Memorandum

To: Safer Products for Washington Program
From: Laurie Valeriano, Cheri Peele & Megan Liu, Toxic-Free Future
Date: November 20, 2024
Re: Comments on Safer Products for Washington Cycle 2 Priority Products

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Polyvinyl chloride (PVC) and styrene-based materials are among the most problematic plastics in use today. The largest uses of two cancer-causing priority chemicals—vinyl chloride, a chlorinated substance, primarily used to produce PVC and ethylbenzene, a BTEX compound used to manufacture styrene—are critical to address under Safer Products for Washington (SPW). Both substances raise significant concerns due to their public health and environmental impacts, especially with respect to vulnerable communities and species. We request that significant sources of these cancer-causing chemicals be addressed in Cycle 2 of Safer Products for Washington, including PVC and ethylbenzene based-styrene in packaging and building materials, because safer, feasible available alternatives exist.

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1. **We request that PVC building materials, specifically flooring, in addition to PVC packaging, be named priority products for the following reasons:**
    - **PVC is a significant use of vinyl chloride for flooring.** PVC manufacturers produced 10 to 20 billion pounds of vinyl chloride in the U.S. in 2019.[1,2] PVC plays a major role in building and construction, accounting for 82% of the national PVC market. For 2023, industry estimates over 269 million pounds of PVC was produced for flooring in the U.S. or, scaling for population, 162 million pounds for use in Washington state alone.

    - **From extraction to disposal, PVC is considered one of the most toxic plastics, contributing to disproportionate impacts in low-income communities and communities of color.** Derived from fossil fuels contributing to climate change, the production of PVC also requires extremely hazardous chemicals. This includes vinyl chloride, a carcinogen whose own production depends on hazardous ethylene dichloride. These toxic chemicals used for PVC production pollute low-income communities and communities of color that live near PVC and vinyl chloride facilities across the U.S.[3]

      A 2024 report found that Cancer Alley, a section of Louisiana where numerous PVC/vinyl chloride facilities are located, is home to a census tract with the highest cancer risk from

[1] *United States Environmental Protection Agency. 2020 CDR Nationally Aggregated Production Volumes.*
[2] *United States Environmental Protection Agency. 2020 Manufacture-Import Information.*
[3] *M. Schade, "PVC Poison Plastic," 2023. [Online]. Available: https://toxicfreefuture.org/wp-content/uploads/2023/04/Report-PDF-PVC-Poison-Plastic-Investigation-4.pdf*

toxic air pollution in the U.S., over seven times greater than the national average. The report also found higher rates of adverse birth outcomes in Cancer Alley, including preterm birth, low birthweight, and infant mortality. Black residents were found to be disproportionately impacted by these already elevated risks of cancer, reproductive, and maternal health harms.

According to Material Research:

> "Since 2010, there have been at least 40 chemical incidents worldwide involving the production of vinyl chloride monomer and its derivative, polyvinyl chloride plastics. Reports reveal that these toxic chemical fires and explosions killed at least 71 people and injured 637 people."

Additionally, the tragic train derailment in East Palestine, Ohio, released nearly 900,000 pounds of vinyl chloride, sickening residents and first responders and contaminating entire communities.

- **PVC requires toxic additives that can leach out of products.** PVC requires additives that can be highly toxic and leach out of products. These additives are not chemically bound to plastic, and can migrate or leach out, exposing people when handling PVC products, or when they leach into indoor air, dust, or drinking water.

- **PVC microplastics are emerging as a dominant polymer in people.** A recent study published in October 2024 tested semen and urine samples from 113 male participants to identify and investigate which microplastics were impacting reproductive health and found PVC microplastics in 91% of samples. We know how widespread PVC is, and we now know it is building up in people's bodies and along with other types of microplastics, contributing to adverse effects upon reproductive health.

- **PVC is extensively used in affordable housing that is built with state funding.** PVC is widely used in affordable housing, particularly in flooring, where it has been introduced as a replacement for PFAS-containing carpets. In Cycle 1 of SPW, PFAS in carpet and phthalates in PVC flooring were banned, making it even more important for PVC in flooring to be addressed in Cycle 2. Research from Minnesota indicates that 97% of affordable housing projects that received state funding specify PVC flooring, a trend that is mirrored in Washington State. It is estimated that 3.3 million pounds of PVC are used annually in Washington's affordable housing sector, contributing to long-term health risks for residents. There is also an opportunity for Washington to use its resources to build affordable housing wisely, purchasing the safest materials for residents, communities, and the environment.

- **There are safer, feasible alternatives to PVC in flooring and other building materials.** Safer, feasible, available alternatives to PVC building materials include:

- **Flooring**: Alternatives to PVC flooring, such as linoleum and cork, are readily available. Products like Forbo Marmoleum Sheet, Gerflor DLW Urban Linoleum Sheet, and Granorte Kenkotrend Cork Plank have Health Product Declarations (HPDs) that ensure transparency about their material content and health impacts.
- **Windows**: Fiberglass and aluminum offer a safer alternative to PVC for windows. In Minnesota, 60% of affordable housing projects still specify PVC windows, but fiberglass is a widely available and more sustainable choice.
- **Siding**: Numerous options exist for non-PVC siding, such as wood, engineered wood, brick and fiber cement that are widely used in Washington, providing additional opportunities to reduce the use of hazardous PVC materials in building construction.

2. For the following reasons, we request that styrene-based plastic packaging and building insulation made from ethylbenzene be named as priority products.

- **The largest use of ethylbenzene is the production of styrene**. Ethylbenzene is a fossil fuel-based chemical that is classified as a possible human carcinogen and known to cause kidney, lung, and liver cancer in animal studies.[4] Over 99% of ethylbenzene produced is used in the production of styrene[5], and a reported 2.1 million pounds were released into air by U.S. facilities in 2022.[6] As a result, workers at production sites and frontline communities near styrene facilities are exposed to the harmful impacts of ethylbenzene.
- **Ethylbenzene can be found in styrene-based polymers:** The Children's Safe Products database contains 296 reports of ethylbenzene (past two year's reporting for OR and WA, attached) and 760 reports of styrene (past two years reporting OR/WA). For 90 brick-level products, companies reported the presence of both ethylbenzene and styrene in synthetic polymers. In most cases, these brick level products include multiple reports for both ethylbenzene and styrene in synthetic polymers. Additionally, reports evaluating methods for polystyrene recycling found the presence of ethylbenzene along with styrene in samples from post-consumer polystyrene containers. One report from 2023 found average levels of 10.5 ppm of ethylbenzene and 138 ppm of styrene in

[4] *United States Environmental Protection Agency, Ethylbenzene. https://www.epa.gov/sites/default/files/2016-09/documents/ethylbenzene.pdf.*

[5] *IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. 2000. Some Industrial Chemicals. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, No. 77. Ethylbenzene. Available: https://www.ncbi.nlm.nih.gov/books/NBK390915/*

[6] *United States Environmental Protection Agency, 2022. TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), top 100 facilities (of 1463) for facilities in All Industries, for Ethylbenzene chemical, U.S., 2022.*

polystyrene flakes from containers[7], while another from 2024 found an average or 11.86 ppm of ethylbenzene and 100.80 ppm of styrene.[8]

- **Packaging is a significant use of styrene-based plastic (polystyrene) made from ethylbenzene which can leach from food packaging.** Over 2 billion pounds of polystyrene packaging were consumed in the U.S. in 2023 according to industry estimates. Polystyrene is used in products like coffee lids, sushi trays, and packing materials, and could become a regrettable substitute for PVC if not properly addressed. Washington has already banned certain types of polystyrene food packaging, but other forms of rigid styrene-based plastics remain prevalent.

  Ethylbenzene has also been found to leach from polystyrene packaging into food[9], generating further concern around the use of this toxic chemical almost solely made for styrene. Furthermore, ethylbenzene has been detected in human bodies. This underscores the urgent need for action to reduce the use of ethylbenzene and other hazardous chemicals in food packaging.
- **Styrene-based plastics are more toxic than other plastic polymers.** Testing of black plastic household products by Toxic-Free Future in 2024 found that styrene-based plastic such as acrylonitrile butadiene styrene (ABS) and high impact polystyrene (HIPS) contained higher levels of harmful flame retardants than non-styrene-based plastic. Flame retardants are added to styrene-based plastic used in electronics, which are contaminating household products through electronic-waste recycling. The highest level of deca-BDE, a banned flame retardant, was detected in a sushi tray at 11,900 ppm.[10]
- **There are safer packaging alternatives already identified by Ecology in the PFAS food packaging alternatives assessment and Cycle 1 of SPW.** Ecology can build on existing work, saving resources and identifying safer alternatives. There are safer alternatives to both PVC and styrene for packaging applications, many of which are already in use. Alternatives include:
  - **Polylactic Acid (PLA)**: A bio-based plastic made from lactic acid, a safer alternative and renewable resource. PLA is biodegradable under industrial composting conditions and presents a safer alternative to conventional plastics for food packaging. NatureWorks produces a biopolymer made of PLA that is GreenScreen Certified and used to produce food packaging.

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[7] *Kellar & Heckman, 2023. First Report on the Novel Technology "INEOS STYROLUTION Twin Screw Degassing Extrusion" According to Article 13(4) of the Commission Regulation (EU) 2022/1616.*

[8] *Keller & Heckman, 2024. Second Report on the Novel Technology "INEOS STYROLUTION Twin Screw Degassing Extrusion" According to Article 13(4) of the Commission Regulation (EU) 2022/1616. 5.*

[9] *C. Thaysen, K. Stevack, R. Ruffolo, D. Poirier, H. De Frond, J. DeVera, G. Sheng, Rochman, C., 2018. Leachate From Expanded Polystyrene Cups Is Toxic to Aquatic Invertebrates (Ceriodaphnia dubia). Frontiers.*

[10] *M. Liu et al. From e-waste to living space: Flame retardants contaminating household items add to concerns about plastic recycling. 2024. Available: https://doi.org/10.1016/j.chemosphere.2024.143319*

    - **Aluminum**: Widely recyclable and durable, aluminum offers a non-toxic alternative to PVC and styrene-based packaging, particularly in applications like food containers and beverage cans.
- **Building materials are a significant use of styrene-based plastic (made from BTEX substances).** Globally, packaging and building construction are the two largest sectors of polystyrene accounting for 30% of production each. Industry reports show that in 2023, 109 million pounds of polystyrene and 371 million pounds of expanded polystyrene were distributed for use in the building and construction sector. Both extruded polystyrene and expanded polystyrene are commonly used for insulation, due to their high thermal resistance and ability to retain heat. The presence of polystyrene insulation in our built environment is concerning given that it is a hazardous plastic made from ethylbenzene and benzene.
- **Ecology is already considering naming insulation as a priority product for organohalogen flame retardants.** Replacing harmful flame retardants with safer ones can help reduce some exposures from insulation, however by addressing polystyrene-based plastics made from BTEX substances (ethylbenzene) and organohalogen flame retardants together Ecology can better protect health and the environment.
- **Safer alternatives to polystyrene-based insulation (made from BTEX substances) exist. There are several uses of styrene-based insulation that can be replaced with safer, feasible and available alternatives, including:**
    - Styrene-based board insulation can be replaced by mineral wool batt insulation in wall cavities.
    - Styrene-based board insulation on a building's exterior above grade, in addition to foundation walls and under slab insulation can be replaced by mineral wool boards as advertised here:
        - https://www.rockwool.com/north-america/resources-and-tools/guides/below-grade-application-guide/
        - https://www.rockwool.com/north-america/products-and-applications/floor-insulation/under-slab-insulation/
    - Other board insulation that can be used for some applications (e.g. exterior continuous) are expanded cork boards, and wood fiber boards.

Conclusion

Washington State has the opportunity to lead the way in reducing its reliance on hazardous materials like PVC and ethylbenzene-based styrene plastics.