DEPARTMENT OF
ECOLOGY
State of Washington

Final Regulatory Analyses

Including the:

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

Chapter 173-334 WAC
Children's Safe Products – Reporting Rule

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Chapter 173-334 WAC
Children's Safe Products Reporting Rule

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Executive Summary

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under chapters 34.05 RCW and 19.85 RCW, for the adopted amendments to the Children's Safe Products Reporting Rule (chapter 173-334 WAC; "CSPA Reporting rule" or "the rule"). This includes the:

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

The adopted rule amendments not specifically dictated in the authorizing statute, or elsewhere in laws or rules, include:

- Adding 20 chemicals to the Chemicals of High Concern for Children (CHCC) list.
- Changing one grouped nonylphenol CHCC to three individual listings.
- Removing three chemicals from the CHCC list.
- Setting a single annual reporting date consistent with reporting in other states.
- Housekeeping, including:
  - Clarifying reporting required for total concentration of the CHCC.
  - Removing obsolete phase-in reporting requirements.
  - Using the term "de minimis" to refer to existing minimum chemical reporting levels.
  - Clarifying that resubmission of identical annual data (copy and paste) is sufficient, instead of a letter to Ecology confirming no changes from the previous annual report.
  - Updating chemical names to be consistent with terminology in the product testing database.
  - Organizational revisions with no impact on requirements.

Over 20 years, the total costs created by adding the 20 new chemicals to the CHCC list, and separating an existing single listing into three CHCCs, add to total present values of:

- Low: $1.5 million
- High: $8.4 million

Over 20 years, the total benefits created by removing three chemicals from the CHCC list would be:

- Low: $12.3 million
- High: $13.9 million

Note that the differences between the costs of adding chemicals and avoided costs associated with removing chemicals are based on differences across:

- Frequency of reports and testing for a specific chemical.

- Numbers of manufacturers producing products more likely to contain a chemical.
- Need for testing for a chemical as a nonfunctional element or contaminant in a product.
- Testing costs (for manufacturers that choose to test).

We also expect the adopted rule amendments to result in informational benefits for government planners, consumers, and manufacturers. These include, but are not limited to, the following benefits associated with improved knowledge of the manufacturing process and potentially damaging chemical content of children's products:

- Greater understanding of the distribution of CHCCs meeting selection criteria in Washington's children's products and economy.
- Credibility and better-informed consumer behavior.
- Economies of scale in manufacturing.
- Avoided impacts to children's health through manufacturer knowledge.
- Avoided recall or litigation costs.

Ecology concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the rule amendments, that the benefits of the adopted rule amendments are greater than the costs.

After considering alternatives to the adopted rule's contents, as well as the goals and objectives of the authorizing statute, Ecology determined that the adopted rule represents the least-burdensome alternative of possible rule contents meeting these goals and objectives.

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

Under the estimated increased compliance costs created by the adopted rule amendments, the Washington economy could experience a loss of 1 – 6 jobs in each year (20 – 120 full-time employees, FTEs, over 20 years), depending on which industry experiences increased compliance costs.

Under the estimated reduced compliance costs created by the adopted rule amendments, the Washington economy could experience a gain of 4 – 9 jobs in each year (80 – 180 FTEs over 20 years), depending on which industry experiences reduced compliance costs.

Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under chapters 34.05 RCW and 19.85 RCW, for the adopted amendments to the Children's Safe Products Reporting Rule (chapter 173-334 WAC; "CSPA Reporting Rule" or "the rule"). This includes the:

- 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 (RCW 34.05.328(1)(d)). 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 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 to small businesses to the largest businesses affected. Chapter 7 documents that analysis, when applicable.

All determinations are based on the best available information at the time of publication.

1.1.1 About the Children's Safe Products Reporting Rule

The Children's Safe Products Act (CSPA; chapter 70.240 RCW) requires Ecology to "identify high priority chemicals that are of high concern for children", and requires manufacturers to report the concentration of those chemicals in their children's products sold or offered for sale in Washington. Based on CSPA's goals and objectives, Ecology developed a process for

identifying Chemicals of High Concern to Children (CHCCs), and adopted the original list in 2011. The CHCC list is adopted in Ecology rule chapter 173-334 WAC, the Children's Safe Products Reporting Rule, and changes to the CHCC list must be made via the rulemaking process. In 2013, Ecology used the same process to amend the CHCC list, adding one chemical, and removing one chemical.

In 2016, CSPA was amended, prohibiting the manufacture and sale of five specific flame retardants, and requiring Ecology to consider the addition of six flame retardants to the CHCC list. Because the CHCC list is in rule, Ecology undertook a rulemaking during which it used the same basic process developed in 2011 and used in 2013, to identify chemicals to add to, or remove from, the CHCC list.

1.2 Summary of the adopted rule amendments

The adopted rule amendments not specifically dictated in the authorizing statute, or elsewhere in laws or rules, include:

- Adding 20 chemicals to the Chemicals of High Concern for Children (CHCC) list.
- Changing one grouped nonylphenol CHCC to three individual listings.
- Removing three chemicals from the CHCC list.
- Setting a single annual reporting date consistent with reporting in other states.
- Housekeeping, including:
  - Clarifying that CHCC reporting must be for total concentration.
  - Removing obsolete phase-in reporting requirements.
  - Using the term "de minimis" to refer to existing minimum chemical reporting levels.
  - Clarifying that resubmission of identical annual data (copy and paste) is sufficient, instead of a letter to Ecology confirming no changes from the previous annual report.
  - Updating chemical names to be consistent with terminology in the product testing database.
  - Organizational revisions with no impact on requirements.

1.3 Reasons for the adopted rule amendments

1.3.1 Adding 20 chemicals to the CHCC list

Ecology identified 20 chemicals to add to the CHCC list, based on information regarding toxicity and potential for exposure and whether they meet the criteria for listing. Ecology used the same basic process used in 2011 and 2013 to identify chemicals as CHCCs. Manufacturers of children's products that contain these chemicals will be required to report on those products.

The chemicals added to the CHCC list include the six flame retardants identified by the Legislature to be considered as potential CHCCs in amendments made to the Children's Safe Products Act (RCW 70.240.025) in 2016.

1.3.2 Changing grouped nonylphenol CHCCs to individual listings

Ecology is listing two chemicals as separate CHCCs, rather than as part of the 4-Nonylphenol group. Nonylphenol and 4-Nonylphenol branched are currently listed as CHCCs, grouped with 4-Nonylphenol. This is based on Ecology's recognition that only one of the three nonylphenol chemicals listed was being reported, due to only the identification (chemical abstract service, "CAS") number for 4-Nonylphenol being identified in the existing reporting system.

1.3.3 Removing three chemicals from the CHCC list

Ecology is removing three chemicals from the CHCC list. These chemicals were previously identified as CHCCs using the same basic process used for identifying CHCCs in this rulemaking. Based on updated information regarding toxicity and/or exposure parameters, Ecology determined that these three chemicals previously identified as CHCCs no longer met the criteria for listing.

1.3.4 Setting single annual reporting dates

The adopted rule amendments set a single annual reporting date. This replaces existing requirements for mid-year reporting for some manufacturers. Ecology chose to revise the timing of annual reports to simplify reporting requirements, and to bring reporting requirements into line with requirements in other states.

1.3.5 Housekeeping

Ecology included a number of housekeeping changes in the adopted rule amendments, to:

- Clarify that CHCC reporting must be for total concentration.
- Remove obsolete language describing phasing in of reporting requirements.
- Use terminology consistent with other regulations.
- Clarify allowable compliance when report contents are identical to the previous report.
- Use chemical names consistently across rule and agency implementation.
- Reorganize rule language to retain some existing requirements from sections we are otherwise deleting.

Housekeeping changes do not change the requirements in the rule.

1.4 Document organization

The remainder of this document is organized in the following chapters:

- Baseline and the adopted rule amendments (Chapter 2): Description and comparison of the baseline (what would occur in the absence of the rule amendments) and the adopted changes to rule requirements.
- Likely costs of the adopted rule amendments (Chapter 3): Analysis of the types and sizes of costs we expect impacted entities to incur as a result of the adopted rule amendments.
- Likely benefits of the adopted rule amendments (Chapter 4): Analysis of the types and size of benefits we expect to result from the adopted rule amendments.
- Cost-benefit comparison and conclusions (Chapter 5): Discussion of the complete implications of the CBA, and comments on the results.
- Least-Burdensome Alternative Analysis (Chapter 6): Analysis of considered alternatives to the contents of the adopted rule amendments.
- Regulatory Fairness Act Compliance (Chapter 7): Comparison of compliance costs to small and large businesses; mitigation; impact on jobs.
- RCW 34.05.328 determinations not discussed in Chapter 5 or 6 (Appendix A)

Chapter 2: Baseline and the Adopted Rule Amendments

2.1 Introduction

We analyzed the impacts of the adopted rule amendments relative to the baseline of the existing 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 amendments were not adopted.

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 adopted rule amendments.

For this rulemaking, the baseline includes:

- The previous rule content: chapter 173-334 WAC.
- The authorizing statute: chapter 70.240 RCW, the Children's Safe Product Act (CSPA). This law explicitly includes:
    - Definitions for:
        - Children's products, children's cosmetics, children's jewelry
        - High priority chemical, selected chemical names and acronyms
        - Manufacturer
        - Toy
        - Trade association
    - Reporting requirements, including:
        - The name of the chemical used or produced and its Chemical Abstracts Service (CAS) number.
        - A brief description of the product or the product component containing the chemical.
        - A description of the function of the chemical in the product.
        - The concentration of the chemical used in each unit of the product or product component. The concentration may be reported in ranges, rather than the exact amount.
        - The name and address of the manufacturer and the name, address, email, and phone number of a contact person for the manufacturer.
        - Any other information the manufacturer deems relevant to the appropriate use of the product.
    - Civil penalties for violation.

2.3 Adopted rule amendments

The adopted rule amendments that differ from the baseline and are not *specifically* dictated in the authorizing statute or elsewhere in law or rule include:

- Adding 20 chemicals to the Chemicals of High Concern for Children (CHCC) list.
- Changing one grouped nonylphenol CHCCs to three individual listings.
- Removing three chemicals from the CHCC list.
- Setting a single annual reporting date consistent with reporting in other states.
- Housekeeping, including:
  - Clarifying that CHCC reporting must be for total concentration.
  - Removing obsolete phase-in reporting requirements.
  - Using the term "de minimis" to refer to existing minimum chemical levels.
  - Clarifying that resubmission of identical data (copy and paste) is sufficient, instead of a letter to Ecology confirming no changes from the previous report.
  - Updating chemical names to be consistent with terminology in the product testing database.
  - Organizational revisions with no impact on requirements.

Table 1 identifies all changes to the CHCC list based on chemicals added, expanded, or removed as a result of the rule amendment. Detailed discussion is provided in the following sections.

Table 1: Changes to the CHCCs list in this rule amendment

CHCC	Acronym	CAS	Change
Bisphenol S	BPS	80-09-1	Add
Dicyclohexyl phthalate	DCHP	84-61-7	Add
Diisobutyl phthalate	DIBP	84-69-5	Add
Phthalic anhydride	Not applicable	85-44-9	Remove
Triphenyl phosphate	TPP	115-86-6	Add
Di (2-methoxyethyl) phthalate	DMEP	117-82-8	Add
Tris (2,3-dibromopropyl) phosphate	TDBPP	126-72-7	Add
Tri-n-butyl phosphate	TNBP	126-73-8	Add
Dipentyl phthalate	DPP	131-18-0	Add
Perfluorooctanoic acid	PFOA	335-67-1	Add
Octamethylcyclotetrasiloxane	D4	556-67-2	Remove
Bisphenol F	BPF	620-92-8	Add
Ethylhexyl diphenyl phosphate	EHDPP	1241-94-7	Add
Tricresyl phosphate	TCP	1330-78-5	Add
Molybdenum & molybdenum compounds	Mo	7439-98-7	Remove
Tris (1-chloro-2-propyl) phosphate	TCPP	13674-84-5	Add
Nonylphenol	Not applicable	25154-52-3	Expand
Bis (2-ethylhexyl) tetrabromophthalate	TBPH	26040-51-7	Add

CHCC	Acronym	CAS	Change
Bis(chloromethyl)propane-1,3-diyl tetrakis-(2-chloroethyl) bis(phosphate)	V6	38051-10-4	Add
Isopropylated triphenyl phosphate	IPTPP	68937-41-7	Add
4-Nonylphenol branched	NP	84852-15-3	Expand
Decabromodiphenyl ethane	DBDPE	84852-53-9	Add
Short-chain chlorinated paraffins	SCCP	85535-84-8	Add
Chlorinated paraffins	Not applicable	108171-26-2	Add
2-ethylhexyl-2,3,4,5-tetrabromobenzoate	TBB	183658-27-7	Add

2.3.1 Adding 20 chemicals to the CHCC list

Baseline

The CHCC list in chapter 173-334 WAC did not include the adopted additions.

Adopted

The adopted rule amendments add the following chemicals (with associated CAS numbers) to the CHCC list.

Table 2: Chemicals added as CHCCs under the adopted rule amendments

Chemical	Acronym	CAS
Bisphenol S	BPS	80-09-1
Dicyclohexyl phthalate	DCHP	84-61-7
Diisobutyl phthalate	DIBP	84-69-5
Triphenyl phosphate	TPP	115-86-6
Di (2-methoxyethyl) phthalate	DMEP	117-82-8
Tris (2,3-dibromopropyl) phosphate	TDBPP	126-72-7
Tri-n-butyl phosphate	TNBP	126-73-8
Dipentyl phthalate	DPP	131-18-0
Perfluorooctanoic acid	PFOA	335-67-1
Bisphenol F	BPF	620-92-8
Ethylhexyl diphenyl phosphate	EHDPP	1241-94-7
Tricresyl phosphate	TCP	1330-78-5
Tris (1-chloro-2-propyl) phosphate	TCPP	13674-84-5
Bis (2-ethylhexyl) tetrabromophthalate	TBPH	26040-51-7
Bis(chloromethyl)propane-1,3-diyl tetrakis-(2-chloroethyl) bis(phosphate)	V6	38051-10-4
Isopropylated triphenyl phosphate	IPTPP	68937-41-7
Decabromodiphenyl ethane	DBDPE	84852-53-9
Short-chain chlorinated paraffins	SCCP	85535-84-8
Chlorinated paraffins		108171-26-2
2-ethylhexyl-2,3,4,5-tetrabromobenzoate	TBB	183658-27-7

Expected impact

Manufacturers of children's products containing the added chemicals will need to report information about these chemicals in their products.

This will likely result in additional costs of identifying the concentration of these chemicals in their products (using new testing, knowledge of product manufacturing processes, or testing for compliance) and reporting this additional information.

This will likely also result in informational benefits for these 20 chemicals, including more informed consumer and government decision-making, reducing potential health impacts and litigation, and improving industry understanding of the presence of CHCCs across the supply chain.[2]

2.3.2 Changing grouped nonylphenol CHCCs to individual listings

Baseline

The CHCC list in chapter 173-334 WAC included CAS number 104-40-5: "4-Nonylphenol; 4-NP and its isomer mixtures including CAS 84852-15-3 and CAS 25154-52-3."

Adopted

The adopted rule amendments separate the above single chemical listing into three individual chemical listings.

Table 3: Chemicals listed as separate CHCCs under the adopted rule

Chemical	CAS
4-Nonylphenol	104-40-5
Nonylphenol	25154-52-3
4-Nonylphenol branched	84852-15-3

Expected impact

Because the baseline rule only listed a single CAS number for the grouped CHCC chemicals (despite listing them separately in the chemical description), manufacturers have likely been testing for and reporting only the one chemical identified by the CAS number 104-40-5.

Listing the three chemicals separately, by individual CAS numbers, will likely result in manufacturers of children's products needing to identify two additional chemicals in their products (using new testing, knowledge of product manufacturing processes, or testing in compliance with other regulations), and reporting this information.

[2] These informational benefits have the potential to impact sales or revenue insofar as consumers make different purchasing decisions based on new information. Rather than removing sales and revenue from the industry, however, this is likely to transfer sales within industries, based on consumer preferences for children's products containing versus not containing CHCCs, and their ability to identify those products. All manufacturers of children's products are covered by the rule. See Chapter 7 of this document for discussion of price impacts on sales and revenue.

This will likely also result in informational benefits for the two chemicals listed separately in the adopted rule. Benefits could include:

- Informing consumer and government decision-making.
- Reducing potential health impacts and litigation.
- Improving industry understanding of the presence of CHCCs across the supply chain.

2.3.3 Removing three chemicals from the CHCC list

Baseline

The CHCC list in chapter 173-334 WAC included the chemicals below.

Table 4: Chemicals removed from the CHCC list under the adopted rule amendments

Chemical	Acronym	CAS
Phthalic anhydride		85-44-9
Octamethylcyclotetrasiloxane	D4	556-67-2
Molybdenum & molybdenum compounds	Mo	7439-98-7

Adopted

The adopted rule amendments remove the above chemicals from the CHCC list.

Expected impact

Manufacturers of children's products containing the chemicals removed from the CHCC list will no longer need to report on these chemicals in their products.

This will likely result in a cost-savings (benefit), as the three chemicals removed will no longer need to be tested or reported by manufacturers. These chemicals no longer meet the criteria used to identify CHCCs for this rule, based on updated scientific information. We note that Ecology has identified the removal of CHCCs as incurring a cost in past rule revisions, but this was for a chemical that was only identified as less toxic.

2.3.4 Setting single annual reporting dates

Baseline

The rule (chapter 173-334 WAC) contained phased-in reporting deadlines that included mid-year reporting in February for specific categories of manufacturers for certain types of products, as well as reporting in August for all other manufacturers for all other products.

Adopted

The adopted rule amendments eliminate reporting deadlines and set an annual reporting date of January 31st.

Expected impact

The adopted rule amendments could result in minor benefits arising from removing the mid-year reporting dates, streamlining compliance with the rule and making it more consistent with similar reporting programs in other states, such as Oregon's January 1 reporting date.

2.3.5 Housekeeping

Baseline

The baseline for housekeeping is the previous rule content.

Adopted

The adopted rule amendments change the organization and contents of the rule language with the intent of streamlining or clarifying the rule, without material change to its requirements, including:

- Clarifying that CHCC reporting must be for the total concentration.
- Removing obsolete phase-in reporting requirements.
- Using the term “de minimis” to refer to existing minimum chemical reporting levels.
- Clarifying that resubmission of identical data (copy and paste) is sufficient, instead of a letter to Ecology confirming no changes from the previous report.
- Updating chemical names to be consistent with terminology in the product testing database.
- Organizational revisions.

Expected impact

Housekeeping changes are not expected to affect rule requirements or how manufacturers comply with the rule. They are intended to improve clarity and understanding.

Chapter 3: Likely Costs of the Adopted Rule Amendments

3.1 Introduction

We estimated the likely costs associated with the adopted rule amendments, as compared to the baseline. Amendments and the baseline are discussed in detail in Chapter 2 of this document.

3.2 Cost analysis

Ecology assessed the likely costs of the adopted rule amendments, and developed quantitative estimates of the value of those costs where possible. We expect the adopted rule amendments to likely result in costs associated with:

- Adding 20 chemicals to the Chemicals of High Concern for Children (CHCC) list.
- Changing grouped nonylphenol CHCCs to individual listings.

There is a high degree of uncertainty inherent in this estimation given one of the purposes of the rule amendments – to learn the degree of presence of the chemicals on the CHCC list in children's products. These uncertainties are discussed as applicable in this section. If Ecology already had knowledge of how much CHCCs are present in children's products, there would be no need for the amendments to the reporting rule. Ecology would already have the information the rule seeks to provide. Our analysis is based on the best available information at the time of this analysis.

We also note that testing is not specifically required by the baseline or the adopted rule, or by the governing statute (CSPA; chapter 70.240 RCW). Other means of estimating chemical contents include 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 children's products also regulated Maine, Oregon, or Vermont under similar reporting regulations may already know the CHCC 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 businesses have. Responsible businesses will have some (if not complete) control or knowledge of the manufacturing process and content of their children's 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 product recall.

Manufacturers started annual reporting of CHCC data to Ecology in August 2012. Manufacturers submit annual reports into the database for each CHCC present in a product category that they offer for sale in Washington. Those annual reports include general product descriptions from the GS1 Global Product Classification: segment, family, class, and brick[3]. Additionally, manufacturers must report where the CHCC is present in the product (component), what function the CHCC serves in the product, and the highest expected concentration of the CHCC in the product component for that function. Manufacturers can report one CHCC in several bricks and components for several functions in one product segment.

One year of reporting data was used for the analysis of costs in this report, from 02/09/2016 to 02/09/2017. For those 12 months of reports, a total 103 manufacturers submitted 9,497 individual reports for the 66 CHCCs listed under the baseline. These reports fall into 12 product segments and 189 bricks, based on the Global Classification System. The 103 manufacturers reporting in that time frame include six that have Washington State addresses, 17 that have addresses outside of the US, and the remainder have addresses in other US states.

3.2.1 Costs of adding 20 chemicals to the CHCC list

We estimated the quantitative costs of complying with the 20 CHCCs we are adding to the rule, except those elements specifically dictated by the law (general criteria for CHCCs, report contents). These estimates are based on:

- The number of manufacturers expected to need to comply with the changes from the baseline.
- The estimated costs of testing.

We used two different estimates to provide a range of possible numbers of additional reports, particularly given the uncertainties discussed above. We then estimated the number of tests potentially necessary (though not required; if manufacturing process knowledge is used, no testing is necessary) for these two reporting estimates. Finally, we estimated the costs of these additional tests.

3.2.1.1 Low reporting estimate based on reporting of similar chemicals

We note that between 02/09/2016 and 02/09/2017 there has been reporting of chemicals whose function is similar to the 20 CHCCs added under the adopted rule. A total of 9,497 reports were made during this time for all baseline CHCC chemicals.[4] The table below summarizes the similar chemicals and the number of reports for each of them during this period, as well as the average number of reports for chemicals similar to the additions to the CHCC list.

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[3] GS1 Global Product Classification browser website: http://www.gs1.org/gpc/browser

[4] WA Department of Ecology (2017). Children's Safe Product Act Reported Data. All reports for 02/09/2016 and 02/09/2017. https://apps.ecology.wa.gov/cspareporting.

Tables 5: Number of reports for similar chemicals, by group [5]

Phosphate flame retardants
Average number of reports: 26.5

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
TPP	115-86-6	Tris (2-chloroethyl) phosphate (TCEP)	115-96-8	31
TDBPP	126-72-7	Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)	13674-87-8	22
TNBP	126-73-8	N/A	N/A	N/A
EHDPP	1241-94-7	N/A	N/A	N/A
TCP	1330-78-5	N/A	N/A	N/A
TCPP	13674-84-5	N/A	N/A	N/A
V6	38051-10-4	N/A	N/A	N/A
IPTPP	68937-41-7	N/A	N/A	N/A

Brominated flame retardants
Average number of reports: 28.5

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
TBPH	26040-51-7	Decabromodiphenyl ether (Deca BDE)	1163-19-5	30
DBDPE	84852-53-9	Hexabromocyclododecane (HBCD)	25637-99-4	27
TBB	183658-27-7	N/A	N/A	N/A

Chlorinated flame retardants
Assumed number of reports based on maximum of other baseline CHCC flame retardants: 28.5

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
SCCP Chlorinated paraffins	85535-84-8 108171-26-2	N/A	N/A	N/A

Replacements for bisphenol A
Average number of reports: 48

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
BPS	80-09-1	Bisphenol A (BPA)	80-05-7	48
BPF	620-92-8	Bisphenol A (BPA)	80-05-7	48

Phthalates
Average number of reports: 89.7

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
DCHP	84-61-7	Diethyl phthalate (DEP)	84-66-2	136
DIBP	84-69-5	Dibutyl phthalate (DBP)	84-74-2	128
DMEP	117-82-8	Di-n-hexyl phthalate (DnHP)	84-75-3	64

[5] Ibid.

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
DPP	131-18-0	Di-n-hexyl phthalate (DnHP)	84-75-3	64
N/A	N/A	Butyl benzyl phthalate (BBP)	85-68-7	72
N/A	N/A	Di-n-octyl pththalate (DnOP)	117-84-0	64
N/A	N/A	Diisodecyl phthalate (DIDP)	26761-40-0	72
N/A	N/A	Diisononyl phthalate (DINP)	28553-12-0	92

Perfluorinated compounds
Average number of reports: 15

New CHCC	CAS Number	Similar Existing CHCC	CAS Number	Number of Reports
PFOA	335-67-1	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	15

We used the average of 236.2 reports in the reporting period of 02/09/2016 to 02/09/2017 for chemicals similar to each group of added CHCCs as the low estimate of the number of additional reports per year that are likely under the adopted rule amendments. We note that reports do not necessarily imply testing, and we control for this below.

3.2.1.2 High reporting estimate based on reporting of similar products

Under the baseline rule and the adopted rule amendments, manufacturers do not need to report based on individual products, but rather by "brick" levels of the GS1 Global Product Classification standard. Children's products containing the 20 chemicals we are adding to the CHCC list fall into 12 GS1 product segments, based on similar chemicals summarized in the table below. The number of manufacturer reports by product segment submitted for these similar chemicals are shown in the following table.[6]

Table 6: Reports for phthalate CHCCs by product segment: February 9, 2016 – February 9, 2017

Product Segment*	BBP	DEHP	DBP	DEP	DIDP	DINP	DnHP	DnOP
Arts/Crafts/Needlework	3	11	20	3	4	19	13	3
Baby Care	2	3	3	1	3	3		1
Beauty/Personal Care/Hygiene	7	6	7	7	7	7	7	6
Clothing	36	45	40	77	43	44	26	40
Footwear	2	7	7	24	2	2	3	2
Household/Office Furniture/Furnishings	1	2	1	2	2	2	1	2
Kitchen Merchandise	1	2	2		1	1		
Personal Accessories	11	8	12	9	8	8	9	8
Stationery/Office Machinery/Occasion Supplies		1						

[6] Ibid.

Product Segment*	BBP	DEHP	DBP	DEP	DIDP	DINP	DnHP	DnOP
Toys/Games	9	31	36	13	2	6	5	2
Total	**72**	**116**	**128**	**136**	**72**	**92**	**64**	**64**

* Two product segments had no reported phthalates – camping and sports equipment

Table 7: Reports for other CHCCs in 2016 by product segment: February 9, 2016 – February 9, 2017

Product Segment*	Deca BDE	BPA	HBCD	PFOS	TBBPA	TDCPP	TCEP
Arts/Crafts/Needlework	2	1			1		
Baby Care	2		1				2
Clothing	23	20	25	15	19	19	27
Footwear		1					
Household/Office Furniture/Furnishings	1		1				1
Personal Accessories		8			3	1	1
Toys/Games	2	18			15	2	
Total	**30**	**48**	**27**	**15**	**38**	**22**	**31**

* Product segments are shown in this table only when these CHCCs were reported

We grouped the chemicals in Table 7 into similar chemical groups, and identified North American Industry Classification System (NAICS) codes that corresponded to the GS1 product categories and bricks in Tables 5 and 6.[7] They are summarized below, by chemical group, with the number of businesses in Washington identified under each set of associated NAICS.[8] Since there were no reports for chlorinated flame retardants, which are not on the baseline CHCC list, we conservatively assumed the number of business NAICS codes in this group was similar to phosphate flame retardants (the larger of the two reported flame retardant groups). See section 7.6 of this document for specific NAICS codes likely to be impacted by the adopted rule amendments.

Table 8: Number of manufacturers in WA potentially producing products associated with new CHCCs

New CHCC Group	Number of WA Businesses in Associated NAICS
Phosphate flame retardants	178
Brominated flame retardants	141
Chlorinated flame retardant (assumed)	178
Replacements for Bisphenol A	125
Phthalates	337
Perfluorinated compounds	39

[7] US Census Bureau (2017). North American Industry Classification System. https://www.census.gov/eos/www/naics/

[8] WA Employment Security Department (2016). Quarterly Census of Employment and Wages. Covered employment classified by industry, Washington State - 6 digit industry, First Quarter 2016 preliminary.

In a given year, some manufacturers may need to report in more than one product segment, and some manufacturers may not need to report any (for example, if they no longer sell that product or have removed the CHCCs from the product). We note that there were 103 manufacturers total that reported any one of the baseline CHCC listed chemicals between 02/09/2016 and 02/09/2017.[9]

The 66 baseline CHCCs were each reported during that time period by an average of 12.04 businesses[10]. Therefore we assumed that 11.69 percent of businesses (12.04/103) will need to report for a single given chemical. Based on the one year of data, a business averaged 13.33 reports per chemical.[11]

For each of the 20 chemicals being added to the CHCC list, our universe of total manufacturers (103), multiplied by the expected percentage of manufacturers that will need to report for a single chemical (11.69%), multiplied by the average reports per chemical for a manufacturer (13.33), gives us the expected number of reports for a single chemical. These are our high estimates, summarized below.

Table 9: High estimates for number of annual reports

CHCC Group	Annual Reports for Added CHCCs
Phosphate flame retardants	277.37
Brominated flame retardants	219.72
Chlorinated flame retardant (assumed)	277.37
Replacements for Bisphenol A	194.78
Phthalates	525.14
Perfluorinated compounds	60.77
Total annual reports	**1,555.16**

We note that reports do not necessarily imply testing, and we control for this below.

3.2.1.3 Controlling for testing percentage

Manufacturers are not required to test for any of the 20 chemicals being added to the CHCC list. However, some may choose to test for them instead of using supply chain or manufacturing process knowledge.

Based on manufacturers required to report under the baseline, we assume 55.03 percent of the reports submitted by manufacturers will be based on test results of their products.[12] We derive this estimate from 02/09/2016 to 02/09/2017 reporting data that identified 5,227 reports of the presence of a CHCC in a product as "no function – contaminant" of the 9,498 total reports.

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[9] WA Department of Ecology (2017). Children's Safe Product Act Reported Data. All reports for 02/09/2016 and 02/09/2017. https://apps.ecology.wa.gov/cspareporting. On average, each CHCC was reported in 5 product segments, in 5 components, for 6 functions, and in 3 concentration ranges.
[10] Ibid.
[11] Ibid.
[12] Ibid.

We assume that reports that are able to identify the use of a chemical indicate the chemical was used as a part of the product design, and manufacturers are likely to know of the chemical in the product without testing (as it is designed to be there). If a manufacturer already knows the product contains one of the 20 new CHCCs (for example because they have knowledge of the manufacturing process, or they have tested for compliance with other state regulations), they are not required to test. For example, a business with many potential products to report may hire a product design engineer to evaluate the product design cycle and identify the likelihood of a CHCC's presence in the product. Then, if a report was submitted to Ecology, it would be submitted without testing any of the products, but instead be based on that engineer's knowledge of product design.

We also note that in Ecology's experience, this is likely a high estimate of historical reports that incurred testing costs, because even if a manufacturer reports a chemical as "no function – contaminant", it is possible the chemical is part of the product design. For example, chemicals purposefully used as part of the manufacturing process that no longer serve a use after production may be reported as a "no function – contaminant". We are unable to discern which products reported as a "no function – contaminant" actually required testing. As a result, we believe the estimated 55.03 percent used above is likely an upper bound, and a smaller percentage of manufacturers will actually test. We emphasize again that no manufacturers are required to test for any of the CHCCs, and the percentage of businesses that will elect to test for the 20 new CHCCs will likely be much smaller, because Ecology believes most manufacturers know what is in their products.

For the low estimate, this means we expect the number of annual tests below under the adopted rule amendments (55.03% of the total reports in Table 5).

Table 10: Low estimated annual testing for new CHCCs

CHCC Group	Annual Testing for Added CHCCs
Phosphate flame retardants	14.58
Brominated flame retardants	15.68
Chlorinated flame retardant (assumed)	15.68
Replacements for Bisphenol A	26.41
Phthalates	49.37
Perfluorinated compounds	8.25
Total CHCC annual tests	**129.99**

For the high estimate, this means we expect the number of annual tests below under the adopted rule amendments (55.03% of the total reports in Table 9).

Table 11: High estimated annual testing for new CHCCs

CHCC Group	Annual Testing for Added CHCCs
Phosphate flame retardants	152.64
Brominated flame retardants	120.91
Chlorinated flame retardant (assumed)	152.64
Replacements for Bisphenol A	107.19
Phthalates	288.98
Perfluorinated compounds	33.44
Total CHCC annual tests	**855.80**

3.2.1.4 Testing costs

From Ecology's experience testing children's products, and available estimates of product and component testing costs, Ecology assumed that testing a product for:[13]

- Combined flame retardant CHCCs would cost $1,500.[14]
- Combined Bisphenol A replacement CHCCs would cost $600.[15]
- Combined phthalates would cost $375.[16]
- An Individual perfluorinated compound would cost $450.[17]

These estimates do not account for any economies of scale or product line attributes, and Ecology emphasizes that testing is not required. If manufacturers already know the product contains the new CHCCs (for example, they have knowledge of the manufacturing process or already tested the product to comply with other regulations), they will not need to test and the compliance costs estimated below will be smaller. If a manufacturer has multiple products falling in multiple product categories that might need to be tested, the compliance costs estimated below will be larger. Similarly, manufacturers only need to report per product brick, so if multiple products fall into a single product brick, they only need to be reported once.[18] If multiple products are made from the same materials, only one test would be needed.

Additionally, product testing, if needed, would only be required to be repeated when the composition of the product changes. One test may be sufficient for several years of reporting, lowering the testing cost below the 20-year present value estimate.

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[13] For more information on testing, methods, and data, see Ecology's "Testing Consumer Products" website, at http://www.ecy.wa.gov/toxics/testing.html.

[14] Based on WA Department of Ecology (2016). Addendum #2 to Quality Assurance Project Plan Flame Retardants in General Consumer and Children's Products. Ecology publication no. 12-07-025B. https://apps.ecology.wa.gov/publications/SummaryPages/1207025B.html.

[15] Based on: WA Department of Ecology (2012). Quality Assurance Project Plan – Evaluation of Bisphenol A in Products Regulated by the State of Washington. Ecology publication no. 12-03-106. https://apps.ecology.wa.gov/publications/SummaryPages/1203106.html.

[16] Addendum 1 to Quality Assurance Project Plan: Chemicals of High Concern to Children in Children's Clothing, Footwear, and Accessories; Ecology publication 15-03-114. https://apps.ecology.wa.gov/publications/SummaryPages/1503114.html. This is likely an overestimate, as manufacturers testing for phthalates under the baseline would already pay the initial $375 for five phthalates, and pay $75 for testing additional phthalates under the adopted rule. As we cannot confidently identify whether a given manufacturer already tests for phthalates, and whether they would only incur the smaller testing cost for additional phthalates under the adopted rule, we chose to use $375 as the cost for testing for the additional phthalates.

[17] Quality Assurance Project Plan - Poly- and Perfluoroalkyl Substances in Consumer Goods in Washington State, Ecology publication 15-04-009. https://apps.ecology.wa.gov/publications/SummaryPages/1504009.html.

[18] We also note that a stakeholder reported but did not cite testing costs of up to $5,000. While this did not correspond to examples of testing costs found for this analysis, we note that this higher unit price would increase estimated total costs by a factor of between 3 1/3 and five.

3.2.1.5 Total costs of testing for 20 new CHCCs

Based on the above methodology and assumptions, we estimated total annual costs to manufacturers of children's products of approximately:

- Low: $62 thousand
- High: $417 thousand
- Over 20 years, these streams of costs add up to present values[19] of:
- Low: $1.1 million
- High: $7.5 million

We note that there are various ways of grouping the flame retardant CHCCs based on their chemistry, use, or function compared to additional existing CHCCs. The flame retardants could also all be grouped together. We investigated these options, and determined that the number of estimated reports based on existing reporting would not significantly impact total costs, potentially changing by a little as 0.2 reports (0.8 percent; grouping all flame retardants together) or as much as 3.2 reports (11 percent; the maximum for any category of flame retardants). At most, these would result in an increase of 4 percent in total estimated costs for added CHCCs.

3.2.2 Costs of changing grouped nonylphenol CHCCs to individual listings

We estimated the quantitative costs of complying with the adopted rule's separation of one nonylphenol CHCC listing into three separate listings, including those elements specifically dictated by the law (general criteria for CHCCs, report contents). These estimates are based on:

- The number of manufacturers expected to need to comply with the changes from the baseline.
- The estimated costs of testing.

While the intent of combining the three nonylphenols into one CHCC listing included reporting for all three chemicals, Ecology observed that only one CAS number was identified as the primary listing. This likely resulted in manufacturers only reporting for one of the three chemicals. We therefore base estimates on reporting and testing for two additional chemicals.

We used two different estimates to provide a range of possible numbers of additional reports, particularly given the uncertainties discussed above in section 3.2.

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[19] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

3.2.2.1 Low reporting estimate based on reporting of similar chemicals

We note that between 02/09/2016 and 02/09/2017 there has been reporting of 4-Nonylphenol whose function is similar to the two nonylphenols listed as separate CHCCs under the adopted rule. A total of 9,497 reports were made during this time for all baseline CHCC chemicals.[20] During that period, 17 manufacturers submitted 110 reports for 4-Nonylphenol. We used this as the low estimate for the number of additional reports per year that are likely under the adopted rule for each of the two separate nonylphenol CHCCs.

We note that reports do not necessarily imply testing, and we control for this below.

3.2.2.2 High reporting estimate based on reporting of similar products

Under the baseline rule and adopted rule amendments, manufacturers do not need to report based on individual products. The data reported to Ecology is provided by product categories. Children's products containing the two nonylphenols listed as separate CHCCs likely fall into various product segments, based on reporting for 4-Nonylphenol, summarized in the table below.[21]

Table 12: Product segments associated with 4-Nonylphenol[22]

Product Segment Name	Number of Reports
Arts/Crafts/Needlework	8
Baby Care	2
Clothing	40
Footwear	20
Household/Office Furniture/Furnishings	3
Toys/Games	37

We identified North American Industry Classification System (NAICS) codes that corresponded to the segments in the table above for which 4-Nonylphenol reports were submitted.[23] The NAICS codes, and number of businesses in WA in each code, included the industries below, with a total of 146 businesses in the state.[24]

Table 13: Likely industries manufacturing children's products reported as containing nonylphenols

NAICS	NAICS Description	Number of Businesses in WA
313210	Blankets and bedspreads made in broadwoven fabric mills	0
313230	Blankets, nonwoven fabric, manufacturing	4

[20] WA Department of Ecology (2017). Children's Safe Product Act Reported Data. All reports for 02/09/2016 and 02/09/2017. https://apps.ecology.wa.gov/cspareporting/
[21] Ibid.
[22] Ibid.
[23] US Census Bureau (2017). North American Industry Classification System. https://www.census.gov/eos/www/naics/
[24] WA Employment Security Department (2016). Quarterly Census of Employment and Wages. Covered employment classified by industry, Washington State - 6 digit industry, First Quarter 2016 preliminary.

NAICS	NAICS Description	Number of Businesses in WA
314120	Blankets (except electric) made from purchased fabrics or felts; Cushions (except carpet, springs) made from purchased fabrics	25
315210	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sew apparel contractors; Costume manufacturers	21
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	21
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing	18
315990	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), rubberizing fabric and manufacturing bibs and aprons; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sewn from purchased fabric (except apparel contractors)	14
316210	Footwear Manufacturing	5
326150	Seat cushions, foam plastics (except polystyrene), manufacturing	15
339930	Doll, Toy, and Game Manufacturing; Craft and hobby kits and sets manufacturing	23

Given that reporting on two additional (separate) CHCCs that are associated with the nonylphenol group would potentially be reported on by 146 businesses each. In a given year, some manufacturers may need to report in more than one product segment, and some manufacturers may not need to report any (for example if they no longer sell that product or have removed the CHCCs from the product). We note that there were 103 manufacturers total that reported any one of the baseline CHCC listed chemicals between 02/09/2016 and 02/09/2017.[25] A given CHCC had 12.04 businesses report, on average.[26] Therefore, we assumed that 11.69 percent (12.04/103) of businesses will need to report for a single given chemical.

Based on the one year of data, a business averaged 13.33 reports per chemical.[27] For each of the two chemicals reported separate from 4-Nonylphenol under the adopted rule amendments, our universe of total manufacturers (146 manufacturers), multiplied by the expected percentage of manufacturers that will need to report for a single chemical (11.69%), multiplied by the average reports per chemical for a manufacturer (13.33), gives us the expected number of reports for a single chemical (227.51). Therefore, for the two nonylphenols now listed as separate CHCCs, we estimate 455.02 additional annual reports.

We note that reports do not necessarily imply testing, and we control for this below.

[25] WA Department of Ecology (2017). Children's Safe Product Act Reported Data. All reports for 02/09/2016 and 02/09/2017. https://apps.ecology.wa.gov/cspareporting/
[26] Ibid.
[27] Ibid.

3.2.2.3 Controlling for testing percentage

No manufacturers are required to test for the two nonylphenols we are listing as separate CHCCs. However, some may choose to test for them instead of using supply chain or manufacturing process knowledge.

Based on the manufacturer reports in the database from 02/09/16-02/09/17, a total of 17 manufacturers submitted 110 reports for 4-Nonylphenol. A total of 48 4-Nonylphenol reports identified the presence as "no function-contaminant," representing 43.6% of the 4-Nonylphenol reports. We assume this percentage of manufacturers will choose to test their products for nonylphenols in a given year.[28]

Our assumption is that reports that are able to identify the use of a chemical imply the chemical was used as a part of the product design, and manufacturers are likely to know the chemical is in the product without testing (as it is designed to be there). If a manufacturer already knows the product contains one of the two additional nonylphenol CHCCs (for example because they have knowledge of the manufacturing process, or they have tested to comply with other states' regulations), they are not required to test. For example, a business with many potential products to report may hire a product design engineer to evaluate the product design cycle and identify the likelihood of a CHCC's presence in the product. Then, if a report was submitted to Ecology, it would be submitted without testing any of the products, but instead be based on that engineer's knowledge of product design. Additionally, if a business creates several products from the same materials, they only have to test those materials once to report for specific CHCCs in several product categories.

Product testing, if needed, would only be required to be repeated when the composition of the product changes. One test may be sufficient for several years of reporting, lowering the testing cost below the 20-year present value estimate.

We also note that in Ecology's experience this is likely a high estimate of reports that incur testing costs, because even if a manufacturer reports a chemical found as "no function – contaminant", it is possible the chemical is part of the product design. For example, chemicals purposefully used as part of the manufacturing process that no longer serve a use after production may be reported as a "no function – contaminant". We are unable to discern which products reported as a "no function – contaminant" actually required testing. As a result, we believe the 43.6 percent used above is likely an overestimate, and a smaller percentage of manufacturers will actually test. We emphasize again that no manufacturers are required to test for any of the CHCCs, and the percentage of businesses that will choose to test for the two nonylphenols listed as separate CHCCs will likely be much smaller, because Ecology believes most manufacturers know what is in their products.

[28] Ibid.

This means we expect the following additional annual tests for the separated nonylphenols.

- Low: 48
- High 198.55

3.2.2.4 Testing costs

From Ecology's experience testing children's products, we assumed testing costs of $250 per product tested for each of the nonylphenols, for a total of $500 to test for both separated nonylphenols.[29]

This estimate does not account for any economies of scale or product line attributes such as how many components are in a product, and Ecology emphasizes that testing is not required. If manufacturers already know the product contains the new CHCCs (for example, they have knowledge of the manufacturing process or already tested the product to comply with other regulations), they will not need to test and the compliance costs estimated below will be smaller. If a manufacturer has multiple products falling in multiple product categories that might need to be tested, the compliance costs estimated below will be larger. Similarly, manufacturers only need to report per product category or brick, so if multiple products fall into a single product category, they only need to be reported once.

Additionally, product testing, if needed, would only be required to be repeated when the composition of the product changes. One test may be sufficient for several years of reporting, lowering the testing cost below the 20-year present value estimate.

3.2.2.5 Total costs of testing for two nonylphenol CHCCs listed separately

Based on the above methodology and assumptions, we estimated total annual costs for testing for the two separate nonylphenols of approximately:

- Low: $24 thousand
- High: $50 thousand

Over 20 years, these streams of costs add up to present values[30] of:

- Low: $433 thousand
- High: $895 thousand

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[29] Based on: WA Department of Ecology (2014). Quality Assurance Project Plan: Chemicals of High Concern to Children in Children's Clothing, Footwear, and Accessories. Ecology publication no. 14-03-125. page 16 https://apps.ecology.wa.gov/publications/SummaryPages/1403125.html.

[30] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

3.3 Cost Summary

3.3.1 Total annual costs

We estimated total annual costs of testing for 20 additional CHCCs, of approximately:

- Low: $62 thousand
- High: $417 thousand

We estimated total annual costs of testing for two nonylphenol listings separated from an existing grouped CHCC listing, of approximately:

- Low: $24 thousand
- High: $50 thousand

These costs sum to approximate total annual costs of:

- Low: $86 thousand
- High: $467 thousand

3.3.2 Total present value costs

Over 20 years, the total present value costs[31] of testing created by adding 20 new chemicals to the CHCC list are estimated to be:

- Low: $1.1 million
- High: $7.5 million

Over 20 years, the total present value costs of testing created by separating one nonylphenol CHCC listing into three CHCCs is estimated to be:

- Low: $433 thousand
- High: $895 thousand

These costs sum to total 20-year present value costs of:

- Low: $1.5 million
- High: $8.4 million

[31] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

These estimates do not account for any economies of scale or product line attributes such as how many components are in a product, and Ecology emphasizes that testing is not required. If manufacturers already know the product contains the new CHCCs (for example, they have knowledge of the manufacturing process or already tested the product to comply with other regulations), they will not need to test and the compliance costs estimated here will be smaller. If a manufacturer has multiple products falling in multiple product categories that might need to be tested, the compliance costs estimated here will be larger. Similarly, manufacturers only need to report per product category or brick, so if multiple products fall into a single product category, they only need to be reported once.

Additionally, product testing, if needed, would only be required to be repeated when the composition of the product changes. One test may be sufficient for several years of reporting, lowering the testing cost below the 20-year present value estimates.

Chapter 4: Likely Benefits of the Adopted Rule Amendments

4.1 Introduction

We estimated the likely benefits associated with the adopted rule amendments, as compared to the baseline (both described in Chapter 2 of this document).

4.2 Benefit analysis

Ecology assessed the likely benefits of the adopted rule amendments, and developed quantitative estimates of the value of those benefits where possible. We expect that the adopted rule amendments will likely result in benefits associated with:

- Lower reporting costs due to removing three chemicals from the Chemicals of High Concern for Children (CHCC) list.
- Informational benefits from reporting for:
  - 20 additional CHCCs.
  - Two nonylphenols listed separately from the baseline 4-Nonylphenol group listing.

There is a high degree of uncertainty inherent in this estimation given one of the purposes of the rule amendments – to learn the presence of the chemicals on the CHCC list in children's products. If Ecology already had comprehensive knowledge of the degree of CHCC presence in children's products, there would be no need for the amendments to the reporting rule. Ecology would already have the information the rule seeks to provide – how much children are exposed to CHCCs, and therefore how much children are potentially exposed to risks to their wellbeing. Our analysis is based on the best available information at the time of this analysis.

We also note that testing is not specifically required by the baseline rule or the adopted rule amendments, or by the governing statute (CSPA; chapter 70.240 RCW). Other means of estimating chemical contents include supply chain knowledge and knowledge of the manufacturing process.

These estimates also do not account for economies of scale or interstate/international regulatory consistency that would reduce testing costs. For example, a manufacturer of children's products also regulated in Maine, Oregon, or Vermont under similar reporting regulations may already know the CHCC contents of their products because of existing reporting.

4.2.1 Benefits of removing three chemicals from the CHCC list

The adopted rule amendments remove the following chemicals from the CHCC list.

Table 14: Chemicals removed from the CHCC list

Chemical	CAS	Reports from 02/09/16-02/09-17
Phthalic anhydride	85-44-9	105
Octamethylcyclotetrasiloxane (D4)	556-67-2	226
Molybdenum & molybdenum compounds	7439-98-7	480
Total reports		**811**

4.2.1.1 Low avoided reporting estimate based on previous reporting of these chemicals

Our low avoided reporting estimate is based on the number of reports submitted for the three chemicals between 02/09/2016 and 02/09/2017. The avoided reporting is the 811 reports for the three chemicals during that time period (Table 14). We note that reports do not necessarily imply testing, and we control for this below.

4.2.1.2 High avoided reporting based on reporting of similar products

Our high avoided reporting estimate is based on the number of manufacturers that might produce products in which the three removed CHCCs are likely to be found.

Under the baseline rule and adopted rule amendments, manufacturers do not need to report based on individual products, but rather by product category using the GS1 Global Product Classification standard. Children's products containing the three removed CHCCs likely fall into various GS1 product segment levels, based on the reports from 02/09/2016 and 02/09/2017, summarized in the table below.[32]

Tables 15: Product segments and the reports from 02/09/16–02/09/17 associated with three chemicals removed from CHCC list[33]

Phthalic anhydride

Product Segment Description	Number of Reports
Arts/Crafts/Needlework	2
Baby Care	3
Beauty/Personal Care/Hygiene	1
Clothing	52
Footwear	3
Household/Office Furniture/Furnishings	1
Personal Accessories	3
Toys/Games	40

[32] US Census Bureau (2017). North American Industry Classification System. https://www.census.gov/eos/www/naics/

[33] Ibid.

Octamethylcyclotetrasiloxane (D4)

Product Segment Description	Number of Reports
Baby Care	1
Clothing	99
Footwear	118
Household/Office Furniture/Furnishings	2
Toys/Games	6

Molybdenum & molybdenum compounds

Product Segment Description	Number of Reports
Arts/Crafts/Needlework	9
Baby Care	9
Camping	4
Clothing	291
Footwear	42
Household/Office Furniture/Furnishings	6
Personal Accessories	42
Stationery/Office Machinery/Occasion Supplies	3
Toys/Games	74

We identified North American Industry Classification System (NAICS) codes that corresponded to the GS1 product segments in the table above.[34] The NAICS codes, and number of businesses in Washington in each code[35], included:

Tables 16: Industries likely to manufacture children's products containing three chemicals removed from the CHCC list[36]

Phthalic anhydride

NAICS	NAICS Description	Number of Businesses in WA
313210	Blankets and bedspreads made in broadwoven fabric mills	0
313230	Blankets, nonwoven fabric, manufacturing	4
314120	Blankets (except electric) made from purchased fabrics or felts; Cushions (except carpet, springs) made from purchased fabrics	25
315210	Costume manufacturers; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sew apparel contractors	21
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	21
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing	18

[34] US Census Bureau (2017). North American Industry Classification System. https://www.census.gov/eos/www/naics/

[35] WA Employment Security Department (2016). Quarterly Census of Employment and Wages. Covered employment classified by industry, Washington State - 6 digit industry, First Quarter 2016 preliminary.

[36] Note that two NAICS categories associated with three reports of molybdenum in party hats were omitted, as the size of the greeting card and occasion supply industry in Washington is disproportionately large compared to this small number of actual reports.

NAICS	NAICS Description	Number of Businesses in WA
315990	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), rubberizing fabric and manufacturing bibs and aprons; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sewn from purchased fabric (except apparel contractors)	14
316210	Footwear Manufacturing	5
325620	Toilet Preparation Manufacturing (cosmetics, perfumes, nail polish, etc.)	23
326150	Seat cushions, foam plastics (except polystyrene), manufacturing	15
339910	Costume jewelry manufacturing; Jewelry, precious metal, manufacturing; Jewelry, costume, manufacturing	37
339930	Doll, Toy, and Game Manufacturing; Craft and hobby kits and sets manufacturing	23

Octamethylcyclotetrasiloxane (D4)

NAICS	NAICS Description	Number of Businesses in WA
313210	Blankets and bedspreads made in broadwoven fabric mills	0
313230	Blankets, nonwoven fabric, manufacturing	4
314120	Blankets (except electric) made from purchased fabrics or felts; Cushions (except carpet, springs) made from purchased fabrics	25
315210	Costume manufacturers; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sew apparel contractors	21
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	21
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing	18
315990	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), rubberizing fabric and manufacturing bibs and aprons; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sewn from purchased fabric (except apparel contractors)	14
316210	Footwear Manufacturing	5
326150	Seat cushions, foam plastics (except polystyrene), manufacturing	15
339930	Doll, Toy, and Game Manufacturing	23

Molybdenum & molybdenum compounds

NAICS	NAICS Description	Number of Businesses in WA
313210	Blankets and bedspreads made in broadwoven fabric mills	0
313230	Blankets, nonwoven fabric, manufacturing	4
314120	Blankets (except electric) made from purchased fabrics or felts; Cushions (except carpet, springs) made from purchased fabrics	25
314910	Tents made from purchased fabrics	52

NAICS	NAICS Description	Number of Businesses in WA
315210	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sew apparel contractors; Costume manufacturers	21
315220	Men's and Boys' Cut and Sew Apparel Manufacturing	21
315240	Women's, Girls', and Infants' Cut and Sew Apparel Manufacturing	18
315990	Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), rubberizing fabric and manufacturing bibs and aprons; Bibs and aprons, waterproof (e.g., plastics, rubber, similar materials), cut and sewn from purchased fabric (except apparel contractors)	14
316210	Footwear Manufacturing	5
326150	Seat cushions, foam plastics (except polystyrene), manufacturing	15
337125	Household Furniture (except Wood and Metal) Manufacturing (includes car seat manufacturing)	0
339910	Costume jewelry manufacturing; Jewelry, precious metal, manufacturing; Jewelry, costume, manufacturing	37
339930	Doll, Toy, and Game Manufacturing; Craft and hobby kits and sets manufacturing	23

In a given year, some manufacturers may need to report in more than one product category, and some manufacturers may not need to report any (for example if they no longer sell that product or have removed the CHCCs from the product). We note that there were 103 manufacturers total that reported any one of the baseline CHCC listed chemicals between 02/09/2016 and 02/09/2017.[37] The existing 66 CHCCs were each reported during that time period by an average of 12.04 businesses.[38] Therefore we assumed that 11.69 percent (12.04/103) of businesses will need to report for a single given chemical.

Based on the one year of data, a business averaged 13.33 reports per chemical.[39] For each of the 3 chemicals we are removing from the CHCC list, our universe of total manufacturers, multiplied by the expected percentage of manufacturers that will need to report for a single chemical, multiplied by the average reports per chemical for a manufacturer, gives us the expected number of reports for a single chemical. Therefore, for each of the three chemicals we are removing from the CHCC list, we estimate the additional reductions in annual reports below.

Table 17: Avoided annual reports under the adopted rule amendments

CHCC Removed	Number of WA Businesses in Associated NAICS	Avoided Annual Reports for Removed CHCCs
Phthalic anhydride	206	321.01

[37] WA Department of Ecology (2017). Children's Safe Product Act Reported Data. All reports for 02/09/2016 and 02/09/2017. https://apps.ecology.wa.gov/cspareporting.
[38] Ibid.
[39] Ibid.

CHCC Removed	Number of WA Businesses in Associated NAICS	Avoided Annual Reports for Removed CHCCs
Octamethylcyclotetrasiloxane (D4)	146	227.51
Molybdenum & molybdenum compounds	235	366.20
Totals	**587**	**914.71**

We note that reports do not necessarily imply testing, and we control for this below.

4.2.1.3 Controlling for testing percentage

No manufacturers are required to test for CHCCs under the adopted rule. Some may, however, choose to test for them instead of using supply chain or manufacturing process knowledge.

Based on manufacturers currently required to report, we assume 84.34 percent of manufacturers will choose to test their products for these chemicals in a given year.[40] We derive this estimate from the previous year's reporting data that identified the presence of one of these three CHCCs in a product as "no function – contaminant" across all reported products. Our assumption is that reports that are able to identify the use of a chemical imply the chemical was used as a part of the product design, and manufacturers are likely to know of the chemical in the product without testing (as it is designed to be there). If a manufacturer already knows the product contains one of the three removed CHCCs (for example because they have knowledge of the manufacturing process, or they have tested to comply with other state regulations), they will not need to test. For example, a business with many potential products to report may hire a product design engineer to evaluate the product design cycle and identify the likelihood of a CHCC's presence in the product. Then, if a report was submitted to Ecology, it would be submitted without testing any of the products, but instead be based on that engineer's knowledge of product design.

We also note that in Ecology's experience this is likely a high estimate of historical reports that incurred testing costs, because even if a manufacturer reports a chemical as "no function – contaminant", it is possible the chemical is part of the product design. For example, chemicals purposefully used as part of the manufacturing process that no longer serve a use after production may be reported as a "no function – contaminant". We are unable to discern which products reported as a "no function – contaminant" actually required testing. As a result, we believe the estimated 84.34 percent used above is likely an upper bound, and a smaller percentage of manufacturers will actually test. We emphasize again that no manufacturers are required to test for any of the CHCCs.

This means we expect the following reduction in annual tests for the three chemicals removed from the CHCC list.

- Low: 684

[40] Ibid.

Table 18: Low avoided testing for removed CHCCs based on existing reporting

CHCC	Avoided Annual Testing for Removed CHCCs
Phthalic anhydride	88.56
Octamethylcyclotetrasiloxane (D4)	190.61
Molybdenum & molybdenum compounds	404.83

- High: 771.47

Table 19: High avoided testing for removed CHCCs based on reporting for similar products

CHCC	Avoided Annual Testing for Removed CHCCs
Phthalic anhydride	270.74
Octamethylcyclotetrasiloxane (D4)	191.88
Molybdenum & molybdenum compounds	308.85

4.2.1.4 Testing costs

From Ecology's experience testing children's products, we assumed testing costs rounded to $1,000 per product tested, based on individual component costs of:[41]

- Phthalic anhydride: $400.
- Octamethylcyclotetrasiloxane: $410.
- Molybdenum and molybdenum compounds: $100.

This estimate does not account for any economies of scale or product line attributes, and Ecology emphasizes that testing is not required. If manufacturers already know the product contains the chemicals removed from the CHCC list (for example, they have knowledge of the manufacturing process or already tested the product to comply with other regulations), they have not been testing and the avoided compliance costs estimated below will be smaller. If a manufacturer has multiple products falling in multiple product categories that were tested, the avoided compliance costs estimated below will be smaller.

4.2.1.5 Total avoided costs of testing for three removed CHCCs

Based on the above methodology and assumptions, we estimated total annual benefits (avoided costs) of approximately:

- Low: $684 thousand
- High: $771 thousand

[41] Based on: WA Department of Ecology (2014). Quality Assurance Project Plan: Chemicals of High Concern to Children in Children's Clothing, Footwear, and Accessories. Ecology publication no. 14-03-125. https://apps.ecology.wa.gov/publications/SummaryPages/1403125.html.
WA Department of Ecology (2016). Addendum to Quality Assurance Project Plan Product Testing Program Version 1: An Assessment of Children's Safe Products Act Data. Ecology publication no. 16-03-121 https://apps.ecology.wa.gov/publications/SummaryPages/1603121.html.

Over 20 years, these streams of benefits add up to present values[42] of:

- Low: $12.3 million
- High: $13.9 million

4.2.2 Informational benefits of adding or separately listing chemicals to the CHCC list

The adopted rule amendments would result in reporting information (whether tested for or known through the manufacturing and sourcing process) on the degree to which children's products contain:

- Bisphenol S (BPS)
- Dicyclohexyl phthalate (DCHP)
- Diisobutyl phthalate (DIBP)
- Triphenyl phosphate (TPP)
- Di-(2-methoxyethyl) phthalate (DMEP)
- Tris (2,3-dibromopropyl) phosphate (TDBPP)
- Tri-n-butyl phosphate (TNBP)
- Dipentyl phthalate (DPP)
- Perfluorooctanoic acid (PFOA)
- Bisphenol F (BPF)
- Ethylhexyl diphenyl phosphate (EHDPP)
- Tricresyl phosphate (TCP)
- Tris (1-chloro-2-propyl) phosphate (TCPP)
- Bis (2-ethylhexyl) tetrabromophthalate (TBPH)
- Bis(chloromethyl)propane-1,3-diyl tetrakis-(2-chloroethyl) bis(phosphate) (V6)
- Isopropylated triphenyl phosphate (IPTPP)
- Decabromodiphenyl ethane (DBDPE)
- Short-chain chlorinated paraffins (SCCP) and Chlorinated paraffins

[42] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

- 2-ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB)
- Nonylphenol (currently grouped with 4-nonylphenol, but likely underreported)
- 4-Nonylphenol branched (currently grouped with 4-Nonylphenol, but likely underreported)

In the following sections, we summarize the reasoning for listing of these chemicals as CHCCs. This reasoning underlies the benefit of reporting concentrations of these chemicals for consumer and government decision-making. We summarize it here descriptively; for technical information, concentrations, etc., see the relevant chemical evaluation in the Ecology publication.[43]

Government decision-making
Reporting on these chemicals in products provides information as to what types of products these CHCCs appear in, how much exposure children face, and the concentration of the chemicals in these products. This additional information allows Ecology to remove chemicals from the CHCC list if it is determined they are not of high concern, based on exposure and concentration, or informs Ecology that more information on these chemicals is needed.

Consumer decision-making
Information on the presence of these chemicals could 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 children's products that pose less risk associated with the added or individually listed CHCCs, without these rule amendments consumers may not have information to identify preferred types of products. This uncertainty prevents them from selecting an optimal bundle of consumptions goods. Under the adopted rule amendments, consumers would be able to choose some quantity of children's products that carry the risks associated with the added or individually listed CHCCs, and some quantity of children's products that do not carry those risks. With uncertainty, consumers are only able to choose which goods they buy based on other attributes and no knowledge of their content of these CHCCs.

Ecology expects that the combination of increased knowledge about these chemicals, combined with increased knowledge of their presence in children's products, will benefit consumers in their ability to behave in line with their full set of preferences for product attributes and risk. Consumers can gather this information from:

- Ecology's Children's Safe Products database: https://apps.ecology.wa.gov/cspareporting.
- Ecology's database of consumer product testing performed by Ecology: https://apps.ecology.wa.gov/ptdbreporting.
- Reports Ecology produces based on the above data: https://apps.ecology.wa.gov/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Product+Testing&DocumentTypeName=Publication).
- Not-for-profit and consumer group provision of information resulting from manufacturer or Ecology testing.

[43] WA Department of Ecology (2017) Children's Safe Products Reporting Rule. Chemicals of High Concern to Children Added or Delisted during the 2017 Rule update. Publication 17-04-021.

We note that some uncertainty will still exist, because the reports only specify a manufacturer's product categories and not specific items.

Information about the chemicals below is taken from their respective Chemical Evaluations, available at https://apps.ecology.wa.gov/publications/SummaryPages/1704021.html.

These Chemical Evaluation documents contain the relevant citations for each chemical.

4.2.2.1 Bisphenol S (BPS)[44]

The EPA classified BPS as high hazard for toxicity from repeated exposure. EPA classified BPS as a moderate hazard for reproductive and developmental toxicity based on prolonged estrus cycle, decreased fertility index, decreased number of live offspring and liver effects. A recent study in rats also reported atrophy of mammary glands in male rats. BPS was classified as an estrogen agonist with some affinity for the estrogen receptor. In a systematic review of BPS, BPA, and BPF endocrine studies, BPS had estrogenic activity in whole organism testing and in a number of in vitro tests.

BPS exposures can occur through oral, dermal, or inhalation routes, however, primary exposure likely occurs through the oral route. Information on distribution in the body, metabolism, and excretion is mostly lacking. Washington State banned BPA for use in baby bottles, infant sippy cups and sports water bottles starting in 2010. BPS is used as a replacement for BPA in polymer production and thermal papers. BPS is used to make baby bottles. BPS has been detected in personal care products, and sales receipt paper and other paper products. National U.S. production volume was reported to be 1-10 million pounds in 2012. BPS was found in 81% of the human urine samples analyzed from general populations in the United States and several Asian countries collected in 2010-11. BPS has also been found in a variety of foods collected from retail grocery stores in Albany, NY in 2008-2010. It was detected in 43% of meats and meat products and about ¼ of seafood, fruit and vegetable samples. BPS was considered to have moderate persistence and low potential for bioaccumulation by EPA.

4.2.2.2 Dicyclohexyl phthalate (DCHP)[45]

In 2011, Ecology identified DCHP as an endocrine disruptor, based on the EU Category 1 for endocrine disruption determination. No new information has been found to change this finding. We have used Category 1 as an authoritative source, because it requires evidence of endocrine disrupting activity in at least one species using intact animals. Since 2011, DCHP was included in the Chronic Hazard Advisory Panel (CHAP) report, which described studies in rodents displaying adverse reproductive and developmental effects when exposed to DCHP. The Consumer Product Safety Improvement Act of 2008 (CPSIA) directed the U.S. Consumer Product Safety Commission (CPSC) to convene the CHAP "to study the effects of all phthalates

[44] Ibid.
[45] Ibid.

and phthalate alternatives as used in children's toys and child care articles". The CHAP assessed the risks of fourteen phthalates and six phthalate alternatives, including three phthalates permanently banned by the CPSIA and three phthalates subject to an interim ban. The CHAP found the toxicological profile of DCHP to be very similar to other antiandrogenic phthalates, thereby concluding that exposure to DCHP contributes to the cumulative risk from other antiandrogenic phthalates and recommending that DCHP be permanently banned from use in children's toys and child care articles at levels greater than 0.1%.

There is new information on the presence of DCHP in indoor dust and air in several studies. DCHP was also found in soap, perfume, modeling clay, and pajamas, but these products are not specifically noted as children's products.

4.2.2.3 Diisobutyl phthalate (DIBP)[46]

DIBP has been identified as an EU Substance of Very High Concern (SVHC), as toxic for reproduction. Substances that may have serious and often irreversible effects on human health and the environment are designated as SVHCs under the EU Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) law. If a substance is identified as an SVHC, it is added to the Candidate List for eventual inclusion in the Authorisation List.

Exposure to DIBP can cause reproductive and developmental effects. The toxicological profile of DIBP is be very similar to other antiandrogenic phthalates, and exposure to DIBP contributes to the cumulative risk from other antiandrogenic phthalates. The CPSC received recommendation that DIBP be permanently banned from use in children's toys and child care articles at levels greater than 0.1%. In 2011, Ecology found evidence of DIBP in biomonitoring studies, indoor air and dust, children's products, and consumer products. Since then, the CPSC has identified DIBP in toys, while DIBP metabolites have been detected in urine in human biomonitoring studies.

4.2.2.4 Triphenyl phosphate (TPP)[47]

EPA classified TPP as a high hazard for toxicity from repeated exposures. At higher doses, reproductive and fetal effects were observed. TPP appears to be active in endocrine tissues. In a recently published study, mice exposed to TPP orally for 35 days had decreased testes weight, histopathological damage, decreased testicular testosterone levels, decreased expression of genes related to testosterone synthesis, and signs of oxidative stress in the liver. Only limited human evidence of endocrine disruption is available. A study in Boston, Massachusetts reported that men living in homes with higher TPP in house dust had decreased sperm counts and altered hormone (prolactin) levels. There is also emerging evidence that TPP may cause long-lasting metabolic disruption in rats. There is evidence that developmental exposure to TPP alone, caused

[46] Ibid.
[47] Ibid.

accelerated onset of type 2 diabetes in a rat diabetes model and increased body fat later in life. These study results suggest a high hazard for developmental toxicity.

TPP is a plasticizing flame retardant in PVC. It is also used as a flame retardant in other polymers, textiles, polyurethane foam, electronic circuit boards, photographic films, and building materials. It is a component of Firemaster® 550 used in polyurethane foams and has been detected in baby products, other children's products, carpet pads, and plastic parts of LCD monitors. TPP is an additive flame retardant and migrates from computer monitors and TV sets. TPP is also used as a plasticizer and may be in clothing, textiles, cosmetics, and personal care products. It is listed as an ingredient in nail polish and a recent biomonitoring study showed short-term spikes in exposure following application of nail polish. U.S. national production volume was reported to be 10,796,422 million pounds per year in 2012.

Because of its physical properties, TPP that escapes from consumer products, either by emission or abrasion, is likely to end up in indoor dust in homes, offices, and vehicles. TPP has also been measured in the indoor air of homes and public buildings in a number of countries. Diphenyl phosphate (DPHP), a metabolite of TPP, has been found in urine at high frequency in North American biomonitoring studies including Boston adults, New Jersey mothers and toddlers, California mothers and their children aged 2-70 months, and North Carolina babies. Levels measured in children were higher than their mothers, and were higher in children with more reported hand-to-mouth behaviors. TPP has been measured in human breast milk in Asian and Swedish studies. TPP was detected in 98% of hair samples and 74% of finger and toenail samples in a population of young adults in Indiana.

TPP appears to be ubiquitous in the environment and has been detected in drinking water, river water, seawater, rainwater, snow, wastewater effluent, ambient air, and indoor air.

4.2.2.5 Di-(2-methoxyethyl) phthalate (DMEP)[48]

The European Union added di-(2-methoxyethyl) phthalate (DMEP) to the candidate list of substances of very high concern (SVHC) based on a determination that DMEP is toxic for reproduction.

Investigations reported DMEP in vacuum cleaner bag dust and house carpets in Germany in studies conducted between 1998 and 2000. DMEP was detected in 100 percent of the 153 blood samples of Hong Kong residents in 2013. Phthalate testing of a variety of cosmetic products in Shanghai detected DMEP in one baby care product (shampoo) in 2013.

4.2.2.6 Tris (2,3-dibromopropyl) phosphate (TDBPP)[49]

TDBPP is reasonably anticipated to be a human carcinogen by the National Toxicology Program, is listed as carcinogen on California's Proposition 65 List, and is classified as possible

[48] Ibid.
[49] Ibid.

carcinogen by the International Agency for Research on Cancer (IARC). According to the European Food Safety Authority, there is convincing evidence that TDBPP is genotoxic and carcinogenic.

TDBPP was used as a flame retardant in children's clothing until banned in 1977. According to the National Toxicology Program, it has been used as an additive flame retardant in polyurethane foams, polystyrene foam, acrylic carpets and sheets, water flotation devices, polyvinyl and phenolic resins, paints, lacquers, paper coatings, styrene-butadiene rubber, and latex. These types of materials are used in children's products and the chemical is still available for sale from overseas suppliers. A disclosure requirement could confirm that imported children's products do not contain this flame retardant. No current information on uses or national production volume is available. TDBPP has not been included in many house dust sampling studies. It was identified in one study of house dust in California.

4.2.2.7 Tri-n-butyl phosphate (TNBP)[50]

TNBP is suspected to cause cancer and is a category 2 cancer hazard. TNBP caused dose-related increases in the incidence and severity of urinary bladder tumors in male and female rats with dietary exposure for two years. Male mice with chronic dietary exposure developed liver tumors. The US Agency for Toxic Substances and Disease Registry (ATSDR) evaluated available toxicity data for TNBP and developed human health screening values. Urinary bladder hyperplasia was the most sensitive effect observed in three oral rat studies of longer duration.

TNBP is mainly used as an additive in fire-resistant aircraft hydraulic fluids and as a plasticizer for cellulose esters, lacquers, plastics, and vinyl resins. It may be present in floor finish, floor wax, paints and glues. It also has a number of industrial applications. U.S. national volume production was reported to be 8,877,744 pounds/year in 2012. TNBP has been measured in indoor dust and air in U.S. and European studies. Two European studies included air measurements and found TNBP more commonly in indoor air than in dust at homes and daycare centers. Recent residential sampling in Norway reported 98% detection in residential indoor air. Inhalation exposure was the predominant route of estimated human residential exposure. Biomonitoring studies indicate that TNBP is making its way into humans. TNBP has been detected in breast milk samples from Sweden and several Asian counties.

There is some evidence of TNBP in the U.S. diet, drinking water and ambient air. TNBP has been found at low parts per billion levels in cereal products including baby food in the US. It has been detected in a study of 74 public drinking water systems from 25 states and Puerto Rico. TNBP was detected in 8.1% of the samples. TNBP was detected in 100% or urban air samples from the Great Lakes area.

[50] Ibid.

4.2.2.8 Dipentyl phthalate (DPP)[51]

In 2011, Ecology identified DPP as an endocrine disruptor, based on the EU Category 1 for endocrine disruption determination. No new information has been found to change this finding. We have used Category 1 as an authoritative source, because Category 1 requires evidence of endocrine disrupting activity in at least one species using intact animals. DPP has been identified as a SVHC based on a toxic for reproduction designation. Substances that may have serious and often irreversible effects on human health and the environment can be identified as SVHCs. In 2014, DPP was found to be "clearly among the most potent phthalates regarding developmental effects". DPP was found to have a toxicological profile very similar to other antiandrogenic phthalates and thus, exposure to DPP contributes to the cumulative risk from other antiandrogenic phthalates.

There is new information on the presence of DPP in house dust and people that does show potential for exposure. DPP was detected in house dust in northern California. A metabolite of DPP, MnPeP, was detected in children's urine in Austria and Germany.

4.2.2.9 Perfluorooctanoic acid (PFOA)[52]

In 2013, PFOA was identified as an SVHC (due to reproductive toxicity). Substances that may have serious and often irreversible effects on human health and the environment can be identified as SVHCs. PFOA is classified by the IARC as possibly carcinogenic to humans. IARC is a specialized cancer agency of the World Health Organization (WHO) with a mission to coordinate and conduct research on the causes of human cancer, the mechanisms of carcinogenesis, and to develop scientific strategies for cancer control.

PFOA has been detected in serum in human biomonitoring studies, as well as in house dust.

4.2.2.10 Bisphenol F (BPF)[53]

EPA classified bisphenol F as high hazard for toxicity from repeated exposures based on reduced body weight and decreased total serum cholesterol, glucose, and albumin in an oral rat study. BPF was classified by EPA as a moderate hazard for reproductive toxicity and a high developmental hazard based primarily on toxicity of its structural analog BPA. In a systematic review of BPS, BPA, and BPF endocrine studies, BPF had estrogenic and anti-androgenic activity in in vitro testing. On average, BPF was as potent as BPA in estrogenic activity assays and about half as potent as BPA in anti-estrogenic activity assays.

In rodents, BPF is readily absorbed following oral exposure, metabolized, and excreted primarily in the urine. Washington State banned BPA for use in baby bottles, infant sippy cups and sports water bottles starting in 2010. BPF is used as a replacement for BPA in epoxy resins used to line

[51] Ibid.
[52] Ibid.
[53] Ibid.

food cans and in polymer plastics. BPF has been detected in personal care products such as lotions and cosmetics. National U.S. production volume was reported to be 355,000 pounds in 2012.

BPF was detected in 68% of indoor dust samples collected between 2006 and 2010 in NY State. Of eight bisphenol analogs measured, it was the third most common bisphenol detected after BPA and BPS. BPF was detected in urine collected between 2000 and 2014 from U.S. adults. Depending on the collection time, BPF was detected in 42-88% samples. BPF was detected more frequently than other BPA analogs in a variety of foods collected from retail grocery stores in Albany, NY. BPF was most frequently detected in fats and oils, dairy products, fish and seafood, meat products, and vegetables and was mostly associated with foods packaged in cans. The study authors estimated daily dietary exposure to BPF through U.S. food for different age groups; toddlers had the highest estimated intakes.

BPF may be slower to degrade in the environment than BPA, but is not expected to have high persistence or high potential for bioaccumulation. BPF has been reported to occur in surface water, sewage, and sediments.

4.2.2.11 Ethylhexyl diphenyl phosphate (EHDPP)[54]

EHDPP was reviewed by the UK Environmental Agency in 2009. Dose-related changes to the blood, liver, kidney, adrenal glands, testes and ovaries were observed in laboratory rats. A fertility and reproductive toxicity study in rats reported that mating and reproductive performance were unaffected by treatment. Reduced pup weight and survival were noted at mid- and high-doses, respectively. Relative and absolute liver and adrenal weight were increased in a dose-dependent manner in both sexes and both generations. Liver and adrenal pathology was also reported. UK assessors judged EHDPP to have a low potential to cause cancer in humans based on negative results in *in vitro* and *in vivo* mutagenicity and genotoxicity assays and an absence of proliferative lesions in repeat-dose studies.

EHDPP is primarily used as a flame retardant and plasticizer in flexible PVC. It is used in food-wrapping films such as those used to wrap meats and skinless sausages. According to a 2009 assessment by the UK, other current uses are in PVC plastics, rubber, polyurethanes, photo films, paints, pigment dispersions, adhesives, and PVC coatings on textiles and fabrics. These are materials that could be in children's products. It is also used in inflammable hydraulic fluids like those used in large aircraft. U.S. national volume production was reported to be one million to ten million pounds/year in 2012. EHDPP has been detected in U.S. house dust. EHDPP has been detected in U.S. diet studies, primarily in fats and oily foods. Biomonitoring studies have measured EHDPP or metabolites in breast milk, urine, and blood. EHDPP was detected in breast milk of Swedish women and women from three Asian counties. It was recently detected in blood of Chinese adults at a median level three times higher than TPHP. A urinary metabolite of EHDPP called DPHP has also been measured in human urine. It is not specific to EHDPP as it can be generated from at least two other flame retardants, TPHP and RDP2. The DPHP

[54] Ibid.

metabolite has been detected in urine of California adults, 91% of children in a German day care study, and 93% of the infants in a North Carolina study. Urinary levels of DPHP in children were higher than their mothers in two studies. Two studies looked for evidence that household sources of TPHP flame retardant contributed to children's exposure. No correlations with indoor dust or air concentrations of TPHP were detected in the German study. No correlations between DPHP in infant urine and the number of infant products in the home were detected in the North Carolina infants. Either another flame retardant is contributing to this metabolite (for example EHDPP) or there are more important sources of exposure. EHDPP has potential to build up in aquatic organisms.

4.2.2.12 Tricresyl phosphate (TCP)[55]

TCP is classified by EPA as high hazard for reproductive and repeated dose toxicity, and a moderate hazard for developmental and neurological toxicity. Endocrine organs appear to be sensitive to TCP toxicity. At higher doses, TCP reduced fertility and survival of offspring in rodents. Aside from impacts on female ovaries, TCP caused a dose-dependent increase in abnormal sperm morphology, reduced sperm concentration, and atrophy of seminiferous tubules in male rodents. TCP reduced the number of litters produced and pups/litter especially when males were treated. In the early 1930s an outbreak of delayed neuropathy and paralysis in the United States was traced to tri-o-cresyl phosphate that had been added to Jamaican ginger extract and ingested as an alternative alcoholic drink during prohibition.

Commercial TCP is composed of a mixture of methylated triphenyl phosphate isomers with an unspecified amount of methyl substitution1 including tri-*meta*-cresylphosphate (CAS no. 563-04-2), tri-*para*-cresylphosphate (CAS no. 78–32-0), and tri-*ortho*-cresylphosphate (CAS no. 78-30-8). TCP is often used as a flame retardant and plasticizer in PVC, cellulosic polymers, thermoplastics and synthetic rubber. It may be added to polyurethane foam as a flame retardant. It also is a flame retardant additive for industrial lubricants such as hydraulic and brake fluids, and in photographic film. The NTP report indicated it was used in back-coatings for upholstery fabric. U.S. national volume production was reported to be one million to ten million pounds/year in 2012.

TCP has been measured in 100% dust samples in two North American studies of house dust. TCP has not been widely measured in biomonitoring studies of the general population or children. All three known isomers of TCP were measured but not detected in urine of German children or indoor dust in multiple German day care centers. TCP was detected at low levels in breast milk from Swedish women. Median levels in Asian women were similar but the maximum detected level in breast milk was much higher in this population.

TCP is likely to partition to fish and sediments if released into waterways. Potential for TCP bioaccumulation may be low however.

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[55] Ibid.

4.2.2.13 Tris (1-chloro-2-propyl) phosphate (TCPP)[56]

EPA classified TCPP as high hazard for reproductive and developmental effects based on increased estrus cycle length, decreased uterine weights, and increased number of runts. TCPP has not been tested for cancer but is structurally similar to TDCPP and TCEP1 which are both demonstrated animal carcinogens. Only limited toxicity testing results for TCPP were identified in a review by the US Agency for Toxic Substances and Disease Registry (ATSDR) in 2012. TCPP is an additive flame retardant used in polyurethane furniture foam, textiles, apparel, leather, electronics, and rigid polyurethane foam insulation and roofing laminates used in building construction. Commercial TCPP is a mixture of isomers: primarily CAS 13674-84-5, with lesser amounts of CAS 76025-08-6, and 76649-15-5. The U.S. national production volume of TCPP was reported to be 54,673,933 pounds in 2012.

TCPP has been detected in U.S. household furniture and in baby products including: polyurethane foam in car seats, changing table pads, sleep positioners, portable mattresses, nursing pillows and children's furniture. Detection rates in foam are reported to be 0.5-2.2% by weight in furniture foam; 1-14% in baby product foam. TCPP has been detected, often with high frequency, in indoor house dust and air by multiple studies in North America. TCPP has been detected in a variety of foods in the U.S. FDA total diet study at low levels. In biomonitoring studies, two metabolites of TCPP have been measured and detected in human urine. While the frequency of detection and levels detected are generally low for the BCIPP metabolite, a recent study measured the BCIPHIPP metabolite in 100% of mothers and their children. EPA considers TCPP to have high hazard for persistence and low hazard for bioaccumulation.

4.2.2.14 Bis (2-ethylhexyl) tetrabromophthalate (TBPH)[57]

EPA classified TBPH as a moderate hazard for reproductive, developmental, neurological and repeated dose toxicities based on rodent toxicity of commercial mixtures, structurally similar chemicals, and professional judgement. Significant data gaps were noted. Pregnant rats exposed to the Firemaster® 550 mixture (which contains TBB1 and TBPH plus two non-brominated phosphate flame retardants) during gestation and lactation had altered thyroid function and produced offspring that were 30–60% heavier by weaning, an effect that persisted into adulthood. Female offspring of treated rats entered puberty sooner and had glucose intolerance and elevated anxiety behaviors in maze testing. TBPH is a brominated analog of phthalate DEHP1 and may be an endocrine disrupter. A metabolite of TBPH induced proliferative damage in rodent liver and altered serum thyroid hormone in rats. A study in Boston, Massachusetts reported house dust concentrations of TBPH were positively associated with higher level of thyroid hormone in men.

TBPH has been detected in foam baby products and U.S. residential furniture. TBPH is an ingredient in additive flame retardant mixtures used in flexible polyurethane foam. TBPH is also used in construction materials and as a non-flammable plasticizer in PVC electrical equipment

[56] Ibid.
[57] Ibid.

and electronics and appliances. In addition, TBPH is a flame retardant in neoprene and certain rubbers. TBPH has been measured with high frequency in residential indoor dust in the United States and Canada. It was found in 100% of indoor dust samples from childcare centers studied in 2010-2011 in Northern California. In a study of pregnant women in North Carolina, levels of TBPH in dust were correlated positively with levels in hand wipes. TBPH was also detected in 100% of office dust and 90% of car dust in Boston study. TBPH was detected in human serum and in maternal serum and breast. TBPH is classified by EPA as high hazard for persistence, and bioaccumulation.

4.2.2.15 Bis(chloromethyl)propane-1,3-diyl tetrakis-(2-chloroethyl) bis(phosphate) (V6)[58]

EPA classified V6 a moderate hazard for carcinogenicity based on the toxicity of chemicals with very similar structures. Commercial V6 also contains 4.5 – 13.5% Tris (2-chloroethyl) phosphate (TCEP) as an impurity. TCEP is classified as a carcinogen by the State of California and a 1b reproductive hazard by the European Union. EPA considered V6 to have high hazard for developmental toxicity and moderate hazard for reproductive toxicity. In a two-generation oral rat study, V6 caused thyroid effects in the parental generation and caused retarded fetal and pup growth in offspring.

V6 has been used as an additive flame retardant in polyurethane foam and has been identified in a number of consumer products including foam carpet pads, tent fabric, and baby products. Average concentration in the products that tested positive was 4.6% by weight of the foam. It is reportedly used in interior foam for automotive and furniture foam. U.S. national production volume of V6 was between 500,000 and 1 million pounds in 2002 but more current information is withheld as confidential business information. V6 has not been widely studied in house dust or the environment. It was detected in 95% of car dust samples and 75% of house dust samples in a single Boston area study. Concentrations in car dust were significantly higher than the house dust which is consistent with its reported higher use in automobile foam. The compound is readily absorbed across the gut and less readily across skin.

4.2.2.16 Isopropylated triphenyl phosphate (IPTPP)[59]

IPTPP is an isomeric mixture of phosphate esters derived from isopropyl phenols. Commercial mixtures may vary in the number of isopropyl substitutions and may contain some triphenyl phosphate and isopropylated diphenyl phosphates as well. EPA classified IPTPP a high hazard for reproductive, developmental, and neurological toxicities. Changes in organ weights, reduced fertility and pup survival was observed in an oral rat study of reproduction and development. Relative weights of liver, epididymis and adrenal glands were also observed in male rats at higher doses. IPTPP caused neurotoxicity (ataxia and degeneration of the spinal cord and peripheral nerves) in hens in a 91-day test submitted by the industry. Brain cholinesterase

[58] Ibid.
[59] Ibid.

inhibition was observed in rodent testing of a commercial mixture which contained 80% IPTPP and 20% TPP.

IPTPP is very likely to be found in children's products. In a European assessment, IPTPP was identified as a flame retardant plasticizer used in a range of PVC products, polyurethanes, textile coatings, adhesives, paints and pigment dispersions. Uses in the U.S. are largely withheld as confidential business information, however, IPTPP isomers are a listed ingredient of Firemaster®550 which is used as an additive flame retardant in flexible polyurethane foam. U.S. consumer product testing has identified the profile of flame retardants contained in Firemaster®550 in foam baby products and U.S. upholstered furniture. The reported U.S. national production volume of IPTPP was 14,904,236 pounds/year in 2012. U.S. biomonitoring studies indicate that exposure to adults and children is occurring. A urinary metabolite of IPTPP was measured in 100% of 22 mothers and 92% of 26 children in a 2013-14 study of families in Princeton, New Jersey. This same metabolite was detected at slightly higher mean levels in 100% of mothers and babies in a 2015 California study population. EPA considered IPTPP to have very high aquatic toxicity, moderate persistence in the environment and high potential for bioaccumulation.

4.2.2.17 Decabromodiphenyl ethane (DBDPE)[60]

EPA classified DBDPE as a high hazard for developmental toxicity based on its structural similarity to decabromodiphenylether (decaBDE). DBDPE had low acute toxicity in animals, either orally and dermally, and is predicted to have low acute inhalation toxicity. No alteration in liver, kidney or body weights was observed indicating no overt toxicity. Authors reported indications of organ impairment In DBDPE-treated rats (decreased serum creatinine, decreased serum liver enzymes alanine transferase and alkaline phosphatase, and increased total bile acids). Liver tissue was not examined for signs of pathology in this study to investigate this observation. DBDPE-treated rats also showed increased serum thyroid hormones. Thyroid hormones are central to proper mammalian development, including the brain and reproductive organs. DBDPE is structurally similar to decabromodiphenyl ether (decaBDE) and has a similar toxicity profile in acute and short-term toxicity testing. In further investigations of developmental exposures, however, decaBDE has been shown to produce neurodevelopmental toxicity and endocrine disruption in rodents in at much lower doses.

DBDPE is a general purpose additive flame retardant for a variety of polymer applications and for textiles. It is a commercially important alternative to decaBDE. It typically comprises 10-15% of the weight of treated plastics (e.g., ABS, HIPS, PVC, polypropylene and polyethylene, etc.). It is used in wire and cable coatings for telecommunications, electrical, and the automotive industry. To a lesser extent it can be used in the latex-based back coating for drapery and upholstery fabrics. DBDPE has been manufactured for more than 20 years and is a High Production Volume (HPV) chemical in the United States today; as of 2012, the National Production volume was 50 to 100 million pounds per year. DBDPE was detected in one-third of baby formula and about one-fourth of baby cereals collected from the U.S. in 2013. DBDPE was detected in a child's tablet and plastics of other consumer products, and in foam, stuffing, and

[60] Ibid.

padding of children's products. A study that tested a variety of children's toys for sale in China found DBDPE in 80% of hard plastic toys, 89% of foam toys, 50% of the stuffed toys, and 40% of rubber or soft plastic toys including baby teethers. Potential migration into saliva was tested by volunteers in this study. One out of 5 volunteers had measurable DBDPE in saliva after lightly chewing a segment of a hard plastic toy in the mouth for 15 min [17].

Because DBDPE is not chemically bound to the treated materials, it can escape into the environment. DBDPE has been widely detected in studies of U.S. house dust. DBDPE has also been detected in residential indoor air and at higher levels in a gymnastics facility in Seattle. DBDPE is listed as a priority for biomonitoring by the California Biomonitoring Program. Two recent government assessments predict that DBDPE has high environmental persistence but came to different conclusions regarding potential for bioaccumulation. There is limited but positive evidence that DPDPE biomagnifies in aquatic food chains. More testing is needed to characterize environmental fate, bioavailability and metabolism of DBDPE in different species.

4.2.2.18 Short-chain chlorinated paraffins (SCCP)[61] and Chlorinated Paraffins

SCCPs (CAS No. 85535-84-8) and Chlorinated paraffins (CAS No. 108171-26-2) are classified as carcinogens by authoritative sources. The U.S. National Toxicology Program classifies chlorinated paraffins as reasonably anticipated to be human carcinogens based on liver, kidney and thyroid tumors in rodent testing. California Proposition 65 also lists chlorinated paraffins (CAS No. 108171-26-2) as carcinogens. The European Union lists SCCPs as a substance of very high concern, as it meets the criteria for both a persistent bioaccumulative and toxic substance and a very persistent, very bioaccumulative substance.

SCCPs could be present in children's products as they have been used as plasticizers and a flame retardant in plastics, especially PVC. Other minor domestic SCCP uses are as a plasticizer and a flame-retardant additive to a variety of products including: rubber formulations, paints and other coatings, and adhesives and sealants. SCCPs are included on Washington State's PBT list (WAC 173-333-320). SCCPs have been detected in breast milk as well as other human tissues. SCCPs are found world-wide in the environment, wildlife and humans. SCCPs bioaccumulate in wildlife and humans, and are persistent and transported globally in the environment.

4.2.2.19 2-ethylhexyl-2,3,4,5-tetrabromobenzoate (TBB)[62]

EPA classified TBB as a moderate hazard for reproductive, developmental, neurological and repeated dose toxicities. This was based on the observed toxicity of a closely related confidential analog, and studies of commercial mixtures, which contain TBB as a major component. Pregnant rats exposed to the Firemaster® 550 mixture during gestation and lactation had altered thyroid function and produced offspring were 30–60% heavier by weaning, an effect that persisted into adulthood. Female offspring of treated rats entered puberty sooner and had glucose intolerance and elevated anxiety behaviors in maze testing.

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[61] Ibid.
[62] Ibid.

TBB is an ingredient in common market replacements for PBDEs in flexible polyurethane foam. Approximately 50% of the Firemaster® 550 mixture is TBB and TBPH1 at a ratio of 4:1 by mass. Past and current national production volume of TBB is withheld as confidential business information. TBB treated foams may be used in many everyday products such as couches, chairs, other upholstered furniture, children's furniture, baby products, office furniture, foam in gymnastic facilities, and auto cushions. TBB may also be present in products made from recycled foam such as carpet backings and pads. TBB has been measured with high frequency in residential indoor dust in studies in the U.S. and Canada. It was found in 100% of indoor dust samples from 39 childcare centers in Northern California. In a study of North Carolina adults, levels of TBB in hand wipes correlated positively with a metabolite of TBB in urine suggesting that dermal contact with dust or treated surfaces contributed to overall exposure. In another investigation, median concentrations of TBB and TBPH in paired hand wipe samples were 2–3 times higher after gymnastics practice compared to before indicating skin exposure was occurring during collegiate gymnast practice. Metabolites of TBB were detected in urine of toddlers and their mothers in New Jersey and California studies. Levels measured in children tended to be higher than their mothers in both studies. TBB metabolites were also commonly detected in maternal serum and breast milk collected in a 2008-2009 study in women living in Québec Canada. TBB is classified by EPA as high hazard for persistence and bioaccumulation.

4.2.2 Nonylphenol and 4-Nonylphenol (branched)[63]

Nonylphenol and 4-Nonylphenol (branched) have been classified as a Category 1 endocrine disruptor by the European Union.

Uterotrophic assays indicate that nonylphenol has estrogenic activity, and several other lines of evidence suggest that nonylphenol can adversely affect mammalian reproduction. Uterotrophic assays indicate that 4-nonylphenol has estrogenic activity.

The Danish EPA found nonylphenol in one of three pencil erasers and one of 28 infant sunscreens and 4-nonylphenol in one out of two nursing pillows. A Dutch study of plastics in children's products found nonylphenol in many samples (mostly polyvinyl chloride).

4.2.3 Potential for reduced health impacts and litigation

Ecology also expects the adopted rule amendments, through better manufacturer and importer understanding of product content, to reduce the likelihood of negative health impacts from children's products containing the 20 additions to the CHCC list, and the two nonylphenols listed as separate CHCCs. There is also potential for recalls and litigation resulting from potential impacts to children. This is because improved product knowledge would reduce the likelihood of unintentionally exposing the public to potentially harmful products, which could otherwise result in recalls or litigation.

[63] Ibid.

There may also be a reduction in likelihood of health impacts and litigation resulting from potential impacts to children. Ecology notes that the presence of a chemical does not establish harm to a child, and that reporting ranges are not indicative of prospective known harm or liability.

We could not confidently estimate the degree to which children's products containing the 20 additions to the CHCC list, and the two nonylphenols listed as separate CHCCs, could cause potential impacts to children, and therefore cannot quantify the associated lawsuits that could be expected. We note, however, that violations of the rule and the federal CPSIA rule have upper bound civil damages for known violations, of:

- $100 thousand for known violations.
- $15 million for a related series of violations.

In relative terms, 14 to 81 individual known violations resulting in recalls, lawsuits, or children's health impacts of a minor degree, over 20 years, will comprise the break-even point compared to total estimated present-value costs of reporting these chemicals in children's products. A single related series of violations would counterbalance compliance costs over 20 years.[64]

4.3 Benefit Summary

We estimated the following range of quantifiable benefits associated with removing three chemicals from the CHCC list:

- Based on the above methodology and assumptions, we estimated total annual benefits (avoided costs) of approximately:
    - Low: $684 thousand
    - High: $771 thousand

- Over 20 years, these streams of benefits add up to present values[65] of:
    - Low: $12.3 million
    - High: $13.9 million

We also expect the adopted rule amendments to result in informational benefits for government planners, consumers, and manufacturers. These include, but are not limited to, the following

[64] These values are based on total estimated costs. They do not account for avoided costs of testing and reporting the three chemicals removed from the CHCC list. If those avoided costs were included, these values would be approximately cut in half.

[65] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

benefits associated with improved knowledge of the manufacturing process and potentially damaging chemical content of children's products.

- Greater understanding of the distribution of CHCCs meeting selection criteria in Washington's children's products and economy.
- Credibility and better-informed consumer behavior.
- Economies of scale in manufacturing.
- Avoided impacts to children's health through manufacturer knowledge.
- Avoided recall or litigation costs.
- See sections 4.2.2 and 4.2.3 above for more discussion of these benefits to develop a qualitative understanding of how expanded CHCC reporting contributes to the above benefits.

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of the costs and benefits of the adopted rule amendments

Over 20 years, the total costs created by adding 20 new chemicals to the CHCC list, and separating an existing single listing into three CHCCs, add to total present values[66] of:

- Low: $1.5 million
- High: $8.4 million

Over 20 years, the total benefits created by removing three chemicals from the CHCC list would be:

- Low: $12.3 million
- High: $13.9 million

Note that the differences between the costs associated with adding chemicals and avoided costs associated with removing chemicals are based on differences across:

- Frequency of reports and testing for a specific chemical.
- Numbers of manufacturers producing products more likely to contain a chemical.
- Need for testing for a chemical as a nonfunctional element or contaminant in a product.
- Testing costs (for manufacturers that choose to test).

We also expect the adopted rule amendments to result in informational benefits for government planners, consumers, and manufacturers. These include, but are not limited to, the following benefits associated with improved knowledge of the manufacturing process and potentially damaging chemical content of children's products.

- Greater understanding of the distribution of CHCCs meeting selection criteria in Washington's children's products and economy.
- Credibility and better-informed consumer behavior.
- Economies of scale in manufacturing.
- Avoided impacts to children's health through manufacturer knowledge.

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[66] Ecology calculates present values based on a real discount rate of 1.12 percent, the historic average real rate of return on US Treasury I-Bonds since 1998. US Treasury Department (2017). Series I Savings Bond Earnings Rates Effective November 1, 2016. Also part of https://www.treasurydirect.gov/indiv/research/indepth/ibonds/res_ibonds_iratesandterms.htm. Note that since publication of the Preliminary Regulatory Analyses (Ecology publication no. 17-04-19), this discount rate has been updated to 1.09 percent. To maintain consistency across these analyses, we have retained the 1.12 percent discount rate for this analysis. The lower discount rate would increase both costs and benefits by 0.3 percent (3 tenths of one percent).

- Avoided recall or litigation costs.
- See sections 4.2.2 and 4.2.3 above for more discussion of these benefits to develop a qualitative understanding of how expanded CHCC reporting contributes to the above benefits.

5.2 Conclusion

Ecology concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted rule amendments, that the benefits of the adopted rule amendments are greater than the costs.

Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(e) 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, Ecology is 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).

Ecology assessed alternative rule content, and determined whether they met the goals and objectives of the authorizing statutes. Of those that would meet these goals and objectives, Ecology determined whether those chosen for the adopted rule were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute: chapter 70.240 RCW

The Children's Safe Product Act (CSPA; chapter 70.240 RCW) sets out explicit prohibitions and requirements, as well as direction to Ecology to identify chemicals of high concern to children (CHCCs) and implement reporting requirements through a rule. The CSPA law includes:

- Prohibition of manufacturing and sale of children's products containing:
    - Lead greater than 90 parts per million.
    - Cadmium greater than 40 parts per million.
    - Phthalates (individually or in combination) greater than one thousand parts per million.
- Authorization for Ecology, in consultation with the WA Department of Health, to further restrict lead content to 40 parts per million.
- Prohibition of manufacturing and sale of children's products and residential upholstered furniture containing five flame retardants above one thousand parts per million.
- Direction to Ecology to identify high-priority chemicals that are of high concern for children, including consideration of specific criteria related to fetal or childhood exposure due to consumer products in the home.
- Direction to Ecology to consider whether any of a set of six flame retardants meet the criteria of a chemical of high concern for children.
- Reporting requirements for manufacturers of children's products containing CHCCs, including:
    - The name of the chemical used or produced and its chemical abstracts service registry number.
    - A brief description of the product or product component containing the substance.
    - A description of the function of the chemical in the product.
    - The concentration of the chemical used in each unit of the product or product component. The concentration may be reported in ranges, rather than the exact amount.
    - The name and address of the manufacturer and the name, address, and phone number of a contact person for the manufacturer.
    - Any other information the manufacturer deems relevant to the appropriate use of the product
- Requirements for manufacturers of children's products containing CHCCs, including notification of persons selling the manufacturer's products in Washington about provisions of the chapter.
- Requirements for manufacturers of prohibited children's products to recall the product and reimburse the retailer or purchaser.
- Authorization of civil penalties of up to $5 thousand for each violation, in first offenses.
- Authorization of civil penalties of up to $10 thousand for repeat offenses.
- Liability limitation of retailers unknowingly selling restricted products.
- Authorization for Ecology to adopt rules as necessary for the purpose of implementing, administering, and enforcing the CSPA law.

6.3 Alternatives considered and why they were not included

6.3.1 Remove formaldehyde from the CHCC list

Ecology considered removing formaldehyde from the CHCC list, based on stakeholder input.

This alternative does not meet the goals and objectives of the authorizing statute. The decision to keep formaldehyde on the CHCC list is based on the same basic assessment process developed and used in 2011 and 2013 to identify, add, and remove chemicals from the list. This assessment process is based on statutory direction to identify CHCCs based on consideration of specific criteria related to fetal or childhood exposure due to consumer products in the home. The authorizing statute does not direct Ecology to identify CHCCs based on other methods such as a risk assessment.

6.3.2 Use a risk assessment to identify CHCCs

Ecology considered basing CHCC identification on risk assessment, based on stakeholder input.

This alternative does not meet the goals and objectives of the authorizing statute. The authorizing statute does not direct Ecology to identify CHCCs based on risk assessment. It directs Ecology to identify CHCCs based on consideration of specific criteria related to fetal or childhood exposure due to consumer products in the home.

6.3.3 Remove parabens from the CHCC list

Ecology considered removing parabens from the CHCC list, based on stakeholder input. These chemicals are approved for use in personal care products by the US Food and Drug Administration (FDA) and the cosmetics industry.

This alternative does not meet the goals and objectives of the authorizing statute. The decision to keep parabens on the CHCC list is based on the same basic assessment process developed and used in 2011 and 2013 to identify, add, and remove chemicals from the list. This assessment process is based on statutory direction to identify CHCCs based on consideration of specific criteria related to fetal or childhood exposure due to consumer products in the home.

6.3.4 Include additional chemicals on the CHCC list

Ecology considered multiple additional chemicals for inclusion on the CHCC list, based on stakeholder request. These included:

Table 20: Additional chemicals considered but not added to the CHCC list

CAS	Chemical
78-33-1	Tris (4-tert-butylphenyl) phosphate (TBPP)
78-51-3	Tris (2-butoxyethyl) phosphate (TBOEP)
79-01-6	Trichloroethylene
79-06-1	Acrylamide
91-59-8	2-Napthylamine
92-87-5	Benzidene and salts
96-18-4	1,2,3-Trichloropropane
97-56-3	CI Solvent Yellow 3
101-14-4	4,4' Methylene (2-chloroaniline)
101-77-9	4,4' Diaminodiphenylmethane
106-89-8	Epichlorohydrin
106-93-4	1,2 Dibromomethane
106-99-0	1,3-Butadiene
107-06-2	1,2 Dichloroethane
120-71-8	6-Methoxy-m-toluidine
605-50-5	Diisopentyl phthalate (DIPP)
838-88-0	4,4'methylenedi-o-toluidine
1336-36-3	Polychlorinated biphenyls
7439-92-1	Lead
7440-02-0	Nickel and nickel compounds
7440-41-7	Beryllium
13560-89-9	Dechlorane plus
26471-62-5	Toluene diisocyanate
27554-26-3	Diisooctyl phthalate (DIOP)
37853-59-1	1,2-bis(2,4,6-tribromophenoxy) ethane (BTBPE)
220532-35-2	Butylated triphenyl phthalate

This alternative does not meet the goals and objectives of the authorizing statute. In developing the adopted rule amendments, Ecology used the same basic assessment process developed and used in 2011 and 2013 to identify, add, and remove chemicals from the CHCC list. This assessment process is based on statutory direction to identify CHCCs based on consideration of specific criteria related to fetal or childhood exposure due to consumer products in the home. The additional chemicals considered did not meet these criteria for CHCC listing.

6.4 Conclusion

After considering alternatives to the adopted rule's contents, as well as the goals and objectives of the authorizing statute, Ecology determined that the adopted rule represents the least-burdensome alternative of possible rule contents meeting these 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 proposed rule amendments. Ecology regulatory analyses include this analysis, where applicable, at the proposal and adoption stages.

This chapter presents the:

- Results of the analysis of relative compliance cost burden.
- Consideration of lost sales or revenue.
- Cost-mitigating action taken by Ecology, if required.
- Small business and local government consultation.
- Industries likely impacted by the adopted rule.
- Expected net impact on jobs statewide.

A small business is defined by the RFA as having 50 or fewer employees. Estimated costs are determined as compared to the existing regulatory environment—the regulations in the absence of the adopted rule amendments. The RFA only applies to costs to "businesses in an industry" in Washington State (WA). This means that impacts, for this document, are not evaluated for non-profit or government agencies.

The existing regulatory environment is called the "baseline" in this document. It includes only existing laws and rules at federal and state levels.

7.2 Quantification of Cost Ratios

Ecology calculated the estimated per-entity costs to comply with the adopted rule amendments, based on the costs estimated in Chapter 3. In this section, Ecology summarizes compliance cost per employee at affected businesses of different sizes.

We used WA Employment Security Department data for employment distributions at the industry level.[67] This data is reported at the facility level at businesses in WA, and therefore is likely an underestimate of the number of employees at the highest owner-operator level of a company. The average affected small business likely to be covered by the adopted rule amendments employs between 3 and 13 people, depending on which industry incurs compliance

[67] WA Employment Security Department (2016). Quarterly Census of Employment and Wages. Number of establishments and employment for all ownerships by 3-digit NAICS industry code. Washington State, 2016 Q1.

costs based on its specific product line in a given year. The largest ten percent of affected businesses employ an average of between 89 and 4,521 people, depending on which industry incurs compliance costs based on its specific product line in a given year.

Based on total 20-year present value (PV) cost estimates from Chapter 3 and cost-savings estimates from Chapter 4, we estimated the following compliance costs per employee. The ranges depend on which specific industry incurs compliance costs, and whether its compliance is related to the 20 chemicals added to the CHCC list, the individual listing of nonylphenols currently listed as a group, or the removal of three chemicals from the CHCC list. Negative numbers indicate a reduction in compliance costs.

Table 21: 20-year PV change in compliance costs per employee

	Increased 20-Year Compliance Costs per Employee: Small Business	Increased 20-Year Compliance Costs per Employee: Largest Business	Reduced 20-Year Compliance Costs per Employee: Small Business	Reduced 20-Year Compliance Costs per Employee: Largest Business
Low: Minimum	$114,020	$332	$934,966	$2,721
Low: Maximum	$437,500	$16,857	$3,587,500	$138,230
High: Minimum	$638,514	$1,858	$1,056,588	$3,075
High: Maximum	$2,450,000	$94,401	$4,054,167	$156,211

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

Note that these estimates are based on estimated testing for reporting, and testing is not required under the baseline or adopted rule amendments. Note also that reporting costs are driven by the authorizing statute, which specifically lists reporting requirements.

7.3 Loss of sales or revenue

Businesses that would incur compliance costs could experience reduced sales or revenues if compliance with this rule would significantly affect 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 significantly affect marginal costs), as well as the specific attributes of the markets in which they sell goods, including the degree of influence of each firm on market prices, as well as the relative responsiveness of market demand to price changes.

The market for children's products is likely to vary in its elasticity. Toys and games, or kitchen/dining products, for example, are likely to have more substitutes, making it more difficult for manufacturers and sellers to pass compliance costs on to consumers through increased prices. Higher prices for toy and game products whose manufacturers incur additional compliance costs under the adopted rule amendments are more likely to result in consumers substituting other products, potentially affecting manufacturers' sales or revenue. Children's

products with specific required attributes are likely to have more uniform product availability and limited substitutes (e.g., car seats). If manufacturers of such products incur compliance costs under the adopted rule amendments, it is likely relatively easier for them to pass costs on to consumers without having those consumers purchase another product instead. In which case, they would be less likely to see losses in sales or revenue.

7.4 Action 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.

Ecology considered all of the above options, and included the following legal and feasible elements in the adopted rule amendments that reduce costs. In addition, Ecology considered the alternative rule contents discussed in Chapter 6, and excluded those elements that would have imposed excess compliance burden on businesses.

The baseline and adopted rule amendments include elements that intend to reduce disproportionate burden on small businesses. This includes allowing multiple options for determining the CHCC content of children's products, including:

- Supply chain knowledge.
- Knowledge of the manufacturing process.
- Testing only if the manufacturer chooses to do so.

Because smaller businesses likely operate in smaller volumes, they may inherently incur lower compliance costs than estimated in this analysis. This would not be reflected in our ranges of single estimates applied to all sizes of manufacturer.

Ecology's scope for reducing burden on small businesses via the examples listed under the RFA (items a – f above) was limited by the authorizing statute, scope of the rule, and scope of this rulemaking:

- The authorizing statute sets the standards for reporting content, and the rule does not require businesses to reduce their use of CHCCs (which would require changes to manufacturing processes or practices and quality assurance).
- Independent Ecology testing is performed instead of manufacturer inspections.
- The rule is not new, and manufacturers of children's products have been aware of, and complying with, the rule for many years.
- Fines for noncompliance are set by the authorizing statute.

7.5 Small Business and Government Involvement

Ecology involved small businesses and local government in its development of the adopted rule amendments, using:

- CSPA Listserv - 693 registered email addresses - so far sending 13 listserv messages since Aug 2016 (a few were corrections).
    - 400 business email addresses, and 35 business associations.
    - Five Washington state local governments, 94 ".gov" addresses, 17 ".us" addresses.
    - 14 nongovernmental organizations, seven Toxic Free Future addresses, 15 addresses at educational institutions.
- Stakeholder meeting 10/25/16. In person and webinar. Agenda: scope of the rule, rulemaking process, chemical evaluation process. 58 attendees.
    - About 25 business attendees, 11 representatives from business associations. Associations included:
        - Alkylphenols & Ethoxylates Research Council
        - American Chemistry Council
        - Fashion Jewelry and Accessories Trade Association (FJATA)
        - International Molybdenum Association (IMOA)
        - Juvenile Products Manufacturers Association
        - Personal Care Products Council
        - Toy Industry Association
    - One local government representative, 11 state government representatives. Attendees included representatives from:
        - King County Local Hazardous Waste Management Program
        - Vermont
        - Oregon
        - Maine
        - WA Ecology

    - Four nongovernmental organization representatives and one educational institution. Attendees representing Toxic Free Future and Evergreen State College.
- Stakeholder webinar 01/04/17. Agenda: updated rule language, Q&A for rule language, chemical list changes, and rulemaking process. 72 attendees.
    - 38 businesses and 11 business associations. Associations included:
        - Alkylphenols & Ethoxylates Research Council
        - American Chemistry Council
        - Association of Washington Business
        - CompTIA - Computing Technology Industry Association
        - FJATA
        - FluoroCouncil
        - IMOA
        - Personal Care Products Council
        - Toy Industry Association
    - 23 other representatives including:
        - City of Everett
        - California Department of Toxic Substances Control
        - Maine Department of Environmental Protection
        - WA Department of Health
        - WA Department of Ecology
        - Toxic Free Future
        - Legal representatives
- Webpages: Regularly updated with current status of rulemaking. Listserv messages sent when significant updates were posted to the website.
- Public hearing on 04/25/17 in person and webinar. Agenda: proposed rule language, Q&A, and public testimony: 9 in-person and 47 webinar attendees.
    - Businesses and associations:
        - 3M
        - American Chemistry Council
        - Association of Washington Businesses
        - Big 5
        - Cleaning Institute
        - Climax Molybdenum
        - Cohen Law
        - Compliance and Risks
        - Edgewell Personal Care
        - Environmental and Regulatory Resources
        - Fashion Jewelry and Accessories Trade Association
        - Gymboree
        - International Molybdenum Association

        - Intertek
        - JC Penney
        - Juvenile Products Manufacturers Association
        - JVC Kenwood
        - Keller and Heckman LLP
        - Kohls
        - Kroger
        - LG Electronics
        - Modern Testing Services
        - Personal Care Council
        - Skechers
        - Target
        - Toy Industry Association
        - UL
        - VF Corporation
        - Vi-Jon
    - Governments and non-governmental organizations:
        - Earth Ministry
        - King County Local Hazardous Waste Management
        - King County/Seattle Public Health
        - Latino Community Fund
        - The ARC of Washington State
        - The Endocrine Disruption Exchange
        - Toxic Free Future
        - Washington Nurses Association
        - Zero Waste Washington

7.6 NAICS Codes of Impacted Industries

The adopted rule is likely to impact the following North American Industry Classification System (NAICS) codes.[68] These codes were selected based on products in which the adopted additions, separate listings, or removals of chemicals from the CHCC list are likely to be found.

Table 22: NAICS codes of likely impacted industries

NAICS Code	Industry Description
313210	Broadwoven fabric mills
313230	Nonwoven fabric mills
314120	Curtain and linen mills
314910	Textile bag and canvas mills
315210	Cut and sew apparel contractors
315220	Men's and boys' cut and sew apparel manufacturing
315240	Women's, girls', and infants' cut and sew apparel manufacturing

[68] US Census Bureau (2017). North American Industry Classification System. https://www.census.gov/eos/www/naics/

NAICS Code	Industry Description
315990	Apparel accessories and other apparel manufacturing
316210	Footwear manufacturing
323111	Commercial printing (except screen and books)
323113	Commercial screen printing
325620	Toilet preparation manufacturing
326150	Urethane and other foam product (except polystyrene) manufacturing
337125	Household furniture (except wood and metal) manufacturing
339910	Jewelry and silverware manufacturing
339930	Doll, toy, and game manufacturing
423220	Home furnishing merchant wholesalers

7.7 Impact on Jobs

Ecology used the Washington State Office of Financial Management's 2007 Washington Input-Output Model[69] to estimate the impact of the adopted rule amendments on jobs in the state. The model accounts for inter-industry impacts and spending multipliers of earned income and changes in output.

The adopted rule amendments will result in transfers of money within and between industries. Industries spending compliance costs on testing are assumed to transfer their expenditures to the income of the laboratory testing industry (NAICS 541380, Testing Laboratories). However, based on Ecology experience, and to maintain conservative estimates, we assumed the labs used are outside of Washington. We therefore estimated jobs impacts based only on changes to compliance costs, without transfers to another in-state industry.

These prospective changes in overall employment in the state are the sum of multiple small increases or decreases across all industries in the state.

Under the estimated increased compliance costs created by the adopted rule amendments, the Washington economy could experience a loss of 1 – 6 jobs in each year (20 – 120 full-time employees, FTEs, over 20 years), depending on which industry experiences increased compliance costs.

Under the estimated reduced compliance costs created by the adopted rule amendments, the Washington economy could experience a gain of 4 – 9 jobs in each year (80 – 180 FTEs over 20 years), depending on which industry experiences reduced compliance costs.

[69] See the Washington State Office of Financial Management's site for more information on the Input-Output model. http://www.ofm.wa.gov/economy/io/2007/default.asp

References

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WA Office of Financial Management (2012; revised October 2015). 2007 Washington Input-Output model. http://www.ofm.wa.gov/economy/io/2007/default.asp

Appendix A
Documentation of Determinations Required under RCW 34.05.328

Describe the general goals and specific objectives of the statute that this rule implements. RCW 34.05.328(1)(a)
See Chapter 6.
Explain why this rulemaking is needed to achieve the goals and objectives of the statute. RCW 34.05.328(1)(b)
See Chapters 1 and 2.
Describe alternatives to rulemaking and the consequences of not adopting this rule. RCW 34.05.328(1)(b)
Before starting the rulemaking we considered options that were not rulemaking. The 2016 CSPA amendment to the law became effective on June 9, 2016 and directed that Departments of Ecology and Health consider adding flame retardants that meet the criteria to the CHCC list. The list of CHCCs at that time was based on chemical assessments completed in 2011 and 2013. The CHCC list can only be amended using rulemaking. If the six flame retardants are not added to the CHCC list by rule, manufacturers will not be required to annually report on the presence of those chemicals in children's products. Without adding these chemicals to the CHCC list, Ecology will lose the opportunity to track the use of these flame retardants. Flame retardants not added to the CHCC list are not be included in Health's recommendations to the Legislature on policy options for reducing exposure, including restrictions on use. **Please see the Least Burdensome Alternative Analysis, Chapter 6 of this document, for discussion of alternative rule content considered.**
A preliminary cost-benefit analysis was made available. RCW 34.05.328(1)(c)
Notice is provided in the proposed rulemaking notice (CR-102 form) filed under RCW 34.05.320.
Do the probable benefits of this rulemaking outweigh the probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented? RCW 34.05.328(1)(d)
See Chapters 1 – 5.
Is this rule the least burdensome alternative for those required to comply? RCW 34.05.328 (1)(e)
Please see Chapter 6 and record for rulemaking.
Does this rule require those to whom it applies to take an action that violates requirements of another federal or state law? ☐ **Yes** ☒ **No**

Explain how that determination was made. RCW 34.05.328(1)(f)

There are no actions in this rule that violate other federal or state laws.

Does this rule impose more stringent performance requirements on private entities than on public entities? RCW 34.05.328 (1)(g)

☐ **Yes. Provide a citation. Explain.**

☒ **No**

The Children's Safe Product Act requires manufacturers of children's product to submit annual reports for selected chemicals present in the children's products they sell in Washington. The requirements are applied equally to all manufacturers of children's products.

Do other federal, state, or local agencies have the authority to regulate this subject?

☐ **Yes. List below.** ☒ **No**

Is this rule different from any federal regulation or statute on the same activity or subject?

☐ **Yes** ☒ **No**

If yes, check all that apply. The difference is justified because:

☐ **A state statute explicitly allows Ecology to differ from federal standards. (If checked, provide the citation.)**

☐ **There is substantial evidence that the difference is necessary to achieve the general goals and objectives of the statute that this rule implements. (If checked, explain.)**

RCW 34.05.328 (1)(h)

The U.S. Environmental Protection Agency regulates the use of chemicals under the Toxic Substances Control Act but does not focus on children's products. The federal Consumer Protection Safety Commission limits specific chemicals in children's products under the federal Consumer Product Safety Improvement Act but does not require manufacturers to report. Other Washington regulations require reporting for chemical emissions or disposal but not for children's products. Three other states require manufacturers to report on chemicals in children's products: Maine (Toxic Chemicals in Children's Products), Vermont (Chemicals of High Concern to Children) and Oregon (Toxic Free Kids Act). This rulemaking was coordinated with other states to avoid conflicts. Ecology works directly with the state's Department of Health on updates to the CSPA Reporting rule language and CHCC list.

Explain how Ecology ensures that the rule is coordinated with other federal, state, and local agencies, laws, and rules. RCW 34.05.328 (1)(i)

Ecology met internally to coordinate with other active rulemaking efforts (like Dangerous Waste, Pollution Prevention). Ecology collaborated with Health on the CHCC evaluation of flame retardants and rule development (as we did during the development of the original CSPA rule). We encouraged local, state and federal agencies to provide input in the development of rule language. This rulemaking was coordinated with other states to avoid conflicts.

Is there an impact to small businesses or local government? **Check all that apply.** **☒ Small businesses ☐ Local governments** **If either are affected, describe how you intend to consult with small businesses, local governments, or both on how the impact can be mitigated.**
See Chapter 7.
Is a Small Business Economic Impact Statement (SBEIS) required? **☒ Yes ☐ No** **If yes, one will be filed with the CR-102 form.** **If no, explain.**