Final Regulatory Analyses:

Including the:

- Final Cost-Benefit Analysis
- Least-Burdensome Alternative Analysis
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

Chapter 173-337 WAC

Safer Products Restrictions and Reporting

By

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For the

Hazardous Waste and Toxics Reduction Program

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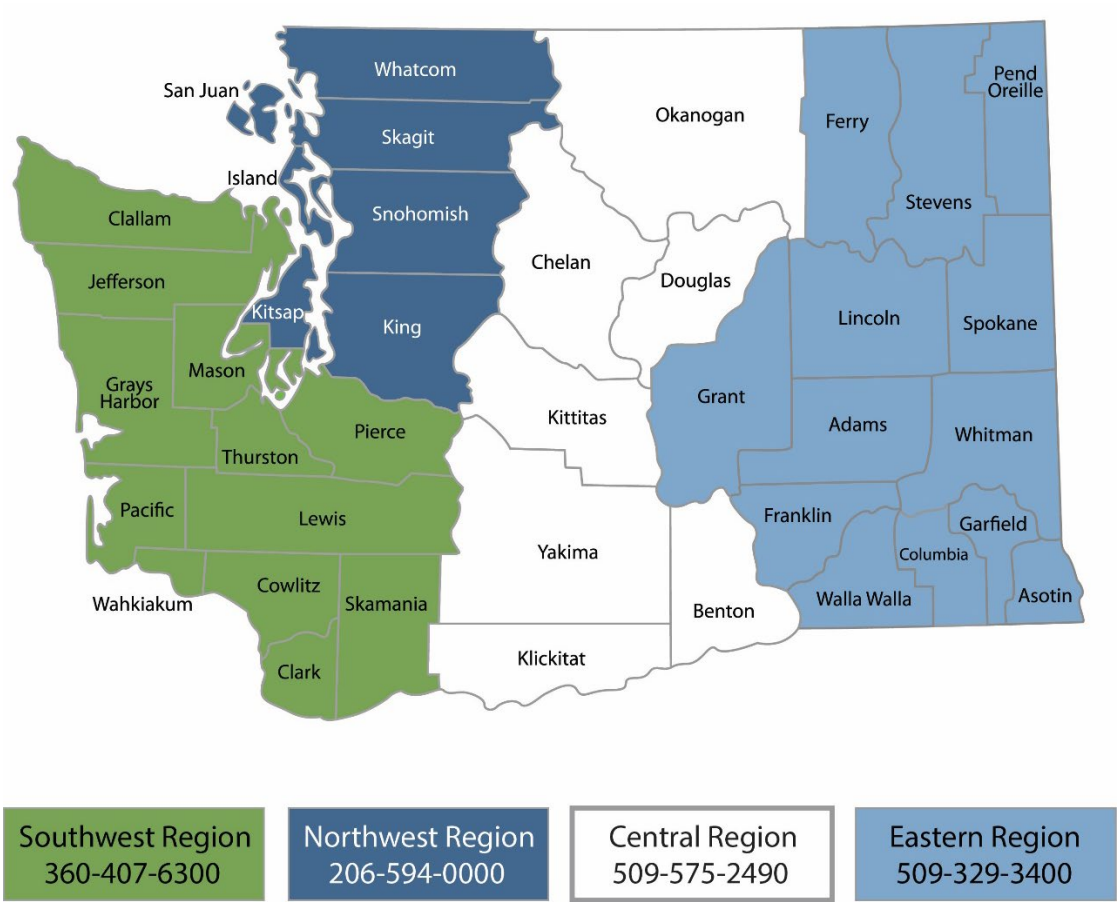

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Chapter 173-337 WAC, Safer Products Restrictions and Reporting

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DEPARTMENT OF
ECOLOGY
State of Washington

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Abbreviations

APA	The Washington Administrative Procedure Act
APEs	Alkylphenol ethoxylates
CBA	Cost-Benefit Analysis
CHCC	Chemicals of high concern to children
DTSC	California's Department of Toxic Substances Control
HPCDS	High Priority Chemicals Data System
IC2	Interstate Chemical Clearinghouse
LBA	Least-Burdensome Alternative Analysis
NAICS	North American Industry Classification system
NPEs	Nonylphenol/nonylphenol ethoxylate
OPFRs	Organophosphate flame retardants
PFAS	Per- and Polyfluoroalkyl Substances
PRA	Preliminary Regulatory Analyses
RCW	Revised Code of Washington
RFA	Washington Regulatory Fairness Act
TMBPF	Tetramethyl bisphenol F

Executive Summary

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the Safer Products Restrictions and Reporting rule (Chapter 173-337 WAC; the "rule"). This includes the:

- Final Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to "determine 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 law being implemented." Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to "determine, after considering alternative versions of the rule…that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives" of the governing and authorizing statutes. Chapter 6 of this document describes that determination.

The APA also requires Ecology to make several other determinations (RCW 34.05.328(1)(a) – (c) and (f) – (h)) about the rule, including authorization, need, context, and coordination. Appendix A of this document provides the documentation for these determinations.

The Washington Regulatory Fairness Act (RFA; Chapter 19.85 RCW) requires Ecology to evaluate the relative impact of rules that impose costs on businesses in an industry. It compares the relative compliance costs for small businesses to those of the largest businesses affected. Chapter 7 of this report documents that analysis, when applicable.

RCW 70A.350.050 requires Ecology to:

- Identify priority chemicals[2] (Phase 1).
- Identify priority consumer products that are a significant source of or use of priority chemicals (Phase 2).
- Determine regulatory actions to increase transparency and to reduce the use of priority chemicals in priority consumer products (Phase 3).
- Adopt rules to implement regulatory actions determined in Phase 3 (Phase 4).

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[2] Phase 1 of cycle 1 of the Safer Products program - Priority chemical identification, is determined by the law and includes the following chemicals or chemical classes: Perfluoroalkyl and polyfluoroalkyl substances; Phthalates; Organohalogen flame retardants; Flame retardants, as identified by the department under Chapter 70A.430 RCW; Phenolic compounds; Polychlorinated biphenyls.

The rule developed in Phase 4 contains specific provisions identified in Phase 2 and regulatory actions determined in Phase 3, including:

- Refining or narrowing the scope of products to which the regulatory actions apply.
- Outlining compliance timelines for when restrictions and reporting requirements take effect.
- Determining concentration limits for priority chemicals in priority products.
- Including exemptions or exceptions to a restriction on a priority chemical in a priority consumer product (as RCW 70A.350.040 authorizes).

The rule would make the following changes:

- Restricting specific priority chemicals in designated priority consumer products.
- Requiring reporting use of specific priority chemicals in designated priority consumer products.

Costs

We expect the rule to impact costs and the health of humans and the environment.

We expect these requirements to result in costs to manufacturers, sellers (including but not limited to wholesale, online, or retail), and distributers of priority consumer products containing priority chemicals in Washington state. The costs would occur because some of the covered parties would have to reorient their production and investment patterns, and some would have to reconfigure their supply chains.

- For some product categories, manufacturers would be required to integrate or develop new chemistries, redesign, or reformulate the product, and recertify new products.
- Another main factor is the time needed to redesign products, so they meet safety standards, performance requirements, and aesthetic preferences.
- In some instances, we expect decreased costs (benefits) for business, such as when product redesign eliminates the need for added chemicals. This would mean that a manufacturer would skip the step of adding a chemical to the production process.

Because of the lack of data on the sales volume of consumer products containing or not containing the priority chemicals, we took an approach that is based on the dollar amount of the US sales[3] for North American Industry Classification system (NAICS)[4] groupings corresponding to priority consumer product categories in the rule.

We adjusted the national sales volumes to the relative population size of Washington state[5].

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[3] Dun & Bradstreet database. 2022.

[4]North American Industry Classification system (NAICS). https://www.census.gov/naics/

[5] Based on the 2020 US census data. https://data.census.gov

When available, we used the market share of alternatives or consumer products restricted in other jurisdictions to determine the amount of losses due to restrictions on consumer products containing priority chemicals. There may be different factors for why a business would lose its share. For example, if all manufacturers attempted to switch to a particular alternative chemical, but it is not sufficiently available to meet that demand in a timely fashion, a subset of these manufacturers may lose market share while the chemical supply adjusts. Conversely, some manufacturers may have already switched to alternatives, or may switch before the effective date of the rule, and could gain market share. In many cases, we rely on California's Safer Consumer program data that requires reporting of several priority chemicals intersecting with the contents of the rule.

When identifying a share of priority chemicals in priority consumer products was not possible because components and ingredients of specific products are often a part of "trade secrets," we undertook the following steps for estimating cost:

- We adjusted the national sales volumes of products to the relative population size of the Washington state (Based on the 2020 US census data. https://data.census.gov).
- We developed potential compliance scenarios for each product (compliance share presented in Table 17) based on the literature and available information.
- We assumed that the manufacturers who cannot switch by the effective date of the rule, will lose market share. We note this is an overly-conservative approach, as it does not account for the rule's exemption option.

We estimated potential costs based on the possible maximum sales loss due to manufacturers inability to switch by the effective date of the rule.

All costs are aggregated as a stream of their annual present values (PV) in the 20-year horizon, although the costs would occur only in a few years based on our scenarios, and for most of the years after 2025, the annual costs would be zero.[6] The cost occurrence is triggered by the rule adopted in May 2023. This would allow businesses to start making decisions on how fast (if at all) they would need to make the shift to an alternative. In all cases, the low range of compliance is considered to be zero, because of the postponed effective dates of the rule and allowing the use of stock manufactured before that date.

The maximum range assumes manufacturers cannot switch by the effective date of the rule, and lose market share. While this scenario could happen for some manufacturers, the effective dates of the rule were set based on stakeholder feedback to avoid this scenario. Therefore, the

[6] All Ecology analyses look at a 20-year time span from the time of rule adoption, which is typically enough time to reflect consequences of a rulemaking. This standard is consistent with principles in federal guidance and historic analytical practices. Present value defined as the value of a consequence occurring at the present time that has the same effect on wellbeing as the future consequence and calculated by discounting the monetary value of each future consequence by a factor that depends on the date it occurs. Ecology calculates present values based on a real discount rate of 0.89 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2022).
http://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm

maximum costs represent a worst-case scenario.

Table 1. Average annual costs per business *in worst-case scenario* for the restriction of specific priority chemicals in designated priority consumer products, 5-year adaptation.

Chemical	Industry	Assumed share to switch, %	Possible maximum sales loss (millions $)	Maximum lost wholesale markup (millions $)	Number of businesses	Maximum annual cost per business
PFAS	**Aftermarket stain and water resistance treatments**	**15**	**$2.9**	**$0.6**	**209**	**$2,780**
PFAS	**Carpet and rugs**	**5**	**$11.8**	**$2.4**	**464**	**$5,067**
PFAS	**Leather and textile furnishings**	**50**	**$77.4**	**$15.5**	**1,139**	**$13,595**
Ortho-Phthalates	**Personal care and beauty products (fragrance)**	**5**	**$293.9**	**$58.8**	**4,357**	**$13,489**
Ortho-Phthalates	**Vinyl flooring**	**2.4**	**$46.8**	**$9.4**	**5,036**	**$1,859**
Organohalogen Flame retardants	**Electric and electronic equipment (plastic device casings)**	**50**	**$95.8**	**$19.2**	**3,388**	**$5,656**
Flame retardants	**Recreational polyurethane foam products**	**64**	**$212.7**	**$42.5**	**792**	**$53,719**
APE	**Laundry detergent**	**95**	**$455.5**	**$91.1**	**519**	**$175,544**
Bisphenols	**Drink can linings**	**5**	**$25.1**	**$5.0**	**352**	**$14,242**
Bisphenols	**Thermal paper**	**50**	**$11.5**	**$2.3**	**256**	**$8,994**
Total	**n/a**	**n/a**	**$1223.4**	**$285.0**	**n/a**	**n/a**

Benefits

In Chapter 4 we qualitatively and quantitatively described the benefits of the rule. The general conclusion is that the restriction of chemicals in specific product categories would reduce a significant source of exposure to these chemicals for people and the environment. Potential benefits could include reduced cancer rates, reduction in diseases associated with endocrine disruption, improved reproductive health, better birth and child development, and improved aquatic health.

Many of the priority chemicals are associated with human diseases and environmental impacts. To identify potential benefits, we calculated the costs of diseases associated with priority chemicals. We assume the reduction in exposure to priority chemicals due to the rule will contribute to a reduction in diseases and potential costs. However, we're exposed to priority

chemicals from many different consumer products, not just those identified as priority consumer products. We don't know exactly what proportion of human and environmental exposure each consumer product contributes so it is not possible to know how much these actions will reduce disease. This is why we have presented the benefits as a range.

We were able to partially quantify the benefits of the rule. The results are shown in the table below.

Table 2. Partial quantification of the benefits (avoided costs) for certain chemical classes.

Chemical class	Low, million $	High, million $
PFAS	**$110**	**$1,252**
Ortho-phthalates	**$798**	**$942**
Flame retardants	**$780**	**$780**
Bisphenols	**$2,618**	**$2,618**
APEs	**See qualitative discussion**	**See qualitative discussion**

Information on the presence of the priority chemicals, from the reporting requirements in the rule, will help consumers make more efficient consumption choices relative to their preferences, by reducing uncertainty for consumers in their purchasing decisions. To the extent that some consumers have a preference for products that pose less risk associated with the chemicals of concern, without the rule consumers may not have the information to identify preferred products. Ecology expects that the combination of increased knowledge about these chemicals, combined with increased knowledge of their presence in products, will benefit consumers in their ability to behave in line with their full set of preferences for product attributes and risk.

This will likely also result in informational benefits for government decision-making, reducing potential health impacts and litigation, and improving industry understanding of the presence of these chemicals across the supply chain. This knowledge would also serve as a deterrent for uses where safe alternatives are available.

Cost-benefit comparison

The APA requires Ecology to, "Determine 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." We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the rule (summarized in the previous section), as compared to the baseline, that the benefits of the rule are likely greater than the costs. Many benefits of the rule were not fully quantifiable, due to data scarcity or confidentiality, as well as the degree of granularity in available data. To attempt to illustrate the scope of benefits when uncertainty constrained our ability to quantify or monetize these impacts, we provided available quantification and/or monetization of related or scaled impacts that would benefit from reduced contributions of chemical exposure under the rule. Under the APA requirement quoted above, qualitative benefits and costs should be considered in conjunction with those that we were able to quantifiably estimate.

Table 3. Cost-Benefit comparison.

Chemical class	Costs*; High, million $	Benefits; Low, million $	Benefits; High, million $
PFAS	**$92.1**	**$110**	**$1,252**
Ortho-phthalates	**$340.7**	**$798**	**$942**
Flame retardants	**$308.5**	**$780**	**$780**
Bisphenols	**$36.6**	**$2,618**	**$2,618**

* Costs could be as low as $0, for manufacturers or products that would achieve the equivalent of compliance under the baseline. For streamlined presentation of this range, we present only the maximum estimated costs in the table above.

Based on input we received during the public comment period, we reevaluated some of our assumptions, criteria, and presentation of results. We paid special attention to ensuring we used consistent assumptions, approaches and expectations across product categories whenever possible. We also focused on presenting comparable results across product categories, including consistent presentation of ranges of estimates in tables. Our goal with these changes was to make the results and estimated financial impacts easier to understand.

Changes in our underlying assumptions account for some of the changes in results reflected in our analysis, while other changed results are due to different presentation for easier comparison across product categories. The most notable changes in our results are increased estimated cost impacts, which reflect a change to our assumptions and a more conservative approach. While some results (including lower cost impacts) previously presented reflect assumptions that we continue to believe are accurate – including the degree to which product categories may be able to comply more quickly with the rule –we adopted the more conservative approach for this final analysis due to stakeholder concerns our original analysis was overly optimistic.

Least-Burdensome Alternative Analysis

The authorizing statute for this rule is Chapter 70A.350 RCW, Toxic Pollution. Its goals and objectives are:

- Implement, administer, and enforce Chapter 70A.350 RCW.
- Regulate priority chemicals in priority consumer products.

We considered the following alternatives during rule development, and did not include them in the rule because they either did not meet the goals and objectives of the statute, would have imposed additional burden on those required to comply with the rule, or both.

- Addressing individual chemicals and not the entire class of chemicals.
- Identifying each individual chemical by a CAS.
- Using risk determinations instead of alternatives assessments.
- Considering GHG emissions when determining safer, feasible, and available.
- Considering costs when determining the availability and feasibility of safer alternatives.

- Matching the federal government's efforts to regulate chemicals in products.
- Focusing on consumer products intended for residential use and not include products intended for industrial use.
- Not restricting ortho-phthalates in vinyl flooring.
- Not restricting bisphenols in can linings.
- Including requirements for televisions and electronic displays, and no other electronic products.
- Delaying the effective date of restrictions.
- Including requirements for products with PCBs.
- Making the effective date of the rule earlier.
- Restricting contaminants and intentionally added chemicals.
- Not allowing chemical concentrations above zero.
- Not allowing manufacturers to use recycled material that has restricted chemicals.
- Not allowing manufacturers to sell existing stock.

Regulatory Fairness Act Compliance

We calculated the estimated per-business costs to comply with the rule, based on the costs estimated in Chapter 3 of this document. Note in Chapter 3 we identified lost sales for businesses in the US with sales in Washington in the worst-case scenario. The losses indicate how much gross revenue a business would lose if the businesses do not adapt to the new regulations before the effective date. The costs of restrictions are shown for potentially illustrative purposes only.

In this section, we estimate compliance costs per employee for businesses registered in Washington. The results are shown below.

We conclude that the rule is likely to have disproportionate impacts on small businesses, and therefore Ecology must include elements in the rule to mitigate this disproportion, where legal and feasible.

Businesses that would incur costs could experience reduced sales or revenues if the rule significantly affects the prices of the goods they sell. The degree to which this could happen is strongly related to each business's production and pricing model (whether additional lump-sum costs would significantly affect marginal costs), and the specific attributes of the markets in which they sell goods. This includes the degree of influence each firm has on market prices and the relative responsiveness of market demand to price changes.

We used the REMI E3+ model for Washington state to estimate the impact of the rule on directly-affected markets, accounting for dynamic adjustments throughout the economy. The model accounts for:

- Inter-industry impacts.

- Price, wage, and population changes.
- Dynamic adjustment of all economic variables over time.
- Interstate and international trade.

Initially, the total value of output in each directly affected sector is modeled to decrease up to $1 million in the first year, with diminishing impacts over time. In sectors with greater potential for local competition to offset imports, output in Washington could increase up to $150 million in the first year, with greatest potential local production offsets in personal care products and electronic components.

The rule would result in transfers of money within and between industries, as compared to the baseline. The modeled impacts on employment are the result of multiple small increases and decreases in employment, prices, and other economic variables across all industries in the state. As potential maximum costs were modeled as lost sales, we structured REMI inputs as lost sales by specified industries, with consumers reallocating that spending on other goods and services.

In directly impacted industries, we modeled local job gains of up to ten jobs, with diminishing gains over time, compared to the baseline. As with impacts to output, local job gains were modeled to occur in industries with greater ability to compensate for reduced imports with local production, including personal care products.

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Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the Safer Products Restrictions and Reporting rule (Chapter 173-337 WAC; the "rule"). This includes the:

- Preliminary Cost-Benefit Analysis (CBA)
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- Administrative Procedure Act Determinations
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The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to "determine 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 law being implemented." Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to "determine, after considering alternative versions of the rule…that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives" of the governing and authorizing statutes. Chapter 6 of this document describes that determination.

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The Washington Regulatory Fairness Act (RFA; Chapter 19.85 RCW) requires Ecology to evaluate the relative impact of rules that impose costs on businesses in an industry. It compares the relative compliance costs for small businesses to those of the largest businesses affected. Chapter 7 of this document documents that analysis, when applicable.

1.1.1 Background

Steady releases of chemicals coming from millions of consumer products are one of the largest sources of toxics entering Washington's environment. While our exposure from each product may be small, these sources of exposure add up. When combined, they can harm our health and Washington's environment.

In 2019, the Washington State Legislature directed the Washington Department of Ecology (Ecology), in consultation with the Washington Department of Health (Health), (jointly "we") to implement a regulatory program to reduce toxic chemicals in consumer products (Chapter 70A.350 RCW).

The Safer Products for Washington program include a regulatory process designed to help keep harmful chemicals out of homes, workplaces, schools, and the environment.

Safer Products for Washington is a systematic approach to reducing exposure to toxic chemicals found in consumer products. The law directs us to take the following actions:

- Phase 1: Identify priority chemical classes. The 2019 Legislature identified the priority chemical classes for the first cycle (May 2019 – June 2023) of the Safer Products for Washington program.
- Phase 2: Identify priority consumer products that are significant sources or uses of those chemicals. We submitted the Priority Consumer Products Report to the Legislature, and the list of priority products became final at the end of the 2021 legislative session.
- Phase 3: Determine if safer alternatives are available and feasible. Decide whether to restrict, require reporting, or take no action on priority chemical-product combinations. We published a Draft Regulatory Determinations Report to the Legislature in November 2021 and its final version in June 2022.
- Phase 4: Adopt the regulatory determinations specified in the Final Regulatory Determinations Report to the Legislature through a rulemaking process by June 1, 2023.

After these four phases are completed, the 5-year cycle repeats, and we return to Phase 1 to identify a new set of priority chemical classes.

1.1.2 Additional elements of cost-benefit analysis required by the law

Although not required under the APA, the authorizing statute (RCW 70A.350.080) requires Ecology to identify costs and benefits of the rules to state agencies, as cited below.

> The department must adopt rules to implement the determinations of regulatory actions specified in RCW 70A.350.040(1) (b) or (c). 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.

1.2 Summary of the rule

The rule would make the following changes:

- Restricting specific priority chemicals in designated priority consumer products.
- Requiring reporting of the use of specific priority chemicals in designated priority consumer products.

1.3 Reasons for the rule

Chapter 70A.350 RCW – Toxic Pollution requires Ecology to determine regulatory actions to:

- Increase transparency.
- Reduce the use of priority chemicals in identified priority consumer products.

RCW 70A.350.050 requires that Ecology adopts rules (Phase 4) to implement the regulatory actions determined during Phase 3 for priority consumer products that are a significant source of or use of priority chemicals (Phase 2). Phase 1 of this first 5-year cycle of the Safer Products program – Priority chemical identification – was determined by the law and includes the following chemicals or chemical classes:

- Perfluoroalkyl and polyfluoroalkyl substances.
- Phthalates.
- Organohalogen flame retardants.
- Flame retardants, as identified by the department under Chapter 70A.430 RCW.
- Phenolic compounds.
- Polychlorinated biphenyls.

The rule represents Phase 4 of the first cycle and contains specific provisions and requirements, including:

- Refining or narrowing the scope of products to which the regulatory actions apply.
- Outlining compliance timelines for when restrictions and reporting requirements take effect.
- Determining concentration limits for priority chemicals in priority consumer products.
- Identifying exemptions or exceptions to a restriction on a priority chemical in a priority consumer product (as RCW 70A.350.040 authorizes).

1.4 Document organization

The remainder of this document is organized into the following Chapters:

- **Baseline and the rule (Chapter 2):** Description and comparison of the baseline (what would occur in the absence of the rule) and the rule requirements.
- **Likely costs of the rule (Chapter 3):** Analysis of the types and sizes of costs we expect impacted entities to incur as a result of the rule.
- **Likely benefits of the rule (Chapter 4):** Analysis of the types and sizes of benefits we expect to result from the rule.

- **Cost-benefit comparison and conclusions (Chapter 5):** Discussion of the complete implications of the CBA.
- **Least-Burdensome Alternative Analysis (Chapter 6):** Analysis of considered alternatives to the contents of the rule.
- **Regulatory Fairness Act Compliance (Chapter 7):** When applicable. Comparison of compliance costs for small and large businesses; mitigation; impact on jobs.
- **APA Determinations (Appendix A):** RCW 34.05.328 determinations not discussed in Chapters 5 and 6.

Chapter 2: Baseline and Rule

2.1 Introduction

We analyzed the impacts of the rule, within the context of all existing requirements (federal and state laws and rules). This context for comparison is called the baseline and reflects the most likely regulatory circumstances that entities would face if the rule was not adopted. It is discussed in Section 2.2, below.

2.2 Baseline

The baseline for our analyses generally consists of existing rules and laws, and their requirements. This is what allows us to make a consistent comparison between the state of the world with and without the rule.

For this rulemaking, the baseline includes:

- Toxic Pollution (Chapter 70A.350 RCW)
- Toxic Substances Control Act, 15 U.S.C. §§2601, et seq.
- 2023 Washington Session Laws Chapter 455 (Session Law for SHB 1047)

2.3 Rule requirements

The rule would make the following changes:

- Restricting specific priority chemicals in designated priority consumer products.
- Requiring reporting of the use of specific priority chemicals in designated priority consumer products.

The tables below summarize the explicit contents of the rule.

Table 4. Summary of restrictions for priority chemicals in priority products.

Chemical	Product	Effective Date	Enforcement
PFAS	**Aftermarket stain- and water-resistance treatments**	**January 1, 2025**	**Intentionally added Rebuttable presumption**
PFAS	**Carpets and rugs**	**January 1, 2025**	**Intentionally added Rebuttable presumption**
PFAS	**Leather and textile furniture and furnishings intended for indoor use**	**January 1, 2026**	**Intentionally added Rebuttable presumption**

Chemical	Product	Effective Date	Enforcement
Ortho-phthalates	**Fragrances in beauty products and personal care products**	**January 1, 2025**	**Intentionally added Rebuttable presumption**
Ortho-phthalates	**Vinyl flooring**	**January 1, 2025**	**1,000 ppm Individual or combined**
Organohalogen flame retardants	**Electric and electronic products with plastic external enclosures, intended for indoor use**	**January 1, 2025*** **January 1, 2027** **January 1, 2028**	**Intentionally added Rebuttable presumption (1,000 ppm)**
Flame retardants**	**Other recreational products made from polyurethane foam**	**January 1, 2025**	**Intentionally added Individual or combined Rebuttable presumption (1,000 ppm)**
Alkylphenol ethoxylates	**Laundry detergent**	**January 1, 2025**	**1,000 ppm Individual or combined**
Bisphenols	**Drink can linings**	**January 1, 2025**	**Rebuttable presumption Excludes TMBPF**
Bisphenols	**Thermal paper**	**January 1, 2026**	**Intentionally added Individual only Rebuttable presumption (200 ppm)**

* = Effective date 2025-01-01 for TVs and displays. Effective date 2027-01-01 for other products manufactured by Group 1 (large businesses). Effective date 2087-01-01 for other products manufactured by Group 2 (small businesses). See the description of Group 1 and Group 2 in section 3.2.1.3.1.

** = Organohalogen flame retardants and organophosphate flame retardants

Table 5. Summary of reporting requirements for priority chemicals in priority consumer products.

Chemical	Product	Report Due Date	Enforcement
PFAS	**Leather and textile furniture and furnishings intended for outdoor use**	**January 31, 2025**	**Intentionally added Rebuttable presumption**
Flame retardants*	**Electric and electronic products with external enclosures, intended for outdoor use**	**January 31, 2025**	**Intentionally added Rebuttable presumption (1,000 ppm)**
Flame retardants*	**Recreational covered wall padding made from polyurethane foam**	**January 31, 2025**	**Intentionally added Individual or combined Rebuttable presumption (1,000 ppm)**
Bisphenols	**Food can linings**	**January 31, 2025**	**Rebuttable presumption Excludes TMBPF**

* = Organohalogen flame retardants and organophosphate flame retardants

2.3.1 Restricting specific priority chemicals in designated priority consumer products

Baseline

Even if there are other regulations on priority chemicals and priority consumer products, we presume there currently are no restrictions on the specific combinations of priority chemicals in priority consumer products in Washington state.

Ortho-phthalates in cosmetics

During the 2023 legislative session, the Legislature adopted SHB 1047, an act relating to the use of toxic chemicals in cosmetic products. This legislation adds a new chapter to Title 70A RCW that among other actions, restricts the use of ortho-phthalates7 in cosmetic products. The Session Law for the bill is 2023 Washington Session Laws Chapter 455.

As adopted

The rule establishes restrictions on five priority chemicals in ten designated priority consumer products manufactured, sold (including but not limited to wholesale, online, or retail), or distributed in Washington state. The details of restrictions are listed in the previous section.

[7] This legislation also restricts the use of PFAS in cosmetics products. However, as this rulemaking does not identify cosmetics as a priority product for PFAS, the new legislation does not affect either the baseline or the as adopted analyses for this rulemaking.

In general, the restrictions in Table 2 prohibit the intentional use or addition of priority chemicals in priority consumer products. In some cases, the rule sets concentration limits to align with restrictions from other jurisdictions. In other cases, where there were no existing limits, we either set a limit based on functionality or developed a rebuttable presumption. The rebuttable presumption describes our logic process for identifying products where restricted priority chemicals are likely intentionally added.

When we test regulated priority consumer products to determine compliance and we detect the restricted chemicals at or above the level identified in the rule, we will presume the chemicals were intentionally added. The manufacturer then can rebut that presumption by certifying that they are not intentionally adding the priority chemicals and providing some evidence to support that statement.

We expect the costs associated with rebutting Ecology's presumptions around intentional use to be minimal. This is for two reasons:

1. Ecology has limited product testing resources and will only be able to test a handful of products for each product category.
2. We provide manufacturers with significant flexibility on how they rebut our presumptions. In some cases, it could be a certified letter from their suppliers; in other cases, it could be product testing. Product testing is not necessary if manufacturers have sufficient transparency across their supply chains, or if they undertake improving supply chain transparency.

Although we expect some costs associated with the rebuttable presumption, we do not analyze them in the this document, because we do not require manufacturers to rebut the presumption. We also cannot confidently estimate the frequency of rebuttals but assume that they would only undertake rebuttal if it was a net savings over otherwise needing to comply. So, our estimates of compliance costs and benefits conservatively assume no one rebuts the presumption in the rule.

Expected impact

We expect the rule to impact costs and the health of humans and the environment.

We expect this requirement to result in costs to manufacturers, sellers (including but not limited to wholesale, online, or retail), and distributers of priority consumer products containing priority chemicals in Washington state. The costs would occur because some of the covered parties would have to reorient their production and investment patterns, and some would have to reconfigure their supply chains.

- For some product categories, manufacturers would be required to integrate or develop new chemistries, redesign, or reformulate the product, and recertify new products.
- Another main factor is the time needed to redesign products, so they meet safety standards, performance requirements, and aesthetic preferences.

- In some instances, we expect decreased costs (benefits) for business, such as when product redesign eliminates the need for added chemicals. This would mean that a manufacturer would skip the step of adding a chemical to the production process.

Many of the chemicals included in the rule are associated with human and environmental hazards[8]:

- Cancer.
- Reproductive harm.
- Developmental harm.
- Endocrine disruption.
- Persistence in the environment.

If we continue to use and release these chemicals, they will continue to accumulate in the environment. People and animals interacting with the environment will experience increased exposures over time.

Contamination from priority chemicals has led to expensive clean-up efforts and widespread drinking water contamination.

By restricting the use of these chemicals in products where safer alternatives are feasible and available, we can reduce future clean-up costs and reduce the burden of diseases caused by the chemicals in the environment. This will benefit human health and the environment.

2.3.2 Requiring reporting use of specific priority chemicals in designated priority consumer products.

Baseline

Although currently there is no requirement to report specific priority chemicals in designated priority consumer products in Washington state, for many reporting parties a reporting requirement already exists in other jurisdictions. Some chemicals within these classes are also included in our Chemicals of High Concern to Children (CHCC) list[9]and are required to be reported in children's products as part of our Children's Safe Products Act. See WAC 173-334.

As adopted

The purpose of the rule's reporting requirement is to increase transparency in product ingredients. The rule establishes reporting requirements for five priority chemicals in four designated priority consumer product categories. The rule states reporting party may be the:

[8] Regulatory Determinations Report to the Legislature. Safer Products for Washington. Cycle 1 Implementation Phase 3. https://apps.ecology.wa.gov/publications/summarypages/2204018.html

[9] Chemicals of high concern to children (CHCC). https://ecology.wa.gov/Regulations-Permits/Reporting-requirements/Reporting-for-Childrens-Safe-Products-Act/Chemicals-of-high-concern-to-children

- Manufacturer of the priority consumer product, or
- A trade organization representing the manufacturer.

The rule would require the reporting party to submit a notification to Ecology:

- By January 31 of the year after the effective date of the reporting requirement, as listed in the table below.
- Annually thereafter by January 31.
- The reporting party may submit a revised notification to Ecology when a priority consumer product no longer contains an intentionally added priority chemical.

The notification must include the following information about a priority consumer product containing an intentionally added priority chemical, that is sold or offered for sale in Washington state during the prior calendar year:

- The name and CAS RN (Chemical Abstracts Service Registry Number) of the priority chemical that is intentionally added. If the priority chemical has a CAS RN.
- The product category or product categories that contain the priority chemical. The product category means the "brick" level of the GS1 Global Product Classification (GPC) standard, which identifies products that serve a common purpose, are of a similar form and material, and share the same set of category attributes.
- The product component within the product category that contains the priority chemical. The product component means a uniquely identifiable material or coating (including ink or dye) that is intended to be included as a part of a finished priority consumer product.
- A description of the function of the priority chemical.
- The concentration range of each intentionally added priority chemical in each product component in each product category. The reporting party may report the concentration in ranges rather than the exact concentration. If there are multiple concentrations for a given product component in a particular product category, the reporting party must report the highest concentration.

  The reporting ranges are:

  1) Less than 100 ppm (0.01 percent).
  2) Equal to or more than 100 ppm (0.01 percent), but less than 500 ppm (0.05 percent).
  3) Equal to or more than 500 ppm (0.05 percent), but less than 1,000 ppm (0.1 percent).
  4) Equal to or more than 1,000 ppm (0.1 percent), but less than 5,000 ppm (0.5 percent).
  5) Equal to or more than 5,000 ppm (0.5 percent), but less than 10,000 ppm (1.0 percent).

6) Equal to or more than 10,000 ppm (1.0 percent).

- Contact information
    1) The name and address of the reporting party.
    2) The name, address, phone number, and electronic mail address of the contact person for the reporting party.
    3) When a trade organization serves as the reporting party, the notification must include a list of the manufacturers they report for and all the required information.
    4) Which option in the hierarchy in the rule best represents the reporting party.
- Any other information the reporting party deems relevant to the appropriate use of the product.

Expected impact

Reporting parties must notify Ecology when they use a specific priority chemical in a specific priority consumer product. The reporting parties would need to create an account in the Interstate Chemical Clearinghouse (IC2) High Priority Chemicals Data System (HPCDS)[10], create their inventory, and then create their annual report.

Reporting parties don't always know which chemicals are in their consumer product or the components, so they may need to contact entities in their supply chain to determine what chemicals are present.

This will likely also result in informational benefits, including increasing consumer awareness and informing government decision-making, reducing potential health impacts and litigation, and improving industry understanding of the presence of these chemicals across the supply chain. This knowledge would also serve as a deterrent for future uses where safe alternatives are available.

[10] Interstate Chemical Clearinghouse (IC2) High Priority Chemicals Data System (HPCDS) https://theic2.org/hpcds#gsc.tab=0

Chapter 3: Likely Costs of the Rule

3.1 Introduction

We analyzed the likely costs associated with the rule, as compared to the baseline. The rule and the baseline are discussed in detail in Chapter 2 of this document.

3.2 Cost analysis

The rule would make the following changes:

- Restricting specific priority chemicals in designated priority consumer products.
- Requiring reporting use of specific priority chemicals in designated priority consumer products.

3.2.1 Restricting specific priority chemicals in designated priority consumer products.

We expect the rule to impact costs and the health of humans and the environment.

We expect these requirements to result in costs to manufacturers, sellers (including but not limited to wholesale, online, or retail), and distributers of priority consumer products containing priority chemicals in Washington state. The costs would occur because some of the covered parties would have to reorient their production and investment patterns, and some would have to reconfigure their supply chains.

- For some product categories, manufacturers would be required to integrate or develop new chemistries, redesign, or reformulate the product, and recertify new products.
- Another main factor is the time needed to redesign products, so they meet safety standards, performance requirements, and aesthetic preferences.
- In some instances, we expect decreased costs (benefits) for business, such as when product redesign eliminates the need for added chemicals. This would mean that a manufacturer would skip the step of adding a chemical to the production process.

The above compliance options would result in various differences in costs (compared to our estimates below in this chapter), depending on specific product attributes, supply chains and contractual relationships, distribution chains, and marketing or other internal business decisions. If these costs exceed potential losses estimated in this chapter, we expect businesses to choose the option with the lowest net cost, including the possibility of selling their products outside of Washington for some period of time.

Because of the lack of data on the sales volume of consumer products containing or not containing the priority chemicals, we took an approach that is based on the dollar amount of

the US sales[11] for North American Industry Classification system (NAICS)[12] groupings corresponding to priority consumer product categories in the rule.

This approach to addressing data scarcity results in uncertainty in our estimates, particularly around:

- Whether capturing entire NAICS categories overestimates the potentially affected population of manufacturers. Costs may be overestimated due to the implicit assumption that all manufacturers in each category produce products covered by the rule.
- Whether the attributes of each NAICS category reflect the sales attributes of the subset of manufacturers that are impacted by the rule. Costs may be overestimated if covered products (and their relevant pricing) represent a disproportionately small fraction of total sales in a NAICS category. Similarly, costs may be underestimated if covered products represent a disproportionately large fraction of total sales in a category.

We adjusted the national sales volumes to the relative population size of Washington state[13].

When available, we used the market share of alternatives or consumer products restricted in other jurisdictions to determine the amount of losses due to restrictions on priority consumer products containing priority chemicals. There may be different factors for why a business would lose its share. For example, if all manufacturers attempted to switch to a particular alternative chemical, but it is not sufficiently available to meet that demand in a timely fashion, a subset of these manufacturers may lose market share while the chemical supply adjusts. In many cases, we rely on California's Safer Consumer program data that requires reporting of several priority chemicals intersecting with the contents of the rule.

When identifying a share of priority chemicals in priority consumer products was not possible because components and ingredients of specific products are often a part of "trade secrets," we took the following steps to estimate costs:

- We adjusted the national sales volumes of products to the relative population size of the Washington state (Based on the 2020 US census data. https://data.census.gov).
- We developed potential compliance scenarios for each product (compliance share presented in Table 17) based on the literature and available information.
- We assumed that the manufacturers who cannot switch by the effective date of the rule, will lose market share. We note this is an overly-conservative approach, as it does not account for the rule's exemption option.
- We estimated potential cost based on the possible maximum sales loss due to manufactures inability to switch by the effective date of the rule.

[11] Dun & Bradstreet database. 2022.
[12]North American Industry Classification system (NAICS). https://www.census.gov/naics/
[13] Based on the 2020 US census data. https://data.census.gov

- We used 5 and 10-year[14] horizons to look at the costs covered parties would incur on the effective date of the restriction if they have different abilities to adapt to the new rules.

All costs are aggregated as a stream of their annual present values (PV) in the 20-year horizon, although the costs would occur only in a few years based on our scenarios, and for most of the years after 2025, the annual costs would be zero.[15] The cost occurrence is triggered by the proposed rule draft published in December 2022. This would allow businesses to start making decisions on how fast (if at all) they would need to make the shift for an alternative. In all cases, the low range of compliance is considered to be zero, because of the postponed effective dates of the rule and allowing use of stock manufactured before that date.

3.2.1.1 Per- and Polyfluoroalkyl Substances (PFAS)

3.2.1.1.1 Aftermarket stain- and water-resistance treatments

Aftermarket stain- and water-resistance treatments applied to textile and leather consumer products frequently contain PFAS to provide stain and water resistance. These treatments may be used on a variety of products by consumers or commercial applicators (including carpets, rugs, furniture, home textiles, apparel, and shoes) after the product is purchased.

The rule focuses on:

- Aftermarket stain-resistant treatments applied to textile and leather consumer products that contain intentionally added PFAS.
- Aftermarket water-resistant treatments applied to textile and leather consumer products that contain intentionally added PFAS.
- Aftermarket stain-resistant and water-resistant treatments applied to textile and leather consumer products that contain intentionally added PFAS.

Using the NAICS code 313310 - “Chemical finishing (e.g., fire, mildew, water resistance) fabrics”, we identified 209 manufacturers and 139 wholesale traders in the aftermarket stain- and water-resistance treatments sector that sell their products in the US. Based on California’s Safer

[14] The Preliminary Regulatory Analyses for this rulemaking also included a 2-year horizon. We have not included this shorter horizon in this final analysis, based on public comments indicating that longer timeframes could be more appropriate.

[15] All Ecology analyses look at a 20-year time span from the time of rule adoption, which is typically enough time to reflect consequences of a rulemaking. This standard is consistent with principles in federal guidance and historic analytical practices. Present value defined as the value of a consequence occurring at the present time that has the same effect on wellbeing as the future consequence and calculated by discounting the monetary value of each future consequence by a factor that depends on the date it occurs. Ecology calculates present values based on a real discount rate of 0.89 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2022).
http://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm

Consumer Product program data, there are 25 companies that reported the use of PFAS in their products, or 15 percent of the market.

Ecology's Final Regulatory Determinations Report to the Legislature for Cycle 1 Implementation Phase 3[16] identified a number of alternative safer materials and processes that are feasible and available. California's Department of Toxic Substances Control (DTSC) also published a report titled "Potential Alternatives to PFASs in Treatments for Converted Textiles or Leathers"[17].

The effective date for the restriction of aftermarket stain- and water-resistance treatments is January 1, 2025. During this adjustment period, sellers and distributers may clear their existing stock and establish a supply system of producers that comply with the restriction. Below are our results for five- and ten-year horizons of costs for manufacturers and wholesalers phasing out aftermarket stain- and water-resistance treatments that contain intentionally added PFAS. If manufacturers take less time to remove PFAS from aftermarket treatments for textile products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 6. Aftermarket treatments for textile product category cost scenarios.

Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
$2,905,476	**$13,361,580**	**209**	**$2,780**	**$6,393**

The postponed effective date also means that manufacturers have options to redistribute their products to other locations or to reformulate products to avoid the use of intentionally added PFAS. The latter seems to be more profitable in current harmonized policy development between different states and countries, the signs of which we currently observe:

- California[18] requires manufacturers to provide notice if their product "contains" PFAS.
- Maine[19] has a ban on intentionally-added PFAS that started in January 2023.
- Maryland[20] and Vermont[21] have bans on intentionally-added PFAS that start in July 2023.
- Colorado[22] has a ban on intentionally added PFAS that starts in January 2024.
- The article "PFAS: making sound investment decisions"[23] mentions how a shift to safer chemicals reduces the overall financial risks to businesses.

[16] https://apps.ecology.wa.gov/publications/summarypages/2204018.html
[17] Potential Alternatives to PFASs in Treatments for Converted Textiles or Leathers (ca.gov)
[18] PFAS CR Template - Proposed Regulatory Text (ca.gov)
[19] getPDF.asp (mainelegislature.org)
[20] 2022 Regular Session - Senate Bill 273 Chapter (maryland.gov)
[21] Vermont Enacts Restrictions on PFAS Chemicals | Beveridge & Diamond PC - JDSupra
[22] Colorado, USA, Regulates PFAS in Consumer Goods | SGS
[23] FW_REPRINT_Expert_MAR22_Bergeson.pdf (lawbc.com)

3.2.1.1.2 Carpets and rugs

PFAS are applied to carpets and rugs to confer stain and soil resistance. This function increases the cleanability of carpets and rugs, which helps to maintain their appearance over time.

California's Safer Consumer program – which requires any domestic and foreign carpet and rug manufacturers whose products contain any member of the class of PFAS in their carpets or rugs to submit a notification – has not received any reports. There may be smaller businesses that sell carpets or rugs containing intentionally added PFAS in Washington, therefore we assume that 95 percent of all businesses are in compliance.

The effective date for the restriction of carpets and rugs that contain intentionally added PFAS is January 1, 2025. Having this adjustment period and the exemption of the existing stock, sellers and distributers would get a chance to clear their stocks and establish a supply system of producers that comply with the regulation. Below are our results for five- and ten-year horizons of costs for manufacturers and wholesalers phasing out carpets and rugs that contain intentionally added PFAS. If manufacturers take less time to remove PFAS from carpet and rug products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 7. Carpet and rugs product category cost scenarios.

Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
$11,756,406	**$54,064,853**	**464**	**$5,067**	**$11,652**

3.2.1.1.3 Leather and textile furniture and furnishings intended for indoor use

The rule would restrict indoor leather and textile furnishings intended for indoor use containing intentionally added PFAS.

Examples of other textiles include:

- Table linens.
- Bedding.
- Cushions and pillows.
- Curtains, drapes, and awnings.
- Towels.

We identified 1,139 manufacturers that sell leather and textile furniture and furnishings in the US. We estimate the Washington market for this product category as $802,177,313. We do not have any data on wholesalers or retailers for this product category.

There is limited data on the prevalence of PFAS in leather and textile furniture and furnishings. While many studies have detected PFAS used in this capacity[24], it is unclear what portion of the market these products represent.

The European Commission report, "The use of PFAS and fluorine-free alternatives in textiles, upholstery, carpets, leather, and apparel[25]" indicates that market penetration of PFAS in upholstery and curtains is up to 100 percent. The report also estimates the relative purchase costs of alternatives compared to PFAS. All of the safer alternatives have similar costs to PFAS, one – Hydrocarbons e.g., Paraffin wax - costs 50 percent lower, but requires a higher dosage.

Non-peer-reviewed data from a non-governmental organization[26] suggests that the use of PFAS in textiles varies by product type and is dependent on performance needs. In this study, 20 bedding products were tested and nine contained PFAS (45 percent). All nine with PFAS were marketed as stain- or water-resistant. Of the table linens tested (20 total), ten contained PFAS (50 percent). All ten that contained PFAS were marketed as stain- or water-resistant.

Based on these findings we assume that 50 percent of all leather and textile furniture and furnishings intended for indoor use contain PFAS.

The effective date for the restriction of leather and textile furniture and furnishings intended for indoor use is January 1, 2026. Having this adjustment period and the exemption of the existing stock, sellers and distributers would get a chance to clear their stocks and establish a supply system of producers that comply with the regulation. Below are our results for five- and ten-year horizons of costs for manufacturers and wholesalers phasing out leather and textile furniture and furnishings containing intentionally added PFAS. If manufacturers take less time to remove PFAS from textile products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 8. Leather and textile furniture and furnishings intended for indoor use product category costs scenarios.

Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
$77,424,407	**$801,108,680**	**1,139**	**$13,595**	**$70,334**

The table below summarizes the modeled costs of the rule for priority consumer products containing intentionally added PFAS. Note that a faster switch to alternatives' production and trade incentivizes business, although the investments in new technologies, formulations, design, and cost of alternative substituting chemicals may outweigh the benefit of decreased

[24] Ecology, 2020

[25] https://echa.europa.eu/documents/10162/17233/pfas_in_textiles_final_report_en.pdf/0a3b1c60-3427-5327-4a19-4d98ee06f041?t=1619607351696

[26] Schreder, E & M Goldberg, 2022. Toxic convenience: The hidden costs of forever chemicals in stain- and water-resistant products. Toxic-Free Future. https://toxicfreefuture.org/wp-content/uploads/2022/08/toxic-convenience.pdf

ongoing losses. Therefore, businesses are presented with the choice of investing to comply with the rule, or losing revenues from the Washington market.

3.2.1.2 Ortho-phthalates

3.2.1.2.1 Fragrances in beauty products and personal care products

During the 2023 legislative session, the Legislature adopted SHB 1047, an act relating to the use of toxic chemicals in cosmetic products. This legislation adds a new chapter to Title 70A RCW that among other actions, restricts the use of ortho-phthalates[27] in cosmetic products. The Session Law for the bill is 2023 Washington Session Laws Chapter 455. The Preliminary Regulatory Analyses for this rulemaking analyzed the costs and benefits of the rule's restriction of ortho-phthalates in fragrances in beauty products and personal care products, beginning January 1, 2025. Neither the adopted rule nor its authorizing statute independently defines beauty and personal care products.

The new statutory restriction on ortho-phthalates could have one of two effects on this analysis:

- If the scope of implementation for beauty and personal care products under the adopted rule and 2023 Washington Session Laws Chapter 455 is identical or a subset, this rulemaking has neither costs nor benefits as compared to the baseline, as concerns ortho-phthalates in beauty and personal care products.
- If there are some "beauty products and personal care products" addressed by the rule that do not meet the new statute's definition of "cosmetic," then the adopted rule is only responsible for the costs and benefits associated with the ortho-phthalate restriction for those products (as the restriction for the rest is part of the baseline).

Our analysis of the definition of "cosmetic product" under 2023 Washington Session Laws Chapter 455 concludes that it covers all the products covered by this rule. Therefore, this rulemaking does not have costs or benefits as compared to baseline for restrictions on ortho-phthalates in beauty and personal care products.

Costs estimated in Preliminary Regulatory Analyses (prior to the new law above)
The rule would apply to personal care and beauty products that have fragrances. Products regulated by the Food and Drug Administration as drugs, biological products, or medical devices are excluded. Although personal care and beauty products that have fragrances is a very broad category, examples of such products include:

- Skincare products and body washes.
- Perfumes, colognes, body mists, and toilet waters.
- Eye and facial makeup.

[27] This legislation also restricts the use of PFAS in cosmetics products. However, as this rulemaking does not identify cosmetics as a priority product for PFAS, the new legislation does not affect either the baseline or the as adopted analyses for this rulemaking.

- Face and body paint.
- Hair care products.
- Deodorants.

We identified 4,357 businesses in the Beauty Products and Personal Care Products market sector that manufacture their products in the US[28]. Based on the California Safe Cosmetics program data, there are 27 companies that reported the use of Diethyl phthalate in their products.[29]

In reality, diethyl phthalate (and alternatives) will frequently be grouped into the "fragrance" ingredient, and it is almost impossible to determine the exact components. At the same time alternative fixatives/solvents (dipropylene glycol, isopropyl myristate, and benzyl alcohol (primary alternatives) are similar in price to diethyl phthalate, therefore this would allow cosmetics manufacturers to switch to a new formulation without bearing the costs of more expensive alternatives.

For this group of products, we chose to model the size of the market share of cosmetics containing diethyl phthalate as five, 50, or 95 percent. Because of the postponed effective date of the rule (January 2025), the cost for the covered parties within the two-year horizon would be zero. The table below shows the results for five-year cost estimates for different market shares of complying based on California's data and assuming that the share in Washington is 5 percent if some of the products not sold in California are sold in Washington.

Table 9. Maximum sales losses for the personal care product categories.

Share of cosmetics in compliance	Total present value costs, 5 years to adapt	Total present value cost, 10 years to adopt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost business, 10 years to adopt
95%	**$293,865,382**	**$1,351,415,456**	**4,357**	**$13,489**	**$31,017**

3.2.1.2.2 Ortho-phthalates in vinyl flooring

We identified vinyl flooring containing intentionally added ortho-phthalates as a priority consumer product in our report on priority consumer products.[30] The vinyl flooring industry provided feedback during a public comment period that they no longer use ortho-phthalates in vinyl flooring. They requested that Ecology removes vinyl flooring from the list of priority products.

During Cycle 1 of the Safer Products for Washington program, Ecology sent the order to 15 manufacturers and to date, 14 manufacturers responded to our order. Twelve manufacturers

[28] Dun & Bradstreet database. 2022.
[29] California Safe Cosmetics program database. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/CSCP/Pages/CSCP.aspx
[30] Regulatory Determinations Report to the Legislature. Safer Products for Washington. Cycle 1 Implementation Phase 3. https://apps.ecology.wa.gov/publications/summarypages/2204018.html

reported they do not use ortho-phthalates as plasticizers. Seven manufacturers reported using DOTP. DOTP is a terephthalate that we identified as a safer alternative in our Final Regulatory Determinations Report to the Legislature. Those manufacturers reported a phase-out date (when they stopped using ortho-phthalates) all switched between 2013 and 2016.

We did not require manufacturers to report volume data. However, many did report an estimated volume sold with and without ortho-phthalates. Of the data reported, most flooring products did not use ortho-phthalates. Two manufacturers who reported using ortho-phthalates estimated that 12 percent and 22 percent of the square yards of vinyl flooring they sold in Washington in 2020 contained ortho-phthalates.

Based on these data and Dun & Bradstreet dataset and an average of sampling results we estimate that the costs for the vinyl flooring containing ortho-phthalates as summarized in the table below. If manufacturers take less time to remove ortho-phthalates from vinyl flooring products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 10. Vinyl flooring product category cost scenarios.

Share of vinyl flooring in non-compliance	Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
2.4%	**$46,812,928**	**$215,281,274**	**5,036**	**$1,859**	**$4,275**

Most of the responded manufacturers confirmed their intentions to phase-out ortho-phthalates. To look at the opportunity of switching to alternative components we looked at the US Consumer Product Safety Commission, which made the prohibition of diisononyl phthalate (DINP) to all children's toys and childcare articles. With data received from manufacturers, Ecology identified that DINP is one of the phthalates still in use in vinyl flooring manufacturing. The Cost-Benefit Analysis of the "Prohibition of Children's Toys and Child Care Articles Containing Specified Phthalates" rule justified that the prohibition on DINP content in mouthable toys and childcare articles did not impact the general market for plasticizers in the United States. Besides, the analysis states that the cost of reformulation to manufacturers would be minimal because many functional alternatives to DINP exist and DINP had already been phased out of many toys and childcare articles. This indicates that the market would likely shift for plasticizes in cosmetics and carpets.

The analysis mentions that there is also a small, but unquantified, cost impact for switching to a different plasticizer, or to a plastic that does not require a plasticizer. Any such reformulation costs were a one-time cost that would largely not be borne by U.S. businesses because most toys (more than 92 percent) are imported.

When the DINP restriction was proposed for children's products, most of the market had already moved toward viable and available alternatives. This situation is like the market for ortho-phthalates in vinyl flooring products. While some uses remain, the vast majority have already moved to existing alternatives.

3.2.1.3 Flame retardants

3.2.1.3.1 Electric and electronic products with plastic external enclosures, intended for indoor use

The restriction in the rule applies to electric and electronic products with plastic external enclosures, intended for indoor use that contain intentionally added organohalogen flame retardants. This applies to these consumer products that are powered either by a battery or a standard 120-volt outlet and designed for up to 20-amp circuits.

Examples of covered items include, but are not limited to, external housing material on personal computers, laptops, monitors, televisions, mobile phones, adaptors, kitchen appliances, washing machines, irons, and hair dryers.

Items not included in the scope of electric and electronic enclosures are printed circuit boards, internal fans, wires, cords, cables, switches, light bulbs, connectors, and screens (however, the plastic enclosure surrounding the screen is in scope).

The scope also does not include wiring devices, control devices, electrical distribution equipment, and lighting equipment—which are hardwired into and become part of the fixed electrical wiring installation of a building. Further, components of electric and electronic products that are removable and replaceable, but not accessible once the product is in its assembled functional form, are not included in the scope. Finally, products FDA regulates as medical devices are not included in the scope.

We were not able to identify what share of electronics contains organohalogen flame retardants. We used scenarios with assumptions of 5, 50, and 95 percent of compliance through five and 10-year horizons to comply with the rule.

We also took into consideration that the rule would establish different compliance schedules (January 1, 2025; 2027; 2028) for different groups:

- January 1, 2025, for electronic displays and televisions.
- January 1, 2027, for Group 1. “Group 1” – a person or entity whose gross sales equal or exceed 1 billion dollars in 2022.
- January 1, 2028, for Group 2. “Group 2” – a person or entity whose gross sales are less than 1 billion dollars in 2022.

The reason for that distinction is to allow Group 1 to lead technological change, as they have more capital available to invest in research and development. They are also less likely to experience disruptions to the supply chain when switching to a safer alternative, because of wide supply options. Group 2 would then be able to access these newly developed technologies for making the necessary changes in production processes.

We found that about 4 percent of all sales[31]are made for displays and TVs, and 25 percent of all electronics manufacturers had revenues exceeding 1 billion dollars.

The electronics market has a shorter lifecycle, because rapid changes in technology have led to an increasingly fast pace of product introductions. New components offering added functionality, improved performance, and quality are routinely available to a growing number of industry sectors, especially in electronics. Obsolescence of components and/or subsystems can be technical, functional, related to style, etc., and occur in nearly any industry. Additionally, industries that involve the chemical sector operate in a system where policies are not durable. Therefore, we expect all of the industry to comply within five years. Given the delayed effective restriction date and exemptions from the rule for the existing stock for the electronics product category, it is likely that manufacturers and sellers would adjust to the regulations without losing their share of the Washington market.

The results of the scenario analysis are shown in the table below. There are three different rows for each product category to illustrate the results of compliance costs with different market shares of the product. If manufacturers take less time to remove organohalogen flame retardants from electric and electronic products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 11. Maximum sales losses for the electronic product categories.

Compliance group	Share in compliance	Total present value, 5 years to adapt	Total present value, 10 years to adapt	Number of businesses	5 years to adapt, annual cost per business	10 years to adapt, annual cost per business
Displays, TVs	**5%**	**$182,054,825**	**$837,225,883**	**3,388**	**$10,747**	**$24,712**
Displays, TVs	**50%**	**$95,818,329**	**$440,645,202**	**3,388**	**$5,656**	**$13,006**
Displays, TVs	**95%**	**$9,581,833**	**$44,064,520**	**3,388**	**$566**	**$1,301**
Group 1	**5%**	**$0**	**$2,659,327,127**	**3,388**	**$0**	**$78,493**
Group 1	**50%**	**$0**	**$1,399,645,856**	**3,388**	**$0**	**$41,312**
Group 1	**95%**	**$0**	**$139,964,586**	**3,388**	**$0**	**$4,131**
Group 2	**5%**	**$0**	**$5,287,214,143**	**3,388**	**$0**	**$156,057**

[31] https://www.prnewswire.com/news-releases/at-cagr-of-10-9-global-electronic-display-market-size--share-2022--2028--projected-to-surpass-at-usd-1-026-5-billion-industry-trends-value-analysis--forecast-report-by-zion-market-research-301548035.html

Compliance group	Share in compliance	Total present value, 5 years to adapt	Total present value, 10 years to adapt	Number of businesses	5 years to adapt, annual cost per business	10 years to adapt, annual cost per business
Group 2	**50%**	**$0**	**$2,782,744,286**	**3,388**	**$0**	**$82,135**
Group 2	**95%**	**$0**	**$278,274,429**	**3,388**	**$0**	**$8,214**
Total	**50%**	**$95,818,329**	**$4,623,035,344**	**3,388**	**n/a**	**n/a**

The Danish Environmental Protection Agency looked at organohalogen flame retardants in electric and electronic equipment[32]. The study concluded that alternative non-organohalogen flame retardants, appertaining polymer systems, and production set-ups are already developed and on the market for most of the identified product types. However, substituting chemicals can involve significant costs, as industries must adapt their production processes, and have products and materials retested for all required performance and product standards The study mentions that in the electronics sector switching to a safer material for casing would raise the cost by 10 to 30 percent. Considering the materials costs for casings comprise one to five percent of the final product, the total increase in costs of production (if switched to a safer alternative) would be 1.1 percent to 6.5 percent.

3.2.1.3.2 Flame retardants in other recreational products made from polyurethane foam

The rule would restrict other recreational products made from polyurethane foam. Other recreational products made from polyurethane foam include products used as padding in recreational and athletic facilities—such as indoor climbing, gymnastics and athletic gyms, schools, and trampoline parks.

Examples of other recreational products made from polyurethane foam include:

- Foam pit cubes.
- Mats and pads—including crash mats, landing mats, training mats, panel mats, martial arts mats, and wall and post pads. This priority product does not include outdoor playground equipment, padding designed to be worn, or building insulation materials.

In its Final Regulatory Determinations Report[33], Ecology references a study by researchers at Duke University, which concluded that 64 percent of gym equipment tested as containing flame retardants at greater than one percent by weight.

[32] Danish Ministry of the Environment (DEPA). (2006). Deca-BDE and Alternatives in Electrical and Electronic Equipment. Retrieved from https://www2.mst.dk/udgiv/publications/2007/978-87-7052-349-3/pdf/978-87- 7052-350-9.pdf

[33] Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3. Ecology, 2022. https://apps.ecology.wa.gov/publications/summarypages/2204018.html

However, since the priority chemical is not necessary for this product, removing it is considered safer than using those OFRs and Organophosphate flame retardants (OPFRs) if flammability requirements are met. For this priority consumer product, we determined that OFRs and OPFRs are not necessary to meet flammability standards for most applications and identified alternatives that do not contain any flame retardants. This would result in potential cost savings, as producers of recreational products made with polyurethane foam would not have to buy OFRs or OPFRs as a manufacturing input. If manufacturers take less time to remove organohalogen flame retardants from polyurethane foam products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 12. Maximum sales losses for the recreational products made from polyurethane foam.

Type of Business	Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
Manufacturers	**$212,725,280**	**$978,271,852**	**792**	**$53,719**	**$123,519**

3.2.1.4 Alkylphenol ethoxylates in laundry detergent

The rule would restrict laundry detergents that contains more than 1,000 ppm of any alkylphenol ethoxylates (APEs). Laundry detergents are likely the largest use of APEs in commerce. The percentage of commercial detergents using APEs is unclear. A 2002 study found that 41 percent of household detergents tested contained NPEs (Nonylphenol/nonylphenol ethoxylate; a type of APE), but they have been phased out of detergents for residential use since that time. A market report contracted by the California Department of Toxic Substances Control (DTSC) in 2015 estimated that "institutional cleaners" (which contains laundry detergents and other cleaning products) were the dominant use of NPEs globally at 39 percent of use by volume

DTSC estimated that 8 fluid ounces of 20 percent NPE-containing liquid is used per 100 pounds of on-premises laundry. Using this number, about 2 million pounds of laundry detergent contains 370,000 pounds. Of NPEs would be discharged per year by Washington on-premises laundries making the heaviest use assumption that 100 percent of on-premises launderers use NPE-containing detergent. As discussed in our report[34] some alternatives are available on the market. If we assume one pound of detergent costs one dollar[35] and about 95 percent of commercial detergents contain APEs, the maximum sales losses would be $455,535,628.

[34] Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3. Ecology, 2022. https://apps.ecology.wa.gov/publications/summarypages/2204018.html

[35] Webrestaurantstore.com https://www.webstaurantstore.com/4293/commercial-laundry-detergent-and-supplies.html?filter=type:detergents;Amazon.com https://www.amazon.com/Commercial-Laundry-Detergent/b?ie=UTF8&node=3310253011; Walmart.com https://www.walmart.com/browse/industrial-scientific/commercial-laundry-detergent/6197502_5702707_2429528_6201004

Interestingly, our research has not shown a price difference between detergents containing and not containing APEs, in both commercial and household use.

Ecology identified several laundry detergents that utilize safer alternative surfactants. These alternative surfactants are currently used in laundry detergents—the application of interest—and are described in marketing materials as meeting the performance requirements we identified. Ecology determined that these safer alternative surfactants are both feasible and available. If manufacturers take less time to remove APEs from polyurethane foam products before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 13. Maximum sales losses for the laundry detergent.

Type of Business	Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
Manufacturers	**$455,535,628**	**$2,094,897,613**	**519**	**$175,544**	**$403,641**

3.2.1.5 Bisphenols

3.2.1.5.1 Drink can linings

The rule would restrict drink can linings that contain a bisphenol-based epoxy can liner. Bisphenols used in the manufacture of epoxy can linings serve to separate foods and beverages from the exterior metal container but can migrate into the food and beverage contents. The Can Manufacturers Institute (CMI) reports that approximately 100 billion aluminum beverage cans and another 25 billion food cans are shipped by can manufacturers every year in the U.S.

A 2016 study called Buyer Beware found 67 percent of cans studied had BPA linings. A 2020 study called Canned Food Market Based Survey found five percent of cans studied had BPA linings. This indicates the switch to cans without BPA linings took about four years. The total sales losses for both drink and food can linings (we were not able to make the distinction with available data sources) for five percent of all can manufacturers non-complying and giving them up to five years to switch to an alternative lining would be $25,065,961. If manufacturers take less time to remove bisphenols from drink can linings before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 14. Maximum sales losses for the drink can lining.

Type of Business	Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
Manufacturers	**$25,065,961**	**$115,272,262**	**352**	**$14,242**	**$32,748**

3.2.1.5.2 Thermal paper

The rule would restrict thermal paper with intentionally added bisphenol. Thermal paper is paper coated with a material formulated to change color when exposed to heat. Examples of thermal paper products include sales receipts, packing labels, and tickets. In our report [36] Ecology determined that Pergafast 201® and e-receipts are safer, feasible, and available alternatives to thermal paper containing bisphenols. Assuming in our scenario that it will take at most five years to switch 50 percent of thermal paper sold in Washington to switch to an alternative, the losses would reach $11,512,467. If manufacturers take less time to remove bisphenols from thermal paper before the effective date of the restriction, these costs would be lower. If they take more than ten years, costs would be higher than presented here.

Table 15. Maximum sales losses for the Thermal paper.

Type of Business	Total present value costs, 5 years to adapt	Total present value costs, 10 years to adapt	Number of businesses	Annual cost per business, 5 years to adapt	Annual cost per business, 10 years to adapt
Manufacturers	**$11,512,467**	**$119,119,254**	**256**	**$8,994**	**$46,531**

3.2.2 Requiring reporting use of priority chemicals in designated priority consumer products.

The rule requires reporting from the manufacturer, who must provide notice that the priority consumer product contains intentionally added priority chemicals by January 1, 2025. The following priority chemicals in priority products would need to be reported:

- Leather and textile furniture and furnishings intended for outdoor use that contain intentionally added PFAS
- Electric and electronic products with plastic external enclosures, intended for outdoor use that contain intentionally added organohalogen flame retardants
- Recreational covered wall padding made from polyurethane foam that contains intentionally added organohalogen flame retardants or organophosphate flame retardants
- Food can linings that contain a bisphenol-based epoxy can liner.

The rule does not require testing and we assume that regulated parties use other means of estimating chemical contents, such as supply chain knowledge and knowledge of the manufacturing process. These estimates also do not account for economies of scale, non-reporters, or interstate/international regulatory consistency that would reduce costs. For example, a manufacturer of priority products also regulated in Maine, Oregon, Vermont, the

[36] Regulatory Determinations Report to the Legislature: Safer Products for Washington Cycle 1 Implementation Phase 3. Ecology, 2022. https://apps.ecology.wa.gov/publications/summarypages/2204018.html

EU, or Switzerland under similar reporting regulations may already know the contents of their products because of existing reporting. Some retailers who act as importers or distributors of products made by companies with no presence in the United States may also need to report, but Ecology assumed the number of importing companies reporting (rather than their manufacturers or manufacturers reporting on their behalf) will be minimal. Costs also depend on the extent of process knowledge that businesses have. Covered businesses will have some (if not complete) control or knowledge of the manufacturing process and content of their products. This is achieved through direct control or contracting. Ecology also recognizes that some businesses will already have process knowledge to mitigate liability in the event of a product recall.

The reporting party would need to create an account in the Interstate Chemicals Clearinghouse (IC2) High Priority Chemicals Data System (HPCDS), create their inventory, and create and submit the annual report. We assume that the reporting would require up to 2 hours of an administrative manager (with an average wage of $ 54.34) and up to 2 hours hour of a chemist working in manufacturing (with an average wage of $ 44.73) to submit the report to Ecology. We found 5,463 businesses that would have to report to Ecology.

Note also that the rule requires only one reporting party to submit a notification for a particular priority consumer product sold in Washington. For example, when Company X's Product A is manufactured, sold, or distributed in Washington, only one reporting party needs to submit a notification to Ecology. The following hierarchy determines which person or entity Ecology will hold primarily responsible for ensuring that Ecology receives a complete, accurate, and timely notification.

- The person or entity that had the priority consumer product manufactured unless it has no presence in the United States.
- The person or entity that marketed the priority consumer product under their name or trademark unless it has no presence in the United States.
- The first person or entity, whether an importer or a distributor, who owned the priority consumer product in the United States.

Given this hierarchy, we estimate ranges for the reporting costs. There are 1,470 manufacturers of the product categories that would have to report, and 3,993 wholesalers of such categories. All the covered businesses are located and have sales in the US; therefore, we assume that they also have sales in Washington. These costs are overestimated if not all US sellers are Washington sellers.

Table 16. Ranges for the maximum costs of reporting for different types of businesses.

Type of business	Number of reporting businesses	Maximum reporting costs
Manufacturer	**1,470**	**$291,266**
Wholesaler	**3,993**	**$791,173**

This is a very conservative estimate because it assumes every business that manufacturers, sells, or distributes priority products would report. In reality, the businesses are allowed to submit the report through trade organizations, and most likely would choose to do so.

3.2.3 Cost to Ecology to administer and enforce the rule

The statute (RCW 70A.350.080) requires Ecology to analyze not only costs and benefits of the rule to businesses but also to state agencies to administer and enforce the rules.

> (2)(a) The department must adopt rules to implement the determinations of regulatory actions specified in RCW 70A.350.040(1) (b) or (c). 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.

The estimated Ecology costs would be $2,223,646 for fiscal years 2021-23 and $2,036,378 for fiscal years 2023-25, making it $4,260,024 to complete cycle 1 of the Safer Products for Washington program. The present value of the agency's costs would be $4,219,390.00. Also, since the statute is not clear on whether this cost needs to be included in the APA cost-benefit analysis comparison (as administrative costs are not included in our approach based on the intent of the APA), the comparison in Chapter 5 excludes this cost.

Chapter 4: Likely Benefits of the Rule

4.1 Introduction

We analyzed the likely benefits associated with the rule, as compared to the baseline. The rule and the baseline are discussed in detail in Chapter 2 of this document.

4.2 Benefits analysis

The rule would make the following changes:

- Restricting specific priority chemicals in designated priority consumer products.
- Requiring reporting use of specific priority chemicals in designated priority consumer products.

4.2.1 Restricting priority chemicals in designated priority consumer products.

The rule would regulate priority chemicals as a chemical class. Chemicals within the class often share hazard traits, hazard endpoints, or mechanisms of action. They are more likely to have similar hazards than those chemicals outside the class. And they are more likely to be hazardous and therefore require more scrutiny.

Most of the chemicals within the classes have a history of regrettable substitutions. That means chemicals of concern within the class were replaced by other chemicals within the class that also turned out to be problematic. Examples include replacing bisphenol A with bisphenol S. Both chemicals are endocrine disruptors. By taking action on the entire class, we prevent the potential for substitution with similarly hazardous chemicals. This, in turn, could reduce the long-run total costs for businesses that might otherwise have switched across multiple products over time as others were restricted.

Taking a class-based approach also helps us avoid treating chemicals with limited data as safe. Instead, we assume they are potentially hazardous unless we have sufficient data to demonstrate they are truly safer.

4.2.1.1 Hazards of Per- and Polyfluoroalkyl Substances (PFAS):

PFAS are a large class of chemicals defined by the presence of multiple carbon-fluorine bonds. These bonds are hard to break, causing PFAS to either be extremely persistent or to break down into other PFAS that are extremely persistent[37]. Persistent chemicals are problematic because they do not break down or they break down very slowly in the environment. That

[37] Ecology, 2021a; Ellis et al., 2001; Schlummer et al., 2015

means that as releases continue, exposures increase. Persistent chemicals are difficult to clean up, particularly if we learn about hazards after widespread contamination has occurred.

Many PFAS also bioaccumulate and are associated with human health and environmental toxicity. PFOA and PFOS are the most well-characterized PFAS. They are associated with systemic and developmental toxicity, persistence, and bioaccumulation. Other chemicals in the PFAS class have similar toxic properties of concern, such as reproductive and developmental toxicity and systemic toxicity (including immunotoxicity, neurotoxicity, and thyroid)[38]. Some PFAS are also toxic to aquatic organisms[39].

Many PFAS currently used were brought to market to replace other PFAS manufacturers phased out due to toxicity concerns[40]. Addressing PFAS as a class avoids replacing current PFAS with other, similarly toxic PFAS.

Based on these concerns, PFAS are already regulated under numerous Washington state laws. Recent Washington state actions restricted PFAS as a class in some food packaging applications (RCW 70A.222.07094) and firefighting foam (RCW 70A.40095). Previous actions on PFAS include listing PFOS and its salts as persistent, bioaccumulative, toxic chemicals under WAC 173-333-31096 and as chemicals of high concern to children under WAC 173-334-130. Because PFAS are halogenated organic compounds, they can be regulated under the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC).

Benefits of reducing exposure to PFAS by restricting their use in carpets and rugs, leather and textile furniture and furnishing, and aftermarket stain and water-resistance treatments

Restricting the use of PFAS in carpets and rugs, leather and textile furniture and furnishing, and aftermarket stain and water-resistance treatments would reduce people's exposure to PFAS and the release of PFAS into the environment. One way people, particularly children, are exposed to PFAS is through ingestion and inhalation of house dust. An intervention study found that when carpets and furniture were replaced with PFAS-free alternatives, concentrations of PFAS in dust dropped 78 percent (Young et al. 2021). Household dust has been estimated to contribute to about 20 percent of children's exposure to PFAS (Trudel et al. 2008). Significantly reducing the dust exposure pathway, by restricting the use of PFAS in these products, would reduce total PFAS exposure and reduce the likelihood of the adverse health outcomes described above.

PFAS used in products can be released into the environment. Because PFAS are persistent, they accumulate in the environment. PFAS have contaminated drinking water and led to clean-up sites. It has been estimated that about 200 million people have PFAS-contaminated drinking water (Andrews, 2020). Drinking water contamination is harmful to health and expensive to mitigate. Orange County California estimated that the infrastructure needed to reduce PFAS levels to the state's recommended level in drinking water will cost at least one billion dollars

[38] Ecology, 2021a; Fenton et al., 2020.
[39] Ecology, 2021a; Lee et al., 2020
[40] EPA, 2021e

(Cordner, 2021). Other examples of the costs of PFAS contamination include farms that have had to discard food due to PFAS levels and property value reductions. By restricting the use of PFAS in some products, this rule will reduce these costs and incur benefits.

In addition, because PFAS are persistent sooner action prevents future needs for clean up and mitigation. These chemicals do not break down on their own and there is some evidence that concentrations in the environment are already exceeding EPA interim drinking water standards[41], suggesting that future clean-up and mitigation efforts are inevitable. The more we reduce PFAS uses and releases now, the more money we'll save by not having to clean them up later.

A recent study on PFAS[42] quantified disease burdens and related economic costs due to legacy PFAS exposures in the US in 2018 and identified PFAS-attributable disease costs in the US of $5.52 billion across five primary disease endpoints shown to be associated with PFAS exposure. This estimate represented the lower bound, with sensitivity analyses revealing as much as $62.6 billion in overall costs.

If we make an assumption that consumer products are uniformly spread across the US (which would be consistent with scaling of US-level sales by Washington population), we estimate an equivalent Washington aggregate cost between $110 million and $1.3 billion.

We note that there are many sources of PFAS exposure, beyond the consumer products covered by the rule, including legacy contamination, other types of consumer products in which PFAS may be used incidentally or with less frequency, and legacy or current products that remain in use. This means the rule will not *eliminate* PFAS exposure in the public, and will therefore not eliminate the costs of this entire exposure burden. Nonetheless, Ecology identified covered products as significant sources of PFAS exposure, using scientific understanding of PFAS exposure pathways and the considerations required in law, and a reduction in PFAS exposure due to these products will ultimately contribute to a reduction in some portion of these costs. Due to the uncertainty in frequency of use and concentrations, discussed throughout this analysis, we could not confidently identify a specific proportion of this benefit that would result specifically from the rule.

We also note that shifting away from PFAS can be good for business. The article "PFAS: making sound investment decisions"[43] mentions how a shift to safer chemicals reduces the overall financial risks to businesses.

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[41] Ian T. Cousins, Jana H. Johansson, Matthew E. Salter, Bo Sha, and Martin Scheringer. Outside the Safe Operating Space of a New Planetary Boundary for Per- and Polyfluoroalkyl Substances (PFAS). Environmental Science & Technology 2022 56 (16), 11172-11179. https://pubs.acs.org/doi/10.1021/acs.est.2c02765

[42] Obsekov, V., Kahn, L.G. & Trasande, L. Leveraging Systematic Reviews to Explore Disease Burden and Costs of Per- and Polyfluoroalkyl Substance Exposures in the United States. *Expo Health* (2022). https://doi.org/10.1007/s12403-022-00496-y

[43] FW_REPRINT_Expert_MAR22_Bergeson.pdf (lawbc.com)

4.2.1.2 Hazards of ortho-phthalates

Many ortho-phthalates are associated with endocrine disruption and reproductive and developmental toxicity. When exposure to multiple ortho-phthalates occurs, it can have cumulative effects on reproduction and development[44]. This is concerning because nearly everyone is exposed to mixtures of ortho-phthalates before birth and throughout their lifespan.

Studies detect multiple ortho-phthalates in cord blood, breastmilk, and the urine of toddlers, children, and adults[45]. Human biomonitoring data suggest that as exposure to some ortho-phthalates decreased, exposure to others increased. This change in exposure suggests that in some products, manufacturers replaced ortho-phthalates such as DEHP with other ortho-phthalates.

Many chemicals within the ortho-phthalates class can disrupt testosterone synthesis during development, which spurred concerns around these chemicals. These impacts support the approach of considering cumulative exposures to multiple ortho-phthalates in decision-making. Not all ortho-phthalates impact testosterone synthesis[46]. However, even ortho-phthalates that do not impact testosterone synthesis have been shown to adversely affect reproduction or development (NTP, 2003; Weaver et al., 2020). Human epidemiological studies amplify concerns regarding the impact of ortho-phthalates (Eales et al., 2022)—whether they impact testosterone synthesis—on reproduction and development (Radke et al., 2018, 2019, 2020), particularly neurodevelopment (Engle et al., 2021).

Given our increased susceptibility during early life stages (Braun, 2017; de Boo & Harding, 2006) and the potential for cumulative impacts and regrettable substitutions, experts call for actions on ortho-phthalates as a class to protect sensitive populations (Birnbaum & Bornehag, 2021; Engle et al., 2021).

A study on phthalates[47] identified 90,761-107,283 attributable deaths and $39.9-47.1 billion in lost economic productivity in the US. We note that there are many sources of phthalate exposure, beyond the consumer products covered by the rule, including legacy contamination, other types of consumer product in which phthalates may be used incidentally or with less frequency, and legacy or current products that remain in use. This means the rule will not *eliminate* phthalate exposure in the public, and will therefore not eliminate the costs of this entire exposure burden. Nonetheless, Ecology identified covered products as significant sources of ortho-phthalate exposure, using scientific understanding of ortho-phthalate exposure pathways and the considerations required in law, and a reduction in ortho-phthalate exposure due to these products will ultimately contribute to a reduction in some portion of these costs. Due to the uncertainty in frequency of use and concentrations, discussed throughout this

[44] NAS, 2008
[45] Wang et al., 2019
[46] Furr et al., 2014
[47] Phthalates and attributable mortality: A population-based longitudinal cohort study and cost analysis. Leonardo Trasande, Buyun Liu, Wei Bao. Phthalates and attributable mortality: A population-based longitudinal cohort study and cost analysis - PubMed (nih.gov)

analysis, as well as uncertainty in the total costs imposed by subcategories of phthalates versus phthalates in general, we could not confidently identify a specific proportion of this benefit that would result specifically from the rule.

Increasing evidence suggests that endocrine-disrupting chemicals (EDCs) contribute to male reproductive diseases and disorders. EDCs may contribute substantially to male reproductive disorders and diseases, with nearly €15 billion in annual associated costs in the European Union[48].

Many phthalates are known for their impacts on male reproductive development. A recent review of phthalate exposure in humans and its impacts on male reproduction found that phthalate exposures at levels measured in the general population impact male reproductive development, particularly DEHP and DBP. Phthalate exposure can impact sperm quality, structural development of the male reproductive system, time to pregnancy, and testosterone levels.[49] About 15 percent of couples experience infertility. Infertility treatments can be expensive and are accompanied by other costs like psychological stress and lost work time. As an example, one cycle of in vitro fertilization was estimated to cost between $15,000 and $30,000 in 2018.[50] Since phthalate exposure is not the only factor that contributes to infertility, we would not expect the rule to eliminate infertility and the costs associated with it. However, some reduction and potential benefits are expected.

Exposure to phthalates, particularly diethyl phthalate and DEHP, in utero is associated with higher odds of preterm birth.[51] Preterm birth can lead to lifelong challenges and disabilities and is associated with healthcare costs. A retrospective cohort study of preterm infants found medical costs in the first six months averaged between $76,153 and $603,778, depending on the gestational age of the infant.[52] According to the March of Dimes, there are an average of 142 preterm babies born each week in Washington State (7,384 annually[53]). Black, Indigenous, and people of color (BIPOC) communities often experience higher rates of preterm birth. In Washington State, the rate of preterm birth is highest for American Indian/Alaska Native (12.8 percent) and black (10.4 percent) populations compared to white populations (7.9 percent). There are many causes of preterm birth. Reducing phthalate exposure would not alleviate all factors that increase the odds of preterm birth. However, we would expect some reduction in preterm births in Washington state.

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[48] Russ H., et al. Male Reproductive Disorders, Diseases, and Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union, *The Journal of Clinical Endocrinology & Metabolism*, Volume 100, Issue 4, April 2015, Pages 1267–1277, https://doi.org/10.1210/jc.2014-4325

[49] https://www.sciencedirect.com/science/article/pii/S0160412018303404?via%3Dihub

[50] https://www.forbes.com/health/family/how-much-does-ivf-cost/

[51] https://pubmed.ncbi.nlm.nih.gov/31351310/

[52] https://www.nature.com/articles/s41372-020-0635-z

[53] https://www.marchofdimes.org/peristats/state-summaries/washington?lev=1&obj=3&reg=99&slev=4&sreg=53&stop=55&top=3

A study on asthma in 2008-2013 found that asthma was responsible for $3 billion in losses due to missed work and school days, $29 billion due to asthma-related mortality, and $50.3 billion in medical costs. All combined, the total cost of asthma in the US were $81.9 billion in 2013.[54]

Benefits of restricting the use of ortho-phthalates in vinyl flooring:

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 remains a significant source of potential exposure to ortho-phthalates for people using and purchasing vinyl flooring products that contain ortho-phthalates. People can be exposed to ortho-phthalates that migrate from vinyl flooring and accumulate in house dust and indoor air. Many ortho-phthalates are widely detected in house dust (Mitro et al., 2016). Ortho-phthalates are one of the most abundant classes of semi-volatile chemicals found in dust samples. Numerous studies show that the presence of vinyl flooring results in elevated levels of ortho-phthalates in indoor air and dust samples (Bi et al., 2018; Giovanoulis et al., 2019; Langer et al., 2014; Shu et al., 2019; Xu et al., 2009). Ortho-phthalates found in household air or dust where vinyl flooring is present include DEHP, BBP, DIBP, and DINP.

Another potential benefit of restricting the use of ortho-phthalates in vinyl flooring is reducing asthma rates. Vinyl flooring has also been associated with worsening asthma symptoms, particularly in children. One study found that children living with vinyl flooring in their bedrooms were 1.5 times more likely to develop asthma during the following 10-year period as compared with children who live in homes with other types of flooring. The association was strongest for children whose parents had bedrooms with vinyl flooring during pregnancy. The impacts of vinyl flooring on asthma may have more impact on sensitive populations such as low-income and minority populations. Some of these communities already face higher rates of asthma, possibly due to increased exposure to other environmental contaminants. We describe this as a potential benefit because there is some uncertainty around the role of ortho-phthalates in the association between asthma and vinyl flooring.[55]

Benefits of reducing ortho-phthalates in fragrances

During the 2023 legislative session, the Legislature adopted SHB 1047, an act relating to the use of toxic chemicals in cosmetic products. This legislation adds a new chapter to Title 70A RCW that among other actions, restricts the use of ortho-phthalates[56] in cosmetic products. The Session Law for the bill is 2023 Washington Session Laws Chapter 455. The Preliminary

[54] Nurmagambetov T, Kuwahara R, Garbe P. The Economic Burden of Asthma in the United States, 2008-2013. Ann Am Thorac Soc. 2018 Mar;15(3):348-356. doi: 10.1513/AnnalsATS.201703-259OC. PMID: 29323930.

[55] Priority Consumer Products Report to the Legislature. Safer Products for Washington Implementation. Phase 2. Ecology, 2020. https://apps.ecology.wa.gov/publications/documents/2004019.pdf

[56] This legislation also restricts the use of PFAS in cosmetics products. However, as this rulemaking does not identify cosmetics as a priority product for PFAS, the new legislation does not affect either the baseline or the as adopted analyses for this rulemaking.

Regulatory Analyses for this rulemaking analyzed the costs and benefits of the rule's restriction of ortho-phthalates in fragrances in beauty products and personal care products, beginning January 1, 2025. Neither the adopted rule nor its authorizing statute independently defines beauty and personal care products.

The new statutory restriction on ortho-phthalates could have one of two effects on this analysis:

- If the scope of implementation for beauty and personal care products under the adopted rule and 2023 Washington Session Laws Chapter 455 is identical or a subset, this rulemaking has neither costs nor benefits as compared to the baseline, as concerns ortho-phthalates in beauty and personal care products.
- If there are some "beauty products and personal care products" addressed by the rule that do not meet the new statute's definition of "cosmetic," then the adopted rule is only responsible for the costs and benefits associated with the ortho-phthalate restriction for those products (as the restriction for the rest is part of the baseline).

Our analysis of the definition of "cosmetic product" under 2023 Washington Session Laws Chapter 455 concludes that it covers all the products covered by this rule. Therefore, this rulemaking does not have costs or benefits as compared to baseline for restrictions on ortho-phthalates in beauty and personal care products.

Benefits discussed in Preliminary Regulatory Analyses (prior to the new law above)

Ecology also determined that a restriction on the use of ortho-phthalates in fragrances in personal care and beauty products would reduce a significant source of exposure. The most common phthalate used in fragrances is diethyl phthalate, which is metabolized to monoethyl phthalate (MEP). MEP is the ortho-phthalate metabolite detected at the greatest concentration in human urine, often an order of magnitude higher than other ortho-phthalate by-products and greater than 70 percent of total measured ortho-phthalate exposure (CDCNHANES, 2021b; Wang et al., 2019). Personal care product use has been clearly linked to urinary excretion of MEP in numerous studies (Buckley et al., 2012; Parlett et al., 2013; Philippat et al., 2015)—including those we mention below, looking at disproportionate exposures. Intervention studies provide especially strong evidence of an association between a suspected source and biological exposure. An intervention study that provided ortho-phthalate-free personal care products to Hispanic teenage girls reduced MEP in urine by 24 percent (Harley et al., 2016).

Reducing exposure to ortho-phthalates by restricting their use in personal care and beauty products would benefit people and the environment. We would expect potential reductions in endocrine-related diseases and reproductive and developmental health improvements. Neuroendocrine and endocrine-related diseases have been associated with high costs in the European Union (Bellanger et al. 2015 and Trassande et al. 2016). A partial quantification subsection reflecting all products for this class

If we assume that consumer products are uniformly spread across the US (which would be consistent with scaling US-level sales by the relative Washington population), we estimate an equivalent Washington aggregate cost between $798 and $942 million in lost productivity in

Washington. Also, if extrapolating from EU data, EDC contribution to male reproductive diseases would make up to $258 million in Washington.

We note that there are many sources of phthalate exposure, beyond the consumer products covered by the rule, including legacy contamination, other types of consumer product in which phthalates may be used incidentally or with less frequency, and legacy or current products that remain in use. This means the rule will not *eliminate* phthalate exposure in the public, and will therefore not eliminate the costs of this entire exposure burden. Nonetheless, Ecology identified covered products as significant sources of ortho-phthalate exposure, using scientific understanding of ortho-phthalate exposure pathways and the considerations required in law, and a reduction in ortho-phthalate exposure due to these products will ultimately contribute to a reduction in some portion of these costs. Due to the uncertainty in frequency of use and concentrations, discussed throughout this analysis, as well as uncertainty in the total costs imposed by subcategories of phthalates versus phthalates in general, we could not confidently identify a specific proportion of this benefit that would result specifically from the rule.

4.2.1.3 Flame retardants

The Washington State Legislature identified two groups of flame retardants as priority chemicals:

- The class of organohalogen flame retardants (HFRs).
- Five organophosphate flame retardants (OPFRs) identified under Chapter 70A.430 RCW.

Hazards of organohalogen flame retardants:

HFRs are persistent in the environment. This is due to the inherent strength of carbon-halogen bonds and the high energy required to break them. As they are used in and released from products, persistent chemicals (such as HFRs) will continue to build up in the environment (Cousins, 2019a). Consequently, as levels in the environment continue to increase, the potential for exposure also increases. This scenario warrants caution—continual and increasing exposure to HFRs may lead to presently unforeseen effects and adverse impacts.

Flame retardants are often additive, meaning the flame retardants are not covalently bound to the other materials and more easily escape from consumer products and expose people. Flame retardants are widely found in house dust (Ecology, 2020a) and people in the U.S. (Ospina et al., 2018). Children are more highly exposed than adults, due to their greater breathing rates, proximity to the floor, and hand-to-mouth behaviors. The concentration of specific flame retardants in house dust has been associated with proximity to electronics (Allen et al., 2008; Brandsma et al., 2014; Harrad et al., 2009; Muenhor & Harrad 2012).

Workers in certain occupations have higher exposure to flame retardants. These occupations include office workers, firefighters, and electronics recyclers (Jakobsson et al., 2002; Park et al., 2015; Qu et al., 2007; Sjodin et al., 1999). Most of these studies are on older flame retardants (PBDEs), but there is no evidence that there would be different exposures from other flame retardants.

Several HFRs have been detected in environmental media and aquatic species in Washington state (Ecology, 2020a). Some HFRs are persistent in the environment, can be transported across long distances, bioaccumulate in organisms, and concentrate in the environment. An example is PBDEs, which the Southern Resident Orca Task Force identified as a primary contaminant of concern for this species (Ecology, 2020a).

Further, once persistent chemicals distribute in the environment, it is difficult, costly, and in some instances nearly impossible to address the contamination in a reasonable timeframe. Put simply, once these chemicals are released, it is much more difficult to control the consequences.

Benefits of restricting halogenated flame retardants in electric and electronic enclosures:

Ecology determined that restricting halogenated flame retardants in electric and electronic products would reduce a significant use of these chemicals, reduce the potential for human exposure, protect sensitive populations, and protect sensitive species.

Restricting the use of organohalogen flame retardants in electric and electronic enclosures would reduce people's exposure. Flame retardants in electronics can contribute to their concentration in house dust. In 2016, Canadian researchers found that surface wipes of home and office electronics had detectable concentrations of organohalogen and phosphorous-based flame retardants. Concentrations in surface wipes of hard polymer casings were correlated with household dust samples, suggesting that the additive flame retardants used in electronics contribute to household dust concentrations (Abbasi, Saini, Goosey, & Diamond, 2016). Children are particularly sensitive to exposure to chemicals found in house dust because they spend more time on and near the floor, have more hand-to-mouth activities, and their bodies are still developing. Restricting the use of organohalogen flame retardants in plastic enclosures of electric and electronic products would reduce house dust concentrations and ultimately people's exposure to these chemicals.

Restricting the use of organohalogen flame retardants in plastic enclosures of electric and electronic products has benefits across the lifecycle of the product. Workers recycling electronics are exposed to higher levels of flame retardants. Higher levels of PBDEs were found in recycling workers in China (Qu et al., 2007) and Sweden compared to control groups. Sjödin et al. (1999) found that levels of PBDEs in workers in electronics dismantling plants were about five times higher than in other workers. Reducing the use of organohalogen flame retardants would reduce people's exposure during manufacturing and recycling or disposal. It would also increase the versatility of recycling streams and reduce the amount of toxic chemicals entering new products made from recycled materials.

Specific benefits include:

- Increased potential for recycling due to less persistent and toxic chemicals in products[57].

[57] This is the basis for the ROHS restriction in the EU

- Reduced occupational exposure during manufacturing and disposal (Nguyen et al, 2019[58]).
- Reduced release of persistent and toxic chemicals into the environment and subsequent reductions in the need for environmental clean-up efforts.
- Reduced exposure to people, particularly children, through the interaction and degradation of products over time.

Organohalogen flame retardants have been associated with a wide range of human diseases, including cancer and lymphoma, thyroid disease, neurobehavioral problems in children, diabetes, earlier puberty in girls, decreased birth weight, and reduced fecundability[59]. Reducing exposure to organohalogen flame retardants has the potential to reduce the impacts of these diseases. Some examples are discussed below.

Low birth weight babies incur an average of $114,437 in medical costs in the first year of their lives. The March of Dimes reports that 106 low-birth-weight babies are born every week in Washington State (5512 per year). This could lead to $630,776,744 in health care spending for low birth weight babies. We note that there are many sources of organohalogen flame retardant exposure, beyond the consumer products covered by the rule, including legacy contamination, other types of consumer product in which organohalogen flame retardants may be used incidentally or with less frequency, and legacy or current products that remain in use. This means the rule will not *eliminate* organohalogen flame retardant exposure in the public, and will therefore not eliminate the costs of this entire exposure burden. Nonetheless, Ecology identified covered products as significant sources of organohalogen flame retardant exposure, using scientific understanding of organohalogen flame retardant exposure pathways and the considerations required in law, and a reduction in organohalogen flame retardant exposure due to these products will ultimately contribute to a reduction in some portion of these costs. Due to the uncertainty in frequency of use and concentrations, discussed throughout this analysis, we could not confidently identify a specific proportion of this benefit that would result specifically from the rule.

Understanding the costs of neurobehavioral problems in children is challenging. Caring for children with neurobehavioral differences can add to family stress and decrease work productivity, but it is also associated with costs for the child. As an example, the social and economic costs of ADHD were estimated to be between 8.40 and 17.44 billion in the US between 2018 and 2019.[60] Neurodevelopmental delays and reduced IQ have significant societal

[58] Workers recycling electronics are exposed to higher levels of flame retardants. Higher levels of PBDEs were found in recycling workers in China (Qu et al., 2007) and Sweden (Sjödin et al., 1999) compared to control groups. Sjödin et al. (1999) found that levels of PBDEs in workers in an electronics dismantling plant were about five times higher than other workers. https://www.sciencedirect.com/science/article/pii/S0160412019301473

[59] https://www.purahome.com/blog/wp-content/uploads/2015/12/Health-consequences-of-exposure-to-brominated-flame-retardants_Young2014.pdf

[60] https://journals.sagepub.com/doi/abs/10.1177/1087054720961828

costs. In 2001 Muir and Zegarac estimated that in the US a 5-point IQ loss was associated with lifetime costs of between $275-326 billion dollars.[61]

Some organohalogen flame retardants are associated with diabetes. A 2017 analysis of the costs of diabetes estimates $237 billion to $327 billion in direct medical costs and $90 billion in reduced productivity.[62]

Cancer is an expensive disease. Not only has it led to over 13,000 deaths in Washington in 2022, loss of productivity, and psychological stress, but it also incurs significant medical costs. In 2019, the national patient economic burden for cancer care was over $20 billion.

Organohalogen flame retardants are not the only factor that can contribute to these diseases. However, potential benefits of the rule include some reductions in the diseases described above.

Hazards of five specific organophosphate flame retardants:

The law identified flame retardants identified by the department under RCW 70A.430 as priority chemicals:

- Triphenyl phosphate (TPP).
- Ethylhexyl diphenyl phosphate (EHDPP).
- Isopropylated triphenyl phosphate (IPTPP).
- Tricresyl phosphate (TCP, mixed isomers).
- Tributyl phosphate.

Each of these chemicals is considered a chemical of high concern to children under our Children's Safe Product Act. They are also associated with human or environmental toxicity.

- TPP is associated with carcinogenicity, endocrine activity, and aquatic toxicity
- EHDPP is associated with carcinogenicity and reproductive toxicity. It is persistent in the environment and toxic to aquatic life.
- IPTPP has been identified by EPA as a persistent bioaccumulative and toxic chemical.
- TCP is often found as part of isomeric mixtures that are associated with reproductive toxicity, acute toxicity, systemic toxicity, neurotoxicity, and aquatic toxicity.
- Tributyl phosphate is a suspected human carcinogen and is associated with neurotoxicity, sensitization, and aquatic toxicity.

[61] https://pubmed.ncbi.nlm.nih.gov/11744507/
[62] https://diabetes.org/about-us/statistics/cost-diabetes

The organophosphate flame retardants described above are associated with cancer, neurodevelopmental delays, and reduced IQ in humans.[63] Reducing exposure to organohalogen flame retardants has the potential to reduce the impacts of these diseases. Some examples are discussed below.

Neurodevelopmental delays and reduced IQ have significant societal costs. In 2001 Muir and Zegarac estimated that in the US a 5-point IQ loss was associated with a cost of $275 billion to $326 billion.[64]

Cancer is an expensive disease. Not only has it led to over 13,000 deaths in WA in 2022, loss of productivity, and psychological stress, but it also incurs significant medical costs. In 2019, the national patient economic burden for cancer care was over $20 billion.

The organophosphate flame retardants included in this regulation are not the only causes of neurodevelopmental delays and cancer. We describe these as potential benefits. Reducing the use of organophosphate flame retardants may contribute to reductions in the diseases described above.

Benefits of restricting halogenated flame retardants and five organophosphate flame retardants in recreational polyurethane foam products:

Ecology determined that restricting halogenated flame retardants and the five organophosphate flame retardants described above in recreational polyurethane products would reduce exposure and release of these chemicals into the environment. Flame retardants in recreational foam accumulate in dust, where they can be inhaled, ingested, and come in contact with skin. There is widespread exposure to flame retardants in the U.S. population (Ospina et al., 2018). Gymnastic studios have higher levels of flame retardants in dust, compared to homes (Carignan et al., 2013, La Guardia & Hale, 2015). In addition, gymnasts and gym employees have higher exposure (Carignan et al., 2013, 2016; Ceballos et al., 2018). Intervention studies where the foam was replaced with flame-retardant-free foam showed reduced exposures (Ceballos et al., 2018; Dembsey et al., 2019). Foam products are also used in other recreational facilities including school auditoriums, climbing gyms, and recreational centers.

Based on the determination that a restriction on the use of halogenated flame retardants and five organophosphate flame retardants in recreational polyurethane foam products would reduce a significant source of exposure to these chemicals for people and the environment, we would also expect a reduction in the hazards discussed above. Potential benefits could include reduced cancer rates, reduction in diseases associated with endocrine disruption, improved neurodevelopmental outcomes, and improved aquatic health.

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[63] https://www.sciencedirect.com/science/article/pii/S0147651322008132, https://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6627825/ and https://ehp.niehs.nih.gov/doi/full/10.1289/EHP9285

[64] https://pubmed.ncbi.nlm.nih.gov/11744507/

4.2.1.4 Hazards of alkylphenol ethoxylates

We approach APEs as a class because RCW 70A.350.010 identifies APEs collectively as a priority chemical. The statute's directive is reasonable and well supported for several reasons:

- The most common APEs have similar biological hazards, including endocrine disruption and aquatic toxicity.
- APEs have toxic transformation products.

The available data on NPEs and OPEs suggest they share similar biological hazards in mammalian species and other organisms, and do not suggest other APEs would differ in this regard (DTSC, 2018; Servos, 1999; Staples et al., 1998). This includes NPEs and OPEs with any length of EO units, as well as APEs with differing branched or linear alkyl chain lengths attached to the phenolic ring (such as dodecylphenol ethoxylates).

APEs share biological hazards partly because of the breakdown process and transformation products associated with them, which we discuss in detail later in this chapter. The majority of NPEs and OPEs break down to shorter chain APEs, carboxylates, or alkylphenols (BAuA, 2012, 2014; DTSC, 2018). APEs generally increase in toxicity as the number of EO units decreases (NICNAS, 2020). Therefore, degradation of APEs can lead to hazardous transformation products with reduced EO units (DTSC, 2018). This supports the rationale for including APEs with any number of EO units in the priority chemical class.

Benefits of restricting the use of alkylphenol ethoxylates in laundry detergent:

Ecology determined that a restriction on the use of APEs in laundry detergent would reduce a significant source of exposure. Studies detect APEs and their degradation products in environmental media in Washington state, including in effluent from wastewater treatment plants, stormwater, streams, rivers, and estuarine and marine waters (Ecology, 2010b; King County, 2007; Meador et al., 2016). APEs and APs are also detected in tissues of fish from Washington state lakes and rivers (Ecology, 2016b; Meador et al., 2016). Reducing APE releases would reduce their presence in the environment and could benefit aquatic life.

As a result of the rule, restricted chemicals in specific product categories would reduce a significant source of exposure to these chemicals for people and the environment, we would also expect a reduction in the hazards discussed above. Potential benefits could include reduced cancer rates, reduction in diseases associated with endocrine disruption, improved neurodevelopmental outcomes, and improved aquatic health.

The potential economic benefits of policy actions on endocrine-disrupting chemicals are quantified as $319 billion in the USA[65].

[65] Endocrine-disrupting chemicals: economic, regulatory, and policy implications
Christopher D Kassotis, Laura N Vandenberg, Barbara A Demeneix, Miquel Porta, Remy Slama, and Leonardo Trasande. Endocrine-disrupting chemicals: economic, regulatory, and policy implications - PMC (nih.gov)

Two example diseases associated with endocrine disruption and exposure to APEs include male fertility[66] and preterm birth.[67]

About 15 percent of couples experience infertility. Infertility treatments can be expensive and are accompanied by other costs like psychological stress and lost work time. As an example, one cycle of in vitro fertilization was estimated to cost between $15,000 and $30,000 in 2018.[68] Since APE exposure is not the only factor that contributes to infertility, we would not expect the rule to eliminate infertility and the costs associated with it. However, some reduction and potential benefits are expected.

There is limited evidence that suggests exposure to APEs has been associated with preterm birth. Preterm birth can lead to lifelong challenges and disabilities and is associated with healthcare costs. A retrospective cohort study of preterm infants found medical costs in the first six months averaged between $76,153 and $603,778, depending on the gestational age of the infant.[69] According to the March of Dimes, there are an average of 142 preterm babies born each week in Washington state (7,384 annually[70]). BIPOC communities often experience higher rates of preterm birth. In Washington state, the rate of preterm birth is highest for American Indian/Alaska Native (12.8 percent) and black (10.4 percent) populations compared to white populations (7.9 percent). If we assume each preterm baby incurs $76,153 in medical costs in the first six months of life and there are 7,384 preterm babies born each year, we would expect about $562, 313,752 in costs. Under the same scenario, but with higher medical costs ($,603, 778 per baby, we would expect $4,458,296,752. There are many causes of preterm birth. Reducing APE exposure would not alleviate all factors that increase the odds of preterm birth. However, we would expect some reduction in preterm births in Washington state.

We note that there are many sources of APE exposure, beyond the consumer products covered by the rule, including legacy contamination, other types of consumer product in which APEs may be used incidentally or with less frequency, and legacy or current products that remain in use. This means the rule will not *eliminate* APE exposure in the public, and will therefore not eliminate the costs of this entire exposure burden. Nonetheless, Ecology identified covered products as significant sources of APE exposure, using scientific understanding of APE exposure pathways and the considerations required in law, and a reduction in APE exposure due to these products will ultimately contribute to a reduction in some portion of these costs. Due to the uncertainty in frequency of use and concentrations, discussed throughout this analysis, we could not confidently identify a specific proportion of this benefit that would result specifically from the rule.

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[66] https://link.springer.com/article/10.1007/s11356-016-7960-y
[67] https://link.springer.com/article/10.1007/s11356-022-19445-y
[68] https://www.forbes.com/health/family/how-much-does-ivf-cost/
[69] https://www.nature.com/articles/s41372-020-0635-z
[70] https://www.marchofdimes.org/peristats/state-summaries/washington?lev=1&obj=3&reg=99&slev=4&sreg=53&stop=55&top=3

4.2.1.5 Hazards of bisphenols

We approach bisphenols as a class because RCW 70A.350.010 identifies bisphenols collectively as a priority chemical. The statute's directive is reasonable and well supported for several reasons:

- Many bisphenols have endocrine-disrupting properties.
- Many bisphenols impact sensitive biological systems during critical windows of susceptibility.
- Previous actions reducing the use of some bisphenols led to increased exposure to other bisphenols.

Many bisphenols are associated with endocrine disruption and reproductive and developmental toxicity (see hazards of data-rich bisphenols). Exposure to low doses of endocrine disruptors early in life can have consequences throughout the lifespan (de Boo and Harding, 2006). Therefore, we should approach classes with chemicals known to cause endocrine disruption and developmental toxicity with caution (Braun et al., 2017).

People are exposed to mixtures of bisphenols before birth and throughout their lifespan (Chen et al., 2016). Studies detect BPA, BPF, and BPS in indoor dust samples, food, and urine (Chen et al., 2016). Because bisphenols can impact similar biological pathways, it is important to consider the potential impacts of cumulative exposures (Karrer et al., 2018, 2020; Liu et al., 2021).

Human biomonitoring data suggest that although exposure to BPA decreased in recent years (La Kind & Naiman, 2015), people are now also widely exposed to BPS and BPF (Lehmler et al., 2018). Exposure data align with the general observation that BPS and BPF were regrettable substitutions for BPA in some applications (Eladak et al., 2015).

Bisphenols are associated with a wide range of endocrine-related health impacts in people. Examples include obesity, neurodevelopmental impact in children (anxiety, depression, hyperactivity, inattention, and conduct problems), male infertility, diabetes, hypertension, cardiovascular disease, ovarian cysts, and early onset of puberty. Examples of economic impacts associated with these diseases are described below.[71]

Some bisphenols are associated with obesity, diabetes, and heart disease. A 2017 analysis of the costs of diabetes estimates $237 billion to $327 billion in direct medical costs and $90 billion in reduced productivity.[72] According to the CDC, heart disease is the leading cause of death for most populations in the US. Between 2017 and 2018 the costs of health care services, medicines, and lost productivity from heart disease were around $229 billion in the US.

[71] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7153198/, https://www.nature.com/articles/jes20168, https://www.sciencedirect.com/science/article/pii/S1438463922000256

[72] https://diabetes.org/about-us/statistics/cost-diabetes

A 2014 economic analysis found that limiting the use of BPA in food cans could bring $889 million to $13.8 billion in benefits in the US per year. This is largely related to reducing childhood obesity and heart disease.[73] Understanding the costs of neurobehavioral problems in children is challenging. Caring for children with neurobehavioral differences can add to family stress and decrease work productivity, but it is also associated with costs for the child. As an example, the social and economic costs of ADHD were estimated to be between 8.40 and 17.44 billion in the US between 2018 and 2019.[74] Neurodevelopmental delays and reduced IQ have significant societal costs. In 2001 Muir and Zegarac estimated that in the US a 5-point IQ loss was associated with lifetime costs of $275 billion to $326 billion.

Benefits of restricting bisphenols in drink can linings and thermal paper:

Ecology determined that a restriction on the use of bisphenols in drink can linings would reduce a significant source of exposure.[75] The use of bisphenols in drink cans has decreased in recent years. However, some uses of bisphenols in drink cans remain. For people consuming these products, they are a significant source of exposure. Sensitive populations, such as black populations, elderly people, and people with lower incomes, report higher canned drink consumption and may reap more benefits from a restriction on the use of bisphenols in the lining of drink cans.

Ecology also determined that a restriction on the use of bisphenols in thermal paper would reduce a significant source of exposure.

Use, disposal, and recycling of thermal paper contribute to bisphenol contamination in the environment. Bisphenols are found in wastewater treatment plant effluent (Hu et al., 2019). They produce documented detrimental effects in fish and other wildlife species (Canesi and Fabbri, 2015; Flint et al., 2012), and are an emerging concern for the endangered Puget Sound orca population (Southern Resident Orca Task Force, 2018). A King County study reported BPA in stormwater and surface waters (King County, 2007). BPA was also found in the bile of male English sole from Puget Sound (da Silva et al., 2013, 2017). Recycling thermal paper is considered an important route of environmental contamination by bisphenols, as reported in Europe (Aschberger et al., 2008) and Japan (Terasaki et al., 2007).

People are exposed to bisphenols through contact with thermal paper and uptake through the skin, and by ingesting foods to which bisphenols have been transferred after contamination of the hands (Biedermann et al., 2010; Hormann et al., 2014). Retail workers who regularly handle thermal paper receipts are especially highly exposed (Ndaw et al., 2016, 2018; Thayer et al., 2016). Our report on priority consumer products found that handling thermal paper contributes a significant fraction of human exposure to BPA and BPS—the most thoroughly studied bisphenols.

[73] https://www.healthaffairs.org/doi/abs/10.1377/hlthaff.2013.0686
[74] https://journals.sagepub.com/doi/abs/10.1177/1087054720961828
[75] https://pubmed.ncbi.nlm.nih.gov/11744507/

Thermal paper and dietary exposures are the leading contributors to BPA exposure in the general population (EFSA, 2015; Liao et al., 2011, 2012). Reducing the use of bisphenols in these applications would significantly reduce exposure. Less exposure to bisphenols could reduce endocrine-related diseases such as obesity and improve reproductive and developmental outcomes. Data from the European Union suggests that exposure to endocrine disruptors can lead to significant disease burdens and costs (Trassande et al. 2016, Bellanger et al, 2015.). Reducing the use of bisphenols would benefit people and the environment by reducing disease burdens and costs associated with diseases.

4.2.2 Requiring reporting use of priority chemicals in designated priority consumer products.

Information on the presence of the priority chemicals will help consumers make more efficient consumption choices relative to their preferences, by reducing uncertainty for consumers in their purchasing decisions. To the extent that some consumers will be willing to pay for products that pose less risk associated with the chemicals of concern, without the rule, consumers may not have the information to identify preferred products. This uncertainty prevents them from selecting an optimal bundle of consumption goods. Under the rule, consumers would be able to choose some quantity of products that carry the risks associated with the priority chemical, and some quantity of products that do not carry those risks. With uncertainty, consumers are only able to choose which goods they buy based on other attributes and have no knowledge of the content of these chemicals. Ecology expects that the combination of increased knowledge about these chemicals, combined with increased knowledge of their presence in products, will benefit consumers in their ability to behave in line with their full set of preferences for product attributes and risk.

This will likely also result in informational benefits for government decision-making, reducing potential health impacts and litigation, and improving industry understanding of the presence of these chemicals across the supply chain. This knowledge would also serve as a deterrent for uses where safe alternatives are available.

4.2.3 Benefits to overburdened communities and underserved populations

Throughout this analysis, we identified that some communities may receive a larger proportion of benefits under the rule, based on degree of exposure, vulnerability and existing burden, or both.

- Higher exposure to chemicals in priority products could result from a combination of individual preferences and choices, and marketing of different products across demographics and neighborhoods.
- Vulnerability and existing burden regarding environmental health, public health, and socioeconomic factors make the burden of exposure to chemicals in priority products

more impactful. This happens through exacerbation of existing exposure, health risks and conditions, as well as reduced ability to prevent, deal with, and recover from illness.

As noted earlier in this chapter:

- The impacts of vinyl flooring on asthma may have more impact on sensitive populations such as low-income and minority populations. Some of these communities already face higher rates of asthma, possibly due to increased exposure to other environmental contaminants. We describe this as a potential benefit because there is some uncertainty around the role of ortho-phthalates in the association between asthma and vinyl flooring.[76]
- Sensitive populations, such as black populations, elderly people, and people with lower incomes, report higher canned drink consumption and may reap more benefits from a restriction on the use of bisphenols in the lining of drink cans.
- APEs have been associated with preterm birth. Black, Indigenous, and people of color (BIPOC) communities often experience higher rates of preterm birth. In Washington State, the rate of preterm birth is highest for American Indian/Alaska Native (12.8 percent) and black (10.4 percent) populations compared to white populations (7.9 percent).[77]

The law also directs Ecology to continue implementing this repeating four-phase cycle of identifying priority chemicals used in priority consumer products, determining appropriate regulatory actions, and developing requirements to implement the regulatory actions.

We will continue involving overburdened communities, sensitive populations, and the community organizations supporting them in the implementation of the Safer Products for Washington program. Examples of how we intend to involve members of those communities and broader audiences include:

- Considering disproportionate impacts on overburdened communities and sensitive populations based on the consumer products they use. We identify the products they use through peer-reviewed literature, engagement with community groups, and public input.
- Enlisting multiple communication channels social media outlets, blogs, press releases, physical mailings, individual emails, and the Safer Products for Washington email list.
- Developing and sharing short videos in English and Spanish about safer products and how they impact consumers.
- Hosting listening sessions and community outreach events.

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[76] Priority Consumer Products Report to the Legislature. Safer Products for Washington Implementation. Phase 2. Ecology, 2020. https://apps.ecology.wa.gov/publications/documents/2004019.pdf

[77] https://www.marchofdimes.org/peristats/state-summaries/washington?lev=1&obj=3&reg=99&slev=4&sreg=53&stop=55&top=3

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of costs and benefits of the rule

Costs

We estimated the costs below resulting from the rule. For discussion, see Chapter 3.

Table 17. Estimated maximum total cost and cost per business.

Chemical	Industry	Assumed share to switch, %	Possible maximum sales loss (millions $)	Maximum lost wholesale markup (millions $)	Number of businesses	Maximum annual cost per business
PFAS	**Aftermarket stain and water resistance treatments**	**15**	**$2.9**	**$0.6**	**209**	**$2,780**
PFAS	**Carpet and rugs**	**5**	**$11.8**	**$2.4**	**464**	**$5067**
PFAS	**Leather and textile furnishings**	**50**	**$77.4**	**$15.5**	**1,139**	**$13,595**
Ortho-Phthalates	**Personal care and beauty products (fragrance)**	**5**	**$293.9**	**$58.8**	**4,357**	**$13,489**
Ortho-Phthalates	**Vinyl flooring**	**2.4**	**$46.8**	**$9.4**	**5,036**	**$1,859**
Organohalogen Flame retardants	**Electric and electronic equipment (plastic device casings)**	**50**	**$95.8**	**$19.2**	**3,388**	**$5,656**
Flame retardants	**Recreational polyurethane foam products**	**64**	**$212.7**	**42.5**	**792**	**$53,719**
APE	**Laundry detergent**	**95**	**$455.5**	**$91.1**	**519**	**$175544**
Bisphenols	**Drink can linings**	**5**	**$25.1**	**$5.0**	**352**	**$14,242**
Bisphenols	**Thermal paper**	**50**	**$11.5**	**$2.3**	**256**	**$8,994**
Total	**n/a**	**n/a**	**$1233.4**	**$285.0**	**n/a**	**n/a**

Underlying assumptions are as follows:

- NAICS codes represent businesses that manufacture, sell, and distribute priority products.
- Businesses manufacture priority consumer products subject to a restriction and priority consumer products that are not subject to a restriction.

- If the share of complying consumer products on the market is unknown, we choose different compliance scenarios.
- Businesses are losing all sales of restricted consumer products after the effective date of the rule.

In reality, manufacturers would choose between:

- Reformulating their products' ingredients.
- Switching to alternative suppliers.
- Reorganizing their product distribution between different markets.

Benefits

We identified the following benefits resulting from the rule. For discussion and illustrative values, see Chapter 4. We were able to partially quantify the benefits of the rule. The results are shown in the table below.

Table 18. Partial quantification of the benefits (avoided costs) for certain chemical classes.

Chemical class	Low, million $	High, million $
PFAS	**$110**	**$1,252**
Ortho-phthalates	**$798**	**$942**
Flame retardants	**$780**	**$780**
Bisphenols	**$2,618**	**$2,618**
APEs	**See qualitative discussion**	**See qualitative discussion**

Summarized benefits include:

- Regulation at the chemical class level, reflecting likely similar hazard traits, endpoints, or mechanisms of action. This approach also prevents potential regrettable substitutions, as has been observed with past chemical replacements. It also helps avoid treating chemicals with limited data as safe.
- Per- and Polyfluoroalkyl Substances (PFAS) in carpets and rugs, leather and textile furniture and furnishing, and aftermarket stain and water-resistance treatments:
    - Reduced inhalation of PFAS in house dust, particularly by children, resulting in reduced contributions to reproductive and developmental toxicity, and to systemic toxicity (immunotoxicity, neurotoxicity, and thyroid toxicity).
    - Reduced releases to the environment, particularly as PFAS are persistent and tend to accumulate in the environment. This reduces likelihood of PFAS contamination affecting drinking water, agriculture, and property values, as well as future need for remediation of PFAS contamination in environmental media. Environmental contamination can harm aquatic organisms.
- Ortho-phthalates in vinyl flooring and personal care products:

    - Reduced exposure to ortho-phthalates in house dust and indoor air, resulting in reduced contributions to:
        - Male reproductive development that include impacts to sperm quality, structural development of the male reproductive system, time to pregnancy, and testosterone levels.
        - Preterm births and their associated likelihood of lifelong challenges, disability, and increased healthcare costs.
        - Asthma incidence and exacerbation of asthma.
- Organohalogen flame retardants in electric and electronic enclosures:
    - Increased potential for recycling due to less persistent and toxic chemicals in products.
    - Reduced occupational exposure during manufacturing and disposal.
    - Reduced release of persistent and toxic chemicals into the environment and subsequent reductions in the need for environmental clean-up efforts.
    - Reduced exposure for people, particularly children, through the interaction and degradation of products over time, reducing contribution to:
        - Cancer and lymphoma.
        - Thyroid disease.
        - Neurobehavioral problems in children.
        - Diabetes.
        - Earlier puberty in girls.
        - Decreased birth weight.
        - Reduced fecundability.
- Ogranophosphate flame retardants (as identified in Chapter 70A.430 RCW) in polyurethane foam products:
    - Reduced exposure to these flame retardants, reducing contribution by chemical to:
        - Triphenyl phosphate (TPP)is associated with carcinogenicity, endocrine activity, and aquatic toxicity
        - Ethylhexyl diphenyl phosphate (EHDPP) is associated with carcinogenicity and reproductive toxicity. It is persistent in the environment and toxic to aquatic life.
        - Isopropylated triphenyl phosphate (IPTPP) has been identified by EPA as a persistent bioaccumulative and toxic chemical.

        - Tricresyl phosphate (TCP) is often found as part of isomeric mixtures that are associated with reproductive toxicity, acute toxicity, systemic toxicity, neurotoxicity, and aquatic toxicity.
        - Tributyl phosphate is a suspected human carcinogen and is associated with neurotoxicity, sensitization, and aquatic toxicity.
- Alkylphenol ethoxylates in laundry detergent:
    - Reduced exposure to alkylphenol ethoxylates, reducing contribution to:
        - Cancer.
        - Endocrine disruption.
        - Neurodevelopmental harms.
        - Reduced male fertility.
        - Preterm birth.
    - Reduced environmental exposure to alkylphenol ethoxylates and their degradation products, through reduced presence in effluent from wastewater treatment plants, stormwater, streams, rivers, and estuarine and marine waters. This would benefit aquatic life.
- Bisphenols in drink can linings and thermal paper:
    - Reduced exposure to bisphenols through ingestion and through the skin, resulting in reduced contribution to endocrine disruption. Examples include obesity, neurodevelopmental impact in children (anxiety, depression, hyperactivity, inattention, and conduct problems), male infertility, diabetes, hypertension, cardiovascular disease, ovarian cysts, and early onset of puberty.
    - Reduced environmental contamination with bisphenols, resulting in reduced impacts to fish and wildlife species, including endangered orcas.
- Improved consumer information from reported information, allowing the public to make better choices in line with their preferences.
- More comprehensively informed ongoing regulatory decision-making, from reported information, reducing potential future health impacts and litigation risk.
- Improved industry understanding of the presence of priority chemicals across the supply chain.

5.2 Conclusion

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the rule, as compared to the baseline, that the benefits of the rule are greater than the costs. It is crucial to also consider the benefits that we were not able to quantify for Washington, as discussed above and in Chapter 4.

Table 19. Cost-Benefit comparison.

Chemical class	Costs*; High, million $	Benefits; Low, million $	Benefits; High, million $
PFAS	**$92.1**	**$110**	**$1,252**
Ortho-phthalates	**$340.7**	**$798**	**$942**
Flame retardants	**$308.5**	**$780**	**$780**
Bisphenols	**$36.6**	**$2,618**	**$2,618**

* Costs could be as low as $0, for manufacturers or products that would achieve the equivalent of compliance under the baseline. For streamlined presentation of this range, we present only the maximum estimated costs in the table above.

These figures were updated from the Preliminary Regulatory Analyses because based on input we received during the public comment period, we reevaluated some of our assumptions, criteria, and presentation of results. We paid special attention to ensuring we used consistent assumptions, approaches and expectations across product categories whenever possible. We also focused on presenting comparable results across product categories, including consistent presentation of ranges of estimates in tables. Our goal with these changes was to make the results and estimated financial impacts easier to understand.

Changes in our underlying assumptions account for some of the changes in results reflected in our analysis, while other changed results are due to different presentation for easier comparison across product categories. The most notable changes in our results are increased estimated cost impacts, which reflect a change to our assumptions and a more conservative approach. While some results (including lower cost impacts) previously presented reflect assumptions that we continue to believe are accurate – including the degree to which product categories may be able to comply more quickly with the rule –we adopted the more conservative approach for this final analysis due to stakeholder concerns our original analysis was overly optimistic.

Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(c) requires Ecology to "…[d]etermine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection." The referenced subsections are:

(a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements;

(b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule;

(c) Provide notification in the notice of proposed rulemaking under RCW 34.05.320 that a preliminary cost-benefit analysis is available. The preliminary cost-benefit analysis must fulfill the requirements of the cost-benefit analysis under (d) of this subsection. If the agency files a supplemental notice under RCW 34.05.340, the supplemental notice must include notification that a revised preliminary cost-benefit analysis is available. A final cost-benefit analysis must be available when the rule is adopted under RCW 34.05.360;

(d) Determine 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.

In other words, to be able to adopt the rule, we are required to determine that the contents of the rule are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s). We assessed alternatives during rule development and determined whether they met the goals and objectives of the authorizing statute(s). Of those that would meet the goals and objectives, we determined whether those chosen for inclusion in the rule were the least burdensome to those required to comply with them.

During the public comment period for this rulemaking, we received feedback that some of the effective dates for restrictions were overly burdensome or unachievable for manufacturers. Based on those comments, the adopted rule includes later dates of:

- January 1, 2027, for organohalogen flame retardants in other electric and electronic products (not TVs or displays) with plastic external enclosures, intended for indoor use, manufactured by Group 1 businesses.
- January 1, 2028, for organohalogen flame retardants in other electric and electronic products (not TVs or displays) with plastic external enclosures, intended for indoor use, manufactured by Group 2 businesses.
- January 1, 2026, for bisphenols in thermal paper.

We note that Ecology received comments on rule coverage for other products and the processes used for product and chemical determinations, as well. Detailed responses to these comments are listed in the Concise Explanatory Statement for this rulemaking, found on the Safer Products for Washington rulemaking webpage.[78]

6.2 Goals and objectives of the authorizing statute

The authorizing statute for this rule is Chapter 70A.350 RCW, Toxic Pollution. Its goals and objectives are:

- Implement, administer, and enforce Chapter 70A.350 RCW.
- Regulate priority chemicals in priority consumer products.

6.3 Alternatives considered and why they were excluded

We considered the following alternatives during rule development, and did not include them in the rule because they either did not meet the goals and objectives of the statute, would have imposed additional burden on those required to comply with the rule, or both.

- Addressing individual chemicals and not the entire class of chemicals.
- Identifying each individual chemical by a CAS.
- Using risk determinations instead of alternatives assessments.
- Considering GHG emissions when determining safer, feasible, and available.
- Considering costs when determining the availability and feasibility of safer alternatives.
- Matching the federal government's efforts to regulate chemicals in products.
- Focusing on consumer products intended for residential use and not include products intended for industrial use.
- Not restricting ortho-phthalates in vinyl flooring.
- Not restricting bisphenols in can linings.
- Including requirements for televisions and electronic displays, and no other electronic products.
- Delaying the effective date of restrictions.
- Including requirements for products with PCBs.
- Making rule effective as soon as possible.
- Restricting contaminants and intentionally added chemicals.

[78] https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-337

- Not allowing chemical concentrations above zero.
- Not allowing manufacturers to use recycled material that has restricted chemicals.
- Not allowing manufacturers to sell existing stock.
- Allowing use of alternative organohalogen flame retardants not currently used in electronic casings, and polymeric flame retardants.

6.3.1 Addressing individual chemicals and not the entire class of chemicals and identifying each chemical by CAS

When the Legislature adopted the law, they intentionally gave Ecology the discretion to address chemicals on a class basis. Chemicals within the class often share hazard traits, hazard endpoints, or mechanisms of action. They are more likely to have similar hazards than those chemicals outside the class. And they are more likely to be hazardous and therefore require more scrutiny.

Most of the chemicals within the classes have a history of regrettable substitutions. That means chemicals of concern within the class were replaced by other chemicals within the class that turned out to be as problematic. Examples include replacing bisphenol A with bisphenol S. Both chemicals are endocrine disruptors. By taking action on the entire class, we prevent the potential for regrettable substitution.

Taking a class-based approach also helps us avoid treating chemicals with limited data as safe. Instead, we assume they are potentially hazardous, unless we have sufficient data to demonstrate they are truly safer.

If there is a chemical within the class that has sufficient data to demonstrate that it truly is less hazardous than the class as a whole, we exempted it. An example of this is the exemption for Tetramethylbisphenol F (TMBPF)We took this approach because we didn’t want to stifle innovation toward safer chemistry.

Ultimately, if we took a chemical-by-chemical approach, we would open up the potential for regrettable substitutions. This does not meet the objective of reducing exposure to priority chemicals.

The rule will not include a list of CAS RNs for every chemical regulated under the rule because this will prevent the rule from regulating chemical classes. However, Ecology intends to develop guidance that provides more information about known chemicals including CAS RNs.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.2 Using risk determinations instead of alternatives assessments

The Safer Products team took a hazard-based approach to identify safer alternatives, not a risk-based approach, because the law defines safer as "less hazardous," not "less risky" (RCW

70A.350.010). Including a risk assessment or exposure assessment would not meet the law's definition of safer (less hazardous, not less risky).

To characterize risk from chemical exposures, it is important to know the totality of exposures and all of the hazards, especially those that occur at the lowest doses. It is also important to know about other stressors (e.g., psychological stress, malnutrition, limited resources, etc.) that can interact with chemical exposures. Because risk is the product of exposure and hazard, if you only see part of the exposure, you will only see a fraction of the risk. Understanding exposure pathways across the lifecycle of chemicals used in consumer products is difficult. It's hard to predict how people will use products and what they'll do with the products when they're done. The best way to reduce risk is to avoid the use of hazardous chemicals in the first place.

If we were to use risk instead of hazard, we would be diverging from the approach set out in the law. It would also be less protective of people and the environment. This does not meet the objectives of this rulemaking.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.3 Considering GHG emissions when determining safer, feasible, and available

The Safer Products team developed criteria based on the definition of "safer" in the statute. The law does not include climate change or other sustainability factors. The Safer Products team supports sustainability and broader lifecycle considerations and encourages industry partners to think holistically about their product manufacturing. However, sustainability and lifecycle analysis are outside the scope of this effort. This effort focuses on finding opportunities to reduce hazardous chemicals in consumer products when Ecology identifies alternatives that are safer, feasible to use in the product, and available to purchase.

When possible, when identifying safer alternatives, we used existing certifications and labeling programs. Many of these programs do consider sustainability factors like recyclability and greenhouse gas emissions. However, based on the definition of safer in our law, we did not require this information.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.4 Considering costs when determining the availability and feasibility of safer alternatives

Cost information is not transparent and depends on the volumes of input chemicals a business buys and contract negotiations. These factors make it difficult for a government agency to make decisions around cost comparability. Instead, we looked at a higher level and based our determination on whether the alternatives were already used for the application of interest. This is based on the assumption that manufacturers would not voluntarily use prohibitively expensive chemicals.

The law requires the Safer Products team to determine the availability and feasibility of safer alternatives. The law does not focus on the cost of the alternatives. Cheaper products may be more hazardous, and if the rule doesn't address these products, then exposures will not be reduced.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.5 Matching the federal government's efforts to regulate chemicals in products

The law directs the Safer Products team to identify priority consumer products that contain priority chemicals, and then to develop requirements if they find safer, feasible, and available alternatives. The law directs the team to consider restrictions that may be consistent with regulatory actions taken by another state or nation. The law does not direct the team to wait for federal actions.

The Safer Products team is acting now and is taking a different approach because other entities are not regulating consumer products in a way that protects people and the environment.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.6 Not restricting ortho-phthalates in vinyl flooring

Chapter 70A.350 RCW directs Ecology to determine regulatory actions in Phase 3 and adopt a rule to implement the regulatory actions. Ecology cannot change the regulatory determinations. We are required to implement regulatory actions identified in the Final Regulatory Determinations Report to the Legislature.

In the Final Priority Consumer Products Report to the Legislature, the Safer Products team cited a 2016 study that estimated that vinyl flooring contains phthalates at concentrations between 9 percent and 32 percent by weight. According to the Resilient Flooring Institute (RFCI), most vinyl flooring products do not use ortho-phthalates. We confirmed this with a data order that was sent to all major vinyl flooring manufacturers. From this data, we learned that while most manufacturers had moved away from ortho-phthalates, some were still using DEHP or DINP in their products. This is still a significant source of exposure for people who use vinyl flooring that contains ortho-phthalates. This can lead to disproportionate exposures that particularly impact sensitive populations, such as infants and children who spend more time on or near the floor.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.7 Not restricting bisphenols in can linings

Stakeholders suggested, during rule development, that the rule should not restrict bisphenols in can linings because it would not reduce a significant source of exposure to people and the environment. We expect the vast majority of food can production in the US had transitioned to

non-BPA liners by the end of 2017 and at more than 95 percent by the end of 2019 for cans produced for the US market.[79]

If even 95 percent of food can linings do not contain BPA, that means five percent of food can linings still contain BPA. People typically buy products consistently. And if they consistently buy food cans that have liners with bisphenols, they will still have exposure.

This alternative does not meet the goals and objectives of the authorizing statute. To learn more about this regulatory determination, see the 2022 Final Regulatory Determinations Report.[80]

6.3.8 Only including requirements for televisions and electronic displays, and no other electronic products

The Safer Products team found alternatives that are safer, feasible, and available for flame retardants used in plastic external enclosures for electric and electronic products. While the use of halogenated flame retardants in TVs and displays has been the target of other regulations, the rule extends to broadly cover the plastic enclosures of electric and electronic products. In our priority product report, we found that halogenated flame retardants are used widely in the plastic enclosures of electric and electronic products. Data support the presence of halogenated flame retardants in the external plastic enclosures of everything from CD players to electric blanket components. In our regulatory determinations report to the Legislature, we found that safer alternative flame retardants could meet relevant product flammability standards. We reached out to industry and our stakeholders to identify any products within this category where safer alternatives wouldn't work. We learned about a few challenges and our formal draft rule excludes those products.

Because enclosures of electric and electronic products can expose people and the environment to organohalogen flame retardants, and safer alternatives are broadly feasible and available, restricting the use of organohalogen flame retardants broadly is the most protective option for people and the environment.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.9 Delaying the effective date of restrictions

The Safer Products team found alternatives that are safer, feasible, and available for priority chemicals in priority consumer products that are restricted in the rule. The law directs the rule to provide at least 365 days after rule adoption before a restriction takes effect. Additionally, the rule proposes compliance schedules that provide manufacturers and distributors time to find alternatives and adjust their products. The law intends to provide equitable access to safer

[79] WA Department of Ecology, 2022. Regulatory Determinations Report to the Legislature. Safer Products for Washington. Cycle 1 Implementation Phase 3.
https://apps.ecology.wa.gov/publications/summarypages/2204018.html
[80] https://apps.ecology.wa.gov/publications/summarypages/2204018.html

consumer products. Delaying compliance dates for all restrictions and reporting requirements will delay achieving the intent of the law.

This alternative does not meet the goals and objectives of the authorizing statute.

6.3.10 Including requirements for products with PCBs

The Toxic Substances Control Act (TSCA) preempts the rule from restricting PCBs in consumer products as originally outlined in Ecology's report.[81]. At the time of the June 2022 final regulatory determinations report, Ecology concluded any restriction that would not be preempted would not be consistent with information published and discussed with stakeholders through that date. Adopting a rule with insufficient notice to stakeholders would be inconsistent with both the APA and the stakeholder requirements of the rule's authorizing statute. This alternative does not meet the goals and objectives of the authorizing statute at this time.

However, Ecology notes that 2023 Washington Session Laws Chapter 455 became law on May 9, 2023 (SB 5369). This law found that "safer, feasible, and available alternatives to PCB-containing paints and printing inks now exist, as determined by the department in its June 2022 Safer Products for Washington report. Moreover, since safer and available products and processes to produce paints and printing inks do exist, the legislature finds that use of manufacturing processes resulting in products with PCB by-products is not inadvertent, but intentional, and constitutes a use of the chemical within the product." Ecology may propose restrictions in the future for this category that are not preempted by TSCA.

6.3.11 Making the rule effective as soon as possible

The rule establishes requirements and compliance dates that are reasonable for manufacturers and distributors. Those required to restrict a priority chemical in a priority consumer product need time to possibly find alternatives, redesign their product, test their product, and market their product. Those required to report the use of a priority chemical in a priority consumer product need time to explore their supply chain, collect data, and then use the IC2 database to report the data to Ecology.

This alternative is more burdensome to covered parties.

6.3.12 Restricting contaminants and intentionally added chemicals

While we acknowledge that restricting contaminants in priority consumer products could be beneficial, it would exceed the scope of this rulemaking and overly burden industry at this time. As the program progresses, the Safer Products team can lower numeric limits and regulate contamination, if needed, through a separate rulemaking process.

[81] See https://ecology.wa.gov/Regulations-Permits/Laws-rules-rulemaking/Rulemaking/WAC-173-337 for links to all relevant documents.

This alternative is more burdensome to covered parties.

6.3.13 Not allowing chemical concentrations above zero

While we acknowledge that setting numeric limits at zero ppm in priority consumer products could be beneficial, it would exceed the scope of this rulemaking and overly burden industry at this time. As the program progresses, the Safer Products team can lower numeric limits, if needed, through a separate rulemaking process.

This alternative is more burdensome to covered parties.

6.3.14 Not allowing manufacturers to use recycled material that has restricted chemicals

We can restrict the presence of priority chemicals in products, even when those priority chemicals come from the use of recycled content. The focus for this first round of rulemaking is on reducing the intentional addition and use of priority chemicals in priority consumer products. Over time, future post-consumer recycled material will contain fewer toxic chemicals because the rule restricts some priority chemicals in priority consumer products.

While regulating priority chemicals that are contaminants would reduce concentrations of priority chemicals, it would also be considerably burdensome. The alternatives may include finding different source materials or avoiding the use of recycled content altogether. This could have unintended consequences on waste reduction efforts and could increase the costs of compliance. Further, instead of ensuring compliance through supply chain transparency, manufacturers would need to test batches of recycled content to ensure compliance.

This alternative is more burdensome to covered parties.

6.3.15 Not allowing manufacturers to sell existing stock

Regulating existing stock will cause manufacturers and distributors to dispose of existing stock. This will result in a financial loss for manufacturers and distributors, increasing the costs of the rule. Additionally, it would waste resources, cause a significant increase in solid waste, and may cause a shortage of available products for consumers.

This alternative is more burdensome to covered parties.

6.3.16 Allowing use of alternative organohalogen flame retardants not currently used in electronic casings, and polymeric flame retardants

We approach organohalogen flame retardants (HFRs) as a class because RCW 70A.350.010 defines HFRs collectively as a priority chemical. In addition, the statute's directive is reasonable and well supported for several reasons:

- HFRs are persistent in the environment.

- Studies associate many organohalogen flame retardants with adequate toxicology information with adverse health effects, including carcinogenicity, mutagenicity, reproductive and developmental toxicity, and endocrine activity.
- Discontinued use of some HFRs led to increased use of other HFRs—growing the potential for exposure to both currently used HFRs and cumulative exposure to current and persistent legacy HFRs.

Regulating the use of individual HFRs in consumer products on a single chemical basis, instead of using a class-based approach, would increase the likelihood of regrettable substitutions or continued use of hazardous chemicals. This imparts unacceptable potential adverse effects on the environment and human health for future generations. It is necessary to consider HFRs together as a chemical class for several reasons:

- The persistent nature of HFRs.
- The association between exposure to many HFRs and adverse impacts on human health and the environment.
- The historical context of regrettable substitution for this class of chemicals that has led to the potential for ongoing and cumulative exposures.

This alternative would not have met the goals and objectives of the authorizing statute.

6.4 Conclusion

After considering alternatives to the rule's contents, within the context of the goals and objectives of the authorizing statute, we determined that the rule represents the least-burdensome alternative of possible rule contents meeting the goals and objectives.

Chapter 7: Regulatory Fairness Act Compliance

7.1 Introduction

The Regulatory Fairness Act (RFA; RCW 19.85.070) requires Ecology to perform a set of analyses and make certain determinations regarding the rule. This chapter presents the:

- Analysis of relative compliance cost burden.
- Consideration of lost sales or revenue.
- Cost-mitigating elements of the rule, if required.
- Small business and local government consultation.
- Industries likely impacted by the rule.
- Expected impact on jobs.

A small business is defined by the RFA as having 50 or fewer employees, at the highest ownership and operator level. Estimated compliance costs are determined as compared to the baseline (the regulatory environment in the absence of the rule, limited to existing federal and state requirements). Analyses under the RFA only apply to costs to "businesses in an industry" in Washington state. This means the impacts, for this part of our analyses, are not evaluated for government agencies.

7.2 Analysis of relative compliance cost burden

We calculated the estimated per-business costs to comply with the rule, based on the costs estimated in Chapter 3 of this document. Note that in Chapter 3 we identified losses in sales for businesses in the US with sales in Washington. The losses indicate how much of the revenues a business would lose if not adapted to the new regulations before the effective date. The costs of restrictions are shown for potentially illustrative purposes only.

In this section, we estimate compliance costs per employee for businesses in Washington.[82] The results are shown in the tables below. We note that for the following product categories, only small businesses were identified in Washington, so Ecology is required to mitigate costs to them to the extent that it is legal and feasible:

- Aftermarket stain and water resistance treatments
- Leather and textile furnishings
- Carpet and rugs
- Recreational polyurethane foam products

[82] Dun & Bradstreet, 2022. Filtered to businesses with a Washington location.

- Thermal paper

For the following product categories, we only identified large businesses. These are exempt from this disproportionate cost analysis under the RFA:

- Electric and electronic equipment (plastic device casings)
- Food and drink cans (can linings)

The following product categories included both small and large businesses, and we compared the costs per employee for each product category:

- Personal care and beauty products (fragrance).
- Vinyl flooring.
- Laundry detergent.

Table 20. Five-year adjustment sales losses per employee.

Product Category	Average Annual Cost per Business	Small Business Employees	Largest 10% of Business Employees	Cost per Employee - Small	Cost per Employee - Largest
Personal care and beauty products (fragrance)	**$13,489**	**7**	**240**	**$1,927**	**$56**
Vinyl flooring	**$1,859**	**4**	**400**	**$465**	**$5**
Laundry detergent	**$175,544**	**2**	**65**	**$87,772**	**$2,701**

Table 21. Ten-year adjustment sales losses per employee.

Product Category	Average Annual Cost per Business	Small Business Employees	Largest 10% of Business Employees	Cost per Employee - Small	Cost per Employee - Largest
Personal care and beauty products (fragrance)	**$13,489**	**7**	**240**	**$4,431**	**$129**
Vinyl flooring	**$1,859**	**4**	**400**	**$1,069**	**$11**
Laundry detergent	**$175,544**	**2**	**65**	**$201,821**	**$6,210**

We determined that the proposed rule is likely to impose disproportionate costs on small businesses in the above sectors, and therefore Ecology must mitigate this disproportion as far as is legal and feasible.

7.3 Loss of sales or revenue

Businesses that would incur costs could experience reduced sales or revenues if the rule significantly affects the prices of the goods they sell. The degree to which this could happen is strongly related to each business's production and pricing model (whether additional lump-sum costs would significantly affect marginal costs), as well as the specific attributes of the markets

in which they sell goods, including the degree of influence each firm has on market prices, as well as the relative responsiveness of market demand to price changes.

We used the REMI E3+ model for Washington state to estimate the impact of the rule on directly affected markets, accounting for dynamic adjustments throughout the economy. The model accounts for: inter-industry impacts; price, wage, and population changes; and dynamic adjustment of all economic variables over time. As potential maximum costs were modeled as lost import sales, we structured REMI inputs as lost imports in specified industries, with consumers reallocating that spending on other goods and services, and local industry compensating to the extent possible.

Initially, the total value of output in each directly affected sector is modeled to decrease up to $1 million in the first year, with diminishing impacts over time. In sectors with greater potential for local competition to offset imports, output in Washington could increase up to $150 million in the first year, with greatest potential local production offsets in personal care products and electronic components.

This modeling is based on known market and product attributes, and consumer preferences and purchasing decisions related to those. If manufacturers achieve compliance with the rule using product redesign, and that in turn changes consumer purchasing decisions differently than is assumed in the model, impacts to output may differ from those estimated above. For example:

- If the attributes of redesigned products make consumers more likely to substitute away to purchasing other products in the same product category or categories in the model, our results would not change.
- If the attributes of redesigned products make consumers more likely to substitute away to different types of product or to stop purchasing certain types of product entirely, overall impacts to output could be higher or lower, but the output value of covered products would be lower.
- If consumers show a preference for products that do not contain chemicals covered by the rule, and it makes them more likely to purchase types of products they don't currently purchase, there would be less impact to the value of covered product output.

Given the diverse and competitive nature of consumer product markets, and the multiple attributes that influence consumer behavior, the above examples may hold at the same time for different subsectors of a market.

7.4 Actions taken to reduce small business impacts

The RFA (19.85.030(2) RCW) states that:

"Based upon the extent of disproportionate impact on small business identified in the statement prepared under RCW 19.85.040, the agency shall, where legal and feasible in meeting the stated objectives of the statutes upon which the rule is based, reduce the costs

imposed by the rule on small businesses. The agency must consider, without limitation, each of the following methods of reducing the impact of the proposed rule on small businesses:

a) Reducing, modifying, or eliminating substantive regulatory requirements;

b) Simplifying, reducing, or eliminating recordkeeping and reporting requirements;

c) Reducing the frequency of inspections;

d) Delaying compliance timetables;

e) Reducing or modifying fine schedules for noncompliance; or

f) Any other mitigation techniques including those suggested by small businesses or small business advocates."

We considered all the above options, the goals and objectives of the authorizing statutes (see Chapter 6), and the scope of this rulemaking. We limited compliance cost-reduction methods to those that:

- Are legal and feasible.
- Meet the goals and objectives of the authorizing statute.
- Are within the scope of this rulemaking.

The scope of this rulemaking was limited to identifying actions – restrictions or reporting – so we could not legally include options a), c), and e).

Ecology was required to start the rulemaking with predetermined requirements, established as actions recommended to the Legislature.

We included the following elements and mitigation techniques in the rule to reduce costs to small businesses.

During the public comment period for this rulemaking, we received feedback that some of the effective dates for restrictions were overly burdensome or unachievable for manufacturers. Based on those comments, the adopted rule includes later dates of:

- January 1, 2027, for organohalogen flame retardants in other electric and electronic products (not TVs or displays) with plastic external enclosures, intended for indoor use, manufactured by Group 1 businesses.
- January 1, 2028, for organohalogen flame retardants in other electric and electronic products (not TVs or displays) with plastic external enclosures, intended for indoor use, manufactured by Group 2 businesses.
- January 1, 2026, for bisphenols in thermal paper.

During the rule development process, Ecology specifically sought input from a variety of industry associations. The intent was to help ensure representation of businesses of all sizes, not just from large manufacturers who have staff dedicated to these types of stakeholder activities. To address potential discrepancies between large and small manufacturers and distributors, we made the following provisions in the rule:

- Incorporated concentration limits and effective dates suggested by manufacturers, distributors, and their representatives as being reasonable.
- Incorporated tiered effective dates for large and small electronics manufacturers. Although "Group 2" businesses may include some that do not qualify as "small" businesses under Washington law, we determined it was preferable to be overinclusive instead of potentially excluding small businesses.
- Left the criteria and process for requesting an exemption open-ended and flexible. This will allow us to respond to small businesses and grant exemptions or compliance extensions on an individualized basis.
- Required the use of the IC2 database when submitting notifications to ECY. Some manufacturers already use this database if they must comply with WA's CSPA (WAC 173-334) and with Oregon regulations. This can reduce costs to small businesses that already use the IC2 database.
- Exempted existing stock and repair and replacement parts manufactured before the effective date. This allows small businesses to continue selling existing stock and to continue repairing products manufactured before the effective date

7.5 Small business and government involvement

We involved small businesses and local governments in the development of the rule:

- Ecology held 29 stakeholder meetings on the topics of the rule during cycle 1 of the program.
- Ecology organized 19 webinars on the topics of the rule during cycle 1 of the program.
- Ecology published on the Safer Products for Washington web page announcements, reports, and other informational materials.
- Three informal public comment periods on the draft products report, draft regulatory determinations report, and a preliminary draft of the rule.
- Outreach through the WA Department of Health newsletter – shared with local health authorities – encouraging feedback.

7.6 North American Industry Classification System (NAICS) codes of impacted industries

The rule likely impacts the following industries, with associated NAICS codes. NAICS definitions and industry hierarchies are discussed at https://www.census.gov/cgi-bin/sssd/naics/naicsrch?chart=2017.

Electric and electronic equipment (plastic device casings)

- 443142 - Electronics stores

- 334417 - Electronic connector manufacturing
- 334111 - Electronic computer manufacturing
- 334418 - Printed circuit assembly manufacturing
- 334419 - Other electronic component manufacturing
- 423620 - Household appliances, electric housewares, and consumer electronics wholesalers
- 423690 - Other electronic parts and equipment merchant wholesalers

Recreational polyurethane foam products

- 326150 - Polyurethane foam products manufacturing
- 424610 - Plastics foam merchant wholesalers

Carpet and rugs

- 314110 - Carpets and rugs made from textile materials
- 423220 - Carpet merchant wholesalers
- 442210 - Carpet stores

Leather and textile furnishings

- 442299 - Home furnishings stores
- 423220 - Home furnishings merchant wholesalers/linens (e.g., bath, bed, table) merchant wholesalers/towels merchant wholesalers
- 314120 - Bedspreads and bed sets made from purchased fabrics/towels or washcloths made from purchased fabrics/curtains and draperies, window, made from purchased fabrics
- 337121 - Household-type furniture, upholstered, manufacturing
- 337211 - Office furniture, padded, upholstered, or plain wood, manufacturing
- 337214 - Office furniture (except wood), padded, upholstered, or plain (except wood), manufacturing

Aftermarket stain and water resistance treatments

- 313310 - Chemical finishing (e.g., fire, mildew, water resistance) fabrics

Food and drink cans (can linings)

- 332431 - Metal cans, light gauge metal, manufacturing

Thermal paper

- 322230 - Tapes (e.g., adding machine, calculator, cash register) made from purchased paper

- 325992 - Heat-sensitized (i.e., thermal) paper made from purchased paper

Laundry detergent

- 325611 - Detergents (e.g., dishwashing, industrial, laundry) manufacturing
- 424690 - Detergents merchant wholesalers

Vinyl flooring

- 326199 - Vinyl floor coverings manufacturing

Personal care and beauty products (fragrance)

- 325199 - Perfume materials (i.e., basic synthetic chemicals, such as terpineol) manufacturing
- 325620 - Blending and compounding perfume bases / Perfumes manufacturing
- 339999 - Atomizers (e.g., perfumes) manufacturing
- 424210 - Perfumes merchant wholesalers / Deodorants, personal, merchant wholesalers
- 325611 - Hand soaps (e.g., hard, liquid, soft) manufacturing / Bar soaps manufacturing
- 325620 - Makeup (i.e., cosmetics) manufacturing / Deodorants, personal, manufacturing / Cosmetic creams, lotions, and oils manufacturing / Hair preparations (e.g., conditioners, dyes, rinses, shampoos) manufacturing

7.7 Impact on jobs

We used the REMI E3+ model for Washington state to estimate the impact of the rule on jobs in the state, accounting for dynamic adjustments throughout the economy.

The rule would result in transfers of money within and between industries, as compared to the baseline. The modeled impacts on employment are the result of multiple small increases and decreases in employment, prices, and other economic variables across all industries in the state. As potential maximum costs were modeled as lost sales, we structured REMI inputs as lost sales by specified industries, with consumers reallocating that spending on other goods and services. In directly impacted industries, we modeled local job gains of up to ten jobs, with diminishing gains over time, compared to the baseline. As with impacts to output (see section 7.3), local job gains were modeled to occur in industries with greater ability to compensate for reduced imports with local production, including personal care products.

This modeling is based on known market and product attributes, and consumer preferences and purchasing decisions related to those. If manufacturers achieve compliance with the rule using product redesign, and that in turn changes consumer purchasing decisions differently than is assumed in the model, impacts to employment may differ from those estimated above. For example:

- If the attributes of redesigned products make consumers more likely to substitute away to purchasing other products in the same product category or categories in the model, our results would not change.
- If the attributes of redesigned products make consumers more likely to substitute away to different types of product or to stop purchasing certain types of product entirely, overall impacts to employment could be higher or lower depending on the labor-intensity of goods or services on which they spend their money instead, but the employment necessary to produce covered products would be lower.
- If consumers show a preference for products that do not contain chemicals covered by the rule, and it makes them more likely to purchase types of products they don't currently purchase, there would be less impact to the covered product employment and potentially less employment gain in markets that consumers are substituting away from.

Given the diverse and competitive nature of consumer product markets, and the multiple attributes that influence consumer behavior, the above examples may hold at the same time for different subsectors of a market.

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Appendix A: Administrative Procedure Act (RCW 34.05.328) Determinations

A. RCW 34.05.328(1)(a) – Clearly state in detail the general goals and specific objectives of the statute that this rule implements.

See Chapter 6.

B. RCW 34.05.328(1)(b) –

1. **Determine that the rule is needed to achieve the general goals and specific objectives of the statute.**

   See chapters 1 and 2.

2. **Analyze alternatives to rulemaking and the consequences of not adopting this rule.**

   Chapter 70A.350 RCW directs Ecology to develop rules to implement the regulatory actions Ecology identified in the Final Regulatory Determinations Report to the Legislature (June 2022). Ecology must adopt a rule by June 1, 2023, as directed by RCW 70A.350.050.

   Please see the Least Burdensome Alternative Analysis, Chapter 6 of this document, for a discussion of alternative rule content considered.

A. RCW 34.05.328(1)(c) - A preliminary cost-benefit analysis was made available.

When filing a rule proposal (CR-102) under RCW 34.05.320, Ecology provides notice that a preliminary cost-benefit analysis is available. At adoption (CR-103 filing) under RCW 34.05.360, Ecology provides notice of the availability of the final cost-benefit analysis.

B. RCW 34.05.328(1)(d) – Determine that probable benefits of this 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.

See Chapters 1 – 5.

C. RCW 34.05.328 (1)(e) - Determine, after considering alternative versions of the analysis required under RCW 34.05.328 (b), (c), and (d) that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated in Chapter 6.

Please see Chapter 6.

D. RCW 34.05.328(1)(f) - Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

To the best of our knowledge, the rule does not require those to whom it applies to take an action that violates requirements of another federal or state regulation. Ecology

examined applicable federal and state regulations related to the regulation of toxic chemicals in consumer products.

E. RCW 34.05.328 (1)(g) - Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law.

To the best of our knowledge, the rule does not impose more stringent performance requirements on private entities than on public entities.

F. RCW 34.05.328 (1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter.

No. The federal Toxic Substances Control Act regulates chemicals but does not regulate the priority chemicals in priority consumer products in the rule. In Washington State, Chapter 70A.430 RCW and Chapter 173-334 WAC regulate similar chemicals as the rule, but do not regulate the same priority consumer products.

If yes, the difference is justified because of the following:

☐ (i) A state statute explicitly allows Ecology to differ from federal standards.

☐ (ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated in Chapter 6.

G. RCW 34.05.328 (1)(i) – Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same subject matter.

Ecology examined applicable federal and state regulations related to the regulation of toxic chemicals in consumer products. Where possible, the requirements in the rule match similar requirements of other authorities including other US states and other nations.