State of Oregon
DEQ Department of Environmental Quality

Toxic Air Contaminant Review and Update Rulemaking

Draft Fiscal Impact Statement

Introduction

DEQ invites public input on proposed permanent rule amendments to chapter 340 of the Oregon Administrative Rules (OARs). Division 247 contains "Health Risk-Based Standards for Toxic Air Contaminants." The rules require DEQ to periodically review and update the health risk-based standards for toxic air contaminants (TACs) to ensure standards reflect the latest science and practices for establishing Toxicity Reference Values (TRVs). The regulatory standards, used by Cleaner Air Oregon, known as Risk Based Concentrations (RBCs), are based on TRVs, so updates to the TRVs in Division 247 also require updates to the corresponding RBCs. RBCs are used to ensure industrial source emissions do not pose excess risk to communities.

In this rulemaking, DEQ is proposing to update values in the rule tables in Divisions 245 and 247 as required under the Division 247 rules. Additionally, DEQ is proposing updates to rule language in these Divisions.

- Rule language in Division 245 that:
  - Establishes when sources must assess risk using the revised RBCs after rule adoption:
    - Sources with in-progress assessments may complete those assessments using the RBCs in effect at the time they began the risk assessment process.
    - If DEQ determines that the revised RBCs could cause the risk from a source's approved risk assessment to exceed either the TBACT or TLAER level, DEQ can require that source to assess risk using the revised RBCs.
    - Sources would be required to assess risk using the revised RBCs when applying for a permit renewal if they have not previously done so.
  - Provides new or reconstructed sources with the option of getting on a Risk Reduction Plan after re-assessing risk using the revised RBCs.
  - Allows flexibility for sources performing a risk assessment under the CAO program proposing to adjust the underlying exposure assumptions for certain RBCs.
  - Revises the existing source submittal process to align with new and reconstructed sources, requiring a single submittal rather than multiple submittals, and providing a single deadline for that submittal.
  - Other minor housekeeping revisions.

- Rule language in Division 247 proposes to update the frequency for reviewing and updating the TRVs.
- OAR 340-247-8010, Table 1, “Priority Toxic Air Contaminant List” – this table provides the emissions reporting requirements for TAC emissions.
- OAR 340-247-8010, Table 2, “Toxicity Reference Values” – this table establishes the air quality standards for TACs.
- OAR 340-245-8010, Table 2, “Risk-Based Concentrations” – this table sets the values used under the Cleaner Air Oregon (CAO) program to determine cumulative risk and whether action to mitigate the risk is required.

Fee analysis

This rulemaking does not involve fees. The current program fees are in OAR 340-216-8020 Table 2, Parts 3 & 4 and OAR 340-216-8030 Table 3. These tables have been provided as Attachment A to this document, for convenience.

Statement of fiscal and economic impact

Fiscal and economic impact

The proposed rules could have fiscal impacts on regulated air quality sources in the state as well as the general public.

Background

Updates to both the reporting requirements for the “Priority Toxic Air Contaminant List” (Division 247) and the Risk-Based Concentrations (RBCs) used by Cleaner Air Oregon, under Division 245, are likely to have the rulemaking’s most significant fiscal and economic impact on the regulated businesses with air quality permits in the state. Other proposed rule updates may also impact these sources, but to varying degrees. In addition to the regulated business community, the proposed rules could have positive fiscal and economic impacts on the general public related to reduced adverse public health outcomes.

DEQ used the statement of fiscal and economic impact developed for the original adoption of the CAO program rulemaking as the starting point for estimating potential impacts. The 2018 analysis is provided as an attachment to this document as “Attachment B: Statement of Fiscal and Economic Impact from Notice of Proposed Rulemaking for Cleaner Air Oregon Program” (Attachment B). The 2018 fiscal analysis was developed through a rigorous assessment of the fiscal and economic impacts to regulated businesses in the state subject to the CAO program. It includes estimated costs of performing risk assessments for facilities of different sizes and complexities, as well as cost ranges associated with installation and operation of standard emission control devices (Attachment B – Tables 6 & 7). It also includes descriptions of the types of negative health effects that people breathing toxic air contaminants may experience, including adverse birth outcomes, and the estimated costs of some chronic diseases tracked in Oregon (Attachment B – Tables 8-10). DEQ staff reviewed Attachment B and concluded that the framework and analysis used in Attachment B remain viable and appropriate to use at this time, with adjustments for cost index increases since the adoption of the CAO program in November 2018.

Potential Impacts to Regulated Air Quality Sources

The proposed updates to the RBCs in Division 245 are likely to pose the most significant fiscal and economic impacts to regulated businesses with air quality permits. This is because the proposed RBCs could affect the outcomes of risk assessments performed under the CAO program as compared to the current RBCs. When assessing risk using the proposed RBCs, a permitted source's risk could increase or decrease relative to the risk assessed using the current RBCs in rule – for RBCs that will be lower, a source's risk may increase, and for RBCs that will be higher, a source's risk may decrease.

Any fiscal impact would be based on the complexity of the risk assessment and the applicability of existing program fees (Attachment A) triggered by the proposed changes to the RBCs and estimated costs of controls that may be needed to meet the program requirements. DEQ has provided cost estimates from the original analysis in Attachment B adjusted using the Producer Price Index for 2026 dollars in the tables below.

Task	Simple	Complex
Emissions inventory	$0[1]-$6,863	$82,358
Level 1 Assessment – Dispersion Table	$137	$6,863
Level 2 Assessment – Screening modeling	$6,863	$48,042
Level 3 Assessment – Refined modeling	$6,863	$137,263
Level 4 Assessment – Health Risk Assessment	$6,863	$686,313

Table 1. Adjusted[2] costs for emissions analysis and risk assessments.

Similarly, risk assessed using the proposed RBCs may cause a facility to exceed Risk Action Levels under OAR 340-245-8010 Table 1 and require actions that would not have been required by that facility under the current RBCs. Required actions may increase both the applicable program fees (Attachment A) and estimated costs (Tables 1 and 2) – for example, an increase in the stringency of an RBC could lead to risk exceeding action levels, where the use of the current RBC would not, which could require community engagement meetings, risk reduction plans, and installation of control devices. In cases where the stringency of an RBC is reduced relative to the current RBC, a permitted source's risk could decrease, leading to reduced program fees and potentially more operational flexibility and/or could reduce the need to install control devices. The following table shows inflation adjusted costs for some common control devices.

[1] DEQ is completing the emissions inventories for all of the approximately 2,200 sources that have Basic and General Air Contaminant Discharge Permits.

[2] Costs adjusted at a rate of 137% from 2018 dollars, based on engineering services from Table 11 of the Producer Price Index, from the Federal Reserve of St. Louis, based on data from the U.S Bureau of Labor Statistics. (May 2026)

Control Device	Initial Cost Range	Operating Cost Range
Fabric Filter (baghouse)	$408,747 - $21,005,069	$203,374 - $7,039,537
Electrostatic Precipitator (ESP)	$363,331 - $8,061,405	$113,541 - $8,629,109
Enclosure	$15,896 - $476,872	$454 - $11,354
HEPA filter	$14,760 - $272,498	NA
Wet scrubber	$28,385 - $193,020	$21,571 - $942,390
Thermal oxidizer	$19,302 - $7,039,537	$3,974 - $5,904,127
Regenerative thermal oxidizer	$1,067,285 - $8,742,650	$124,895 - $624,475
Catalytic reactor	$23,844 - $7,039,537	$4,428 - $1,930,196
Carbon adsorber	$408,747 - $2,838,523	NA

Table 2. Adjusted[3] costs for pollution control equipment installation and operation.

In addition to the potential impacts from increases or decreases to risk using the proposed RBCs, the proposed updates to the reporting requirements under Division 247 in the Priority Toxic Air Contaminant List could lead to increased costs for reporting emissions for some permitted sources. These costs would be associated with the increased time required to determine the emissions from the proposed additional TACs. However, because DEQ does not currently require reporting of these proposed TACs, there is no way to determine the number of sources affected or the extent to which those sources would be impacted fiscally.

Additionally, DEQ is proposing a number of rule language updates to Division 245 that could have a fiscal impact on permitted sources under the CAO program, as well as some changes that would affect the timing of fiscal impacts. For example, DEQ is proposing language that defines when sources would be required to assess risk using the proposed RBCs upon adoption by the Environmental Quality Commission. This change is proposed to provide certainty to regulated entities. Also in this category is proposed language that allows new or reconstructed sources to develop and implement a Risk Reduction Plan if the revised RBCs demonstrate new

[3] Costs adjusted at a rate of 114% from 2018 dollars, based on “Industrial and manufacturing plant and process engineering projects” from Table 11 of the Producer Price Index, from the Federal Reserve of St. Louis, based on data from the U.S Bureau of Labor Statistics. (May 2026)

risk levels exceeding thresholds which could require a source to make changes to their facility or operations (for example, installing controls).

The proposed rule updates that could have fiscal impacts include proposed rule language that provides flexibility to sources performing a Risk Assessment that allows adjustments to underlying exposure assumptions for specific chemicals, where appropriate, without requiring a Level 4 Risk Assessment. This could reduce the risk assessment fees (Attachment A) by over 50% in some cases, as well as potentially reducing the cost to the source for environmental services needed to prepare the assessment (Table 1).

Additionally, DEQ is proposing to revise the submittal process and deadlines for existing sources required to perform a risk assessment. The proposed changes would reduce the number of submittals and approvals required for risk assessment materials to a single submittal that includes all of the materials. Under the current process in rule, DEQ technical staff and permittees spend significant amounts of time refining Emissions Inventories. In some cases, the uncertainty around emissions-producing activities can result in requiring a source to perform source testing. These rounds of reviews and approvals, as well as source testing, can have significant impact on the overall cost to the source for completing the risk assessment. DEQ anticipates that the proposed process change could lead to reductions in the costs of compliance related to consultation and source testing.

By requiring the Emissions Inventory, Modeling Protocol, Risk Assessment Work Plan (required for Level 3 or 4 assessments), and the final Risk Assessment itself submitted at the same time, DEQ will be able to better understand the impact that emissions from specific activities will have on the risk to community members nearby. This should allow for quicker resolution when there is uncertainty in emissions estimates by allowing technical staff to review the Emissions Inventory materials and the modeled results simultaneously. DEQ anticipates that this will reduce the number of reviews and requests for additional information potentially reducing source testing requirements when the agency has identified that “high uncertainty” emissions do not contribute significantly to the overall source risk. This could reduce both the monetary costs to the source and the time required to approve a risk assessment.

Potential Impacts to the General Public

There could be fiscal and economic impacts to the public based on the proposed rules. People who are exposed to toxic air contaminants at sufficient concentrations and durations have an increased chance of developing cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. In addition to exposure from breathing toxic air contaminants, some contaminants, such as mercury, can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and are eventually magnified up through the food chain. Descriptions of these health effects and adverse birth outcomes can be found in Attachment B, tables 8 and 10.

The proposed rules could result in reduced emissions and less exposure to toxic air contaminants by people who live, work, and play in proximity to sources that emit these contaminants. Less exposure to these toxics should result in fewer premature deaths and illnesses allowing Oregonians to experience longer lives, better quality of life, lower medical expenses, fewer work and school absences, and better worker

productivity – all of which have a positive economic benefit to the general public. Some costs of chronic diseases to Oregonians can be found in Attachment A, table 9 from the 2018 statement of fiscal and economic impact.

Key findings from the 2018 staff report were that:

- Many TACs regulated under CAO and for which TRV updates are proposed are associated with increased risk of the top four non-accidental causes of death in Oregon (heart disease, stroke, respiratory disease, and cancer).[4]
- It is not possible to know what proportion of chronic disease cases are attributable to industrial and commercial air toxics.
- Data clearly show that chronic diseases have a substantial social and economic impact in Oregon (See "Public Impact" section of Appendix B). If even a small fraction of these chronic health outcomes is attributable to air toxics, reducing emissions could prevent substantial health costs.

The only update to those findings since the 2018 staff report is that the per-case cost of treating disease in Oregon has increased. These increases in healthcare costs are outpacing increases in income, meaning that more people are delaying or avoiding healthcare visits or rationing medication which can jeopardize health outcomes.[5]

Cheaper housing is more likely to be located near sources of air pollution including industrial sources.[6] Therefore, the populations most likely to live near permitted CAO facilities – those most exposed - are also more likely to have lower incomes and less ability to pay for healthcare costs. They are also more likely to have healthcare funded by taxpayer dollars through programs like the Oregon Health Plan (Medicaid).

Even if only a small fraction of chronic disease is attributable to industrial air toxics, the scale of the cost of chronic disease means that small, incremental decreases could mean large cost savings. EPA[7] concluded that the benefits of controlling air pollution exceed compliance costs by a factor of more than 30 to 1; meaning that for every $1 spent on installing controls or reducing air pollution, there is a $30 benefit for public health, with roughly 85% of these health benefits driven by avoidance of premature mortality8.

[4] OHA. 2024. Leading Causes of Death - https://visual-data.dhsoha.state.or.us/t/OHA/views/LeadingCausesDash/LeadingDash1?%3AisGuestRedirectFromVizportal=y&%3Aembed=y)

[5] OHA. 2025. Impact of Health Care Costs on People in Oregon, 2024. https://www.oregon.gov/oha/HPA/HP/Cost%20Growth%20Target%20documents/2024-Impact-of-Health-Care-Costs-on-Oregonians_FINAL.pdf

[6] Goplerud, DK, et. al. 2022. The Spatial Relationship Between Low-Income Housing Tax Credit Program and Industrial Air Pollution. Cityscape. U.S. Department of Housing and Urban Development. https://www.huduser.gov/portal/periodicals/cityscape/vol24num3/ch7.pdf

[7] U.S. Environmental Protection Agency. (2011) The Benefits and Cost of the Clean Air Act from 1990 to 2020: Final Report – Second Prospective Study. Office of Air and Radiation.

Statement of cost of compliance

State agencies

No increased cost of compliance to DEQ or the Oregon Health Authority is anticipated based on the proposed rules relative to the 2018 fiscal impact analysis performed for the establishment of the CAO program. The proposed increase from every three to every five years for requiring a review and update of the TRVs could lead to cost reductions to these agencies.

Some state agencies own and operate air quality permitted sources in the state, and in some cases, could experience cost of compliance increases. Increases could occur if the proposed updates lead to increased emissions reporting and/or increased risk and additional compliance requirements under the CAO program for those sources. In cases where the proposed updates lead to decreased risk or sources would be allowed to make exposure adjustments to specific contaminants without performing a Level 4 Risk Assessment, permitted sources could experience a decrease in the cost of compliance.

Local governments

Local governments own and operate approximately 62 air quality permitted sources in the state. Some of these sources could experience cost of compliance increases if the proposed updates lead to increased emissions reporting and/or increased risk and additional compliance requirements under the CAO program. In cases where the proposed updates lead to decreased risk or sources would be allowed to make exposure adjustments to specific contaminants without performing a Level 4 Risk Assessment, permitted sources could experience a decrease in the cost of compliance.

Public

The proposed updates to the Priority Toxic Air Contaminant List, TRVs, and the RBCs were established using the most up to date and appropriate methods and science. One benefit to the public is that DEQ will continue to collect information on toxic air contaminant emissions in the state and assess potential health risks to the public from exposure to these contaminants. This not only applies to permitted facility emissions, but also to estimated emissions from a number of other sources (for example, transportation, biogenic, and wildfire emissions), as well as to monitoring data collected by DEQ across the state. This information is critical for developing short- and long-term strategies for reducing public health risks from exposure to toxic air contaminants, which ultimately leads to reduced costs to the public in general.

In most cases, the proposed changes either introduce new standards for new, or current, toxic air contaminants or reduce the allowable exposure levels from the current values in rule. This means that the proposed rules could lead to potential reduced emissions from air quality permitted sources under the CAO program, which results in reduced exposure to these contaminants by the public.

Impacts on the public of CAO in general are described in the staff report for the 2018 rules (See “Public Impact” section of Appendix B).

Large businesses - businesses with more than 50 employees

Large businesses may experience cost of compliance increases in cases where the proposed updates lead to increased emissions reporting and/or increased risk and additional compliance requirements under the CAO program. In cases where the proposed updates lead to decreased risk or sources would be allowed to make exposure adjustments to specific contaminants without performing a Level 4 Risk Assessment, permitted sources could experience cost of compliance decreases.

Small businesses – businesses with 50 or fewer employees

Small businesses may experience cost of compliance increases in cases where the proposed updates lead to increased emissions reporting and/or increased risk and additional compliance requirements under the CAO program. In cases where the proposed updates lead to decreased risk or sources would be allowed to make exposure adjustments to specific contaminants without performing a Level 4 Risk Assessment, permitted sources could experience cost of compliance decreases.

To mitigate costs to small businesses, DEQ provides significant Small Business Technical Assistance under the CAO program for developing emissions inventories and reporting emissions. In some cases, DEQ staff work with small business owners to complete entire Risk Assessments. This technical assistance provides significant cost of compliance reductions by providing the services typically performed by environmental consultants free of charge to these small businesses – these estimated costs are in Table 1.

ORS 183.336 Cost of Compliance Effect on Small Businesses

a. Estimated number of small businesses and types of businesses and industries with small businesses subject to proposed rule.

Based on information submitted to DEQ by permitted sources, DEQ currently estimates there are 83 small businesses that could be required to assess risk using the proposed RBCs under the CAO program, as this is the number of small businesses with Simple and Standard Air Contaminant Discharge Permits.

b. Projected reporting, recordkeeping and other administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule.

As indicated, there are no new or increased fees and the impacts to cost of compliance are dependent on any increased reporting requirements and the outcomes of risk assessments performed by small businesses. DEQ provides Small Business Technical Assistance to mitigate these costs.

c. Projected equipment, supplies, labor and increased administration required for small businesses to comply with the proposed rule.

As indicated, there are no new or increased fees and the impacts to cost of compliance are dependent on any increased reporting requirements and the outcomes of risk assessments performed by small businesses.

d. Describe how DEQ involved small businesses in developing this proposed rule.

DEQ included small business owners and operators as members of previous advisory committees for development of the original CAO rulemaking when DEQ established the fees and potential program costs (Attachments A and B). DEQ has also included small business owners and operators in the current rulemaking advisory committees to provide input on the potential changes to the costs of compliance from the proposed rules.

Documents relied on for fiscal and economic impact

The requirement to list the documents relied on to determine fiscal impact is separate from and in addition to the similar list in the Rules affected, authorities, supporting documents section above.

Document title	Document location
Cleaner Air Oregon Notice of Proposed Rulemaking (2018)	Link to the Notice of Proposed Rulemaking
Producer Price Index – Table 11. Producer price indexes for the net output of selected industries and their products, not seasonally adjusted. Federal Reserve Bank of St. Louis, U.S. Bureau of Labor Statistics. (2026)	Link to Producer Price Index Table 11
Leading Causes of Death – Oregon Health Authority (2024)	Link to OHA data on Leading Causes of Death
Impact of Health Care Costs on People in Oregon – Oregon Health Authority (2025)	Link to OHA Health Care Cost document
Goplerud, DK, et. al. 2022. The Spatial Relationship Between Low-Income Housing Tax Credit Program and Industrial Air Pollution. Cityscape. U.S. Department of Housing and Urban Development.	Link to article on low-income housing and air pollution.

Housing cost

As ORS 183.534 requires, DEQ evaluated whether the proposed rules would have an effect on the development cost of a 6,000-square-foot parcel and construction of a 1,200-square-foot detached, single-family dwelling on that parcel.

DEQ determined the proposed rules may have effect on these development costs. The costs of additional permits, pollution control or process equipment, and compliance could be passed through by businesses providing products and services for such development and construction. The possible impact of these proposed changes appears to be minimal. DEQ cannot quantify the impact at this time because the available information does not indicate whether the costs would be passed on to consumers and any such estimate would be speculative.

Racial equity

ORS 183.335(2)(a)(F) requires agencies to provide a statement identifying how adoption of the rule will affect racial equity in this state.

The proposed updates to the health-based standards (TRVs) are based strictly on assessment of toxicological information and have been established to be protective of sensitive populations. In some cases, the TRVs are based on data from human epidemiological studies and may not adequately include non-white populations. This means there is the potential that some TRVs are based on racially inequitable information. However, in developing TRVs authoritative sources apply uncertainty factors to mitigate differences in sensitivity between populations in these types of studies, including any special sensitivity derived from race. In more recent studies, toxicologists work to include more diversity in epidemiological studies, which is why periodically reviewing and updating the TRVs is critically important for ensuring that DEQ is using the most up to date and representative science.

Additionally, the assessment of risk under the CAO program applies the regulatory standards (RBCs) to determine the exposure location with the highest risk and regulates TAC emissions to be protective of that risk level for all nearby community members. In this way the proposed rule updates do not lead the agency to make decisions that disproportionately disadvantage on the basis of race.

Environmental justice considerations

ORS 182.545 requires natural resource agencies to consider the effects of their actions on environmental justice issues.

182.545 Duties of natural resource agencies. In order to provide greater public participation and to ensure that all persons affected by decisions of the natural resource agencies have a voice in those decisions, each natural resource agency shall:

(1) In making a determination whether and how to act, consider the effects of the action on environmental justice issues.
(2) Hold hearings at times and in locations that are convenient for people in the communities that will be affected by the decisions stemming from the hearings.
(3) Engage in public outreach activities in the communities that will be affected by decisions of the agency.
(4) Create a citizen advocate position that is responsible for:
    (a) Encouraging public participation;
    (b) Ensuring that the agency considers environmental justice issues; and
    (c) Informing the agency of the effect of its decisions on communities traditionally underrepresented in public processes.

ORS 182.545 requires natural resource agencies to consider the effects of their actions on environmental justice issues.

The CAO Program is designed to regulate and reduce TAC emissions from major and non-major sources of air pollution in Oregon. Environmental justice communities are often fence-line communities near these emissions sources. Updating the TRVs and RBCs in this rulemaking ensures that the health-based standards and their corresponding regulatory values reflect the latest science and practices to regulate emissions from these facilities in traditionally overburdened communities.

DEQ considered the effects of the current rulemaking by including advisory committee members representing environmentally overburdened communities. Due to the highly technical nature of

this rulemaking, DEQ and OHA developed a number of educational materials for the public intended to assist with communicating the background information needed to understand the proposed rules and the potential impact these changes could have on the assessed risk from TAC emissions in their communities – these materials included supplemental reports on specific items, fact sheets, and online video presentations. Additionally, DEQ and OHA held office hours for RAC members between meetings to allow additional opportunities for members to ask clarifying questions and have further discussions on the background information used to establish the proposed rules. Finally, DEQ is proposing to include Environmental Justice criteria when prioritizing sources under the CAO program to perform a risk assessment using the updated RBCs. In these ways DEQ has actively taken steps to consider and include Environmental Justice considerations in this rulemaking.

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age, sex, religion, sexual orientation, gender identity, or marital status in the administration of its programs and activities.

For translation or other formats, visit DEQ's Civil Rights and Environmental Justice page.

Attachment A: Current Cleaner Air Oregon Program Fees

Part 3. Cleaner Air Oregon Annual Fees: (Due date 12/1 for 1/1 to 12/31 of the following year)		
Basic ACDP	(A) #1-7 OAR 340-216-8010 Table 1 Part A	$159.00
	(B) #8-9 OAR 340-216-8010 Table 1 Part A	$316.00
General ACDP	(A) Fee Class One	$315.00
	(B) Fee Class Two	$569.00
	(C) Fee Class Three	$823.00
	(D) Fee Class Four	$159.00
	(E) Fee Class Five	$53.00
	(F) Fee Class Six	$105.00
Simple ACDP	(A) Low Fee	$844.00
	(B) High Fee	$1,687.00
Standard ACDP		$3,377.00
1. DEQ may extend the payment due date for dry cleaners or gasoline dispensing facilities until March 1st.		

Part 4. Specific Activity Fees:		
Notice of Intent to Construct Type 2[1]		$720.00
Permit Modification	(A) Non-Technical	$432.00
	(B) Basic Technical	$540.00
	(C) Simple Technical	$1,800.00
	(D) Moderate Technical	$9,000.00
	(E) Complex Technical	$18,000.00
Toxic Air Contaminant Permit Addendum Modification	(A) Non-Technical	$452.00
	(B) Basic Technical	$452.00
	(C) Simple Technical	$1,507.00
	(D) Moderate Technical	$7,538.00
	(E) Complex Technical	$15,118.00
Major NSR or Type A State NSR Permit Modification		$63,000.00
Modeling Review (outside Major NSR or Type A State NSR)		$9,000.00
Public Hearing at Source's Request		$3,600.00
State MACT Determination		$9,000.00
Compliance Order Monitoring [2]		$180.00/month

OAR 340-216-8030
Table 3
Cleaner Air Oregon Specific Activity Fees

#	ACTIVITY	Permit Type			
		Title V	Standard ACDP	Simple ACDP	General or Basic ACDP
1	Existing Source Call-In Fee	$10,470	$10,470	$1,047	$523
2	New Source Consulting Fee	$12,564	$12,564	$1,989	$1,047
3	Submittal Document Modification Fee	$2,617	$2,617	$523	$262
Risk Assessment Fees					
4	Level 1 Risk Assessment - de minimis (no permit required)	$1,570	$1,570	$1,047	$838
5	Level 1 Risk Assessment – not de minimis	$2,094	$2,094	$1,570	$1,152
6	Level 2 Risk Assessment - de minimis (no permit required)	$3,246	$3,246	$2,408	$2,094
7	Level 2 Risk Assessment – not de minimis	$3,769	$3,769	$2,932	$2,408
8	Level 3 Risk Assessment - de minimis (no permit required)	$9,214	$8,585	$5,549	$4,711
9	Level 3 Risk Assessment – not de minimis	$20,835	$11,831	$8,062	$6,596
10	Level 4 Risk Assessment - de minimis (no permit required)	$22,406	$19,369	$12,250	NA
11	Level 4 Risk Assessment – not de minimis	$36,226	$27,012	$16,228	NA
Risk Above Risk Action Levels					
12	Risk Reduction Plan Fee	$7,015	$7,015	$2,722	$2,722
13	Air Monitoring Plan Fee (includes risk assessment)	$26,327	$26,327	NA	NA
14	Postponement of Risk Reduction Fee	$4,607	$4,607	$4,607	$2,094
15	TBACT/TLAER Review (per Toxic Emissions Unit and type of toxic air contaminant)	$3,141	$3,141	$1,570	$1,570
Other Fees					
16	TEU Risk Assessment – no permit mod	$1,047	$1,047	$523	$523
17	TEU Risk Assessment – permit mod	$4,188	$4,188	$2,094	$1,047
18	Level 2 Modeling review only for TEU approval	$1,989	$1,361	$838	$733
19	Level 3 Modeling review only for TEU approval	$3,979	$3,979	$3,664	$3,664
20	Community Engagement Meeting Fee – high	$8,376	$8,376	$8,376	$8,376
21	Community Engagement Meeting Fee – medium	$4,188	$4,188	$4,188	$4,188
22	Community Engagement Meeting Fee - low	$1,047	$1,047	$1,047	$1,047
23	Source Test Review Fee (plan and data review) - complex	$6,282	$6,282	$6,282	$6,282
24	Source Test Review Fee (plan and data review) – moderate	$4,397	$4,397	$4,397	$4,397
25	Source Test Review Fee (plan and data review) – simple	$1,466	$1,466	$1,466	$1,466

Attachment B: Statement of Fiscal and Economic Impact from Notice of Proposed Rulemaking for Cleaner Air Oregon Program

Statement of fiscal and economic impact

The proposed rules would have fiscal and economic impacts on businesses, state and federal agencies, units of local governments and the public. Fiscal impacts can be positive or negative to those affected. As examples, reducing health costs to the public would be a positive impact, and increasing costs of regulatory compliance for businesses would be a negative impact.

Owners and operators of facilities that currently require an air quality permit would incur costs of program permit fees, described above, and be required to analyze whether emissions from their operations are below Risk Action Levels set under the Cleaner Air Oregon rules. This includes public entities who manage facilities or operations requiring an air quality permit. Cost estimates for these analyses are included in Table 6 below, Emissions Analysis and Risk Assessment Costs. The owners and operators of some facilities that are required to go through a more complex permitting process would also incur costs to implement required community engagement steps. Some facilities with emissions resulting in health risks above Risk Action Levels would incur costs to reduce those emissions.

People who are exposed to air toxics at sufficient concentrations and durations have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. In addition to exposure from breathing air toxics, some air toxics, such as mercury, can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and are eventually magnified up through the food chain. The proposed rules may result in reduced air toxic emissions and less exposure to air toxics by people who live and work in proximity to facilities that emit air toxics. Less exposure to air toxics will result in fewer premature deaths and illnesses allowing Oregonians to experience longer lives, better quality of life, lower medical expenses, fewer work and school absences, and better worker productivity.

Table 6

Emissions analysis and risk assessment costs

Task	Simple	Complex
Emissions inventory	$0*-$5,000	$60,000
Level 1 Assessment – Lookup Table Calculation Using Stack Heights and Exposure Location	$100	$5,000

Table 6 Emissions analysis and risk assessment costs		
Task	**Simple**	**Complex**
Distance		
Level 2 Assessment – Screening modeling	$5,000	$35,000
Level 3 Assessment – Refined modeling	$5,000	$100,000
Level 4 Assessment – Health Risk Assessment	$5,000	$500,000

*DEQ is doing the emissions inventory for all of the approximately 2,200 sources that have Basic and General Air Contaminant Discharge Permits.

Statement of cost of compliance

State agencies

The majority of state agencies and local governments should be minimally or not directly impacted by the proposed rules because the rules predominantly regulate process emission sources, many of which are related to manufacturing. State agencies and local governments holding permits may be required to reduce air toxic emissions if the predicted risk exceeds Risk Action Levels. These permit holders would also incur public engagement costs. Costs for holding a public meeting could range from $1,400 to $6,400. If owners or operators choose to install pollution control equipment, Table 7 below shows what the range of estimated costs could be. As of August 31, 2017, state agencies own 23 permitted facilities, federal agencies own 5 permitted facilities, and local governments own 62 permitted facilities. Currently there are no tribal owned permitted facilities. Cleaner Air Oregon base and activity fees would affect these permit holders directly. Changes to fees could affect these agencies indirectly if businesses change the price of goods and services to offset any increased costs from paying a permit fee.

In instances where new or existing facility emissions cause potential risk above the applicable Risk Action Levels, local governments may be asked to consult with the DEQ Director and the Oregon Health Authority (OHA) to consider and weigh local factors prior to a DEQ decision whether to issue a permit. Local government may also be consulted in land use issues potentially affected by facilities emitting air toxics.

DEQ and OHA will see an increase in workload as a result of the proposed rules. Implementation of a new permitting program will require additional resources. DEQ has completed a workload analysis to estimate the cost of different levels of risk assessment and the number of additional resources needed. DEQ will permit facilities subject to Cleaner Air Oregon with the aid of OHA staff in areas of health risk assessment and risk communication. DEQ and OHA workloads would initially increase as staff becomes familiar with the proposed rules and a new program and could level off after the first tier of implementation.

Having the Cleaner Air Oregon air toxics program in place may also reduce DEQ and OHA's workload in some instances, by reducing the need for the agencies to respond on a facility by

facility basis to public concerns about air toxics emissions that are not currently covered by a regulatory structure.

Table 7

Pollution control equipment for air toxics emissions*

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Fabric filter (baghouse)	Particulate matter (PM), hazardous air pollutant (HAP) PM	Asphalt batch plants, concrete batch kilns, steel mills, foundries, fertilizer plants, and other industrial processes. Colored art glass manufacturers.	$360,000 - $18,500,000		$180,000 - $6,200,000	
Electrostatic precipitator (ESP)	PM, HAP PM	Power plants, steel and paper mills, smelters, cement plants, oil refineries	$320,000 - $7,100,000		$100,000 - $7,600,000	
Enclosure	Fugitive PM or volatile organic compounds (VOCs)	Any process or operation where total emissions capture is required, i.e., printing, coating, laminating	$14,000 - $420,000		$400 - $10,000	
HEPA filter	Chrome emissions	chrome plating	$13,000 - $240,000		Application specific	

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Wet scrubber (packed towers, spray chambers, Venturi scrubbers)	Gases, vapors, sulfur oxides, corrosive acidic or basic gas streams, solid particles, liquid droplets	Asphalt and concrete batch plants; coal-burning power plants; facilities that emit sulfur oxides, hydrogen sulfide, hydrogen chloride, ammonia, and other gases that can be absorbed into water and neutralized with the appropriate reagent.	$25,000 - $170,000		$19,000 - $830,000	
Thermal oxidizer	VOCs, gases, fumes, hazardous organics, odors, PM	Landfills, crematories, inks from graphic arts production and printing, can and coil plants, hazardous waste disposal. semiconductor manufacturing	$17,000 - $6,200,000		$3,500 - $5,200,000	
Regenerative thermal oxidizer	VOCs	Paint booths, printing, paper mills, municipal waste treatment facilities	$940,000 - $7,700,000		$110,000 - $550,000	
Catalytic reactor	VOCs, gases	Landfills, oil refineries, printing or paint shops	$21,000 - $6,200,000		$3,900 - $1,700,000	

Carbon adsorber	Vapor-phase VOCs, hazardous air pollutants (HAPs)	Soil remediation facilities, oil refineries, steel mills, printers, wastewater treatment plants	$360,000 - $2,500,000	Not available

Control Device Type	Types of Pollutants it can reduce	Examples of facilities where this is used	Initial costs		Annual Operating Costs	
			low	high	low	high
Biofilter	VOCs, odors, hydrogen sulfide (H_2S), mercaptans (organic sulfides)	Wastewater treatment plants, wood products facilities, industrial processes	$360,0000 - high end not available		Not available	
Fume suppressants	Chromic acid mist, chromium, cadmium and other plating metals	Chromic acid anodizing and chrome plating operations	Up to $122,000		Not available	

*Costs are from examples in the EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, EPA Air Pollution Control Technology Fact Sheets, and information provided by permitted facilities

Local governments

As noted above, local governments own or operate 62 facilities currently requiring an air quality permit. Minimally, those local government agencies would be impacted by the proposed fee structure for Cleaner Air Oregon which includes an annual base fee assessed on all current air quality permit holders. In addition, local governments who operate these facilities would be required to assess the risk that the facility's emissions pose and in some cases may be required to reduce that risk.

Large businesses

DEQ anticipates the proposed rules, when fully implemented, could have fiscal and economic impacts on approximately 1,360 large businesses holding air quality permits and an unknown number of businesses that are not currently required to have air permits. If the cancer or non cancer risk from a facility exceeds the Risk Action Levels, the facility would be required to take action to reduce air toxics emissions or show that the best available control technology for air toxics (TBACT) is already being achieved. The proposed rules would allow facilities flexibility in choosing a method to reduce emissions through the application of pollution prevention or

pollution control equipment. If owners or operators choose to install pollution control equipment, Table 7 above shows what the range of estimated costs could be. Small businesses may also incur these costs if required to install pollution control equipment.

Pollution prevention

In EPA's and DEQ's hierarchy of pollution management strategies (acceptable ways to reduce pollution), pollution prevention, also known as source reduction, is preferred over the addition of pollution controls and treatment whenever feasible (see Pollution Prevention Act of 1990, https://www.epa.gov/p2/pollution-prevention-act-1990)[9] Pollution prevention has been implemented successfully for cleaning operations (e.g., metal parts), coating and painting (e.g., marine anti-fouling, wood preservation), lubricants and process fluids (e.g., loss lubrication, mold release agents), and dry cleaning of clothes. In evaluating the costs of pollution prevention, DEQ considers not only the cost of replacing one solvent for another, but also capital costs, energy differences, labor costs, waste disposal and quality control considerations. In many instances involving both large and small businesses, DEQ has found that pollution prevention can decrease costs for a facility owner, rather than increase them. Short-term investments in pollution prevention measures can result in savings that can pay for the initial investments over time.

Reporting

All currently permitted sources report to DEQ annually so their reporting requirements for Cleaner Air Oregon will be in addition to existing reporting requirements. Some facilities that aren't required to have air permits under current regulations require may be required to have them under Cleaner Air Oregon, and in that case the requirement to report annually would be new. Some facilities already report emissions of Hazardous Air Pollutants (187 pollutants out of approximately 600 air toxics) annually. Under the proposed regulations, all facilities that emit air toxics must report emissions to DEQ a minimum of every three years. Facilities that have permit requirements to limit air toxics emissions must report compliance annually or semi-annually. The initial emissions inventory created the greatest workload for facilities, so updating this inventory should involve minimal costs. DEQ anticipates that the additional reporting requirements for Cleaner Air Oregon cost facilities approximately $120 to $1,200 per year.

[9] U.S. Environmental Protection Agency. (2011) The Benefits and Cost of the Clean Air Act from 1990 to 2020: Final Report – Second Prospective Study. Office of Air and Radiation.

[8] Pollution prevention is generally preferred because it results in less pollution to control, treat, or dispose of. Pollution controls can generate wastes or contaminated equipment that require end-of-life management. Reducing pollution at the source means less hazards posed to the public and the environment. In addition, pollution controls can fail and toxic substances can be used in unintended ways. Reducing the use of those toxic substances at the source avoids those potential risks.

Source testing

Source testing is currently not required as a part of Cleaner Air Oregon, but some facilities may choose to do source testing to more accurately estimate emissions. Source testing may be required to determine compliance with Cleaner Air Oregon permit conditions but DEQ anticipates that will be the case for very few sources. Cost for source testing for air toxics depends on the air toxic to be tested. Source testing for some air toxics, such as hexavalent chromium, is relatively complex and therefore expensive. Source test costs range from $7,500 for a single air toxic that is easy to test to $35,000 for multiple air toxics that are more difficult to test. Businesses already required to perform periodic compliance source testing could save money if the air toxics and criteria pollutant tests could be aligned.

Community engagement

If the risk from a facility is greater than any Risk Action Level, a Community Engagement Plan is required. Under a Community Engagement Plan, the owner or operator of the facility will be required to notify the community within the area of impact, hold two public meetings to describe the risks and solicit input on ways to reduce the risks, provide translation services if necessary, report back to DEQ the results of the public meetings, and hold ongoing annual meetings to keep the community updated on ongoing activities to reduce risk, if necessary. Costs for holding a public meeting range from $1,400 to $6,400. If a new facility seeks a permit to construct and their risk is estimated to be over 5 in 1 million but less than 10 in 1 million, the owner or operator of the facility is required to notify the community within 7 days of permit application submittal and hold one public meeting if requested by ten or more individuals.

Small businesses

The proposed rules would require that the facility owner or operator of a small business demonstrate that the risk posed by the facility's air emissions would not exceed the proposed Risk Action Levels. This compliance demonstration can be accomplished using any of the levels of risk assessment, 1 through 4.

In addition to the fiscal and economic impact described under the section above “Large businesses - businesses with more than 50 employees,” the proposed rules could have the following impacts on small business:

Estimated number of small businesses and types of businesses and industries with small businesses subject to proposed rule

The proposed rules could affect approximately 1,090 small businesses. These businesses include asphalt plants, auto body shops, chromium electroplaters, dry cleaners, ethylene oxide sterilizers, grain elevators, gas stations, lumber mills, metal fabricators, metal foundries, and surface coaters. If any of these businesses had Cleaner Air Oregon permit conditions, they would have additional compliance requirements over existing permit requirements. In addition there may be an unknown number of additional facilities that are currently not required to get permits under the existing air quality permitting program but may be subject to Cleaner Air Oregon rules and would have to pay fees.

Many of the small businesses subject to the Cleaner Air Oregon rules would only be required to submit triennial reports of air toxics emissions. Some small businesses may be required to reduce air toxics emissions through either permit limits, pollution prevention or pollution control equipment if cancer risk, chronic non cancer risk or acute non cancer risk is above Risk Action Levels.

Projected reporting, recordkeeping and other administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule

Small businesses that must meet Cleaner Air Oregon permit requirements would have increased recordkeeping and reporting requirements. Administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule may increase in a range from $100 to $500,000 above current costs if the small business is required to perform computer modeling or a health risk assessment if cancer risk, chronic non cancer risk or acute non cancer risk is above Risk Action Levels.

Projected equipment, supplies, labor and increased administration required for small businesses to comply with the proposed rule

Depending on the size and nature of a small business's' operation, pollution control costs could be much less than, or in some cases the same as, the cost ranges for different types of control equipment found in Table 7, above. Summarizing from Table 7, if a small business's' cancer risk, chronic non cancer risk or acute non cancer risk were above Risk Action Levels, the proposed rules could result in additional costs ranging from approximately $13,000 to $18,500,000 for initial equipment including purchase and labor, and ranging from approximately $400 to $7,600,000 in annual operating costs.

Because of existing regulatory coverage and generally low risk estimates for gas stations and dry cleaners, DEQ proposes to exclude them from risk screening, risk assessment and risk reduction requirements. These facilities would need to pay small fees to be tracked and evaluated by DEQ, but generally would not bear the costs of additional reporting, risk analysis or emission reductions. Gas stations and drycleaners may be evaluated as part of a multi-source area assessment or if DEQ determines that individual facilities pose higher risk.

How DEQ involved small businesses in developing this proposed rule

DEQ notified small businesses during rule development by email, announcements on the DEQ website, advisory committee meetings, and through Twitter and Facebook. Small business representatives were on the rules advisory committee during rule development. At the onset of the public comment period, DEQ notified small businesses by email, and notices in the Secretary of State Bulletin.

Impacts on the public

The proposed Cleaner Air Oregon rules are intended to assess and decrease risk above Risk Action Levels for people living nearby industrial and commercial facilities. The Risk Action Level

analysis would be based on many factors, including the best available science regarding toxicity of regulated air toxics, as proposed in the risk-based concentrations. Cleaner Air Oregon air toxics reductions that decrease cancer risk, chronic non cancer risk or acute non cancer risk could create positive economic benefits and improvements in public health and welfare statewide. The rules could also have negative economic effects on the public. In analyzing potential positive and negative effects on the public of the proposed Cleaner Air Oregon rules, DEQ has consulted with OHA and relied upon information provided by them.

Positive impacts on the public

The proposed Cleaner Air Oregon rules have the potential to meaningfully impact public health in the state by reducing air toxics emissions. The air toxics that would be regulated by Cleaner Air Oregon rules are known to increase risk of a wide range of health outcomes including cardiovascular and respiratory illness, lung disease, cancers, birth defects, premature births, developmental disorders, central nervous system damage, intellectual disability, and premature death.

Based on a preliminary analysis of a subset of emissions inventory data using proposed screening tools and Risk Action Levels, DEQ and OHA have determined that a number of air toxics are most likely emitted at concentrations whose risk exceeds the proposed Risk Action Levels. Information from EPA's National Air Toxics Assessment supports this initial analysis. The impact of air toxics on health depends on people's exposure. DEQ and OHA do not currently have enough information about how many people are exposed to specific concentrations of industrial and commercial air toxics emissions or about the relative actual contribution of air toxics to disease to know how reducing emissions will translate to improved public health in quantitative terms. As Cleaner Air Oregon regulations are implemented, the emissions inventory and the permitting process will improve DEQ and OHA's understanding of Oregonians air toxics exposures.

In this analysis it is not possible to predict the total reduced medical costs that would result from the proposed rules. However, it is possible to describe the range of health outcomes associated with air toxics currently emitted in Oregon and to describe the economic burden of medical treatment for a subset of those health effects. This section also points to national analyses that estimate the fraction of certain diseases that are due to environmental exposures.

Health effects caused by air toxics commonly emitted by facilities in Oregon

DEQ and OHA summarized the health effects associated with 15 of the air toxics to be regulated under Cleaner Air Oregon. This information is summarized in Table 8 below. This summary illustrates the range of health effects that may be caused by this small subset of 15 air toxics. Many more of the air toxics to be regulated under Cleaner Air Oregon are associated with these and other health effects.

Table 8

Examples of health effects associated with a subset of 15 air toxics

Type of Toxicity	Air toxics associated with these health outcomes
Respiratory Effects Includes asthma and asthma symptoms (difficulty breathing, shortness of breath, coughing, wheezing, chest pain), reduced lung function, respiratory irritation, and other respiratory conditions	formaldehyde*, cobalt*, hexavalent chromium*, cadmium*, chlorine*, acrolein*, hydrogen fluoride*, naphthalene*, PAHs, manganese, arsenic
Cancer includes lung, respiratory, leukemia, lymphoma, liver, kidney and gastrointestinal cancers	arsenic*, hexavalent chromium*, cadmium*, formaldehyde*, PAHs*, benzene*, trichloroethylene*, lead*, dioxins*, naphthalene*
Heart Disease includes hypertension, arrhythmia, heart attack	arsenic, PAHs, lead, acrolein, hydrogen fluoride
Kidney Function includes reduced kidney function, kidney stones	cadmium*, lead, trichloroethylene, hydrogen fluoride
Liver Disease includes reduced liver function, fatty liver disease	dioxin*, trichloroethylene, hydrogen fluoride
Type of Toxicity	Air toxics associated with these health outcomes
Neurological Effects includes effects on motor function, balance, vision, hearing, cognition, memory, anxiety,	lead*, arsenic*, manganese*, cadmium, PAHs, benzene, trichloroethylene, formaldehyde, cobalt

focus or behavior following exposure as an adult or during brain development	
Fetal Development includes low birth weight, pre-term birth, miscarriage, and birth defects following exposure to mothers during pregnancy	arsenic*, PAHs*, trichloroethylene*, formaldehyde, cadmium, benzene, trichloroethylene, lead, dioxins
Impaired Fertility includes damage to male or female reproductive organs, reduced sperm counts, altered sex hormones, and infertility	manganese, PAHs, hexavalent chromium, dioxins, trichloroethylene
Blood Regulation includes impaired bone marrow function, anemia	benzene*, lead, naphthalene, cobalt
Immune Function includes allergic responses, reduced immune function	trichloroethylene*, benzene*, dioxins, PAHs

*For these chemicals, the associated health effect serves as the basis for Risk Action Levels proposed in Cleaner Air Oregon. Inclusion of all other chemicals is based on studies referenced in EPA, ATSDR, or OEHHA documents. The magnitude of and certainty around these associations varies.[10]

[10] EPA Integrated Risk Information System. https://www.epa.gov/iris

ATSDR Toxic Substances Portal. https://www.atsdr.cdc.gov/toxprofiles/index.asp

California Office of Environmental Health Hazard Assessment. Air Toxics Hot Spots Program Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Dec, 2008 https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-technical-support-document-derivationadoption-air-toxics-hot-spots-program-technical-support-document-derivation

Information needed to quantify economic impact of health improvements

Oregon currently lacks the data necessary to quantify total potential health cost savings from Cleaner Air Oregon because of the lack of information about how many people are exposed to specific concentrations of industrial and commercial air toxics emissions and the relative actual contribution of air toxics to disease. Just as a lack of information about individual facility risk assessment and emission reduction outcomes prevents DEQ from quantifying specific fiscal impacts to businesses, a lack of health information also prevents DEQ from quantifying specific positive fiscal impacts from potential Cleaner Air Oregon emission reductions. The health impact of reducing emissions depends on the specific chemicals that are being reduced, the health risks those chemicals influence, the relationship between exposure and health, and the extent to which emissions are reduced. Defining the economic impact of improved health further requires knowledge of the portion of cases that are related to air toxics exposures, prevalence of health outcomes in the state, and the cost of medical treatment for each case.

Costs of chronic diseases in Oregon

Air toxics included in Cleaner Air Oregon are associated with increased risk of four of the top five leading causes of death in Oregon (heart disease, stroke, respiratory disease, and cancer).[11] DEQ and OHA don't know what portion of these may be attributable to industrial and commercial air toxics, but data clearly show that chronic diseases have a substantial social and economic impact in Oregon. OHA uses Center for Disease Control and Prevention data to estimate the cost of certain chronic diseases in Oregon. If even a small fraction of these chronic health outcomes is attributable to air toxics, reducing emissions could prevent substantial health costs. The total estimated costs of chronic diseases tracked in Oregon are summarized in Table 9.

Table 9

Total Estimated Cost of Chronic Diseases that are Tracked in Oregon

Health Outcome	Description	Average Annual Cost of Each Case	Estimated Annual Medical Costs in Oregon[A]	Examples of air toxics that may contribute to health risk

[11] OHA. 2016. Leading Causes of Death http://public.health.oregon.gov/ProviderPartnerResources/PublicHealthAccreditation/Documents/indicators/leadingcausesofdeath.pdf)

Asthma	Estimates include adults and children	$2,740	$411 million	formaldehyde, cobalt, hexavalent chromium, cadmium, PAHs, manganese, arsenic

Health Outcome	Description	Average Annual Cost of Each Case	Estimated Annual Medical Costs in Oregon[A]	Examples of air toxics that may contribute to health risk
Cancer	Estimates are based on adult cancer treatment only	$11,410	$1.9 billion	arsenic, hexavalent chromium, cadmium, formaldehyde, PAHs, benzene, trichloroethylene, lead, dioxins, naphthalene
Cardiovascular disease	Estimates are for adults only and include hypertension, stroke, coronary heart disease, congestive heart failure, and other heart disease	$2,220- $16,760 (disease-specific)	$3.6 billion[B]	arsenic, PAHs, lead, acrolein, hydrogen fluoride

[A] Calculated using the CDC Chronic Disease Cost Calculator [12] based on 2008 prevalence and cost statistics and 2010 census data. Estimates are limited to medical expenditures and do not include indirect costs such as missed days of work and school.

[B] This cost estimate integrates costs of all cardiovascular disease without double counting costs of treatments for comorbid cardiovascular conditions.

Oregon Health Authority also tracks cases of pre-term birth, low birth weight, miscarriage, and some birth defects. There are no existing estimates of the direct medical costs associated with these adverse birth outcomes in Oregon, but there is potential for substantial economic and social impact. The total incidence of selected adverse birth outcomes in Oregon are summarized in Table 10. While several air toxics are associated with increased risk for these adverse birth outcomes, the portion of cases attributable to exposure to air toxics is unknown.

Table 10

Adverse Birth Outcomes in Oregon

Health outcome	Total number of pregnancies impacted by each health outcome in OR 2009-2013[A]	Potential Economic and Social Costs	Examples of air toxics that may contribute to health risk

[12] OHA, 2010. Estimated medical treatment costs of chronic diseases, Oregon 2010. http://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Documents/datatables/_CDCC_2010.pdf

Low birth weight[B]	14,239	Costs depend on degree of prematurity/weight but can include direct medical costs associated with neonatal ICU treatment, increased risk of neonatal infections, increased risk of developmental disabilities, predisposition to disease later in life, parental stress, and costs of parents' missed days of work.	arsenic, PAHs, formaldehyde, cadmium, benzene, trichloroethylene

Health outcome	Total number of pregnancies impacted by each health outcome in OR 2009-2013[A]	Potential Economic and Social Costs	Examples of air toxics that may contribute to health risk
Pre-term birth[C]	17,442	Costs depend on degree of prematurity/weight but can include direct medical costs associated with neonatal ICU treatment, increased risk of neonatal infections, increased risk of developmental disabilities, predisposition to disease later in life, parental stress, and costs of parents' missed days of work.	lead, formaldehyde
Miscarriage[D]	978	Costs include direct medical costs, genetic testing/placental virus testing to determine the cause, parents' missed days of work, and emotional trauma to parents.	PAHs, lead, formaldehyde, arsenic, dioxins, trichloroethylene
Birth anomalies[E]	2,831	Costs are highly variable depending on the type and severity of the anomaly, but may include neonatal surgery, follow-up surgeries and medical costs throughout childhood and into adulthood, long-term disability, parents'	dioxins, arsenic, trichloroethylene, benzene

		missed days of work, and stress to families	

[A] There were 228,115 total live births in Oregon 2009-2013.

[B] <2500 grams birth weight. Source: Vital records

[C] <36 weeks' gestation at birth. Source: Vital records

[D] Fetal deaths at or after 20 weeks of gestation. Any spontaneous pregnancy losses earlier in gestation are not recorded. Source: Oregon Vital Records http://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/Pages/index.aspx

[E] Birth anomaly numbers are limited to cases of 12 "core" birth anomalies that have been tracked historically in the Oregon Birth Anomalies Surveillance System (anencephalus, cleft lip alone, cleft palate, gastroschisis, hypoplastic left heart syndrome, hypospadias, limb deficiencies, spina bifida, tetralogy of fallot, transposition of the great arteries, and trisomy 21). Oregon has recently started tracking a broader set of birth anomalies but data are not yet available. National Birth Defects Prevention Network, 2016 https://www.nbdpn.org/docs/bdra23587-sup-0001-_suppinfo01_2016DEC16.pdf

Estimates of the portion of health effects caused by pollution

Several analyses have estimated the portion of a given disease that is attributable to environmental exposures. Because there is often uncertainty around the complex ways that genes, nutrition, social factors, behavior, and chemical exposures interact to influence health, the environmentally attributable fraction is often presented as a range rather than a specific number.

These estimates of the environmentally attributable fraction are not specific to the set of air toxics included in Cleaner Air Oregon. Therefore, these numbers cannot be directly applied to estimate the contribution of air toxics to health risks in Oregon. Rather, they provide an indication of the potential magnitude of the contribution of pollution to disease. The most comprehensive assessment of the contribution of pollution to disease is a 2002 study drawing on 1997 data (dollar figures are 1997 dollars). The findings are summarized below.

● Asthma. Researchers estimate that 10-30% of asthma is attributable to outdoor air pollution (including both industrial and non-industrial sources). The yearly fraction of

asthma cases that could be attributed to environmental factors cost the US between $0.7 and $2.3 billion. These cost estimates account for direct medical costs and lost productivity due to asthma-related premature deaths.13

● Cancer. Researchers estimate that between 2-10% of childhood cancer is attributable to environmental factors, accounting for nationwide costs ranging from $132-663 million a year. These cost estimates account for direct medical costs, costs associated with secondary cancers, lost productivity associated with treatments and premature death.[5]

● Neurodevelopmental disorders. Researchers estimate that 5-20% of neurodevelopmental disorders such as ADHD, autism, and mental retardation may be attributable to environmental factors (excluding lead which was considered separately), costing the US between $4.6-18.4 billion a year. Cost estimates in this study were based on direct costs of medical care, long-term care, and lost productivity.[5] Another study estimated that developmental delays caused by exposure to polycyclic aromatic hydrocarbons in New York City alone cost $13.7 million.[14]

● Lead Poisoning. Researchers estimated that the total cost of childhood lead poisoning in the US was 43.4 billion yearly. All cases of lead poisoning are attributed to lead exposure, but the relative contribution of different sources of exposure to lead is not well established.

Living near industrial and commercial sites is associated with increased risk of illness

Several national studies, most published in the past five years, have found that living near industrial and commercial sites increases risk for several health conditions that are common in Oregon. The specific health impacts that are observed depend on the kinds of chemicals industries are using. Taken together, these studies suggest that reducing industrial and commercial exposure to air toxics could improve health.

● Mortality. A national study found that counties with higher rates of toxic air and water emissions also had increased rates of adjusted mortality.[15]

● Cardiovascular disease. A national study found that counties with higher emissions of carcinogens, metals, or hazardous air pollutants saw significantly higher rates of mortality from cardiovascular disease.[16]

---

[13] Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. Environ Health Perspect. 2002 Jul;110(7):721-8

[14] Weiland K, Neidell M, Rauh V, Perera F. Cost of developmental delay from prenatal exposure to airborne polycyclic aromatic hydrocarbons. J Health Care Poor Underserved. 2011 Feb;22(1):320-9. doi: 10.1353/hpu.2011.0012

[15] Hendryx M, Fedorko E. The relationship between toxics release inventory discharges and mortality rates in rural and urban areas of the United States. J Rural Health. 2011 Winter;27(4):358-66. doi: 10.1111/j.1748-0361.2011.00367.x

[16] Hendryx M, Luo J, Chen BC. Total and cardiovascular mortality rates in relation to discharges from Toxics Release Inventory sites in the United States. Environ Res. 2014 Aug;133:36-41. doi: 10.1016/j.envres.2014.05.010.

● Autism. A national study found that children living close to industrial and commercial facilities releasing arsenic, lead or mercury into the air are significantly more likely to be diagnosed with autism spectrum disorder.[17]

● Asthma. A nationwide evaluation of National Air Toxics Assessment data performed by CDC scientists found a correlation between modeled acrolein exposure and prevalence of asthma attacks in census tracts across the US. [18]

● Cancer. A national study found that living close to industrial and commercial facilities releasing chemicals known to cause cancer is associated with significantly higher rates of cancer hospitalizations. The authors estimated that in 2009, excess cancer risk associated with these industrial and commercial exposures cost an estimated $902.8 million in treatment costs.[19]

Improved air quality can improve public health

There are several examples of clear public health improvements observed in response to improvements in air quality:

● In Southern California, air pollution control efforts were accompanied by meaningful improvements in children's respiratory health. As air quality improved, the percent of children with decreased lung function was cut in half,[20] and children with asthma were 30% less likely to experience symptoms of bronchitis.[21]

●The temporary closure of a steel mill in Utah Valley was linked to temporary improvements in birth outcomes and respiratory health. One study found that rates of premature birth were significantly lower among women who were pregnant while the mill was closed than among women who were pregnant before or after the closure.[22] Another study found that children's

[17] Dickerson AS, Rahbar MH, Han I, Bakian AV, Bilder DA, Harrington RA, Pettygrove S, Durkin M, Kirby RS, Wingate MS, Tian LH, Zahorodny WM, Pearson DA, Moyé LA 3rd, Baio J. Autism spectrum disorder prevalence and proximity to industrial facilities releasing arsenic, lead or mercury. Sci Total Environ. 2015 Dec 1;536:245- 51. doi: 10.1016/j.scitotenv.2015.07.024.

[18] deCastro BR. Acrolein and asthma attack prevalence in a representative sample of the United States adult population 2000-2009. PLoS One. 2014 May 9;9(5):e96926. doi: 10.1371/journal.pone.0096926. eCollection 2014.

[19] Hendryx M, Luo J. Cancer hospitalizations in rural-urban areas in relation to carcinogenic discharges from Toxics Release Inventory facilities. Int J Environ Health Res. 2013;23(2):155-69. doi: 10.1080/09603123.2012.708919

[20] Gauderman WJ, Urman R, Avol E, Berhane K, McConnell R, Rappaport E, Chang R, Lurmann F, Gilliland F. Association of improved air quality with lung development in children. N Engl J Med. 2015 Mar 5;372(10):905-13. doi: 10.1056/NEJMoa1414123

[21] Berhane K, Chang CC, McConnell R, Gauderman WJ, Avol E, Rapapport E, Urman R, Lurmann F, Gilliland F. Association of Changes in Air Quality With Bronchitic Symptoms in Children in California, 1993-2012. JAMA. 2016 Apr 12;315(14):1491-501. doi: 10.1001/jama.2016.3444.

[22] Parker JD, Mendola P, Woodruff TJ. Preterm birth after the Utah Valley Steel Mill closure: a natural experiment. Epidemiology. 2008 Nov;19(6):820-3. doi: 10.1097/EDE.0b013e3181883d5d.

hospital admissions for pneumonia, bronchitis and asthma were two to three times higher when the mill was opened than when it was closed.[23]

● Federal regulations on leaded gasoline resulted in a dramatic decrease in blood lead levels in children across the country.[24] The Center for Disease Control and Prevention has concluded that there is no safe level of lead exposure due to its impacts on brain development. Because lead exposure comes from many sources, scientists were not sure of the extent to which lead from paint and gasoline were responsible for high blood lead levels in children until they were able to observe the effect of these regulations.

Other considerations

In attempting to estimate the economic and health burden of air toxics emissions in Oregon, there are several additional points worth considering:

● A portion of the health costs of air toxics emissions are currently externalized. People who are not employed by a facility, but who live, go to school, or work near a facility emitting pollutants above proposed Risk Action Levels may bear the health burden of pollution exposure without experiencing the economic benefit a facility may have from exceeding Risk Action Levels.

● Many of the broader social costs of disease are particularly difficult to quantify. For example, indirect costs of asthma hospitalization include missed days of work and school; indirect costs of neurodevelopmental delays include lost lifetime earning potential, social isolation, and caregiver time; indirect costs of fetal heart malformation often include increased risk of secondary health effects.

● Risk-based air toxics permitting regulations could also significantly improve the health of workers, resulting in lower health care costs and more productive workers. Workplace exposure standards are typically not entirely health-based.

Negative impacts on the public

The proposed rules could have negative economic effects on the public if facilities providing jobs and contributing to local economies were to curtail production or close in response to regulatory requirements. Because employment plays a key role in the public health, proposed Cleaner Air Oregon regulations include many provisions to allow flexibility for regulated businesses which would decrease the chances of closures in direct response to regulations. Facilities above Risk Action Levels may request conditional risk levels, have additional time to

[23] Pope CA 3rd.Respiratory disease associated with community air pollution and a steel mill, Utah Valley. Am J Public Health. 1989 May;79(5):623-8.

[24] EPA, History of Reducing Air Pollution from Transportation in the United States https://www.epa.gov/air-pollution- transportation/accomplishments-and-success-air-pollution-transportation

comply, and may wait for effective control technologies to develop if none are available at the time of permitting. Facilities demonstrating lack of financial ability to install the needed controls at the time required could postpone installation of controls to reduce risk. If facilities are above DEQ Director Consultation Risk Action Levels, there is a provision for consultation between the DEQ Director, the OHA and local governments to consider and weigh local factors, including employment, prior to a DEQ decision whether to issue a permit. In addition, the proposed tiered implementation plan will delay potential impacts to many facilities. However, business decisions are influenced by many factors, and DEQ therefore lacks information to predict specific potential impacts to employment.

The proposed rules could affect the public indirectly if businesses alter the price of goods and services in response to increased base or activity permit fees or the cost to comply with Cleaner Air Oregon rules. DEQ expects any such price increases to be small, but lacks available information to estimate potential increases accurately.

Citizens and local government representatives, such as city or county health or planning staff and elected officials may also be impacted by the need to participate in public meetings, including time to research and understand potential air toxics health concerns and risk assessment and permitting issues, and time spent preparing communications and attending meetings. DEQ is not able to quantify the time and fiscal impact on public process participants, but recognizes that time spent may impact local government budgets and for members of the public may require time away from work, childcare, travel or other expenses.

Impacts on the environmental services sector

The direct cost of complying with regulations can result in increased employment. For example, an environmental regulation could mean more jobs for those engaged in pollution abatement. Further, it is possible that regulations may produce more labor-intensive production processes. Studies of national air quality regulations have shown positive effects on overall economic health. The Clean Air Act's public health safeguards encourage technology investments that can have positive economic effects on the public. Although in the short term new environmental regulations can have some positive and negative impacts on employment in different sectors, studies indicate that those impacts are limited and that the overall effect of environmental regulations on reported job shift events are extremely minor compared to other factors, such as overall economic growth, business cycles, and changes in technology.[25]

A peer-reviewed study by economists at Resources for the Future, a nonpartisan Washington, D.C. think tank, examined the impact of environmental compliance costs on employment in four regulated industries (pulp and paper, refining, iron and steel, and plastics). They concluded that increased environmental spending generally does not cause a significant change in employment. [26]

[25] http://econweb.ucsd.edu/~elib/berman_bui2001
[26] https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn10

Another peer-reviewed study published in the Journal of Public Economics found no evidence that stringent local air quality regulation substantially reduced employment in the Los Angeles basin over a 13-year period of "sharply increased" regulation.

Documents relied on for fiscal and economic impact

Document title	Document location
Air Contaminant Discharge Permits – Table 1	http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/_340_tables/340-216-_0020_10-24.pdf
Air & Waste Management Association Fact Sheet: Air Pollution Emission Control Devices for Stationary Sources, April 2007	http://events.awma.org/files_original/ControlDevicesFactSheet07.pdf
EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, December 1995, Section 5, Chapter 1, SO_2 and Acid Gas Controls	http://www.epa.gov/ttn/catc/dir1/cost_toc.pdf
EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, January 2002, Section 6, Chapter 1, Baghouses and Filters	http://www.epa.gov/ttn/catc/dir1/cost_toc.pdf
EPA Air Pollution Control Cost Manual, Report No. 452/B-02-001, September 1999, Section 6, Chapter 3, Electrostatic Precipitators	https://www3.epa.gov/ttn/ecas/docs/cs6ch3.pdf
EPA Health and Environmental Effects of Hazardous Air Pollutants	https://www.epa.gov/haps/health-and-environmental-effects-hazardous-air-pollutants
EPA Technical Bulletin Choosing an Adsorption System for VOC: Carbon, Zeolite, or Polymers? May 1999	https://www3.epa.gov/ttncatc1/cica/files/fadsorb.pdf
EPA Pollution Control Technology Fact Sheet Spray-Chamber/Spray-Tower Wet Scrubber, EPA-452/F-03-016	https://www3.epa.gov/ttncatc1/cica/files/fsprytwr.pdf
EPA Air Pollution Control Technology Fact Sheet Catalytic Incinerator, EPA-452/F-03- 018	https://www3.epa.gov/ttncatc1/cica/files/fcataly.pdf

EPA Air Pollution Control Technology Fact Sheet Regenerative Incinerator, EPA- 452/F-03-021	https://www3.epa.gov/ttncatc1/cica/files/fregen.pdf
EPA Air Pollution Control Technology Fact Sheet Thermal Incinerator, EPA-452/F-03- 022	https://www3.epa.gov/ttncatc1/cica/files/fthermal.pdf
EPA Air Pollution Control Technology Fact Sheet, Paper/Nonwoven Filter – High Efficiency Particle Air (HEPA) Filter, EPA-452/F-03-023	https://www3.epa.gov/ttncatc1/cica/files/ff-hepa.pdf
EPA Pollution Control Technology Fact Sheet Fabric Filter – Mechanical Shaker Cleaned Type, EPA-452/F-03-024	https://www3.epa.gov/ttncatc1/cica/files/ff-shaker.pdf
EPA Air Pollution Control Technology Fact Sheet Dry Electrostatic Precipitator (ESP) – Wire-Plate Type, EPA-452/F-03-028	https://www3.epa.gov/ttncatc1/cica/files/fdespwpl.pdf
EPA Air Pollution Control Technology Fact Sheet Permanent Total Enclosures (PTEs), EPA-452/F-03-033	https://www3.epa.gov/ttncatc1/cica/files/fpte.pdf
EPA The Clean Air Act and the Economy	https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#economy
Analytical Components of the Benefits and Costs of the Clean Air Act 1990-2020, the Second Prospective Study	https://www.epa.gov/clean-air-act-overview/analytical-components-benefits-and-costs- clean-air-act-1990-2020-second
Air Toxics Case Study – Health Benefits of Benzene Reduction in Houston, 1990-2020	https://www.epa.gov/sites/production/files/2015- 07/documents/812caaa_benzene_houston_final_report_july_2009.pdf
EPA AP-42, Chapter 12.20 Electroplating 07/1996	https://www3.epa.gov/ttnchie1/ap42/ch12/final/c12s20.pdf
EPA Integrated Risk Information System	https://www.epa.gov/iris
ATSDR Toxics Substances Portal	https://www.atsdr.cdc.gov/toxprofiles/index.asp
California Office of Environmental Health Hazard Assessment. Air Toxics	https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-technical-support-

Hot Spots Program Technical Support Document for the Derivation of Noncancer Reference Exposure Levels. Dec, 2008	document-derivationadoption-air-toxics-hot-spots-program-technical-support-document-derivation
OHA. 2016. Leading Causes of Death	http://public.health.oregon.gov/ProviderPartnerResources/PublicHealthAccreditation/Documents/indicators/leadingcausesofdeath.pdf
OHA, 2010. Estimated medical treatment costs of chronic diseases, Oregon 2010.	http://www.oregon.gov/oha/PH/DISEASESCONDITIONS/CHRONICDISEASE/DATAREPORTS/Documents/datatables/CDCC_2010.pdf
Oregon Vital Records	http://www.oregon.gov/oha/PH/BIRTHDEATHCERTIFICATES/VITALSTATISTICS/Pages/index.aspx
National Birth Defects Prevention Network, 2016	https://www.nbdpn.org/docs/bdra23587-sup-0001-suppinfo01_2016DEC16.pdf
Landrigan PJ, Schechter CB, Lipton JM, Fahs MC, Schwartz J. Environmental pollutants and disease in American children: estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities.	Environ Health Perspect. 2002 Jul;110(7):721-8
Weiland K, Neidell M, Rauh V, Perera F. Cost of developmental delay from prenatal exposure to airborne polycyclic aromatic hydrocarbons.	J Health Care Poor Underserved. 2011 Feb;22(1):320-9. doi: 10.1353/hpu.2011.0012
Hendryx M, Fedorko E. The relationship between toxics release inventory discharges and mortality rates in rural and urban areas of the United States	J Rural Health. 2011 Winter;27(4):358-66. doi: 10.1111/j.1748-0361.2011.00367.x
Hendryx M, Luo J, Chen BC. Total and cardiovascular mortality rates in relation to discharges from Toxics Release Inventory sites in the United States.	Environ Res. 2014 Aug;133:36-41. doi: 10.1016/j.envres.2014.05.010.
Dickerson AS, Rahbar MH, Han I, Bakian AV, Bilder DA, Harrington RA, Pettygrove S, Durkin M, Kirby RS, Wingate MS, Tian LH, Zahorodny WM, Pearson DA, Moyé LA 3rd, Baio J. Autism spectrum disorder prevalence	Sci Total Environ. 2015 Dec 1;536:245- 51. doi: 10.1016/j.scitotenv.2015.07.024.

and proximity to industrial facilities releasing arsenic, lead or mercury.	
deCastro BR. Acrolein and asthma attack prevalence in a representative sample of the United States adult population 2000-2009.	PLoS One. 2014 May 9;9(5):e96926. doi: 10.1371/journal.pone.0096926. eCollection 2014.
Hendryx M, Luo J. Cancer hospitalizations in rural-urban areas in relation to carcinogenic discharges from Toxics Release Inventory facilities.	Int J Environ Health Res. 2013;23(2):155-69. doi: 10.1080/09603123.2012.708919
Gauderman WJ, Urman R, Avol E, Berhane K, McConnell R, Rappaport E, Chang R, Lurmann F, Gilliland F. Association of improved air quality with lung development in children.	N Engl J Med. 2015 Mar 5;372(10):905-13. doi: 10.1056/NEJMoa1414123
Berhane K, Chang CC, McConnell R, Gauderman WJ, Avol E, Rapapport E, Urman R, Lurmann F, Gilliland F. Association of Changes in Air Quality With Bronchitic Symptoms in Children in California, 1993-2012.	JAMA. 2016 Apr 12;315(14):1491-501. doi: 10.1001/jama.2016.3444.
Parker JD, Mendola P, Woodruff TJ. Preterm birth after the Utah Valley Steel Mill closure: a natural experiment.	Epidemiology. 2008 Nov;19(6):820-3. doi: 10.1097/EDE.0b013e3181883d5d.
Pope CA 3rd.Respiratory disease associated with community air pollution and a steel mill, Utah Valley.	Am J Public Health. 1989 May;79(5):623-8.
EPA, History of Reducing Air Pollution from Transportation in the United States	https://www.epa.gov/air-pollution-transportation/accomplishments-and-success-air-pollution-transportation
Environmental regulation and labor demand: evidence from the South Coast Air Basin' Eli Berman , Linda T.M. Bui	http://econweb.ucsd.edu/~elib/berman_bui2001
The Clean Air Act and the Economy	https://www.epa.gov/clean-air-act-overview/clean-air-act-and-economy#_edn10