



DEPARTMENT OF
ECOLOGY
State of Washington

Guidance Document

First, Second, and Third Tier Review of Toxic Air Pollution Sources (Chapter 173-460 WAC)

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Introduction

Ecology and local air quality agencies use first, second and third tier review to regulate emissions of toxic air pollutants. Hundreds of potentially toxic chemicals are released into the air each year in Washington. Excess exposures to these chemicals can cause serious illnesses and premature deaths. Widespread exposure probably accounts for some of the occurrences of various types of cancers within our population.

This publication is to help toxic air pollution sources understand and use the first, second, and third tier review sections of the notice of construction application. Requirements for first, second, and third tier review are found in Chapter 173-460 Washington Administrative Code (WAC).

First Tier Review

What is first tier review?

First tier review is part of a notice of construction application for a new or modified toxic air pollutant source. It compares your project emissions to the toxic air pollutant values listed in WAC 173-460-150.

How do I know if I need to do a first tier review?

You will need to do a first tier review if potential emissions from your project exceed the de minimis emission levels specified in WAC 173-460-150. Your potential emissions are the expected worst-case emissions from your facility, considering its physical and operational design.

How do I get first tier review?

You do not need to submit a separate petition for first tier review. The notice of construction application you file with the permitting agency serves as your petition for first tier review. Typically, the permitting agency will conduct a first tier review on every notice of construction application it receives.

What issues must I address before the order can be issued?

You must show that the emission increases from all new or modified emission units are below the acceptable source impact level (ASIL):

- after application of best available control technology for air toxics (tBACT); and
- at any location outside of your property boundary.

You can find the ASILs in WAC 173-460-150.

How can I show that emissions are below the ASIL?

You can show emissions are below the ASIL by:

- demonstrating that the emissions are at or below the small quantity emission rates (SQER);
- using a screening model (such as AERSCREEN); or
- using a refined air dispersion model (such as AERMOD).

What can I do if emissions exceed the ASIL?

You have several options, including:

- revise the project and application;
- negotiate an enforceable limit;
- off-set the emissions by reducing emissions from another on-site emission unit;
- submit a second tier petition;
- submit a third tier petition; or
- withdraw the application.

How do I off-set the new emissions by reducing them at another emission unit?

You must meet several criteria in order to get this option approved:

- the emission reductions must be actual reductions;
- the reductions must be modeled against all affected receptors; and
- when the emission increases and reductions are modeled together at the receptor, the modeling must demonstrate that the off-set proposal results in emission values lower than the ASIL.

Who approves a first tier analysis?

Your permitting agency will review the first tier analysis and either approve or deny it.

What happens if my first tier analysis is approved?

If your permitting agency approves the first tier analysis, it will include the approval decision in an “Order of Approval.” For permits issued by Ecology, guidelines for issuing this order and requirements for notifying the public are in WAC 173-400-110. Other permitting agencies may have their own guidelines. The order may contain the following:

- emission limits for each toxic air pollutant (TAP) subject to review;
- a method of assuring compliance with TAP limits (usually monitoring, reporting, and operation restrictions);
- a statement of the Best Available Control Technology for Air Toxics (tBACT) for each TAP; and
- enforcement criteria for voluntary emission reductions, including monitoring, record-keeping, and reporting requirements.

What happens if my first tier analysis is not approved?

If emission increases still exceed the ASIL and other options do not work, you can submit a petition for second tier review.

Are there any exemptions from the first tier review process?

Yes. A list of exemptions from new source review is in WAC 173-400-110. Also, your permitting agency might have its own list of exemptions. Exemptions for toxic air pollutants and criteria pollutants are related because the permit process procedures, definitions, and exemptions are the same for both.

Exemptions are divided into two broad categories:

- emission unit and activity exemptions; and
- exemptions based on emissions.

To see if your project is exempt, read the emission unit and activity listing in WAC 173-400-110(4 and 5), and contact your permitting agency. De minimis emission values for toxic air pollutants are in WAC 173-460-150. You must consider all of the new or modified emission units together. For the project to be exempt, emissions from all of the individual emission units added together must be below the de minimis values.

Second Tier Review

What is second tier review?

Like first tier review, second tier review is part of a notice of construction application for a new or modified toxic air pollutant source. You need to do a second tier review if any of your project's toxic air pollutant emissions exceed the ASIL after you have completed a first tier review. In this step of the notice of construction application process, the applicant submits a health impacts assessment to Ecology. Ecology will review the health risks associated with your project.

How do I get second tier review?

Submit a petition for second tier review to Ecology, with a copy to the permitting agency that has jurisdiction. The application form includes the Health Impact Assessment Checklist and is available at: <http://www.ecy.wa.gov/biblio/ecy070415.html>

What is the review process for a second tier petition?

Ecology's air toxics engineer, toxicologist, and air quality modeler work together on second tier petitions. The review process includes:

- pre-application conference;
- a second tier petition and payment of applicable fees;
- HIA protocol; and
- HIA document.

Pre-application conference

After Ecology is notified that a proposed project requires second tier review, Ecology recommends you have a pre-application conference with Ecology staff before you submit a second tier petition. The pre-application conference:

- helps you identify regulatory issues before you commit a significant amount of time and resources toward a specific course of action;
- lets you know early in the process what you need to address in the Health Impact Assessment, which can avoid unnecessary delays later on; and
- helps you identify the review criteria for your project, so that you can present your proposal accurately.

You and your consulting team need to attend the conference. The team typically includes an engineer, plant operations manager, and other specialists involved in your proposal. You and your team will meet with an Air Quality Program engineer, toxicologist, and air quality modeler.

The permit writer who reviewed your first tier analysis will also attend, whether they work for Ecology or a local air quality agency.

At the conference, you, your team, and Ecology staff will review the following information:

- required permits, approvals, and fees;
- protocol for the health impact analysis;
- the refined air dispersion modeling methods used to estimate TAP levels;
- typical project review timelines;
- application regulations;
- the public hearing process; and
- any other questions you might have.

The amount of information Ecology can give you at the conference depends on the level of detail you provide about the project. Because the conference takes place early in the process, Ecology will not be able to anticipate all the relevant project details. Ecology will give you a protocol to follow that tells you what to do next.

The conference **will not** provide:

- a detailed toxicology analysis or modeling review; or
- a final recommendation on a proposal.

To schedule a pre-application conference, call Matt Kadlec at (360) 407-6817 or Gary Palcisko at (360) 407-7338. They will work with you to find a time that works for everyone. The conference is typically held at Ecology's Headquarters building at:

300 Desmond Drive SE
Lacey, WA 98503

Second tier review petition and fees

After the pre-application conference, the applicant submits to Ecology a petition and applicable fees for second tier review, with a copy to the permitting agency that has jurisdiction. The application form includes the Health Impact Assessment Checklist and is available at: <http://www.ecy.wa.gov/biblio/ecy070415.html>. You can find more information on applicable fees starting on page 31.

HIA protocol

The applicant must also submit an HIA protocol. Ecology will review the HIA protocol after the applicant submits the \$10,000 initial fee with the HIA protocol and completed second tier application. Basic information required for HIA protocol is included later in this document.

HIA document

After Ecology approves the HIA Protocol, the applicant prepares and submits an HIA document. Ecology toxicologists will review the HIA to determine if health impacts are adequately characterized. Ecology will provide substantive and non-substantive comments on the HIA document and will request the applicant revise the HIA document if necessary. This process can be repeated until the applicant prepares an acceptable final HIA document. Ecology's project engineer or delegate will review portions of the HIA that involve the project's engineering specifications. Likewise, Ecology's dispersion modeler will review portions of the HIA that involve toxic air pollutant (TAP) concentration modeling. Following confirmations by the engineer and modeler, Ecology's project toxicologist will review risk assessment portions of the HIA. The toxicologist will then communicate to all parties the results of the HIA review.

Once an acceptable HIA document has been prepared, Ecology will prepare a brief staff report which summarizes Ecology's review of the HIA and includes recommendation(s) to the local permitting authority about the petition. Ecology will:

- post the applicant's final HIA document, Ecology's staff report, and Ecology's cover letter on Ecology's [air toxics review web page](http://www.ecy.wa.gov/programs/air/Tier2/Tier2_infosite.html) (http://www.ecy.wa.gov/programs/air/Tier2/Tier2_infosite.html);
- make a final recommendation for approval or denial of the project; and
- send the recommendation to you and the permitting agency, which issues the actual approval order.

Ecology's decision on the second tier petition must be included in the final decision on the notice of construction application.

Who approves a petition for second tier review?

Only Ecology staff can review, approve, or deny a second tier petition.

What materials should I provide, and when?

In the pre-application conference, you will be given a protocol for preparing the required documentation for the second tier petition. After the pre-application conference, the permitting agency (either a local air quality agency or one of Ecology's regional offices) will provide a preliminary order of approval directly to Ecology. Then, follow this protocol to provide information:

Provide to Ecology:

- the results of the refined air dispersion modeling for all pollutants that exceed the SQERs; and
- a full copy of the second tier petition (containing a Health Impacts Assessment).

Provide to the permitting agency that reviewed your first tier analysis:

- a full copy of the second tier petition.

Is public involvement required?

Yes. Public involvement is required for any project that needs a second tier review. It may be limited to a public notice and public comment period, or Ecology may determine that a public hearing is needed. If a public hearing is held, Ecology and the permitting agency will hold a joint public hearing to streamline the public review process. Ecology staff will explain the second tier recommendation at the public hearing. You and your consultants should be prepared to explain your project and answer questions at the public hearing.

What can I do if Ecology does not approve the second tier petition?

If Ecology denies the second tier petition, the permitting agency may not approve the project. At that point, you have the following options:

- revise the project and application;
- propose emission reductions from an off-site emission unit;
- submit a third tier petition; or
- withdraw the application.

My project triggers second tier review. Are there any exemptions from the second tier review process?

No. If your project triggers second tier review, you must submit a second tier petition to Ecology before your project can be approved. If you think that your project will not meet the approval criteria of a second tier review, you may opt to submit a third tier petition instead of a second tier petition.

Third Tier Review

What is third tier review?

You can submit a petition for third tier review if the health risks from your project exceed the second tier review thresholds. In third tier review, your petition requests that the director of Ecology approve the project based on a risk management analysis.

How do I submit a petition for third tier review?

Submit your petition for third tier review to Ecology, with a copy to the permitting agency that has jurisdiction.

What materials should I provide, and when?

The materials required for a third tier review are the same as for a second tier review. You may submit the third tier petition at the same time you submit the second tier petition. Prior denial of a second tier petition submitted under WAC 173-460-090 is not required. The permitting agency (either a local air quality agency or one of Ecology's regional offices) will provide a preliminary order of approval directly to Ecology. Then follow this protocol to provide information:

Provide to Ecology:

- the results of the refined air dispersion modeling for all pollutants that exceed the SQERs;
- a full copy of the third tier petition (containing a health impacts assessment); and
- a description of environmental benefits of the proposal.

Provide to the permitting authority that reviewed your first tier analysis:

- a full copy of the third tier petition.

In addition to the above documentation, you may propose voluntary measures to reduce community exposure to pollutants emitted by your project. Voluntary measures might include voluntary reduction of emissions from existing unmodified emissions units at your facility or at another facility.

What is the review process for a third tier petition?

Ecology's air toxics engineer, toxicologist, and air quality modeler work together to prepare a recommendation to the director of Ecology to either approve or deny a third tier petition.

Within 30 days after you've submitted the petition, Ecology will:

- review it for completeness; and
- provide you a letter stating the petition is complete or listing needed information if it is not complete.

Within 60 days after determining that your petition is complete, Ecology will:

- write a draft technical support document and send it to you and the permitting agency for review and comment;
- address any questions or concerns brought up during review;
- together with you, initiate a minimum 30-day public notice and public comment period;
- together with you, schedule a public hearing.

After the public hearing, Ecology will review and address all comments. Ecology will then prepare the final recommendation and technical support document, and send them to you and the permitting authority, which issues the actual approval order.

Ecology's final recommendation on the third tier petition must be included in the final decision on the notice of construction application.

What criteria will Ecology follow to approve or deny a petition for third tier review?

Before approving your third petition, Ecology's director must find that the following conditions are met:

- proposed emission controls represent at least tBACT;
- a health impact assessment addressing all of Ecology's requirements has been completed; and
- approval of the project will result in a greater environmental benefit to the state of Washington.

Is public involvement required?

Yes. Public involvement is required for any project that needs a third tier review. The public involvement process must include a public notice and public comment period, as well as a public hearing. The purpose of the public hearing is to present the results of the third tier review and to

answer any questions from the public. You and your consultants should be prepared to explain your project and answer questions at the public hearing.

What can I do if Ecology does not approve the third tier petition?

If Ecology denies the third tier petition, the permitting agency may not approve the project. At that point, you have the following options:

- revise the project and application;
- propose emission reductions from an off-site emission unit; or
- withdraw the application.

My project triggers third tier review. Are there any exemptions from the third tier review process?

No. If your project triggers third tier review, you must submit a third tier petition before your project can be approved.

Health Impact Assessment

This section helps toxic air pollution sources prepare a health impact assessment (HIA) as part of second tier or third tier review, as required in Chapter 173-460 WAC. Ecology's Air Quality Program recommends that permit applicants preparing an HIA refer to the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, published in March 2015 by the Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. (See the citation list at the end of this document.)

The guidance manual addresses the techniques used to assess health risks of airborne contaminants released by new or modified stationary sources like those permitted in Washington. Most of the techniques described in the Hot Spots Program Guidance Manual are common to other regulatory risk assessment applications. However, applicants may need additional analyses depending on their unique circumstances. Applicants should contact Ecology before beginning work on their HIA in order to assure that all WAC 173-460-090 requirements will be satisfied. In general, using the Hot Spots Program Guidance Manual risk assessment procedures and report presentation will speed up Ecology's review. It will also minimize the chance that applicants will need to revise and resubmit their HIA.

What is an HIA?

An HIA looks at how emissions of toxic air pollutants from a specific project will affect public health. It involves several steps, including hazard identification, exposure analysis, toxic response, and risk characterization.

Who needs to submit an HIA?

Second and third tier petitions always need an HIA.

How do I submit an HIA?

When you submit a petition for a second or third tier review, the HIA will be included in your pre-application conference.

Why do I need a pre-application conference?

Pre-application conferences help you learn about regulatory issues before you commit a significant amount of time and resources to a specific course of action. At the pre-application conference, Ecology will tell you what issues need to be addressed in the HIA. This will help you avoid unnecessary costs and delays.

What documentation do I submit with an HIA?

Because each HIA is tailored to fit a specific project, each one may require different documentation. Generally, you will need to include:

- A map of the site and neighborhood showing:
 - location of new or modified emission points;
 - local zoning of the affected area;
 - locations of and distances (in meters) between the sources; and
 - residences, businesses, roadways, public properties, and public or private facilities serving population subgroups such as schools, nursing homes, hospitals, and for certain TAPs, private and public drinking water wells (note the well depth).
- Hazard identification, including:
 - a list of all TAPs (as defined in Chapter 173-460 WAC) that will be emitted by the facility, and
 - a physical description of those TAPs.

For details, refer to the sections below titled “Dispersion Modeling Protocol and Report Contents,” “Contents of the Health Impact Assessment,” and “Outline of the Health Impact Assessment Report.”

What do I need to submit about the TAP concentrations?

You must show how you derived the TAP concentration levels. Include the following:

- emission rates, in grams per unit of time, at the maximum possible rate;
- modeled concentration estimates in $\mu\text{g}/\text{m}^3$ or ppb (disclose the emissions factors used in modeling);
- any available monitoring measurement results; and
- any uncertainties and assumptions in deriving concentration levels.

You must also disclose the cross-media transport of the emissions in the environment, the environmental persistence, the degradation pathways, and the final fate of the toxic air pollutants. This means describe the movement of proposed toxic air emissions from air into water and/or soil which people may be exposed to. Generally, the inhalation pathway of exposure is the largest contributor to the total dose. However, there are situations where a non-inhalation pathway contributes substantially to total dose. You can get detailed guidance on this subject from a variety of authorities, for example EPA's Guidelines for Exposure Assessment (1992) and Exposure Factors Handbook (2011) and OEHHA's Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (2015, chapter five). (See the citation list at the end of this document.)

What materials must I include to assess exposure?

You must identify the TAP exposure pathways, including the following:

- Disclose the total daily intake of TAPs attributable to the project source as well as the background sources. EPA has some ambient air concentration estimates in their NATA database.
- Estimate the durations of exposure, including long-term averages, short-term peaks and worst-case scenarios. Detail the exposure parameters associated with sensitive population subgroups. You can get detailed guidance on this subject from a variety of authorities, including EPA's Guidelines for Exposure Assessment (1992) and Exposure Factors Handbook (2011) and OEHHA's Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, (2015, chapter five). (See the citation list at the end of this document.) Identify the potentially exposed populations. Give special emphasis to any subpopulations that might be unusually susceptible to any TAPs emitted by your project.
- Using the information on the location of potentially exposed populations, show the TAP concentrations at the points where people might be exposed to the pollutants in question.

What issues do I need to address in the toxicity discussion?

The toxicity discussion should focus on the effects relevant to the proposed toxic air pollutant concentrations. The following issues should be thoroughly discussed:

- toxic effects of the toxic air pollutants;
- exposure levels associated with specific effects;
- exposure patterns and duration of exposure as established by studies of the toxic effects;
- any quantitative, chronic toxicity values including:
 - inhalation reference concentration or similar hazard-based concentrations;
 - cancer unit risk factor estimates;
 - slope factor or carcinogenic potency estimates; and
- any quantitative intermediate and short-term acute toxicity values.

What issues do I need to address in the risk/hazard assessment section?

Provide a discussion of offsetting reductions in risk that might accrue to society as a result of completing the proposed facility modification. This typically includes a:

- qualitative discussion of the risks;
- quantitative discussion of the risks with appropriate toxicity measures, calculated cancer risks, and the hazard index;
- discussion of uncertainties in the risk assessment;

- discussion of acceptability of risk with regard to guidelines in Chapter 173-460 WAC; and
- discussion of the extent to which the proposed facility might affect human health.

What issues do I need to address in the uncertainty section?

There is always some level of uncertainty associated with risk assessment. While uncertainty encompasses those factors that are not known, and could be eliminated or reduced with scientific studies, we are not asking you to conduct original research. We want you to disclose your level of confidence in the data used to substantiate your conclusions.

Risk can be over or underestimated because of many factors, including:

- extrapolation of toxicity data in animals to humans;
- uncertainty in the estimation of emissions;
- uncertainty in the air dispersion models;
- interactive effects of exposure to more than one carcinogen or toxicant;
- uncertainty in the exposure estimates; and
- uncertainty about the extent of toxicant susceptibility variation within human populations.

The HIA mentions subpopulations. What is an example of a sensitive or understudied subpopulation?

Children are a subpopulation whose hematological nervous, endocrine, and immune systems are still developing. They may be more sensitive to the effects of carcinogens on their developing systems. These sensitivities are not included in the worker population and risk estimates based on occupational epidemiological data, which are based on adult populations.

Who reviews the HIA?

Ecology's Air Quality Program toxicologists review HIAs. While the toxicologists are reviewing the HIA, the engineer and dispersion modeling staff review other portions of the second or third tier petition. They determine if tBACT and refined modeling are sufficient.

Note that though Ecology's toxicologists review HIA documentation; they are not authorized to prepare the applicant's assessment.

What can I do if Ecology does not approve the HIA?

You have the following options:

- revise the project and application;
- propose emission reductions from an off-site or on-site emission unit;
- submit a third tier petition (See WAC 173-460-100); or
- withdraw the application.

Where can I get more information on the HIA?

Contact either of the Air Quality Program toxicologists:

Matt Kadlec
(360) 407-6817
matt.kadlec@ecy.wa.gov

Gary Palcisko
(360) 407-7338
gary.palcisko@ecy.wa.gov

Contents of the Health Impact Assessment Protocol

Applicants must submit a Health Impacts Assessment Protocol before submitting a draft HIA. The protocol ensures that the applicant will submit sufficient information and is intended to prevent delays caused by incomplete analyses. The protocol should contain a description of how the applicant intends to estimate the health impacts posed by TAPs subject to second tier review. Generally, an applicant will need to provide an air quality analysis that demonstrates compliance with both national ambient air quality standards and toxics review. The following items need to be included in the Health Impact Assessment Protocol:

Emissions Estimate

- Quantify short- and long-term emission rates,
 - mass per hour, day, year;
- Report emission factors and their source and justification;
- Report applicable emission standards and ASILs;
- Provide background concentrations, if known.

Source Characteristics

- Site plan showing fence line, emission units, and other structures;
- Modeling parameters.

Model and Model Assumptions

- AERMOD is to be used in most situations.

Meteorology

- Identify representative surface meteorological data.
 - 5 years of continuous quality-assured/quality-controlled meteorological data/QC'd upper air data

Receptor Grid

- Recommended receptor grid spacing to ensure that sampling error does not reduce the maximum computed concentration by more than 10%:

Distance from Source [m]	Grid Spacing [m]
0 – 150	12.5
150 – 400	25
400 – 900	50
900 - 2000	100
2000 - 4500	300
> 4500	600

Deposition

- For some TAPs, applicants may need to estimate deposition so that multi-pathway exposures can be assessed. These TAPs include:
 - 4,4'-Methylene dianiline
 - Creosotes
 - Diethylhexylphthalate
 - Hexachlorocyclohexanes
 - PAHs
 - PCBs
 - Cadmium & compounds
 - Chromium VI and compounds
 - Inorganic arsenic and compounds
 - Beryllium and compounds
 - Lead and compounds
 - Mercury and compounds
 - Nickel
 - Fluorides (including hydrogen fluoride)
 - Dioxins and furans

Model Output/Results

- Files provided to Ecology
- Modeling results to be used to demonstrate compliance or assess risk

Receptors

- Identify receptors where the ASIL is exceeded.
 - Identify maximally-exposed residential, workplace receptors and point(s) of maximum impact. (**Note:** Maximally-impacted receptors around a site can vary depending on concentration averaging time.)

Short-term and long-term risk-based exposure concentrations

Depending on which chemicals are being evaluated and the type of receptor that is impacted, short-term and/or long-term ambient concentrations are needed.

- Short-term = typically 1-hr., 8-hr., 24-hr. concentrations
- Long-term = typically annual average concentration

Acute and chronic non-cancer hazard (1-hr., 8-hr., 24-hr., annual exposure concentrations)

For all non-carcinogenic toxic air pollutants exceeding their SQERs:

- Identify relevant short-term and long-term non-cancer toxicity values for chemicals exceeding SQERs
 - For example: EPA RfCs, OEHHA RELs, ATSDR MRL
- Calculate Hazard Quotients (HQ)
 - Exposure concentration ($\mu\text{g}/\text{m}^3$) divided by risk-based concentration ($\mu\text{g}/\text{m}^3$)
- For multiple chemicals with similar toxic effects (i.e., same tissue or organ system), calculate Hazard Index
 - Sum hazard quotients with same averaging time and similar toxic effects for all toxic air pollutants that exceed the SQER
- Determine the frequency and geographic extent that short- and long-term concentrations exceed relevant toxicity values (i.e., HQs > 1)

Cancer risk (annual exposure concentrations)

For all carcinogenic toxic air pollutants exceeding their ASILs and SQERs:

- Identify existing inhalation unit risk factors or cancer potency factors
- Calculate lifetime increased cancer risk from exposure to each TAP
- Calculate the sum of cancer risks for all chemicals emitted in excess of SQER to produce the total increased cancer risk from project
- Identify population exposed in excess of one per million and estimate total population risk from project

Outline of the Health Impact Assessment Report

In general, the HIA should provide information about:

- Project description
- Emissions
- Air dispersion modeling
- ASIL screening
- Risk assessment
 - Hazard identification, exposure, dose-response (which criteria are used to estimate risk), risk characterization, uncertainty
 - Discussion of acceptability of risk

Recommended Outline of an HIA

Note: Not every item below will be required in every HIA report. Ecology staff will discuss the specific requirements of your HIA report during the pre-application meeting.

Project description

- Project overview
- Physical location
 - Address, city, county
 - Land use (zoning) in areas adjacent to project
 - Site map showing emission points, property boundary, off-site receptors (outside any limited public access boundary maintained around the facility, and the locations of any buildings and their usage (i.e., housing, business, school, etc.))

SQER and ASIL comparison

- Comparison of facility emission rates of TAPs to their respective SQER
 - Model concentrations of those that exceed their SQER
 - Compare results to their ASIL(s)
- Refined dispersion modeling to estimate off-site concentration of those TAPs to their respective ASILs
- If a chemical exceeds its ASIL at an off-site location, then a health impact assessment is performed.

Hazard identification

- Identification of the TAPs that may pose a threat to human health (those that exceed ASILs and those that exceed SQERs with similar effects).
- Physical description of the TAP (s) emitted in amounts greater than their SQER and overview of each chemical's toxicity (i.e., affected tissue/organ and the critical effect. For example, acrolein: Eyes and respiratory tract; eye irritation and respiratory epithelium lesions).
- Potential for cross-media transport in the environment, environmental persistence, degradation pathways, and final fate of the TAP(s). Provide public water solubility data, and degradation half-lives in air, water, and soil.

Identification of places with potentially-exposed people (off-site)

- For example, residences, businesses, parks, schools, hospitals within the geographic extent where estimated concentrations are greater than the ASIL.

Discussion of TAP concentrations

- Using the information on location of potentially-exposed populations, TAP concentrations that exceed ASIL(s) should be given at points where humans might come into contact with the TAP(s).
- Derivation of the concentration levels should be discussed.
- Concentration estimates, in $\mu\text{g}/\text{m}^3$ by modeling and emissions factors used in modeling.
 - Averaging times may vary depending on the project and potentially-exposed receptors, but examples are:
 - Maximum 1-hr., 8-hr., and 24-hr. exposure – for chemicals that have the potential to cause acute effects over a short time
 - Annual average exposure – for chemicals that have the potential to cause cancer or other chronic effects
 - Display results on maps

Exposure assessment

- Identification of TAP exposure pathways
- Development of total daily intake attributable to source and background sources (existing ambient air concentration estimates for some pollutants are available in EPA's NATA)
 - Durations of exposure, including long-term averages, short-term peaks, and worst-case scenarios
 - Exposures at maximally-affected residence(s), business(es), and fence line (limited public access boundary) places
 - Exposure parameters associated with sensitive population subgroups. For example, situations where children may be frequently exposed may warrant child-specific exposure parameters.

Toxicity (should focus on effects relevant to proposed TAP concentrations)

- Description of toxic effect(s)
- Exposure levels associated with effect(s)
- Exposure pattern and duration of exposure in studies of toxic effects
- Any quantitative, chronic toxicity values
 - Inhalation reference concentration or similar hazard-based concentrations
 - Cancer unit risk factor estimates
 - Oral risk based concentrations for substances evaluated through multi-pathways of exposure
- Quantitative intermediate/short-term toxicity values
- Discussion of how the site-specific toxicity value considers exposure duration and frequency at the site

Risk/hazard characterization

- Qualitative discussion of the risk(s)
- Quantitative discussion of the risk(s)
 - With appropriate measure(s) of toxicity
 - Calculated cancer risk(s)
 - Hazard quotients and hazard indexes, if there are any co-acting combinations of TAPs. (Critical effect –specific hazard indexes for TAPs emitted at rates above their SQERs for any co-acting combination of such TAPs.)

Discussion of uncertainty and variability of numeric values used in the HIA

A HIA is composed of many numeric values – each with its own uncertainty and/or variability. Uncertainty is that which is not known about a factor that influences its value. Variability occurs when a quantity that is repeatedly measured exhibits values that differ. It can be quantified using descriptive statistics such as the range.

Discussion of acceptability of risk with regard to guidelines in Chapter 173-460 WAC

- Increased cancer risk is no more than 10 per million
- Non-cancer hazard quotients or indexes are less than one, or Ecology determined that non-cancer hazards are acceptable

Second and Third Tier Review Timeline

Step 1: Applicant submits to Ecology:

- full copy of the second or third tier petition (including all of the elements discussed in the HIA protocol);
- results of the refined air dispersion modeling for all pollutants that exceed the ASILs;
- preliminary order of approval issued by the permitting agency (The permitting agency will generally provide the preliminary order of approval directly to Ecology. The permitting agency is either a local air quality agency or one of Ecology's regional offices.); and
- description of environmental benefits of the proposal (for a **third tier petition**).

Step 2: Within 30 days after receiving the petition, Ecology will:

- review it for completeness; and
- issue a letter stating the petition is complete or list all information needed to complete the petition.

Step 3: Within 60 days after determining a petition is complete, Ecology will:

- write a draft technical support document and send it to the applicant and permitting agency for review and comment;
- address any questions or concerns brought up during that review;
- for a **second tier petition**, make a final decision to recommend approval or denial of the project, and send the **final second tier** recommendation to the applicant and the permitting agency;
- for a **third tier petition**, prepare a third tier review recommendation and technical support document for public comment, and send them to the applicant and the permitting agency.

Step 4: Permitting agency initiates a public comment period on the draft notice of construction approval

After receiving Ecology's recommendation on the second or third tier petition, the permitting agency and the applicant must:

- provide a minimum 30-day public notice and a public comment period before approving or denying a notice of construction application involving second or third tier review;
- include the draft notice of construction approval order and Ecology's recommendation on the second or third tier petition as part of the public review documents;

- hold a public hearing to discuss the third tier petition and to answer questions from the public; and
- in consultation with Ecology, address any questions or concerns brought up during the public comment period.

Step 5: Final approval or denial of the project by the permitting agency

- If Ecology recommends approval of the project, the permitting agency may approve the notice of construction application.
- If Ecology recommends denial of the project, the permitting agency may not approve the project.

Second and Third Tier Review Fees

Purpose

This section explains second and third tier review fees and key process changes to applicants and consultants who submit health impact assessments under Chapter 173-460 WAC. These changes were prompted by a 2011 fee rule that changes the way Ecology collects fees and charges time for work spent reviewing health impact assessment documents.

Background

Beginning July 1, 2011, Ecology changed the fee schedule for permitting activities covered under our new source review program. These fee increases, which were authorized by the 2011 legislature, must support the cost of issuing a permit. Ecology accomplishes this by collecting an initial fee with the application that will cover a set number of review hours (base hours), depending on application type and a \$95 per hour fee for the hours above base needed to complete the review and issue the permit. A notice summarizing all of the changes made by Ecology to the permitting fees regulation is available at <http://www.ecy.wa.gov/biblio/1102028.html>.

How the 2011 Fee Structure Affects Second and Third Tier Review

Under the 2011 fee structure, each member of Ecology's toxics review team will provide approximately 2 hours of pre-application assistance to the applicant. Time spent on pre-application assistance will not be counted toward the permit fee (not toward the initial fee or any additional fee) billed to the applicant, and will be provided in the form of one meeting between the applicant and Ecology, as well as any required advanced preparation for that meeting. Our goal in this pre-application assistance is to provide you with the majority of the information you need to prepare your health impact assessment protocol for submission to Ecology.

Once Ecology has provided information in the meeting, we will still be available to offer limited guidance to you as you prepare your protocol; however, the next step is for you to submit a health impact assessment (HIA) protocol along with the initial review fee of \$10,000. The fee must be submitted with the protocol to Ecology's fiscal office before Ecology will review or approve the HIA protocol.

The HIA protocol must be accompanied by a completed application for second or third tier review. The application form includes the Health Impact Assessment Checklist and is available at <http://www.ecy.wa.gov/biblio/ecy070415.html>.

Alternate Method for Continuing Discussions with Ecology

It is our goal that you know how to proceed to develop the HIA by the end of the pre-application meeting. If you think your project needs more than a 2-hour meeting with Ecology, you have three choices:

- Submit the Application for Second Tier Review or Third Tier Review along with your \$10,000 check. Ecology will meet with you to help you prepare your HIA and we will track our time against your initial fee.
- Enter into a contract with Ecology for additional upfront work. The rate is \$95 per hour. We charge the same rate for working on your project under either option.
- Request Ecology stop working on the project once the 2 hours of “free” (included in the initial review fee) pre-application assistance are used up.

The Initial Fee You Submit May Not Cover the Cost of Processing Your Petition

The \$10,000 initial fee you submit covers up to 106 hours of Ecology’s review time. Ecology will track the number of hours spent on your project and will notify you when we approach the 106 hours covered by the initial fee. If the total number of review hours exceeds 106 hours, Ecology will bill you \$95 per hour for each additional hour worked. We will bill you at the end of the process just before we issue a final decision. You must pay the bill before Ecology will issue a decision on your petition.

Public Hearing

The applicant is responsible for costs associated with a public hearing, if one is held. This includes staff time to prepare for the public hearing, travel time to and from the public hearing, time spent conducting the public hearing, time spent responding to public comments, and publications costs for a newspaper notice.

Changes to HIA Review Procedure

Ecology’s goal is to complete our review of the HIA in a timely manner so that applicants are not charged additional hourly charges. To accomplish this goal, Ecology has changed the way we review the health impact assessment. The primary changes to our review procedure include:

- Ecology will provide the minimum amount of pre-application assistance necessary to advise the applicant of the demonstrations and submittals necessary to meet permitting requirements (one meeting lasting about 2 hours).
- Ecology will review the HIA protocol after the applicant submits the \$10,000 initial fee with the HIA protocol and complete second or third tier application. The HIA protocol review process can be one of continuous improvement, until an acceptable HIA protocol has been prepared.

- Based on the approved HIA protocol, the applicant will prepare and submit an HIA document for review by Ecology.
- Ecology will provide substantive and non-substantive comments on the HIA document and will request the applicant revise the HIA document, as necessary. This process can be one of continuous improvement, until an acceptable final HIA document has been prepared by the applicant. Ecology's project engineer or delegate will review portions of the HIA that involve the project's engineering specifications. Likewise, Ecology's meteorological modeler will review portions of the HIA that involve toxic air pollutant (TAP) concentration modeling. Following confirmations by the engineer and modeler, Ecology's project toxicologist will review risk assessment portions of the HIA. The toxicologist will then communicate to all parties the results of their review of the HIA.
- Once an acceptable HIA document has been prepared, Ecology will prepare a brief staff report which summarizes Ecology's review of the HIA and includes a recommendation(s) to the local permitting authority regarding the petition.
- Ecology will post the applicant's final HIA document and Ecology's staff report and cover letter on Ecology's air toxics review web page.

Who to Contact for More Information

For more information, contact:

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Citations

Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, Oakland, CA, March 2015 (http://oehha.ca.gov/air/hot_spots/hotspots2015.html)

U.S. EPA. Guidelines for Exposure Assessment. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC, EPA/600/Z-92/001, 1992.
(<http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=15263>)

U.S. EPA. Exposure Factors Handbook 2011 Edition (Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.
(<http://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252>)