DEPARTMENT OF ECOLOGY
State of Washington

Final Regulatory Analyses

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

Chapter 173-460 WAC
Controls for New Sources of Toxic Air Pollutants

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Chapter 173-460 WAC

Controls for New Sources of Toxic Air Pollutants

by

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Table of Contents

Tables

Acronyms

AERSCREEN	American Meteorological Society / Environmental Protection Agency Screening Model
AERMOD	American Meteorological Society / Environmental Protection Agency Regulatory Model
APA	Administrative Procedure Act
ASIL	Acceptable Source Impact Level
ATSDR	Agency for Toxic Substances and Disease Registry
CAA	Clean Air Act
CAS	Chemical Abstracts Service
CBA	Cost-Benefit Analysis
EGBE	Ethylene Glycol Monobutyl Ether
EPA	U.S. Environmental Protection Agency
HAP	Hazardous Air Pollutant
LBA	Least-Burdensome Alternative Analysis
MRL	Minimal Risk Level
NDMA	N-Nitrosodimethylamine
OEHHA	California Office of Environmental Health Hazard Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated diphenyl ethers
PSD	Prevention of Significant Deterioration
RCW	Revised Code of Washington
REL	Reference Exposure Level
RFA	Regulatory Fairness Act
RfC	Reference Concentration
SQER	Small Quantity Emissions Rate
TAP	Toxic Air Pollutant
TBACT	Best Available Control Technology for Toxics
TCE	Trichloroethylene
URF	Unit Risk Factor
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code

Executive Summary

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under Chapters 34.05 and 19.85 RCW, for the adopted amendments to the Controls for New Sources of Toxic Air Pollutants rule (Chapter 173-460 WAC; the "rule"). This includes the:

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

The amendments make the following changes:

- Update the toxic air pollutant (TAP) list.
- Recalculate:
  - De minimis emission values.
  - Small quantity emissions rates (SQERs).
  - Acceptable source impact levels (ASILs).
- Specify the number of significant digits of emissions rates (i.e., de minimis and SQERs) and concentrations (i.e., ASILs).
- Update language in the rule to use the acronym "TAP" instead of toxic air pollutant.

The reasons for the rule amendments are to:

- Align the rule with current scientific information about chemicals, including adjusting for the impacts of early life exposure to a chemical. We are adding some chemicals or modified values based on previous errors in the rule language itself.
- Remove ammonium sulfate as a toxic air pollutant based on our toxicity review in response to a rulemaking petition on this chemical from the Far West Agribusiness Association.
- Improve clarity.
- Remove redundancy.

Likely costs

Potential First Tier Review, TBACT, and permitting costs for unidentified facilities emitting added TAPs.

Recalculated ASILs:

- Annual cost of up to $481 thousand for complex modeling and health impact assessment across 53 facilities. The equivalent present value is $8.2 million over 20 years.

- Potential Second Tier Review costs for unidentified facilities emitting TAPs above an adopted more stringent ASIL.

Recalculated SQERs:

- Annual cost of $380 thousand for additional emissions modeling across 53 facilities. The equivalent present value is $6.5 million over 20 years.
- Potential additional costs of up to $3.6 million over 20 years for analysis of two TAPs for which averaging periods change.
- Potential additional modeling costs for unidentified facilities emitting TAPs above an adopted more stringent SQER.

Recalculated de minimis emission values:

- Annual cost of between $4 thousand and $38 thousand across five identified facilities. The equivalent present value is $61 thousand to $638 thousand.
- Potential First Tier Review, TBACT, and permitting costs for unidentified facilities emitting TAPs above a more stringent adopted de minimis value.

Likely benefits (primary estimates)

Current scientific inputs:

- Appropriate level of review for chemicals posing a threat to human health and the environment.
- Additional review and potential pre-planning of additional emissions controls for TAPs that are currently emitted.
- Potential additional pre-planned emissions controls resulting in reduced emissions of five TAPs that have established ties to increased cancer risk (various cancer types) and/or injury or impairments to the:
    - Endocrine system
    - Nervous system
    - Respiratory system
    - Cardiovascular system

Potential avoided First Tier Review costs for unidentified facilities emitting removed TAPs.

Recalculated ASILs:

- Annual avoided costs of up to $921 thousand at 18 facilities that may avoid Second Tier Review. The equivalent present value is $15.7 million over 20 years.
- Alternative estimate of the above present value benefit, of up to $7.8 million over 20 years (median estimate) in pre-planned emissions controls no longer needed to avoid Second Tier Review.

Recalculated SQERs:

- Annual avoided cost of $92 thousand for avoided emissions modeling across eight facilities. The equivalent present value is $1.6 million over 20 years.
- Potential cost savings of up to $3.6 million of 20 years for analysis of two TAPs for which averaging periods change.

Recalculated de minimis emission values:

- Potential avoided costs for unidentified facilities emitting TAPs for which adopted de minimis emissions values are less stringent.

Total quantifiable cost and benefit comparison – primary estimates

The table below summarizes quantifiable costs and benefits, assuming no facilities choose to pre-plan additional emissions controls.

Total quantifiable costs -- primary estimates

Costs and Benefits	Present Value*	Total 20-Year Present Value
De minimis-related costs	$349,790	
SQER-related costs	$6,466,569	Cost
ASIL-related costs	$8,194,551	$15,010,911
SQER-related benefits	$1,567,653	Benefit
ASIL-related benefits	$15,676,532	$17,244,185
	Net cost	-$2,233,274

* Median estimate if range was estimated.

Total quantifiable cost and benefit comparison – alternative estimates

The table below summarizes quantifiable costs and benefits, assuming facilities always choose to alter operations or pre-plan additional emissions controls when they discover they are potentially exceeding a SQER or ASIL for at least one TAP (when possible to reduce costs under the baseline or the amendments). Alternative costs are presented at the median.

Total quantifiable costs -- alternative estimates

Costs	Present Value	Total Present Value
De minimis-related costs	$349,790	
SQER-related costs	$3,233,285	Cost
ASIL-related costs	$4,097,275	$7,680,351
SQER-related benefits	$1,567,653	Benefit
ASIL-related benefits	$7,838,266	$9,405,919
-	Net quantifiable cost	-$1,725,569

Qualitative and comparative costs and benefits

We note there are also qualitatively discussed potential impacts for facilities not reflected in our data because all their TAP emissions are below SQERs:

- Costs:
    - First Tier Review, permitting, and facility-specific TBACT costs, if emissions exceed an adopted de minimis level.

    - Second Tier Review costs and fees, if emissions exceed an adopted SQER.
- Benefits:
    - Avoided First Tier Review, permitting, and facility-specific TBACT costs, if emissions no longer exceed an adopted de minimis level.

There are also qualitatively discussed benefits in the form of appropriate screening of all TAPs based on current scientific evidence, as well as potential increases in the level of pre-planned emissions controls to keep emissions below SQERs or ASILs. These translate to a general improvement in the rule's protectiveness of public health, as well as specific potential improvements to protectiveness regarding TAPs for which additional emissions controls may be pre-planned. See section 4.2.5 for more discussion.

While we could not confidently estimate the impacts the amendments will have on health risk, we identified potential health endpoints related to TAPs that were emitted in our data at levels that exceed the amended SQER, but not the baseline SQER. These TAPs include various carcinogens and neurological toxicants (see section 4.2.5). Comparing the value of a statistical life ($9.4 million, the equivalent value of mortality risk reductions that add to 100 percent)[1] to the highest net costs in the alternative cost estimate (assuming pre-planned emissions control costs are 10 percent of Second Tier Review costs) above, the $91 thousand 20-year net cost in the median alternative estimates would be balanced by a mortality risk reduction equivalent to one percent of a life.

These comparative values do not account for other costs and value losses associated with illness (whether or not it results in death), including:

- Emergency and ongoing health care expenses
- Income loss
- Indirect impacts to family

Conclusion

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

Least-burdensome alternative

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

[1] Using EPA value of a statistical life (VSL) of $7.4 million (2006-dollars), updated to 2019-dollars using the US Bureau of Labor Statistics Consumer Price Index measure of inflation. The updated VSL is $9.4 million.

Small business impact

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

The amendments are not likely to have a significant net impact on prices, sales, or jobs over 20 years. This holds for the state economy as well as industries likely to incur the highest costs or receive the highest payments.

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Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology (Ecology) as required under Chapters 34.05 and 19.85 RCW, for the amendments to the Controls for New Sources of Toxic Air Pollutants rule (Chapter 173-460 WAC; the "rule"). This includes the:

- Preliminary 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 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.

1.1.1 Rulemaking purpose

This rulemaking seeks to update the rule so it continues to reflect the most current scientific findings regarding TAPs and health effects.

The rule uses screening values to systematically address increases in TAP emissions by ensuring use of appropriate controls, and by ensuring the health impacts posed by a new or modified facility will be minimal. It also includes regulatory values that limit emissions of TAPs.

- De minimis emission values: De minimis emission values determine whether a facility must use TBACT and undergo First Tier Review.
- SQERs: SQER values determine the degree of emissions modeling a new or modified TAP source must perform when it is seeking a permit.

- ASILs: ASILs are concentrations of a TAP in ambient air at or below which a project's impacts may be permitted without the need to submit a site-specific health impact assessment. These levels are set with the intent of protecting human health and safety. New or modified facilities must meet these levels using initially planned or additional emissions control measures.

1.2 Permitting new sources of air pollution

To protect air quality in the state, Washington law requires permitting of sources of criteria pollutants, and new sources of TAPs. Criteria pollutants are pollutants for which EPA has set a National Ambient Air Quality Standard to protect human health and welfare. TAPs are airborne chemicals that are hazardous to human health and cause a wide variety of illnesses.

Washington State has been regulating new sources of these TAPs since 1991 through the permitting process. Ecology last updated the rule in 2009 to reflect scientific knowledge current at that time. Ecology, or the local air agency with jurisdiction, may require a proposed facility (either new or modified) to get an air quality permit before starting construction.

Ecology, or the air agency with jurisdiction, is responsible for reviewing the pre-construction application that a facility must submit when they want to install a new facility or modify an existing facility.[2] The application must include a detailed description of the project. The description must include:

- Process equipment information.
- Type and amount of air contaminants emitted by the project.
- Air pollution control practices.
- Air pollution control equipment.

Some types of emission units and activities, such as single-family residences or installation or modification of a single laboratory fume hood, are exempt from permitting under WAC 173-400-110(4). Additionally, facilities emitting less than specific emission thresholds of and criteria pollutants and TAPs are exempt under WAC 173-400-100(5). This rule exempts a project with all TAP emissions below de minimis emission values from review; however, the project may be subject to permitting requirements from other emissions.

If a proposed new activity or unit (i.e., new source) at a facility is not categorically exempt, then the facility must quantify the increase in emissions. If the increased emission rate of any TAP exceeds the de minimis emission rate in WAC 173-460-150, the unit or activity must use TBACT and the ambient impacts must be evaluated by the permitting authority as part of a tiered review process.

[2] The permitting process in Washington does not consider existing emissions from a business. The permit review is limited to new emissions from a modification or all of the emissions if the facility is new.

1.2.1 Three tiers of toxic air permitting

When a facility applies for a permit to install a new source or modify an existing source of TAPs, there are three review tiers:

- Toxic screening (First Tier Review).
- Health impacts assessment (Second Tier Review).
- Risk management decision (Third Tier Review).

1.2.2 First Tier Review

WAC 173-460-080 requires all facilities to undergo a First Tier Review toxic screening analysis if the project under review emits more than de minimis levels of any TAP. There are two ways to perform a First Tier Review analysis:

1. Determine if adopted TAP emissions are below the relevant SQERs. A project may use simplified modeling such as AERSCREEN to document its emissions. If yes, then no further analysis is required.
2. Determine if adopted TAP emissions are greater than the relevant SQER. If yes, a facility must model those emissions using more complex dispersion modeling (AERMOD), and compare the resulting ambient concentration to the appropriate ASIL.
    i. If the ambient concentration of a TAP is below the relevant ASIL, then no further analysis is required.
    ii. If the ambient concentration of a TAP is above the relevant ASIL, the permit moves to Second Tier Review.

1.2.3 Second Tier Review

A Second Tier Review (WAC 173-460-090) is a site-specific health impacts assessment of the emissions resulting from a proposed project. The objective of a Second Tier Review is to quantify:

- The increase in lifetime cancer risk for people exposed to the increased concentration of any carcinogenic TAP.
- The increased health hazard from any non-carcinogenic TAP in ambient air.

Once quantified, we compare the cancer risk to the maximum risk allowed by a Second Tier Review (one in one hundred thousand).

1.2.4 Third Tier review

If the emissions of a carcinogenic TAP result in a cancer risk of greater than one in one hundred thousand, or Ecology determines the non-cancer hazard is not acceptable then an applicant may ask Ecology to perform a third tier review. A third tier review is a risk management decision made by the director of Ecology. In making this decision, the director considers:

- The greater environmental benefit that the project provides the state of Washington
- Other measures an applicant may propose to reduce exposure to TAPs in the community.

The applicant must also participate in a public meeting and hearing that discusses the impacts on the community.

Two permit applications have gone through third tier review to date.

1.2.5 Second Tier Review processing requirements

When the permitting agency with jurisdiction – either a local air agency or Ecology – determines that modeled TAP emissions for a proposed project exceed the corresponding ASIL, the permitting agency cannot issue a pre-construction permit until after Ecology reviews the health impacts assessment and determines that the facility has met the approvability criteria under Second Tier Review.

Ecology evaluates a project's Second Tier Review only if:

- The permitting agency has advised us that the applicant has met other conditions for processing the permit application.
- Emission controls in the conditional permit represent at least TBACT.
- Ambient concentrations exceed ASILs after using more refined emission quantification and air dispersion modeling techniques.
- A health impact assessment is included in the petition. Otherwise, the permit application may not move forward.

1.2.6 Pre-planning new source controls

Ecology has found that many permit applicants appear to pre-plan emissions control technology in such a way that they will avoid Second Tier Review. They do this by having emissions levels below ASIL values. This manifests itself as planned controls in excess of expected TBACT. Alternatively, facilities may adjust their operations to keep emissions below ASIL values.

The TBACT is the minimum emissions control technology that a permitting authority will expect a facility to install. The application establishes all expected and modeled emissions levels for TAPs, including at least TBACT emissions controls. While Ecology and local air agencies do not track this behavior, permit writers have observed this as a common practice.

1.3 Summary of the adopted amendments

The amendments make the following changes:

- Update the TAP list.
- Recalculate:
  - De minimis emission values.
  - SQERs.
  - ASILs.
- Specify the number of significant digits of emissions rates (i.e., de minimis and SQERs) and concentrations (i.e., ASILs).
- Update language in the rule to use the acronym "TAP" instead of toxic air pollutant.

1.4 Reasons for the amendments

The main reasons for the rule amendments are to:

- Align the rule with current scientific information about chemicals, including adjusting for the impacts of early life exposure to a chemical.
- Remove ammonium sulfate as a toxic air pollutant based on our toxicity review in response to a rulemaking petition on this chemical from the Far West Agribusiness Association.
- Improve clarity.
- Remove redundancy.

The "Decision Making Documentation: Updating Chapter 173-460 WAC" provides the decisions and reasons supporting the adoption for the following topics:[3]

- Updating the list (add or subtract chemicals): retained 387 TAPs, removed 8 TAPs, and added 45 TAPs
- Chemicals considered but not added to the TAP list: seven (acetone, fuel oil. no 2, kerosene and 4 kerosene-based jet fuels).
- Evaluation of ammonium sulfate: removed.
- Recalculation of ASILs: updated.
- Evaluation of excluding criteria pollutants as TAPs: retained as TAPs.
- Evaluation of the use of early life adjustment factors: included so adjusted appropriate ASILs.
- Review of the existing ASIL for diethyl and methyl mercury: revised.
- Evaluation of ASILs for groups of chemicals (toxicity equivalency): no adjustments
- Revision of the small quantity emission rate modeling parameters: updated modeling parameters.
- Recalculation of the small quantity emission rates: recalculated using AERSCREEN model and new modeling parameters.
- Recalculation of de minimis emission values: updated using existing methodology (SQER/20).

Updating the rule to support the rule changes: aligned rule to require two significant digits for emission rates and concentrations.

1.5 Document organization

We organized the remainder of this document in the following chapters:

[3] Ecology. Decision Making Documentation: Updating Chapter 173-460 WAC. June 2019.

- Baseline and amendments (Chapter 2): Description and comparison of the baseline (what would occur in the absence of the amendments) and the adopted changes to requirements.
- Likely costs of the amendments (Chapter 3): Analysis of the types and sizes of costs we expect impacted entities to incur because of the amendments.
- Likely benefits of the amendments (Chapter 4): Analysis of the types and size of benefits we expect to result from the amendments.
- Cost-benefit comparison and conclusions (Chapter 5): Discussion of the complete implications of the CBA.
- Least-Burdensome Alternative Analysis (Chapter 6): Analysis of considered alternatives to the contents of the amendments.
- Regulatory Fairness Act Compliance (Chapter 7, when applicable): 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 Amendments

2.1 Introduction

We analyzed the impacts of the adopted amendments relative to the baseline of the existing rule, within the context of all existing requirements (federal and state laws and rules). We call this context for comparison the baseline. The baseline reflects the most likely regulatory circumstances that entities would face if we did not amend the rule. We discuss it more in Section 2.2, below.

2.2 Baseline

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

For this rulemaking, the baseline includes:

- The existing rule, chapter 173-460 WAC, Controls for New Sources of Toxic Air Pollutants
- The authorizing statute, chapter 70.94 RCW, Washington Clean Air Act

2.3 Amendments

The amendments:

- Update the TAP list.
- Recalculate:
  - De minimis emission values.
  - SQERs.
  - ASILs.
- Specify the number of significant digits of emissions rates (i.e., de minimis and SQERs) and concentrations (i.e., ASILs).
- Update language in the rule to use the acronym "TAP" instead of toxic air pollutant.

2.3.1 Update the TAPs list

Baseline

The baseline rule contains 395 TAPs.

Adopted

The amendments remove and add chemicals to the list of TAPs.

Removing chemicals from the TAP list

The table below lists TAPs we are removing from the baseline TAP list. We are basing these amendments on the:

- Lack of sufficient scientific data to retain the chemical on the list.
- Chemical being redundant with other chemicals or chemical groups on the list.

Table 1: Chemicals removed from the baseline TAP list

Chemical Common Name	CAS[4]
5-Nitro-o-anisidine	99-59-2
Ammonium sulfate	7783-20-2
Chromic acid	11115-74-5
Chromium hexavalent: soluble, except chromic trioxide	---
Dibromochloromethane	124-48-1
Melphalan hydrochloride	3223-07-2
Pentabromodiphenyl ether	32534-81-9
Tetrabromodiphenyl ether	40088-47-9

Adding chemicals to the TAP list

The table below lists chemicals we are adding to the baseline TAP list. We are basing these amendments on current scientific information sufficient to identify the chemical as a TAP. We then set an appropriate ASIL, SQER, and de minimis emission value for it.

Table 2: Chemicals added to the TAP list

Chemical Common Name	CAS[5]
1,2,3-Trimethylbenzene	526-73-8
1,2,4-Trimethylbenzene	95-63-6
1,3,5-Trimethylbenzene	108-67-8
1-Bromopropane	106-94-5
2,3-Dichloropropene	78-88-6
2-Hexanone	591-78-6
Boron & compounds, NOS	----
Bromobenzene	108-86-1
Caprolactam	105-60-2
Carbonyl sulfide	463-58-1
Cerium oxide	1306-38-3
Chloroprene	126-99-8
Chromium(III), insoluble particulates, NOS	----
Chromium(III), soluble particulates, NOS	----
Cresols (mixture), including m-cresol, o-cresol, p-cresol	1319-77-3
Guthion (azinphos-methyl)	86-50-0
Lead phosphate	7446-27-7
Libby amphibole asbestos and amphiboles, NOS (fibers/cubic centimeter)	----
Malathion	121-75-5
Nickel & compounds	----
Nickel acetate	373-02-4
Nickel carbonate	3333-67-3
Nickel carbonate hydroxide	12607-70-4
Nickel carbonyl	13463-39-3
Nickel chloride	7718-54-9
Nickel hydroxide	12054-48-7
Nickel nitrate hexahydrate	13478-00-7

[4] The Chemical Abstracts Service Registry Number (CAS) is a unique identifier for each chemical.

[5] Ibid.

Chemical Common Name	CAS[5]
Nickel oxide (nickel monoxide, nickel(II) oxide)	1313-99-1
Nickel oxide black (nickel sesquioxide, nickel(III) oxide)	1314-06-3
Nickel sulfate	7786-81-4
Nickel sulfate hexahydrate	10101-97-0
Nickel sulfide	11113-75-0
Nickelocene	1271-28-9
Nitrobenzene	98-95-3
Oleum	8014-95-7
Parathion	56-38-2
Phosphorus, white	12185-10-3
Polybrominated diphenyl ethers (PBDEs) [containing less than 10 bromine atoms]	----
Propionaldehyde	123-38-6
Sulfur trioxide	7446-71-9
Tertiary-butyl acetate	540-88-5
Tetrahydrofuran	109-99-9
Uranium, insoluble compounds	----
Uranium, soluble salts	----
Xylene (mixture), including m-xylene, o-xylene, p-xylene	1330-20-7

The amendments also add six types of asbestos to the TAP list (Actinolite, Amosite, Anthophylite, Chrysotile, Crocidolite, and Tremolite), with de minimis emissions levels, SQERs, and ASILs identical to those of the general listing for "Asbestos (fibers/cubic centimeter)." This change is intended to reduce confusion about the coverage of the existing asbestos group listing.

Expected impact

Removing chemicals from the TAP list

New or modified facilities emitting four of the chemicals we are removing from the TAP list will potentially be required to do less modeling or health impact analysis as part of permit application if their emissions exceed the baseline SQER. If emissions of these chemicals exceed baseline ASILs, they could be able to reduce the amount of pre-planned emissions controls:

- 5-Nitro-o-anisidine
- Ammonium sulfate
- Dibromochloromethane
- Melphalan hydrochloride

New or modified facilities emitting these five chemicals will notice no change because emissions from those chemicals are subject to another TAP:

- Chromic acid
- Chromium hexavalent: soluble, except chromic trioxide
- Pentabromodiphenyl ether
- Tetrabromodiphenyl ether

If a permitting agency permits a facility under the baseline and they exceed only the baseline de minimis levels for removed TAPs, the facility could become exempt from permitting (all TAP emissions below de minimis).

Adding new chemicals to the TAP list

New or modified facilities emitting the chemicals we are adding to the as TAPs will potentially be required to do additional modeling or health impact analysis as part of a permit application. This occurs if their emissions of those chemicals exceed adopted de minimis emission values or SQERs. If emissions of these chemicals exceed adopted ASILs, they will need to pre-plan additional emissions controls or submit a health impact assessment under Second Tier Review.

If the baseline does not require facilities to do additional analysis (because they do not emit baseline TAPs in excess of de minimis levels), they will need to do additional analysis if they emit an adopted new TAP in excess of the de minimis level.

The public also benefits from added protection from the new TAPs. They are based on up-to-date scientific values and better reflect their true toxicity.

2.3.2 Recalculate de minimis emission values

Baseline

The baseline rule includes de minimis emission values for 395 TAPs. New or modified facilities emitting below these levels are not subject to additional emissions analysis (First Tier Review).

Adopted

The amendments modify de minimis emission values for 434 TAPs (including the new and removed TAPs; see section 2.3.1). 0.5 percent of de minimis values increase (become less stringent), while 99.5 percent decrease (become more stringent).

We note that one percent of de minimis levels change the number of significant figures to which facilities report and compare emissions in a permit application. While rounding to the appropriate number of significant figures can numerically change the de minimis level, facilities round reported emissions in the same way. The comparison between de minimis levels and reported emissions is therefore unchanged.

Expected impact

Increasing de minimis values will result in reduced emissions analysis and review for these TAPs if they emit them. If these were the only TAPs they emit, they will not need the First Tier Review at all.

Decreasing de minimis values will result in more emissions analysis and review for those TAPs if they emit them. If these were the only TAPs they emit, they will need the First Tier Review that they would not need under the baseline.

Decreasing de minimis values also better protects the public. We base them on up-to-date scientific values that better reflect their true toxicity. This indicates the baseline under-protects public health compared to the amendments.

2.3.3 Recalculate small quantity emission rates

Baseline

The baseline rule includes SQERs for 395 TAPs. New or modified facilities emitting above these levels are subject to more complex dispersion modeling or additional analysis when emissions exceed ASILs (Second Tier Review).

Adopted

The amendments modify SQERs for 438 TAP (including the new and removed TAPs; see section 2.3.1). About 0.5 percent of SQERs increase (become less stringent), while 99.5 percent decrease (become more stringent).

Expected impact

SQERs increasing could result in facilities needing less emissions modeling for these TAPs, if they emit them. For TAPs with lower or new SQERs under the amendments, this could result in a larger number of TAPs for which additional emissions modeling is required (or operational changes to reduce emissions below the SQER).

The public also benefits from added protection from the TAPs with decreasing SQERs. We base them on up-to-date scientific values that better reflect current dispersion modeling techniques. This indicates the baseline may in some cases under-protect public health compared to the amendments.

2.3.4 Recalculate acceptable source impact levels

Baseline

The baseline rule includes ASILs for 395 TAPs. New or modified facilities may not emit above these levels, and so pre-plan additional emissions controls.

Adopted

The amendments modify ASILs for 156 TAPs (including new and removed TAPs; see section 2.3.1). About 25 percent of ASILs increase (become less stringent), and nine percent decrease (become more stringent). ASILs for 66 percent of TAPs will not change under the amendments.

Expected impact

Higher ASILs could result in facilities not needing to pre-plan as many emissions controls (plan for emissions controls or other measures) as under the baseline. Lower ASILs could mean they incur Second Tier Review costs, or need to pre-plan for additional controls, if they emit the TAPs for which ASILs change under the amendments.

The public also benefits from added protection from the TAPs with decreasing ASILs. We base them on up-to-date scientific values that better reflect current understanding of

toxicity, instead of the information supporting their baseline SQERs. This indicates the baseline under-protects (25 percent of TAPs) or over-protects (nine percent of TAPs) public health compared to the amendments.

2.3.5 Specify the number of significant digits

Baseline

The existing rule varies in the number of significant digits used for emissions rates and concentrations.

Adopted

The amendments round all values to two significant digits.

Expected impact

We do not expect this amendment to result in costs or benefits other than clarity. Since values are rounded, this amendment will not change exceedances of de minimis emission values, SQERs, or ASILs.

2.3.6 Use “TAP” acronym

Baseline

We use the term “toxic air pollutant” throughout the existing rule.

Adopted

We replace the term “toxic air pollutant” with “TAP.”

Expected impact

We do not expect this amendment to result in costs or benefits other than clarity through conciseness.

Chapter 3: Likely Costs of the Amendments

3.1 Introduction

We estimated the likely costs associated with the adopted amendments, as compared to the baseline. Chapter 2 of this document discusses the amendments and the baseline.

3.2 Cost analysis

The amendments make the following changes:

- Update the list of TAPs.
- Recalculate:
  - De minimis emission values.
  - SQERs.
  - ASILs.
- Specify the number of significant digits of emissions rates (i.e., de minimis and SQERs) and concentrations (i.e., ASILs).
- Update language in the rule to use the acronym "TAP" instead of toxic air pollutant.

3.2.1 Update the list of toxic air pollutants

Adding chemicals to the toxic air pollutants list

New or modified facilities emitting the chemicals we are adding as TAPs will potentially be required to do additional modeling or health impact analysis as part of permit application, if their emissions of those chemicals exceed the SQER. If emissions these chemicals exceed adopted ASILs, they will need to pre-plan additional emissions controls, or submit a Second Tier Review petition if emissions reductions are infeasible.

We examined emissions data for 373 pre-construction permits likely to include TAP emissions, issued by 11 permitting agencies and Ecology in 2018.[6] In the case of all but one permitting agency providing emissions data, TAP data was often limited to baseline TAPs for which emissions exceeded the SQER. This means we could not comprehensively identify whether facilities included in the data emitted the TAPs added under the amendments.

Within the available comprehensive TAP emissions data, however, we could identify that:

- Two facilities emit a new TAP.
- No facilities emitted new TAP in excess of the adopted de minimis level.

[6] Data included at least facility names from: Ecology's Central Regional Office, Industrial Section, Nuclear Waste Program, and Eastern Regional Office; Olympic Region Clean Air Agency; Yakima Clean Air Agency; Southwest Clean Air Agency; Puget Sound Clean Air Agency; Benton County Clean Air Agency; and Northwest Clean Air Agency. Comprehensive data was gleaned from pre-construction applications and permits.

Facilities not reflected in our data – de minimis levels

If there are facilities not reflected in our data that exceed only the de minimis level for a new TAP, they fall into one of two categories:

Category 1

The facility is not subject to permitting under the baseline (does not emit any TAPs in excess of a baseline de minimis level). These facilities will become subject to permitting, and incur costs of installing TBACT. This cost will be specific to the facility and the relevant TAPs exceeding the de minimis level. They will also incur the full costs of First Tier Review.

First Tier Review costs

First Tier Review may be completed by the permitting air agencies, private consultants, or by in-house environmental engineers at applicant facilities and typically consist of an engineering review and simple modeling using AERSCREEN. These analyses typically take less than one-half week with costs varying between $720 and $7,500. Variations in costs depend largely on the amount, type, and number of TAPs emitted, availability of emissions data for the emissions source, and the location of the facility. In many cases, entities conduct First Tier Review on preconstruction applications that cover well-known machines and/or process emissions, which may have peer-reviewed or EPA-issued emissions values. When emissions data are not available, First Tier Review will require more advanced modeling, which will significantly increase the time and cost involved.

Permitting agencies complete the majority of First Tier Reviews, especially in the case of smaller facilities. Costs may vary between $720 and $3,500 for six to twenty-two hours of work and fees charged by different regional air agencies vary in amount and structure. Private consultants may complete reviews for larger facilities or complex projects. Our survey of private consultants that have recently completed First Tier Reviews found a cost range between $1,200 and $7,500 and will most often take less than one-half week to complete. Costs related to First Tier Reviews completed by in-house engineers will depend largely on the facilities staff salary rates, but we assume that the time spent preparing the analysis will be similar to that of permitting agencies or private consultants.[7]

Category 2

The facility exceeds at least one baseline de minimis level, but is not included in our dataset because of data limitations (i.e., most data reflects TAPs emitted in excess of a SQER). These facilities are already subject to First Tier Review under the baseline, and will only incur new costs for each new TAP emitted in excess of the de minimis level.

[7] These estimates are based on March-April 2019 conversations with staff from permitting air agencies and environmental consultants who recently completed analyses required for First Tier Review of pre-construction permits.

Facilities not reflected in our data – SQERs
If there are facilities not reflected in our data that exceed the SQER for a new TAP, they fall into one of two categories:

Category 1
The facility is not subject to permitting under the baseline (i.e., does not emit any TAPs in excess of a baseline de minimis level). These facilities will become subject to permitting, and incur the costs of First Tier Review and TBACT (see discussion above). Because they also exceed the adopted SQER for a new TAP, they will need to use AERSCREEN or AERMOD to estimate their ambient impacts. If they are unable to demonstrate ambient impacts below an ASIL, these facilities become subject to Second Tier Review.

Second Tier Review costs
We estimate that typical costs for consultant to draft a Second Tier Review range between $10 thousand and $50 thousand. Ecology's fee starts at $10 thousand. These fees vary depending on the complexity of the review, and may add between four and six months of work to a project.[8] Complexity varies by:

- The number of TAPs emitted.
- The number sources at a facility.
- The location and surrounding terrain of the facility site.
- Whether modeling is required for the site.

Rough estimates suggest that a project's cost may increase by $5 thousand for each additional TAP reviewed.[9] Facilities located in dense urban areas, or near varying terrain (mountains, valleys, etc.), will also require additional modeling related to the dispersion of emitted TAPs. Facilities may be able to reduce costs by reusing recent modeling, if relevant to the project. Additionally, review costs may increase for facilities that emit carcinogens and those located near vulnerable communities and/or habitat.

Facilities may also pre-plan additional emissions controls or accept conditions and/or emissions limit to avoid Second Tier Review. While this action varies according to the specific attributes of a facility, they are likely to undertake it if the costs are less than the costs of Second Tier Review.

Category 2
The facility exceeds at least one baseline de minimis level, but is not reflected in our data because they do not exceed any SQERs (varies by permitting agency). These facilities are already subject to First Tier Review, but could become subject to Second Tier Review under the amendments if they cannot demonstrate an ambient impact

[8] These estimates are based on March-April 2019 conversations with environmental consultants who recently completed analyses required for Second Tier Review of pre-construction permits.
[9] Ibid.

below the ASIL through site-specific dispersion modeling. They will incur the costs of Second Tier Review (see discussion above).

Facilities may also pre-plan additional emissions controls or accept conditions and/or emissions limit to avoid Second Tier Review. While this action varies according to the specific attributes of a facility, they are likely to undertake it if the costs are less than the costs of Second Tier Review.

3.2.2 Recalculate de minimis emission values

Decreasing de minimis values (becoming more stringent) for TAPs will result in facilities needing more emissions analysis and review for those TAPs, if they emit them.

We examined emissions data for 373 pre-construction permits issued by 11 permitting air agencies in 2018.[10] The data included TAP emissions rates for 237 facilities. However, we could not convert across averaging periods based on the data available so we limited the data used for this analysis to reported emissions data for the same averaging period as the baseline and adopted amendments. We based our analysis on the resulting 162 facility-TAP data points with emissions rates reported for matching averaging periods.

We then compared the emissions rates for each facility and TAP to the baseline de minimis and adopted de minimis. We identified cases for which facilities would not exceed the baseline de minimis, but will under the amendments.

For de minimis values that decrease (become more stringent) 22 facilities will exceed at least one additional de minimis value under the amendments. The average number of additional TAPs for which a facility exceeded the de minimis was 1.5. As available data reflects 43 percent of statewide pre-construction permits involving TAPs, we estimate that each year about 51 facilities will incur additional First Tier Review costs. This amounts to 73 additional TAPs. These costs are likely to be a minor component of overall First Tier Review costs for those facilities already subject to First Tier Review under the baseline.

The amendments also change the averaging period for acetonitrile. We could not use available data to create a comparable emissions rate for both the baseline and the amendments. We observe, however, that three facilities in our dataset emit acetonitrile. If they do not emit acetonitrile in excess of the baseline de minimis, but do under the amendments, facilities will need to include it as part of their First Tier Review. As available data reflects about 43 percent of statewide pre-construction permits involve TAPs, we estimate about seven facilities statewide will emit acetonitrile.

There were five facilities identified in our data as not needing First Tier Review under the baseline, but needing it under the amendments. We note again that our data was often limited to TAPs emitted in excess of the baseline SQER, so it is possible that there are facilities that do not emit any TAPs in excess of the baseline de minimis (i.e., they are not

[10] Ibid.

subject to toxics review), but will exceed the adopted de minimis level. In this case, they will incur the additional costs of First Tier Review.

First Tier Review costs

First Tier Reviews may be completed by permitting air agencies, private consultants, or by in-house environmental engineers at applicant facilities and typically consist of an engineering review and simple modeling using AERSCREEN. These analyses typically take less than one-half week with costs varying between $720 and $7,500. Variations in costs depend largely on the amount, type, and number of TAPs emitted, availability of emissions data for the facility, and the location of the facility. In many cases, permitting agencies conduct First Tier Reviews on permit applications that cover well-known machines and/or process emissions, which may have peer-reviewed or EPA-issued emissions values. When emissions data are not available, First Tier Reviews require more advanced modeling, which will significantly increase the time and cost involved.

Permitting air agencies complete the majority of First Tier Reviews, especially for smaller facilities. Costs may vary between $720 and $3,500 for six to twenty-two hours of work and fees charged by different permitting agencies vary in amount and structure. Private consultants may complete reviews for larger facilities or complex projects. Our survey of private consultants that have recently completed First Tier Reviews found a cost range between $1,200 and $7,500 and will most often take less than one-half week to complete. Costs related to First Tier Reviews completed by in-house engineers will depend largely on the facilities staff salary rates, but we assume that the time spent preparing the analysis will be similar to that of permitting agencies or private consultants.[11]

We estimate the total quantifiable annual cost resulting from recalculation of de minimis levels to be the product of the number of additional facilities needing First Tier Review, and the cost of First Tier Review. Facilities will likely incur additional First Tier Review costs for:

- Four TAPs (across five facilities) for which adopted de minimis emission levels decrease (become more stringent)
- Facilities not subject to First Tier Review under the baseline.

The total cost of First Tier Reviews for these five facilities will be between $4 thousand and $38 thousand. For rulemaking analyses, we estimate costs and benefits in equivalent 20-year present values. This is to estimate comparable costs and benefits when they may occur at different times. We calculate present values using a risk-free real rate of return, currently estimated to be 1.03 percent.[12] The equivalent 20-year present value cost is between $61 thousand and $638 thousand.

[11] These estimates are based on March-April 2019 conversations with staff from permitting air agencies and environmental consultants who recently completed analyses required for First Tier Review of pre-construction permits.

[12] US Treasury Department (2019). Historic rates of return on I Bonds, 1998 to present.

There will also likely be incremental First Tier Review costs per additional TAP exceeding a de minimis level. Facilities will likely incur minor additional per-TAP First Tier Review costs for:

- Seventy-three TAPs (across 51 facilities) for which adopted de minimis emission levels decrease (become more stringent), and facilities are already subject to First Tier Review.
- Acetonitrile emitted by up to seven facilities.

3.2.3 Recalculate small quantity emission rates

SQERs decreasing (becoming more stringent) under the amendments could result in a larger number of TAPs for which additional modeling is required.

We examined emissions data for 373 pre-construction permits issued by 11 permitting air agencies in 2018.[13] The data included TAP emissions rates for 237 facilities. However, we could not convert across averaging periods based on the data available, so we limited the data used for this analysis to emissions data reported for the same averaging period as the baseline and the amendments. We based our analysis on the resulting 162 facility-TAP data points with emissions rates reported for matching averaging periods.

We then compared the emissions rates for each facility and TAP to the baseline SQER and adopted SQER. We identified cases for which facilities would not exceed the baseline SQER, but will exceed the adopted SQER. For SQERs that decrease (become more stringent) 23 facilities will exceed at least one additional SQER under the amendments. The average number of TAPs for which a facility exceeded an additional SQER was 1.4. As available data reflects 43 percent of statewide pre-construction permits involving TAPs, we estimate that each year about 53 total facilities will incur additional emissions modeling costs. This amounts to 76 additional TAPs.

The amendments also change the averaging period for acetonitrile. We could not use available data to create a comparable emissions rate for both the baseline and the amendments. We observe, however, that three facilities in our dataset emit acetonitrile. If they do not emit acetonitrile in excess of the baseline SQER, but will under the amendments, they will need to include it as part of their modeled emissions. As the available data reflects about 43 percent of statewide pre-construction permits involving TAPs, we estimate about seven facilities statewide will emit acetonitrile.

There were no facilities identified in our data as not needing any advanced emissions modeling for TAPs under the baseline, but needing it under the amendments.

Additional modeling costs

[13] These estimates are based on March-April 2019 conversations with staff from permitting air agencies and environmental consultants who recently completed analyses required for First Tier Review of pre-construction permits.

We estimate that typical costs related to emissions modeling begin at $10 thousand, for facilities not previously exceeding a SQER.[14] Rough estimates suggest that a project's cost may increase by $5 thousand for each additional TAP reviewed.[15]

We estimate the total annual cost resulting from recalculation of SQERs to be the product of the number of additional TAPs needing at least additional emissions modeling, and the incremental cost of $5 thousand per TAP.[16] Facilities will likely incur additional emissions modeling costs for:

- Seventy-six TAPs (across 53 facilities) for which adopted SQERs decrease (become more stringent).
- Acetonitrile emitted by up to seven facilities.

This total annual cost will be:

- $380 thousand for TAPs with more stringent adopted SQERs.
- Up to $35 thousand for acetonitrile.

For rulemaking analyses, we estimate costs and benefits in equivalent 20-year present values. This is to estimate comparable costs and benefits when they may occur at different times. We calculate present values using a risk-free real rate of return, currently estimated to be 1.03 percent.[17]

The present value of costs related to more stringent SQERs with comparable data is $6.5 million over 20 years. There are potentially extra costs of up to $3.6 million over 20 years for analysis of two TAPs for which averaging periods change under the amendments.

Note that these facilities undergo some advanced modeling for other TAPs under the baseline, so they will not incur additional fees.

Alternative SQER-related cost estimate

An alternative cost estimate for the cost of facilities potentially exceeding a SQER is the cost of avoiding additional modeling through operational changes or pre-planning additional emissions controls. For the broad range of industries, facilities, and sizes of facilities impacted by the amendments, however, we could not confidently define an independent range of these costs. This behavior is an option, and we expect that businesses will take advantage of this option if the costs were lower than the costs incurred for additional modeling.

[14] These estimates are based on March-April 2019 conversations with environmental consultants who recently completed analyses required for Second Tier Review of pre-construction permits.
[15] Ibid.
[16] We note that there are options available for emissions modeling, which can be accomplished using AERSCREEN or AERMOD methods. The AERSCREEN method is less expensive, and based on past experience, we believe it may be used on many small sources of TAPs at a lower incremental costs than used in our estimates.
[17] US Treasury Department (2019). Historic rates of return on I Bonds, 1998 to present.

We calculated changes in costs of compliance using a range of proportions, measuring the relative size of additional emissions control costs, using the additional modeling costs above. We ran cost impact calculations for 10, 25, 50, 75, and 90 percent of the cost of this additional emissions modeling. At the median, this will reduce high-end costs of avoiding additional modeling by reducing emissions below SQERs, to $190 thousand per year, or a present value of $3.2 million over 20 years.

We discuss the sensitivity analysis of the impacts of this alternative cost estimate in Chapter 5.

3.2.4 Recalculate acceptable source impact levels

Lower ASILs could mean facilities need to undergo Second Tier Review including health impact assessment, or to pre-plan for additional emissions controls, if they emit the TAPs for which ASILs decrease (become more stringent) under the amendments.

Modeled emissions for facilities are facility-specific, and modeled in units of micrograms (one-millionth of a gram) per cubic meter. Therefore, we could not compare emissions in our data to baseline or adopted ASILs. Even for those facilities exceeding additional SQERs, under the amendments (see previous section) we lack sufficient data and the ability to model emissions that we would compare to ASILs.

Based on the analysis described in the previous section, we identified 53 facilities that will exceed at least one additional SQER under the amendments. To deal with the uncertainty of whether modeled concentrations of TAPs that exceed the SQER will exceed the ASIL and require analysis of health impacts, we used two scenarios in cost calculations:

- Fifty-three facilities have TAP emissions that exceed the SQER, but modeled concentrations do not exceed ASILs so those facilities will incur minor modeling costs as estimated in section 3.2.3.
- Fifty-three facilities have TAP emissions that exceed the SQER and 18 percent (the percentage of decreasing ASILs for which SQER exceedances will increase) of modeled concentrations exceed the relevant ASIL, so they will incur additional costs from preparing a health impact assessment. This will result in a high-end estimate of approximately 9.6 facilities incurring high-end Second Tier Review costs of $50 thousand for complex analysis with health impact assessment for multiple TAPs, plus the $10 thousand fee.[18]

  This high-end assumption results in $481 thousand in annual costs. For rulemaking analyses, Ecology estimates costs and benefits in equivalent 20-year present values. This is to estimate comparable costs and benefits when they may occur at different times. We calculate present values using a risk-free real rate of

[18] These estimates are based on March 2019 conversations with environmental consultants who recently completed analyses required for Second Tier Review of pre-construction permits.

return, currently estimated to be 1.03 percent.[19] The present value of costs related to ASILs that are more stringent is $8.2 million over 20 years.

Note that these facilities undergo some Second Tier Review and modeling for other TAPs under the baseline, so they will not incur additional fees.

Alternative high-end cost estimate
An alternative cost estimate for the cost of facilities potentially exceeding an ASIL is the cost of avoiding Second Tier Review through pre-planning additional emissions controls. For the broad range of industries, facilities, and sizes of facilities impacted by the amendments, however, we could not confidently define an independent range of costs for the installation of additional emissions controls to avoid Second Tier Review. This behavior is an option, and we expect that businesses will take advantage of this option if the costs were lower than the costs incurred under Second Tier Review of the pre-construction permit.

We calculated changes in costs of compliance using a range of proportions, measuring the relative size of additional emissions control costs, using the high-end Second Tier Review costs above. Ecology ran cost impact calculations for 10, 25, 50, 75, and 90 percent of the cost of Second Tier Review. At the median, this will reduce high-end costs of avoiding Second Tier Review analysis to $241 thousand per year, or a present value of $4.1 million over 20 years.

We discuss the sensitivity analysis of the impacts of this alternative cost estimate in Chapter 5.

3.2.5 Specify the number of significant digits
We do not expect this amendment to result in costs, compared to the baseline. See Chapter 2 for discussion.

3.2.6 Use “TAP” acronym
We do not expect this amendment to result in costs, compared to the baseline. See Chapter 2 for discussion.

[19] US Treasury Department (2019). Historic rates of return on I Bonds, 1998 to present.

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Chapter 4: Likely Benefits of the Amendments

4.1 Introduction

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

4.2 Benefit analysis

The amendments make the following changes:

- Update the list of TAPs.
- Recalculate:
  - De minimis emission values.
  - SQERs.
  - ASILs.
- Specify the number of significant digits of emissions rates (i.e., de minimis and SQERs) and concentrations (i.e., ASILs).
- Update language in the rule to use the acronym "TAP" instead of toxic air pollutant.

4.2.1 Update the list of TAPs

Delisted TAPs

New or modified facilities emitting the chemicals removed from being TAPs will potentially be required to do less modeling or health impact analysis as part of permit application, if their emissions of a delisted TAP exceed the baseline SQER. If emissions of these chemicals exceed baseline ASILs, they could be able to avoid Second Tier Review or reduce pre-planned emissions controls.

We examined emissions data for 373 permits likely to include TAP emissions, issued by 11 permitting air agencies and Ecology in 2018.[20] In the case of all but one agency providing emissions data, TAP data was often limited to baseline TAPs for which emissions exceeded the SQER.

Three facilities in our data emitted at least one of the delisted TAPs. One emitted a single delisted TAP, while the other emitted two. None of the facilities emitted a TAP in excess of the baseline de minimis. This means there is no likely cost savings for these two facilities.

We note, however, that comprehensive data was not available for facilities emitting TAPs above the baseline de minimis but below the baseline SQER. Therefore, there may be facilities that avoid First Tier Review for some of the delisted TAPs.

[20] Data included at least facility names from: Ecology's Central Regional Office, Industrial Section, Nuclear Waste Program, and Eastern Regional Office; Olympic Region Clean Air Agency; Yakima Clean Air Agency; Southwest Clean Air Agency; Puget Sound Clean Air Agency; Benton County Clean Air Agency; and Northwest Clean Air Agency. Comprehensive data was gleaned from pre-construction applications and permits.

We did not identify any facilities that will entirely avoid first or Second Tier Review under the amendments. This is due to the number and variety of TAPs emitted by covered facilities.

Adding new chemicals to the TAP list
We are adding new chemicals to the TAP list based on current scientific data on their health impacts. Additional screening of emissions of these chemicals benefits the public by:

- Ensuring they receive the appropriate level of review.
- Requiring additional emissions controls in cases of emissions from initial designs posing a threat to public and environmental health.

We identified health and environmental impacts associated with exposure to the adopted new TAPs. Since appropriate review and protection of public health and the environment are benefits of newly listed TAPs as well as recalculations of de minimis values, SQERs, and ASILs, we discuss the health and environmental risks posed by some of the affected TAPs in detail in a single section of this document, section 4.2.5.

4.2.2 Recalculate de minimis emission values

Avoided First Tier Review costs
Increasing de minimis values (becoming less stringent) for TAPs could result in facilities needing less emissions analysis and review for these TAPs if they emit them.

We examined emissions data for 373 permits issued by 11 permitting air agencies in 2018.[21] The data included TAP emissions rates for 237 facilities. However, we could not convert across averaging periods based on the data available, so we limited the data used for this analysis to emissions data reported for the same averaging period as the baseline and amendments. We based our analysis on the resulting 162 facility-TAP data points with emissions rates reported for matching averaging periods.

We then compared the emissions rates for each facility and TAP to the baseline de minimis and adopted de minimis. We identified cases for which facilities exceed the baseline de minimis, but will not under the amendments. For de minimis values that increase (become less stringent), 15 facilities will exceed at least one less de minimis under the amendments. The average number of TAPs requiring less review was 1.2. As available data reflects 43 percent of statewide pre-construction permits involve TAPs, we estimate that each year about 35 total facilities will avoid First Tier Review costs. This amounts to 41 TAPs.

The amendments also change the averaging period for acetonitrile. We could not use available data to create a comparable emissions rate for both the baseline and the amendments. We observe, however, that three facilities in our dataset emit acetonitrile. If they emit acetonitrile in excess of the baseline de minimis, but do not under the

[21] Ibid.

amendments, facilities will no longer need to include it as part of their First Tier Review. As available data reflects about 43 percent of statewide pre-construction permits involve TAPs, we estimate about seven facilities statewide will emit acetonitrile.

There were no facilities identified in our data as needing First Tier Review under the baseline, but no longer needing it at all under the amendments. We note again that our data was often (though not entirely) limited to TAPs emitted in excess of the baseline SQER, so it is possible that there are facilities that emit TAPs in excess of the baseline de minimis, but will not exceed the adopted de minimis level. In this case, they will incur fewer First Tier Review costs.

We estimate the total annual benefit resulting from recalculation of de minimis levels to be the product of the number of additional TAPs no longer needing First Tier Review and the incremental cost per TAP. Facilities will likely experience reduced First Tier Review costs for:

- Forty-one TAPs (across 35 facilities) for which adopted de minimis emission values increase (become less stringent).
- Acetonitrile emitted by up to seven facilities.

We note that the facilities above are undergoing First Tier Review regardless of the amendments. The costs of First Tier Review (as compared to being exempt because all TAP emissions fall below the de minimis) are primarily application costs related to submitting all proposed emissions (including, but not limited to, TAPs). We did not identify any facilities that will incur this full cost under the amendments. The incremental cost of a TAP is difficult to separate from the overall cost of gathering and submitting this information, but is likely small compared to the overall effort of submitting a complete application for all emissions.

Public health protection

We based decreases in de minimis emission levels (greater stringency) on current scientific data on their health impacts. This means additional screening of emissions of these chemicals benefits the public by:

- Ensuring they receive the appropriate level of review.
- Requiring additional emissions controls in cases of emissions from initial designs posing a threat to public and environmental health.

We identified health and environmental impacts related to exposure to the new TAPs. Since appropriate review and protection of public health and the environment are benefits of new TAPs as well as recalculations of de minimis values, SQERs, and ASILs, we discuss the health and environmental risks posed by affected TAPs in detail in a single section of this document, section 4.2.5.

4.2.3 Recalculate small quantity emission rates

Avoided modeling costs

SQERs increasing for TAPs could result in facilities needing less extensive emissions modeling for these TAPs, if they emit them.

We examined emissions data for 373 pre-construction permits issued by 11 permitting air agencies in 2018.[22] The data included TAP emissions rates for 237 facilities. However, we could not convert across averaging periods based on the data available, so we limited the data used for this analysis to emissions data reported for the same averaging period as the baseline and the amendments. We based our analysis on the resulting 162 facility-TAP data points with emissions rates reported for matching averaging periods.

We then compared the emissions rates for each facility and TAP to the baseline SQER and adopted SQER. We identified cases for which facilities would exceed the baseline SQER, but will not exceed the adopted SQER. For SQERs that increase (become less stringent) eight facilities will exceed at least one less SQER under the amendments. The average number of TAPs for which a facility exceeded at least one less SQER was one. As available data reflects 43 percent of statewide pre-construction permits involving TAPs, we estimate that each year about eight facilities will incur fewer modeling costs. This amounts to eight TAPs.

The amendments also change the averaging period for acetonitrile. We could not use available data to create a comparable emissions rate for both the baseline and the amendments. We observe, however, that three facilities in our dataset emit acetonitrile. None of these facilities emits it in excess of the baseline SQER, so they will not benefit from reductions in the number of TAPs subject to additional modeling under the amendments.

There were no facilities identified in our data as needing additional modeling for TAPs that exceed the SQER under the baseline, but no longer needing it at all under the amendments.

We estimate that that a project's cost may increase by $5 thousand for each additional TAP analyzed. [23]

We estimate the total annual benefit resulting from recalculation of SQERs to be the product of the number of TAPs that will no longer need additional modeling, and the incremental cost of $5 thousand per TAP. Facilities will likely experience reduced modeling costs for:

- Eight TAPs (across eight facilities) for which adopted SQERs increase (become less stringent).

[22] Ibid.

[23] These estimates are based on March 2019 conversations with environmental consultants who recently completed analyses required for Second Tier Review of pre-construction permits.

This total annual benefit will be $92 thousand.

For rulemaking analyses, we estimate costs and benefits in equivalent 20-year present values. This is to estimate comparable costs and benefits when they may occur at different times. We calculated present values using a risk-free real rate of return, currently estimated to be 1.03 percent.[24]

The present value of avoided costs associated with less stringent SQERs with comparable data is $1.6 million over 20 years.

Public health protection
We based decreases in SQERs (greater stringency) on current scientific data on their health impacts. This means additional screening of emissions of these chemicals benefits the public by:

- Ensuring they receive the appropriate level of review.
- Requiring additional emissions controls in cases of emissions from initial designs posing a threat to public and environmental health.

We identified health and environmental impacts related to exposure to the new TAPs. Since appropriate review and protection of public health and the environment are benefits of new TAPs as well as recalculations of de minimis values, SQERs, and ASILs, we discuss the health and environmental risks posed by affected TAPs in detail in a single section of this document, section 4.2.5.

4.2.4 Recalculate acceptable source impact levels

Avoided emissions control costs
Higher ASILs could mean facilities do not need to pre-plan for as much additional emissions control, if they emit the TAPs for which ASILs increase (become less stringent) under the amendments.

Modeled emissions for facilities are facility-specific, and modeled in units of micrograms (one-millionth of a gram) per cubic meter. Therefore, we could not compare emissions in our data to baseline or adopted ASILs. Even for those facilities exceeding fewer SQERs under the amendments (see previous section), we lack sufficient data on, and the ability to model, emissions that would be compared to ASILs.

Based on the analysis described in the previous section, we identified 18 facilities that will exceed at least one less SQER under the amendments. To deal with the uncertainty of whether modeled concentrations of TAPs that will no longer exceed the SQER will have exceeded the ASIL and required analysis of health impacts, we used two scenarios in cost calculations:

[24] US Treasury Department (2019). Historic rates of return on I Bonds, 1998 to present.

- Eighteen facilities have TAP emissions that exceed the SQER, but modeled concentrations do not exceed ASILs. These facilities only avoid minor modeling costs as estimated in section 3.2.3.
- Eighteen facilities have TAP emissions that exceed the SQER, and 100 percent of associated ASILs increase under the amendments, so *up to* all modeled concentrations will have exceeded the relevant ASIL. In this scenario, between zero and eight facilities avoid $50 thousand in additional costs of health impact assessment with complex analysis for multiple TAPs.[25]

  This high-end assumption results in up to $921 thousand in avoided annual analysis costs. For rulemaking analyses, we estimate costs and benefits in equivalent 20-year present values. This is to estimate comparable costs and benefits when they may occur at different times. We calculated present values using a risk-free real rate of return, currently estimated to be 1.03 percent.[26] The present value of avoided costs associated with less stringent ASILs is $15.7 million over 20 years.

  Note that these facilities undergo some Second Tier Review and modeling, or pre-plan additional emissions controls, for other TAPs under the baseline, so they will not avoid additional fees through pre-planning.

  Alternative benefit estimate
  An alternative estimate for the avoided cost of facilities potentially exceeding an ASIL is the cost of avoiding Second Tier Review through pre-planning additional emissions controls. For the broad range of industries, facilities, and sizes of facilities impacted by the amendments, however, we could not confidently define an independent range of costs for the installation of additional emissions controls used under the baseline to avoid Second Tier Review. This behavior is an option, and we expect that businesses take advantage of this option if the cost is lower than the costs incurred under Second Tier Review of the pre-construction permit.

  We calculated changes in avoided costs of compliance using a range of proportions, measuring the relative size of additional emissions control costs. We ran benefit calculations for 10, 25, 50, 75, and 90 percent of the cost of Second Tier Review. At the median, this will reduce high-end benefits of avoiding Second Tier Review analysis to $460 thousand per year, or a present value of $7.8 million over 20 years.

  We discuss the sensitivity analysis of the impacts of this alternative cost estimate in Chapter 5.

[25] These estimates are based on March 2019 conversations with environmental consultants who recently completed analyses required for Second Tier Review of pre-construction permits.
[26] US Treasury Department (2019). Historic rates of return on I Bonds, 1998 to present.

Public health protection
We based decreases in ASILs (greater stringency) on current scientific data on their health impacts. This means additional screening of emissions of these chemicals benefits the public by:

- Ensuring they receive the appropriate level of review.
- Requiring additional emissions controls in cases of emissions from initial designs posing a threat to public and environmental health.

We identified health and environmental impacts associated with exposure to the new TAPs. Since appropriate review and protection of public health and the environment are benefits of new TAPs as well as recalculations of de minimis values, SQERs, and ASILs, we discuss the health and environmental risks posed by affected TAPs in detail in a single section of this document, section 4.2.5.

4.2.5 Public health and environmental protection

Exposure to TAPs has varying impacts on public health and the environment. These include increased risk of cancers and decreased functions of the endocrine, nervous, respiratory, and cardiovascular systems, among other impacts. The occurrence of these health impacts is largely dependent on a number of exposure factors including concentration, frequency, and length of exposure.

We are decreasing the ASIL for a number of TAPs based on current scientific data on their health impacts. We selected risk-based concentrations from three sources:[27]

- EPA Integrated Risk Information System (IRIS)[28].
- California Office of Environmental Health Hazard Assessment (OEHHA) reference exposure levels and cancer potency factors.[29]
- Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels[30].

We anticipate an increased stringency around these TAPs will reduce exposure to each of the chemicals. This will have associated positive public health and environmental impacts. Increases to both public health and environmental well-being have economic benefits. Poor human health and related healthcare expenditures are generally associated with lower macroeconomic growth, which results from reductions in:

- Consumer spending on non-medical goods
- Worker productivity

[27] See Appendix B for discussion of how ASILs are calculated.
[28] https://www.epa.gov/iris
[29] https://oehha.ca.gov/chemicals/export-all/csv?eid=138&token=h_hIxOhzQJIamt3QAD9iirTyV239O7WQExyTlfuR93Y&return-url
[30] https://www.atsdr.cdc.gov/mrls/mrllist.asp

- Capacity for public investment in areas outside of healthcare.[31]

An increase in human health and productivity will generate macroeconomic benefits. An environment healthy for individuals and families is also more likely to attract a workforce that is larger or better matched to the needs of a local economy.[32]

Similarly, increased environmental well-being is associated with macroeconomic benefits. Ecosystems provide critical functions to society, like purifying water, mitigating the spread of disease, and providing raw materials. These functions are often referred to as ecosystem services. The degree of disturbance experienced by the ecosystem often relates to an ecosystem's ability to provide predictable and ongoing services. Anthropogenic or natural disturbances to ecosystems can often have a more significant impact on an ecosystem's services than to the ecosystem's long-term resilience. The loss of services provided by ecosystems may threaten a society's economic well-being when the society cannot readily substitute disrupted services.[33]

The following discussion identifies TAPs for which:

- At least one facility does not exceed the baseline SQER, but will exceed the adopted SQER, and
- The adopted ASIL is lower than the baseline ASIL.

Trichloroethylene

Trichloroethylene (TCE) is a volatile organic compound (VOC) commonly used in the manufacture of refrigerants and as a solvent for metal decreasing. According to the EPA, the United Stated uses over 250 million pounds of TCE annually.[34] Although TCE breaks down quickly in the air, it can persist for a long time in soil and water.[35] TCE is a known carcinogen also known to harm the nervous system, liver, respiratory system, kidneys, and cardiovascular system.[36] The most common type of exposure is through the air, but all routes of exposure are harmful to humans. Kidney cancer is most often related to TCE exposure, but studies also suggest it can also be related to liver cancer and non-Hodgkin lymphoma.[37, 38]

[31] World Health Organization, 2009.
[32] This environmental amenity value is a variable in the REMI PI+ macroeconomic model for Washington. (The model is explained and used in Chapter 7 of this document.) While we could not quantify the potential improvement in environmental amenities – and did not include this benefit in demand, price, or jobs modeling – a positive impact to environmental amenities would have supported additional increases in statewide population, productivity, output, and revenues.
[33] Farley, 2012.
[34] U. S. Environmental Protection Agency (EPA), 2017.
[35] U.S. Department of Health and Human Services, National Institute of Health (NIH), 2016.
[36] U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR), 2016.
[37] Ibid.
[38] EPA, 2017.

N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) is a VOC most often used today for research purposes, but in the past was used in the production of rocket fuels, as an antioxidant, and solvent.[39] NDMA disperses in the air relatively quickly, but lingers longer in soils and water. Exposure to the chemical may occur in occupational settings at facilities that emit NDMA, by eating food that may contain the chemical (cured and smoked meats), and breathing tobacco smoke. The EPA has identified NDMA as a probable carcinogen to humans, although data and research are limited.[40, 41] However, studies have provided sufficient evidence of carcinogenicity in animals.[42] Long-term exposure to NDMA may cause liver damage and influence low platelet counts.[43]

Benz[a]anthracene

Benz(a)anthracene is a polycyclic aromatic hydrocarbon (PAH) most commonly produced by incomplete combustion of organic matter, oil, gasoline, diesel, and coal. Common human exposure routes include though ambient air, tobacco smoke, and through contact at paving operations.[44] Benz(a)anthracene disperses and breaks down relatively quickly in the atmosphere, but may persist longer in soil and water.[45] Research linking cancer in humans to benz(a)anthracene exposure is somewhat limited. However, the EPA lists the chemical as a probable human carcinogen, based on studies in animal populations that show probable carcinogenic effects.[46] Studies have also demonstrated that benz(a)anthracene and other PAHs as endocrine disrupters for both human and animal populations.[47]

Chrysene

Chrysene is a PAH most commonly produced by incomplete combustion of organic matter, oil, gasoline, diesel, and coal. The public may be exposed to chrysene through oral or dermal exposure to or breathing smoke, exhaust, and tobacco products. Chrysene is ubiquitous in the environment and most commonly transferred through the air. [48] Workers at facilities that use, combust, or produce petroleum or coal-derived substances may have elevated exposure.[49] Research linking health impacts in humans from chrysene exposure is limited; however, the EPA lists the chemical as a probable human carcinogen, based on studies in animal populations.[50]

[39] NIH, 2012.
[40] World Health Organization, 2008.
[41] EPA, 2000
[42] NIH, 2012
[43] EPA, 2000
[44] NIH, 2017a
[45] U.S. Department of Energy, Office of Science, Oak Ridge National Laboratory, Risk Assessment Information Laboratory (DOE), 1992
[46] EPA, 1990a
[47] Zhang et al, 2012
[48] DOE, 1994
[49] NIH, 2017b
[50] EPA, 1990b

Ethylene glycol monobutyl ether (EGBE)

Ethylene glycol monobutyl ether (EGBE), also known as 2-Butxyethanol, is a liquid chemical commonly used as a solvent in surface coatings, spray and quick-dry lacquers, enamels, varnishes and removers, latex paint, and commercial cleaning products. EGBE moves between air, soil, and water with relative ease and breaks down in the air within days, but may take longer to degrade in soil and water. It is not bioaccumulative in humans or animals. The most common exposure route is inhaling vapors, which can cause:

- Irritation
- Dizziness
- Drowsiness
- Headaches
- Nausea[51]

Studies have documented negative health impacts to animals from exposure to EGBE, including:

- Destruction of red blood cells.
- Breathing issues.
- Harm to liver and kidney functions.[52]

According to the EPA, EGBE is not likely to be carcinogenic to humans, but both liquid and vapor forms are highly flammable.[53, 54]

[51] U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (DHHS), 1998
[52] Ibid.
[53] EPA, 2010
[54] DHHS, 2019

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of the costs and benefits of the amendments

Likely costs (primary estimates)

Potential First Tier Review, TBACT, and permitting costs for unidentified facilities emitting added TAPs.

Recalculated de minimis emission values:

- Annual cost of between $4 thousand and $38 thousand across five identified facilities. The equivalent present value is $61 thousand to $638 thousand.
- Potential First Tier Review, TBACT, and permitting costs for unidentified facilities emitting TAPs above a more stringent adopted de minimis value.

Recalculated SQERs:

- Annual cost of $380 thousand for additional emissions modeling across 53 facilities. The equivalent present value is $6.5 million over 20 years.
- Potential additional costs of up to $3.6 million over 20 years for analysis of two TAPs for which averaging periods change.
- Potential Second Tier Review costs for unidentified facilities emitting TAPs above a more stringent adopted SQER.

Recalculated ASILs:

- Annual cost of up to $481 thousand for complex modeling and health impact assessment across 53 facilities. The equivalent present value is $8.2 million over 20 years.
- Potential Second Tier Review costs for unidentified facilities emitting TAPs above a more stringent adopted ASIL.

Likely benefits

Current scientific inputs:

- Appropriate level of review for chemicals posing a threat to human health and the environment.
- Additional review and potential pre-planning of additional emissions controls.
- Potential additional pre-planned emissions controls resulting in reduced emissions of five TAPs that have established ties to increased cancer risk (various cancer types) and/or injury or impairments to the:
    - Endocrine system
    - Nervous system
    - Respiratory system
    - Cardiovascular system

Potential avoided First Tier Review costs for unidentified facilities emitting removed TAPs.

Recalculated de minimis emission values:

- Potential avoided costs for unidentified facilities emitting TAPs for which adopted de minimis emissions values are less stringent.

Recalculated SQERs:

- Annual avoided cost of $92 thousand for avoided emissions modeling across eight facilities. The equivalent present value is $1.6 million over 20 years.
- Potential cost savings of up to $3.6 million of 20 years for analysis of two TAPs for which averaging periods change.

Recalculated ASILs:

- Annual avoided costs of up to $921 thousand at 18 facilities that may avoid Second Tier Review. The equivalent present value is $15.7 million over 20 years.

Total quantifiable cost and benefit comparison – primary estimates
The table below summarizes quantifiable costs and benefits, assuming no facilities choose to make operational changes or pre-plan additional emissions controls.

Table 3: Total quantifiable costs -- primary estimates

Costs	Present Value*	Total Present Value
De minimis-related costs	$349,790	
SQER-related costs	$6,466,569	**Cost**
ASIL-related costs	$8,194,551	$15,010,911
SQER-related benefits	$1,567,653	**Benefit**
ASIL-related benefits	$15,676,532	$17,244,185
	Net quantifiable cost	-$2,233,274

* Median estimate if range was estimated

Total quantifiable cost and benefit comparison – alternative estimates
The table below summarizes quantifiable costs and benefits, assuming facilities always choose to pre-plan additional emissions controls when they discover they are potentially exceeding an ASIL for at least one TAP (when possible to reduce costs under the baseline or the amendments). Alternative costs are presented at the median.

Table 4: Total quantifiable costs -- alternative estimates (median)

Costs	Present Value	Total Present Value
De minimis-related costs	$349,790	
SQER-related costs	$3,233,285	Cost
ASIL-related costs	$4,097,275	$7,680,351
SQER-related benefits	$1,567,653	Benefit
ASIL-related benefits	$7,838,266	$9,405,919
-	Net quantifiable cost	-$1,725,569

Qualitative and comparative costs and benefits
We note there are also qualitatively discussed potential impacts for facilities not reflected in our data because all their TAP emissions are below SQERs:

- Costs:
    - First Tier Review, permitting, and facility-specific TBACT costs, if emissions exceed an adopted de minimis level.
    - First Tier Review, site specific dispersion modeling costs if emissions exceed an adopted SQER.
    - Second Tier Review costs and fees, if ambient impacts exceed an adopted ASIL.
- Benefits:
    - Avoided First Tier Review, permitting, and facility-specific TBACT costs, if emissions no longer exceed an adopted de minimis level.

There are also qualitatively discussed benefits in the form of appropriate screening of all TAPs based on current scientific evidence, as well as potential increases in the level of pre-planned emissions controls to keep emissions below SQERs or ASILs. These translate to a general improvement in the rule's protectiveness of public health, as well as specific potential improvements to protectiveness regarding TAPs for which additional emissions controls may be pre-planned. See section 4.2.5 for more discussion.

While we could not confidently estimate the impacts the amendments will have on health risk, we identified potential health endpoints related to TAP emissions in our data at levels that exceed the adopted SQER, but not the baseline SQER. These TAPs include various carcinogens and neurological toxicants (see section 4.2.5). Comparing the value of a statistical life ($9.4 million, the equivalent value of mortality risk reductions that add to 100 percent)[55] to the highest total compliance costs estimated at $15 million would be balanced by a mortality risk reduction equivalent to less than two lives over 20 years.

These comparative values do not account for other costs and value losses associated with illness (whether or not it results in death), including:

- Emergency and ongoing health care expenses
- Income loss
- Indirect impacts to family

[55] Using US Environmental Protection Agency value of a statistical life (VSL) of $7.4 million (2006-dollars), updated to 2019-dollars using the US Bureau of Labor Statistics Consumer Price Index measure of inflation. The updated VSL is $9.4 million.

Sensitivity analysis
The assumed ratio of pre-planned emissions control costs is the most uncertain variable in this analysis. We examined what happens to net total costs (in present value) when this assumption is varied.

Table 5: Sensitivity analysis of pre-planned emissions control cost assumption

Ratio of pre-planned emissions control cost to emissions modeling or Second Tier Review analysis cost	Total net cost
Primary (100%)	-$2,233,274
90%	-$2,131,733
75%	-$1,979,421
50%	-$1,725,569
25%	-$1,471,716
10%	-$1,319,404

As the assumed ratio of pre-planned emissions controls decreases, the total net quantifiable costs of the amendments increase toward zero.

5.2 Conclusion
Ecology concludes, based on reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the adopted amendments, that the benefits of the 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 amendments, Ecology is required to determine that the contents of the amendments are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s).

Ecology assessed alternative amendment 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 amendments were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute: Chapter 70.94 RCW, Washington Clean Air Act

The goals and objectives of the authorizing statute are:

- Secure and maintain levels of air quality that protect human health and safety, including the most sensitive members of the population.
- Comply with the requirements of the federal Clean Air Act.
- Prevent injury to plant, animal life, and property, to foster the comfort and convenience of Washington's inhabitants.

- Promote the economic and social development of the state.
- Facilitate the enjoyment of the natural attractions of the state.
- Protect the public welfare.
- Preserve visibility.
- Protect scenic, aesthetic, historic, and cultural values.
- Prevent air pollution problems that interfere with the enjoyment of life, property, or natural attractions.
- Safeguard the public interest through an intensive, progressive, and coordinated statewide program of air pollution prevention and control.
- Provide for an appropriate distribution of responsibilities, and to encourage coordination and cooperation between the state, regional, and local units of government.
- Improve cooperation between state and federal government, public and private organizations, and the concerned individual.
- Provide for the use of all known, available, and reasonable methods to reduce, prevent, and control air pollution.
- Achieve significant reductions in emissions from those small facilities whose aggregate emissions constitute a significant contribution to air pollution in a particular region.
- Preserve, protect, and enhance the air quality for current and future generations.

6.3 Alternatives considered and why they were not included

6.3.1 Include all EPA hazardous air pollutants on TAP list

An air agency requested that the TAP list include all of the chemicals designated by EPA as hazardous air pollutants (HAPs). This alternative would not have met the goals and objectives of the authorizing statute.

For a chemical to be included as a TAP, it must have a published toxicity value from one of the three accepted scientific data sources (EPA IRIS, California OEHHA, and ATSDR). 40 HAPs do not have a toxicity value so they were not included as a TAP. The state rule requires an evaluation of the emissions of a TAP against a threshold, whereas the federal Clean Air Act requires EPA regulate emissions of HAP (for the purposes of air permitting) by establishing the appropriate control technology.

6.3.2 Add steps to address toxic equivalence of mixtures

We considered adding steps to the pre-construction permitting process to address the toxic equivalence of mixtures of TAPs. We based this on EPA's determination that an individual TAP does not adequately consider the impact of mixtures of dioxin-like compounds and carcinogenic PAHs. This alternative would have been more burdensome without necessarily meeting the goals and objectives of the authorizing law to a greater degree.

Adding more steps after finding a value in a table when there is more than one of these chemicals conflicts with the rulemaking goal of establishing one value for each TAP in the look-up table. By having a single set of comparison values, the adopted amendments facilitate straightforward, scientifically based compliance. Listing individual chemicals with sufficient supporting information as TAPs with appropriate screening values allows facilities to make individual comparisons.

6.3.3 Make de minimis emission values and SQERs the same

We considered making the de minimis emission value equal to the SQER. This alternative would not have met the goals and objectives of the authorizing statute.

The current rule requires a project with emissions of any toxic air pollutants equal to or greater than the de minimis emission threshold in WAC 173-460-150 to submit a notice of construction application and get approval from their permitting authority, before they can begin construction..

Emissions less than the de minimis emission threshold require no regulatory review, nor does tBACT apply. Raising the de minimis emission value to equal the higher SQER does not protect human health and the environment because SQER values are not trivial levels of emissions. The SQERs are a screening tool to simplify permitting. New sources with emissions at or below the SQER satisfy the acceptable source impact analysis requirement of WAC 173-460-070. The purpose of the SQER is to establish a conservative emission level to minimize dispersion modeling requirements for those new sources emitting small quantities.

The rule compares controlled emissions after applying tBACT to the SQER. Some new sources with emissions lower than the SQER could potentially have ambient impacts in excess of an ASIL. For this reason, many permitting agency staff in the stakeholder group felt it was important to have a de minimis emission value lower than the SQER so that they could consider tBACT. tBACT in these cases would serve to reduce the chances that emissions at or below the SQER could potentially cause a theoretical exceedance of an ASIL.

Establishing the small quantity emission rate as the de minimis emission value would remove most contributors to emissions of toxic air pollution from the permitting arena. Eliminating these projects from any permit review, especially from tBACT analysis, does not protect human health and the environment. We considered this alternative during rulemaking and concluded that it does not meet the goals and objectives of the Washington Clean Air Act.

6.3.4 Set de minimis emission values at 1/10 of SQERs

We considered setting de minimis emission values equal the SQER value divided by 10 (instead of 20), consistent with the order of magnitude difference in other regulatory structures (risk difference between 10^{-6} and 10^{-5}; EPA's 1980 Prevention of Significant Deterioration (PSD) guidance; engineering safety factor; and Idaho's air toxics permitting structure). This alternative would not have met the goals and objectives of the authorizing statute.

We added de minimis emission values in 2009 as part of a rulemaking action that integrated the air toxics rule into the overall procedures of permitting air emissions (new source review) in Chapter 173-400 WAC.

We established the de minimis emission values as five percent of the SQER to maintain consistency between these two rules. The general air quality rules in Chapter 173-400 WAC establish de minimis emission values for criteria pollutants equal to five percent of the PSD significance levels.

The current value represents a protective approach for defining de minimis in the context of permitting. Doubling the threshold could potentially result in fewer projects needing to apply for a permit and the associated requirement to comply with the control technology to reduce emissions (tBACT). Emissions by multiple small sources can combine concentrations high enough to pose risks to human health and the environment. The Legislature also recognizes this in RCW 70.94.011.

To summarize, this alternative would not protect human health and the environment, and thus does not meet the goals and objectives of the Washington Clean Air Act.

6.3.5 Use more protective parameters to establish SQERs

Ecology considered using more protective parameters to establish SQERs. This could have included using:

- Lower building height
- A capped stack
- Closer boundaries
- Urban population

This alternative would have imposed more burden on covered parties by resulting in more site-specific modeling for additional TAPs. This would not necessarily have resulted in additional pre-planned emissions controls, as this alternative would not have affected emissions exceeding the ASIL.

6.3.6 Maintain existing values for methyl and diethyl mercury

We considered maintaining the baseline values for methyl and diethyl mercury, because these chemicals are so toxic that every project should be reviewed. This alternative would have imposed more burden on a facility with these emissions.

The existing value requires a modeling analysis of every project because the ASIL, SQER, and de minimis emission value are set close to zero. Maintaining the existing value does not align the level of review by an applicant and the permitting agency, with the risk associated with the project. By developing a Washington-based value that reflects an appropriate noncancer health effect threshold for the ASIL, the same process is applied to all TAPs for establishing the SQER and de minimis emission value.

6.3.7 Add acetone as a toxic air pollutant

Acetone is colorless liquid with a sweetish smell and distinctive taste. It is often used for cleaning and degreasing, and is used in the manufacturing of plastics, fibers, drugs, and other chemicals. It is the primary ingredient in most commercial nail polish removers.

We considered adding acetone as a TAP because it met the TAP listing criteria. Including acetone on the TAP list would have imposed more burden on businesses and permitting agencies. EPA promotes acetone as a Safer Choice chemical because it is best in class for specific functions. [56] EPA notes that acetone has a "low potential for harming either human health or the environment." Including it as a TAP could have unintended consequences by disincentivizing the use of a chemical that we promote as a substitute for more harmful chemicals. Adding the chemical as a TAP does not align the level of review by an applicant and the permitting agency with the risk associated with the emissions from the project.

6.3.8 Add certain fuels as toxic air pollutants

We considered adding these fuels as TAPs because they met the listing criteria: fuel-oil no. 2 (home heating oil), kerosene (aviation fuel, heating fuel and solvent), and four kerosene-based jet fuels (JP-4, JP-5, JP-7, and JP-8). We did not include them because the rule already regulates the volatile TAPs that comprise each fuel:

- Gasoline and diesel fuel contain the TAPS such as benzene, toluene, xylenes, n-hexane, and naphthalene.
- According to ATSDR, jet fuel contains several different TAPs (e.g., benzene, toluene, ethylbenzene, xylene, naphthalene and others).[57,58] ATSDR establishes the minimal risk level for jet fuels based on the jet fuel mixture, rather than individual components. Using naphthalene as an example, consideration of these individual TAPs would likely be more stringent than an ASIL based on the jet fuel mixture that is the basis for the JP-8 minimal risk level.

Including these fuels would therefore be duplicative and provide no regulatory benefit.

6.3.9 Add certain chemicals as toxic air pollutants

We considered adding four chemicals to the TAP list because they met the listing criteria. They were not included because they are redundant with adopted TAPs.

Table 6: Chemicals considered but not added to the TAP list

Chemical Common Name	CAS	Reason – Redundant
PBDE-99 [2,2',4,4',5-pentabromodiphenyl ether]	60348-60-9	Covered by Polybrominated diphenyl ethers (PBDEs) [Containing less than 10 bromine atoms]. The ASIL for PBDEs is based on ATSDRs minimal risk level. An inhalation MRL (or inhalation toxicity value) specific to PBDE-99 [2,2',4,4',5-pentabromodiphenyl ether] does not exist. The MRL does not specify individual PBDE congeners, only that they are "lower brominated."

[56] Refer to EPA's Safer Choice Standard and Criteria found at https://www.epa.gov/saferchoice/standard#tab-2.
[57] ATSDR Jet Fuels JP-4 and JP-7 found at https://www.atsdr.cdc.gov/ToxProfiles/tp76-c3.pdf.
[58] ATSDR JP-5, JP-8 and Jet A-Fuels found at https://www.atsdr.cdc.gov/toxprofiles/tp121-c3.pdf.

Chemical Common Name	CAS	Reason – Redundant
Pentabromodiphenyl ether	32534-81-9	Covered by Polybrominated diphenyl ethers (PBDEs) [Containing less than 10 bromine atoms]. The ASIL for PBDEs is based on ATSDRs minimal risk level. An inhalation MRL (or inhalation toxicity value) specific to pentabromodiphenyl ether does not exist. The MRL does not specify individual PBDE congeners, only that they are “lower brominated.
Polybrominated diphenyl ethers (PBDEs)	32536-52-0	Covered by Polybrominated diphenyl ethers (PBDEs) [Containing less than 10 bromine atoms]. The ASIL for PBDEs is based on ATSDRs minimal risk level. An inhalation MRL (or inhalation toxicity value) specific to polybrominated diphenyl ethers does not exist. The MRL does not specify individual PBDE congeners, only that they are “lower brominated.
Selenium sulfide	7446-34-6	Covered by Selenium & selenium compounds (other than hydrogen selenide)

6.3.10 Do not use Age-Dependent Adjustment Factors

During the public comment period for this rulemaking, we received comments opposing the use of Age-Dependent Adjustment Factors (ADAF). This alternative would not have met the goals and objectives of the authorizing statute, as it would not prevent new sources of air pollution from emitting toxic air pollutants at a rate that may pose an unacceptable risk to individuals and communities.

We set ASILs at an increased cancer risk rate of 1 in one million based on continuous lifetime exposure beginning at birth to 70 years. While we understand that the assumptions and the methods for quantifying inhalation unit risk factors (e.g., linear low-dose extrapolation upper-bound estimate) generally provide public health protection, it is important to consider children's susceptibility to exposure to carcinogens. In this manner, we follow EPAs guidelines to use age dependent factors to account for children’s susceptibility from exposure to pollutants that act through a mutagenic mode of action. For additional discussion, please see the Concise Explanatory Statement for this rulemaking.

6.4 Conclusion

After considering alternatives to the adopted amendments’ contents, as well as the goals and objectives of the authorizing statute, we determined that the adopted amendments represent 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 adopted amendments.

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 amendments.
- Expected net impact on jobs statewide.

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

We refer to the existing regulatory environment as the "baseline" in this document. It includes only existing laws and rules at federal and state levels.

7.2 Quantification of cost ratios

We calculated the estimated per-entity costs to comply with the amendments, based on the primary compliance costs estimated in Chapter 3, and the primary compliance cost savings estimated in Chapter 4. In this section, we summarize compliance cost per employee at affected businesses of different sizes.

The average affected small business likely to be covered by the amendments employs about eight people.[59] The largest ten percent of affected businesses employ an average of 10,500 people.[60] Based on cost estimates from Chapter 3, we estimated the following compliance costs per employee. Some existing private employers potentially experience a net benefit, through avoided Second Tier Review costs or reductions in pre-planned emissions control equipment. Negative low net cost indicates a potential reduction in compliance costs.

[59] Database of Washington employment. Where ranges of employment were provided, we used the lowest number of employees in the range.

[60] Ibid. Note that the primary employment database lists highest-employment businesses as 10,000+. The actual average for the largest ten percent of businesses is likely higher. This would make the disproportions shown in Table 8 larger.

Table 7: Change in compliance costs per employee for small and large businesses

Small Businesses		Largest 10 Percent of Businesses	
Low	High	Low	High
($5,500.00)	$19,000.00	($5.50)	$5.00

While cost savings per employee are disproportionately larger for small businesses when a cost-savings is experienced, compliance costs are disproportionately higher for small businesses when net compliance costs are positive. We conclude that the adopted amendments are likely to have disproportionate impacts on some small businesses, and therefore must include elements in the amendments to mitigate this disproportion, as far as is legal and feasible.

7.3 Loss of sales or revenue

Businesses that will incur costs could experience reduced sales or revenues if the amendments 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, and the relative responsiveness of market demand to price changes.

We used the REMI PI+ model for Washington State to estimate the impact of the amendments on directly affected markets, accounting for dynamic adjustments throughout the economy. The model accounts for inter-industry impacts; price, wage, and population changes; and dynamic adjustment of all economic variables over time. We based model inputs on forecast quantifiable costs and benefits (cost-savings) estimated in chapters 3 and 4.

For existing facilities (representing potential future facilities in each year), we identified the associated industry (see North American Industry Classification System, NAICS, list in section 7.6).[61] For pre-construction permits for which we did not have corresponding emissions data that was comparable with the baseline and the amendments, we assumed costs and benefits estimated for modeled facilities were distributed across identified industries in the same proportions as in facilities on which we had comprehensive emissions data. Net compliance costs (positive or negative) were assumed to be transfers to/from environmental consultants (NAICS 5413, Engineering Services, including environmental engineering services).

The REMI PI+ model output represents many aspects of the state economy, modeling the impact of positive and negative transfers across industries, and comparing it to a baseline model reflecting the status quo and forecast trends. To examine whether businesses were likely to lose sales or revenue, we looked at model output related to prices and demand (sales reflected in dollars). While the aggregate net increase in economic activity is likely to create a very small increase in statewide (all industry) total demand (less than 1/100 of one percent), none of the industries we identified as incurring net compliance costs or experiencing net compliance benefits were found to experience a significant change in demand. Similarly, the model indicated that there will be no significant impacts to commodity prices or the overall price level. We therefore do not expect businesses to experience a significant impact to their sales and revenue.

[61] See https://www.census.gov/eos/www/naics/index.html for more NAICS information, industry groupings, and descriptions.

7.4 Action taken to reduce small business impacts

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

> Based upon the extent of disproportionate impact on small business identified in the statement prepared under RCW 19.85.040, the agency shall, where legal and feasible in meeting the stated objectives of the statutes upon which the rule is based, reduce the costs imposed by the rule on small businesses. The agency must consider, without limitation, each of the following methods of reducing the impact of the proposed rule on small businesses:
>
> (a) Reducing, modifying, or eliminating substantive regulatory requirements;
>
> (b) Simplifying, reducing, or eliminating recordkeeping and reporting requirements;
>
> (c) Reducing the frequency of inspections;
>
> (d) Delaying compliance timetables;
>
> (e) Reducing or modifying fine schedules for noncompliance; or
>
> (f) Any other mitigation techniques including those suggested by small businesses or small business advocates.

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

- Adding steps to address mixtures of TAPs.
- Using more protective parameters to establish SQERs.
- Maintaining the baseline de minimis, SQER, and ASIL values for methyl and diethyl mercury.
- Adding acetone as a TAP.
- Adding certain fuels as TAPs.

Because the purpose of this rulemaking is to update the basis of pre-construction permitting to current scientific values and understanding of toxicity, it is otherwise difficult to reduce compliance costs stemming from the adopted amendments. Moreover, it is difficult to reduce compliance costs specifically for small businesses, since there is not necessarily a correlation between business size and the types or amounts/rates of TAPs they emit. If review of new or modified facilities was reduced below what is deemed necessary based on current evidence regarding the toxicity of TAPs, for small businesses, the rule would not be able to meet the goal of protecting public health and the environment in the authorizing statute (see statutory goals and objectives, section 6.2).

7.5 Small business and government involvement

Ecology involved small businesses and local government in its development of the adopted amendments by:

- Holding public meetings including representatives from:
    - Business associations (typically representing many small businesses)
    - Consultants
    - Local air agencies
    - Local governments (city, county)
    - Federal agencies
    - Environmental groups
    - Members of the public
- Communicating through the Air Quality Program distribution list, including:
    - Forty-six representatives from government agencies (excluding Ecology)
    - Sixteen representatives from local air agencies
    - Twelve representatives from organizations representing industry
    - Four representatives from local governments
    - Ninety-three direct representatives of industry
    - Forty consultant representatives
- Communicating through the distribution list created for this rulemaking, including:
    - Fourteen representatives from government agencies (excluding Ecology)
    - Eleven representatives from local air agencies
    - Two representatives from organizations representing industry
    - Eleven direct representatives of industry
    - Five consultant representatives

We note that it is time consuming and costly to participate in the rulemaking process, and this can be a significant effort to small businesses. However, we did consult with them through organizations representing broader industries.

7.6 NAICS Codes of impacted industries

The amendments are likely to affect the following industries (North American Industry Classification System, "NAICS").

Table 8: Industries likely to be impacted by the amendments

NAICS Code	Industry (or sub-industry) name
1141	Shellfish fishing
2373	Highway, street, and bridge construction
3119	Coffee and tea manufacturing
3211	Sawmills
3222	Other paperboard container manufacturing
3323	Architectural and structural metals manufacturing
3345	Other measuring and controlling device manufacturing
3364	Aircraft manufacturing
3366	Ship and boat building
4233	Lumber, plywood, millwork/wood panel merchant wholesalers
4239	Miscellaneous durable goods merchant wholesalers
4241	Industrial and personal service paper merchandise wholesalers
4244	Other grocery and related products merchant wholesalers
4412	Boat dealers
4452	Fish and seafood markets
4523	Warehouse clubs and supercenters
4539	All other miscellaneous store retailers (excluding tobacco stores)
4821	Line-haul railroads
5112	Software publishers
5415	Custom computer programming services
5416	Other management consulting services
5629	Remediation services
6214	Freestanding ambulatory surgical and emergency centers
6221	General medical and surgical hospitals
6231	Nursing care facilities (skilled nursing facilities)
8122	Cemeteries and crematories
8129	Pet care (except veterinary) services

7.7 Impact on Jobs

We used the REMI PI+ model for Washington State to estimate the impact of the amendments on jobs in the state, accounting for dynamic adjustments throughout the economy. The model accounts for inter-industry impacts; price, wage, and population changes; and dynamic adjustment of all economic variables over time. The amendments will result in transfers of money within and between industries. We based model inputs on forecast quantifiable costs and benefits (cost-savings) estimated in Chapters 3 and 4.

For existing facilities (representing potential future facilities in each year), we identified the associated industry (see NAICS list in section 7.6).[62] For pre-construction permits for which we did not have corresponding emissions data that was comparable with the baseline and the amendments, we assumed costs and benefits estimated for modeled facilities were distributed across identified industries in the same proportions as in facilities on which we had comprehensive emissions data. Net compliance costs (positive or negative) were assumed to be transfers to/from environmental consultants (NAICS 5413, Engineering Services, including environmental engineering services).

[62] See https://www.census.gov/eos/www/naics/index.html for more NAICS information, industry groupings, and descriptions.

The REMI PI+ model output represents many aspects of the state economy, modeling the impact of positive and negative transfers across industries, and comparing it to a baseline model reflecting the status quo and forecast trends. To examine the amendments' impact on jobs, we looked at the aggregate jobs impact (across all industries and jobs in the state), as well as jobs impacts specific to industries directly impacted by the amendments, and the industry of consultants that receive increases in emissions analysis spending, or lose income when emissions analysis spending is reduced or avoided. Since jobs impacts vary by year (as the state economy adjusts to a change in expenditures), the table below summarizes low and high impacts to jobs.

Table 9: Modeled impacts on jobs (thousands of jobs)

Impacts	**Low**	**High**
Total employment	0.001	0.003
Industries with highest net costs		
Highest net cost: NAICS 23 – Construction	0.000	0.001
Second highest net cost: Federal civilian	Less than one job (< 0.000 thousand jobs)	
Industries with highest net benefits		
NAICS 3211 – Sawmills and wood preservation	Less than one job in each industry (< 0.000 thousand jobs)	
NAICS 5415 – Computer systems		
NAICS 5416 – Management, scientific, and technical consulting services		
NAICS 6214, 6215, 6219 – Outpatient, laboratory, and other ambulatory care services		
NAICS 5413 – Engineering services		

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

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Appendix A.
Administrative Procedure Act (RCW 34.05.328)

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

See Chapter 6.

B. RCW 34.05.328(1)(b)

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

See Chapters 1 and 2.

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

If we do not update the list of chemicals and values, the rule will reflect outdated scientific information and permits issued under the current rule might not adequately protect public health, or a business must get a permit for emissions that might not be subject to regulation in the updated rule.

We told the Far West Agribusiness Association that we would begin rulemaking in 2018 to their 2017 request for rulemaking to declassify ammonium sulfate as a toxic air pollutant. The 2018 legislature considered a bill that would have required us to complete rulemaking on the list of toxic chemicals and their emission values by the end of 2020 (House Bill 2602). The bill did not pass, in part because we had committed to this rulemaking.

We considered an expanded rulemaking scope that covered the entire rule or a few select topics. This is a complex rule so an update covering multiple topics could take several years. Rather, we decided to limit this action to one topic – updating the table – so we could complete it and adopt a rule in about a year. We will assess other possible amendments by working with interested parties through the exploratory rulemaking process.

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

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

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

D. RCW 34.05.328(1)(d) – Determine that probable benefits of this rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.

See Chapters 1 – 5.

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

See Chapter 6.

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

The actions required by the amendments in this rulemaking would not require covered parties to violate existing federal or state laws or rules.

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

The rule imposes the same requirements on public and private entities.

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

There are no federal regulations or statues applicable to the same activity or subject matter.

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

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

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

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

Ecology staff worked with the implementing agencies to develop rule language and ensure consistency across programs:

- Local air agencies: Benton Clean Air Agency, Olympic Region Clean Air Agency, Northwest Clean Air Agency, Puget Sound Clean Air Agency, Southwest Clean Air Agency, Spokane Regional Clean Air Agency, and Yakima Regional Clean Air Agency.
- Other Ecology programs: Industrial Section (covers pulp/paper/sulfite/aluminum mills), Nuclear Waste Program (Hanford), and Central and Eastern Regional Office – Air Quality Program (covers most of central and eastern Washington).
- Energy Facility Site Evaluation Council.

Appendix B. Setting the Acceptable Source Impact Level, Small Quantity Emission Rates, and De Minimis Values

Selecting the sources and values for the acceptable source impact level (ASIL) was a major portion of the work involved in revising Chapter 173-460 WAC. Ecology selected risk-based concentrations from four sources:

- The U. S. Environmental Protection Agency (EPA).
- The Agency for Toxic Substances and Disease Registry (ATSDR).
- The California Office of Environmental Health Hazard Assessment (OEHHA).
- Ecology for diethyl and methyl mercury.

What major elements did we consider as the ASIL list was developed?

A few major decision points formed the base for creating the list in the rule. We decided that:

- Only those pollutants with an identified risk factor would be included on the list.
- Each pollutant can have only one ASIL and one concentration averaging time.
- Each ASIL can have either a short-term value or a long-term value but not both.
- A short term ASIL can have a 1-hour or 24-hour averaging period.
- If a TAP has toxicity values based on cancer and non-cancer effects, we will set the ASIL based on cancer risk. We used this approach because the concentrations resulting in a lifetime increased cancer risk of one in one million are usually much lower than concentrations associated with non-cancer reference concentrations. We deviated from this approach for 2,4- & 2,6- toluene diisocyanates because the chronic reference exposure level is lower than a level that results in a one in a million lifetime cancer risk.
- We will account for children's susceptibility to early-life exposure to carcinogens.
- If more than one toxicity value was available for the same TAP, we will set the ASIL based on the most recently promulgated value.
- In deriving ASILs based on noncancerous effects, we gave preference to toxicity values based on chronic effects, followed by intermediate values, followed by acute values. We deviated from the hierarchy two chemicals:
  - Isopropyl alcohol. We deviated from the hierarchy for isopropyl alcohol because the 1-hour acute reference exposure level is lower than the chronic reference exposure level.
  - Sulfur dioxide. We deviated from the hierarchy for sulfur dioxide to maintain consistency with how the ASILs values are set for the other criteria pollutants.
- We will set ASILs based on chronic RELs, RfCs and MRLs with 24-hour time weighted averages rather than with annual averages as this was done with the aim of having one ASIL value per TAP while ensuring that we would not overlook the acute effects of TAPs.

- If the data source didn't provide an averaging period, we will set it at 24-hours.
- We will not use draft MRLs, RELs URFs, or RfCs.
- We will convert an MRL from parts-per-billion (ppb) to micrograms per meter cubed ($\mu g/m^3$) assuming 20 degrees Celsius at 1 atmosphere pressure.
- We will round all values for emission rates and concentrations to two significant digits.
- We will establish the ASIL for diethyl and methyl mercury based on our evaluation of research and other available information.

How were the small quantity emission rates set?

Each pollutant on the TAP list has a small quantity emission rate (SQER). The SQER values are derived from the ASIL values, calculated through modeling. We used EPA's. AERSCREEN Version 16216, a screening level air dispersion model.

SQER values are based on the following model inputs and calculations:

Table 10: Model parameters and values

Parameter	Value
Emission rate	1 gram per second
Point source stack height	10, 10.5, and 11 meters
Point source stack diameter	0.33 meters
Point source exit velocity	1, 5, and 10 meters per second
Point source stack temperature	Ambient
Point source stack location	Four locations Southwest corner of building Building centroid Center of each horizontal dimension (two)
Volume source side length	0.5, 1, 2, and 3 meters
Volume source release height + initial vertical dimension	5 + 5.5 meters 6.5 + 4 meters 7.5 + 3 meters 10 + 0.5 meters
Flagpole receptor height	1.5 meters
Urban or rural dispersion	Rural
Building downwash	Only applies to point sources
Building height	10 meters
Building dimensions	10 x 20 meters
Terrain effects	No
Meteorology options	Temperature 250 – 310K (Kelvin) Minimum wind 0.5 meters per second Friction velocity adjusted (Adj_u*)
Surface characteristics	Desert shrubland Grassland Cultivated land
Receptor distances	5 to 50 meters in 5 meter increments

We examined several possible source and building configurations to simulate a realistic yet conservative scenario that would apply anywhere. We ran 124 model runs. The median of all concentrations between five and 50 meters downwind of the source (compliance point) predicted by each of the 124 model runs was 4282 $\mu g/m^3$.

Table 11: SQER calculations

Calculations	Carcinogenic TAPs	Non-carcinogenic TAPs	Non-carcinogenic TAPs (Acute reference exposure level)
Averaging period	Annual	24 hour	One-hour
Emission unit	Grams/second	Grams/second	Grams/second
Formula	ASIL/4282*0.1	ASIL/4282*0.6	ASIL/4282
Result	Pounds/year	Pounds/hour	Pounds/hour

We used the following formula to convert ppm to mg/m^3:

$$Y\ mg/m^3 = (X\ ppm)(molecular\ weight)/24.45$$

To convert from mg/m^3 to $\mu g/m^3$ multiply by 1000

We used the following calculations to establish SQER values for the year, 24-hour and 1-hour ASILs.

Year ASIL

SQER (pounds/year) =

$$\left[\frac{\text{Annual ASIL } \left(\frac{\mu g}{m^3}\right) \text{x } 60 \left(\frac{sec}{min}\right) \text{x } 60 \left(\frac{min}{hr}\right) \text{x } 8760 \left(\frac{hr}{yr}\right)}{4282 \left(\frac{\mu g}{m^3}\right) \text{x } 0.1 \text{ x } 453.6 \left(\frac{g}{lb}\right)}\right] \Big/ 1 \left(\frac{g}{sec}\right)$$

24-hour ASIL

SQER (pounds/day) =

$$\left[\frac{24-\text{hr ASIL } \left(\frac{\mu g}{m^3}\right) \text{x } 60 \left(\frac{sec}{min}\right) \text{x } 60 \left(\frac{min}{hr}\right) \text{x } 24 \left(\frac{hr}{day}\right)}{4282 \left(\frac{\mu g}{m^3}\right) \text{x } 0.6 \text{ x } 453.6 \left(\frac{g}{lb}\right)}\right] \Big/ 1 \left(\frac{g}{sec}\right)$$

1-hour ASIL

SQER (pounds/hour) =

$$\left[\frac{1-\text{hr ASIL } \left(\frac{\mu g}{m^3}\right) \text{x } 60 \left(\frac{sec}{min}\right) \text{x } 60 \left(\frac{min}{hr}\right)}{4282 \left(\frac{\mu g}{m^3}\right) \text{x } 453.6 \left(\frac{g}{lb}\right)}\right] \Big/ 1 \left(\frac{g}{sec}\right)$$

Table 12: AERSCREEN conversion factors

Convert from	Convert to	Multiply by
1 hour	3 hour	1
1 hour	8 hour	0.9
1 hour	24 hour	0.6
1 hour	Annual	0.1

How were the de minimis values established?
The de minimis values are set at 1/20 of the SQER. This is the same concept we applied to establish the de minimis values (called emission exemption levels) in WAC 173-400-110(5). Section 110(5) establishes de minimis at 1/20th of the Prevention of Significant Deterioration significant emission rates. De minimis rates in WAC 173-460-150 and WAC 173-400-110(5) are appropriate regulatory vehicles.

We retained the existing de minimis emission values for nitrogen dioxide, sulfur dioxide, carbon monoxide, and lead. These four TAPs are also regulated under Chapter 173-400 WAC as criteria pollutants. Establishing a single de minimis emission value in WAC 173-460-150 based on the de minimis value in WAC 173-400-110(5) ensures consistency between the two rule provisions.