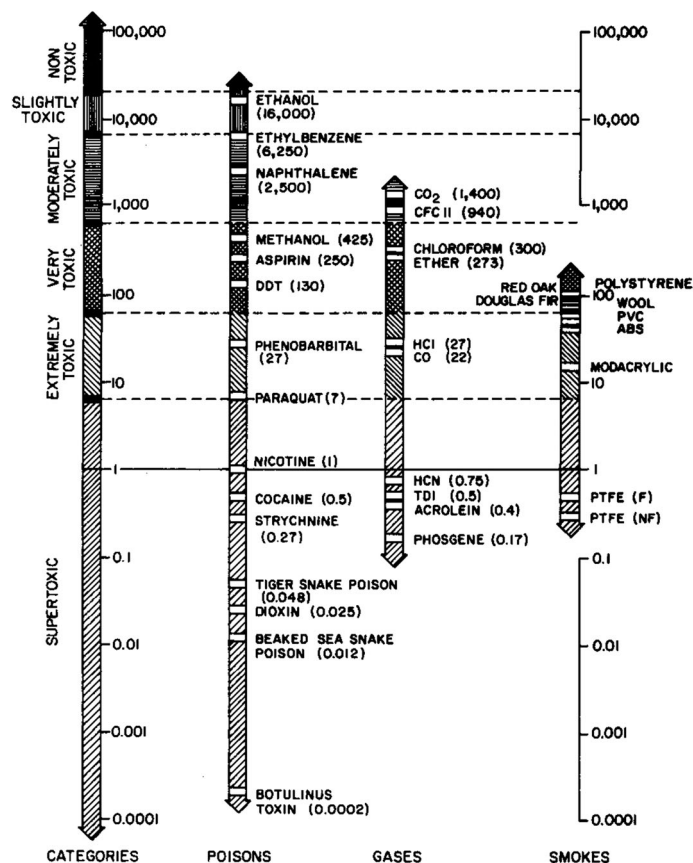


Figure 1. Levels of smoke toxicity (in orders of magnitude) [10].

incapacitation or lethality occurred eventually. It was found that rats and baboons were not incapacitated at huge concentrations of irritants (and in fact sometimes, they died a long time after exposure, but they were able to perform the escape functions that they were taught to do, to escape from their exposure). Moreover, the volunteer humans were also neither incapacitated nor killed. This showed that irritants do not usually cause incapacitation, even at concentrations that may eventually kill the victims.

### 3. USE OF THE CONE CALORIMETER AS A FIRE HAZARD PREDICTIVE TOOL

The cone calorimeter is a specialized piece of fire test equipment that is used to assess heat release data, as well as ignitability, mass loss, and smoke released by burning materials. There have been a large number of studies that have demonstrated that the cone calorimeter (ASTM E1354 [11]) can be successfully used for many products to predict full-scale (or at least relatively large scale) fire performance of the corresponding products. The most widely studied products are wires and cables, upholstered furniture, mattresses, wall linings, and aircraft panels.

The fire performance of wire and cable products is probably the one that has been investigated most extensively, usually in comparison with vertical cable tray tests, such as the UL 1685/CSA FT4 test [12–14]. One study looked at materials used in cable jackets and insulations, where a variety of different polymers were included. Tests were conducted in the cone calorimeter and in a vertical cable tray test [15]. The results showed that there is excellent correlation (Figure 2) between the cone calorimeter peak heat release rate (on the one hand) and tray cable heat release rate and tray cable char length (on the other hand). Tray cable char length was assessed because it is the typical property measured in tray cable tests. In particular, both ways (cable tray char length and cable tray heat release) of assessing the fire performance of the cables at a larger scale indicate the same trend. In fact, whichever way the data are analyzed, there is a steady increase in cable tray heat release with cone calorimeter heat release at low heat release values and then a leveling off of cable tray heat release (which in the cable tray test is a result of the full consumption of the cables). Similar information was also obtained by another study [16], which focused exclusively on PVC-based cables. These two studies are part of a series of studies, summarized in subsequent work [17], that have established that the cone calorimeter is fully suitable as a predictive tool for electrical cables (see, e.g., Figures 3–5). The figures show how predictions can be made from cone test results. This is important because it allows trends obtained in cone calorimeter tests to be indicative of trends in full-scale fire tests with cables.

A similar type of prediction results from analyzing data from the cone calorimeter on tests of upholstered furniture composite tests [18]. The Association of Contract Textiles/Decorative Fabrics Association (ACT/DFA) study was intended to investigate whether the cone calorimeter could be

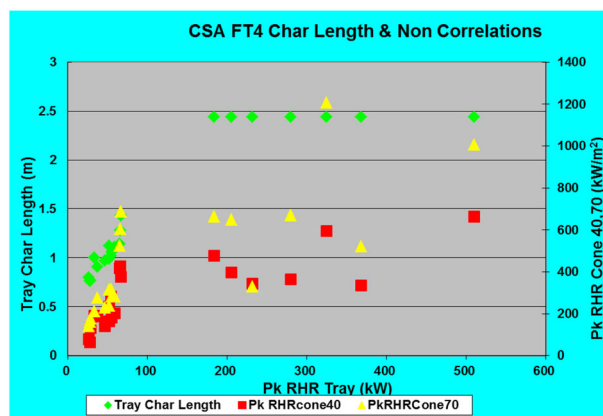


Figure 2. Char length for cables in the vertical cable tray test (UL 1685/CSA FT4) and peak heat release rate in the cone calorimeter as a function of cable tray peak heat release rate [13].

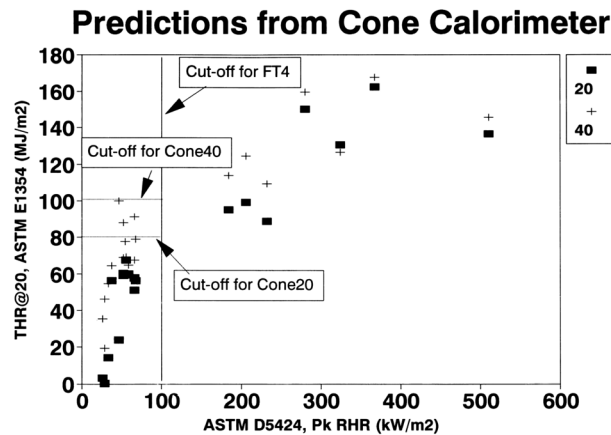


Figure 3. Comparison of flame spread in tray tests with char length and heat release rate [17].

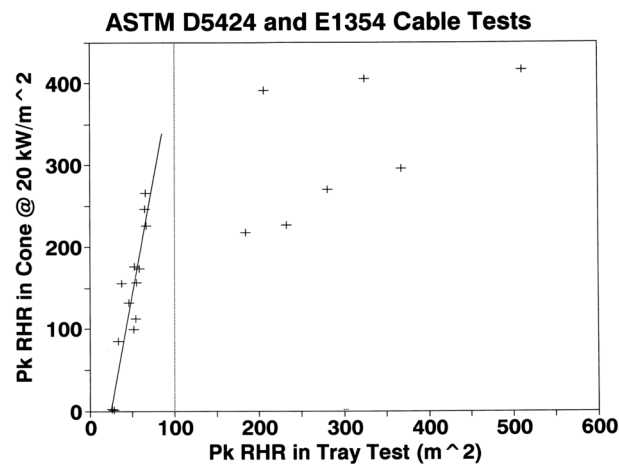


Figure 4. Comparison of peak heat release rate in cone and vertical cable tray test [17].

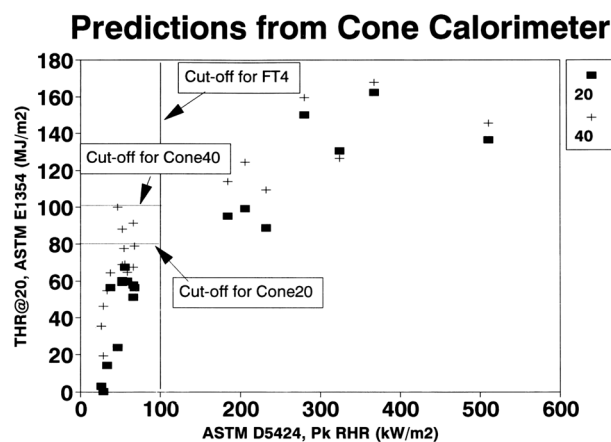


Figure 5. Indication of vertical cable tray test results predicted from cone test results [17].

used to predict CA TB 133/ASTM E1537 [19, 20] data. They chose 26 upholstery fabrics, representative of the most widely used compositions and weights, and conducted cone calorimeter tests, at an initial test heat flux of  $35 \text{ kW/m}^2$ , with tests in the horizontal orientation. They also ran

full-scale ASTM E1537 tests, using the California room. The data were not analyzed directly by ACT/DFA but were analyzed later by a different author [18]. The samples were prepared as recommended by the Combustion Behaviour of Upholstered Furniture (CBUF) project of the European Union (EU) [21]. The fabrics (with a very broad weight range) were all tested on a conventional slightly flame retarded polyurethane foam (complying with CA TB 117 [22]), weighing approximately 1.4 lb./ft<sup>3</sup>, and an interliner, as well as on a highly flame retarded formulation containing high levels of melamine. The two interliners used were a polyaramid weighing approximately 2 oz./yd<sup>2</sup> and a coated glass weighing approximately 10 oz./yd<sup>2</sup>. Soon after the ACT/DFA work was completed, NIST conducted a study with 27 fabric/barrier/foam systems that were tested in the cone calorimeter and in the CA TB 133/ASTM E1537 test [23]. The analysis of the ACT/DFA work [18] included consideration of the NIST results also.

The full-scale testing for this furniture work was conducted using the standard mock-up cushions, constructed with thread recommended by the manufacturers of the interliners. There was no replication of full-scale work. Several predictive equations and approaches to fire safety correlations were investigated, including one proposed by NIST when they compared work in two standard rooms (California and ASTM) [24]. The NIST equation [24] assumed that the key cut-off, when the full-scale construction is a standard mock-up, should be for systems with a 3 min average cone calorimeter heat release rate of 160 kW/m<sup>2</sup>; as shown later, that value is too high. However, a system was proposed [18] that resulted in better predictions. With that system, in some cases, the cone calorimeter erroneously labeled as unsafe systems (i.e., fabric/foam or fabric/barrier/foam combinations), which were found to be safe in full-scale testing, but in no cases did the cone calorimeter predict satisfactory performance for systems that failed large-scale tests. This was an improvement over the NIST recommendations [24]. When using the NIST suggestions, as expanded to more systems, eight systems (out of 27) were predicted to perform well (from cone calorimeter data) but actually had poor fire performance in the full-scale test. Four of the eight systems incorrectly predicted contained melamine foam (which was only adequately predicted in two of six systems). In the case of one system that performed badly (although the cone data did not predict that), the repeat full-scale test performed well. The results are partially invalidated by the fact that plastic (nylon) zippers were used in several systems, a construction feature known to make systems perform badly. As a summary of this analysis, the cone calorimeter correctly predicted whether 67 of the 78 ACT-DFA systems would cause a self-propagating fire (86%) and whether 19 of the 27 NIST systems would cause a self-propagating fire (70%). If the melamine foam systems are excluded, the analysis predicted adequately 49 out of the 52 ACT-DFA systems (94%) and 16 out of the 20 NIST systems (80%). The threshold value estimated by NIST (a 3 min average heat release rate of 160 kW/m<sup>2</sup>) does not use the cone calorimeter as a direct predictor of full-scale heat release rate but rather as an indicator of the probability of a system to be made into a safe item of upholstered furniture. The results of this flawed 'correlation' are shown in Figure 6.

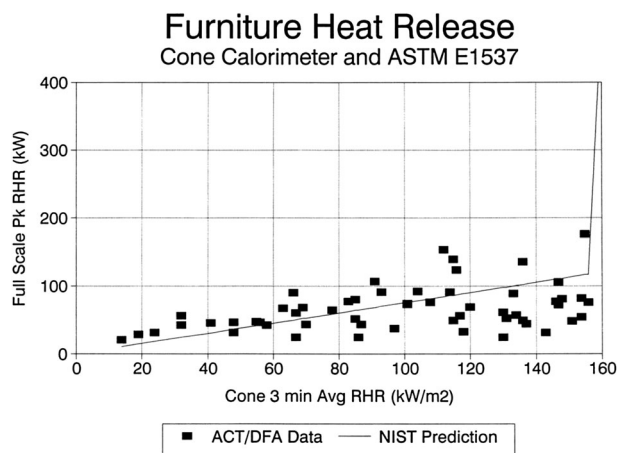


Figure 6. Prediction of CA TB 133 test results from cone calorimeter [17].



Figure 7 indicates that there is a 'safe zone' (based on heat release) for which furniture upholstery systems are likely to lead to safe constructions, within a reasonable probability.

The European study mentioned earlier (the CBUF project [21]) predicted that systems with average rate of heat release  $\leq 65 \text{ kW/m}^2$  would not cause self-propagating fires; all 12 systems complying with that criterion in the ACT-DFA study gave good full-scale results. The conclusion from the ACT/DFA work was that the cone calorimeter could be used as a surrogate test method to assess whether systems are likely to cause a self-propagating fire or whether they are safe. An important secondary finding was the realization that the fabric has a much greater effect in cone testing than in real-scale fires. The majority of predictive errors from the cone calorimeter are false positives, meaning materials that perform adequately in large-scale tests are falsely predicted to fail by cone data; these errors do not negatively affect fire safety.

Similar work to the furniture work discussed earlier was also performed for mattresses [25], for a series of wall linings in Europe [26], and for a series of special wall linings, namely aircraft panels [27]. In the case of mattresses, the transition region in the cone calorimeter is still at roughly the same 3 min average value for heat release rate as for upholstered furniture:  $100\text{--}200 \text{ kW/m}^2$  average (3 min). The corresponding equation is similar to that for upholstered furniture. However, experience has shown that bedding (such as sheets and blankets) can substantially affect heat release from mattresses, particularly when the actual mattress has fairly poor fire performance. Thus, in general, tests with mattresses and bedding are of particular interest for systems with fairly high heat release rate values. With regard to wall linings, it is interesting to note that the aircraft cabin wall lining data and actual room wall lining data (from a European project using the ISO 9705 room-corner test [28]) can both be correlated with a simple empirical equation, a first order approximation for relative time to flashover in a room-corner scenario. This information was generalized in a study that addressed several different products [29]. The predictive equation for relative time to flashover based on cone calorimeter data at an incident heat flux of  $50 \text{ kW/m}^2$  suggests that time to flashover is proportional to the ratio of time to ignition to peak heat release rate, a ratio sometimes called the fire performance index or FPI [30]. An example using the aircraft panel and European wall lining data is shown in Figure 8 [29]. Figure 9 shows that the cone calorimeter can even be used to predict zones of flashover potential for wall and ceiling linings based on a fire model, such as the one by Karlsson [31] instead of a simple correlation like Figure 8.

It has also been shown that the computer model Conetools [32], developed at SP (in Sweden), serves as a useful means to predict ISO 9705 room-corner fire test results for wall linings from small-scale fire test results in the cone calorimeter (e.g., [33]). Additionally, the work just cited and other scientific work also showed [33, 34] that the use of the cone calorimeter and Conetools can, in a preliminary fashion, help to predict results for wall linings in the European regulatory single burning item test (SBI test, EN 13823 [35]).

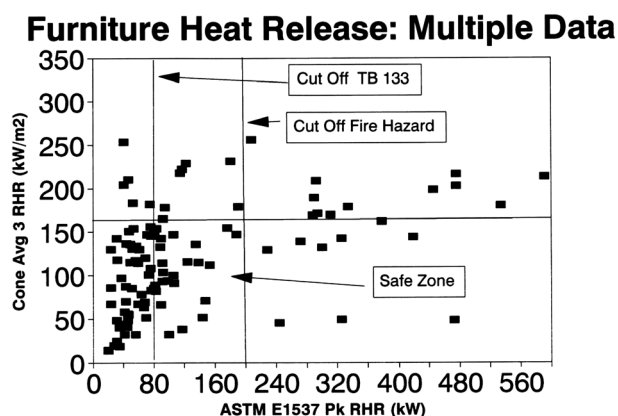


Figure 7. Predictions of full-scale furniture test data showing safe zone [17].



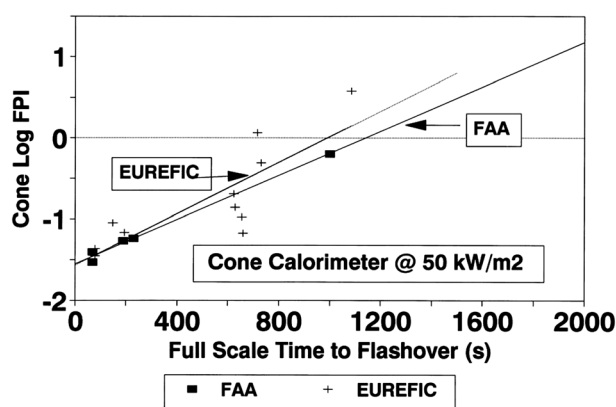


Figure 8. Comparison of wall linings (EUREFIC) and aircraft panels (FAA) full-scale test results with fire performance index predictions from cone calorimeter [28].

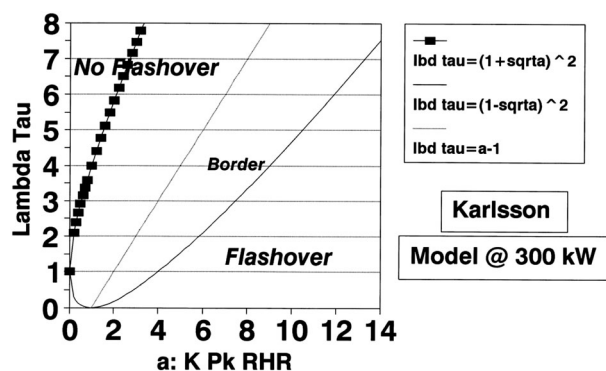


Figure 9. Safe zone predictions in wall linings based on Karlsson model and cone calorimeter data [28].

In conclusion, even from the limited amount of work discussed here, it is clear that the cone calorimeter can be used appropriately to assess fire performance of materials and products, and this will be performed in subsequent sections.

#### 4. OTHER SMALL-SCALE HEAT RELEASE TESTS USEFUL AS PREDICTIVE TOOLS

The cone calorimeter (ASTM E1354 [11], ISO 5660 [36]) is a key tool for small-scale testing of materials, composites, and products to assess heat release rate. However, it is not the only such test, and two other key small-scale tests can be used to test materials for heat release: the Ohio State University (OSU) heat release rate calorimeter (Smith [37], ASTM E906 [38], FAA Aircraft Materials Fire Test Handbook Chapter 5 [39]) and the FM Fire Propagation Apparatus (Tewarson [40], ASTM E2058 [41], FM FPA). In this study, some OSU work will be discussed here but no specific FM FPA work.

In the past, a large number of fire tests or techniques have been used, and many are still being used, to measure various individual properties associated with the fire performance of materials (and sometimes products). The measurement of single properties is inconsistent with the concept of fire hazard, because fire hazard is associated with the combination of a multitude of fire properties, including the ignitability of a material, its flammability, the amount of heat released from it when it burns, the rate at which this heat is released, the rate at which the material is consumed, the smoke production tendency, and the intrinsic toxic potency of the smoke. In 1972, Edwin Smith published detailed information on one test method (OSU heat release rate apparatus) that is capable of

measuring combined properties including heat release [37]. Such combined properties are thus more directly associated with fire hazard than any individual fire property. Hirschler and Smith [42] correlated data from the OSU with data from a full-scale non-standard room–corner test (Table II), showing a reasonable degree of predictability from the test, in that materials showing high heat release in the OSU also show high heat release in the room and vice versa.

In much more extensive (and predictive) studies, the OSU was used by the Federal Aviation Administration (FAA) in order to correlate material (and composite) data with data from full aircraft burns [43]. The FAA established a four-part research program to define how heat release criteria would provide appropriate safety guidance. The concept was to see whether this could then be incorporated into regulations to ensure fire safety. Using time to flashover as the primary end-point, the FAA work established a full-scale aircraft post-crash scenario to evaluate and ‘rank’ the fire performance of the aircraft interior materials, while monitoring all major fire properties [44]. Then, the FAA evaluated and ‘ranked’ a group of five representative generic cabin interior wall panel constructions in the full-scale aircraft fire test scenario [45]. Subsequently, the FAA established a series of input conditions and pass/fail criteria using the OSU test to obtain results that could be used to ‘rank’ the five materials in the same order as they were ranked by the full-scale tests [46]. Finally, NIST and FM Global were commissioned to investigate whether the cone calorimeter (at NIST) and the FPA apparatus (at FM Global) would give reasonably correlated results: they gave the same type of rankings as the OSU, even if they gave different absolute numbers. The result of this work was the development of pass/fail criteria of 65 kW/m<sup>2</sup> peak heat release rate and 65 kW min/m<sup>2</sup> average total heat released after 2 min of test in a 5 min test in the OSU, at an incident heat flux of 35 kW/m<sup>2</sup>. This reliance on heat release rate has proven to be extremely effective, and a July 2013 post-crash aircraft fire is an example of its effectiveness: an Asiana jet crashed in San Francisco airport with 307 people on board and no fire fatalities (although three passengers died of other injuries [47]).

## 5. NBS/NIST FULL-SCALE STUDIES ON FLAME RETARDED PRODUCTS

Much of the research on flame retarded materials has focused on individual materials or on products that contain them. The potential synergy between flame retarded materials in a room fire scenario is less well documented. In other words, the question is does individual product protection add up to a greater protection in a room containing several disparate product types? In an attempt to document

Table II. Comparison of heat release in OSU and room–corner test [42].

|                                   | Pk HRR OSU        | THR OSU at 10 min | OSU heat flux     | THR full |
|-----------------------------------|-------------------|-------------------|-------------------|----------|
|                                   | kW/m <sup>2</sup> | MJ/m <sup>2</sup> | kW/m <sup>2</sup> | MJ       |
| Natural wood oak panel            | 74                | 24.8              | 30                | 90       |
| Natural wood oak panel            | 121               | 30.2              | 41                | 90       |
| FR ABS                            | 112               | 13.6              | 30                | 70       |
| FR ABS                            | 264               | 29.9              | 41                | 70       |
| Polycarbonate                     | 211               | 31.2              | 30                | 134      |
| Polycarbonate                     | 434               | 102.2             | 41                | 134      |
| FR Acrylic                        | 37                | 9.2               | 30                | 37       |
| FR Acrylic                        | 52                | 17.9              | 41                | 37       |
| Generic PVC                       | 96                | 21.4              | 30                | 30       |
| Generic PVC                       | 109               | 24.8              | 45                | 30       |
| Low smoke PVC                     | 23                | 6.9               | 30                | 30       |
| Low smoke PVC                     | 70                | 29.3              | 45                | 30       |
| CPVC                              | 20                | 6.3               | 30                | 28       |
| CPVC                              | 20                | 6.3               | 41                | 28       |
| <i>Full-scale ignition source</i> |                   |                   |                   | 33       |

Notes: Pk HRR OSU, peak heat release rate from Ohio State University (ASTM E906) heat release test; THR OSU, total heat released during Ohio State University heat release test; THR full, total heat released during full-scale room–corner test.

and understand this, NIST (then NBS) conducted a study in 1988 [48]. This seminal study went beyond just investigating the effects of flame retardants on improved fire safety for individual materials and products but looked at a full set of flame retarded materials, their use in products and a comparison with the corresponding non-flame-retarded materials.

The study involved five different product categories, which were assembled and tested in small-scale and in full-scale room fires. In one set of products, all five products were made with flame retarded materials, whereas in the other set, the same base polymers were used but without flame retardant additives. The products involved were (in the order in the report) the following: (1) television housings, (2) business machine housings, (3) upholstered chairs, (4) electric cable arrays, and (5) laminated electronic circuit boards. These products were studied thoroughly in full-scale fires, in bench-scale fire tests, and by computer modeling.

The objective of this study was to investigate the fire hazard of a wide array of flame retardant containing products relative to non-flame-retarded but otherwise substantially identical products. The question to be answered was whether the fire hazard is reduced. The flame retarded formulations were chosen, in accordance with the report, to represent ones that are (or were, at the time) commercially available and in common use, but which were anticipated to represent high quality performance. None of the systems was designed to provide exceptional fire performance.

In this publication, it was believed essential to retain, as much as possible, the language from the original NBS/NIST publication, from 1988, demonstrating that the systems were designed to provide adequate fire performance, within the state-of-art of the time. The executive summary states as follows: 'the two central issues to be explored were:

- “(1) For today’s most commonly used FR/polymer systems, is the overall fire hazard reduced, when compared to similar non-fire retarded (NFR) items?”
- “(2) Since both the commercially popular FR chemicals and the base polymer formulations can be expected to change in the future, can appropriate bench-scale test methodologies be validated which would allow future testing to be quick and simple?”

The executive summary continues with the following statement regarding approach. ‘To answer these questions, a wide-ranging experimental program was formulated. Five representatives of commonly used plastic products were especially manufactured (using commercial formulations) for this program, each in an NFR and an FR version.’ Note that the approach addressed ‘commonly used plastic products’ and ‘commercial formulations’ and that there was no intent to meet any specific regulatory requirement.

The formulations used were the following:

- (a) TV cabinet housing: High impact polystyrene in both sets. The FR System was composed of 12% of a brominated material (decabromobiphenyl oxide) and 4% antimony oxide.
- (b) Business machine housing: Polyphenylene oxide in both sets. The FR System was composed of triaryl phosphate ester for 1% P.
- (c) Upholstered chair: Flexible polyurethane foam padding and the same nylon cover fabric (250 kg/m<sup>2</sup>) for both sets. The non-FR foam had a density of 25 kg/m<sup>3</sup>, and the FR system contained an organic chlorinated phosphate, an organic brominated flame retardant, and 35% alumina trihydrate, for a content of 4.75% Br, 2.6% Cl, 0.32% P, and 10.0% Al and a density of 64 kg/m<sup>3</sup>. The FR system was intended to perform better than foam intended for CA TB 117 use but was probably not as good as a BS 5852 crib # 5 foam.
- (d) Cable array: Each electric cable contained five conductors (copper wires, 14 AWG, 1.63 mm diameter) with insulated wire outside diameter of 3.30 mm. The outside diameter of the jacketed cable was 12.7 mm. The same wire jacket was used in both sets, and it was a black chlorosulphonated polyethylene containing antimony oxide (12.2% Cl and 2% Sb). The insulation of the non-FR system was cross-linked ethylene vinyl acetate (EVA) copolymer with clay (18.9 phr), antioxidant (2 phr), processing aid (1 phr), and catalyst (1.5 phr). The FR system was cross-linked EVA copolymer with clay (28 phr), chlorinated cycloaliphatic flame retardant (38 phr), antimony oxide (18.9 phr), antioxidant (2 phr), processing aid (1 phr), and catalyst (1.5 phr). The FR system was probably intended to represent a vertical tray cable composition. It would not have complied with riser of plenum cable requirements.

- (e) Laminated circuit board: This material was intended to represent glass/polyester electric circuit boards but contained no copper or electrical components. The board was 6.4 mm thick. The polymer in both systems was polyester resin. The non-FR system contained 38 wt% polyester, 44 wt% calcium carbonate, and 18 wt% fiberglass reinforcement. The FR system contained 39 wt% polyester, decabromobiphenyl oxide (10 wt%), antimony oxide (3 wt%), and alumina trihydrate (30 wt%) and 18 wt% fiberglass reinforcement. It was probably intended to represent a UL 94 V0 compound.

Tables III and IV contain the cone calorimeter data for the various products at two different incident heat fluxes. Clearly, flame retardants had a significant effect on heat release rate and effective heat of combustion. Furniture calorimeter tests (i.e., tests in which the product is placed on a load cell under a hood and the heat and smoke released are assessed) were conducted on all products. A natural gas burner with a nominal face of 180 mm × 150 mm and operating at 50 kW for 200 s was used for most tests, except for the cable products, in which case a line burner 0.36 m long with the same flow of natural gas was used. Table V shows the furniture calorimeter data. Once more, the improvement due to the flame retardants is very significant.

Table III. Cone calorimeter data of NBS/NIST products (30 kW/m<sup>2</sup> heat flux) [48].

| Material                  | FR or NFR | Pk HRR (kW/m <sup>2</sup> ) | Effective heat combustion (MJ/kg) |
|---------------------------|-----------|-----------------------------|-----------------------------------|
| TV cabinet                | NFR       | 970                         | 30                                |
| TV cabinet                | FR        | 340                         | 12                                |
| Bus. machine              | NFR       | 650                         | 30                                |
| Bus. machine              | FR        | 280                         | 21                                |
| Chair (fabric/foam)       | NFR       | 470                         | 27                                |
| Chair (fabric/foam)       | FR        | 290                         | 18                                |
| Chair (foam only)         | NFR       | 540                         | 27                                |
| Chair (foam only)         | FR        | 180                         | 15                                |
| Cable (jacket/insulation) | NFR       | 360                         | 28                                |
| Cable (jacket/insulation) | FR        | 380                         | 23                                |
| Cable (jacket)            |           | 270                         | 23                                |
| Cable (jacket)            |           | 280                         | 23                                |
| Cable (insulation)        | NFR       | 740                         | 39                                |
| Cable (insulation)        | FR        | 260                         | 23                                |
| Circuit board             | NFR       | 250                         | 21                                |
| Circuit board             | FR        | 100                         | 13                                |

Notes: Pk HRR, peak heat release rate from cone calorimeter heat release test; NFR, non-flame retarded product; FR, flame retarded product.

Table IV. Cone calorimeter data of NBS/NIST products (100 kW/m<sup>2</sup> heat flux) [48].

| Material                  | FR or NFR | Pk HRR (kW/m <sup>2</sup> ) | Effective heat combustion (MJ/kg) |
|---------------------------|-----------|-----------------------------|-----------------------------------|
| TV cabinet                | NFR       | 1400                        | 29                                |
| TV cabinet                | FR        | 480                         | 10                                |
| Bus. machine              | NFR       | 1100                        | 29                                |
| Bus. machine              | FR        | 570                         | 20                                |
| Chair (fabric/foam)       | NFR       | 1460                        | 28                                |
| Chair (fabric/foam)       | FR        | 760                         | 18                                |
| Chair (foam only)         | NFR       | 1580                        | 29                                |
| Chair (foam only)         | FR        | 310                         | 14                                |
| Cable (jacket/insulation) | NFR       | 550                         | 26                                |
| Cable (jacket/insulation) | FR        | 380                         | 21                                |
| Cable (insulation)        | NFR       | 1280                        | 38                                |
| Cable (insulation)        | FR        | 490                         | 21                                |
| Circuit board             | NFR       | 250                         | 18                                |
| Circuit board             | FR        | 147                         | 14                                |

Notes: Pk HRR, peak heat release rate from cone calorimeter heat release test; NFR, non-flame retarded product; FR, flame retarded product.

Table V. Furniture calorimeter data of NBS/NIST products [48].

| Material                 | FR or NFR | Pk HRR (kW) | Effective heat combustion (MJ/kg) |
|--------------------------|-----------|-------------|-----------------------------------|
| TV cabinet               | NFR       | 515         | 23                                |
| TV cabinet               | FR        | 180         | 20                                |
| TV cabinet               | FR        | 175         | 20                                |
| Bus. machine             | NFR       | 560         | 24                                |
| Bus. machine             | FR        | 380         | 28                                |
| Chair (fabric/foam)      | NFR       | 1160        | 26                                |
| Chair (fabric/foam)      | NFR       | 1205        | 27                                |
| Chair (fabric/foam)      | FR        | 50          | No data (too low)                 |
| Cable (vertical)         | NFR       | 400         | 41                                |
| Cable (vertical)         | FR        | 75          | No data (too low)                 |
| Cable (jacket, vertical) |           | 140         | 34                                |
| Cable (Z configuration)  | NFR       | 245         | 35                                |
| Cable (Z configuration)  | FR        | 130         | 34                                |
| Circuit board            | NFR       | 205         | 18                                |
| Circuit board            | FR        | 100         | No data (too low)                 |

Notes: Pk HRR, peak heat release rate from furniture calorimeter full-scale heat release test; NFR, non-flame retarded product; FR, flame retarded product.

In order to analyze the data for all products together, the full set of NFR products were set in an array as shown in Figure 10 and in a room–corridor arrangement as shown in Figure 11. The small-scale and furniture scale calorimeter data (Table V) predicted that the chair would ignite with the small 50 kW burner (on for 200 s) and then spread flame to get the other items ignited. When the same data were used for the FR products, the furniture calorimeter information showed that if the same array was used as used for the NFR products, only the TV cabinet and the chair would ignite, and the heat release/flame spread would originate virtually mainly from the burner and the TV and would give very low mass loss rate and would not contribute significantly to the fire buildup. Thus, it became clear to NBS/NIST that the array used for the NFR products would not be suitable to burn the FR products and that an auxiliary burner (120 kW, on for 2100 s, starting 300 s before the ignition of the 50 kW burner) would need to be used to avoid finding no flame propagation at all. Therefore, the arrangements shown in Figures 12 and 13 were used. The summary of the key data from the two sets of burns is shown in Table VI.

With regard to smoke toxicity, the executive summary states ‘The results showed that none of the test specimens produced smoke of extreme toxicity. The smoke from both the FR and NFR products

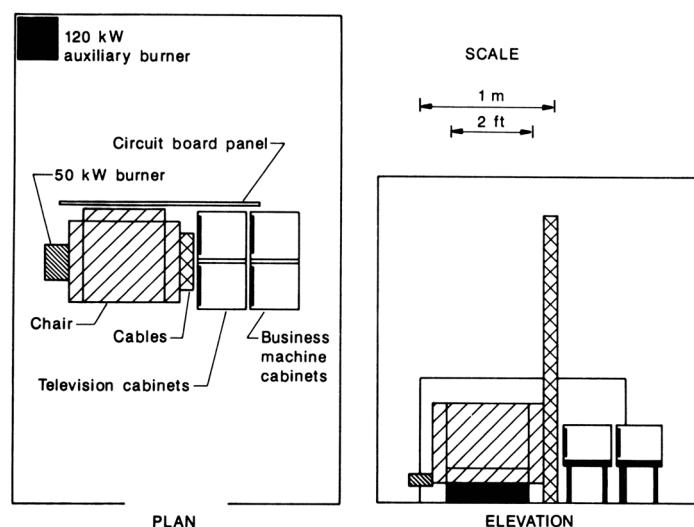


Figure 10. NBS/NIST layout of full-scale product burns for non-FR products [48].

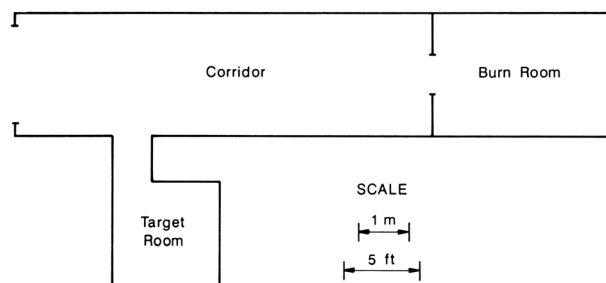


Figure 11. NBS/NIST room-corridor layout of full-scale product burns for non-FR products [48].

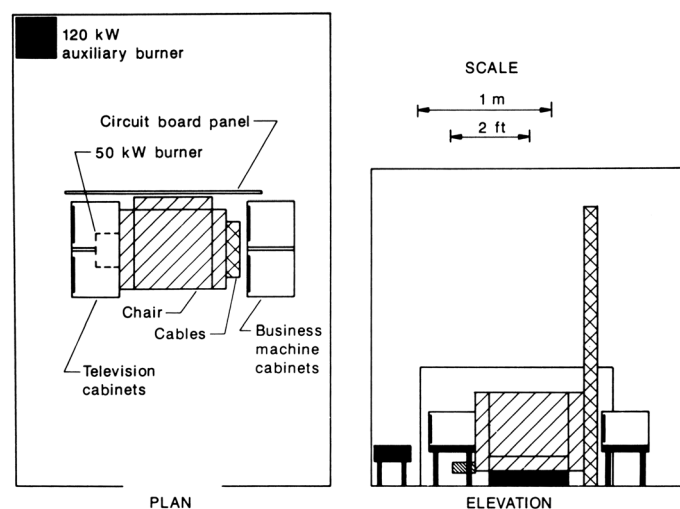


Figure 12. NBS/NIST layout of full-scale product burns for FR products [48].

was similar in potency and comparable to the potency of the smoke produced by materials commonly found in buildings.’

With regard to overall fire hazard, the executive summary states ‘The impact of FR materials on the survivability of the building occupants was assessed in two ways: (1) Comparing the time to untenability in the burn room; this is applicable to the occupants of the burn room. (2) Comparing the total production of heat, toxic gases, and smoke from the fire; this is applicable to occupants of the building remote from the room of fire origin.’ It continues ‘For the FR tests, the average available escape time was more than 15-fold greater than for the occupants of the NFR room. With regard to the production of combustion products,

- “The amount of material consumed in the fire for the FR tests was less than half the amount lost in the NFR tests.”
- “The FR tests indicated an amount of heat released from the fire which was  $\frac{1}{4}$  that released by the NFR tests.”
- “The total quantities of toxic gases produced in the room fire tests, expressed in ‘CO equivalents,’ were  $\frac{1}{3}$  for the FR products, compared to the NFR ones.”
- “The production of smoke was not significantly different between the room fire tests using NFR products and those with FR products.”

“Thus, in these tests, the fire retardant additives did decrease the overall hazard of their host products.”

In summary, the study showed that the proper selection of flame retardants can improve fire and life safety by significantly lowering heat release, toxic product release, and mass loss, while dramatically



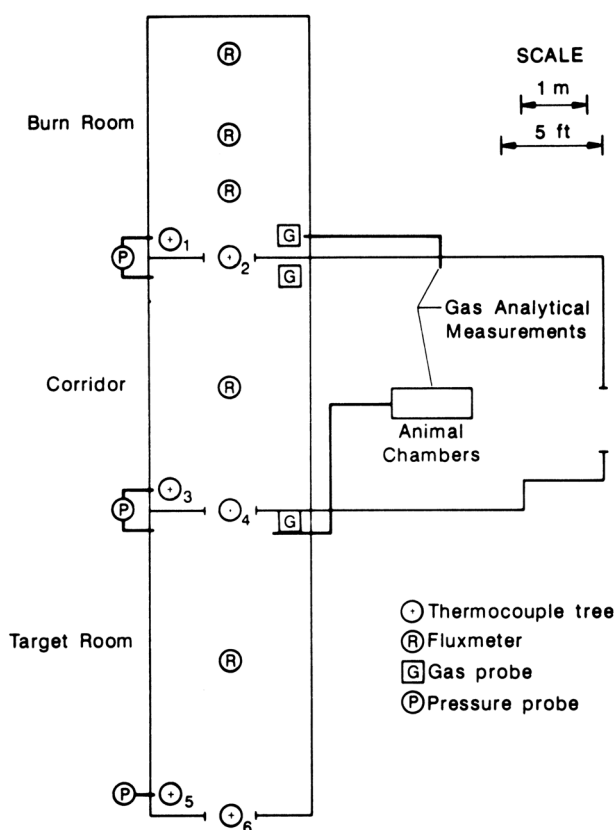


Figure 13. NBS/NIST room–corridor layout of full-scale product burns for FR products [48].

Table VI. Summary of full-scale results in NBS/NIST Tests [48].

|                        | NFR array                   | FR array | Comparison                                |
|------------------------|-----------------------------|----------|-------------------------------------------|
| Available escape time  | 113 s                       | 1789 s   | 15.8 fold longer time to escape from FR   |
| Total heat released    | 750 MJ                      | 200 MJ   | 3.5–4.0 fold heat released by NFR         |
| Smoke released         | (Overall)                   |          | No significant difference between systems |
| Toxic gas production   | (As CO equivalent)          |          | 3 fold less toxicity from FR              |
| Mass loss              | (Based on initial mass)     |          | Less than half the amount lost from FR    |
| Auxiliary burner       | Did not affect NFR Products |          | No Burning of FR Products Without It      |
| Predicted heat release | 1640 kW                     | 345 kW   | 4–5 fold higher heat release rate for NFR |

Notes: NFR array, array of non-flame retarded products; FR array, array of flame retarded products.

increasing time available for escape or rescue. In summary, the FR products are associated with a much lower fire hazard. Moreover, the ignition sources needed to cause FR products to burn are much larger than those for non-flame retarded products, if the products have been properly flame retarded. The authors noted that it is possible to develop flame retarded products that are not effective in lowering fire hazard because they are either ineffective systems or are being added at insufficient levels.

An interesting subsequent analysis of the NBS/NIST test data [49] found that the flame retardants added (many of which were brominated materials) did not just have an ‘overall positive effect’ from the point of view of fire hazard (over the non-flame-retarded products), something which has been demonstrated statistically, but that there is no evidence that the flame retardants adversely affected *any aspect* of fire hazard.

The NBS/NIST work was also analyzed soon after its completion by two of the authors [2] for the identification of the most important physical variable in the tests, which is a predictor of the resulting fire hazard. They found that a key conclusion of the work was that the heat release rate was that



variable and that it was much more predictive than time to ignition and toxicity of the difference in hazard. This brings this present work full circle, to the analysis shown at the beginning of the paper.

## 6. EFFECTS ON SMOKE RELEASE

This subject will be addressed very briefly. A study was made looking at five series of studies of room–corner tests in which heat and smoke release was assessed [8]. The analysis of these five series of full-scale room–corner tests in which heat and smoke release was measured showed that, in most cases, when heat release is low (as represented in Table VII by the ‘materials with adequate heat and low smoke’), the material or product will generate low heat and low smoke. On the opposite end of the scale, there are materials reaching early flashover, and they will often release very high smoke. In between, those two cases can be found some 10% of materials or products that release adequate (or low) heat but high smoke. This is the basis for data analyses that developed properties known as ‘smoke parameter’ or ‘smoke factor’ that combine heat release rate data and smoke obscuration data so as to give a better understanding of the type of smoke obscuration to be expected in real fires or in large-scale tests as opposed to the (often misleading) data obtained from small-scale tests. The consequence of this is that smoke release needs to be considered to identify those few cases where high smoke is associated with low heat. In general, however, as flame retardants tend to lower heat release (as shown earlier), they will either have minimal effect on full-scale smoke release or decrease such smoke release. This is important for the present analysis to highlight the positive effect of flame retardants.

## 7. MAJOR CONE CALORIMETER STUDIES OF INDIVIDUAL AND GROUPS OF FLAME RETARDED MATERIALS

In one study, 35 materials were investigated with the cone calorimeter at three incident heat fluxes (20, 40, and 70 kW/m<sup>2</sup>) [4]. In that study, several of the materials tested represented flame retarded and non-flame-retarded versions of the same polymers for similar types of applications. In some cases, there is more than one flame retarded version. Table VIII shows the peak heat release rate of a flame retarded and a non-flame-retarded version and the ratio between the two. In each case, the peak heat release rate is significantly decreased by the flame retardant system, in some cases by an order of magnitude. Some information on the materials tested is shown in the notes to the table. Table IX shows some other materials (for which less detailed information is available) [50, 51], tested either in the cone calorimeter or in the OSU calorimeter (ASTM E906 [38]). Some additional materials, also tested in the cone calorimeter, were also added [52]. The conclusions are similar to those for the results in Table VIII. Another comprehensive study looked at a large number of different polymers and at the effects of flame retardants on all of them [53]; there is too much information in the study to summarize it here, other than to indicate that flame retardants lowered heat release for all polymers studied.

When investigating flexible polyurethane foam, which is widely used for upholstered furniture, one study [5] looked at the effects of incorporating flame retardants into polyurethane foam on the cone calorimeter, and some results are shown in Table X. The effectiveness (to some extent) of adding flame retardants to achieve compliance with the traditional open flame test in CA TB 117 [22] is

Table VII. Full-scale room–corner tests measuring heat and smoke [8].

| Room–corner test series | Materials reaching early flashover | Materials with adequate heat and low smoke | Materials with adequate heat and high smoke | Number of materials tested |
|-------------------------|------------------------------------|--------------------------------------------|---------------------------------------------|----------------------------|
| SwRI                    | 1                                  | 8                                          | 1                                           | 10                         |
| EUREFIC                 | 14                                 | 12                                         | 2                                           | 28                         |
| SBI                     | 12                                 | 15                                         | 3                                           | 30                         |
| Coast Guard             | 3                                  | 5                                          | 1                                           | 9                          |
| BFGoodrich              | 1                                  | 5                                          | 1                                           | 7                          |
| Overall                 | 31                                 | 45                                         | 8                                           | 84                         |

Table VIII. Effect of flame retardants on cone calorimeter peak heat release rate [4].

| Material               | Heat flux         | Pk HRR non-FR     | Pk HRR FR         | Ratio of HRR |
|------------------------|-------------------|-------------------|-------------------|--------------|
|                        | kW/m <sup>2</sup> | kW/m <sup>2</sup> | kW/m <sup>2</sup> |              |
| ABS (+ FR1)            | 20                | 614               | 224               | 2.7          |
| ABS (+ FR1)            | 40                | 944               | 402               | 2.3          |
| ABS (+ FR1)            | 70                | 1311              | 409               | 3.2          |
| ABS (+ FR2)            | 20                | 614               | 224               | 2.7          |
| ABS (+ FR2)            | 40                | 944               | 291               | 3.2          |
| ABS (+ FR2)            | 70                | 1311              | 419               | 3.1          |
| PE                     | 20                | 913               | 88                | 10.3         |
| PE                     | 40                | 1408              | 192               | 7.3          |
| PE                     | 70                | 2735              | 268               | 10.2         |
| PVC rigid              | 20                | 102               | 25                | 4            |
| PVC rigid              | 40                | 183               | 84                | 2.2          |
| PVC rigid              | 70                | 190               | 93                | 2.1          |
| PVC wire and cable     | 20                | 116               | 9                 | 12.8         |
| PVC wire and cable     | 40                | 167               | 64                | 2.6          |
| PVC wire and cable     | 70                | 232               | 100               | 2.3          |
| PVC wire and cable # 2 | 20                | 116               | 72                | 1.6          |
| PVC wire and cable # 2 | 40                | 167               | 92                | 1.8          |
| PVC wire and cable # 2 | 70                | 232               | 134               | 1.7          |
| Polystyrene            | 20                | 723               | 277               | 2.6          |
| Polystyrene            | 40                | 1101              | 334               | 3.3          |
| Polystyrene            | 70                | 1555              | 445               | 3.5          |

*Notes:* ABS non-FR, Cycolac CTB acrylonitrile butadiene styrene terpolymer (Borg Warner); ABS/FR1, Cycolac KJT acrylonitrile butadiene styrene terpolymer flame retarded with bromine compounds (Borg Warner); ABS/FR2, polymeric system containing ABS and some PVC as additive; LDPE, polyethylene (Marlex HXM 50100); LDPE/FR Black non-halogen flame retarded, irradiation cross-linkable, polyethylene copolymer cable jacket compound (DEQD-1388, Union Carbide); PVC rigid, poly(vinyl chloride) rigid weatherable extrusion compound with minimal additives (BFGoodrich); PVC rigid FR, chlorinated PVC sheet compound (BFGoodrich); PVC wire and cable, flexible wire and cable PVC compound (non-flame retarded) (BFGoodrich); PVC wire and cable/FR 1, flexible vinyl thermoplastic elastomer alloy wire and cable jacket experimental compound, example of a family of VTE alloys (BFGoodrich); PVC wire and cable/FR 2, flexible wire and cable poly(vinyl chloride) compound (containing flame retardants) (BFGoodrich); Polystyrene crystal, Huntsman 333 (Huntsman); FR, flame retarded polystyrene crystal, Huntsman 351 (Huntsman); Pk HRR non-FR, peak heat release rate in cone calorimeter test for non-flame retarded materials; Pk HRR FR, peak heat release rate in cone calorimeter test for flame retarded materials; ratio of HRR, ratio between Pk HRR non-FR and Pk HRR FR.

weak but clear. However, much better improvements can be found with additional levels of flame retardants. The importance of choosing the right level of flame retardant additives is exemplified by a recent unpublished cone calorimetric study of two foams [54] with a small amount of flame retardant added, in order to comply with the widely criticized FMVSS 302 [55] test used for foams (and other plastics) inside automobiles. The study showed that the foams treated purely to meet FMVSS 302 and the untreated foams exhibited virtually no difference in heat release (Figure 14). The effect of adding enough flame retardants to polyurethane foam simply to meet CA TB 117 has some effect, albeit not very large, on heat release. However, results from a US National Institute of Justice (NIJ) research study on estimations of the burning rates of upholstered furniture [56] show something that had not been identified earlier. When polyurethane foam is treated with flame retardants to achieve CA TB 117 level and the foam is used in conjunction with a flame retarded fabric (the study used a cotton fabric that met the requirements of NFPA 701 [57]), the effect on heat release is very significant, while it is much less significant when used with a very flammable fabric (compare Figures 15 and 16, both showing cone calorimeter data) [58]. The same work also expanded the work by conducting full-scale tests. Figure 17 shows the effect of using CA TB 117 foam as compared to non-FR foam with an FR cotton fabric on a one seat sofa ignited in the seat by the ASTM E1537 square burner [59]. The figure shows that the system with the flame retarded foam and the flame retarded fabric has such a significant effect on heat release that there is virtually no fire from the sofa after ignition. For comparison, Figure 18 shows that, if neither the foam nor the

Table IX. Effect of flame retardants on cone calorimeter or Ohio State University calorimeter peak heat release rate [50–52].

| Material                                    | Heat flux         | Pk HRR non-FR     | Pk HRR FR         | Ratio of HRR |
|---------------------------------------------|-------------------|-------------------|-------------------|--------------|
|                                             | kW/m <sup>2</sup> | kW/m <sup>2</sup> | kW/m <sup>2</sup> |              |
| EVA (cross-linked)                          | 30                | 463               | 110               | 4.2          |
| EVA (thermoplastic)                         | 30                | 574               | 83                | 6.9          |
| HDPE                                        | 30                | 1803              | 114               | 15.8         |
| HDPE # 2                                    | 50                | 1167              | 476               | 2.5          |
| Polypropylene                               | 30                | 1555              | 174               | 8.9          |
| PVC rigid # 2                               | 30                | 98                | 42                | 2.3          |
| PVC rigid # 3                               | 30                | 118               | 56                | 2.1          |
| Plywood                                     | 25                | 114               | 43                | 2.7          |
| Plywood                                     | 50                | 150               | 75                | 2.0          |
| Particle board *                            | 25                | 151               | 66                | 2.3          |
| Particle board B (+ FR1)                    | 25                | 160               | 70                | 2.3          |
| Particle board B (+FR1)                     | 50                | 227               | 141               | 1.6          |
| Particle board B (+FR2)                     | 50                | 227               | 52                | 4.4          |
| Polyethylene wire and cable (+ CI FR1)      | 50                | 800               | 165               | 4.8          |
| Polyethylene wire and cable (+ CI FR2)      | 50                | 800               | 517               | 1.5          |
| Polyethylene wire and cable (+ mineral FR3) | 50                | 800               | 126               | 6.3          |
| Polyethylene wire and cable (+ ATH FR4)     | 50                | 800               | 271               | 3.0          |
| Polyethylene wire and cable (+ ATH FR5)     | 50                | 800               | 179               | 4.5          |
| Lumber (+ FR to FSI < 25)                   | 75                | 226               | 83                | 2.7          |

All tests in cone calorimeter except for those marked with an asterisk (\*) for particle board. The tests on polyethylene wire and cable compounds originate from reference [47], lumber and FR lumber from reference [49], and all others from reference [46].

*Notes:* Pk HRR non-FR, peak heat release rate in cone calorimeter test for non-flame retarded materials; Pk HRR FR, peak heat release rate in cone calorimeter test for flame retarded materials; ratio of HRR, ratio between Pk HRR non-FR and Pk HRR FR.

Table X. Cone calorimeter study of various polyurethane foams [5].

| Type of foam   | Incident heat flux | Peak heat release rate | Effective heat of combustion |
|----------------|--------------------|------------------------|------------------------------|
| Units          | kW/m <sup>2</sup>  | kW/m <sup>2</sup>      | MJ/kg                        |
| Non-FR foam    | 25                 | 420                    | 25.6                         |
| CA TB 117 foam | 25                 | 350                    | 22.7                         |
| Non-FR foam    | 35                 | 910                    | 23.1                         |
| CMHR foam      | 35                 | 110                    | 10.8                         |

*Notes:* Non-FR foam, polyurethane foam without added flame retardants; CA TB 117 foam, polyurethane foam with added flame retardants to achieve compliance with CA TB 117 test; CMHR foam, polyurethane foam with added flame retardants to achieve compliance with an improved (unnamed) fire test.

fabric is flame retarded, the sofa releases abundant heat and results in a significant fire and flashover, while a sofa with non-FR cotton and CA TB 117 foam gave off much less (but still too much) heat. Note that this particular study was performed using two seat sofas in a very large room. The effect on heat release of adding flame retardants to the foam is clearly noticeable but is less pronounced than it is in the presence of a flame retarded fabric.

Another study investigated polyurethane foam in the cone calorimeter (at an incident heat flux of 25 kW/m<sup>2</sup>) and in the British Standard BS 5852 [60], using various wood cribs, ranging from # 4 (smallest, 8.5 g), through # 5 (17.0 g) up to # 7 (largest, 126 g) [61]. It showed that well flame retarded polyurethane foam (using, in this case, melamine flame retardants) could resist very severe ignition sources and, even if ignited, would generate low heat release and perform very well in mock-up furniture tests. The study used two foams (one without flame retardants and one that met BS 5852 crib # 5). Some cone calorimeter results, together with the pass/fail results according to BS

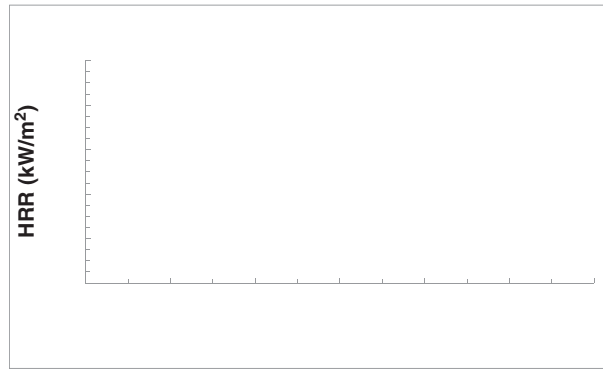


Figure 14. Alexander Morgan cone calorimeter: polyurethane foam treated for FMVSS 302 [54].

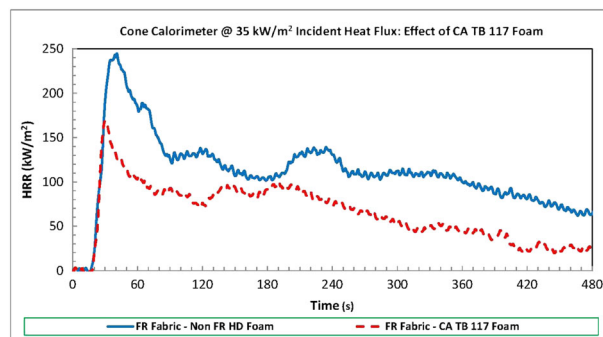


Figure 15. NIJ cone calorimeter comparison of polyurethane foam treated for CA TB 117 and non-FR with an FR cotton fabric treated for NFPA 701 [56,58].

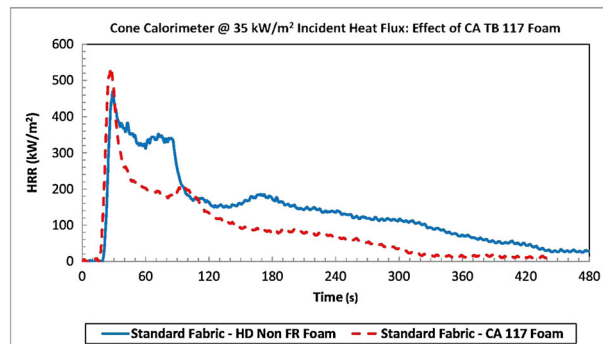


Figure 16. NIJ cone calorimeter comparison of polyurethane foam treated for CA TB 117 and non-FR with a non-FR cotton fabric [56,58].

5852, are shown in Table XI. It was of interest that one of the fabrics (polyolefin) was so poor that it would fail the BS 5852 test with both foams while one of the fabrics was so good that even the non-flame-retarded foam passed the BS 5852 test with the largest wood crib.

One type of materials needs to be considered separately: those are foam plastic insulation materials. It is often difficult to conduct a proper fire test with these materials, especially those that are melting materials, such as polystyrene foam. In the USA, these materials are usually assessed for code use by means of the Steiner tunnel (ASTM E84 [62]), while in the EU, they are being assessed primarily by means of the Euroclass testing system, via the SBI test (EN 13823 [35]) or by the

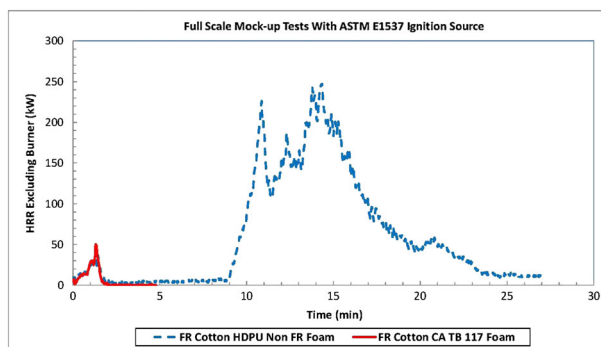


Figure 17. NIJ full-scale (ASTM E1537, one seat sofa) comparison of polyurethane foam treated for CA TB 117 and non-FR with an FR cotton fabric treated for NFPA 701 [56,58].

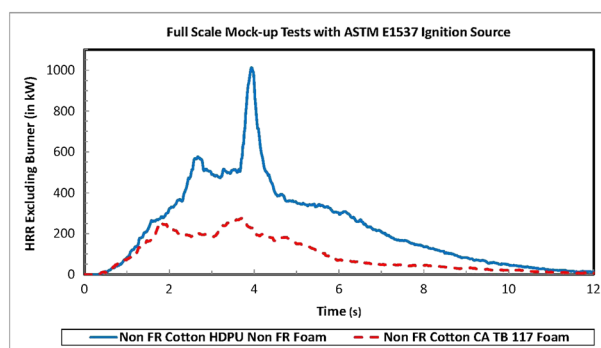


Figure 18. NIJ full-scale (ASTM E1537, two seat sofa) comparison of polyurethane foam treated for CA TB 117 and non-FR with non-FR cotton fabric [56,58].

Table XI. Cone calorimeter study of two polyurethane foams with and without fabrics [58].

| Type of system         | Time to ignition | Pk HRR            | Eff. Ht. Comb | BS 5852/crib # |
|------------------------|------------------|-------------------|---------------|----------------|
|                        | s                | kW/m <sup>2</sup> | MJ/kg         |                |
| Non-FR foam            | 3                | 533               | 29            | Fail/4         |
| Melamine foam          | 7007             | 97                | 6             | Pass/7         |
| Polyolefin/non-FR foam | 15               | 613               | 35            | Fail/4         |
| Polyolefin/mel foam    | 22               | 450               | 31            | Fail/4         |
| Nylon/non-FR foam      | 515              | 341               | 20            | Fail/4         |
| Nylon/mel foam         | 3349             | 313               | 23            | Pass/5         |
| Canvas/non-FR foam     | 134              | 355               | 12            |                |
| Canvas/mel foam        | 159              | 187               | 19            |                |
| Flex vinyl/non-FR foam | 548              | 142               | 8             | Pass/7         |
| Flex vinyl/mel foam    | 10,000           | 117               | 3             | Pass/7         |

Notes: Non-FR Foam, polyurethane foam without added flame retardants; melamine foam (mel foam), polyurethane foam with added melamine flame retardants to achieve compliance with an improved (unnamed) fire test; Pk HRR, peak heat release rate in cone calorimeter test; Eff. Ht. Comb., effective heat of combustion in cone calorimeter test.

ignition test (ISO 11925-1 [63]). With both systems, the flame retarded polystyrene foam significantly outperforms the foam that is not flame retarded. In the ASTM E84 test, flame retarded foam typically exhibits a flame spread index (FSI) in the range of 20–70 and a smoke developed index (SDI) of less than 450 (code requirements are for an FSI less of than 75 and an SDI of less than 450). On the other

hand, if the foam is not flame retarded, it inevitably fails the requirements. In the EU, flame retarded extruded or expanded polystyrene will normally result in a Euroclass ranging from B (rarely) to E (depending on the level of flame retardants added), while a non-flame-retarded foam will almost always result in a fail (i.e., Euroclass F) [64].

A comprehensive study of the flammability characteristics of foam plastics at NIST [65] was designed to try to obtain a test method for foam plastics that is a suitable alternative to the Steiner Tunnel Test as a measure of flammability for foamed plastic. The work investigated test apparatuses such as the cone calorimeter and the lateral ignition and flame spread test apparatus (LIFT, ASTM E1321, [66]), and the authors were attempting to more completely characterize foamed plastic flammability. Key flammability properties were obtained from these apparatuses to describe ignitability, flame spread rate, heat release rate, and smoke obscuration. An extensive data set of these flammability properties for 10 selected foamed plastics was generated. The tested materials included melting foams (polystyrene foams) and charring foams (polyurethanes, polyisocyanurate, and phenolic foams). The problems due to the effects of melting and dripping were limited by testing the materials in the horizontal orientation. In addition, an integrated approach to material flammability characterization was presented that uses these parameters to predict fire growth potential. The results were somewhat disappointing in that no test apparatus was identified that would assess the materials appropriately. The authors developed variations of both the cone calorimeter and the LIFT, but they were still unsatisfactory, and they recommended that modeling work be used. However, this does not affect the conclusions from the actual tests conducted, namely, that flame retarded foam plastics outperform non-flame-retarded ones.

Important work on television sets, which are emblematic of other appliances, was primarily conducted by Jürgen Troitzsch [67, 68], who was able to show that non-flame-retarded television sets, such as those commonly used in Europe, can quickly take a room to flashover. The main full-scale fire test was carried out with a TV set purchased in Germany, with a 20×20 mm hole cut in the lateral right front side of the back plate adjacent to the housing, where flame originating from a solid fuel pellet (0.15 g, 40–55 W, 5–10 mm flame) was applied. After ignition, the solid fuel pellet flame impinged on the back plate on top of it and later on the edge of the housing, simulating an external and internal low intensity ignition source. After just 24 s following pellet ignition, the TV back plate began to burn, and after 4.5 min, a pre-flashover situation developed in the room, with full flashover at 7 min, when all the furniture started burning, with big flames and high temperatures. The fire safety requirements for the cabinet of that TV set were no more than the horizontal (HB) version of the UL 94 test [69]. In contrast, TV sets purchased in the USA and in Japan, where the cabinets had to be flame retarded in order to meet the vertical requirements of the UL 94 test (Class UL 94 V2, V1, V0, or 5 V), either did not ignite or extinguished quickly when exposed to ignition sources as high as 200 mL of isopropanol or cloth soaked in isopropanol (representing up to 40 kW insults).

A separate study by Margaret Simonson on TV sets showed the vital benefit (for fire safety and environmental issues) found in life cycle analyses of flame retarded products versus non-flame-retarded products conducted at SP in Sweden [70]. Similar studies followed later also on upholstered furniture [71] and on cables [72], also at SP.

## 8. DISCUSSION AND CONCLUSIONS

A recent study found, based on much of the same data reviewed here, that the addition of flame retardants improves fire safety in a variety of ways but with particular emphasis on the fact that it increases time available for escape and rescue [73]. A 1999 publication [45] looked specifically at the NBS/NIST work discussed in depth in the first part of this study and concluded that the addition of flame retardants had a positive effect on not just the overall time available for escape but also on the smoke toxicity of the fire atmospheres. The author stated ‘there is no evidence that [the flame retardants] adversely affect any aspect of fire hazard. Because they reduce ignitability they reduce flame spread, because they reduce flame spread they reduce the fire’s burning rate; because they reduce the burning rate they reduce the quantity of smoke the fire produces.’



Another study investigated the safety, health, and environmental aspects of flame retardants [74] and concluded that 'this survey shows that the appropriate use of flame retardants, as a class, effectively provides improved fire safety via lowering the probability of ignition, the heat released and the amounts of smoke, combustion products and dangerous environmental toxicants. In consequence the use of flame retardants increases the available time for escape from a fire.' Much of the work in this specific study was based on earlier work [75] that received insufficient analysis.

In this work, the investigation of the importance of heat release rate in fire hazard, the investigation of the use of small-scale heat release tests for predictions of real-scale heat release information, and the in-depth analysis of the NBS/NIST work are all based on the best fire safety science.

In summary, this work demonstrates the following:

- (1) Heat release (and particularly heat release rate) is the most important property associated with fire hazard and fire safety.
- (2) The NBS/NIST work of 1988 demonstrated that flame retardants (as used in five products) decreased heat release and significantly increased time available for escape and rescue from a fire and fire safety.
- (3) Cone calorimeter (and OSU calorimeter) data on small-scale samples can be used to measure heat release rate and to predict the results of fires in full scale with many materials and products.
- (4) Flame retardants, when added as appropriately researched systems, will decrease heat release rate by well beyond statistical deviations for the polymeric materials studied, which represent most of those where fire safety is a potential concern.

In conclusion, this work demonstrates that the correct use of flame retardants (by using efficient systems, designed for the substrate, at sufficient levels) will decrease heat release rate and thus have a very positive effect on fire safety.

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## Flame retardants and heat release: review of data on individual polymers

Marcelo M. Hirschler<sup>\*,†</sup>

*GBH International, 2 Friars Lane, Mill Valley, CA 94941, USA*

### SUMMARY

This work is the second of two parts that considered the following issue: do flame retardants affect heat release of polymers? The reason for investigating the issue is because it is important to assess whether the addition of flame retardants positively decreases fire hazard. This part of the work considered the two following issues. (1) Analysis of the individual polymeric materials that need to be studied. (2) Analysis of the data found on heat release (particularly peak heat release rate), ignitability (if available), and other thermal properties (as available) of polymers in small-scale test data in recent years. The effects are being presented in terms of the percentage of improvement. The work demonstrated that, almost without exception, when adequately compounded systems were developed, the peak heat release rate of the flame retarded system was lower than that of the non-flame retarded system. The overall conclusion of the two-part study was that flame retardants does indeed improve fire safety (when used appropriately) and that a key reason for the beneficial effect of flame retardants is that they decrease heat release. Copyright © 2014 John Wiley & Sons, Ltd.

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**KEY WORDS:** flame retardants; heat release; fire hazard; polymers

### 1. INTRODUCTION

The first part of this two-part study [1] investigated the effects of flame retardants on heat release of products and of groups of polymers. It concluded that the correct use of flame retardants (by using efficient systems, designed for the substrate, at sufficient levels) will decrease heat release rate and thus have a very positive effect on fire safety.

Until relatively recently, heat release rate measurements were seen by some people as just another piece of data to gather. In fact, the importance of heat release as a fundamental fire safety property is still not a full part of the public understanding of fire safety. However, fire scientists have now concluded that heat release is much more than a set of data. It has been shown by multiple analyses of fire hazard that heat release rate is the most important fire property and that the peak heat release rate (Pk HRR) is the numerical indicator of the intensity of a fire [2–8]. One key study has demonstrated that heat release rate is much more critical than either ignitability or smoke toxicity in affecting the probability of survival in a fire [2].

Fire safety can be improved in one of two ways, or via a combination of both, as shown later. This work will address exclusively passive fire protection.

- **Passive fire protection.** This means using materials and products with superior fire performance so as to either minimize the probability of ignition or, if ignition does occur, minimize the damaging effects of the resulting fire.

<sup>\*</sup>Correspondence to: Marcelo M. Hirschler, GBH International, 2 Friars Lane, Mill Valley, CA 94941, USA.

<sup>†</sup>E-mail: gbhint@aol.com

- Active fire protection. This means relying on fire detection and suppression systems (such as smoke alarms and sprinklers). Fire detection systems alert the occupants (and/or first responders, such as fire fighters) while fire suppression systems extinguish the fire.

Flame retardants are materials that can be incorporated into combustible materials to improve their fire performance. It has been shown in many studies that flame retardants can be effective in having effects such as making materials or products less easily ignitable and/or reducing flame spread and they are extensively used to help materials and/or products meet certain fire test requirements. In view of the fact that there is no fire if ignition does not occur, a delay in ignition will improve fire safety. However, fire hazard assumes that ignition has occurred, so it is important to study the effects of flame retardants on fire hazard, with an emphasis on the key property of heat release, as explained later.

Fire risk is the combination of fire hazard and of the probability of fire occurring. Fire hazard is defined as 'the potential for harm associated with fire'. Fire risk is defined as 'an estimation of expected fire loss that combines the potential for harm in various fire scenarios that can occur with the probabilities of occurrence of those scenarios'. It is essential to understand that it is possible to have high fire hazard but low fire risk because the probability of such a fire is low.

Most, if not all, solid combustible materials (plastics, wood, textiles, rubbers, and so on) are polymeric (meaning that they have a complex chemical structure, with repeating units). Many polymeric materials, whether natural or synthetic, have poor fire performance in the absence of added flame retardants. That is particularly important for those polymers that are in widest use, such as polyolefins (polyethylene or polypropylene (PP)), polyurethane, polystyrene, polyethylene terephthalate (PET), nylon, or cotton. When a polymer is used in applications where fire safety is an important consideration, the lack of intrinsic fire safety must be addressed for ensuring passive fire protection. The following are examples of different approaches:

- adding flame retardants (i.e., using additive flame retardants),
- creating new polymers with better fire performance through syntheses of variations of the polymer (i.e., using reactive flame retardants),
- blending or otherwise compounding it with other polymers with better fire performance (i.e., creating blends or mixtures), and
- encapsulating the polymer or separating it from the potential exposure to the heat insult.

This study will look primarily at the first aspect, namely, additive flame retardants and fire hazard. Typical applications where fire safety can be critical are upholstered furniture, mattresses, wire and cable, interior finish, insulation, appliance, and computer housings, among others.

## 2. KEY POLYMERS OR MATERIALS TO INVESTIGATE

The world of natural and synthetic polymers is enormous, and it is literally impossible to study every polymer that is commercially available or that may become commercially available in the near future. Therefore, it is important to prioritize the polymers that are of major importance and that need to be investigated. Several criteria were considered in order to come to a determination of a list. First, it is essential to consider all synthetic polymers that are of major use worldwide (or at least in the developed world) and that decision can be made based on the amount of material sold. Another important criterion is that polymers that are important in critical applications where fire safety is a major concern need to be investigated. A third criterion used was to choose natural materials that have the potential to be flame retarded and that are used in key applications where fire safety matters and where synthetic polymers are possible alternatives. A fourth criterion was not to choose polymers that rarely require additional flame retardance, primarily because of their inherent excellent fire performance or because they are used in applications where fire safety is rarely a major concern.

Statistics from the American Chemistry Council (among others) show that the synthetic polymer with the highest production volume is polyethylene (including high density polyethylene, low density polyethylene (LDPE), linear LDPE, and various blends). In terms of volume, polyethylene is followed by PP, poly(vinyl chloride) (PVC), and polystyrene. The major markets for these polymers



are building and construction, transportation, electrical and electronics, furniture and furnishings, appliances, and packaging. According to the American Chemistry Council, sales of thermoplastics in the USA in 2012 is distributed in the following markets: packaging (34%), consumer and institutional (20%), building and construction (16%), transportation (4%), furniture and furnishings (2%), electrical and electronic (2%), and industrial and machinery (1%), with the remainder all others or export. In all of these areas (with the possible exception of packaging), multiple applications exist where fire safety needs to be considered.

In the area of building and construction, fire safety is an important consideration particularly for interior finish, insulation, roofing, siding, and exterior veneers. Polymers of interest here include polyolefins, polystyrene, rigid PVC, wood, cellulose, and rigid polyurethane. In the area of transportation, many polymers are used, including primarily the following (as analyzed, for highway vehicles, for a recent NFPA document (NFPA 556)): polyurethanes, PP, PVC, polyethylene, nylons/polyamides, ABS, and engineering thermoplastics. In the area of furniture and furnishings, fire safety is essential, especially for upholstered furniture and mattresses, because that is the area where the highest heat content in buildings is found. Polymers of interest here include flexible polyurethanes and materials used for fabrics, such as cotton, polyester, nylon, wool and silk, and wood. Protective clothing is an area where fire safety is a consideration, and the typical materials used are aromatic polyamides and cellulose. In the area of electrical and electronics, the key areas are wire and cable, connectors, and circuit/wiring boards. Polymers of interest here include flexible PVC, polyolefins (including polyethylene and ethylene vinyl acetate (EVA)), thermoplastic polyurethanes, epoxies, and fluoropolymers. In the area of appliances, there are two types of products with fire safety considerations: housings for appliances and electronic/computer equipment and the interior circuitry for such products. Polymers of interest here include various engineering thermoplastics, such as styrenics (including ABS and high impact polystyrene or HIPS), polycarbonate (PC), polyesters (including PET and polybutylene terephthalate, PBT), poly ether ether ketone and similar polymers, polyamides/nylons, polyphenylene oxide based blends, and rigid PVC. In the area of packaging, there are relatively low fire safety concerns. A few of the polymeric materials mentioned earlier need not be investigated further in this work because they are rarely treated with flame retardants, because of their intrinsically excellent fire performance.

The resulting list of materials is not necessarily comprehensive but will cover a very significant range. With these criteria, the following list was created (in alphabetical order):

- ABS and/or other styrenics, including HIPS,
- cellulose or cotton fabrics,
- engineering thermoplastics (including PC),
- epoxy resins,
- EVA and/or other polyolefin blends and/or copolymers,
- flexible PVC,
- LDPE,
- nylon and/or other polyamides,
- polyesters (including also PET fabrics),
- polycarbonate,
- polypropylene,
- polystyrene,
- polyurethane (foam and thermoplastic polyurethane),
- rigid PVC, and
- wood (different species, if possible).

With the criteria earlier, the following short list was created of materials that need not be investigated (in alphabetical order).

- aromatic polyamides {very high thermal stability; often used without additives for protective clothing or barriers},
- fluoropolymers (including polytetrafluoroethylene and others) {superior fire performance; normally used as is for electrical and piping applications},

- poly ether ether ketone and similar polymers {superior fire performance; normally used as is for engineered plastics applications},
- silk {sufficient fire performance for high-end textile applications}, and
- wool {sufficient fire performance for certain textile applications}.

The major polymeric system that was considered for analysis and was not investigated (because no data have been published) is cellulose loose fill insulation, a material that is extensively used and almost always used in flame retarded form, but which does not seem to have been tested for heat release rate, either before or after the addition of flame retardants.

### 3. HEAT RELEASE EFFECTS OF FLAME RETARDANTS ON INDIVIDUAL POLYMERS

The cone calorimeter is a specialized piece of fire test equipment that is used to assess heat release data, as well as ignitability, mass loss, and smoke released by burning materials. There have been a large number of studies that have demonstrated that the cone calorimeter (ASTM E1354 [9]) can be successfully used for many products to predict full-scale (or at least relatively large scale) fire performance of the corresponding products. The most widely studied products are wires and cables, upholstered furniture, mattresses, wall linings, and aircraft panels. The cone calorimeter is the primary fire testing technique used in the studies reviewed here.

Another heat release technique was developed by Richard Lyon, at the Federal Aviation Administration (FAA) in 2004, namely, the pyrolysis–combustion flow calorimeter (PCFC) or micro calorimeter [10]. This new fire test instrument was later standardized as ASTM D7309 [11], and it quickly and easily measures the combustibility or pyrolysis (aerobic or anaerobic) of materials, such as plastics, wood, or textiles, with samples that are only a few milligrams and results that are obtained in minutes. Its output includes the heat release capacity, a fundamental material property that can be correlated with the heat release rate. Lyon and co-workers have developed correlations with other standard heat release instrument fire test data (including the cone calorimeter). Lyon and collaborators have published extensively using this technique and showed its effectiveness in classifying polymeric materials on the basis of their heat release capacity. These publications also include results using flame retarded materials. However, the direct comparisons of results of flame retarded materials with their non-flame retarded alternates are easier understood using the cone calorimeter, and that is the focus that will be used in this work.

The effects of the flame retardant additives on each of the individual properties studied are being presented in a variety of tables and calculated as a percentage improvement.

#### 3.1. Polyolefins

Polyolefins are among the highest heat release polymers and are also among the most widely used materials for a variety of applications. The first part of this study [1] includes tables that contain data on the heat release of a variety of polyolefin systems [4,12–14] and demonstrates the effectiveness of flame retardants in decreasing heat release for such polymers. An NBS/NIST study [14] discussed in detail in the first part of this work also included a cable coating compound that is composed of polyolefins. Some other recent work on polyolefins follows. Tables I and II include work on the effectiveness of inorganic and phosphorus-based flame retardants on EVA and on a PP copolymer, tested in the cone calorimeter at an initial test heat flux of 40 kW/m<sup>2</sup> [15]. The three flame retardant additives used were aluminum trihydrate (ATH), magnesium hydroxide (MDH), and Fyrol P26 (a proprietary commercial additive with 36% phosphorus). It is notable that there is a significant improvement in heat release rate, particularly Pk HRR, for both polymers but a much lower effect on time to ignition (TTI) or on the ratio of the two properties (FPI or fire performance index). The percentage improvement in Pk HRR in the EVA systems investigated is in the 76–88% range, and in the PP systems, it ranged from 60 to 79%.

A different study on EVA cable jacket compounds (containing calcium carbonate) uses several mineral fillers, namely, ATH, MDH, huntite (HU), and hydromagnesite (HM) plus combinations of these additives [16] (Table III). The numbers in the table following the HU and HM designations



Table I. Effectiveness of inorganic and phosphorus-containing flame retardants on heat and ignitability properties of EVA [15].

|                       | TTI | Pk HRR            | FPI                                 | Avg HRR           | THR               |
|-----------------------|-----|-------------------|-------------------------------------|-------------------|-------------------|
| EVA                   | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| 40 kW/m <sup>2</sup>  |     |                   |                                     |                   |                   |
| Untreated             | 25  | 1905              | 0.01                                | 645               | 88                |
| Plus 60% ATH          | 28  | 460               | 0.06                                | 244               | 64                |
| Improvement %         | 12  | 76                | 364                                 | 62                | 27                |
| Plus 57% ATH 3% Fyrol | 35  | 221               | 0.16                                | 147               | 63                |
| Improvement %         | 40  | 88                | 1107                                | 77                | 28                |
| Plus 60% MDH          | 44  | 381               | 0.12                                | 286               | 68                |
| Improvement %         | 76  | 80                | 780                                 | 56                | 23                |
| Plus 57% MDH 3% Fyrol | 38  | 311               | 0.12                                | 183               | 63                |
| Improvement %         | 52  | 84                | 831                                 | 72                | 28                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); ATH, aluminum trihydrate; MDH: magnesium hydroxide; Fyrol, Fyrol P26, a proprietary commercial phosphorus-containing flame retardant with 36% phosphorus; improvement %, percentage improvement in relevant property based on the untreated material.

Table II. Effectiveness of inorganic and phosphorus-containing flame retardants on heat and ignitability properties of PP [15].

|                                      | TTI | Pk HRR            | FPI                              | Avg HRR           | THR               |
|--------------------------------------|-----|-------------------|----------------------------------|-------------------|-------------------|
| PP copolymer at 40 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| Untreated                            | 19  | 2540              | 0.01                             | 805               | 105               |
| Plus 30% MDH                         | 21  | 1010              | 0.02                             | 550               | 91                |
| Improvement %                        | 11  | 60                | 178                              | 32                | 13                |
| Plus 25% MDH 5% Fyrol                | 12  | 545               | 0.02                             | 355               | 84                |
| Improvement %                        | -37 | 79                | 194                              | 56                | 20                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); MDH, magnesium hydroxide; Fyrol, Fyrol P26, a proprietary commercial phosphorus-containing flame retardant with 36% phosphorus; improvement %, percentage improvement in relevant property based on the untreated material.

indicate the amount of each flame retardant added. The fire test is the cone calorimeter at initial test heat fluxes of 30, 50, and 70 kW/m<sup>2</sup>. The range of improvements in Pk HRR is in the range of 17–46%.

Some effects of adding clays and ammonium phosphate on HDPE are shown in Table IV [17]. The testing was conducted in the cone calorimeter at an initial test heat flux of 35 kW/m<sup>2</sup>. The three additives used were clay (sodium montmorillonite), ammonium phosphate monobasic (MB), and sodium montmorillonite modified with ammonium phosphate monobasic (M1). It is notable that there is a significant improvement in heat release rate, particularly Pk HRR but a much lower effect on TTI or on the ratio of the two properties (FPI). This is a consequence of the polymer being investigated and of the type of flame retardant additive used, which affects primarily heat release rate. The percentage improvement in Pk HRR in the systems investigated ranged from 21% to 47%.

Table V shows the effects on another two wire and cable polyolefin systems, LDPE, and ethyl butyl acetate (EBA) using inorganic additives and silicone coupling agents [18]. The mix of additives used was a masterbatch containing 30% calcium carbonate and 12.5% silicone. The test method is the cone calorimeter at an initial test heat flux of 35 kW/m<sup>2</sup>. There are improvements in both heat release and ignitability, with the Pk HRR being improved 77% in LDPE and 50–75% in EBA.

Table III. Effectiveness of inorganic flame retardants on heat and ignitability properties of an EVA cable jacket compound [16].

| EVA cable jacket compound          | TTI<br>s | Pk HRR<br>kW/m <sup>2</sup> | FPI<br>m <sup>2</sup> skW <sup>-1</sup> | Avg HRR<br>kW/m <sup>2</sup> |
|------------------------------------|----------|-----------------------------|-----------------------------------------|------------------------------|
| <b>30 kW/m<sup>2</sup></b>         |          |                             |                                         |                              |
| Untreated (plus calcium carbonate) | 210      | 186                         | 1.13                                    | 107                          |
| Plus ATH                           | 226      | 117                         | 1.93                                    | 81                           |
| Improvement %                      | 8        | 37                          | 71                                      | 24                           |
| Plus Hydromagnesite                | 302      | 117                         | 2.58                                    | 83                           |
| Improvement %                      | 44       | 37                          | 129                                     | 22                           |
| Plus HU24HM67                      | 249      | 139                         | 1.79                                    | 73                           |
| Improvement %                      | 19       | 25                          | 59                                      | 32                           |
| Plus HU43HM50                      | 219      | 130                         | 1.68                                    | 68                           |
| Improvement %                      | 4        | 30                          | 49                                      | 36                           |
| Plus HU77HM18                      | 227      | 135                         | 1.68                                    | 64                           |
| Improvement %                      | 8        | 27                          | 49                                      | 40                           |
| Plus HU95HM5                       | 236      | 154                         | 1.53                                    | 52                           |
| Improvement %                      | 12       | 17                          | 36                                      | 51                           |
| <b>50 kW/m<sup>2</sup></b>         |          |                             |                                         |                              |
| Untreated (plus calcium carbonate) | 83       | 257                         | 0.32                                    | 107                          |
| Plus ATH                           | 98       | 169                         | 0.58                                    | 84                           |
| Improvement %                      | 18       | 34                          | 80                                      | 21                           |
| Plus MDH                           | 125      | 163                         | 0.77                                    | 88                           |
| Improvement %                      | 51       | 37                          | 137                                     | 18                           |
| Plus Hydromagnesite                | 101      | 168                         | 0.60                                    | 89                           |
| Improvement %                      | 22       | 35                          | 86                                      | 17                           |
| Plus HU24HM67                      | 93       | 162                         | 0.57                                    | 74                           |
| Improvement %                      | 12       | 37                          | 78                                      | 31                           |
| Plus HU41HM57                      | 88       | 168                         | 0.52                                    | 71                           |
| Improvement %                      | 6        | 35                          | 62                                      | 34                           |
| Plus HU43HM50                      | 81       | 154                         | 0.53                                    | 56                           |
| Improvement %                      | -2       | 40                          | 63                                      | 48                           |
| Plus HU77HM18                      | 90       | 138                         | 0.65                                    | 41                           |
| Improvement %                      | 8        | 46                          | 102                                     | 62                           |
| Plus HU95HM5                       | 78       | 174                         | 0.45                                    | 57                           |
| Improvement %                      | -6       | 32                          | 39                                      | 47                           |
| <b>70 kW/m<sup>2</sup></b>         |          |                             |                                         |                              |
| Untreated (plus calcium carbonate) | 43       | 251                         | 0.17                                    | 187                          |
| Plus ATH                           | 54       | 208                         | 0.26                                    | 102                          |
| Improvement %                      | 26       | 17                          | 52                                      | 45                           |
| Plus Hydromagnesite                | 48       | 197                         | 0.24                                    | 106                          |
| Improvement %                      | 12       | 22                          | 42                                      | 43                           |
| Plus HU24HM67                      | 44       | 190                         | 0.23                                    | 90                           |
| Improvement %                      | 2        | 24                          | 35                                      | 52                           |
| Plus HU43HM50                      | 40       | 191                         | 0.21                                    | 84                           |
| Improvement %                      | -7       | 24                          | 22                                      | 55                           |
| Plus HU77HM18                      | 40       | 189                         | 0.21                                    | 85                           |
| Improvement %                      | -7       | 25                          | 24                                      | 55                           |
| Plus HU95HM5                       | 43       | 202                         | 0.21                                    | 103                          |
| Improvement %                      | 0        | 20                          | 24                                      | 45                           |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); ATH, aluminum trihydrate; HU, huntite; HM, hydromagnesite, numbers indicate amounts of HU and of HM; improvement %, percentage improvement in relevant property based on the untreated material.

NFPA 556 [19] is a guide on hazard assessment of passenger road vehicles, and it contains heat and ignitability parameters from cone calorimeter tests for a set of 9 PP materials that have been flame retarded (Table VI). It does not contain the data for the corresponding non-flame retarded PP, but data from Hirschler [4] show that Pk HRR for non-flame retarded PP was measured at 1170 kW/m<sup>2</sup>

Table IV. Effectiveness of clay and phosphate-treated clay flame retardants on heat and ignitability properties of HDPE [17].

|                              | TTI | Pk HRR            | FPI                              | Avg HRR           | THR               |
|------------------------------|-----|-------------------|----------------------------------|-------------------|-------------------|
| HDPE at 35 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| Untreated                    | 91  | 1744              | 0.05                             | 502               | 174               |
| Plus 5% clay                 | 67  | 1218              | 0.06                             | 550               | 171               |
| Improvement %                | -26 | 30                | 5                                | -10               | 2                 |
| Plus 7.5% clay               | 71  | 927               | 0.08                             | 478               | 142               |
| Improvement %                | -22 | 47                | 47                               | 5                 | 18                |
| Plus 10% clay                | 52  | 1006              | 0.05                             | 483               | 165               |
| Improvement %                | -43 | 42                | -1                               | 4                 | 5                 |
| Plus 5% M1                   | 83  | 1288              | 0.06                             | 456               | 143               |
| Improvement %                | -9  | 26                | 24                               | 9                 | 18                |
| Plus 7.5% M1                 | 88  | 1147              | 0.08                             | 441               | 142               |
| Improvement %                | -3  | 34                | 47                               | 12                | 18                |
| Plus 10% M1                  | 63  | 946               | 0.07                             | 414               | 147               |
| Improvement %                | -31 | 46                | 28                               | 18                | 16                |
| Plus 5% MB + 5% M1           | 48  | 1361              | 0.04                             | 510               | 165               |
| Improvement %                | -47 | 22                | -32                              | -2                | 5                 |
| Plus 10% MB + 2.5% M1        | 53  | 1051              | 0.05                             | 479               | 135               |
| Improvement %                | -42 | 40                | -3                               | 5                 | 22                |
| Plus 7.5% MB + 5% M1         | 43  | 1194              | 0.04                             | 653               | 166               |
| Improvement %                | -53 | 32                | -31                              | -30               | 5                 |
| Plus 10% MB + 5% M1          | 41  | 1372              | 0.03                             | 506               | 159               |
| Improvement %                | -55 | 21                | -43                              | -1                | 9                 |
| Plus 5% MB + 10% M1          | 42  | 1309              | 0.03                             | 460               | 156               |
| Improvement %                | -54 | 25                | -39                              | 8                 | 10                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); clay, sodium montmorillonite; MB, ammonium phosphate monobasic; M1, and sodium montmorillonite modified with ammonium phosphate monobasic; improvement %, percentage improvement in relevant property based on the untreated material.

Table V. Effectiveness of calcium and silicon mixed flame retardants on heat and ignitability properties of polyolefin wire and cable compounds [18].

|                                | TTI | Pk HRR            | FPI                              | Eff. Heat Comb. |
|--------------------------------|-----|-------------------|----------------------------------|-----------------|
|                                | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/kg           |
| LDPE alone                     | 76  | 1420              | 0.05                             | 41.0            |
| LDPE and Ca Si mix             | 95  | 320               | 0.30                             | 26.0            |
| Improvement %                  | 25  | 77                | 455                              | 37              |
| Ethyl butyl acetate            | 77  | 1304              | 0.06                             | 40.9            |
| EBA and silicone alone         | 84  | 1044              | 0.08                             | 33.4            |
| Improvement %                  | 9   | 20                | 36                               | 18              |
| EBA and calcium carbonate only | 102 | 658               | 0.16                             | 26.3            |
| Improvement %                  | 32  | 50                | 163                              | 36              |
| EBA and Ca Si mix              | 148 | 326               | 0.45                             | 24.1            |
| Improvement %                  | 92  | 75                | 669                              | 41              |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Eff. Heat Comb., effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); EBA, ethyl butyl acetate; improvement %, percentage improvement in relevant property based on the untreated material.

at an incident heat flux of 20 and 1509 kW/m<sup>2</sup> at an incident heat flux of 40 kW/m<sup>2</sup>. Similar information can be found in a table in part 1 of this study [1]. These data again show the positive effect of flame retardants on the heat release of this polyolefin.

Table VI. Cone calorimeter data for nine flame retarded polypropylene materials at heat flux indicated (in kW/m<sup>2</sup>) [19].

|                         | TTI | Pk HRR            | FPI                              | Avg HRR 3         | Eff. Heat Comb |
|-------------------------|-----|-------------------|----------------------------------|-------------------|----------------|
|                         | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | kW/m <sup>2</sup> | MJ/kg          |
| At 20 kW/m <sup>2</sup> |     |                   |                                  |                   |                |
| # 1                     | 382 | 236               | 1.62                             | 183               | 23.6           |
| # 2                     | 325 | 168               | 1.93                             | 136               | 29.8           |
| # 3                     | 377 | 207               | 1.82                             | 173               | 24.4           |
| # 4                     | 384 | 195               | 1.97                             | 157               | 25.3           |
| # 5                     | 396 | 301               | 1.32                             | 199               | 24.3           |
| # 6                     | 387 | 215               | 1.80                             | 131               | 25.9           |
| # 7                     | 402 | 228               | 1.76                             | 185               | 27.1           |
| # 8                     | 377 | 207               | 1.82                             | 173               | 26.8           |
| # 9                     | 386 | 202               | 1.91                             | 173               | 27.8           |
| At 40 kW/m <sup>2</sup> |     |                   |                                  |                   |                |
| # 1                     | 80  | 243               | 0.33                             | 170               | 23.9           |
| # 2                     | 63  | 206               | 0.31                             | 144               | 28.6           |
| # 3                     | 62  | 209               | 0.30                             | 167               | 25.2           |
| # 4                     | 72  | 206               | 0.35                             | 144               | 25.4           |
| # 5                     | 74  | 231               | 0.32                             | 160               | 25.2           |
| # 6                     | 70  | 193               | 0.36                             | 155               | 26.1           |
| # 7                     | 75  | 193               | 0.39                             | 138               | 25.9           |
| # 8                     | 71  | 188               | 0.38                             | 139               | 25.8           |
| # 9                     | 67  | 172               | 0.39                             | 127               | 25.7           |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR 3, average heat release rate during the 3 min following ignition in cone calorimeter test; Eff. Heat Comb, effective heat of combustion in cone calorimeter test.

Another study looked at the effects of adding, to polyethylene and to PP, 3% of an organically modified clay (a proprietary commercial additive called Cloisite 30B) and 3% of various brominated materials, creating halogen-containing polymer nanocomposites [20]. The four brominated additives are butyric acid pentabromobenzyl ester (FR1), pentabromobenzyl ester polyacrylate (FR2), methacrylate acid pentabromobenzyl ester (FR3), and acrylic acid pentabromobenzyl ester (FR4). The results are shown in Table VII. There is clearly a good reduction in Pk HRR, but the TTI and the total heat released remain virtually unchanged, within statistical significance. The fact that the TTI is lowered means, the nanocomposites are usually easier to ignite than the virgin polymer and the fact that the THR is unchanged means that the nanocomposite essentially burns up completely.

Having introduced the concept of using nanocomposites as flame retardant additives, it is worth mentioning here that such materials have been used in numerous studies with a variety of polymers (very often polyolefins and styrenics) and they show huge decreases in heat release rate (particularly Pk HRR), but these decreases are often accompanied by the same type of effect discussed earlier: no effect (or detrimental effect) on TTI and no effect on total heat released. Moreover, the Pk HRR of the flame retarded system is often still quite high. In a study by Kashiwagi *et al.* [21], the Pk HRR of a PP system decreased from over 3000 kW/m<sup>2</sup> to values ranging from 600 to 800 kW/m<sup>2</sup>. The extensive amount of scientific literature on these systems will not be reviewed here because it would go beyond the scope of the present work. However, interested readers should consult work included in a Wilkie and Morgan book on flame retardants [22], including studies by Jiang [23], Lopez-Cuesta [24], Marosi [25], and Delichatsios [26], as well as a Wilkie and Morgan book entitled 'Flame Retardant Polymer Nanocomposites' [27] and additional work by Beyer [28], Gilman [29], and Schartel [30]. Typically, nanocomposites are parts of complex multi-component systems.

A pair of interesting NIST studies [31, 32] looked at the fire testing of materials intended for use in electronic equipment, in small scale and in full scale. The small-scale work [31] showed that the heat released by the type of PP chosen for the cone calorimeter tests is very high and that not all flame retardant systems can be effective in reducing the heat release rate to manageable levels. However, the addition of a 'non-halogen' flame retardant system resulted in a PP material with a Pk HRR of

Table VII. Effectiveness of halogen-containing nanocomposites as flame retardants on heat and ignitability properties of some polyolefins [20].

| Cone calorimeter<br>at 35 kW/m <sup>2</sup> | TTI | Pk HRR            | FPI                              | THR               |
|---------------------------------------------|-----|-------------------|----------------------------------|-------------------|
|                                             | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/m <sup>2</sup> |
| Polyethylene                                |     |                   |                                  |                   |
| Untreated                                   | 73  | 1949              | 0.04                             | 100               |
| Plus FR4                                    | 75  | 1577              | 0.05                             | 92                |
| Improvement %                               | 3   | 19                | 27                               | 8                 |
| Plus FR2                                    | 64  | 1817              | 0.04                             | 95                |
| Improvement %                               | -12 | 7                 | -6                               | 5                 |
| Plus FR1                                    | 75  | 1190              | 0.06                             | 88                |
| Improvement %                               | 3   | 39                | 68                               | 12                |
| Plus FR3                                    | 67  | 1762              | 0.04                             | 97                |
| Improvement %                               | -8  | 10                | 2                                | 3                 |
| Polypropylene                               |     |                   |                                  |                   |
| Untreated                                   | 50  | 1642              | 0.03                             | 60                |
| Plus FR4                                    | 44  | 1656              | 0.03                             | 72                |
| Improvement %                               | -12 | -1                | -13                              | -20               |
| Plus FR1                                    | 48  | 1281              | 0.04                             | 73                |
| Improvement %                               | -4  | 22                | 23                               | -22               |
| Plus FR3                                    | 46  | 957               | 0.05                             | 74                |
| Improvement %                               | -8  | 42                | 58                               | -23               |
| Plus FR2                                    | 67  | 1762              | 0.04                             | 97                |
| Improvement %                               | -6  | 54                | 103                              | -2                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); FR1, butyric acid pentabromobenzyl ester; FR2, pentabromobenzyl ester polyacrylate; FR3, methacrylate acid pentabromobenzyl ester; FR4, acrylic acid pentabromobenzyl ester; improvement %, percentage improvement in relevant property based on the untreated material.

some 450 kW/m<sup>2</sup>, compared to a corresponding value of more than 2000 kW/m<sup>2</sup> for the (untested) non-flame retarded PP material. No tabular data are presented because no direct comparison can be referenced. In later sections of this work, some of the data on other polymeric systems from the studies will be presented.

### 3.2. Styrenics

Polystyrene and ABS are widely used thermoplastic engineering polymers, which are also poor fire performers in the absence of flame retardants. The NBS/NIST data [14] show that the heat release rate of the TV cabinet material (made out of polystyrene) is improved by flame retardants, and a table in part 1 of this study includes data that shows how the heat release rate of ABS and of polystyrene are also very positively affected by flame retardants [1]. The following data comes from more recent studies on specific polymers: three studies on polystyrene and one on ABS.

The same work that studied the effects of adding, to polyolefins, 3% of an organically modified clay (Cloisite 30B) and 3% of various brominated materials, creating halogen-containing polymer nanocomposites, also studied the effects on polystyrene [20]. In this case, an added flame retardant was also used, namely, antimony trioxide (ATO). Conclusions are similar to those for the polyolefins, and the data are shown in Table VIII.

Table IX shows that brominated additives are effective at decreasing heat release and ignitability of HIPS [33], particularly in the presence of antimony oxide as a synergist. The tests were conducted in a cone calorimeter at an incident heat flux of 40 kW/m<sup>2</sup>. The combined systems have particularly strong effects on the FPI. One study investigated the effects of synthetic micas (or synthetic clays) and of natural clays (sodium montmorillonite and treated versions of sodium montmorillonite) on polystyrene and on a combination of polystyrene and a polystyrene co-maleic anhydride. The results are shown later in Tables X–XII [34]. A recent study looked at layered double hydroxides as flame retardants for polystyrene (Table XIII) [35].

Table VIII. Effectiveness of halogen-containing nanocomposites and antimony oxide as flame retardants on heat and ignitability properties of polystyrene materials [20].

| Cone calorimeter at<br>35 kW/m <sup>2</sup> | TTI | Pk HRR            | FPI                                 | THR               |
|---------------------------------------------|-----|-------------------|-------------------------------------|-------------------|
|                                             | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/m <sup>2</sup> |
| Polystyrene                                 |     |                   |                                     |                   |
| Untreated                                   | 59  | 1242              | 0.05                                | 100               |
| Plus FR1                                    | 43  | 1065              | 0.04                                | 77                |
| Improvement %                               | -27 | 14                | -15                                 | 23                |
| Plus FR1 + ATO                              | 41  | 590               | 0.07                                | 50                |
| Improvement %                               | -31 | 52                | 46                                  | 50                |
| Plus FR2                                    | 33  | 707               | 0.05                                | 62                |
| Improvement %                               | -44 | 43                | -2                                  | 38                |
| Plus FR2 + ATO                              | 42  | 541               | 0.08                                | 45                |
| Improvement %                               | -29 | 56                | 63                                  | 55                |
| Plus FR3                                    | 34  | 967               | 0.04                                | 71                |
| Improvement %                               | -42 | 22                | -26                                 | 29                |
| Plus FR3 + ATO                              | 43  | 813               | 0.05                                | 51                |
| Improvement %                               | -27 | 35                | 11                                  | 49                |
| Plus FR4                                    | 34  | 813               | 0.04                                | 75                |
| Improvement %                               | -42 | 35                | -12                                 | 25                |
| Plus FR4 + ATO                              | 44  | 875               | 0.05                                | 61                |
| Improvement %                               | -25 | 30                | 6                                   | 39                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); FR1, butyric acid pentabromobenzyl ester; FR2, pentabromobenzyl ester polyacrylate; FR3, methacrylate acid pentabromobenzyl ester; FR4, acrylic acid pentabromobenzyl ester; ATO, antimony oxide; improvement %, percentage improvement in relevant property based on the untreated material.

Table IX. Effectiveness of brominated additives (with and without antimony oxide) as flame retardants on heat and ignitability properties of high impact polystyrene [33].

| Cone at 40 kW/m <sup>2</sup> | TTI | Pk HRR            | Av HRR 3 min      | Eff. Ht Comb | FPI                              |
|------------------------------|-----|-------------------|-------------------|--------------|----------------------------------|
|                              | s   | kW/m <sup>2</sup> | kW/m <sup>2</sup> | MJ/kg        | m <sup>2</sup> skW <sup>-1</sup> |
| HIPS                         | 60  | 968               | 621               | 30.7         | 0.06                             |
| HIPS + SbO                   | 62  | 910               | 580               | 28.6         | 0.07                             |
| HIPS + Deca                  | 55  | 708               | 470               | 17.0         | 0.08                             |
| HIPS + Deca + SbO            | 72  | 360               | 255               | 10.1         | 0.20                             |
| HIPS + DBE                   | 54  | 782               | 487               | 18.6         | 0.07                             |
| HIPS + DBE + SBO             | 78  | 393               | 302               | 10.8         | 0.20                             |
| HIPS + BT93                  | 54  | 768               | 509               | 19.6         | 0.07                             |
| HIPS + BT93 + SbO            | 88  | 423               | 293               | 12.2         | 0.21                             |
| HIPS + HBCD                  | 72  | 885               | 710               | 23.2         | 0.08                             |
| HIPS + HBCD + SbO            | 80  | 766               | 423               | 13.2         | 0.10                             |
| Improvement % SbO            | 3   | 6                 | 7                 | 7            | 10                               |
| Improvement % Deca           | -8  | 27                | 24                | 45           | 25                               |
| Improvement % Deca + SbO     | 20  | 63                | 59                | 67           | 223                              |
| Improvement % DBE            | -10 | 19                | 22                | 39           | 11                               |
| Improvement % DBE + SbO      | 30  | 59                | 51                | 65           | 220                              |
| Improvement % BT93           | -10 | 21                | 18                | 36           | 13                               |
| Improvement % BT93 + SbO     | 47  | 56                | 53                | 60           | 236                              |
| Improvement % HBCD           | 20  | 9                 | -14               | 24           | 31                               |
| Improvement % HBCD + SbO     | 33  | 21                | 32                | 57           | 68                               |

Notes: Brominated additives at 12%; antimony oxide at 4%; Sb, antimony oxide; Deca, decabromodiphenyl oxide; DBE, decabromodiphenyl ethane; BT93, ethylenebis(tetrabromophthalimide); HBCDE, hexabromocyclododecane; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR 3 min, average heat release rate during the 3 min following ignition in cone calorimeter test; Eff. Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test).



Table X. Effectiveness of synthetic micas as flame retardants on heat and ignitability properties of polystyrene materials [34].

| Cone at 50 kW/m <sup>2</sup>                                                                 | TTI | Pk HRR            | FPI                              | Ht Comb | THR               |
|----------------------------------------------------------------------------------------------|-----|-------------------|----------------------------------|---------|-------------------|
| Synthetic Micas                                                                              | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/kg   | MJ/m <sup>2</sup> |
| Polystyrene                                                                                  | 65  | 1294              | 0.05                             | 30.6    | 111               |
| PS + 1 (18.6 wt% Mica O)                                                                     | 51  | 513               | 0.10                             | 27.9    | 94                |
| PS + 2 (9.3 wt% Mica O)                                                                      | 49  | 428               | 0.11                             | 27.1    | 98                |
| PS + 3 (1.9 wt% Mica O)                                                                      | 63  | 911               | 0.07                             | 29.4    | 111               |
| PS + 4 (10 wt% Mica N)                                                                       | 41  | 995               | 0.04                             | 30.8    | 113               |
| PS + 5 (5 wt% Mica N)                                                                        | 43  | 1146              | 0.04                             | 31.7    | 117               |
| PS + 6 (1 wt% Mica N)                                                                        | 52  | 1201              | 0.04                             | 31.9    | 117               |
| Mica O: dimethyl, di(hydrogenated tallow) ammonium treated sodium fluorinated synthetic mica |     |                   |                                  |         |                   |
| Mica N: sodium fluorinated synthetic mica                                                    |     |                   |                                  |         |                   |
| Improvement % 1                                                                              | -22 | 60                | 98                               | 9       | 15                |
| Improvement % 2                                                                              | -25 | 67                | 128                              | 11      | 12                |
| Improvement % 3                                                                              | -3  | 30                | 38                               | 4       | 0                 |
| Improvement % 4                                                                              | -37 | 23                | -18                              | -1      | -2                |
| Improvement % 5                                                                              | -34 | 11                | -25                              | -4      | -5                |
| Improvement % 6                                                                              | -20 | 7                 | -14                              | -4      | -5                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XI. Effectiveness of sodium montmorillonites as flame retardants on heat and ignitability properties of polystyrene materials [34].

| Cone at 50 kW/m <sup>2</sup>                                                             | TTI | Pk HRR            | FPI                                 | Ht Comb | THR               |
|------------------------------------------------------------------------------------------|-----|-------------------|-------------------------------------|---------|-------------------|
| Sodium montmorillonite                                                                   | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/kg   | MJ/m <sup>2</sup> |
| Polystyrene                                                                              | 65  | 1294              | 0.05                                | 30.6    | 111               |
| PS + 1 (16.2 wt% MMT O)                                                                  | 52  | 446               | 0.12                                | 26.9    | 97                |
| PS + 2 (8.1 wt% MMT O)                                                                   | 58  | 555               | 0.10                                | 26.6    | 98                |
| PS + 3 (1.6 wt% MMT O)                                                                   | 66  | 1080              | 0.06                                | 29.9    | 111               |
| PS + 4 (10 wt% MMT N)                                                                    | 40  | 792               | 0.05                                | 29.2    | 106               |
| PS + 5 (5 wt% MMT N)                                                                     | 41  | 993               | 0.04                                | 29.5    | 111               |
| PS + 6 (1 wt% MMT N)                                                                     | 57  | 1106              | 0.05                                | 29.8    | 110               |
| MMT O: dimethyl, di(hydrogenated tallow) ammonium treated montmorillonite (Cloisite 15A) |     |                   |                                     |         |                   |
| MMT N: sodium montmorillonite (Cloisite Na+)                                             |     |                   |                                     |         |                   |
| Improvement % 1                                                                          | -20 | 66                | 132                                 | 12      | 13                |
| Improvement % 2                                                                          | -11 | 57                | 108                                 | 13      | 12                |
| Improvement % 3                                                                          | 2   | 17                | 22                                  | 2       | 0                 |
| Improvement % 4                                                                          | -38 | 39                | 1                                   | 5       | 5                 |
| Improvement % 5                                                                          | -37 | 23                | -18                                 | 4       | 0                 |
| Improvement % 6                                                                          | -12 | 15                | 3                                   | 3       | 1                 |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

A different recent study, using a mass loss cone (ASTM E2102 [36]), looked at ABS and a combination of three flame retardants: ethane-1,2-bis pentabromophenyl, antimony oxide, and zinc borate. The effects are very significant, as shown in Table XIV [37].

The NIST work discussed earlier, on materials for electronic equipment, [31] included comparisons for HIPS, and the data are being analyzed in Table XV. The flame retardants used are identified simply as brominated and non-halogen. In both cases, improvements can be found on Pk HRR (31–57%) as well as in the other key parameters (TTI, effective heat of combustion, and total heat released).

Table XII. Effectiveness of phosphonium synthetic micas as flame retardants on heat and ignitability properties of polystyrene and associated materials [34].

| Cone at 50 kW/m <sup>2</sup>                                                         | TTI | Pk HRR            | FPI                                 | Ht Comb | THR               |
|--------------------------------------------------------------------------------------|-----|-------------------|-------------------------------------|---------|-------------------|
| Phosphonium treated synthetic micas                                                  | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/kg   | MJ/m <sup>2</sup> |
| Polystyrene                                                                          | 65  | 1294              | 0.05                                | 30.6    | 30.6              |
| PS + 1 (styrene/maleic anhydride)                                                    | 64  | 1280              | 0.05                                | 30.8    | 30.8              |
| PS + 2 (PS + 1 + 8.3 wt% Mica P)                                                     | 65  | 557               | 0.12                                | 26.5    | 26.5              |
| PS + 3 (8.3 wt% Mica P)                                                              | 64  | 586               | 0.11                                | 26.6    | 26.6              |
| Mica P: triphenyl, n-hexadecyl phosphonium treated sodium fluorinated synthetic mica |     |                   |                                     |         |                   |
| System 1: addition of styrene/maleic anhydride                                       |     |                   |                                     |         |                   |
| Improvement % 1                                                                      | -2  | 1                 | 0                                   | -1      | -1                |
| Improvement % 2                                                                      | 0   | 57                | 132                                 | 13      | 13                |
| Improvement % 3                                                                      | -2  | 55                | 117                                 | 13      | 13                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XIII. Effectiveness of layered double hydroxides as flame retardants on heat and ignitability properties of polystyrene [35].

|                                | TTI | Pk HRR            | FPI                                 | THR               |
|--------------------------------|-----|-------------------|-------------------------------------|-------------------|
| Cone at 35 kW/m <sup>2</sup>   | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/m <sup>2</sup> |
| Polystyrene                    | 88  | 813               | 0.11                                | 138               |
| PS + 5 wt% LDH-DBP             | 72  | 616               | 0.12                                | 133               |
| Improvement %                  | -18 | 24                | 8                                   | 4                 |
| PS + 5 wt%5 LDH-SMM 30 min DBP | 65  | 517               | 0.13                                | 133               |
| Improvement %                  | -26 | 36                | 16                                  | 4                 |
| PS + 5 wt% LDH-SMM 60 min DBP  | 66  | 621               | 0.11                                | 131               |
| Improvement %                  | -25 | 24                | -2                                  | 5                 |
| PS + 5 wt% LDH syntal DBP      | 59  | 627               | 0.09                                | 129               |
| Improvement %                  | -33 | 23                | -13                                 | 7                 |
| PS + 10 wt% LDH-DBP            | 74  | 444               | 0.17                                | 127               |
| Improvement %                  | -16 | 45                | 54                                  | 8                 |
| PS + 15 wt% LDH-DBP            | 95  | 402               | 0.24                                | 125               |
| Improvement %                  | 8   | 51                | 118                                 | 9                 |

Notes: DBP, 3,4-dihydroxybenzophenone; LDH, layered double hydroxides; SMM, surface modification; LDH syntal, commercial material; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Recent cone calorimeter work compared the fire performance of a commercial non-flame retarded expanded polystyrene (EPS) foam with a commercial flame retarded EPS foam [38]. The work both conducted its own cone calorimeter work, at an incident heat flux of 35 kW/m<sup>2</sup>, and compared work performed earlier [39, 40] with other foamed EPS systems, at incident heat fluxes ranging from 30 to 50 kW/m<sup>2</sup>. The results (Table XVI) show that a certain level of improvement was obtained on the Pk HRR and on the TTI for all systems.

### 3.3. Engineering thermoplastics

Engineering thermoplastics are widely used for a large number of applications, even if they are not as high volume as polyolefins or styrenics. The NBS/NIST study [14] included two products that fall under this category: the business machine housing (a polyphenylene oxide) and the laminated circuit board (a polyester). Some other recent work on engineering thermoplastics follows. A study on PC

Table XIV. Mass loss cone study of the effectiveness of various flame retardants on heat and ignitability properties of ABS [37].

| Mass loss cone at<br>35 kW/m <sup>2</sup> | TTI | Pk HRR            | FPI                                 | THR               |
|-------------------------------------------|-----|-------------------|-------------------------------------|-------------------|
|                                           | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/m <sup>2</sup> |
| Untreated ABS                             | 83  | 900               | 0.09                                | 134               |
| Plus FR1                                  | 64  | 239               | 0.27                                | 44                |
| Plus FR2                                  | 67  | 257               | 0.26                                | 40                |
| Plus FR3                                  | 65  | 203               | 0.32                                | 31                |
| Plus FR4                                  | 60  | 265               | 0.23                                | 35                |
| Plus FR5                                  | 72  | 360               | 0.20                                | 57                |
| Plus FR6                                  | 64  | 336               | 0.19                                | 92                |
| Improvement % FR1                         | -23 | 73                | 190                                 | 67                |
| Improvement % FR2                         | -19 | 71                | 183                                 | 70                |
| Improvement % FR3                         | -22 | 77                | 247                                 | 77                |
| Improvement % FR4                         | -28 | 71                | 146                                 | 74                |
| Improvement % FR5                         | -13 | 60                | 117                                 | 57                |
| Improvement % FR6                         | -23 | 63                | 107                                 | 31                |

Notes: FR1, EBP + 6 phr antimony oxide; FR2, EBP + 4.5 phr antimony oxide + 1.5 phr zinc borate; FR3, EBP + 3 phr antimony oxide + 3 phr zinc borate; FR4, EBP + 1.5 phr antimony oxide + 4.5 phr zinc borate; FR5, EBP + 6 phr zinc borate; FR6, zinc borate only; EBP, ethane-1,2-bis pentabromophenyl; TTI, time to ignition in mass loss cone (ASTM E2102) test; Pk HRR, peak heat release rate in mass loss cone test with thermopile column; THR, total heat released during test in mass loss cone test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in mass loss cone test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XV. Effectiveness of flame retardant systems on heat and ignitability properties of polystyrene (HIPS) [31].

| Cone at 50 kW/m <sup>2</sup>    | TTI | Pk HRR            | FPI  | THR               | Ht Comb |
|---------------------------------|-----|-------------------|------|-------------------|---------|
|                                 | s   | kW/m <sup>2</sup> |      | MJ/m <sup>2</sup> | MJ/kg   |
| HIPS                            | 30  | 723               | 0.04 | 59.5              | 33.9    |
| HIPS + brominated FR            | 33  | 318               | 0.10 | 23.8              | 12.3    |
| HIPS + brominated FR            | 41  | 502               | 0.08 | 33.8              | 16.4    |
| HIPS + non-halogen FR           | 34  | 313               | 0.11 | 42.2              | 22.3    |
| Improvement % brominated FR (1) | 10  | 56                | 150  | 60                | 64      |
| Improvement % brominated FR (2) | 37  | 31                | 97   | 43                | 52      |
| Improvement % non-halogen FR    | 13  | 57                | 162  | 29                | 34      |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

was recently conducted in the cone calorimeter at an incident heat flux of 50 kW/m<sup>2</sup>, using intumescent flame retardants containing nitrogen and phosphorus (Table XVII) [41]. The next table (Table XVIII) shows the effect (based on mass loss cone data) of a variety of flame retardants on a polyamide 6 (nylon) [42]. One study on a plastic PET is shown in Table XIX [43]. The same work also addresses PET fabrics and that will be shown in the section on fibers. An engineering thermoplastic often used in wire and cable applications is thermoplastic polyurethane and a recent study will be shown here, although this could also have been added to a section on polyurethanes. The study used the cone calorimeter at an incident heat flux of 50 kW/m<sup>2</sup>, and the results are shown in Table XX [44].

The NIST work discussed earlier, on materials for electronic equipment [31], included comparisons for PC and PC/ABS blends, and the data is being analyzed in Table XXI. The flame retardants used are identified simply as brominated, phosphorus containing, and non-halogen. In the case of PC alone, the brominated flame retarded materials have very significant improvements in Pk HRR (57–68%), but the effects on other key parameters (TTI, effective heat of combustion, and total heat released) are negligible or even detrimental. The non-halogen system used has little effect. In the case of PC/

Table XVI. Effectiveness of flame retardant systems on heat and ignitability properties of foamed expanded polystyrene (EPS) [38].

|                                    | TTI  | Pk HRR            | FPI               |
|------------------------------------|------|-------------------|-------------------|
| Foamed EPS at 35 kW/m <sup>2</sup> | s    | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| EPS                                | 77.7 | 310.5             | 0.25              |
| EPS Plus Commercial FR             | 81   | 230.6             | 0.35              |
| Improvement % FR                   | 4    | 26                | 40                |
| Foamed EPS at 30 kW/m <sup>2</sup> | TTI  | Pk HRR            | FPI               |
|                                    | s    | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| EPS                                | 73   | 299               | 0.24              |
| EPS Plus Commercial FR             | 77   | 238               | 0.32              |
| Improvement % FR                   | 5    | 20                | 33                |
| Foamed EPS at 40 kW/m <sup>2</sup> | TTI  | Pk HRR            | FPI               |
|                                    | s    | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| EPS                                | 28   | 394               | 0.07              |
| EPS Plus Commercial FR             | 40   | 321               | 0.12              |
| Improvement % FR                   | 43   | 19                | 75                |
| Foamed EPS 50 kW/m <sup>2</sup>    | TTI  | Pk HRR            | FPI               |
|                                    | s    | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| EPS                                | 18   | 407               | 0.04              |
| EPS Plus Commercial FR             | 24   | 379               | 0.06              |
| Improvement % FR                   | 33   | 7                 | 43                |

Notes: Data at 35 kW/m<sup>2</sup> were determined by the authors [38], while data at 30, 40, and 50 kW/m<sup>2</sup> were obtained by comparison of published data from other authors [39, 40]. TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XVII. Effectiveness of intumescent flame retardants on heat and ignitability properties of a polycarbonate material [41].

| Polycarbonate                                                                                          | TTI | Pk HRR            | FPI                                 | THR               |
|--------------------------------------------------------------------------------------------------------|-----|-------------------|-------------------------------------|-------------------|
| Cone at 50 kW/m <sup>2</sup>                                                                           | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | MJ/m <sup>2</sup> |
| Untreated polycarbonate                                                                                | 58  | 357               | 0.16                                | 80                |
| Plus FR1                                                                                               | 52  | 219               | 0.24                                | 69                |
| Plus FR2                                                                                               | 54  | 192               | 0.28                                | 52                |
| FR1: intumescent FR with P and N BASPB: bis-aminobenzyl spirocyclic pentaerythritol bisphosphonate     |     |                   |                                     |                   |
| FR2: intumescent FR with P and N ABDPP: arylene-N,N0-bis(2,2-dimethyl-1,3-propanediol phosphoramidate) |     |                   |                                     |                   |
| Improvement % FR1                                                                                      | -10 | 39                | 46                                  | 14                |
| Improvement % FR2                                                                                      | -7  | 46                | 73                                  | 35                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

ABS, very significant improvements were found in all the key fire properties, including 85% improvement in FPI.

### 3.4. Poly(vinyl chloride)

Poly(vinyl chloride) can be used as a rigid material (for pipes, conduits, siding, and profiles) or as a flexible material (typically for wire and cable, wall coverings, or floor coverings). The most common need for improved fire performance is in the area of flexible PVC because rigid PVC already has good fire performance. Numerous tables in part 1 of this study [1] include several examples of the positive effects of flame retardants on heat release of both rigid and flexible PVC. Some newer examples (three for wire and cable compounds, one for wall coverings, and one for

Table XVIII. Mass loss cone study of the effectiveness of various flame retardants on heat release of a polyamide 6 [42].

| Nylon polyamide 6                      | Pk HRR            | Avg HRR           | THR               |
|----------------------------------------|-------------------|-------------------|-------------------|
| Mass loss cone at 35 kW/m <sup>2</sup> | kW/m <sup>2</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| PA6                                    | 975               | 375               | 163               |
| PA6 + OP2                              | 695               | 300               | 158               |
| PA6 + OP3                              | 480               | 235               | 136               |
| PA6 + OP4                              | 335               | 190               | 122               |
| PA6 + OP5                              | 755               | 345               | 160               |
| PA6 + OP6                              | 720               | 325               | 149               |
| PA6 + OP7                              | 575               | 315               | 143               |
| PA6 + OP8                              | 380               | 186               | 135               |
| PA6 + OP9                              | 535               | 288               | 141               |
| Improvement % OP2                      | 29                | 20                | 3                 |
| Improvement % OP3                      | 51                | 37                | 17                |
| Improvement % OP4                      | 66                | 49                | 25                |
| Improvement % OP5                      | 23                | 8                 | 2                 |
| Improvement % OP6                      | 26                | 13                | 9                 |
| Improvement % OP7                      | 41                | 16                | 12                |
| Improvement % OP8                      | 61                | 50                | 17                |
| Improvement % OP9                      | 45                | 23                | 13                |

Notes: OP2, 15% organic phosphinate; OP3, 14% OP 1% Zn borate; OP3, 12% OP 3% Zn borate; OP5, 14% OP 1% borophosphate; OP6, 12% OP 3% borophosphate; OP7, 14% OP 1% organo clay; OP8, 13% OP 1% zinc borate 1% organo clay; OP9, 13% OP 1% borophosphate 1% organo clay; Pk HRR, peak heat release rate in mass loss cone test with thermopile column (ASTM E2102); THR, total heat released during test in mass loss cone test; Avg HRR, average heat release rate during mass loss cone test; improvement %, percentage improvement in relevant property based on the untreated material.

Table XIX. Effectiveness of expanded graphite flame retardants on heat and ignitability properties of a PET material [41].

|                                          | TTI | Pk HRR            | FPI                                 |
|------------------------------------------|-----|-------------------|-------------------------------------|
| PET plastic cone at 35 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) |
| Untreated PET plastic                    | 209 | 523               | 0.40                                |
| Plus exp. graphite (EG)                  | 189 | 303               | 0.62                                |
| Plus Nano1                               | 187 | 349               | 0.54                                |
| Plus Nano 2                              | 174 | 440               | 0.40                                |
| Plus Nano 3                              | 220 | 438               | 0.50                                |
| Plus EG + Nano1                          | 179 | 231               | 0.77                                |
| Plus EG + Nano2                          | 210 | 304               | 0.69                                |
| Plus EG + Nano 3                         | 222 | 347               | 0.64                                |
| Improvement % EG                         | -10 | 42                | 56                                  |
| Improvement % Nano1                      | -11 | 33                | 34                                  |
| Improvement % Nano2                      | -17 | 16                | -1                                  |
| Improvement % Nano3                      | 5   | 16                | 26                                  |
| Improvement % EG Nano1                   | -14 | 56                | 94                                  |
| Improvement % EG Nano2                   | 0   | 42                | 73                                  |
| Improvement % EG Nano3                   | 6   | 34                | 60                                  |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

conduits and window profiles) are also shown. In the case of rigid PVC, the effects of flame retardants on heat release tend to be low because the primary reason these materials are being added is smoke release or other issues.

Table XXII shows heat release testing results for rigid PVC materials at incident heat fluxes of 30 and 50 kW/m<sup>2</sup> [45] in the Ohio State University calorimeter (OSU, ASTM E906 [46]). Tables XXIII

Table XX. Effectiveness of nanocomposites as flame retardants on heat and ignitability properties of a thermoplastic polyurethane (TPU) [44].

| TPU                                          | TTI | Pk HRR            | FPI                                 | Avg HRR 3 min     | Ht Comb |
|----------------------------------------------|-----|-------------------|-------------------------------------|-------------------|---------|
| Cone at 50 kW/m <sup>2</sup>                 | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) | kW/m <sup>2</sup> | MJ/kg   |
| Untreated TPU                                | 28  | 1031              | 0.03                                | 515               | 27      |
| TPU + 5% Cloisite 30B                        | 27  | 518               | 0.05                                | 376               | 28      |
| TPU + 5% Multiwalled carbon nanotubes (MWNT) | 21  | 571               | 0.04                                | 492               | 28      |
| TPU + 5% Carbon nanofibers                   | 21  | 808               | 0.03                                | 361               | 27      |
| Improvement %, Cloisite 30B                  | -4  | 50                | 92                                  | 27                | -4      |
| Improvement %, carbon nanotubes              | -25 | 45                | 35                                  | 4                 | -4      |
| Improvement %, carbon nanofibers             | -25 | 22                | -4                                  | 30                | 0       |

Notes: Cloisite 30B, montmorillonite (MMT) surface treated with methyl, tallow, bis-2-hydroxyethyl, quaternary ammonium; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR 3 min, average heat release rate during 3 min following ignition in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XXI. Effectiveness of flame retardant systems on heat and ignitability properties of polycarbonate and polycarbonate/ABS blends [31].

|                                 | TTI | Pk HRR            | FPI  | THR               | Ht Comb |
|---------------------------------|-----|-------------------|------|-------------------|---------|
| Cone at 50 kW/m <sup>2</sup>    | s   | kW/m <sup>2</sup> |      | MJ/m <sup>2</sup> | MJ/kg   |
| PC                              | 77  | 885               | 0.09 | 37.5              | 24.0    |
| PC + brominated FR              | 51  | 378               | 0.13 | 25.2              | 22.3    |
| PC + brominated FR              | 41  | 280               | 0.15 | 45.9              | 21.2    |
| PC + non-halogen FR             | 46  | 829               | 0.06 | 38.8              | 23.6    |
| Improvement % brominated FR (1) | -34 | 57                | 55   | 33                | 7       |
| Improvement % brominated FR (2) | -47 | 68                | 68   | -22               | 12      |
| Improvement % non-halogen FR    | -40 | 6                 | -36  | -3                | 2       |
| Cone at 50 kW/m <sup>2</sup>    | TTI | Pk HRR            | FPI  | THR               | Ht Comb |
|                                 | s   | kW/m <sup>2</sup> |      | MJ/m <sup>2</sup> | MJ/kg   |
| PC/ABS                          | 34  | 543               | 0.06 | 44.4              | 29.7    |
| PC/ABS + Phosphorus FR          | 45  | 388               | 0.12 | 35                | 20.6    |
| Improvement % Phosphorus FR     | 32  | 29                | 85   | 21                | 31      |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

and XXIV show results of wire and cable compounds tested in the cone calorimeter [47, 48]. Significant improvements in heat release are evident. Work conducted in the cone calorimeter to look at the effects of various additives, with particular emphasis on a phosphate plasticizer as a flame retardant additive which also replaces traditional phthalate plasticizers, in wall coverings and in plenum cables is shown in Tables XXV and XXVI [49].

### 3.5. Polyurethane foams

Polyurethane foams have been discussed extensively earlier, including in the NBS/NIST work. However, it is worth noting that the improvement keeps being found, even in recent work, both on flexible foams (Table XXVII) [50] and on rigid foams (Tables XXVIII [50] and XXIX [16]). Moreover, a recent analysis has looked at flexible polyurethane foam used in upholstered furniture [51] and found the significant positive contributions to heat release made by flame retardants, provided they are added at a sufficiently high level to be effective (i.e., beyond just the level needed to comply with the discredited automotive test FMVSS 302 [52]).



Table XXII. Effectiveness of molybdenum smoke suppressants as flame retardants on heat release of rigid PVC materials [45].

| OSU calorimeter              | Pk HRR at 30      | Pk HRR at 50      |
|------------------------------|-------------------|-------------------|
|                              | kW/m <sup>2</sup> | kW/m <sup>2</sup> |
| PVC for conduits             | 60                | 76                |
| PVC + AOM 0.5 phr            | 64                | 60                |
| PVC + AOM 1 phr              | 62                | 63                |
| PVC + AOM 2.5 phr            | 50                | 53                |
| PVC + AOM 5 phr              | 47                | 54                |
| Improvement % AOM 0.5 phr    | −7                | 21                |
| Improvement % AOM 1 phr      | −3                | 17                |
| Improvement % AOM 2.5 phr    | 17                | 30                |
| Improvement % AOM 5 phr      | 22                | 29                |
| PVC for window profile       | 70                |                   |
| PVC + AOM 1.3 phr            | 58                |                   |
| PVC + AOM 2.5 phr            | 60                |                   |
| PVC + AOM 5 phr              | 57                |                   |
| PVC + Mo tri 1.3 phr         | 58                |                   |
| PVC + Mo tri 2.5 phr         | 57                |                   |
| Improvement % AOM 1.3 phr    | 17                |                   |
| Improvement % AOM 2.5 phr    | 14                |                   |
| Improvement % AOM 5 phr      | 19                |                   |
| Improvement % Mo Tri 1.3 phr | 17                |                   |
| Improvement % Mo Tri 2.5 phr | 19                |                   |

Notes: AOM, ammonium molybdate; Mo Tri, molybdenum trioxide; Pk HRR, peak heat release rate from Ohio State University (ASTM E906) heat release test at relevant heat flux; improvement %, percentage improvement in relevant property based on the untreated material.

Table XXIII. Effectiveness of flame retardants on heat and ignitability properties of PVC with phosphorus-containing plasticizers [47].

| Cone at 50 kW/m <sup>2</sup> | TTI | Pk HRR            | FPI                                 |
|------------------------------|-----|-------------------|-------------------------------------|
| With P plasticizers          | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>−1</sup> ) |
| PVC for cables               | 29  | 190               | 0.15                                |
| PVC + system 1               | 23  | 115               | 0.20                                |
| PVC + system 2               | 28  | 123               | 0.23                                |
| PVC + system 3               | 25  | 141               | 0.18                                |
| PVC + system 4               | 30  | 118               | 0.25                                |
| PVC + system 5               | 25  | 121               | 0.21                                |
| PVC + system 6               | 26  | 121               | 0.21                                |
| Improvement % 1              | −21 | 39                | 31                                  |
| Improvement % 2              | −3  | 35                | 49                                  |
| Improvement % 3              | −14 | 26                | 16                                  |
| Improvement % 4              | 3   | 38                | 67                                  |
| Improvement % 5              | −14 | 36                | 35                                  |
| Improvement % 6              | −10 | 36                | 41                                  |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

### 3.6. Epoxy resins

Epoxy resins are used extensively in two primary applications: printed wiring or circuit boards and adhesives. Table XXX presents some recent data [53]. The improvement in Pk HRR from the addition of the flame retardants (in that particular system) exceeds 80%.

Table XXIV. Effectiveness of tin-based flame retardants on heat and ignitability properties of PVC with phosphorus-containing plasticizers [48].

| PVC for cables with P plasticizers | TTI | Pk HRR            | FPI                                 |
|------------------------------------|-----|-------------------|-------------------------------------|
| Cone at 50 kW/m <sup>2</sup>       | s   | kW/m <sup>2</sup> | (m <sup>2</sup> skW <sup>-1</sup> ) |
| PVC control                        | 22  | 260               | 0.08                                |
| PVC + ATH                          | 45  | 163               | 0.28                                |
| PVC + ATH + LDH                    | 52  | 72                | 0.72                                |
| PVC + ATH + Sn LDH1                | 46  | 74                | 0.62                                |
| PVC + ATH + Sn LDH2                | 48  | 73                | 0.66                                |
| PVC + ATH + Sn LDH3                | 56  | 59                | 0.95                                |
| Improvement % ATH                  | 105 | 37                | 226                                 |
| Improvement % ATH + LDH            | 136 | 72                | 754                                 |
| Improvement % ATH Sn LDH1          | 109 | 72                | 635                                 |
| Improvement % ATH Sn LDH2          | 118 | 72                | 677                                 |
| Improvement % ATH Sn LDH3          | 155 | 77                | 1022                                |

Notes: Plasticizer, 8-Methylnonyl diphenyl phosphate; LDH, layered double hydroxide with Mg + Al nitrates; LDH Sn, LDH + Sn, various ratios; ATH, alumina trihydrate; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XXV. Effectiveness of flame retardants on heat release of PVC wall coverings using phosphorus-containing plasticizers [49].

| Cone at 50 kW/m <sup>2</sup>   | Pk HRR            | Improvement | Avg HRR           | Ht Comb |
|--------------------------------|-------------------|-------------|-------------------|---------|
| PVC wall coverings             | kW/m <sup>2</sup> | %           | kW/m <sup>2</sup> | MJ/kg   |
| PVC + 40 DOP + 20 Ca (control) | 228               | 0           | 146               | 16.9    |
| Additive system 1              | 167               | 27          | 116               | 14.0    |
| Additive system 2              | 191               | 16          | 127               | 11.2    |
| Additive system 3              | 203               | 11          | 132               | 13.0    |
| Additive system 4              | 135               | 41          | 104               | 10.8    |
| Additive system 5              | 90                | 61          | 83                | 11.9    |
| Additive system 6              | 91                | 60          | 89                | 11.3    |
| Additive system 7              | 102               | 55          | 84                | 9.8     |
| Additive system 8              | 94                | 59          | 79                | 10.7    |
| Additive system 9              | 102               | 55          | 83                | 11.7    |
| Additive system 10             | 99                | 57          | 81                | 9.9     |
| Additive system 11             | 99                | 57          | 82                | 10.1    |
| Additive system 12             | 107               | 53          | 85                | 9.3     |
| Additive system 13             | 109               | 52          | 90                | 9.6     |
| Additive system 14             | 95                | 58          | 77                | 8.5     |
| Additive system 15             | 91                | 60          | 73                | 8.3     |
| Additive system 16             | 81                | 64          | 69                | 8.8     |
| Additive system 17             | 159               | 30          | 102               | 10.5    |
| Additive system 18             | 165               | 28          | 101               | 13.0    |
| Additive system 19             | 105               | 54          | 80                | 10.6    |
| Additive system 20             | 83                | 64          | 63                | 11.0    |
| Additive system 21             | 98                | 57          | 67                | 10.4    |

Notes: DOP, dioctyl phthalate plasticizer; Ca, calcium carbonate; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in Pk HRR based on the untreated material.

Table XXVI. Effectiveness of flame retardants on heat release of PVC plenum cable compounds using phosphorus-containing plasticizers [49].

| Cone at 40 kW/m <sup>2</sup> | Pk HRR            | Improvement | Avg HRR           | Ht Comb |
|------------------------------|-------------------|-------------|-------------------|---------|
| PVC cables (for plenum)      | kW/m <sup>2</sup> | %           | kW/m <sup>2</sup> | MJ/kg   |
| PVC Non FR + DOP (control)   | 283               | 0           | 170               | 15.7    |
| Additive system 1            | 161               | 43          | 47                | 12.9    |
| Additive system 2            | 132               | 53          | 76                | 11.5    |
| Additive system 3            | 134               | 53          | 64                | 12.0    |
| Additive system 4            | 158               | 44          | 83                | 10.7    |
| Additive system 5            | 128               | 55          | 80                | 10.8    |
| Additive system 6            | 127               | 55          | 94                | 11.4    |
| Additive system 7            | 117               | 59          | 76                | 11.4    |

Notes: Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; Ht Comb, effective heat of combustion in cone calorimeter test; improvement %, percentage improvement in Pk HRR based on the untreated material.

Table XXVII. Effectiveness of flame retardants on heat release of a flexible polyurethane foam [50].

| Cone at 25 kW/m <sup>2</sup> | TTI  | Pk HRR               | Improvement | FPI                              | Avg HRR           | THR                |
|------------------------------|------|----------------------|-------------|----------------------------------|-------------------|--------------------|
| Flexible PU foam             | s    | (kW/m <sup>2</sup> ) | %           | m <sup>2</sup> skW <sup>-1</sup> | kW/m <sup>2</sup> | MJ/ m <sup>2</sup> |
| Control                      | 15.6 | 412                  | 0           | 0.04                             | 225               | 57.4               |
| Additive system 1            | 13.7 | 249                  | 40          | 0.06                             | 126               | 54.2               |
| With Zn stearate             | 372  | 340                  | 17          | 1.09                             | 174               | 64.4               |
| With Mg stearate             | 39.1 | 444                  | 8           | 0.09                             | 194               | 70.8               |
| With ATH                     | 16.0 | 401                  | 3           | 0.04                             | 218               | 60.1               |
| With Fyrol RDP               | 22.6 | 429                  | 4           | 0.05                             | 210               | 56.7               |
| With Fyrol FR2               | 18.4 | 326                  | 21          | 0.06                             | 163               | 48.2               |
| With Cl P ester              | 28.4 | 315                  | 24          | 0.09                             | 144               | 19.9               |
| With alkyl aryl phosphate    | 26.1 | 274                  | 33          | 0.10                             | 154               | 49.2               |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released during test in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in Pk HRR based on the untreated material.

Table XXVIII. Effectiveness of flame retardants on heat release of a rigid polyurethane foam [50].

| Cone at 25 kW/m <sup>2</sup>     | TTI | Pk HRR            | Improvement | FPI                              |
|----------------------------------|-----|-------------------|-------------|----------------------------------|
| Rigid PU foam                    | s   | kW/m <sup>2</sup> | %           | m <sup>2</sup> skW <sup>-1</sup> |
| Control                          | 26  | 890               | 0           | 0.03                             |
| With alkyl aryl phosphate        | 41  | 548               | 38          | 0.07                             |
| With Fyrol RDP                   | 65  | 910               | 2           | 0.07                             |
| With Fyrol RDP + Zn stearate     | 33  | 720               | 19          | 0.05                             |
| With Zn stannate and Zn stearate | 9   | 485               | 46          | 0.02                             |
| With Zinc stannate               | 31  | 424               | 52          | 0.07                             |
| With Zn hydroxystannate          | 36  | 471               | 47          | 0.08                             |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in Pk HRR based on the untreated material.

Table XXIX. Effectiveness of flame retardants on heat release of a polyisocyanurate foam [16].

| Cone at 40 kW/m <sup>2</sup> | TTI | Pk HRR            | FPI                              | Avg HRR           | THR               |
|------------------------------|-----|-------------------|----------------------------------|-------------------|-------------------|
|                              | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| Polyisocyanurate foam        |     |                   |                                  |                   |                   |
| Untreated                    | 4.3 | 161               | 0.03                             | 69                | 11                |
| Plus TCPP                    | 4.6 | 87                | 0.05                             | 19                | 5                 |
| Improvement %                | 7   | 46                | 98                               | 72                | 55                |

*Notes:* TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released during test in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material; TCPP, tris (1-chloro-2-propyl) phosphate.

Table XXX. Effectiveness of flame retardants on heat release of an epoxy resin [53].

|                              | TTI | Pk HRR            | FPI                              | THR               | Avg HRR           | Eff. Ht Combust |
|------------------------------|-----|-------------------|----------------------------------|-------------------|-------------------|-----------------|
| Cone at 50 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/m <sup>2</sup> | kW/m <sup>2</sup> | MJ/kg           |
| Epoxy                        | 62  | 1192              | 0.05                             | 184               | 350               | 26.8            |
| Epoxy + APP                  | 41  | 200               | 0.21                             | 104               | 107               | 23.8            |
| Epoxy + Mod APP              | 47  | 184               | 0.26                             | 98                | 77                | 20.5            |
| Improvement % APP            | −34 | 83                | 294                              | 43                | 69                | 11              |
| Improvement % ModAPP         | −24 | 85                | 391                              | 47                | 78                | 24              |

*Notes:* APP, ammonium polyphosphate; ModAPP, APP modified with silane; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Eff. Ht Combust, effective heat of combustion during cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XXXI. Effectiveness of expanded graphite flame retardants on heat and ignitability properties of a PET fiber material [43].

| PET fibers                   | TTI | Pk HRR            | FPI                              |
|------------------------------|-----|-------------------|----------------------------------|
| Cone at 35 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> |
| Untreated PET fibers         | 128 | 510               | 0.25                             |
| Plus exp. graphite (EG)      | 102 | 92                | 1.11                             |
| Plus Nano1                   | 128 | 213               | 0.60                             |
| Plus EG + Nano1              | 106 | 272               | 0.39                             |
| Improvement % EG             | −20 | 82                | 342                              |
| Improvement % Nano1          | 0   | 58                | 139                              |
| Improvement % EG Nano1       | −17 | 47                | 55                               |

*Notes:* TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

### 3.7. Textiles

Four examples are being presented associated with textiles: one work on PET polyester fibers (Table XXXI) [43], three types of work on cotton fibers (Tables XXXII–XXXIV [54–56]), and one study on a glass-reinforced polyester composite, with and without a barrier (Table XXXV) [57]. In all cases, the cone calorimeter was used for the studies and showed significant improvements in Pk

Table XXXII. Effectiveness of a flame retardant additive on heat release of cotton fabric and fiber [54].

| Cotton                       | Cotton fabric     |                   | Cotton fiber      |                   |
|------------------------------|-------------------|-------------------|-------------------|-------------------|
|                              | Pk HRR            | THR               | Pk HRR            | THR               |
| Cone at 50 kW/m <sup>2</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> | kW/m <sup>2</sup> | MJ/m <sup>2</sup> |
| Untreated cotton             | 220               | 2.7               | 145               | 2.4               |
| Cotton + FR 50 g/L           | 180               | 2.5               | 115               | 2.2               |
| Cotton + FR 100 g/L          | 170               | 2.3               | 105               | 1.7               |
| Cotton + FR 150 g/L          | 160               | 2.0               | 100               | 1.6               |
| Cotton + FR 200 g/L          | 155               | 2.0               | 90                | 1.4               |
| Cotton + FR 250 g/L          | 150               | 2.0               | 75                | 1.3               |
| Cotton + FR 300 g/L          | 135               | 1.9               | 70                | 1.3               |
| Improvement % 50             | 18                | 7                 | 21                | 8                 |
| Improvement % 100            | 23                | 15                | 28                | 29                |
| Improvement % 150            | 27                | 26                | 31                | 33                |
| Improvement % 200            | 30                | 26                | 38                | 42                |
| Improvement % 250            | 32                | 26                | 48                | 46                |
| Improvement % 300            | 39                | 30                | 52                | 46                |

Notes: Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; improvement %, percentage improvement in relevant property based on the untreated material.

Table XXXIII. Effectiveness of flame retardants on heat and ignitability properties of cotton in normal and enriched atmospheres [55].

| Cotton fabric                | TTI | Pk HRR            | FPI                              | Eff. Ht Combust | Avg HRR           |
|------------------------------|-----|-------------------|----------------------------------|-----------------|-------------------|
| Cone at 25 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/kg           | kW/m <sup>2</sup> |
| Atmosphere: air              |     |                   |                                  |                 |                   |
| Untreated cotton             | 22  | 340               | 0.06                             | 12              | 200               |
| Cotton + N FR                | 34  | 120               | 0.28                             | 7               | 60                |
| Improvement % N FR           | 55  | 65                | 338                              | 42              | 70                |
| Atmosphere: 30% oxygen       |     |                   |                                  |                 |                   |
| Untreated cotton             | 21  | 360               | 0.06                             | 13.0            | 230               |
| Cotton + N FR                | 34  | 170               | 0.20                             | 7.0             | 70                |
| Cotton + M FR                | 39  | 110               | 0.35                             | 3.5             | 30                |
| Improvement % N FR           | 62  | 53                | 243                              | 46              | 70                |
| Improvement % M FR           | 86  | 69                | 508                              | 73              | 87                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR, average heat release rate during test in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Eff. Ht Combust, effective heat of combustion during cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

HRR. The PET fabric study (Table XXXI) involved additives (based primarily on expanded graphite and nanocomposites) that were similar to those used in the PET plastic study presented earlier [44]; the Pk HRR improvements exceeded 45% in all cases studied. The same team that did the PET studies also investigated cotton fabrics (Table XXXII); in this case, the additives were able to decrease Pk HRRs by 18–39% (unfortunately, the flame retardant additives are identified only by a trade name). Two other teams did cotton heat release additive studies on cotton fabrics relatively recently. In one case, the Pk HRR decreased significantly when burnt both in air (65%) and in a 30% oxygen atmosphere (53 and 69%); the additives were described by commercial trade names only (Table XXXIII [55]). The other cotton study (from the US Forest Products Lab) looked at the effect of adding diammonium phosphate (SRRC2) or a mixture of diammonium phosphate and dimethyloldihydroxyethyleneurea (SRRC1) to cotton fabrics; they found improvements of 43–65% depending on the heat flux (Table XXXIV).

Table XXXIV. Effectiveness of flame retardants on heat and ignitability properties of cotton [56].

|                        | TTI | Pk HRR            | FPI                              | Eff. Ht Combust |
|------------------------|-----|-------------------|----------------------------------|-----------------|
|                        | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> | MJ/kg           |
| Cone testing of cotton |     |                   |                                  |                 |
| 20 kW/m <sup>2</sup>   |     |                   |                                  |                 |
| Untreated              | 14  | 137               | 0.10                             | 15.9            |
| Cotton + SRRC 1        | 23  | 57                | 0.40                             | 10.4            |
| Cotton + SRRC 2        | 28  | 48                | 0.58                             | 8.2             |
| Improvement % SRRC1    | 64  | 58                | 295                              | 35              |
| Improvement % SRRC2    | 100 | 65                | 471                              | 48              |
| 30 kW/m <sup>2</sup>   |     |                   |                                  |                 |
| Untreated              | 9   | 152               | 0.06                             | 16.5            |
| Cotton + SRRC 1        | 10  | 86                | 0.12                             | 13.2            |
| Cotton + SRRC 2        | 12  | 86                | 0.14                             | 10.9            |
| Improvement % SRRC1    | 11  | 43                | 96                               | 20              |
| Improvement % SRRC2    | 33  | 43                | 136                              | 34              |
| 50 kW/m <sup>2</sup>   |     |                   |                                  |                 |
| Untreated              | 5   | 196               | 0.03                             | 17.7            |
| Cotton + SRRC 1        | 8   | 102               | 0.08                             | 13.5            |
| Cotton + SRRC 2        | 12  | 83                | 0.14                             | 11.6            |
| Improvement % SRRC1    | 60  | 48                | 207                              | 24              |
| Improvement % SRRC2    | 140 | 58                | 467                              | 34              |

Notes: SRRC 1 Mix, with N and P; SRRC 2 Mix, with P; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Eff. Ht Combust, effective heat of combustion during cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

Table XXXV. Effectiveness of flame retardants on heat and ignitability properties of GRP composites [57].

| GRP composites               | TTI | Pk HRR            | Eff. Ht Comb | THR               |
|------------------------------|-----|-------------------|--------------|-------------------|
| Cone at 50 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | MJ/kg        | MJ/m <sup>2</sup> |
| Polyester + glass            |     |                   |              |                   |
| GRP                          | 29  | 343               | 25.0         | 52                |
| GRP + MP                     | 28  | 262               | 19.0         | 36                |
| GRP + APP                    | 23  | 268               | 23.0         | 37                |
| GRP + MPP                    | 24  | 303               | 22.0         | 41                |
| GRP + ATH                    | 30  | 243               | 23.0         | 45                |
| GRP + FR                     | 29  | 176               | 12.0         | 28                |
| Improvement % MP             | -3  | 24                | 24           | 31                |
| Improvement % APP            | -21 | 22                | 8            | 29                |
| Improvement % MPP            | -17 | 12                | 12           | 21                |
| Improvement % ATH            | 3   | 29                | 8            | 13                |
| Improvement % FR             | 0   | 49                | 52           | 46                |
| GRP composites/barrier       |     |                   |              |                   |
| Polyester + glass            |     |                   |              |                   |
| GRP                          | 229 | 220               | 20.0         | 45                |
| GRP + MP                     | 200 | 196               | 20.0         | 38                |
| GRP + APP                    | 230 | 175               | 21.0         | 49                |
| GRP + MPP                    | 213 | 210               | 19.0         | 46                |
| GRP + ATH                    | 251 | 196               | 19.0         | 42                |
| GRP + FR                     | 204 | 148               | 17.0         | 37                |
| Improvement % MP             | 590 | 43                | 20           | 27                |
| Improvement % APP            | 693 | 49                | 16           | 6                 |
| Improvement % MPP            | 634 | 39                | 24           | 12                |
| Improvement % ATH            | 766 | 43                | 24           | 19                |
| Improvement % FR             | 603 | 57                | 32           | 29                |

Notes: MP, melamine phosphate; APP, ammonium polyphosphate; MPP, melamine pyrophosphate; FR, halogenated phosphate ester; ATH, alumina trihydrate; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; THR, total heat released during test in cone calorimeter test; Eff. Ht Combust, effective heat of combustion during cone calorimeter test; improvement %, percentage improvement in relevant property based on the untreated material.



The data from study on GRP and barriers can be found in Table XXXV [57]. The composite was studied as is or with a thin silicate insulative fabric. The flame retardant additives used were melamine phosphate (MP), melamine pyrophosphate (MPP), ammonium polyphosphate (APP), a halogenated phosphate ester (FR), and ATH. The improvements in Pk HRR were particularly impressive with the insulative fabric, but even without it, improvement of 49% was found, for example, with the halogenated phosphate ester.

### 3.8. Wood

The last series of examples being presented involve various wood products. Note that it has already been discussed, in the first paper of this project [1], earlier that fire-retardant treated wood, a product that is regulated via a flame spread test and not a heat release test, exhibits reduced heat release in comparison with wood that is untreated. In all cases, flame retardants improve heat release. Two of the studies involved cone calorimeter testing (Tables XXXVI and XXXVII [58, 59] and one involves mass loss cone testing Table XXXVIII [60]). In one case, the information presented includes also the Euroclass achieved by the different wood specimens, showing that lower heat release also has regulatory implications, in the European Union in this case, but this effect is also valid in US codes (with different classifications).

Table XXXVI. Effectiveness of flame retardants on heat release of some particleboards [58].

| Wood Materials                          | TTI  | Pk HRR            | Avg HRR 3 min     |
|-----------------------------------------|------|-------------------|-------------------|
| Cone at 50 kW/m <sup>2</sup>            | s    | kW/m <sup>2</sup> | kW/m <sup>2</sup> |
| Untreated low density particleboards    |      |                   |                   |
| 1                                       | 45   | 225               | 176               |
| 2                                       | 39   | 212               | 161               |
| 3                                       | 32   | 227               | 158               |
| 4                                       | 36   | 202               | 156               |
| 5                                       | 34   | 227               | 160               |
| 6                                       | 41   | 256               | 185               |
| 7                                       | 47   | 213               | 160               |
| 8                                       | 25   | 238               | 140               |
| 9                                       | 33   | 261               | 169               |
| Average of above                        | 37   | 229               | 163               |
| FRT low density particleboards          |      |                   |                   |
| 1                                       | 55   | 118               | 66                |
| 2                                       | 54   | 151               | 92                |
| 3                                       | 47   | 183               | 107               |
| Average of above                        | 52   | 151               | 88                |
| Improvement % due to FR                 | 41   | 34                | 46                |
| Untreated medium density particleboards |      |                   |                   |
| 1                                       | 35   | 248               | 160               |
| 2                                       | 38   | 264               | 168               |
| 3                                       | 31   | 254               | 157               |
| 4                                       | 32   | 290               | 168               |
| Average of above                        | 34   | 264               | 163               |
| FRT medium density particleboards       |      |                   |                   |
| 1                                       | 641  | 117               | 84                |
| 2                                       | 942  | 68                | 94                |
| 3                                       | 29   | 175               | 102               |
| 4                                       | 38   | 166               | 109               |
| 5                                       | 828  | 81                | 93                |
| Average of above                        | 496  | 121               | 96                |
| Improvement % due to FR                 | 1358 | 54                | 41                |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; Avg HRR 3 min, average heat release rate during 3 min following ignition in cone calorimeter test; improvement % due to FR, percentage improvement in relevant property based on the untreated material; average of above, average values of the individual cone calorimeter tests above this row.

Table XXXVII. Effectiveness of flame retardants on heat release of two different species of wood [59].

|                               | TTI | Pk HRR            | FPI                               | Euroclass |
|-------------------------------|-----|-------------------|-----------------------------------|-----------|
| Cone at 50 kW/m <sup>2</sup>  | s   | kW/m <sup>2</sup> | m <sup>2</sup> s kW <sup>-1</sup> |           |
| Wood (larch)                  |     |                   |                                   |           |
| Untreated                     | 17  | 171               | 0.10                              | C         |
| Plus FRT treatment 1          | 38  | 136               | 0.28                              | C         |
| Plus FRT treatment 2          | 26  | 76                | 0.34                              | B         |
| Improvement % FRT treatment 1 | 124 | 20                | 181                               |           |
| Improvement % FRT treatment 2 | 53  | 56                | 244                               |           |
| Wood (thermowood pine)        |     |                   |                                   |           |
| Untreated                     | 14  | 165               | 0.08                              | C         |
| Plus FR treatment 3           | 108 | 56                | 1.93                              | B         |
| Plus FR treatment 4           | 31  | 84                | 0.37                              | B         |
| Plus FR treatment 5           | 125 | 51                | 2.45                              | B         |
| Improvement % FRT treatment 3 | 535 | 67                | 1840                              |           |
| Improvement % FRT treatment 4 | 82  | 51                | 271                               |           |
| Improvement % FRT treatment 5 | 635 | 70                | 2365                              |           |

Notes: TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); Euroclass, classification in the European Union classification system for construction materials; improvement %, percentage improvement in relevant property based on the untreated material.

Table XXXVIII. Mass loss cone study of the effectiveness of various flame retardant systems on heat and ignitability properties of pine wood [60].

| Wood (pine)                            | TTI | Pk HRR            | FPI                              |
|----------------------------------------|-----|-------------------|----------------------------------|
| Mass loss cone at 35 kW/m <sup>2</sup> | s   | kW/m <sup>2</sup> | m <sup>2</sup> skW <sup>-1</sup> |
| Untreated                              | 98  | 182               | 0.54                             |
| Plus FR1                               | 115 | 139               | 0.83                             |
| Plus FR2                               | 101 | 121               | 0.83                             |
| Plus FR3                               | 127 | 144               | 0.88                             |
| Plus FR4                               | 81  | 103               | 0.79                             |
| Plus FR5                               | 120 | 107               | 1.12                             |
| Plus FR6                               | 70  | 107               | 0.65                             |
| Plus FR7                               | 68  | 137               | 0.50                             |
| Plus FR8                               | 55  | 97                | 0.57                             |
| Plus FR9                               | 72  | 78                | 0.92                             |
| Improvement % FR1                      | 17  | 24                | 54                               |
| Improvement % FR2                      | 3   | 34                | 55                               |
| Improvement % FR3                      | 30  | 21                | 64                               |
| Improvement % FR4                      | -17 | 43                | 46                               |
| Improvement % FR5                      | 22  | 41                | 108                              |
| Improvement % FR6                      | -29 | 41                | 21                               |
| Improvement % FR7                      | -31 | 25                | -8                               |
| Improvement % FR8                      | -44 | 47                | 5                                |
| Improvement % FR9                      | -27 | 57                | 71                               |

Notes: FR1, Cu based wood preservative Cu: 0.11% w/w; FR2, tribromoneopentyl alcohol 1.1–0.81% Br; FR3, phosphoric acid 3-(diphenoxy-phosphoryloxy)-phenyl ester diphenyl ester 5.5–0.58% P; FR4, chlorinated paraffin with 65% Cl content 22.7–14.8% Cl; FR5, tetrabromobisphenol A bis (2,3-dibromopropyl ether) 1.9–0.65% aliphatic Br and 0.65% aromatic Br; FR6, Cu preservative + FR2; FR7, Cu preservative + FR3; FR8, Cu preservative + FR4; FR9, Cu preservative + FR5; TTI, time to ignition in cone calorimeter test; Pk HRR, peak heat release rate in cone calorimeter test; FPI, fire performance index (ratio of time to ignition and peak heat release rate, in cone calorimeter test); improvement %, percentage improvement in relevant property based on the untreated material.

#### 4. DISCUSSION AND CONCLUSIONS

It is worth mentioning that a few other publications have investigated different aspects of the effects of flame retardants on fire safety. In one study [61], it was found that the addition of flame retardants improves fire safety in a variety of ways but with particular emphasis on the fact that it increases time available for escape and rescue. In a 1999 study [62], the seminal NBS/NIST work [14] was analyzed. The author concluded that the addition of flame retardants did not just have a positive effect on the overall time available for escape (a key fire hazard issue) but that it also positively affected the smoke toxicity of the fire atmospheres. The author stated ‘there is no evidence that [the flame retardants] adversely affect any aspect of fire hazard. Because they reduce ignitability they reduce flame spread, because they reduce flame spread they reduce the fire’s burning rate; because they reduce the burning rate they reduce the quantity of smoke the fire produces.’ Another study that investigated the safety, health, and environmental aspects of flame retardants [63] concluded that ‘this survey shows that the appropriate use of flame retardants, as a class, effectively provides improved fire safety via lowering the probability of ignition, the heat released and the amounts of smoke, combustion products and dangerous environmental toxicants. In consequence the use of flame retardants increases the available time for escape from a fire.’ Much of the work in that specific study was based on earlier work that had received insufficient analysis.

The first part of this work, which included an in-depth analysis of the seminal NBS/NIST work [14] as well as a consideration of the importance of heat release rate in fire hazard and the usefulness of cone calorimeter data to predict real scale heat release information, was based on the best fire safety science. The initial work concluded that the NBS/NIST work of 1988 demonstrated that flame retardants (as used in five products) decreased heat release and significantly increased time available for escape and rescue from a fire and fire safety. It also showed that cone calorimeter (and OSU calorimeter) data on small-scale samples can be used to measure heat release rate and to predict the results of fires in full scale with many materials and products.

The studies reviewed in the present portion of the work were those conducted primarily in the initial 21st century years. The choice of studies was based on the availability of the data, and some of the studies are of uneven quality. However, the breadth of the work covered and the similarity of the interpretation that can be obtained from the studies indicate that the conclusions that can be drawn are fully appropriate.

In summary, this work demonstrates that flame retardants, when added as appropriately researched with the correct systems and in the proper amounts, will decrease the heat release rate for virtually all polymeric materials. Thus, the correct use of flame retardants will decrease heat release rate and lower fire hazard and, thus, have a very positive effect on fire safety.

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| Comment Code | Commenter       | Email                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted       |
|--------------|-----------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| I- 1 -1      | David Keeney    | daverkeeney@gmail.com          | I am fully in support of this effort to reduce the toxicity of common consumer products in Washington and wish that you could go farther and completely ban these products for any uses. Even when chemicals have a primary use that does not have great impacts to individual Washingtonians, those chemicals are eventually released into the environment where they impact human and environmental health. I support this effort as a good first step and hope to see further restrictions on the importation and use of hazardous chemicals into our state.                                                                                                                                                   | 12/09/22<br>11:10 AM PT |
| I- 2 -1      | qreqw asfd      | safd@gmail.com                 | sdf                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 12/16/22 8:57 AM PT     |
| I- 3 -1      | John Tester     | john.testergmail.com           | body content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12/16/22 9:18 AM PT     |
| I- 4 -1      | John Tester     | john.testergmail.com           | body content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12/16/22 9:19 AM PT     |
| I- 5 -1      | Magdalena Skuza | magdalena.skuzaa@trustrace.com | As I read two main goals of this legislation are to - Reduce the use of priority chemicals in consumer products by establishing restrictions. -Increase transparency in product ingredients by requiring notification. I would like to ask for clarification on what "requiring notification" means. Does it relate to some warning symbols or something like that?                                                                                                                                                                                                                                                                                                                                               | 12/20/22 2:58 AM PT     |
| I- 6 -1      | John Tester     | john.testergmail.com           | body content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 12/20/22<br>11:39 AM PT |
| I- 7 -1      | Hiroki Honma    | almablossom@gmail.com          | Restrictions on flame retardants used in information equipment. Halogen-based flame retardants are generally used around power supply units and around heat-generating elements such as heaters in order to emphasize product safety. In addition to halogen flame retardants, phosphorus-based flame retardants also exist, but exemption from regulations is considered appropriate if the technical issues cannot be resolved in consideration of corrosiveness, as in the case of circuit boards.<br>Therefore, regarding the use of halogen-based flame retardants, we are proposing exemptions for areas around heating elements and parts around power supply units that are subject to high temperatures. | 12/28/22 7:16 PM PT     |



| Comment Code | Commenter    | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 8 -1      | test test    | test@targetedvictory.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/04/23 11:09 AM PT |
| I- 9 -1      | Betty Hoxsie | bettyhoxsie@hotmail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/04/23 9:12 PM PT  |
| I- 10 -1     | Sedgie Ginn  | combopipey@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/05/23 8:09 AM PT  |

| Comment Code | Commenter    | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
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| I- 11 -1     | Cathy Kohary | cathykohary@me.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/05/23 10:10 AM PT |
| I- 12 -1     | Rebecca Dale | mabeckyquall@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                                     | 1/05/23 10:20 AM PT |
| I- 13 -1     | Jerry Golden | jeribou@hotmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/05/23 11:28 AM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted  |
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| I- 14 -1     | deon rodden     | deonarodd@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/05/23 3:50 PM PT |
| I- 15 -1     | Gerald Peterson | jerryp44@ebarqmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/05/23 4:16 PM PT |
| I- 16 -1     | Joan Prchal     | jsprchal@yahoo.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements</p> <p>Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us.</p> <p>With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                | 1/05/23 5:54 PM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 17 -1     | June MacArthur  | portmacarthur@msn.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/05/23 6:17 PM PT |
| I- 18 -1     | Jason Greenland | jasonmg99@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements</p> <p>Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us.</p> <p>With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                     | 1/05/23 8:31 PM PT |
| I- 19 -1     | Dave Perri      | dperri57@gmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/05/23 9:05 PM PT |

| Comment Code | Commenter         | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 20 -1     | Mike Staszak      | sk8crazy7@hotmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/05/23 9:09 PM PT |
| I- 21 -1     | Christine Majul   | twinbears04@gmail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/05/23 9:43 PM PT |
| I- 22 -1     | April Featherkile | afeatherkile@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/05/23 9:52 PM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
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| I- 23 -1     | Robert Kennar   | rjkennar@hotmail.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/05/23 10:28 PM PT |
| I- 24 -1     | Tim Hartzell    | trhartzell@aol.com         | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/05/23 10:51 PM PT |
| I- 25 -1     | Robert Thatcher | robertthatcher44@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements</p> <p>Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us.</p> <p>With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                | 1/05/23 10:54 PM PT |



| Comment Code | Commenter      | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|----------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 26 -1     | Linda Badgley  | lindabadgley1944@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/06/23 3:49 AM PT |
| I- 27 -1     | Kaylynn Wilson | rightsofanimals8@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/06/23 4:00 AM PT |
| I- 28 -1     | Cathy Foubert  | cfoubert@comcast.net       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/06/23 4:02 AM PT |

| Comment Code | Commenter   | Email               | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 29 -1     | Doug Webb   | boink34@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/06/23 6:31 AM PT |
| I- 30 -1     | Lisa McElvy | lmcely9@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/06/23 7:30 AM PT |
| I- 31 -1     | Lana Lasley | lpureheart@aol.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                          | 1/06/23 8:09 AM PT |

| Comment Code | Commenter       | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted   |
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| I- 32 -1     | Betty Hoxsie    | bettyhoxsie@hotmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/06/23 10:18 AM PT |
| I- 33 -1     | Rowena Frombach | frombachrenna@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/06/23 10:55 AM PT |
| I- 34 -1     | Paula Rose      | writingprose.rose5@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/06/23 11:31 AM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted   |
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| I- 35 -1     | Priscilla Olson | pm4261943@comcast.net | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/06/23 11:39 AM PT |
| I- 36 -1     | Greg Berglund   | farmer@eltopia.com    | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/06/23 12:41 PM PT |
| I- 37 -1     | Robert Welch    | stockcar9@juno.com    | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics. Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 1/06/23 2:51 PM PT  |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 38 -1     | Kirk Jessee      | katzum1953kj@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/06/23 3:44 PM PT  |
| I- 39 -1     | Stephen Osterday | steve823@gmail.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/06/23 9:36 PM PT  |
| I- 40 -1     | Michael Fox      | miklj@comcast.net        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/06/23 10:11 PM PT |

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| I- 41 -1     | Joanne Jorgensen | jjj1992@comcast.net      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/06/23 11:55 PM PT |
| I- 42 -1     | Sandy Leithold   | ssleith50274@hotmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/07/23 6:03 AM PT  |
| I- 43 -1     | Judy deneen      | jdkdeneen@yahoo.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                            | 1/07/23 11:26 AM PT |

| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted  |
|--------------|----------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 44 -1     | Sharon Graff   | graffsharon@hotmail.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/07/23 2:02 PM PT |
| I- 45 -1     | Ned Kindler    | nedly1953@yahoo.com     | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics. Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 1/07/23 3:00 PM PT |
| I- 46 -1     | Stephen Bailey | grubber6221@gmail.com   | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/07/23 4:12 PM PT |
| I- 47 -1     | Javier Acosta  | acostajavi509@gmail.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/07/23 4:49 PM PT |



| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 48 -1     | Kenneth Hereth | metalmagic2@fairpoint.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/07/23 10:56 PM PT |
| I- 49 -1     | Teresa Hartley | terihartly@comcast.net    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/08/23 11:03 AM PT |
| I- 49 -1     | NELSON HOOPER  | nelsonhooper@comcast.net  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/08/23 11:03 AM PT |

| Comment Code | Commenter           | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 50 -1     | Karin Foss          | wolfechild@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/08/23 11:44 AM PT |
| I- 51 -1     | Michael Psiropoulos | michael@psiropoulos.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/09/23 8:29 AM PT  |
| I- 52 -1     | Kathy Harnden       | kharnden15@comcast.net  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/09/23 10:57 AM PT |

| Comment Code | Commenter   | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 53 -1     | Jake Sully  | mdo@targetedvictory.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/09/23 12:10 PM PT |
| I- 54 -1     | Robert Leth | bobleth46@gmail.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/10/23 11:02 AM PT |
| I- 55 -1     | Dixie Smith | dixie.l.smith@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 11:37 AM PT |

| Comment Code | Commenter        | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 56 -1     | Patrick Rice     | pdrice42586@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 12:33 PM PT |
| I- 57 -1     | ARLENE LUMPER    | coffenudge@comcast.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/10/23 12:40 PM PT |
| I- 58 -1     | Marna Kostelecky | cotena@aol.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 1:04 PM PT  |

| Comment Code | Commenter         | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 59 -1     | Ralph Matamoros   | ralph_rm@yahoo.com         | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/10/23 5:25 PM PT |
| I- 60 -1     | Constance Coulter | conniecoulter0@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/10/23 7:29 PM PT |
| I- 61 -1     | Michele Buttelman | mbuttelmanhezu53@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/10/23 9:06 PM PT |

| Comment Code | Commenter         | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 62 -1     | Michele Buttelman | mbuttelmanhezu53@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 9:08 PM PT |
| I- 63 -1     | James Tindle      | fullcircle818@outlook.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 9:22 PM PT |
| I- 64 -1     | Heidi Biedebach   | abycinnamon@gmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/10/23 9:26 PM PT |

| Comment Code | Commenter         | Email                         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 65 -1     | Teresa Dichesare  | tdichesare@gmail.com          | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/10/23 10:05 PM PT |
| I- 66 -1     | Paulene Dougherty | doughertypaulene@rickmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/10/23 10:29 PM PT |
| I- 67 -1     | Roger Thompson    | iamroger61@outlook.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/11/23 4:29 AM PT  |



| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 68 -1     | Everitt Allen | yogaforallages@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/11/23 5:52 AM PT |
| I- 69 -1     | Barbara Lyon  | barbaras1959@msn.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/11/23 9:21 AM PT |
| I- 70 -1     | Donna Headen  | donnaheaden1950@gmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/11/23 9:49 AM PT |

| Comment Code | Commenter       | Email                         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted      |
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| I- 71 -1     | Gary Conn       | gaconn@wabroa<br>dband.com    | As a voice in my community, I have concerns about how this new policy proposal could impact families.<br>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.<br>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.<br>Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/11/23 11:05<br>AM PT |
| I- 72 -1     | Jennifer Kimzey | mskimz@yahoo.<br>com          | I am contacting you with deep concern about the policy proposal regarding consumer products.<br>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.<br>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.<br>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/11/23 11:49<br>AM PT |
| I- 73 -1     | Laurie Van Unen | laurie_vanunen<br>@msn.com    | As a voice in my community, I have concerns about how this new policy proposal could impact families.<br>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.<br>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.<br>Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/11/23 11:59<br>AM PT |
| I- 74 -1     | Dixie Smith     | dixie.l.smith@co<br>mcast.net | I am contacting you with deep concern about the policy proposal regarding consumer products.<br>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.<br>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.<br>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/11/23 12:15<br>PM PT |

| Comment Code | Commenter       | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 75 -1     | Deborah Goodloe | debbiegoodloe1955@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/11/23 1:01 PM PT |
| I- 76 -1     | Travis Travis   | tkuntzmann@gmail.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/11/23 2:02 PM PT |
| I- 77 -1     | Nancy Barnes    | nanawa8@gmail.com           | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/11/23 3:40 PM PT |

| Comment Code | Commenter   | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 78 -1     | Donna Smith | 419dgssmith@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                        | 1/11/23 3:43 PM PT |
| I- 79 -1     | Barry Evans | redclaymore@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/11/23 5:29 PM PT |
| I- 80 -1     | Laura Azar  | ogreatmama1@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/11/23 6:44 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
|--------------|-----------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 81 -1     | Tina Bowden     | grandmatof4@charter.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/11/23 9:12 PM PT  |
| I- 82 -1     | Douglas Liebert | malkin@centurylink.net  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/11/23 9:32 PM PT  |
| I- 83 -1     | debra brackeen  | debbrackeen@q.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/11/23 10:35 PM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
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| I- 84 -1     | Bruce Dakin     | bdfixit@bellsouth.net    | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                    | 1/12/23 8:01 AM PT  |
| I- 85 -1     | CAROL DAVIS     | caroldavis7425@gmail.com | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder. | 1/12/23 11:30 AM PT |
| I- 86 -1     | Theodore Dooley | teddooley@yahoo.com      | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder. | 1/12/23 12:19 PM PT |

| Comment Code | Commenter    | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 87 -1     | Jlm Ternes   | jamesdternes@gmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/12/23 1:59 PM PT |
| I- 88 -1     | Ann Doumit   | doumitanna.1979@outlook.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/12/23 3:19 PM PT |
| I- 89 -1     | James Doumit | jdoumit@cbidah.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/12/23 3:20 PM PT |



| Comment Code | Commenter    | Email               | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|--------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 90 -1     | Jerry Golden | jeribou@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/12/23 3:51 PM PT |
| I- 91 -1     | Diane Ehr    | ehrdiane@gmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/12/23 4:33 PM PT |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 92 -1     | Richard Anderson | ric.anderson14@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/12/23 4:56 PM PT |
| I- 93 -1     | Rebecca Knudsen  | knitwack44@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/12/23 4:56 PM PT |
| I- 94 -1     | SL MELTON        | ladyl54@yahoo.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/12/23 7:29 PM PT |

| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 95 -1     | Cheryl Willem    | cherylwillem@yahoo.com    | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/12/23 9:57 PM PT  |
| I- 96 -1     | Pat Hogan        | rpatrickhogan@comcast.net | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/12/23 10:08 PM PT |
| I- 97 -1     | Carolyn Schuster | cdschuster28@gmail.com    | I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/12/23 10:17 PM PT |
| I- 98 -1     | Keri Skari       | keriskari@gmail.com       | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.                                   | 1/12/23 10:19 PM PT |

| Comment Code | Commenter    | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 99 -1     | Tom Sharples | sharples8@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/12/23 11:02 PM PT |
| I- 100 -1    | steve ramsay | ssr@dr.com            | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/12/23 11:13 PM PT |
| I- 101 -1    | Merle Dublin | mldoublin@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/12/23 11:33 PM PT |

| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted   |
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| I- 102 -1    | Marla Agarenzo | milliejo17@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/12/23 11:39 PM PT |
| I- 103 -1    | Greg Rarrick   | gngrarrick@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/13/23 5:25 AM PT  |
| I- 104 -1    | Jeromey Austin | jeromeyaustin@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/13/23 5:46 AM PT  |

| Comment Code | Commenter        | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted  |
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| I- 105 -1    | James Zielasko   | james_zielasko_@msn.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/13/23 6:36 AM PT |
| I- 106 -1    | D Layton         | l8ndadach@gmail.com     | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/13/23 7:50 AM PT |
| I- 107 -1    | Stanley Fronczak | stles1984@aol.com       | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics. Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 1/13/23 8:57 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 108 -1    | Jim Fulton    | morris98021@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/13/23 9:18 AM PT  |
| I- 109 -1    | Eric Lundgren | tyeho@yahoo.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/13/23 10:18 AM PT |
| I- 110 -1    | Gerald Davis  | gerald.davis@junio.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/13/23 10:49 AM PT |



| Comment Code | Commenter      | Email                            | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 111 -1    | Barbara Hughes | barbhughescom<br>mun@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/13/23 11:01 AM PT |
| I- 112 -1    | Joyce Bunch    | jabunch7@yahoo.com               | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/13/23 11:15 AM PT |
| I- 113 -1    | Cathy Kohary   | cathykohary@me.com               | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/13/23 11:20 AM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-----------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 114 -1    | Melode Feller   | melodefeller59@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 11:23 AM PT |
| I- 115 -1    | CLYDE HILAND    | knine2009@hotmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 11:28 AM PT |
| I- 116 -1    | Robert Brackett | bobbrackett67@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/13/23 12:49 PM PT |

| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
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| I- 117 -1    | Kimberly Davis | kimdavis.kd12@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/13/23 12:57 PM PT |
| I- 118 -1    | Harry Smith    | hesiihar@comcast.net    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 1:41 PM PT  |
| I- 119 -1    | Diane Ehr      | ehrdiane@gmail.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 2:18 PM PT  |

| Comment Code | Commenter      | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 120 -1    | Brenda Seifert | brendag45@gmail.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                            | 1/13/23 2:56 PM PT |
| I- 121 -1    | Diane Cater    | caterdesigns1@frontier.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 2:58 PM PT |
| I- 122 -1    | John Kincaid   | johnmkincaid@comcast.net   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/13/23 3:40 PM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted  |
|--------------|-----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 123 -1    | Linda Bayne     | lbayne249@gmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/13/23 3:52 PM PT |
| I- 124 -1    | Alice Nicholson | anicholson@currently.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                                     | 1/13/23 6:07 PM PT |
| I- 125 -1    | Lucinda Twedt   | twedt_cindy@yahoo.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 6:24 PM PT |

| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 126 -1    | Susan Heywood  | sisters_2@msn.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                            | 1/13/23 6:26 PM PT |
| I- 127 -1    | Holly Stockton | gdoiowu2@msn.com          | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/13/23 6:48 PM PT |
| I- 128 -1    | Paul Smithburg | paul.millwright@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/13/23 7:29 PM PT |

| Comment Code | Commenter         | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 129 -1    | Roberta Czarnecki | bonrosec@gmail.com         | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/13/23 8:06 PM PT  |
| I- 130 -1    | Douglas Gunter    | drakonisracing@outlook.com | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.                                   | 1/13/23 8:19 PM PT  |
| I- 131 -1    | mark haney        | ixnay00@msn.com            | I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/13/23 9:39 PM PT  |
| I- 132 -1    | Barbara travis    | barbaraandhoward@gmail.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/13/23 10:15 PM PT |



| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 133 -1    | Russell Coleman | rcoleman58@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/14/23 1:42 AM PT |
| I- 134 -1    | shawn mattix    | shawnmattix9@msn.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/14/23 1:54 AM PT |
| I- 135 -1    | John Mernone    | jm1700@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/14/23 6:01 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 136 -1    | Juan Torres   | jtracing71@hotmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                          | 1/14/23 6:23 AM PT |
| I- 137 -1    | Rodney Baker  | rbykbaker@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/14/23 8:31 AM PT |
| I- 138 -1    | Robby Diamond | robbyjdiamond@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/14/23 8:31 AM PT |

| Comment Code | Commenter        | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 139 -1    | Karynn MacKinnon | raindancemt@yahoo.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                        | 1/14/23 8:46 AM PT  |
| I- 140 -1    | Karin Foss       | wolfchild@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/14/23 9:49 AM PT  |
| I- 141 -1    | Wayne Barnum     | barnumwayne@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/14/23 10:05 AM PT |

| Comment Code | Commenter    | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 142 -1    | Jim Fulton   | morris98021@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                        | 1/14/23 11:17 AM PT |
| I- 143 -1    | Art Lenz     | arthur.lenz@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/14/23 12:49 PM PT |
| I- 144 -1    | Jerry Golden | jeribou@hotmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/14/23 1:09 PM PT  |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted  |
|--------------|---------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 145 -1    | Jerry Golden  | jeribou@hotmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/14/23 1:11 PM PT |
| I- 146 -1    | Susan Heywood | sisters_2@msn.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/14/23 1:42 PM PT |
| I- 147 -1    | Leona Clemons | leona.clemons@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/14/23 1:50 PM PT |

| Comment Code | Commenter         | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 148 -1    | Kevin Stich       | stickmann00@yahoo.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/14/23 2:21 PM PT |
| I- 149 -1    | Sandra Bale       | snlbale@gmail.com     | I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/14/23 5:02 PM PT |
| I- 150 -1    | Michal McAllister | immichalann@gmail.com | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.                                   | 1/14/23 5:19 PM PT |
| I- 151 -1    | John LaFarge      | jclafarge@aol.com     | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                      | 1/14/23 6:22 PM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-----------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 152 -1    | David Vally     | vally53@live.com           | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/14/23 7:02 PM PT |
| I- 153 -1    | Judith Wagner   | judy.wagner.9453@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/14/23 8:37 PM PT |
| I- 154 -1    | Collin Crawford | mshomerun@yahoo.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/14/23 9:39 PM PT |



| Comment Code | Commenter       | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-----------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 155 -1    | Matt Thibodeau  | devil_on_wheels666@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/14/23 9:41 PM PT  |
| I- 156 -1    | Deborah Hunley  | hunleygirl@hotmail.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/14/23 11:13 PM PT |
| I- 157 -1    | Michael Painter | mpaint@zebracomputers.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 12:40 AM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
|--------------|----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 158 -1    | ARLENE LUMPER  | coffenudge@comcast.net   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In today's world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 6:51 AM PT |
| I- 159 -1    | Cassandra Cota | cassy.lozano39@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesn't make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                            | 1/15/23 7:16 AM PT |
| I- 160 -1    | Diane Wilkins  | wilkinsd49@yahoo.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements. Potentially decrease performance in electronic products. What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesn't make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                            | 1/15/23 8:12 AM PT |

| Comment Code | Commenter      | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|----------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 161 -1    | alice brauhn   | braun9047@gmail.com         | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 9:30 AM PT |
| I- 162 -1    | Georgiann Cain | georgianncain@sbcglobal.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 9:58 AM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-----------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 163 -1    | Robert George   | azboater1@aol.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 11:53 AM PT |
| I- 164 -1    | Kathy Siekerman | kjs19561@hotmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/15/23 12:33 PM PT |
| I- 165 -1    | Annette Nitz    | annette_t_n@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/15/23 1:22 PM PT  |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted  |
|--------------|-----------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 166 -1    | Lisa Grimes     | kcks@gorge.net         | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/15/23 1:32 PM PT |
| I- 167 -1    | David Eichner   | david@icansoftware.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/15/23 2:23 PM PT |
| I- 168 -1    | Kenneth Douglas | kjgrizz7@gmail.com     | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                                                                                                                                                                                                                                                          | 1/15/23 2:44 PM PT |
| I- 169 -1    | Kelly Huffman   | momhasveto@comcast.net | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics. Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 1/15/23 2:48 PM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted  |
|--------------|-----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 170 -1    | Julie Helgerson | helgerson62@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                            | 1/15/23 3:09 PM PT |
| I- 171 -1    | Jon Martin      | nwmaximus@yahoo.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                                 | 1/15/23 3:39 PM PT |
| I- 172 -1    | Bersha Mahala   | brozanne7@yahoo.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 4:02 PM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Comment Submitted  |
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| I- 173 -1    | Robert Meier   | rdmmeier@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                                                                                                                                                                                                          | 1/15/23 8:54 PM PT |
| I- 174 -1    | Ronald Liebert | rliebert68@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics. Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 8:59 PM PT |
| I- 175 -1    | Jerry Jensen   | jerryjensen_@msn.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                       | 1/15/23 9:14 PM PT |



| Comment Code | Commenter    | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 176 -1    | Karen Wines  | gingersoxie152@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                                                                                                                                                                                                              | 1/15/23 9:33 PM PT  |
| I- 177 -1    | Deborah Hart | isagrl@msn.com           | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks - get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products sold in Washington, possibly even encouraging consumers to go out of state to buy the same products we use today. It could also result in decreased performance of our electronics.</p> <p>Fire safety, product availability and overall product performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/15/23 10:21 PM PT |
| I- 178 -1    | Damian Ray   | damian.ray1@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                     | 1/16/23 12:31 AM PT |

| Comment Code | Commenter      | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted  |
|--------------|----------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 179 -1    | Christina Lott | winggeddrag@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families.</p> <p>Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p> | 1/16/23 3:39 AM PT |
| I- 180 -1    | Rodney Baker   | rbykbaker@yahoo.com        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                             | 1/16/23 7:44 AM PT |
| I- 181 -1    | Linda Badgley  | lindabadgley1944@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                             | 1/16/23 8:13 AM PT |
| I- 182 -1    | John Hazelwood | bjh3636@aol.com            | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                             | 1/16/23 9:01 AM PT |

| Comment Code | Commenter       | Email              | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
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| I- 183 -1    | Yo Seki         | yoichi83@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were over 5,000 house fires in Washington. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. It could make the products we use less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                                      | 1/16/23 9:35 AM PT  |
| I- 184 -1    | Patricia Harper | bussdr@yahoo.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could pose greater threats to us. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. Please consider altering this extreme proposal so it doesnt make us less safe and make everyday life harder.</p>                                   | 1/16/23 9:54 AM PT  |
| I- 185 -1    | Bridget Marks   | marksbc@msn.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. With over 5,000 house fires in our state in 2021, fire risk is a very real concern for families. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/16/23 11:12 AM PT |

| Comment Code | Commenter       | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 186 -1    | Rowena Frombach | frombachrenna@gmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/16/23 11:16 AM PT |
| I- 187 -1    | Robert Smith    | robert@ncpod.org            | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 3:49 AM PT  |
| I- 188 -1    | Trisha Jennings | tables-eldest.0c@icloud.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 3:50 AM PT  |

| Comment Code | Commenter         | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 189 -1    | Michael Eichorn   | mikeichorn1@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 3:50 AM PT |
| I- 190 -1    | Aeren Huckleberry | aeren_01@yahoo.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 3:51 AM PT |
| I- 191 -1    | Jenae Harris      | jyharris3@msn.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 3:51 AM PT |

| Comment Code | Commenter     | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 192 -1    | Betty Camara  | savana5710@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 3:51 AM PT |
| I- 193 -1    | Gail Jurgens  | gailcj@yahoo.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 3:52 AM PT |
| I- 194 -1    | Ralph Gilbert | fishrdg@yahoo.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/17/23 3:52 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 195 -1    | Mike matthias | tattyme2003@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 3:52 AM PT |
| I- 196 -1    | Donald Cole   | coledonc@gmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 3:52 AM PT |
| I- 197 -1    | David Thomas  | coja0707@gmail.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 3:52 AM PT |



| Comment Code | Commenter          | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 198 -1    | Ray Honea          | ray.dar@comcast.net   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/17/23 3:53 AM PT |
| I- 199 -1    | John Zakariassen   | johnzak1310@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/17/23 3:53 AM PT |
| I- 200 -1    | Victoria Stockdale | gozags97@gmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 3:53 AM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 201 -1    | Al he           | a@mail.com             | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 3:53 AM PT |
| I- 202 -1    | Kenneth Maylone | kdmaylone@aol.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 3:54 AM PT |
| I- 203 -1    | Virginia kerr   | lynnworks111@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 3:55 AM PT |

| Comment Code | Commenter    | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 204 -1    | Steve Rasor  | reddog60@comcast.net   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 3:56 AM PT |
| I- 205 -1    | Jay Michel   | jaymichel327@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 3:58 AM PT |
| I- 206 -1    | David Eldred | pcspatrol@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 3:58 AM PT |

| Comment Code | Commenter     | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
|--------------|---------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 207 -1    | Jane Moniot   | janemoniot@gmail.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/17/23 3:59 AM PT |
| I- 208 -1    | Diane Gerig   | bowentherapy@protonmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/17/23 4:11 AM PT |
| I- 209 -1    | Joseph Miller | joeudogu@gmail.com          | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 4:13 AM PT |

| Comment Code | Commenter     | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 210 -1    | Ed Tropp      | edtropp@cbbain.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 4:21 AM PT |
| I- 211 -1    | Chris Liming  | climing@gmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 4:24 AM PT |
| I- 212 -1    | Scott Mckimmy | firefr55@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/17/23 4:25 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 213 -1    | Scott Mckimmy | firefr55@hotmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 4:26 AM PT |
| I- 214 -1    | Greg Allison  | gl56allison@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 4:29 AM PT |
| I- 215 -1    | April Faires  | geccoeert@earthlink.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 4:30 AM PT |

| Comment Code | Commenter            | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 216 -1    | Rex Kendall          | navyguardian@yahoo.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/17/23 4:35 AM PT |
| I- 217 -1    | Rosemarie Mindermann | roseyett@msn.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/17/23 4:40 AM PT |
| I- 218 -1    | John Worster         | carcrashman@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 4:46 AM PT |



| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|----------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 219 -1    | April Faires   | geccoeert@earthlink.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 4:50 AM PT |
| I- 220 -1    | Lou Lomax      | lomaxlouann73@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 4:52 AM PT |
| I- 221 -1    | Glenda Roberts | gmr62441@aol.com        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 4:54 AM PT |

| Comment Code | Commenter    | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 222 -1    | K Schmitz    | kimmy1956@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 4:59 AM PT |
| I- 223 -1    | Janice Leach | maielea4@icloud.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:21 AM PT |

| Comment Code | Commenter      | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 224 -1    | Dale Bennett   | crossbowcowboy@outlook.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:22 AM PT |
| I- 225 -1    | Richard Branam | richard.branam@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:23 AM PT |
| I- 226 -1    | Rebecca Glass  | bkglass@hotmail.com        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/17/23 5:27 AM PT |

| Comment Code | Commenter      | Email             | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 227 -1    | Anton Luru     | aluru73@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:32 AM PT |
| I- 228 -1    | Richard Bailey | rb431@hotmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/17/23 5:36 AM PT |
| I- 229 -1    | Camren Burton  | writer021@aol.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:36 AM PT |

| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 230 -1    | Sandra Bale   | snlbale@gmail.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 5:37 AM PT |
| I- 231 -1    | Paul Hartt    | pbhartt500@gmail.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 5:39 AM PT |
| I- 232 -1    | Karen Pearson | karenmpearson.35@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/17/23 5:43 AM PT |

| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 233 -1    | Scott Mckimmy | firefr55@hotmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 8:02 AM PT |
| I- 234 -1    | ron beeler    | rbeeler52@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/17/23 8:34 AM PT |
| I- 235 -1    | Cheryl Pullen | clpullen@comcast.net  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 9:01 AM PT |

| Comment Code | Commenter          | Email                         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|--------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 236 -1    | Randy Angelshaug   | runninrum@yahoo.com           | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 9:01 AM PT  |
| I- 237 -1    | John Lovie         | john.lovie@whidbey.com        | I support in full the proposed rulemaking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1/17/23 9:35 AM PT  |
| I- 238 -1    | Yvette Fitzjarrald | alphamom33@aol.com            | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 10:12 AM PT |
| I- 239 -1    | robert littlefield | robdoglittlefield@outlook.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 10:14 AM PT |



| Comment Code | Commenter         | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 240 -1    | Teresa Dichesare  | tdichesare@gmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/17/23 10:18 AM PT |
| I- 241 -1    | Maria Eberlein    | eberleinm@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 10:33 AM PT |
| I- 242 -1    | Nickolas Blomberg | nwdb2001@yahoo.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/17/23 10:47 AM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 243 -1    | Cheryl Maxwell  | panthera741@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 10:50 AM PT |
| I- 244 -1    | Doug Parker     | me.set.free@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/17/23 10:53 AM PT |
| I- 245 -1    | David Armstrong | darmst6829@aol.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/17/23 11:08 AM PT |

| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 246 -1    | Laura Conner   | lconner2000@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 11:24 AM PT |
| I- 247 -1    | John Mernone   | jm1700@yahoo.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 12:18 PM PT |
| I- 248 -1    | leonard daigle | daigle8491@comcast.net  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/17/23 1:48 PM PT  |

| Comment Code | Commenter    | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|--------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 249 -1    | Rev. Ann     | babsjc1@yahoo.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 1:53 PM PT |
| I- 250 -1    | Nadine Faber | nf660066@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 3:22 PM PT |
| I- 251 -1    | Gary Conn    | gaconn@wabroadband.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 3:32 PM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|---------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 252 -1    | Kathy Harnden | kharnden15@comcast.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 3:49 PM PT |
| I- 253 -1    | Joan Prchal   | jsprchal@yahoo.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/17/23 4:19 PM PT |
| I- 254 -1    | Andre Wooten  | dredogg87@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/17/23 4:31 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 255 -1    | Marie Fournier  | mariefournier46@yahoo.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 4:37 PM PT |
| I- 256 -1    | Anita Bauman    | abauman52@hotmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 5:05 PM PT |
| I- 257 -1    | Sheila Mitchell | sffmitchell@comcast.net   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 7:20 PM PT |

| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|---------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 258 -1    | John Kincaid  | johnmkincaid@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/17/23 7:20 PM PT |
| I- 259 -1    | Penny Bowdish | genebowdish@outlook.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 7:34 PM PT |
| I- 260 -1    | George Benoit | gbenoitea@hotmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/17/23 8:40 PM PT |



| Comment Code | Commenter        | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 261 -1    | Michael Scheele  | mscheele@hotmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/17/23 9:28 PM PT  |
| I- 262 -1    | Shelley Grimshaw | sgrimshaw21@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/17/23 9:58 PM PT  |
| I- 263 -1    | Lisa Grimes      | kcks@gorge.net          | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/17/23 10:32 PM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 264 -1    | Craig Sayre    | craig.sayre@msn.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/18/23 12:30 AM PT |
| I- 265 -1    | Diane Crossley | dianek72@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 12:41 AM PT |
| I- 266 -1    | Debra Ciarlo   | dciarlo333@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/18/23 1:31 AM PT  |

| Comment Code | Commenter     | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 267 -1    | Deborah Wells | debwells12@charter.net      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/18/23 1:40 AM PT |
| I- 268 -1    | Gary Stratton | stratton_g@msn.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/18/23 2:08 AM PT |
| I- 269 -1    | Bill Melton   | williammelton2001@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 5:30 AM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 270 -1    | Gene Gower    | rangerdoh@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/18/23 5:55 AM PT |
| I- 271 -1    | Nathan Katsma | topgun200118@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/18/23 6:47 AM PT |
| I- 272 -1    | CLYDE HILAND  | knine2009@hotmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/18/23 7:15 AM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 273 -1    | Jamie Myers     | jamiemyers4@gmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/18/23 7:17 AM PT |
| I- 274 -1    | Susan Lundin    | susanlundin777@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/18/23 8:24 AM PT |
| I- 275 -1    | Shirley Widener | swidener@hotmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 8:57 AM PT |

| Comment Code | Commenter         | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 276 -1    | James King        | kingjim1946@yahoo.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 9:04 AM PT  |
| I- 277 -1    | Thomas Weatherwax | drkwolf@yahoo.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/18/23 9:50 AM PT  |
| I- 278 -1    | Rick Johnson      | lakeside1956@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 10:25 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
|--------------|---------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 279 -1    | Wilna Wheeler | wilna.wheeler@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/18/23 10:36 AM PT |
| I- 280 -1    | Mark Lundy    | marlund2@comcast.net    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/18/23 10:37 AM PT |
| I- 281 -1    | Gerald Davis  | gerald.davis@junio.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/18/23 11:03 AM PT |



| Comment Code | Commenter          | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 282 -1    | Chasity Hungerford | lisen_of_the_wod@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1/18/23 12:35 PM PT |
| I- 283 -1    | Courtney Carignan  | carigna4@msu.edu             | <p>I hold a Ph.D. in environmental health and have been studying exposure and health effects of halogenated flame retardants and PFASs for the past 15 years. My research has contributed to our understanding that halogenated flame retardants and PFASs escape from products they are added to, enter the air and dust of our indoor environments, enter our bodies and cause reproductive harm. Most notably, as a postdoc at Harvard in 2017 I found that women with higher exposure to organophosphate flame retardants were less likely to become pregnant and to have a viable birth, and that these effects were cumulative across the three investigated OPFRs.</p> <p>I'm testifying today in favor of the proposed rule and in favor of regulating phthalates, phenols, halogenated flame retardants and PFAS each as a class to stop the cycle of regrettable substitution of one problematic chemical to a similar, but less studied, chemical that is later found to be similarly harmful.</p> <p>For example, changing from DecaBDE to hexabromocyclododecane (HBCD) in the plastic casings of electronics. Both are highly persistent, easily migrate from products into air and dust, enter our bodies, are toxic, and are excreted in breast milk. As part of my dissertation research at Boston University, I found higher levels of HBCD in breast milk among mothers who had a larger number of stereo and video electronics in their home. One of my coauthors later found those products were being recycled overseas into cooking utensils such as spatulas and ladles. I also found that women who ate conventionally grown foods had higher levels of HBCD in their breast milk, suggesting a possible exposure</p> | 1/18/23 1:50 PM PT  |

| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 284 -1    | June Robbins   | jmarie00176@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/18/23 7:59 PM PT  |
| I- 285 -1    | Colleen Herr   | cherr4@yahoo.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 9:16 PM PT  |
| I- 286 -1    | Sharon Jackson | sjack1551@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/18/23 11:03 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-----------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 287 -1    | John skierski   | skierskijohn1@outlook.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/18/23 11:23 PM PT |
| I- 288 -1    | Hubert Taisacan | htaisacan1966@mail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/18/23 11:48 PM PT |
| I- 289 -1    | Jeffrey Wear    | jeff.wear@yahoo.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/18/23 11:57 PM PT |

| Comment Code | Commenter        | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 290 -1    | Jami Martinez    | jami08.jm@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/19/23 1:28 AM PT |
| I- 291 -1    | Alan Jussila     | alanjussila@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/19/23 1:38 AM PT |
| I- 292 -1    | Joanne Jorgensen | jlj1992@comcast.net   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/19/23 1:51 AM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 293 -1    | John Mernone   | jm1700@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/19/23 1:58 AM PT |
| I- 294 -1    | Larry Mccarter | Rdslarry@mac.com     | <p>I do not see any exemption for Biosolids, nor should they be exempted: If the goal of this law is to reduce our (and wildlife's) exposure to certain pollutants, certainly land application of Biosolids MUST not be an exempt product. Thank you!.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1/19/23 7:17 AM PT |
| I- 295 -1    | Ronald Liebert | rliebert68@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/19/23 7:51 AM PT |

| Comment Code | Commenter              | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 296 -1    | Deon Rodden            | deonarodd@gmail.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/19/23 8:46 AM PT |
| I- 297 -1    | Christina Mittelstaedt | christina_mitt@hotmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                            | 1/19/23 9:18 AM PT |
| I- 298 -1    | LEO JACOBS             | LEO.JACOBS@FRONTIER.COM    | <p>I believe we need to postpone this rule making for at least Two more years. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington state, costing Washingtonians even more to live in the state of Washington. You should create product availability for these new products and let the market phase out the older stuff, that should be priorities of the state of Washington.. The negatives of this proposed policy are just too high, this rule should be put on hold till further impact studies are conducted.</p>                                                                                                                                                                                                                                     | 1/19/23 9:19 AM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 299 -1    | Ardis Fureby    | ardis@wavecable.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/19/23 9:44 AM PT  |
| I- 300 -1    | John Hayes      | winterdog791@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/19/23 9:54 AM PT  |
| I- 301 -1    | Cheryl Carampot | angelcherie2003@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/19/23 12:39 PM PT |



| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 302 -1    | Robert Brackett | bobbrackett67@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/19/23 1:27 PM PT |
| I- 303 -1    | Andrew goble    | andrewgoble37@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/19/23 3:14 PM PT |
| I- 304 -1    | Kathy Harnden   | kharnden15@comcast.net  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/19/23 3:35 PM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 305 -1    | George Benoit | gbenoitea@hotmail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/19/23 4:18 PM PT |
| I- 306 -1    | Dale Manley   | razrxwarrior@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/19/23 7:34 PM PT |
| I- 307 -1    | Derek Feldman | dodgeris@yahoo.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/19/23 8:10 PM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 308 -1    | Gina Morrison | justginaz@aol.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/19/23 10:43 PM PT |
| I- 309 -1    | Kathy Harnden | kharnden15@comcast.net  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/20/23 12:54 AM PT |
| I- 310 -1    | Edward Koch   | edwardkoch001@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/20/23 3:39 AM PT  |

| Comment Code | Commenter        | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 311 -1    | Johnjoseph Pajor | cassjohnjoseph@yahoo.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/20/23 3:53 AM PT  |
| I- 312 -1    | Brooke Strehler  | brooke.strehler@comcast.net | <p>I completely agree with the proposed legislation. There is too much PFAS in our waters and it is vital we stop adding to the problem. I think it's also important that the Department of Ecology consider rulemaking and legislation of systems that aid in the destruction of PFAS, like industrial pyrolysis systems. While limiting our input of these horrible manmade chemicals is important, it is equally important that we do what we can to deplete existing quantities. I believe this should be considered in future rulemaking.</p>                                                                                                                                                                                                                                                      | 1/20/23 4:15 AM PT  |
| I- 313 -1    | Scott Tabor      | scotttathd@gmail.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/20/23 10:11 AM PT |

| Comment Code | Commenter           | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|---------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 314 -1    | Renita Wattenburger | renitawattenburger@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/20/23 10:59 AM PT |
| I- 315 -1    | Danny Alexander     | tinybig1.da.da@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/20/23 11:00 AM PT |
| I- 316 -1    | Charles Hoffert     | chuckhoffert45@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/20/23 11:22 AM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 317 -1    | Anita Poulin    | cynsmommie@yahoo.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/20/23 12:03 PM PT |
| I- 318 -1    | Paulette Hayes  | paulettehayes@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/20/23 12:42 PM PT |
| I- 319 -1    | Kiessling April | testificari@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/20/23 2:44 PM PT  |

| Comment Code | Commenter            | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 320 -1    | Dorothy Nelson-Suter | dsunelson@copper.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/20/23 2:52 PM PT |
| I- 321 -1    | Pam Hasey            | pamhasey25@aol.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/20/23 4:41 PM PT |
| I- 322 -1    | Larry Prior          | prior21us@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/20/23 7:10 PM PT |



| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 323 -1    | James Neils     | jamien_59@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/20/23 7:51 PM PT  |
| I- 324 -1    | April Faires    | geccoeert@earthlink.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/20/23 9:25 PM PT  |
| I- 325 -1    | Preston Hammond | preston57@comcast.net   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/20/23 10:47 PM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 326 -1    | Stacy Parker    | lemonwitch@hotmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/20/23 11:00 PM PT |
| I- 327 -1    | Cameron McElroy | bubblebuddyfan@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/21/23 12:09 AM PT |
| I- 328 -1    | Juanita Wilson  | nita13best@yahoo.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/21/23 12:16 AM PT |

| Comment Code | Commenter     | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 329 -1    | Steve S       | sschrock9669@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/21/23 1:25 AM PT |
| I- 330 -1    | Jodi Pfeiffer | jolpfe@gmail.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/21/23 5:14 AM PT |
| I- 331 -1    | Donna McNeill | donnarubyred1@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/21/23 5:50 AM PT |

| Comment Code | Commenter               | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
|--------------|-------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 332 -1    | Cathy Rhine             | poonzee2@gmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/21/23 10:26 AM PT |
| I- 333 -1    | Roy Shepard             | larks01@charter.net    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/21/23 12:16 PM PT |
| I- 334 -1    | Miriam FlahertyBrygider | miriam_21811@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/21/23 1:34 PM PT  |

| Comment Code | Commenter         | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
|--------------|-------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 335 -1    | Deanna Wiederhold | dwiet200204@yahoo.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/21/23 1:49 PM PT |
| I- 336 -1    | Gregory Jenney    | g_jenney@yahoo.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/21/23 2:42 PM PT |
| I- 337 -1    | Curtis Chamberlin | curt.chamberlin@yahoo.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/21/23 3:03 PM PT |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 338 -1    | Bruce Vanderhoff | fisher4jesus@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/21/23 3:04 PM PT |
| I- 339 -1    | Carol Penuel     | cpenuel@msn.com          | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/21/23 4:29 PM PT |
| I- 340 -1    | Klein Gary       | cartoad1951@aol.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/21/23 4:30 PM PT |

| Comment Code | Commenter       | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 341 -1    | Jack Largent    | jacklargent@hotmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/21/23 5:02 PM PT |
| I- 342 -1    | Sharon Elkins   | sharonelkins83@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/21/23 5:09 PM PT |
| I- 343 -1    | Joan Pennington | jandmpennington@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/21/23 7:29 PM PT |



| Comment Code | Commenter          | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|--------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 344 -1    | Michael Pennington | jandmpennington@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/21/23 7:31 PM PT |
| I- 345 -1    | DuWayne Layton     | l8ndadacc@gmail.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/21/23 8:54 PM PT |
| I- 346 -1    | Connie Ehrhard     | cehrhard0@gmail.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/21/23 9:13 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 347 -1    | John Mernone    | jm1700@yahoo.com          | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/21/23 10:27 PM PT |
| I- 348 -1    | Matt McGowan    | mattmcgowan544@icloud.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/21/23 10:52 PM PT |
| I- 349 -1    | Robert Brownell | robert@brownells.net      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/21/23 10:59 PM PT |

| Comment Code | Commenter         | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 350 -1    | John Gabriel      | jrgabby@bluetiehome.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/22/23 1:07 AM PT |
| I- 351 -1    | Judith Van Leuven | rjvan47@comcast.net         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/22/23 3:23 AM PT |
| I- 352 -1    | Mary Siegel       | creativeelegance2@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 3:51 AM PT |

| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 353 -1    | Alfred Berg   | bergngstm@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/22/23 7:04 AM PT |
| I- 354 -1    | Dave ones     | papadajones@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/22/23 8:21 AM PT |
| I- 355 -1    | Herman Blegen | hblegen@live.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/22/23 8:24 AM PT |

| Comment Code | Commenter         | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|-------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 356 -1    | Susan Cinkovich   | cinko4@live.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/22/23 10:26 AM PT |
| I- 357 -1    | Patricia Ronalder | patcor1@comcast.net    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/22/23 10:52 AM PT |
| I- 358 -1    | Gerald Walden     | gwwalden3301@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/22/23 11:17 AM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 359 -1    | Larin Amos      | mercedes1671@yahoo.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 1:17 PM PT |
| I- 360 -1    | Robert Brackett | bobbrackett67@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 1:24 PM PT |
| I- 361 -1    | Colleen Nyberg  | nybergcd@msn.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/22/23 1:45 PM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 362 -1    | Gary Showalter | garydshow@comcast.net  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 2:16 PM PT |
| I- 363 -1    | Robert Toohey  | bob2e@juno.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 2:35 PM PT |
| I- 364 -1    | Kathleen Ball  | kball29509@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 4:41 PM PT |



| Comment Code | Commenter         | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 365 -1    | Margaret Plunkett | margiemp777@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/22/23 7:52 PM PT |
| I- 366 -1    | Holiday Lammon    | holidaylammon0@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/22/23 7:52 PM PT |
| I- 367 -1    | Nancy Metz        | nanumont@hotmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/22/23 9:16 PM PT |

| Comment Code | Commenter        | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 368 -1    | Nancy Jorgensen  | nancylynnjorgensen@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 9:20 PM PT  |
| I- 369 -1    | Ruben Ruelas     | rruelas1122@yahoo.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/22/23 10:12 PM PT |
| I- 370 -1    | Deborah Gieszler | dgieszler@charter.net        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/22/23 10:31 PM PT |

| Comment Code | Commenter        | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 371 -1    | Jeffrey Gieszler | jgieszler@charter.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/22/23 10:34 PM PT |
| I- 372 -1    | Iris Miller      | candel50@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/23/23 7:37 AM PT  |
| I- 373 -1    | John Mernone     | jm1700@yahoo.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/23/23 8:21 AM PT  |

| Comment Code | Commenter      | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 374 -1    | Eleanor Howard | eleanor2@taylor635.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/23/23 9:03 AM PT  |
| I- 375 -1    |                |                            | test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1/23/23 9:10 AM PT  |
| I- 376 -1    | Cathy Foubert  | cfoubert@comcast.net       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/23/23 10:27 AM PT |
| I- 377 -1    | David McClarin | ruthettandavid@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/23/23 11:47 AM PT |

| Comment Code | Commenter    | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|--------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 378 -1    | Jerry Golden | jeribou@hotmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/23/23 3:08 PM PT |
| I- 379 -1    | Donald Hart  | gibbs.7441@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/23/23 4:30 PM PT |
| I- 380 -1    | George Mull  | tincupkw@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/23/23 6:03 PM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted   |
|--------------|----------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 381 -1    | Alan Jussila   | alanjussila@yahoo.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/23/23 7:02 PM PT  |
| I- 382 -1    | Shannon Brown  | gamenutt1964@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/23/23 9:48 PM PT  |
| I- 383 -1    | Linda Stafford | listafford48@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/23/23 11:40 PM PT |

| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 384 -1    | paul megargel | kmegargel@comcast.net    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/24/23 1:04 AM PT |
| I- 385 -1    | Ruth Keyser   | rhk23feb1996@yahoo.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 3:16 AM PT |
| I- 386 -1    | Diana Brandt  | diana.brandt@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 5:36 AM PT |



| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| I- 387 -1    | Helen Brumbaugh | hebrumbaugh@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/24/23 5:46 AM PT |
| I- 388 -1    | Daniel Eakin    | daniel.eakin32@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/24/23 6:26 AM PT |
| I- 389 -1    | Susan Anderson  | tapeus@yahoo.com         | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/24/23 6:49 AM PT |

| Comment Code | Commenter         | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 390 -1    | Ken Jones         | kb56mlwa@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                                                                                                                                                                       | 1/24/23 7:14 AM PT |
| I- 391 -1    | Jacqueline Doctor | dr.j5@live.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                                                                                                                                                                            | 1/24/23 7:39 AM PT |
| I- 392 -1    | Khristina Kravas  | Kkravas@gmail.com    | <p>I applaud the attempt to make beauty products safer. Having worked with a small beauty company that was committed to clean products, I would explore you to look carefully at the time lines.</p> <p>Packaging/filling minimums for some types of products (aerosols for instance) can require numbers that amount to years of inventory for small brands. Additionally, the process of finding adequate replacements for undesirable ingredients often take multiple, multi-month reformulation cycles.</p> <p>As a consumer, I'd love for this to go into effect immediately, but a 2 year hard deadline would not be fair or even possible for small, independent businesses.</p> <p>Perhaps the solution is to require a growing percentage of a brand's products to comply within a rolling time frame so that rhymes are 100% compliant within 5 years?</p> <p>Clear labeling - eg a certification process that would allow the brands to use a "WA green beauty compliant" logo would also be useful for consumers and brands alike.</p> | 1/24/23 8:50 AM PT |

| Comment Code | Commenter         | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted   |
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| I- 393 -1    | Lauralee Carbone  | lillola@msn.com        | <p>Literally all of us have forever chemicals in our bloodstream. So many health problems have manifested as a result of BPA, phthalates, etc. that disrupt our hormones. Our healthcare system is overloaded with thyroid issues, cancers and more.</p> <p>As a mother of a child who had cancer I applaud this legislation that is FINALLY being introduced. I would be so proud as a Washingtonian to see it pass.</p> <p>This information is not new. I read the book OUR STOLEN FUTURE decades ago. Please pass this law ASAP.</p> <p>Thank you,</p>                                                                                                                                                                                    | 1/24/23 9:25 AM PT  |
| I- 394 -1    | Mattie Town       | mbess91@gmail.com      | <p>Please work hard to pass this bill. People have busy lives and don't have time to always buy all natural products - we need our lawmakers to protect us from things that cause cancer! Thank you - Mattie Town</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1/24/23 10:08 AM PT |
| I- 395 -1    | Rose Intveld      | rosesmith007@gmail.com | <p>I support this safer products proposal, and I urge our lawmakers to as well. As a woman who is culturally expected to use many beauty products daily and therefore exposed to more chemicals in products than men, I feel it is critical to reduce the harmful exposure to cancer causing chemicals people face every day. As a consumer, some products can be super confusing and misleading about what toxic chemicals are in the product - even something labeled "Natural". I recently learned that there is butane in most dry shampoos - butane! This should not be something that we can just casually buy and put onto our skin. Please protect consumers!</p>                                                                    | 1/24/23 10:14 AM PT |
| I- 396 -1    | Tambra Zimmermann | tambra.rmz@outlook.com | <p>Exciting news! Having been in the spa and beauty industry, and understanding the dangers of these chemical has always led me to question how they are allowed in products that are often used daily and stay on the body. I felt bad using them, so tried to source ones without chemicals that endangerd people. Clients expected with all the government oversight agency's they were protected. It will be interesting to see if the manufacturers have the funds and political connections to shut the bill down.</p>                                                                                                                                                                                                                 | 1/24/23 10:40 AM PT |
| I- 397 -1    | Mark Parker       | markp214@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/24/23 11:00 AM PT |

| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|---------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 398 -1    | Amy Giffin    | amygiffin311@gmail.com   | This should already be law. As a cancer survivor working in Beauty I am overwhelmingly concerned about what people allow on and in their bodies. Many people have no understanding of this or that cosmetics seep into our bodies. Thank you for all steps to ban cancerous elements in our lives.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1/24/23 11:15 AM PT |
| I- 399 -1    | test test     | test@targetedvictory.com | I am contacting you with deep concern about the policy proposal regarding consumer products.<br>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.<br>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.<br>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.                                                                                    | 1/24/23 11:27 AM PT |
| I- 400 -1    | Maggi Allen   | maggi_allen@yahoo.com    | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.<br>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.<br>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.<br>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.<br>Please reconsider this proposal. There has to be a better way to address your concerns. | 1/24/23 11:31 AM PT |
| I- 401 -1    | Amanda Bailey | amandabailey7@gmail.com  | The toxins that we have literally created are killing us as a whole - not to mention more targeted at people of color. We need regulations that protect us and our families, because, unregulated, we will continue to be misinformed. If these go unregulated, we are not only hurting those that use the cosmetics and hair supplies, but, we hurt everyone as PFAS and other chemicals continue to pervade water and soil. Please, please, help consumers choose healthier and safer alternatives to show these markets that it is not only possible, but expected to live healthier, longer lives by knowledgably choosing safe products.                                                                                                                                                                                                                           | 1/24/23 11:54 AM PT |

| Comment Code | Commenter   | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 402 -1    | John Berg   | jsberg2@live.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/24/23 12:16 PM PT |
| I- 403 -1    | James King  | kingjim1946@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 1:32 PM PT  |
| I- 404 -1    | Maggi Allen | maggi_allen@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 1:43 PM PT  |

| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 405 -1    | Mary Hill        | jasaala@outlook.com       | I have long had problems with perfumes and scents, whether in actual perfumes and colognes or when added to various products, such as detergents, fabric softeners, air "fresheners" or lotions. For many years, I could not walk down the laundry products aisle until Gain stopped coming in cardboard boxes, without holding my breath, which could be somewhat difficult. At home, I use unscented everything. However, since Downy Unstoppables and Gain Flings have come into common use, my problem is now vastly exacerbated. I cannot be in the home of someone who uses them, I cannot be in a car with someone who is wearing clothing laundered with them, I cannot sit outside on my deck when the neighbors are running their dryers, I cannot be downwind outside from anyone who is wearing clothing laundered using them, I cannot accept anything that has been stored in their home if they use these products. When my grandchildren come to visit, even washing their clothes does not remove the offending chemicals. My doctor has diagnosed me with chemical-induced asthma. My throat burns, I fill with phlegm, and begin having a difficult time breathing. I liken it to breathing in ammonia fumes. I have spoken to people, such as my stepson, who was unaware that use of these products was what was causing his family to have problems until I mentioned it. Once they stopped using them, their problems were mitigated. I am hoping that something can be done to alleviate the problems these products emit. | 1/24/23 1:52 PM PT |
| I- 406 -1    | Stacya Silverman | stacyasilverman@gmail.com | I've been a make-up artist for 40 years and licensed esthetician for over 30, and I hope these laws preventing toxic and cancer causing ingredients in cosmetics go forward. I wish these laws were already in place. Many of us are gobsmacked that there aren't stricter laws about what goes into these products that can cause illness in humans and damage to the water and soil when washed down the drain. Let's do this. Let's be the first state to do it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1/24/23 2:58 PM PT |
| I- 407 -1    | Carol Saatzer    | saatzer9044@gmail.com     | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.<br>This policy is just wrong for Washington. It could upend everyday life as we know it:<br>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products<br>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.<br>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1/24/23 3:07 PM PT |

| Comment Code | Commenter           | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
|--------------|---------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 408 -1    | Mary Fields         | mfieldsmurals@comcast.net  | I hope lawmakers approve House Bill 1047 to ban harmful chemicals in cosmetics. It's unconscionable that such poisons should be absorbed by customers unknowingly and equally bad that they end up in the waterways, causing irreparable harm to wildlife. Forever chemicals have made it so that there is no place on earth where rainwater is safe to drink! The ban should include all products where these chemicals are used, not just cosmetics. Manufacturers should also begin to phase out plastic packaging. Thank you.                                                                                                                                                                                                                                                    | 1/24/23 3:13 PM PT |
| I- 409 -1    | Kristin Fitzpatrick | kristfitz@live.com         | I fully support this bill and hope the legislature will pass it into law. It's shameful that buying cosmetics is a research project - there's no need to expose people to formaldehyde, arsenic, and lead when we know how harmful they are. And everyone is exposed when these forever chemicals wash out into the environment. Please protect the people and environment of WA state by passing this into law.                                                                                                                                                                                                                                                                                                                                                                     | 1/24/23 3:27 PM PT |
| I- 410 -1    | Kayla Kinnick-Maes  | kaylakayla8585@gmail.com   | Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.<br>This policy is just wrong for Washington. It could upend everyday life as we know it:<br>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products<br>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.<br>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.                                                                                                                                | 1/24/23 6:17 PM PT |
| I- 411 -1    | Shirley Burrows     | shirleyandpaco@comcast.net | I am contacting you with deep concern about the policy proposal regarding consumer products.<br>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.<br>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.<br>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state. | 1/24/23 6:29 PM PT |



| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 412 -1    | Betty Gassert   | quanet_2@hotmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/24/23 7:50 PM PT |
| I- 413 -1    | Anita Poulin    | cynsmommie@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/24/23 7:56 PM PT |
| I- 414 -1    | Michelle Barrus | chellywb@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 7:58 PM PT |

| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted   |
|--------------|---------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 415 -1    | Heidi Watters | heidiwatters@gmail.com   | Please enact restrictive measures on harmful or unproven substances in products. The complexity of product ingredients requires oversight beyond public capabilities and is precisely the role of government rather than individuals who cannot possibly know. Thank you very much for all the work on this topic. I'm proud WA is a scientific and policy leader on this topic.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1/24/23 8:35 PM PT  |
| I- 416 -1    | Douglas Maki  | doug_maki99338@yahoo.com | As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.                                                                                                                                            | 1/24/23 9:13 PM PT  |
| I- 417 -1    | Joy Flynn     | bombon4085@gmail.com     | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 1/24/23 10:08 PM PT |

| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|---------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 418 -1    | Etta Talbert  | ettajane2@yahoo.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/24/23 10:20 PM PT |
| I- 419 -1    | Robert Butler | butlerr663@gmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/24/23 10:24 PM PT |
| I- 420 -1    | Marlys Bloom  | 4success2u2@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 10:42 PM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 421 -1    | Cindy Wood      | cinwoo63@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/24/23 11:00 PM PT |
| I- 422 -1    | Mike Staszak    | sk8crazy7@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 11:02 PM PT |
| I- 423 -1    | Kathy Siekerman | kjs19561@hotmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 11:36 PM PT |

| Comment Code | Commenter          | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 424 -1    | Carol Fleischacker | fleischacker46@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/24/23 11:48 PM PT |
| I- 425 -1    | Robert George      | azboater1@aol.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/24/23 11:51 PM PT |
| I- 426 -1    | Suzy Lutey         | suzylutey1@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                            | 1/24/23 11:54 PM PT |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 427 -1    | Byron Barton     | byronandjean@comcast.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/25/23 12:04 AM PT |
| I- 428 -1    | Joanne Jorgensen | jlj1992@comcast.net      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 1:16 AM PT  |
| I- 429 -1    | Jeanne Deller    | jkdeller@gmail.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 1:40 AM PT  |

| Comment Code | Commenter       | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 430 -1    | Forrest Gibson  | fords007@hotmail.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/25/23 8:07 AM PT |
| I- 431 -1    | Kathleen Allen  | kathleenallen1954@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 9:32 AM PT |
| I- 432 -1    | Richard Wooster | rich@kjmllaw.com            | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/25/23 9:59 AM PT |



| Comment Code | Commenter            | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 433 -1    | Lisa Srsen           | srsenlisa@yahoo.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/25/23 10:21 AM PT |
| I- 434 -1    | Jean Born            | jeanborn94@gmail.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 10:30 AM PT |
| I- 435 -1    | Traci Lynn Hoenstine | tracihoenstine@GMAIL.COM | <p>Natural is healthy, Why not go totally healthy? No harmful stuff! Thank you</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1/25/23 10:50 AM PT |
| I- 436 -1    | Ron Goulter          | rongoulter@yahoo.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 10:56 AM PT |

| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 437 -1    | Laurel Pascual | lepasc40@aol.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/25/23 11:06 AM PT |
| I- 438 -1    | James Porter   | dougout52@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 11:12 AM PT |
| I- 439 -1    | Carolyn Miller | cjmiller501@aol.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 11:33 AM PT |

| Comment Code | Commenter       | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|-----------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 440 -1    | Bill. Copeland  | monofgod1109@hotmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/25/23 12:21 PM PT |
| I- 441 -1    | Laurel Anderson | laurel.anderson11@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 12:29 PM PT |
| I- 442 -1    | Howard Donaghy  | hardlyablesn@msn.om         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/25/23 12:49 PM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 443 -1    | John Gomes      | johngomes58@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/25/23 12:54 PM PT |
| I- 444 -1    | Jeremy Goodman  | nopitu@bellsouth.net     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/25/23 1:15 PM PT  |
| I- 445 -1    | Cameron McElroy | bubblebuddyfan@yahoo.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 1:37 PM PT  |

| Comment Code | Commenter   | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| I- 446 -1    | Meloey Goad | gmelody855@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/25/23 2:17 PM PT |
| I- 447 -1    | Harry Smith | hesiihar@comcast.net   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/25/23 2:34 PM PT |
| I- 448 -1    | Mary Vela   | vela.maryc@outlook.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/25/23 2:38 PM PT |

| Comment Code | Commenter      | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|----------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 449 -1    | Russell Waddel | russ.waddel@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 3:05 PM PT |
| I- 450 -1    | Bill McCorkle  | bill.mccorkle@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                            | 1/25/23 3:45 PM PT |
| I- 451 -1    | John Gomes     | johngomes58@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/25/23 3:52 PM PT |

| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 452 -1    | Cynthia Moir  | ckmoir63@gmail.com         | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/25/23 4:10 PM PT |
| I- 453 -1    | Judith Hansen | hansengj@msn.com           | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/25/23 4:31 PM PT |
| I- 454 -1    | Marc Boyd     | marcofexcellence@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/25/23 4:35 PM PT |



| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 455 -1    | Larry Prior      | prior21us@gmail.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/25/23 4:36 PM PT |
| I- 456 -1    | Marlene Odegaard | marleneodegaard@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/25/23 4:36 PM PT |
| I- 457 -1    | Barbara Leder    | cloudclimbers@comcast.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/25/23 4:38 PM PT |
| I- 458 -1    | Engrid Hooper    | engridhooper@gmail.com    | <p>Please protect us from toxic chemicals in body care and makeup. We need to have only safe body products for sale. It's not okay to sell toxic products. We need protections.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1/25/23 4:52 PM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| I- 459 -1    | Amy Yokoyama   | iamdivinelight@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/25/23 5:11 PM PT |
| I- 460 -1    | Denise Miller  | wpadutch@gmail.com       | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/25/23 6:00 PM PT |
| I- 461 -1    | Daniel Carroll | danshell409@gmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/25/23 6:38 PM PT |

| Comment Code | Commenter            | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 462 -1    | Cinda Van Dusseldorp | cindavandusseldorp@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/25/23 7:00 PM PT |
| I- 463 -1    | Daniel Peltola       | ruthp031304@gmail.com        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/25/23 8:49 PM PT |
| I- 464 -1    | Lisa Golden          | lisabolstad@gmail.com        | I support stricter regulations to have safer consumer products                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1/25/23 9:09 PM PT |
| I- 465 -1    | Sheri Neff           | sherineff@gmail.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/25/23 9:12 PM PT |

| Comment Code | Commenter         | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted   |
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| I- 466 -1    | Robert Zetterberg | b2j5z3@hotmail.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/25/23 9:27 PM PT  |
| I- 467 -1    | Jodi Mathis       | jodimathis62@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/25/23 10:18 PM PT |
| I- 468 -1    | Jerry Fretz       | tuffy694@gmail.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/25/23 10:36 PM PT |

| Comment Code | Commenter            | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 469 -1    | Deborah Wells        | debwells12@charter.net   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 12:29 AM PT |
| I- 470 -1    | katharina Veenendaal | klh116@aol.com           | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 12:44 AM PT |
| I- 471 -1    | Richard Anderson     | ric.anderson14@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/26/23 2:15 AM PT  |

| Comment Code | Commenter            | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 472 -1    | Roberta Ramsey       | ramseyroberta@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/26/23 2:15 AM PT |
| I- 473 -1    | Patricia Hendrickson | arnes51@yahoo.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 2:46 AM PT |
| I- 474 -1    | Larry Engles         | lengles@aol.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/26/23 2:54 AM PT |

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| I- 475 -1    | Sheila Tolley   | sheilatolley7@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/26/23 7:29 AM PT  |
| I- 476 -1    | Hubert Taisacan | htaisacan1966@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/26/23 10:04 AM PT |
| I- 477 -1    | Marlin Young    | madmarlin53@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                     | 1/26/23 10:52 AM PT |



| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 478 -1    | Terry Kruschik | tkruschik@yahoo.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/26/23 10:52 AM PT |
| I- 479 -1    | Jim Jones      | the3rdpigshouse1@aol.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/26/23 12:29 PM PT |
| I- 480 -1    | Howard Donaghy | hardlyablesn@msn.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/26/23 1:36 PM PT  |

| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 481 -1    | Deborah Hart    | isagrl@msn.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 2:06 PM PT |
| I- 482 -1    | Shirley Widener | swidener@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/26/23 2:37 PM PT |
| I- 483 -1    | Yvonne McKim    | yvonne@mckim.org     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 3:05 PM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 484 -1    | Rena comstock   | gapeachnw@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 3:48 PM PT |
| I- 485 -1    | Susan Lange     | slange4462@yahoo.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 3:53 PM PT |
| I- 486 -1    | Patricia Bowlin | bowlinpatti@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/26/23 5:18 PM PT |

| Comment Code | Commenter        | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 487 -1    | Erica Svavarsson | ericadsvavarsson@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/26/23 5:21 PM PT |
| I- 488 -1    | Debra Brackeen   | debbrackeen@q.com          | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/26/23 5:44 PM PT |
| I- 489 -1    | Donna Greene     | ladybugue@hotmail.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/26/23 9:39 PM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 490 -1    | Faye Nelson     | fayevnel@aol.com       | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/26/23 10:36 PM PT |
| I- 491 -1    | Terrie McHargue | idahosyringa@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/26/23 11:23 PM PT |
| I- 492 -1    | Breanna Reina   | breanna_reina@aol.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/26/23 11:40 PM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 493 -1    | Ryan Sumpter   | ryan_s@wavecabl.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/26/23 11:54 PM PT |
| I- 494 -1    | Gayle Cooper   | ggaylecooper@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/27/23 12:17 AM PT |
| I- 495 -1    | Clare Rinehart | brew5399@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 1:48 AM PT  |

| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|----------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 496 -1    | Karen Loeffler | loefflrmj@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/27/23 4:10 AM PT |
| I- 497 -1    | Vicki Crigger  | harleybirdc@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/27/23 4:21 AM PT |
| I- 498 -1    | Deborah Davis  | debwentny1@gmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 5:01 AM PT |



| Comment Code | Commenter       | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 499 -1    | Sharon Anderson | aharonanderson2017@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/27/23 5:06 AM PT |
| I- 500 -1    | Yvonne Uriarte  | yvonneuriarte@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/27/23 5:49 AM PT |
| I- 501 -1    | Linda Condon    | springermom56@yahoo.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 6:39 AM PT |

| Comment Code | Commenter       | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|-----------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 502 -1    | Marilyn Pearson | marilynpearson2002@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 9:40 AM PT  |
| I- 503 -1    | John Budrow     | knowtanks@gmail.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/27/23 11:16 AM PT |
| I- 504 -1    | Cathy Mcnish    | crmcnish@outlook.com         | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                            | 1/27/23 11:51 AM PT |

| Comment Code | Commenter            | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
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| I- 505 -1    | Edythe Pavlov        | edionasname@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/27/23 11:55 AM PT |
| I- 506 -1    | Carol Widener        | doremi88@man.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/27/23 12:03 PM PT |
| I- 507 -1    | Dorothy Nelson-Suter | dsunelson@copper.net  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/27/23 1:57 PM PT  |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 508 -1    | Joanne Treffrey | jwcheyenne@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/27/23 3:11 PM PT |
| I- 509 -1    | Larry McVay     | l.mcvay@comcast.net       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 3:42 PM PT |
| I- 510 -1    | Rev. Stone      | chooselove@rockisland.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/27/23 6:29 PM PT |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 511 -1    | Elizabeth Harris | harrise2000@yahoo.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/27/23 6:30 PM PT |
| I- 512 -1    | Deborah Gefroh   | gefrohd@msn.com          | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/27/23 6:40 PM PT |
| I- 513 -1    | Linda Gebaroff   | linda.gebaroff@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/27/23 6:44 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 514 -1    | Angela Hembroff | ahembroff@hotmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 8:04 PM PT |
| I- 515 -1    | Cynthia Moir    | ckmoir63@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/27/23 8:11 PM PT |
| I- 516 -1    | Roberta Gamino  | robertag3029@icloud.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/27/23 8:20 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 517 -1    | Teresa Hayford  | terihayford@msn.com     | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/27/23 8:40 PM PT |
| I- 518 -1    | Barbara Cutshaw | bjcutshaw@hotmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/27/23 9:06 PM PT |
| I- 519 -1    | April Faires    | geccoeert@earthlink.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/27/23 9:33 PM PT |



| Comment Code | Commenter             | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 520 -1    | Patsy Frazier         | sallyofthevalley01@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/27/23 10:28 PM PT |
| I- 521 -1    | Dianne Hufford        | dianneh@hscis.net            | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/27/23 11:58 PM PT |
| I- 522 -1    | janet.<br>Yvonnewylie | jywylie@comcast.net          | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/28/23 12:22 AM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 523 -1    | TABBY HERALD    | tvhmustang@aol.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/28/23 1:32 AM PT |
| I- 524 -1    | Joyce Satchell  | joycesatchell472@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/28/23 1:39 AM PT |
| I- 525 -1    | Carolyn Edwards | cedwards07@aol.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/28/23 2:05 AM PT |

| Comment Code | Commenter     | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 526 -1    | G Lightle     | lightleg@yahoo.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/28/23 2:09 AM PT |
| I- 527 -1    | Dawn Moler    | dawnegray3@gmail.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 5:33 AM PT |
| I- 528 -1    | Johanna Smith | josodfranch@earthlink.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/30/23 5:38 AM PT |

| Comment Code | Commenter         | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 529 -1    | Todd Norcross     | crossmartialarts@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 5:57 AM PT |
| I- 530 -1    | Lanny Christenson | sluggo57@comcast.net       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 5:57 AM PT |
| I- 531 -1    | Jane Davis        | janegary@msn.com           | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 5:58 AM PT |

| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 532 -1    | Storgaard Tena  | storgaard@yahoo.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 6:06 AM PT |
| I- 533 -1    | Michael Markley | pepsi.52@comcast.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 6:18 AM PT |
| I- 534 -1    | Mary Stein      | steinhaus3@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 6:25 AM PT |

| Comment Code | Commenter            | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 535 -1    | Dan Wight            | wightshop@yahoo.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/30/23 6:30 AM PT |
| I- 536 -1    | David Bancroft       | dkbancroft13@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/30/23 6:56 AM PT |
| I- 537 -1    | Pamela Carlson-Roell | pmcr@live.com          | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/30/23 6:57 AM PT |

| Comment Code | Commenter          | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|--------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 538 -1    | Marc Fountain      | mofountain62@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/30/23 7:01 AM PT |
| I- 539 -1    | Valerie McNulty    | vam4metoo@yahoo.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 1/30/23 7:04 AM PT |
| I- 540 -1    | Maureen McCutcheon | mampokane@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 1/30/23 7:09 AM PT |



| Comment Code | Commenter         | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| I- 541 -1    | Roberta Czarnecki | bonrosec@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/30/23 7:10 AM PT |
| I- 542 -1    | Karl Zetterberg   | karl@zetterberg.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/30/23 7:14 AM PT |
| I- 543 -1    | Rene' Gemmell     | renemklady@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 7:29 AM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 544 -1    | Karl Zetterberg | karl@zetterberg.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/30/23 8:02 AM PT |
| I- 545 -1    | Brie Adams      | bladams1965@gmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:07 AM PT |
| I- 546 -1    | Connie Coulter  | conniecoulter0@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 8:11 AM PT |

| Comment Code | Commenter         | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 547 -1    | Liana Angove-sowa | lsowa.angove@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:14 AM PT |
| I- 548 -1    | Linda Bayne       | lbayne249@gmail.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:30 AM PT |
| I- 549 -1    | linda harrell     | linda984@outlook.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 8:35 AM PT |

| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 550 -1    | Bradley Walker | steeldart@comcast.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 1/30/23 8:35 AM PT |
| I- 551 -1    | Dyan lyness    | tdlyness@aol.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:36 AM PT |
| I- 552 -1    | Ken Budde      | kennrb@hotmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:37 AM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 553 -1    | Kathleen Thomas | kat92870@yahoo.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:47 AM PT |
| I- 554 -1    | Julie Sanborn   | donjulie1959@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:54 AM PT |
| I- 555 -1    | Susan Kelley    | gid_ey_up@hotmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/30/23 8:57 AM PT |

| Comment Code | Commenter     | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| I- 556 -1    | Mark Smith    | oldguardduke@yahoo.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/30/23 8:57 AM PT |
| I- 557 -1    | Bob Apple     | bobapple@post.com         | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/30/23 8:57 AM PT |
| I- 558 -1    | Johanna smith | josodfranch@earthlink.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/30/23 9:01 AM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 559 -1    | Terri horat    | horatterri@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 9:10 AM PT |
| I- 560 -1    | Robin Cashatt  | snowdenatv@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 9:13 AM PT |
| I- 561 -1    | Howard Donaghy | hardlyablesn@msn.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 9:15 AM PT |



| Comment Code | Commenter     | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 562 -1    | Matt McGowan  | mattmcgowan544@icloud.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 9:18 AM PT |
| I- 563 -1    | Mark Parker   | markp214@gmail.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 9:20 AM PT |
| I- 564 -1    | Pamela Seaman | 2goofoffs@gmail.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 9:23 AM PT |

| Comment Code | Commenter        | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 565 -1    | Lee Craig        | dlcraig303@gmail.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 9:28 AM PT |
| I- 566 -1    | Camille Viebrock | camille.viebrock@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 9:36 AM PT |
| I- 567 -1    | Neal Amos        | jjjmavcola@yahoo.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 9:37 AM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 568 -1    | Claudia French | cotrutza@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 9:44 AM PT |
| I- 569 -1    | charles fray   | barnbrown@gmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 1/30/23 9:57 AM PT |
| I- 570 -1    | David Bancroft | dkbancroft13@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 9:58 AM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 571 -1    | Dianne Rickman | diannerick26@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 10:00 AM PT |
| I- 572 -1    | Carol Sandberg | rosmee@hotmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 10:08 AM PT |
| I- 573 -1    | Diane Ehr      | ehrdiane@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 10:13 AM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted   |
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| I- 574 -1    | Robert Thatcher | robertthatcher44@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                 | 1/30/23 10:24 AM PT |
| I- 575 -1    | Diane Cater     | caterdesigns1@frontier.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 10:31 AM PT |
| I- 576 -1    | Kristin Mangino | mangino2270@comcast.net    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 10:31 AM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 577 -1    | Leona Baird     | leonabaird@ymail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 10:32 AM PT |
| I- 578 -1    | Mike Staszak    | sk8crazy7@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/30/23 10:37 AM PT |
| I- 579 -1    | Judith Odermann | hayboss@outlook.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 10:37 AM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 580 -1    | Roy Peden       | roypeden@hotmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 10:46 AM PT |
| I- 581 -1    | Carol Johnson   | cajhorsesense@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 10:46 AM PT |
| I- 582 -1    | Clarence Harvey | harveycc75@gmail.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/30/23 10:46 AM PT |



| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 583 -1    | Helen Gentry   | yesdiggityus@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 10:48 AM PT |
| I- 584 -1    | Pedro Gonzales | petergon1@yahoo.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 10:54 AM PT |
| I- 585 -1    | B. Tatro       | briettatatro@gmail.com | <p>If you were to give the average person on the street a choice between safe products and unsafe products, the public is going to choose safe every time. So the answer to the debate is simple. Corporations want to continue using unsafe ingredients because it will cost them money to change their formulas and to that I say, break out the tiny violin. It's a new era - and there should absolutely be strong regulations that protect consumers and the environment from dangerous chemicals in detergents, cosmetics, clothing, carpeting, upholstery, etc.. So, yes, I fully support this proposed rule.</p>                                                                                                                                                                                                                                           | 1/30/23 10:54 AM PT |

| Comment Code | Commenter          | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|--------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 586 -1    | Marguerite Mickles | margiemickles01@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 10:55 AM PT |
| I- 587 -1    | Pamela Crown       | crownp2009@hotmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 11:29 AM PT |
| I- 588 -1    | Maureen Rainville  | moerainville@hotmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 12:40 PM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 589 -1    | Karen Henning | kehe52@gmail.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 1:00 PM PT |
| I- 590 -1    | Julie Sanborn | donjulie1959@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 1:12 PM PT |
| I- 591 -1    | Mike Staszak  | sk8crazy7@hotmail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/30/23 1:27 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-----------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 592 -1    | Helene Dietzman | helenedietzman2@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 1:33 PM PT |
| I- 593 -1    | Bob Woodruff    | bawanag@gmail.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/30/23 1:35 PM PT |
| I- 594 -1    | Howard Donaghy  | hardlyablesn@msn.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 1:41 PM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 595 -1    | Kristin Haley  | fnst322@yahoo.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 1:48 PM PT |
| I- 596 -1    | Dorcas Cluck   | jo.cluck.99338@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 1/30/23 2:02 PM PT |
| I- 597 -1    | JoAnne Fleming | 1jfleming@frontier.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 2:15 PM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 598 -1    | Den Mark Wichar | deedub@webtv.net       | <p>Dear Washington State Department of Ecology, I support all proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule.</p> <p>It is critical to end use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals, and these rules are critically important for moving companies in the right direction.</p>                                                                                                                                                                          | 1/30/23 3:04 PM PT |
| I- 599 -1    | Marianne Edain  | fh@whidbey.com         | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction.</p> <p>I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                   | 1/30/23 3:07 PM PT |
| I- 600 -1    | Kevin Gallagher | kevingal@uw.edu        | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction.</p> <p>I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p> <p>Thank you.</p> | 1/30/23 3:09 PM PT |
| I- 601 -1    | E Ellis         | harborsolar1@gmail.com | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction.</p> <p>I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                   | 1/30/23 3:17 PM PT |

| Comment Code | Commenter         | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Comment Submitted  |
|--------------|-------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 602 -1    | Lorelette Knowles | lmk@rainforsoft.com  | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                  | 1/30/23 3:18 PM PT |
| I- 603 -1    | Marcelo Hirschler | mmh@gbhint.com       | I am submitting comments expressing my concern about the proposed regulation and include several attachments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1/30/23 3:33 PM PT |
| I- 604 -1    | Joyce Weir        | jaweir@povn.com      | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                  | 1/30/23 4:51 PM PT |
| I- 605 -1    | Derek Benedict    | dsbened@frontier.com | <p>Dear Washington State Department of Ecology, We've publicly known about toxic man-made chemicals for over five decades, and things are only getting worse. So I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p> | 1/30/23 4:53 PM PT |



| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
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| I- 606 -1    | Danny Beatty    | jdbeatty@wavecable.com | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                     | 1/30/23 5:31 PM PT |
| I- 607 -1    | Shelly Ackerman | shellya@whidbey.com    | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                     | 1/30/23 5:34 PM PT |
| I- 608 -1    | Brenda Alt      | max.brenda@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/30/23 8:44 PM PT |

| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 609 -1    | Ronalee Mattern | ronniekm@comcast.net | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 9:27 PM PT  |
| I- 610 -1    | Jackie Cole     | jlwmc@comcast.net    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/30/23 9:46 PM PT  |
| I- 611 -1    | Nancy Campbell  | nancy_22091@msn.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/30/23 10:45 PM PT |

| Comment Code | Commenter        | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 612 -1    | June Robbins     | jmarie00176@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/30/23 11:18 PM PT |
| I- 613 -1    | Eric Brandt      | thenwki@gmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/30/23 11:58 PM PT |
| I- 614 -1    | Ronald Macoubrie | rmac5969@hotmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 12:00 AM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|-----------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 615 -1    | Christine Davis | dchristine492@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/31/23 12:09 AM PT |
| I- 616 -1    | Barbara travis  | barbaraandhoward@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/31/23 12:15 AM PT |
| I- 617 -1    | Nancy Bruehl    | nancy.bruehl@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 12:56 AM PT |

| Comment Code | Commenter          | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 618 -1    | Jaime Amador       | jim.amador@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/31/23 2:43 AM PT |
| I- 619 -1    | Lynn DeGroot       | degrootlynn1@gmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 2:55 AM PT |
| I- 620 -1    | Marguerite Mickles | margiemickles01@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 3:17 AM PT |

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| I- 621 -1    | Danya Laurendeau | unodeau2@yahoo.com       | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/31/23 5:59 AM PT |
| I- 622 -1    | Lisa Halcomb     | glh1088@frontier.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 6:24 AM PT |
| I- 623 -1    | Tim Carter       | tim.carter8725@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 6:55 AM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 624 -1    | Diana Brandt   | diana.brandt@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 10:08 AM PT |
| I- 625 -1    | Kate Thorson   | kate.thorson@gmail.com   | <p>We do not do enough to regulate harmful chemicals in products that impact human and environmental health. I fully support all action to regulate and reduce or remove these chemicals in order protect our communities.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1/31/23 10:47 AM PT |
| I- 626 -1    | Howard Donaghy | hardlyablesn@msn.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 1/31/23 10:58 AM PT |



| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|---------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 627 -1    | Max Jones     | mmmaxo1o@comcast.net  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 1/31/23 11:57 AM PT |
| I- 628 -1    | Ray Orlowski  | thebigo99@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 12:20 PM PT |
| I- 629 -1    | Linda Leonard | linleonard1@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 1:02 PM PT  |

| Comment Code | Commenter     | Email                                         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|---------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 630 -1    | ANDRIA MARTIN | chammorita01@hotmail.com                      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 1/31/23 2:19 PM PT |
| I- 631 -1    | Levi Patrick  | levi-ecology.commentinput.com@levipatrick.com | <p>Dryer Sheets and Laundry Detergents</p> <p>I, as many people, have allergic reactions among other reactions. I also get visual migraine reactions. If people continue to use these non-hypoallergenic versions, they should be required to have their exhaust apparatus treated like other poisonous outputs such as wood and gas heaters and fireplaces. E.g. Exhaust stacks regulated at heights for the aforementioned.</p> <p>Thank you, Levi Patrick</p>                                                                                                                                                                                                                                                               | 1/31/23 2:26 PM PT |
| I- 632 -1    | Rebecca Dale  | mabeckyquall@gmail.com                        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/31/23 2:51 PM PT |
| I- 633 -1    | Gervin Obina  | obie1@msn.com                                 | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 1/31/23 3:00 PM PT |

| Comment Code | Commenter   | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 634 -1    | Kim Decker  | deckkimgarden@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                                 | 1/31/23 5:20 PM PT |
| I- 635 -1    | Rev. Stone  | chooselove@rockisland.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 1/31/23 7:57 PM PT |
| I- 636 -1    | Gary Carone | g-money13@comcast.net     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 9:03 PM PT |

| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
|--------------|-----------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 637 -1    | Alice Nicholson | anicholson@currently.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/31/23 9:20 PM PT |
| I- 638 -1    | Laura Himes     | himes2011@gmail.com      | I support this. Thank you Ecology regulators.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1/31/23 9:24 PM PT |
| I- 639 -1    | Dale Pedersen   | wahoo_069@hotmail.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/31/23 9:27 PM PT |
| I- 640 -1    | Stewart Low     | thelows2@q.com           | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p> | 1/31/23 9:38 PM PT |

| Comment Code | Commenter        | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
|--------------|------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 641 -1    | Michael Anderson | djamhaa@comcast.net    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 1/31/23 9:43 PM PT  |
| I- 642 -1    | Gerald Walden    | gwwalden3301@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/31/23 10:07 PM PT |
| I- 643 -1    | Dan Maurin       | dsubarurx@msn.com      | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 1/31/23 11:51 PM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 644 -1    | Gwendolyn Lewis | gwenniejl@aol.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 1/31/23 11:55 PM PT |
| I- 645 -1    | Maria Eberlein  | eberleinm@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/01/23 12:01 AM PT |
| I- 646 -1    | Lenora ONeill   | amkwdmll@aol.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 2/01/23 12:32 AM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|---------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 647 -1    | Jill Larson   | jillylarson@aol.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/01/23 1:15 AM PT |
| I- 648 -1    | Kelly Hackett | klynnhackett@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 1:33 AM PT |
| I- 649 -1    | Nancy Taylor  | taylornj2@aol.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                     | 2/01/23 6:32 AM PT |



| Comment Code | Commenter       | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 650 -1    | Sara DeLong     | delong3@stjohn cable.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/01/23 7:15 AM PT |
| I- 651 -1    | JoAnne Warehime | jcwarehime@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/01/23 8:23 AM PT |
| I- 652 -1    | Ben grossman    | ben@hopnationbrew.com    | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/01/23 8:24 AM PT |

| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted   |
|--------------|----------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 653 -1    | John Hancock   | john.hank@me.com      | I strongly support this proposed rule, and I applaud the direction towards safety from secret poisons. It's impossible for us consumers to know the harms from products containing chemicals not named in the packaging, concealed from public scrutiny, and minimized in their danger. Any restrictive step helps protect us from insidious and accumulating threats we can't know about until it's too late. Yes, I'm doing my best to avoid poisonous products, but government also has a role in protecting all of us together. Thanks for listening and acting!                                                                                                                                                                                                                                                                                        | 2/01/23 9:22 AM PT  |
| I- 654 -1    | Karin Foss     | wolfechild@gmail.com  | As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns. | 2/01/23 10:03 AM PT |
| I- 655 -1    | Brian Bomengen | bbomengen@hotmail.com | I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.                                                                                 | 2/01/23 10:54 AM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|-----------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 656 -1    | Ramon Cooper    | rtcoop71@live.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/01/23 1:14 PM PT |
| I- 657 -1    | connie peterson | conniezbooks@yahoo.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/01/23 2:15 PM PT |
| I- 658 -1    | Connie Bailey   | dakotaairee@aol.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 3:01 PM PT |

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|--------------|---------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 659 -1    | Gerald Fisher | jtfisher82@gmail.com  | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/01/23 6:17 PM PT |
| I- 660 -1    | Bruce Dakin   | bdfixit@bellsouth.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 7:23 PM PT |
| I- 661 -1    | Greg Berglund | farmer@eltopia.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 7:47 PM PT |

| Comment Code | Commenter     | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 662 -1    | sean Rafferty | sr_1775@yahoo.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 7:50 PM PT |
| I- 663 -1    | Jeff Mensch   | jeffjeffmensch@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 9:04 PM PT |
| I- 664 -1    | Heidi Antonie | hantonie25@startrmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/01/23 9:18 PM PT |

| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|---------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 665 -1    | Randy Dahl    | rddahl@nwi.net        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 2/01/23 9:23 PM PT  |
| I- 666 -1    | Frances Irwin | francie@irwinw.net    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/01/23 10:03 PM PT |
| I- 667 -1    | Lisa Bewick   | lbewick0909@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 2:30 AM PT  |

| Comment Code | Commenter         | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 668 -1    | Diana Hinshaw     | hindand47@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 2/02/23 6:46 AM PT |
| I- 669 -1    | Jennifer Vazquezc | jusbnme76@yahoo.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 6:58 AM PT |
| I- 670 -1    | DesiRae McGraw    | deairaezabel1@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 2/02/23 9:31 AM PT |



| Comment Code | Commenter          | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 671 -1    | Kristine MacDonald | kemacdon66@gmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/02/23 10:35 AM PT |
| I- 672 -1    | Shirley Radtke     | shirleyradtke@gmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 10:41 AM PT |
| I- 673 -1    | Patticia Neissl    | patricianeissl@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 1:03 PM PT  |

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| I- 674 -1    | Jerry Robison  | jbrobison12@comcast.net  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/02/23 1:10 PM PT |
| I- 675 -1    | Susan Sampson  | loneoakranch@comcast.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/02/23 4:33 PM PT |
| I- 676 -1    | Diana Andriolo | dianak246@gmail.com      | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/02/23 4:49 PM PT |

| Comment Code | Commenter     | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 677 -1    | William Moore | wjmmoore@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 5:15 PM PT |
| I- 678 -1    | Larry Prior   | prior21us@gmail.com  | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 2/02/23 6:04 PM PT |
| I- 679 -1    | Gervin Obina  | obie1@msn.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 2/02/23 8:49 PM PT |

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| I- 680 -1    | Gary Dirks      | gary.d.dirks@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/02/23 8:51 PM PT |
| I- 681 -1    | Kathy Becker    | dlb1978kab@gmail.com   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/02/23 9:00 PM PT |
| I- 682 -1    | Valerie Lovejoy | starwoman_44@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/02/23 9:29 PM PT |

| Comment Code | Commenter  | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 683 -1    | Jim Fulton | morris98021@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 10:03 PM PT |
| I- 684 -1    | Lynne Ryan | pdlryan@gmail.com       | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 2/02/23 10:12 PM PT |
| I- 685 -1    | Dean Uota  | deanuota@gmail.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 10:13 PM PT |

| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
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| I- 686 -1    | Ray Orlowski  | thebigo99@comcast.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/02/23 11:01 PM PT |
| I- 687 -1    | Edythe Pavlov | edionasname@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/02/23 11:52 PM PT |
| I- 688 -1    | Ryan Miner    | rdminer33@gmail.com   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/03/23 12:06 AM PT |

| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 689 -1    | Tim Hartzell   | trhartzell@aol.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 1:31 AM PT |
| I- 690 -1    | Rhonda Rarrick | ronirene@yahoo.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 2/03/23 2:01 AM PT |
| I- 691 -1    | Tina Hixson    | jtcleaners409@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 2:43 AM PT |



| Comment Code | Commenter        | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 692 -1    | Melinda Gibelyou | mgibelyou@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 5:00 AM PT |
| I- 693 -1    | Robert Graham    | bambamrwg@hotmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                            | 2/03/23 6:51 AM PT |
| I- 694 -1    | Iwona Stoklosa   | iwonaspl@aol.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 7:12 AM PT |

| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
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| I- 695 -1    | Iwona Stoklosa  | iwonaspl@aol.com      | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 8:06 AM PT  |
| I- 696 -1    | Dennis Ragsdale | cegaw@comcast.net     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 2/03/23 8:46 AM PT  |
| I- 697 -1    | Diana Cutsforth | dmcutsforth@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 10:54 AM PT |

| Comment Code | Commenter      | Email                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
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| I- 698 -1    | Bardella Hurst | bardih@yahoo.com               | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/03/23 11:17 AM PT |
| I- 699 -1    | Tom Duren      | tom@3rdrockcontrols.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/03/23 12:00 PM PT |
| I- 700 -1    | Janet Hurt     | nfma@seattlefarmersmarkets.org | <p>Dear Washington State Department of Ecology,</p> <p>I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction.</p> <p>I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                            | 2/03/23 12:10 PM PT |

| Comment Code | Commenter         | Email                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 701 -1    | Ridge Marshall    | rmarshall@ewingandclark.com    | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                                          | 2/03/23 12:12 PM PT |
| I- 702 -1    | Loretta Gallagher | lhgallagher58@gmail.com        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/03/23 12:31 PM PT |
| I- 703 -1    | Ann Street        | annstreet500@gmail.com         | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 2:05 PM PT  |
| I- 704 -1    | Darrell Rodgers   | darrell.rodgers@kingcounty.gov | See attached comment letter from Dr. Darrell A. Rodgers, Division Director at PHSKC-EH.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2/03/23 2:18 PM PT  |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
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| I- 705 -1    | James Borgmann | j.p.borgmann@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/03/23 2:19 PM PT |
| I- 706 -1    | AC Churchill   | ac@earthministry.org   | <p>Dear Washington State Department of Ecology,</p> <p>I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction.</p> <p>I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                                   | 2/03/23 2:49 PM PT |
| I- 707 -1    | Leon Sojka     | leonsojka@yahoo.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 3:25 PM PT |

| Comment Code | Commenter              | Email               | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 708 -1    | Howard Donaghy         | hardlyables@msn.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 3:37 PM PT |
| I- 709 -1    | Jim Zinter             | jzinter@comcast.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 5:24 PM PT |
| I- 710 -1    | Dorothy Townsend-Tyers | sheesh@whidbey.com  | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water.</p> <p>There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                                          | 2/03/23 5:48 PM PT |

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|--------------|----------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 711 -1    | Bert Schippers | buhbuh66@earthlink.net | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/03/23 6:06 PM PT |
| I- 712 -1    | Deon Rodden    | deonarodd@gmail.com    | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 7:10 PM PT |
| I- 713 -1    | Rudy Ebert     | rebert2423@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 2/03/23 7:16 PM PT |



| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 714 -1    | Carol Love    | clove201@msn.com         | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 9:08 PM PT |
| I- 715 -1    | Lesley Arocho | lestertb57@gmail.com     | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/03/23 9:09 PM PT |
| I- 716 -1    | Nancy Francis | curlyfries56@hotmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 2/03/23 9:15 PM PT |

| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 717 -1    | Robert Helmick | roberthelmick@hotmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 2/04/23 2:16 AM PT |
| I- 718 -1    | Nathan Katsma  | topgun200118@gmail.com    | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/04/23 7:13 AM PT |
| I- 719 -1    | Lee Smith      | lvsjr@msn.com             | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/04/23 7:22 AM PT |

| Comment Code | Commenter       | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 720 -1    | Nancy Jorgensen | nancylynnjorgensen@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 7:50 AM PT |
| I- 721 -1    | SANDRA Renner   | sandyrenner@hotmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 8:30 AM PT |
| I- 722 -1    | Sandra Renner   | sa.dyrenner@hotmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 8:34 AM PT |

| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|---------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 723 -1    | Diane Wilkins | wilkinsd49@yahoo.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/04/23 9:43 AM PT  |
| I- 724 -1    | Elkins Sherry | gordonelkins@earthlink.net | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/04/23 10:01 AM PT |
| I- 725 -1    | Cindy Wood    | cinwoo63@gmail.com         | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/04/23 10:53 AM PT |

| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|----------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 726 -1    | Maria Eberlein | eberleinm@hotmail.com     | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 11:23 AM PT |
| I- 727 -1    | Glenn Hoopman  | gghoopman@aol.com         | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 2/04/23 11:37 AM PT |
| I- 728 -1    | Thomas Osimitz | tom@sciencestrategies.com | <p>February 2, 2023</p> <p>Washington Department of Ecology 300 Desmond Drive SE Lacey, Washington 98503</p> <p>Re: Draft Rule for Safer Products for Washington – Cycle 1 and flame retardants in plastic external enclosures for electric and electronic products</p> <p>Please see uploaded PDF. Thank you.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2/04/23 12:02 PM PT |
| I- 729 -1    | Arthur Gordon  | arthurgordon430@gmail.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families.</p> <p>In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                            | 2/04/23 12:18 PM PT |

| Comment Code | Commenter         | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 730 -1    | Yvonne Courtright | yvonnecourtright@yahoo.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 1:07 PM PT |
| I- 731 -1    | Pat Ronalder      | patcor1@comcast.net        | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 1:25 PM PT |
| I- 732 -1    | Andre Wooten      | dredogg87@gmail.com        | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                            | 2/04/23 1:26 PM PT |

| Comment Code | Commenter            | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|----------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 733 -1    | Bridget French       | bridgetbonnie2@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/04/23 1:56 PM PT |
| I- 734 -1    | Elizabeth Huntington | ehuntington7@aol.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 2/04/23 2:38 PM PT |
| I- 735 -1    | Carmen Unget         | carmen_unger@yahoo.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/04/23 3:59 PM PT |



| Comment Code | Commenter         | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|-------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 736 -1    | Michael Carter    | wsugradjan68@gmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/04/23 4:34 PM PT |
| I- 737 -1    | Gladys Heinzingwe | dgheinz@olypen.com        | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/04/23 4:40 PM PT |
| I- 738 -1    | Richard Widner    | grumpy.marine80@gmail.com | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/04/23 9:28 PM PT |

| Comment Code | Commenter        | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
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| I- 739 -1    | David Koski      | david@kosmosisland.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/04/23 11:50 PM PT |
| I- 740 -1    | Michelle Sargent | norasgirl@gmail.com    | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                   | 2/05/23 12:55 AM PT |
| I- 741 -1    | Maureen Callanan | mj6callanan@gmail.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p> | 2/05/23 1:21 AM PT  |

| Comment Code | Commenter        | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 742 -1    | Theresa DeLauder | tadelauder@yahoo.com | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                          | 2/05/23 2:55 AM PT |
| I- 743 -1    | Sandi Kamuf      | skamuf@msn.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 4:26 AM PT |
| I- 744 -1    | Sandi Kamuf      | skamuf@msn.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 4:27 AM PT |

| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 745 -1    | Susan McCullough | suemccullough54@yahoo.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 6:11 AM PT |
| I- 746 -1    | Glenyss Holmes   | glenysslh61@gmail.com     | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability.</p> <p>Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                                   | 2/05/23 6:56 AM PT |
| I- 747 -1    | Deborah Davis    | debwentny1@gmail.com      | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/05/23 7:27 AM PT |

| Comment Code | Commenter     | Email                           | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|---------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 748 -1    | Jeff Shelly   | jeffesanchez61@gmail.com        | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 7:48 AM PT |
| I- 749 -1    | Scott Pettit  | dillonwscott@aol.com            | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 2/05/23 8:38 AM PT |
| I- 750 -1    | Scott Andrews | flyfisherscott1961.17@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/05/23 9:00 AM PT |

| Comment Code | Commenter            | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted   |
|--------------|----------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 751 -1    | Rita Witte           | rmwitte@gmail.com       | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants.</p> <p>These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p> | 2/05/23 9:36 AM PT  |
| I- 752 -1    | Heidi gross          | hummergirl.hg@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 2/05/23 9:42 AM PT  |
| I- 753 -1    | katharina Veenendaal | klh116@aol.com          | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                   | 2/05/23 10:35 AM PT |

| Comment Code | Commenter       | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|-----------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 754 -1    | carlyn bickmore | c.bickmore@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 12:03 PM PT |
| I- 755 -1    | Jodi Pfeiffer   | jolpfe@gmail.com       | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 1:00 PM PT  |



| Comment Code | Commenter     | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|---------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 756 -1    | Barry Huber   | haley8826@hotmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 1:04 PM PT |
| I- 757 -1    | James Johnson | judijim@comcast.net   | <p>I am contacting you with deep concern about the policy proposal regarding consumer products. This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances. But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                 | 2/05/23 1:06 PM PT |
| I- 758 -1    | Jim Zinter    | jzinter@comcast.net   | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/05/23 1:09 PM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|----------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 759 -1    | Jim Talarico   | jtalarico1221@gmail.com  | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 2:14 PM PT |
| I- 760 -1    | Richard Branam | richard.branam@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment. This policy is just wrong for Washington. It could upend everyday life as we know it: Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us. Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/05/23 2:18 PM PT |
| I- 761 -1    | Hazen Haukur   | haukur.hazen@gmail.com   | <p>As a voice in my community, I have concerns about how this new policy proposal could impact families. In 2021 alone, there were nearly 10,000 house fires in Washington. Moreover, in 2021 the U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards. This policy removes a key tool in helping slow the spread of flames: flame retardants. These critical materials should not be removed from products. The proposal could make the products we use everyday less safe, while also disrupting the supply chain in our state, potentially impacting product availability. Please put Washington families first and not move forward with this policy proposal.</p>                                                                                                                                            | 2/05/23 2:44 PM PT |

| Comment Code | Commenter     | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|---------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 762 -1    | David Vally   | vally53@live.com       | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/05/23 4:14 PM PT |
| I- 763 -1    | Helen Gentry  | yesdiggitus@yahoo.com  | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/05/23 6:13 PM PT |
| I- 764 -1    | Donna Zickler | donnazickler@gmail.com | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 6:30 PM PT |

| Comment Code | Commenter       | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|-----------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 765 -1    | Robert Thatcher | robertthatcher44@gmail.com | <p>Im reaching out regarding the proposal under Safer Products for Washington related to the regulation of electronics and electrical equipment.</p> <p>This policy is just wrong for Washington. It could upend everyday life as we know it:</p> <p>Make it more challenging for product manufacturers to meet flammability requirements Potentially decrease performance in electronic products</p> <p>What Washingtonians need are policies that help keep us safe, not policies that could potentially increase safety risks to us.</p> <p>Please consider altering this extreme proposal so it doesnt make compromise product safety and make everyday life harder.</p>                                                                                                                                                                                                                   | 2/05/23 7:11 PM PT |
| I- 766 -1    | Judith Swanson  | sandjswanson27@gmail.com   | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products.</p> <p>In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk.</p> <p>This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics.</p> <p>Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high.</p> <p>Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 7:39 PM PT |
| I- 767 -1    | Stanley Willis  | stanwillis245@spectrum.net | <p>I am contacting you with deep concern about the policy proposal regarding consumer products.</p> <p>This policy could decrease access to electronic and electrical products in the state of Washington. And it could lead to a decrease in performance for some electronics and home appliances.</p> <p>But it's not just a matter of inconvenience. This is a matter of safety too. By removing flame retardants from electronics, you are potentially putting the products that Washington families use at greater risk of a fire. In 2021 alone, The U.S. Consumer Product Safety Commission recalled over 6.2 million units due to fire and shock hazards.</p> <p>I urge the Department of Ecology to go consider other avenues to address their concerns. This policy is bad for our state.</p>                                                                                        | 2/05/23 8:34 PM PT |

| Comment Code | Commenter     | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|---------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 768 -1    | Paul Cummins  | paulrc2@msn.com           | <p>As a Washington resident I am concerned with the policy proposal relating to electronic and electrical products. In todays world, we rely on these products to do the simplest tasks get ready for work, get directions on where to go, communicate, wash our clothes, etc. But by limiting flame retardants in these products, you could be unintentionally putting consumers at greater risk. This policy is just too extreme. Not only could it lead to a greater risk of fire, but it also could limit the products available for sale in Washington. It could also result in decreased performance of our electronics. Fire risk, product availability, and overall performance should be priorities. The negatives of this proposed policy are just too high. Please reconsider this proposal. There has to be a better way to address your concerns.</p> | 2/05/23 9:19 PM PT |
| I- 769 -1    | Melissa Lound | melissa.lound@gmail.com   | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                            | 1/20/23 3:38 PM PT |
| I- 770 -1    | Mike Conlan   | mickconlan@hotmail.com    | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                            | 1/20/23 5:16 PM PT |
| I- 771 -1    | Victoria Cole | wildlife.escape@gmail.com | <p>Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.</p>                                                                                                                                                                                                                                            | 1/20/23 5:18 PM PT |

| Comment Code | Commenter         | Email                           | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|-------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 772 -1    | katherine Carvlin | kleo9873@gmail.com              | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. | 1/20/23 5:20 PM PT |
| I- 773 -1    | John Hennessy     | john.charles.hennessy@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. | 1/20/23 5:21 PM PT |
| I- 774 -1    | Cornelia Teed     | joteed2000@yahoo.com            | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. | 1/20/23 5:23 PM PT |
| I- 775 -1    | Barbara Blackwood | barbara.bb@comcast.net          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. | 1/20/23 5:24 PM PT |

| Comment Code | Commenter          | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
|--------------|--------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 776 -1    | Sara Parsons       | snicholson16@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species.                                                                     | 1/20/23 5:28 PM PT |
| I- 777 -1    | Ondine Eaton       | ondine.eaton@outlook.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Ondine Eaton 18210 Mountain View Rd. NE Duvall, WA 98019 | 1/20/23 5:29 PM PT |
| I- 778 -1    | Carol Scott        | scottytravels7@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Carol Scott 901 E McLeod Rd Bellingham, WA 98226         | 1/20/23 5:30 PM PT |
| I- 779 -1    | Phyllis Villeneuve | lepsville@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Phyllis Villeneuve 5337 Fadling Rd SW Olympia, WA 98512  | 1/20/23 5:31 PM PT |



| Comment Code | Commenter       | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
|--------------|-----------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 780 -1    | Susan MacGregor | seesue@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Susan MacGregor 9504 169th Ave NE Redmond, WA 98052   | 1/20/23 5:37 PM PT |
| I- 781 -1    | Jen McGill      | jenrmcgill@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jen McGill 3638 Hat st Clinton, WA 98236              | 1/20/23 5:38 PM PT |
| I- 782 -1    | John Thompson   | mapleglen@aol.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, John Thompson 4953 Spinnaker Drive Freeland, WA 98249 | 1/20/23 5:38 PM PT |
| I- 783 -1    | Gill Fahrenwald | anvilman@orcalink.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Gill Fahrenwald PO Box 2323 Olympia, WA 98507         | 1/20/23 5:41 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 784 -1    | Vana Spear      | vanaluane@yahoo.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, vana spear 1805 204th PI SW Lynnwood, WA 98036                                                                                                                                                         | 1/20/23 5:42 PM PT |
| I- 785 -1    | Anna Smith      | innbytheferry@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Anna Smith 15334 179th Ave NE Woodinville, WA 98072                                                                                                                                                    | 1/20/23 5:48 PM PT |
| I- 786 -1    | Margaret Graham | magraham4@comcast.net     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Thank you for proposing these restrictions that will help make the environment safer for children and all of us as well as the environment. Thanks. Sincerely, Margaret Graham 7043 23rd Ave NW Seattle, WA 98117 | 1/20/23 5:49 PM PT |

| Comment Code | Commenter        | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
|--------------|------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 787 -1    | Diane Horn       | dhorneecs@aol.com            | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Diane Horn 202 W. Olympic Pl. Apt. 404 Seattle, WA 98119                         | 1/20/23 5:53 PM PT |
| I- 788 -1    | Lorraine Johnson | lorraine.d.johnson@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lorraine Johnson 13716 Lake City Way NE Seattle, WA 98125                        | 1/20/23 6:01 PM PT |
| I- 789 -1    | Brandie Deal     | laughsalot0579@yahoo.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Brandie Deal 301 225th St SW Bothell, WA 98021                                   | 1/20/23 6:07 PM PT |
| I- 790 -1    | Tina Kendall     | nahbee84@hotmail.com         | Dear Washington State Department of Ecology, Hello, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Tina Kendall Sincerely, Tina Kendall 10201 NE 58th St Vancouver, WA 98662 | 1/20/23 6:20 PM PT |

| Comment Code | Commenter     | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted  |
|--------------|---------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 791 -1    | Randy Guthrie | r_guth7@yahoo.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Randy Guthrie 7102 77th Ave se Snohomish, WA 98290                                              | 1/20/23 6:21 PM PT |
| I- 792 -1    | Linda Lindsay | llindsay@whidbey.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Linda Lindsay PO Box 112 Langley, WA 98260                                                      | 1/20/23 6:27 PM PT |
| I- 793 -1    | Shary B       | shary50@yahoo.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Shary B 1950 Alaskan Way Seattle, WA 98101                                                      | 1/20/23 6:29 PM PT |
| I- 794 -1    | Elizabeth Fry | bethyfry@hotmail.com | Dear Washington State Department of Ecology, Please follow the science and not the money!! I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elizabeth Fry 18505 Karl Rd Leavenworth, WA 98826 | 1/20/23 6:30 PM PT |

| Comment Code | Commenter        | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted  |
|--------------|------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 795 -1    | Lara Lorenz      | laralorenzkastner@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lara Lorenz 8312 21st Ave NW Seattle, WA 98117             | 1/20/23 6:35 PM PT |
| I- 796 -1    | Gregory Penchoen | gapenchoen@yahoo.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Gregory Penchoen 7616 320th St S Roy, WA 98580             | 1/20/23 6:37 PM PT |
| I- 797 -1    | Kristin Stewart  | kristinstewart01@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kristin Stewart 3345 Quail Creek Lane NE Olympia, WA 98516 | 1/20/23 6:39 PM PT |
| I- 798 -1    | John Lambert     | johnslambert55@gmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, JOHN LAMBERT PO Box 942 Carnation, WA 98014                | 1/20/23 6:40 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
|--------------|-----------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 799 -1    | Steve Dymoke    | thedymokes@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Steve Dymoke 4086 Crystal Springs Drive NE Bainbridge Island, WA 98110  | 1/20/23 6:48 PM PT |
| I- 800 -1    | Ruchi Stair     | ruchi.stair@outlook.com | Dear Washington State Department of Ecology, I urge you to use the strongest possible language in Safer Products for Washington, including all of the proposed restrictions and reporting requirements. Washingtonians deserve clean air and water--we must end the use of dangerous chemicals in products--such as PFAs, phthalates, OFR, OPFRs, and bisphenols-- that are building up in humans, wildlife, and in our food and water. There are safer solutions than toxins, and companies will respond only if the regulations clear require non-toxic solutions. Please move forward the proposed rule as soon as possible. Sincerely, Ruchi Stair 2227 N Nugent Rd Lummi Island, WA 98262      | 1/20/23 6:53 PM PT |
| I- 801 -1    | Lemoine Radford | lemoine52@gmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lemoine Radford 3603 E Lake sammamish Shore Lane SE Sammamish, WA 98075 | 1/20/23 7:07 PM PT |
| I- 802 -1    | Kerri Grace     | kerrigrace@hotmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kerri Grace 19314 Beall Rd SW Vashon, WA 98070                          | 1/20/23 7:13 PM PT |

| Comment Code | Commenter         | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
|--------------|-------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 803 -1    | Daniel Henling    | dhenling@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Daniel Henling 1412 NW 61st ST Apt 2 Seattle, WA 98107   | 1/20/23 7:14 PM PT |
| I- 804 -1    | Elyette Weinstein | elyette_w@yahoo.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, elyette weinstein 5000 Orvas Court SE Olympia, WA 98501  | 1/20/23 7:14 PM PT |
| I- 805 -1    | Cathleen Goshö    | tanuki45@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cathleen Goshö 20125 Fremont Ave. N. Shoreline, WA 98133 | 1/20/23 7:22 PM PT |



| Comment Code | Commenter      | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted  |
|--------------|----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 806 -1    | Qat Boaterre   | qqqqkt@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Qat Boaterre 4360 King Mountain Road Bellingham, WA 98226 | 1/20/23 7:30 PM PT |
| I- 807 -1    | Susan Vossler  | vosslerm1@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Susan Vossler 12945 64th Ave NE Kirkland, WA 98034        | 1/20/23 7:44 PM PT |
| I- 808 -1    | Cathleen Burns | commcomm2@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cathleen Burns 544 Seaview Ln Friday Harbor, WA 98250     | 1/20/23 7:45 PM PT |

| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 809 -1    | Dawnell DM       | dorotea.ana@gmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Dawnell DM 14921 93RD BLVD NE Bothell, WA 98011        | 1/20/23 8:04 PM PT |
| I- 810 -1    | Yogit Yonev      | yonityogev@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Yonit Yogev 821 Kaiser Rd NW Apt 2D Olympia, WA 98502  | 1/20/23 8:09 PM PT |
| I- 811 -1    | Denice Soundview | soundviewdenice@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Denice Soundview 8204 E Sommerset Dr Spokane, WA 99217 | 1/20/23 8:25 PM PT |

| Comment Code | Commenter           | Email                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|---------------------|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 812 -1    | Jennifer Schumacher | jenmariedoll@gmail.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jennifer Schumacher 611 Hawks Glen Dr SE Olympia, WA 98513                                                                                           | 1/20/23 8:27 PM PT |
| I- 813 -1    | Kate Kostal         | kkostal@gmail.com              | Dear Washington State Department of Ecology, I support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kate Kostal 13518 90th Ave NE Kirkland, WA 98034                                                                                                                   | 1/20/23 8:34 PM PT |
| I- 814 -1    | Linda Carroll       | lindalouise701184951@yahoo.com | Dear Washington State Department of Ecology, As an environmentally motivated voter and the daughter of a Rogers High School (Spokane) chemistry teacher, I support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Linda Carroll 215 West Waverly Place Spokane, WA 99205 | 1/20/23 8:41 PM PT |

| Comment Code | Commenter          | Email               | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
|--------------|--------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 815 -1    | William Hoffer     | sunengser@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, William Hoffer 420 SE Wyers St White Salmon, WA 98672 | 1/20/23 8:53 PM PT |
| I- 816 -1    | Eleanor van Noppen | vanwho@comcast.net  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Eleanor van Noppen 2708 30th Ave SE Olympia, WA 98501 | 1/20/23 8:53 PM PT |
| I- 817 -1    | Eleanor van Noppen | vanwho@comcast.net  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Eleanor van Noppen 2708 30th Ave SE Olympia, WA 98501 | 1/20/23 8:55 PM PT |
| I- 818 -1    | Terry Nightingale  | tnight@pobox.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Terry Nightingale 3617 23rd Ave W Seattle, WA 98199   | 1/20/23 8:59 PM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Comment Submitted  |
|--------------|----------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 819 -1    | Stephen Bailey | stilltruckinsb@yahoo.com | Dear Washington State Department of Ecology, YES! STOP THE POISONS!! WE ARE KILLING OUR WORLD AND OURSELVES WITH T H O U S A N D S OF POISONS! ONE LITERAL H E L L OF A WORLD WE ARE GIVING OUR CHILDREN AND FUTURE GENERATIONS! I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Stephen Bailey 4778 Edward Dr Deming, WA 98244 | 1/20/23 9:22 PM PT |
| I- 820 -1    | Janna Rolland  | jannarolland@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Janna Rolland 6227 34th Avenue NE Seattle, WA 98115                                                                                                                                                                                | 1/20/23 9:27 PM PT |
| I- 821 -1    | Rose Ochs      | rose.ochs@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Rose Ochs 18552 Springdale Ct. NW Shoreline, WA 98177                                                                                                                                                                              | 1/20/23 9:31 PM PT |

| Comment Code | Commenter   | Email                           | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted   |
|--------------|-------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 822 -1    | Daman Awla  | damanawla@gmail.com             | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Daman Awla 1805 29th Ave Seattle, WA 98122               | 1/20/23 9:52 PM PT  |
| I- 823 -1    | Jenny Hayes | pajamas70@yahoo.com             | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jenny Hayes 7038 26th Ave NW Seattle, WA 98117           | 1/20/23 10:04 PM PT |
| I- 824 -1    | Jayne Jonas | jaymejo1@msn.com                | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jayme Jonas 23402 NE 29th PI Sammamish, WA 98074         | 1/20/23 10:14 PM PT |
| I- 825 -1    | Nancy White | nancypendletonwhite@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Nancy White 13311 E Forrest Ave Spokane Valley, WA 99216 | 1/20/23 10:40 PM PT |

| Comment Code | Commenter     | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted   |
|--------------|---------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 826 -1    | Glen Anderson | glenanderson@integra.net | Dear Washington State Department of Ecology, VOTERS STRONGLY SUPPORT SAFER PRODUCTS!!!!!!!!!!!!!!!!!!!!!! WE URGE the Dept. of Ecology to DEVELOP AND IMPLEMENT VERY, VERY STRONG RULES for our SAFETY!!!!!!!!!!!!!!!!!!!!!! Your proposed Safer Products for Washington rule is a good start. WE MUST STOP USING DANGEROUS CHEMICALS in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Glen Anderson 5015 15th Ave SE Lacey, WA 98503 | 1/20/23 10:41 PM PT |
| I- 827 -1    | Roseanne L    | roseynseattle@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Roseanne L 516 High St Bellingham, WA 98225                                                                                                | 1/20/23 11:08 PM PT |
| I- 828 -1    | Elsa Pond     | elsapiekar@yahoo.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elsa Pond 2648 SEMINARY HILL RD CENTRALIA, WA 98531                                                                                        | 1/20/23 11:15 PM PT |



| Comment Code | Commenter          | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted   |
|--------------|--------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 829 -1    | Vicki Shaw         | vickishaw94@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Vicki Shaw 3627 Stone Way N Seattle, WA 98103          | 1/20/23 11:40 PM PT |
| I- 830 -1    | Denise Stotsenberg | deniselynda123@icloud.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Denise Stotsenberg 689 La Cana st Coupeville, WA 98239 | 1/21/23 12:04 AM PT |
| I- 831 -1    | Michael Rosen      | larrywang@duck.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Michael Rosen 5980 se 30th st Mercer island, WA 98040  | 1/21/23 12:57 AM PT |
| I- 832 -1    | David Arntson      | dchristiemusic@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, David Arntson 1615 208th St SE, #3 Bothell, WA 98012   | 1/21/23 1:03 AM PT  |

| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
|--------------|---------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 833 -1    | Rebecca Evans | celloevans@yahoo.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Rebecca Evans 632 NW 75th St Seattle, WA 98117              | 1/21/23 2:25 AM PT |
| I- 834 -1    | Nancy McMahon | n.mcmahon1@icloud.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Nancy McMahon 3123 Scotch Meadows Ct S.E. Olympia, WA 98501 | 1/21/23 4:20 AM PT |
| I- 835 -1    | Mary Goolsby  | goolsbyonwhidbey@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Mary Goolsby 4419 Crestmont Place Clinton, WA 98236         | 1/21/23 8:35 AM PT |
| I- 836 -1    | Sandra Martin | sandjomar@yahoo.com        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Sandra Martin 8330 22nd Ave NW Seattle, WA 98117            | 1/21/23 8:37 AM PT |

| Comment Code | Commenter    | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
|--------------|--------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 837 -1    | Cheryl Biale | cherylalab214@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cheryl Biale 7711 Greenridge St. SW Olympia, WA 98512    | 1/21/23 9:07 AM PT |
| I- 838 -1    | Leslie Rosen | lrthebeautybar@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Leslie Rosen 5980 SE 30th Street Mercer Island, WA 98040 | 1/21/23 9:07 AM PT |
| I- 839 -1    | Hillary Lipe | hillarylipo@gmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Hillary Lipe 12031 20th Ave Ne Seattle, WA 98125         | 1/21/23 9:08 AM PT |
| I- 840 -1    | Izaak Koller | izaak.koller@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Izaak Koller 7355 23rd Ave NW Seattle, WA 98117          | 1/21/23 9:37 AM PT |

| Comment Code | Commenter         | Email                 | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Comment Submitted   |
|--------------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 841 -1    | Justine Kamionsky | jkammy@hotmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Justine Kamionsky 1145 19th Ave E Seattle, WA 98112          | 1/21/23 9:39 AM PT  |
| I- 842 -1    | Elizabeth Sokol   | eli_sokol@yahoo.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elizabeth Sokol 17722 28th Ave NE Lake Forest Park, WA 98155 | 1/21/23 10:02 AM PT |
| I- 843 -1    | Don Worley        | mzee.worley@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Don Worley 1949 Hwy 25 South Kettle Falls, WA 99141          | 1/21/23 10:04 AM PT |
| I- 844 -1    | Elizabeth Tanner  | ziggybuddha2@aol.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elizabeth Tanner 337 Kruger rd Onalaska, WA 98570            | 1/21/23 10:36 AM PT |

| Comment Code | Commenter         | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted   |
|--------------|-------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 845 -1    | Telina Violette   | telinah@hotmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Telina Violette 1415 SE 5th Way Battle Ground, WA 98604 | 1/21/23 11:49 AM PT |
| I- 846 -1    | Scott Species     | sspecies@yahoo.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Scott Species 1922 9th Ave., # 401 Seattle, WA 98101    | 1/21/23 12:19 PM PT |
| I- 847 -1    | Fred Eschen       | chiwaukumfred@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Fred Eschen 18505 Karl rd Leavenworth, WA 98826         | 1/21/23 1:27 PM PT  |
| I- 848 -1    | Denise DeGabriele | degabforbes@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Denise DeGabriele 4015 54th Ave. SW. Seattle, WA 98116  | 1/21/23 1:40 PM PT  |

| Comment Code | Commenter       | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
|--------------|-----------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 849 -1    | K Eggers        | lullabyguy@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, K. Eggers 2353 Addy-Gifford rd Addy, WA 99101         | 1/21/23 3:01 PM PT |
| I- 850 -1    | Allison Ostrer  | aostrer@hotmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Allison Ostrer 2721 SW Trenton St Seattle, WA 98146   | 1/21/23 4:45 PM PT |
| I- 851 -1    | Phil Letourneau | plet@unm.edu         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Phil Letourneau 6227 34th Avenue NE Seattle, WA 98125 | 1/21/23 4:45 PM PT |
| I- 852 -1    | Cathleen Burns  | commcomm2@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cathleen Burns 544 Seaview Ln Friday Harbor, WA 98250 | 1/21/23 6:39 PM PT |



| Comment Code | Commenter              | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted   |
|--------------|------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 853 -1    | Jeanne Martin          | jcarolmartin@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jeanne Martin 1795 W Camp Sundown RD Bremerton, WA 98312        | 1/21/23 8:32 PM PT  |
| I- 854 -1    | Mike and Elledge       | v.elledge@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Mike and Elledge 15015 223rd Ave NE Woodinville, WA 98077       | 1/21/23 8:36 PM PT  |
| I- 855 -1    | Kathleen Quinn         | ksquinn61@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kathleen Quinn 429 2nd Ave W Seattle, WA 98129                  | 1/22/23 10:11 AM PT |
| I- 856 -1    | Susan and Peter Risser | srisser@rockisland.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Susan and Mr. Peter Risser 1822 Wold Rd Friday Harbor, WA 98250 | 1/22/23 10:42 AM PT |



| Comment Code | Commenter        | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Comment Submitted   |
|--------------|------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 857 -1    | Marjorie Ostle   | marjorieostle@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marjorie Ostle PO Box 218 Olga, WA 98279          | 1/22/23 10:57 AM PT |
| I- 858 -1    | J S              | snoodledoo@yahoo.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, J. S. 963 SE Ensign Pl, , College Place, WA 99324 | 1/22/23 11:08 AM PT |
| I- 859 -1    | Crispin Stutzman | crispin.stutzman@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Crispin Stutzman 2123 H St Bellingham, WA 98225   | 1/22/23 2:05 PM PT  |
| I- 860 -1    | Leah Eister      | leaheisterhargrave@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Leah Eister 2622 3rd Ave N Seattle, WA 98109      | 1/22/23 11:48 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted   |
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| I- 861 -1    | Derek Benedict  | dsbened@frontier.com    | Dear Washington State Department of Ecology, America has known about the hazards of man-made chemicals for over five decades. So I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Derek Benedict 709 212th PI SW Lynnwood, WA 98036 | 1/23/23 12:19 AM PT |
| I- 862 -1    | Jana Hobbs      | jankahobbs@outlook.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jana Hobbs 13506 NE 66th St Kirkland, WA 98033                                                                                        | 1/23/23 8:54 AM PT  |
| I- 863 -1    | Clayton Compton | claycompton@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Clayton Compton 10925 NE 37th PI Bellevue, WA 98004                                                                                   | 1/23/23 1:31 PM PT  |

| Comment Code | Commenter                  | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Comment Submitted   |
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| I- 864 -1    | Emily Lust                 | emilyrlust@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Emily Lust 4761 34th Ave NE Seattle, WA 98105                  | 1/24/23 9:25 AM PT  |
| I- 865 -1    | Natalie Schmidt            | missupstairs@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Natalie Schmidt 106 22nd Ave Apt 201 Seattle, WA 98122         | 1/24/23 12:25 PM PT |
| I- 866 -1    | Lucinda and Donald Wingard | wingardJL@comcast.net  | Dear Washington State Department of Ecology, Please support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. We support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lucinda and Donald Wingard 3604 121st St. Ct. NW, Gig Harbor, WA 98332 | 1/24/23 1:15 PM PT  |

| Comment Code | Commenter          | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted   |
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| I- 867 -1    | Terri Smith-Weller | t.smithweller@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. I want the environment to be as safe as possible for my grandchildren, not continuing to get more and more polluted. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Terri Smith-Weller 6553 4th Ave NW Seattle, WA 98117 | 1/24/23 7:48 PM PT  |
| I- 868 -1    | Lauren Rolfe       | rolfe.lauren@gmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lauren Rolfe 107 Dorffel Dr E seattle, WA 98112                                                                                                                           | 1/24/23 9:53 PM PT  |
| I- 869 -1    | Lisa Weber         | 45.lisa@gmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lisa Weber 15026 40th Ave W Apt 4-303 Lynnwood, WA 98087                                                                                                                  | 1/24/23 10:07 PM PT |

| Comment Code | Commenter          | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Comment Submitted   |
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| I- 870 -1    | Sarah Samnick      | sarahsamnick@gmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Sarah Samnick 7309 49th Ave. NE Seattle, WA 98115   | 1/25/23 3:21 PM PT  |
| I- 871 -1    | Keri Aron          | keriaron1975@gmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Keri Aron 193 Bennett rd Randle, WA 98377           | 1/26/23 7:53 AM PT  |
| I- 872 -1    | Mary Lou Dickerson | maryloudickerson@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Mary Lou Dickerson 719 N 68th St Seattle, WA 98103  | 1/26/23 10:50 AM PT |
| I- 873 -1    | Judith Mason       | Judithd.mason@comcast.net    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Judith Mason 2538 CRESTLINE DR NW OLYMPIA, WA 98502 | 1/26/23 1:00 AM PT  |

| Comment Code | Commenter          | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
|--------------|--------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 874 -1    | Jaime Moore        | jmmoore0818@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jamie Moore 3011 NE 116th St Vancouver, WA 98686        | 1/27/23 8:16 AM PT |
| I- 875 -1    | Jo Monahan         | thespiralway@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jo Monahan 519 W 5th St Port Angeles, WA 98362          | 1/27/23 7:57 PM PT |
| I- 876 -1    | Shelly Sumner      | shelly.sumner@icloud.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Shelly Sumner 4020 N Garfield Rd Spokane, WA 99224      | 1/29/23 1:08 PM PT |
| I- 877 -1    | Phyllis Villeneuve | lepsville@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Phyllis Villeneuve 5337 Fadling Rd SW Olympia, WA 98512 | 1/29/23 3:32 PM PT |

| Comment Code | Commenter          | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
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| I- 878 -1    | Therese Cushing    | cushing_nw@yahoo.com        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Therese Cushing 6429 224th Ave NE Redmond, WA 98053                                                                                                                                                                                                                                                                     | 1/29/23 4:27 PM PT |
| I- 879 -1    | Florence Ariessohn | fariessohn@gmail.com        | Dear Washington State Department of Ecology, I know you get form letters, but this one is different, because I am HIGHLY sensitive to chemicals and the off-gassing of all sorts of building materials, household products, etc. We need to protect everyone, not just the canary in the coal mine like me. I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Florence Ariessohn 5412 180th Ave E Lake Tapps, WA 98391 | 1/29/23 4:40 PM PT |
| I- 880 -1    | Lara Lorenz        | laralorenzkastner@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lara Lorenz 8312 21st Ave NW Seattle, WA 98117                                                                                                                                                                                                                                                                          | 1/29/23 6:23 PM PT |



| Comment Code | Commenter             | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
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| I- 881 -1    | Marjorie Ostle        | marjorieostle@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marjorie Ostle PO Box 218 Olga, WA 98279                 | 1/29/23 7:09 PM PT |
| I- 882 -1    | David Arntson         | dchristiemusic@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, David Arntson 1615 208th St SE, Unit 3 Bothell, WA 98012 | 1/29/23 8:32 PM PT |
| I- 883 -1    | Jayme Jonas           | jaymejo1@msn.com           | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jayme Jonas 23402 NE 29th PI Sammamish, WA 98074         | 1/29/23 9:02 PM PT |
| I- 884 -1    | Jeremy Harrison-Smith | jharrisonsmith@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jeremy Harrison-Smith PO Box 245 Clear Lake, WA 98235    | 1/29/23 9:20 PM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted   |
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| I- 885 -1    | Vana Spear     | vanaluane@yahoo.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, vana spear 1805 204th PI SW Lynnwood, WA 98036                                                                                                                                   | 1/29/23 9:23 PM PT  |
| I- 886 -1    | Kate Kostal    | kkostal@gmail.com    | Dear Washington State Department of Ecology, I support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. We must end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. Safer solutions exist which can be used in place of hazardous chemicals. These rules are critically important for moving companies in the right direction. I support the proposed rule as a vital next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kate Kostal 13518 90th Ave NE Kirkland, WA 98034                                                                                                                                                                  | 1/29/23 10:14 PM PT |
| I- 887 -1    | Derek Benedict | dsbened@frontier.com | Dear Washington State Department of Ecology, Big-Chem keeps coming out with all sorts of products that are toxic to humans, animals, and plants. And this needs to stop! So I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Derek Benedict 709 212th PI SW Lynnwood, WA 98036 | 1/30/23 12:40 AM PT |

| Comment Code | Commenter      | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
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| I- 888 -1    | Derek Benedict | dsbened@frontier.com      | Dear Washington State Department of Ecology, Big-Chem continues to develop all sorts of toxins that are fatal to humans, animals, and plants. And this needs to stop! So I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Derek Benedict 709 212th PI SW Lynnwood, WA 98036 | 1/30/23 12:41 AM PT |
| I- 889 -1    | Derek Benedict | dsbened@frontier.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Derek Benedict 709 212th PI SW Lynnwood, WA 98036                                                                                                                             | 1/30/23 12:45 AM PT |
| I- 890 -1    | Cheryl Biale   | cherylalab214@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cheryl Biale 7711 Greenridge St SW Olympia, WA 98512                                                                                                                          | 1/30/23 9:42 AM PT  |

| Comment Code | Commenter    | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted   |
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| I- 891 -1    | Anne Harvey  | anharvey13@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Anne Harvey 1075 Burchell Rd Coupeville, WA 98239     | 1/30/23 11:11 AM PT |
| I- 892 -1    | Marie Weis   | marieweis@yahoo.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marie Weis 248 Shorewood Ct Fox Island, WA 98333      | 1/30/23 11:54 AM PT |
| I- 893 -1    | Sheila Riffe | SHEILA.RIFFE@GMAIL.COM | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Sheila Riffe 7311 AUTUMN PARK DR SE Olympia, WA 98513 | 1/30/23 12:28 PM PT |

| Comment Code | Commenter       | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
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| I- 894 -1    | Pauline Osborne | pkrogst@hotmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. In addition to these proposed rules, I'd like to see hazardous flooring finishes like Swedish Finish reviewed and banned. This finish made by Glitsa, a local WA state company, off-gasses formaldehyde a toxic chemical that injured myself and 2 children. There is a lot of work to do to remove hazardous chemicals from various products. Having this and other toxic chemicals in products banned would have prevented us from having an environmental illness while also allowing us to more safely participate in society. Sincerely, Pauline Osborne 174 Tall Tree Way Sequim, WA 98382 | 1/30/23 1:19 PM PT |
| I- 895 -1    | Craig Zimmerman | dragonfly6160@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Craig Zimmerman 37306 244th Ave SE Enumclaw, WA 98022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1/30/23 1:42 PM PT |
| I- 896 -1    | Clayton Compton | claycompton@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Clayton Compton 10925 NE 37th Pl Bellevue, WA 98004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1/30/23 2:17 PM PT |

| Comment Code | Commenter        | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
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| I- 897 -1    | Amy Scott        | theamyscott@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Amy Scott 2426 NW 62nd St Seattle, WA 98107           | 1/31/23 7:43 PM PT |
| I- 898 -1    | Melissa Lound    | melissa.lound@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Melissa Lound 4720 38th Ave NE Seattle, WA 98105      | 2/01/23 4:48 PM PT |
| I- 899 -1    | Olivia Pond      | oliviampond@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Olivia Pond 2401 S Jackson St #5066 Seattle, WA 98144 | 2/02/23 1:58 PM PT |
| I- 900 -1    | Joseph A Yencich |                         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Joseph A Yencich 9117 NE 151st St. Bothell, WA 98011  | 2/02/23 2:55 PM PT |

| Comment Code | Commenter      | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Comment Submitted  |
|--------------|----------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 901 -1    | Robert Walling | Mayfaire5469@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Robert Walling 14100 Linden Ave. N. #471 Seattle, WA 98133                                      | 2/02/23 2:57 PM PT |
| I- 902 -1    | Karin Olefsky  | karino@gmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Karin Olefsky 3024 135th Ave NE BELLEVUE, WA 98005                                              | 2/02/23 3:00 PM PT |
| I- 903 -1    | Dena Fantle    | fantle@comcast.net     | Dear Washington State Department of Ecology, Hello, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Thank you for your support, Dena Fantle Sincerely, Dena Fantle 4722 130th Ave SE Bellevue, WA 98006 | 2/02/23 3:01 PM PT |
| I- 904 -1    | Laura Zerr     | godawgz5@msn.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Laura Zerr 33916 186th Ave SE Auburn, WA 98092                                                  | 2/02/23 3:02 PM PT |



| Comment Code | Commenter         | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Comment Submitted  |
|--------------|-------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 905 -1    | Thomas Angell     | twangell@msn.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Thomas Angell 621 S F St Spokane, WA 99224             | 2/02/23 3:04 PM PT |
| I- 906 -1    | Felicity Devlin   | felicitydevlin@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Felicity Devlin 2417 N Washington Tacoma, WA 98406     | 2/02/23 3:08 PM PT |
| I- 907 -1    | Brandon Juhl      | brandon.juhl@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Brandon Juhl 1731 70th PI SE Everett, WA 98203         | 2/02/23 3:13 PM PT |
| I- 908 -1    | Wendy Schonwetter | emeraldnew@comcast.net   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Wendy Schonwetter 4209 S 350th Street Auburn, WA 98001 | 2/02/23 3:20 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|-----------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 909 -1    | Erik LaRue      | pacific2626@gmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Erik LaRue 17598 Maiben Rd Burlington, WA 98233      | 2/02/23 3:24 PM PT |
| I- 910 -1    | Michelle Kelly  | mlakelly@hotmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Michelle Kelly 1132 2nd Ave S Edmonds, WA 98020      | 2/02/23 3:27 PM PT |
| I- 911 -1    | Jean Thornsby   | Jean_thornsby@hotmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jean Thornsby 36721 6th Ave SW Federal Way, WA 98023 | 2/02/23 3:31 PM PT |
| I- 912 -1    | Marlene Inverso | mjinverso@yahoo.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marlene Inverso 4336 Libby Rd. NE Olympia, WA 98506  | 2/02/23 3:32 PM PT |

| Comment Code | Commenter                  | Email                   | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Comment Submitted  |
|--------------|----------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 913 -1    | Tom Borst                  | theupriverrat@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Tom Borst 60857 state route 20 marblemount, WA 98267       | 2/02/23 3:36 PM PT |
| I- 914 -1    | Mike Sebring               | msebring@yahoo.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Mike Sebring 6023 39th Ave NE Seattle, WA 98115            | 2/02/23 3:44 PM PT |
| I- 915 -1    | Lucinda and Donald Wingard | wingardJL@comcast.net   | Dear Washington State Department of Ecology, We support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. We support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lucinda and Donald Wingard 3604 121st St. Ct. NW, Gig Harbor, WA 98332 | 2/02/23 3:49 PM PT |
| I- 916 -1    | Lora Mason                 | masonlo@comcast.net     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lora Mason 6011 Woodland Place North Seattle, WA 98103     | 2/02/23 3:55 PM PT |

| Comment Code | Commenter       | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Comment Submitted  |
|--------------|-----------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 917 -1    | Therese Cushing | cushing_nw@yahoo.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Therese Cushing 6429 224th Ave NE Redmond, WA 98053          | 2/02/23 4:01 PM PT |
| I- 918 -1    | Eleanor Dowson  | eleanordowson@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Eleanor Dowson 2007 Millpointe Drive SE Mill Creek, WA 98012 | 2/02/23 4:04 PM PT |
| I- 919 -1    | Alicia Gardner  | bcjay4@gmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Alicia Gardner 900 University St Apt 15R Seattle, WA 98101   | 2/02/23 4:05 PM PT |

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| I- 920 -1    | Bethanne Zelano | bzelano@gmail.com        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Bethanne Zelano 309 Crest Ln Bellingham, WA 98229        | 2/02/23 4:08 PM PT |
| I- 921 -1    | Danny Arguetty  | darguetty@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Danny Arguetty 111 14th Ave E Apt 12 Seattle, WA 98112   | 2/02/23 4:15 PM PT |
| I- 922 -1    | Ondine Eaton    | ondine.eaton@outlook.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Ondine Eaton 18210 Mountain View Rd. NE Duvall, WA 98019 | 2/02/23 4:16 PM PT |
| I- 923 -1    | C Lenihan       | c.lenihan@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, C Lenihan PO Box 4 Beaver, WA 98305                      | 2/02/23 4:18 PM PT |

| Comment Code | Commenter        | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted  |
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| I- 924 -1    | E Willey         | elainewilley@comcast.net | Dear Washington State Department of Ecology, Our family supports all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. Finding the safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. We support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, E Willey 19231 88th Ave West Edmonds, WA 98026               | 2/02/23 4:51 PM PT |
| I- 925 -1    | Marie Milo       | 2doves50@gmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marie Milo 15714 SE 178th PL Renton, WA 98058               | 2/02/23 5:05 PM PT |
| I- 926 -1    | Peg Wehrle       | marg.we52@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Peg Wehrle 604 Thomas St., NW Olympia, WA 98502             | 2/02/23 5:10 PM PT |
| I- 927 -1    | Heather Murawski | ndnwoman404@yahoo.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Heather Murawski 17929 W Spring Lake Dr SE Renton, WA 98058 | 2/02/23 5:23 PM PT |

| Comment Code | Commenter        | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Comment Submitted  |
|--------------|------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 928 -1    | Kathryn Lambros  | dklambros@comcast.net       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kathryn Lambros 8339 25th Ave NW Seattle, WA 98117                | 2/02/23 5:46 PM PT |
| I- 929 -1    | Charlene Donovan | charlene47donovan@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, CHARLENE DONOVAN 14800 NE 13TH CIRCLE VANCOUVER, WA 98684         | 2/02/23 6:02 PM PT |
| I- 930 -1    | Karen Ahern      | klahern@msn.com             | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Karen Ahern 10759 NE BillPoint Dr Bainbridge Island, WA, WA 98110 | 2/02/23 6:04 PM PT |



| Comment Code | Commenter     | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Comment Submitted  |
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| I- 931 -1    | Karen Ahern   | klahern@msn.com              | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Karen Ahern 10759 NE Bill Point Dr Bainbridge Island, WA 98110 | 2/02/23 6:05 PM PT |
| I- 932 -1    | Freya Horn    | horn.freya@yahoo.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Freya Horn 3223 NE 103rd St Seattle, WA 98125                  | 2/02/23 6:16 PM PT |
| I- 933 -1    | Darrell Scott | fiddler.rebound0d@icloud.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, darrell scott 1911 30th Ave S Seattle, WA 98144                | 2/02/23 6:25 PM PT |
| I- 934 -1    | Laurie Cooper | lcoop96@hotmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Laurie Cooper 1010 Carol Way Edmonds, WA 98020                 | 2/02/23 6:41 PM PT |

| Comment Code | Commenter          | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted  |
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| I- 935 -1    | Jen Mullen         | jenfaymullen@yahoo.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jen Mullen 7033 22nd Ave NW Seattle, WA 98117                 | 2/02/23 6:49 PM PT |
| I- 936 -1    | Sarah Beeson       | sarah.stoliker@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Sarah Beeson 930 9th St SW Puyallup, WA 98371                 | 2/02/23 7:21 PM PT |
| I- 937 -1    | Ann Marie Culliton | annieculliton@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Ann Marie Culliton 15721 Densmore Ave N Shoreline, WA 98133   | 2/02/23 8:05 PM PT |
| I- 938 -1    | Brian Venable      | brainscience2003@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Brian Venable 14300 Greenwood Ave N Apt 214 Seattle, WA 98133 | 2/02/23 8:11 PM PT |

| Comment Code | Commenter      | Email                    | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Comment Submitted  |
|--------------|----------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 939 -1    | Cheron Holman  | cherieholman@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cheron Holman 5525 60TH AVENUE NE SEATTLE, WA 98105                                                                                      | 2/02/23 8:24 PM PT |
| I- 940 -1    | Rebecca Burke  | rubyclare@aol.com        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Rebecca Burke 1007 N 42nd Street Seattle, WA 98103  | 2/02/23 8:53 PM PT |
| I- 941 -1    | John Lambert   | johnslambert55@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, JOHN LAMBERT PO Box 942 Carnation, WA 98014         | 2/02/23 8:58 PM PT |
| I- 942 -1    | Chris Landback | landbackc@gmail.com      | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Chris Landback 16220 8th Ave NE Shoreline, WA 98155 | 2/02/23 9:13 PM PT |

| Comment Code | Commenter          | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
|--------------|--------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 943 -1    | David Stetler      | davidhstetler@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, David Stetler 9916 NE 134th Ct Kirkland, WA 98034    | 2/02/23 9:32 PM PT  |
| I- 944 -1    | Denise Stotsenberg | deniselynda123@icloud.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Denise Stotsenberg PO Box 612 Coupeville, WA 98239   | 2/02/23 9:36 PM PT  |
| I- 945 -1    | Rebecca Glass      | bkglass@hotmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Rebecca Glass 18003 Stone Ave N Shoreline, WA 98133  | 2/02/23 10:04 PM PT |
| I- 946 -1    | Kevin Barras       | kevinbarras@hotmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kevin Barras 18589 111TH AVENUE E Puyallup, WA 98374 | 2/02/23 10:14 PM PT |

| Comment Code | Commenter          | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Comment Submitted   |
|--------------|--------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 947 -1    | Mark Bradley       | carthedral@msn.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Mark Bradley 2992 River road Sequim, WA 98382               | 2/02/23 11:17 PM PT |
| I- 948 -1    | Michelle Pavcovich | ladiabla333@hotmail.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Michelle Pavcovich 11351 20th Ave NE Seattle, WA 98125      | 2/02/23 11:47 PM PT |
| I- 949 -1    | Steven Reeves      | Steve@SolarBoy.org          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Steven Reeves 300 SE Weston Rd Shelton, WA 98584            | 2/03/23 12:46 AM PT |
| I- 950 -1    | Doris Wilson       | jodyhere24doris@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Doris Wilson 12711 NE 129th Court, G-104 Kirkland, WA 98034 | 2/03/23 1:35 AM PT  |

| Comment Code | Commenter           | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|---------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 951 -1    | Susan Ballinger     | skylinebal@gmail.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Susan Ballinger 2009 Skyline Dr Wenatchee, WA 98801                                                                                                                                  | 2/03/23 4:40 AM PT |
| I- 952 -1    | Elizabeth Sundquist | esundquist@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elizabeth Sundquist 8613 NE 169 Place Kenmore, WA 98028                                                                                                                              | 2/03/23 7:18 AM PT |
| I- 953 -1    | Colin Watson        | colinwats@hotmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. I would propose even stricter restrictions in hospitals and doctors offices. Both my wife and I are affected by these chemicals It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Colin Watson 1700 7th Ave 116 #227 Seattle, WA 98101 | 2/03/23 8:11 AM PT |



| Comment Code | Commenter          | Email             | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted   |
|--------------|--------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 954 -1    | Elizabeth Johnson  | libbo@comcast.net | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Elizabeth Johnson POB 707 Stevenson, WA 98648                                        | 2/03/23 8:12 AM PT  |
| I- 955 -1    | Janice Macarthur   | jkaym86@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Please this will save lives!! Sincerely, Janice Macarthur 1020 se Coffey rd Washougal, WA 98671 | 2/03/23 9:02 AM PT  |
| I- 956 -1    | Stephen Swanson MD | swnsnisle@aol.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Stephen Swanson MD 15203 SR 20 Coupeville, WA 98239                                  | 2/03/23 10:01 AM PT |
| I- 957 -1    | Florence           | flharty@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Florence 11/18/1985 1130 NW Baker Dr White Salmon, WA 98672                          | 2/03/23 10:16 AM PT |



| Comment Code | Commenter        | Email                     | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Comment Submitted  |
|--------------|------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 958 -1    | Jennifer McClure | thomjenmc@msn.com         | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jennifer McClure 6510 22nd ave nw Seattle, WA 98127  | 2/03/23 2:12 PM PT |
| I- 959 -1    | Ariana Knight    | arianaknight@hotmail.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Ariana Knight 7745 29TH AVE NE SEATTLE, WA 98115     | 2/03/23 2:54 PM PT |
| I- 960 -1    | Stephani Zador   | mgwd15@gmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Stephani Zador 2516 NE 91st street Seattle, WA 98115 | 2/03/23 3:20 PM PT |
| I- 961 -1    | Cheryl Harrison  | cherylpharrison@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Cheryl Harrison P o Box 337 Clear Lake, WA 98235     | 2/03/23 3:26 PM PT |

| Comment Code | Commenter      | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
|--------------|----------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| I- 962 -1    | Rebecca Evans  | celloevans@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Rebecca Evans 632 NW 75th St Seattle, WA 98117          | 2/03/23 4:08 PM PT |
| I- 963 -1    | John Birnel    | jbirnel@comcast.net  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, John Birnel 719 N 68th St Seattle, WA 98103             | 2/03/23 5:10 PM PT |
| I- 964 -1    | Seth Anderson  | rightwith@yahoo.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, seth anderson PO Box 1558 westport, WA 98595            | 2/03/23 5:16 PM PT |
| I- 965 -1    | Kateri Wimsett | kwimsett@msn.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, KATERI WIMSETT 2736 LANGRIDGE LOOP NW Olympia, WA 98502 | 2/03/23 9:12 PM PT |

| Comment Code | Commenter        | Email                | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
|--------------|------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 966 -1    | Shannon Haferman | haferclan@aol.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Shannon Hafermann 167 Cross Creek Lane Leavenworth, WA 98826  | 2/03/23 10:04 PM PT |
| I- 967 -1    | Katie Atkins     | ktalicekt@yahoo.com  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Katie Atkins 1815 30th Ave Seattle, WA 98122                  | 2/03/23 10:54 PM PT |
| I- 968 -1    | Sally Boyce      | sallyb43wa@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Sally Boyce 4335 NE 43rd St. Seattle, WA 98105                | 2/03/23 11:31 PM PT |
| I- 969 -1    | Denee Scribner   | deneec@yahoo.com     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Denee Scribner 16822 N Columbine Ct Nine Mile Falls, WA 99026 | 2/04/23 11:43 AM PT |

| Comment Code | Commenter       | Email                           | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Comment Submitted   |
|--------------|-----------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 970 -1    | Sohalia Ganje   | sohaliaganje@gmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, sohalia ganje 13725 56th Ave S Apt D211 Tukwila, WA 98168     | 2/04/23 12:19 PM PT |
| I- 971 -1    | Monica Guillot  | nikkiguillot@gmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Monica Guillot 6201 Northeast 56th Street Vancouver, WA 98661 | 2/04/23 1:16 PM PT  |
| I- 972 -1    | Jan Ellis       | janellis16@hotmail.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Jan Ellis 72 Kruse St Port Townsend, WA 98368                 | 2/04/23 5:26 PM PT  |
| I- 973 -1    | Eldon Broughton | broughtonconstruction@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, ELDON BROUGHTON 2403 WESTSHORE DR NE MOSES LAKE, WA 98837     | 2/04/23 5:51 PM PT  |

| Comment Code | Commenter     | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted   |
|--------------|---------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 974 -1    | Joyce Alonso  | Jbalonso3@msn.com          | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Joyce Alonso 2303 E 60th Spokane, WA 99223                                                                                               | 2/05/23 9:46 AM PT  |
| I- 975 -1    | Wendy Massey  | wendykunstmassey@yahoo.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, wendy massey 8636 great horned owl In blaine, WA 98230                                                                                   | 2/05/23 11:16 AM PT |
| I- 976 -1    | Duncan Massey | duncan.massey@gmail.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Duncan Massey 802 D St Blaine, WA 98230                                                                                                  | 2/05/23 11:27 PM PT |
| I- 977 -1    | Sean Edmison  | sedmison@hotmail.com       | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Please ban all "forever chemicals" through effective rulemaking and prompt enforcement. Sincerely, Sean Edmison 11820 167th PI NE Redmond, WA 98052 | 2/06/23 12:00 AM PT |

| Comment Code | Commenter        | Email               | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Comment Submitted   |
|--------------|------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 978 -1    | Tracy Hendershot | lichen@sprynet.com  | Dear Washington State Department of Ecology, It's time ... I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Tracy Hendershott 1314 4th PI KIRKLAND, WA 98033 | 2/03/23 10:23 PM PT |
| I- 979 -1    | Kevin Gallagher  | kevingal@uw.edu     | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Kevin Gallagher 15866 36th Ave NE Lake Forest Park, WA 98155   | 1/29/23 6:27 PM PT  |
| I- 980 -1    | Shelly Ackerman  | shellya@whidbey.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Shelly Ackerman 7228 Olin Place Clinton, WA 98236              | 1/26/23 10:32 PM PT |



| Comment Code | Commenter         | Email                  | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted   |
|--------------|-------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| I- 981 -1    | Danny Beatty      |                        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Danny Beatty 14833 Gibraltar Rd Anacortes, WA 98221       | 1/23/23 10:13 AM PT |
| I- 982 -1    | Joyce Weir        | jaweir@povn.com        | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Joyce Weir PO Box 973 Newport, WA 99156                   | 1/22/23 4:38 PM PT  |
| I- 983 -1    | Lorelette Knowles | lmk@rainforsoft.com    | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Lorelette Knowles 1010 Hoyt Ave, Apt. 4 Everett, WA 98201 | 1/21/23 3:12 PM PT  |
| I- 984 -1    | E Ellis           | harborsolar1@gmail.com | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, E Ellis 115 N K ST # 1701 Aberdeen, WA 98520              | 1/21/23 2:32 AM PT  |



| Comment Code | Commenter       | Email            | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Comment Submitted  |
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| I- 985 -1    | Kevin Gallagher | kevingal@uw.edu  | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Thank you. Sincerely, Kevin Gallagher 15866 36th Ave NE Lake Forest Park, WA 98155 | 1/20/23 7:36 PM PT |
| I- 986 -1    | Marianne Edain  | fh@whidbey.com   | Dear Washington State Department of Ecology, I am writing to support all of the proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end the use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals and these rules are critically important for moving companies in the right direction. I support the proposed rule as a critical next step in preventing pollution and protecting vulnerable populations and species. Sincerely, Marianne Edain Box 53 Langley, WA 98260                                 | 1/20/23 6:49 PM PT |
| I- 987 -1    | Den Mark Wichar | deedub@webtv.net | Dear Washington State Department of Ecology, I support all proposed restrictions and reporting requirements in the proposed Safer Products for Washington rule. It is critical to end use of dangerous chemicals in products that are building up in people, food, wildlife, and water. There are safer solutions that can be used in place of hazardous chemicals, and these rules are critically important for moving companies in the right direction. Sincerely, Den Mark Wichar 711 W 25 St Vancouver, WA 98660                                                                                                                                                                                | 1/20/23 5:15 PM PT |

| Comment Code | Commenter     | Email                          | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Comment Submitted   |
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| O- 1 -1      | Zhengmao Zhou | zhouzhengmao@126.com           | <p>We suggest removing the restriction and reporting requirements for the use of organohalogen flame retardants(OFRs) in the casings and enclosures of EEE products for the following reasons:</p> <p>1.<br/>Taking control of OFRs as a whole family is not in line with the suggestion from US National Academies of Sciences, Engineering and Medicine (NASEM), who released a study report in 2019, pointing out that OFRs used in consumer products cannot be made hazardous assessment as a single group; instead they should be sorted into 14 subgroups based on chemical structure, physicochemical properties, and predicted biologic activity. OFRs should be assessed not only in hazard but also in technical feasibility of alternatives as well as impacts on the industry. Thus, currently it is not desirable to conduct "one size fits all" control over OFRs.</p> <p>2.<br/>Restricting the use of OFRs is aimed to achieve "Safer Products". Although in some instances there might be alternatives to some sub-groups of OFRs for use in indoor EEE casings, substitutes are not always available. If product manufacturers are forced to use alternatives not well proven, it will undermine fireproof performance of the indoor EEE products and jeopardize consumers' life and property. Further, most of the alternatives may fail to make products safer for they are not vigorously assessed in health and environment risks.</p> <p>3.<br/>From the perspective of circular economy, the plastics with OFRs actually has its unique advantage in recycling and carbon footprint given consideration to its</p> | 1/16/23 8:49 AM PT  |
| O- 2 -1      | Benjamin Gann | ben_gann@americanchemistry.com | Attached are comments from the American Chemistry Council's North American Flame Retardant Alliance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1/18/23 10:15 AM PT |
| O- 3 -1      | Janan Rabiah  | janan@contracttextiles.org     | Please see the uploaded file for our comments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1/27/23 12:51 PM PT |

| Comment Code | Commenter   | Email         | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted  |
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| O- 4 -1      | Patrick Fox | pfox@bsef.org | <p>BSEF, the International Bromine Council, the global representative body for bromine producers and producers of bromine technologies, is deeply concerned by the Washington State Draft Rule targeting organohalogen flame retardants (OFRs) in electrical and electronic equipment (EEE).</p> <p>BSEF views the Draft Rule as unprecedentedly broad in scope, lacking a sound scientific base and critical technical considerations. The proposal is not supported by a comprehensive impact assessment and is inconsistent with other States' and third country legislation.</p> <p>BSEF calls on the Department of Ecology to amend the draft by significantly narrowing its scope in terms of OFRs and finished products covered. It also requests additional exemptions for battery powered (Li-ion) and cordless devices, as the cases of such products require flame retardants/fire safety measures to avoid any ignition in particular.</p> <p>Please find attached the BSEF detailed comments. Many thanks in advance for taking these into consideration.</p> <p>Kind regards, Patrick Head of Public Affairs &amp; Advocacy, BSEF.</p> | 1/30/23 2:46 AM PT |

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| O- 5 -1      | Robert Tabor | robert.tabor@carrier.com | <p>Regarding Proposed Rule Language "Chapter 173-337 WAC SAFER PRODUCTS RESTRICTIONS AND REPORTING" filed on Dec 7, 2022, NEW SECTION WAC 173-337-112 Flame retardants: Given that certain Life Safety system devices designed for long service lives require service or maintenance at infrequent but regular intervals may require the use of an ancillary hardwired product whose primary function is to provide power to the engaged device and to facilitate their removal as necessary for service and/or maintenance, and that certain Life Safety systems and devices connect wirelessly, we propose the following changes (pgs 11, 12 &amp; 13);</p> <p>On Pg 11, 12 - (1) Electric and electronic products with plastic external enclosures, intended for indoor use. (a) Applicability. (i) Priority consumer products. This subsection applies to electric and electronic products with plastic external enclosures, intended for indoor use that are powered by either of the following: (A) Standard 120 volt outlets and designed for up to 20 amp circuit; (B) Battery. (ii) This subsection does not apply to: (A) Electric and electronic products with plastic external enclosures, intended for outdoor use. (B) Consumer products that receive power only when they are hardwired into and permanently part of the fixed electrical wiring of a building. This includes wiring devices, control devices, electrical distribution equipment, and lighting equipment. (C) Life Safety, including fire alarm and security, systems &amp; devices</p> <p>On Pg 13 - (2) Electric and electronic products with plastic external enclosures, intended for outdoor use. (a) Applicability. (i) Priority consumer products. This</p> | 1/31/23 8:03 AM PT |

| Comment Code | Commenter    | Email                      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Comment Submitted  |
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| O- 6 -1      | Emi Yamamoto | emi.yamamoto@jeita.or.jp   | <p>JEITA (Japan Electronics &amp; Information Technology Industries Association) on behalf of the four Japanese electric and electronic industrial associations - JEITA, CIAJ, JBMIA and JEMA* would like to submit our comments to this proposed rule language for Safer Products for Washington published in December, 2022 in addition to previous comments submitted three times so far (at draft regulatory determination issued in December, 2021, regulatory determinations issued in June, 2022, and preliminary draft issued on August, 2022).</p> <p>We hope our comments would provide substantive information to the final rule language on HFRs in EEE that Ecology plans to adopt by June 1, 2023.</p> <p>We sincerely hope to collaborate with Ecology to ensure that the HFRs restrictions are implemented in a manner that reduces risks to humans and the environment while preserving social benefits for the present and future generations in Washington State. If you have any questions, please let me know without any hesitation.</p> <p>*Four Japanese Electric and Electronic Industrial Associations are as follows: JEITA (Japan Electronics &amp; Information Technology Industries Association), CIAJ (Communications and Information Network Association of Japan), JBMIA (Japan Business Machine and Information System Industries Association) and JEMA (Japan Electrical Manufacturers' Association).</p> | 1/31/23 9:21 PM PT |
| O- 7 -1      | Luke Harms   | luke_m_harms@whirlpool.com |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2/02/23 4:08 PM PT |

| Comment Code | Commenter      | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Comment Submitted   |
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| O- 8 -1      | Steve Kooy     | skooy@bifma.org              | <p>Thank you for the opportunity to provide comments on Chapter 173-337 WAC Safer Products Restrictions and Reporting. The Business and Institutional Furniture Manufacturers Association (BIFMA) supports over 200 businesses including ~100 small businesses - all are impacted by the proposed rule.</p> <p>BIFMA and its members have a rich history proactively supporting sustainable regulations and voluntary programs such as USGBC's LEED and IWBI's WELL. We strive to work with government and NGOs to implement practical, attainable requirements that drive consistency amongst the variety of regulations. The following comments reflect the views of BIFMA's membership.</p> <p>WAC 173-337-060 (2)(a)(i) Reporting requirements ?<br/>The timing indicates a start date of January 31st of the year after the effective date. We request a minimum of 12 months after the effective date to ensure adequate understanding and implementation time to meet the requirements. As written, it's possible an effective date could be September 2023 therefore less than 6 months to meet the requirements.</p> <p>WAC 173-337-060 (3)(b)(i) Reporting requirements ?<br/>Our experience indicates in many cases details such as CAS# and/or names of the chemicals are withheld by the supplier to protect proprietary information. We recommend a tiered reporting approach that requests CAS level information but allows chemical class level reporting and/or hazard level reporting (e.g. Greenscreen information).</p> <p>WAC 173-337-060 (3)(b)(i) Reporting requirements ?</p> | 2/03/23 8:54 AM PT  |
| O- 9 -1      | Judah Prero    | judah.prero@arnoldporter.com | The Chemical Users Coalition appreciates the opportunity to provide our feedback on the Washington Department of Ecology's Proposed Rule - Chapter 173-337 WAC - Safer Products Restrictions and Reporting. Our comments are attached.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2/03/23 9:47 AM PT  |
| O- 10 -1     | Kirsten McDade | kirstenm@resources.org       | Please see attached comment letter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2/03/23 10:58 AM PT |
| O- 11 -1     | Daniel Mustico | dmustico@opei.org            | Please see the attached comments of the Outdoor Power Equipment Institute. Thank you for the consideration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2/03/23 11:04 AM PT |
| O- 12 -1     | Derek Swick    | dswick@cancentral            | Greetings. Please see attached CMI comments on the WA Safer Products proposed rule. Please confirm receipt.<br>Best regards, Derek                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2/03/23 12:02 PM PT |
| O- 13 -1     | John Mavretich | jbmavretich@venable.com      | Attached please find comments submitted on behalf of the Resilient Floor Covering Institute (RFCI). Thank you for your consideration of these comments.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2/03/23 1:50 PM PT  |

| Comment Code | Commenter        | Email                                  | Comment                                                                                                                                                                                                                                                                                                                                                                              | Comment Submitted   |
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| O- 14 -1     |                  |                                        | Attached please find comments of the Resilient Floor Covering Institute on the Department of Ecology's proposed rule in connection with the Safer Products for Washington program. We also submitted these comments today through Ecology's online portal. Please let us know if you have any questions. Thank you                                                                   | 2/03/23 5:52 PM PT  |
| O- 15 -1     | Patrick Harmon   | patrick.harmon@basf.com                | Please see the attached file.                                                                                                                                                                                                                                                                                                                                                        | 2/04/23 7:56 AM PT  |
| O- 16 -1     | Jeff Wasil       | jwasil@nmma.org                        | Please see the attached comments. Thank you                                                                                                                                                                                                                                                                                                                                          | 2/04/23 2:57 PM PT  |
| O- 17 -1     | John Keane       | JKEANE@AHAM.ORG                        |                                                                                                                                                                                                                                                                                                                                                                                      | 2/05/23 5:46 AM PT  |
| O- 18 -1     | Lydia Jahl       | lydia@greensciencepolicy.org           | Please see attached file.                                                                                                                                                                                                                                                                                                                                                            | 2/05/23 9:54 AM PT  |
| O- 19 -1     | Shawn Swearingen | shawn_swearingen@americanchemistry.com | Over the Excel Size Limit                                                                                                                                                                                                                                                                                                                                                            | 2/05/23 12:32 PM PT |
| O- 20 -1     | Daniel Moyer     | dmoyer@cta.tech                        | Comments uploaded to file                                                                                                                                                                                                                                                                                                                                                            | 2/05/23 4:26 PM PT  |
| O- 21 -1     | Tim Shestek      | tim_shestek@americanchemistry.com      | Attached are comments from the American Chemistry Council (ACC). Thank you in advance for considering our views.                                                                                                                                                                                                                                                                     | 2/05/23 4:28 PM PT  |
| O- 22 -1     | Barbara Losey    | blosey@regnet.com                      |                                                                                                                                                                                                                                                                                                                                                                                      | 2/05/23 5:10 PM PT  |
| O- 23 -1     | Catherine Palin  | cpalin@autosinnovate.org               | See attached file.                                                                                                                                                                                                                                                                                                                                                                   | 2/05/23 5:23 PM PT  |
| O- 24 -1     | Pamela Miller    | pamela@akaction.org                    | Please see our comments as an attached pdf document.                                                                                                                                                                                                                                                                                                                                 | 2/05/23 6:29 PM PT  |
| O- 25 -1     | Bob Miller       | bob.miller@albemarle.com               |                                                                                                                                                                                                                                                                                                                                                                                      | 2/05/23 7:20 PM PT  |
| O- 26 -1     | Eileen Conneely  | eileen_conneely@americanchemistry.com  |                                                                                                                                                                                                                                                                                                                                                                                      | 2/05/23 9:37 PM PT  |
| O- 27 -1     | Ben Gann         | ben_gann@americanchemistry.com         | Please find the attached comments from the American Chemistry Council's (ACC) North American Flame Retardant Alliance (NAFRA) regarding the Draft Rule for Safer Products for Washington – Cycle 1.                                                                                                                                                                                  | 2/06/23 12:46 AM PT |
| G- 1 -1      | MaryAnn Hogan    | usatbtep@nist.gov                      | These comments are submitted on behalf of the Government of Korea, which appreciates the opportunity to provide comments regarding the "Proposed Rule of Safer Products Restrictions and Reporting of the state of Washington", notified by the United States under the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) as G/TBT/N/USA/1958. | 2/01/23 12:24 PM PT |



| Comment Code | Commenter     | Email                        | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Comment Submitted  |
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| G- 2 -1      | MaryAnn Hogan | usatbtep@nist.gov            | <p>These comments, which do not include any confidential business information (CBI), were provided to NIST (as the USA Notification Authority under the World Trade Organization Agreement on Technical Barriers to Trade - WTO TBT Agreement) by Ms. Emi Yamamoto of the secretariat of JEITA (Japan Electronics &amp; Information Technology Industries Association) on behalf of four Japanese electric and electronic industrial associations (JP4EE). The Safer Products for Washington Rulemaking Proposal was notified by the United States per obligation under the WTO TBT Agreement, and circulated by the WTO under the symbol G/TBT/N/USA/1958.</p> <p>The input/comments provided by JP4EE is based on their knowledge as EEE manufacturers, and they would very much appreciate careful consideration of their input. The Four Electrical and Electronics Associations that comprise JP4EE are as follows:</p> <p>JEITA (Japan Electronics &amp; Information Technology Industries Association) JEMA (Japan Electrical Manufacturers' Association) CIAJ (Communications and Information Network Association of Japan) JBMIA (Japan Business Machine and Information System Industries Association)</p> <p>Kind regards,<br/>Emi Yamamoto Deputy Manager, Technical Strategy Department Business Development and Strategy Division Japan Electronics and Information Technology Industries Association (JEITA)</p> | 2/01/23 1:18 PM PT |
| G- 3 -1      | Marla Oughton | marla.oughton@kingcounty.gov |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2/02/23 3:29 PM PT |
| G- 4 -1      | MaryAnn Hogan | usatbtep@nist.gov            | <p>These comments are submitted on behalf of P.R. China regarding the "Proposed Rule of Safer Products Restrictions and Reporting of the state of Washington", notified by the United States under the World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) as G/TBT/N/USA/1958. ZHAOMINGGANG China WTO/TBT National Notification &amp; Enquiry Center</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2/02/23 8:48 PM PT |
| G- 5 -1      | Zhao Minggang | tbt@customs.gov.cn           | <p>Dear USA WTO/TBT Enquiry Point: Please find attached the Comments from P. R. China on Notification G/TBT/N/USA/1958. Please acknowledge receipt of this email by return message. Many thanks for your consideration of these comments.</p> <p>Thank you.</p> <p>Yours faithfully ZHAOMINGGANG China WTO/TBT National Notification &amp; Enquiry Center</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2/03/23 5:46 PM PT |

| Comment Code | Commenter    | Email                       | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                           | Comment Submitted  |
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| G- 6 -1      | Ashley Evans | ashley.evans@kingcounty.gov | Please find attached Haz Waste's comment letter on the draft rule for Chapter 173-337 WAC. Please let me know if I need to submit this in a different way. Thanks!                                                                                                                                                                                                                                                                                | 2/01/23 4:55 PM PT |
| C- 1 -1      | Cheri Peele  | cpeele@toxicfreefuture.org  | Hello - I am trying to submit comments through the Ecology website on the draft reg for Toxic-Free Future and Clean Production Action. Unfortunately, the website seems to be hung up. Please find attached our comments here as a back-up, in case they do not go through on the website. If you need them in another format, please let me know. Thanks so much again for all the remarkable work Ecology has done on this proposed regulation. | 2/05/23 7:17 PM PT |