

# 2018 AirToxScreen Summary Document

January 2026

## Executive summary

The Oregon Department of Environmental Quality created this summary of emissions data from all air sources and the related human health risk for Oregon presented in U.S. EPA's AirToxScreen Database for 2018, with supplementary information obtained from EPA's AirToxScreen Mapping Tool.

These ATS results provide information on cancer and noncancer human health risks related to emissions of air toxics in the U.S. in 2018. EPA releases this data to states approximately three years after collecting it so that the states can review it and provide their own quality control and assurance processes. DEQ then carefully reviews ATS data specific to Oregon and provides a summary of this information as a tool for users who might not be familiar with how to search each year's ATS Database.

- The ATS data will be provided on an annual basis, and replaces the former National Air Toxics Assessment program, which provided air emissions data every three years.
- The 2018 nationwide and Oregon statewide cancer risks from air emissions are both 30 in a million. Washington and California also have average cancer risks of 30 in a million, while Idaho has 20 in a million.
- Among Oregon's 36 counties, the 2018 county-wide average cancer risks ranged from 12 in a million in Harney and Wallowa Counties to 36 in a million in Josephine County in 2018.
- The majority of 2018 cancer risk from air toxics in Oregon was due to formaldehyde, a chemical found in air and primarily created through the process of secondary formation of air pollutants.
- Cancer risks are discussed using two different but related subsets of ATS data: risk by pollutant, and risk by source category.
- Noncancer risks in Oregon in 2018 did not exceed a hazard quotient of 1 for any pollutant in any census tract.
- In general, the 2018 ATS cancer risk due to air toxics in Oregon is roughly the same as the cancer risk presented in the DEQ 2017 ATS summary.
- This summary, as well as the EPA ATS data on which it is based, do not provide risk information for locations that are smaller than a census tract.

An expanded description of related details is provided below. Although DEQ has provided this summary, EPA produces the original ATS Database and is the appropriate agency to contact if complex questions arise.

## 1.0 Introduction

The information in this summary document was pulled from U.S. EPA's AirToxScreen Database of 2018 air toxics emissions and human health risk data for the United States, as well as individual states, counties, and census tracts. An accompanying tool, the [2018 ATS Mapping Tool](#), provides another perspective on this data with an interactive set of maps. This summary provides important health information for people living in Oregon related to the emission of air pollutants.

The 2018 ATS Database provides cancer risk estimates related to both individual pollutants and to source categories. The statewide risk for Oregon is the same whether you look at it as total risk from pollutants or total risk from source categories. It's important to know which pollutants are driving risk in Oregon, and where those pollutants are coming from -- that is, from which source categories. In this summary we'll first investigate the data from individual pollutants and then follow this by looking at the source categories.

EPA's ATS is meant to provide a comprehensive evaluation of air toxics in the U.S., based on modeled air quality and data submitted by state and local air agencies. The process is similar to that used to produce NATA reports previously. EPA developed ATS as a tool for state, local and tribal agencies to prioritize air toxics, emission sources, and locations of interest for further study to gain a better understanding of risks to human health. However, this process is not designed to predict risks at specific locations, like a specific residential address.

Prior to 2017, EPA published NATA data about once every three years; the last and final NATA report was published for 2014 data. The AirToxScreen Database has replaced EPA's former use of NATA and will present emissions and risk data annually. It appears that human health risks in Oregon due to inhalation of pollutants in air emissions were roughly the same in 2017 and 2018, based on ATS data.

Noncancer risks were not present at unacceptable levels in Oregon in 2018, based on ATS data. Noncancer risks are discussed in terms of a hazard quotient. A hazard quotient is obtained by dividing the concentration of a pollutant in air by its noncancer inhalation toxicity value. A hazard quotient of 1 or below for a single chemical is the level at which noncancer human health effects are considered unlikely. As the hazard quotient increases above 1, the likelihood of adverse human health effects also increases. When considering the noncancer risks from **multiple** chemicals, the term "hazard index" is used.

No air pollutant in any Oregon county or census tract in 2018 exceeded a noncancer hazard quotient of 1 for any target organ or system that was evaluated, including:

- Respiratory
- Neurological
- Liver
- Developmental
- Reproductive
- Kidney
- Ocular
- Endocrine
- Hematological
- Immunological

- Skeletal
- Spleen
- Thyroid
- Whole body (critical effects relevant to the whole body, such as decreased body weight).

Based on the lack of potential adverse noncancer effects in Oregon air, only cancer risks for air toxics emissions are discussed further.

## 2.0 Why cancer risk matters

Cancer risk is presented as a probability of contracting cancer. Typically, cancer risk estimates are presented as the number of *additional* cancer cases that could occur within a population of one million human beings due to exposure to a particular carcinogenic pollutant. “Additional” cancer cases refer to the fact that the background cancer rate in the United States -- without any additional chemical exposure – is about 1 in 3 for women and 1 in 2 for men, according to the American Cancer Society. The background cancer rate is related to genetics, exposure to things in typical daily life, voluntary choices such as smoking, and other parameters.

So, if 1 in 3 women in the U.S. is likely to get cancer during her lifetime, then she has an approximate 33 percent chance of getting cancer. This is equivalent to 33 in 100, which would be the same as 330,000 in one million. In combination with the state cancer risk of 30 shown below, the potential cancer risk for a population of one million women in Oregon would be 330,030 in one million. In this example, 30 of the possible incidents of cancer in a population of one million women could be due to exposure to air toxics discussed in this summary.

## 2.1 Acceptable cancer risk levels

An acceptable cancer risk level for an individual carcinogenic compound is typically considered to be 1 in 1 million, also written as  $1 \times 10^{-6}$ , or simply  $10^{-6}$ . For multiple carcinogens, an acceptable cancer risk level is typically considered to be 10 in 1 million, or  $1 \times 10^{-5}$ , or 1 in 100,000.

The U.S. Environmental Protection Agency describes a range of acceptable cancer risk from 1 in 1 million to 1 in 10,000 – that is,  $1 \times 10^{-6}$  up to  $1 \times 10^{-4}$ :

“Acceptable Exposure Level is a legal term defined in the National Contingency Plan (NCP), which is the regulation that promulgates the Comprehensive Environmental Remediation, Cleanup, and Liability Act, or CERCLA, typically associated with the cleanup of Superfund sites. An acceptable exposure level is the ‘concentration level of a contaminant to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime....’. For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent lifetime cancer risk to an individual of between  $10^{-4}$  (1 in 10,000) and  $10^{-6}$  (1 in 1,000,000) using information on the relationship between the dose and response.

Sometimes this is referred to as the acceptable risk range (Source: National Oil and Hazardous Substances Pollution Contingency Plan). Sometimes ‘acceptable exposure level’ is referred to as ‘acceptable risk.’ So, an “acceptable” risk level (or range) of a contaminant, defined by law, is a range that EPA uses to make cleanup decisions at Superfund sites. This is a risk level (or range) that people can be exposed to, including

sensitive populations, without health problems. For carcinogens, the acceptable risk range is between  $10^{-4}$  (1 in 10,000) and  $10^{-6}$  (1 in 1,000,000).”

The cancer risk values given for Oregon counties in Table 1 below are based on the presence of multiple carcinogenic air toxics and are assumed to be part of a single human exposure pathway, inhalation.

### 3.0 Cancer risks nationally

The 2018 ATS Database presented emissions from all 50 states and three territories that include the Virgin Islands, Puerto Rico, and the District of Columbia. Louisiana, Georgia, DC, and Arkansas had the highest cancer risks, at 40 in a million. Nineteen of the 50 states had a cancer risk of 30 in a million (including Oregon), while 30 states and Puerto Rico had a cancer risk of 20 in a million. Two states and one territory had the lowest cancer risk of 10 in a million – Wyoming, Hawaii, and the Virgin Islands. The average cancer risk for the U.S. as a whole was 20 in a million in 2018.

For the entire U.S., secondary formation of chemicals in air caused a cancer risk of 13 in a million, and formaldehyde is the related chemical that makes up most of the cancer risk in the formation of secondary chemicals. The risk from formaldehyde makes up more than 40 percent of the total cancer risk nationally.

Carbon tetrachloride causes about 2 in a million cancer risk, and is the main contributor to the cancer risk nationally related to background concentrations of chemicals in air; 2.5 in a million is due to biogenics (please see Section 4.3); and 0.9 in a million is due to stationary point sources, which are typically industrial facilities. There are dozens of additional types of emissions sources across the U.S., but none of those exceeded 1 in a million cancer risk, and most were much lower. The source categories discussed in Section 4.3 are responsible for most of the cancer risk in the U.S.

### 4.0 Cancer risks in Oregon

Cancer risk for pollutants in air for the state of Oregon is approximately 30 in a million, which means that due to exposure to certain air toxics in Oregon, there is a probability that 30 *additional* incidents of cancer above background levels may occur within a population of one million people. The following list presents cancer risks and population numbers in the states of Oregon, Washington, California, and Idaho. In each case, the cancer risk number shown indicates that for any population of one million people within a state, this additional (above background) number of cancer cases may occur.

State	Cancer risk in a million	Population
Oregon	30	3,831,050
Washington	30	6,724,526
California	30	37,249,389
Idaho	20	1,567,577

Note: Based on EPA’s 2018 ATS cancer risk data, the unrounded cancer risk in Oregon is 28.2 in a million.

## 4.1 Cancer risks for counties in Oregon

There are 36 counties in Oregon. Below is a table listing highest-to-lowest cancer risks for all 36 counties, based on the averaging of cancer risk per pollutant across all census tracts in a county, followed by summation of the average cancer risks for each pollutant in a county. ATS describes census tracts as land areas defined by the U.S. Census Bureau: tracts usually contain from 1,200 to 8,000 people, with most having close to 4,000 people. Census tracts are usually smaller than 2 square miles in cities but are much larger in rural areas; this means metropolitan counties such as Multnomah County will have a larger number of census tracts than counties with lower populations. There are 72 air pollutants with cancer effects listed in the ATS Database for Oregon statewide in 2018, although cancer risks for many of the pollutants in various counties are zero.

In 2018, Josephine and Multnomah counties had the highest cancer risks related to air toxics emissions, respectively, as shown below in Table 1. The high risk for Jackson County reflects the high frequency and large swaths of wildfires that took place in Oregon in 2018. The Klondike Creek fire in Josephine County was said to be the largest wildfire in the state's history and eventually connected with the adjacent Taylor Creek fire. The nearby counties of Coos, Curry, Klamath, and Jackson were also impacted by these fires, which created severe smoke health hazards and drove up the cancer risk due to toxic chemicals formed in the fire being transported to other areas.

County-wide cancer risk from emissions in Multnomah County were primarily due to secondary formation of chemicals (which was true state-wide) with a risk of 12 in a million; residential wood combustion with a risk of 6 in a million; and point source emissions from industrial and commercial facilities with a risk of 3 in a million. Multnomah County had the highest cancer risks from residential wood combustion and point source emissions in the state.

Harney and Wallowa Counties had the lowest cancer risks in Oregon at 10 in a million each, but the pollutant formaldehyde and the source category secondary formation drove the risk in these two counties, at a cancer risk of about 7 in a million and 6.5 in a million, respectively. Typically, cancer risks in a million are shown as rounded whole numbers, but the decimal points shown below indicate why the risk sequence is as shown.

**Table 1**

No.	County	Cancer Risk (in a million)
1	Josephine	35.7
2	Multnomah	35.5
3	Jackson	31.4
4	Clackamas	30.7
5	Washington	30.0
6	Lane	28.6
7	Marion	27.8
8	Linn	25.9
9	Douglas	24.4
10	Polk	24.2
11	Yamhill	23.9
12	Klamath	23.5

No.	County	Cancer Risk (in a million)
13	Benton	23.4
14	Curry	23.3
15	Columbia	22.4
16	Coos	22.1
17	Hood River	21.9
18	Deschutes	20.1
19	Wasco	19.5
20	Umatilla	18.7
21	Morrow	18.0
22	Malheur	17.0
23	Sherman	16.7
24	Jefferson	16.2
25	Gilliam	15.8
26	Tillamook	15.8
27	Union	15.5
28	Lincoln	15.2
29	Clatsop	14.9
30	Crook	14.8
31	Lake	14.8
32	Baker	14.1
33	Wheeler	13.8
34	Grant	13.2
35	Wallowa	12.1
36	Harney	11.9

The total cancer risk values per county in the table above represent the sums of per-pollutant cancer risks that are averaged across all census tracts for each county. As an example, the cancer risk related to formaldehyde in Multnomah County is an average of the formaldehyde risks across all census tracts in Multnomah County; this averaging is performed for each pollutant in Multnomah County. Then, those average cancer risks for each pollutant are added together to obtain a total cancer risk for Multnomah County.

## 4.2 Importance of cancer risk in individual census tracts

When considering individual census tracts, the cancer risk can be higher in a single census tract within a county than the average cancer risk for that county as a whole. Calculating an average emissions concentration and the related cancer risk for a county or the state tends to dilute, or “wash out” the higher cancer risks within census tracts inside those larger areas. If you look at the [2018 ATS Mapping Tool](#), some higher-risk census tracts can be identified in some Oregon counties.

The county with highest cancer risk of 35.7 in a million was Josephine County in southwestern Oregon adjacent to California. Large wildfires occurred in that area and likely caused much of the higher cancer risk values identified. Formaldehyde levels of cancer risk in Josephine County were high. Formaldehyde is directly emitted in these cases by combustion and can also form in

the smoke from wildfires. Three census tracts in Josephine County had total cancer risks that exceeded 35.7 in a million, and the three of them are adjacent from north to south. Tract 41033361500, with a cancer risk of 60 in a million, is a large tract with the town of Selma located in the approximate center of it and encompasses part of Siskiyou National Forest. Tract 41033360900, with a cancer risk of 50 in a million, has the town of Galice at its northern edge, and the towns of Wonder and Wilderville at its southeastern edge. Tract 41033361600, with a cancer risk of 40 in a million, contains the towns of Cave Junction, Kerby, and California Bar. This tract's southern border butts up against California. One other tract in Josephine County had a cancer risk of 20 in a million, while two others had cancer risks of 30 in a million.

Identifying census tracts with higher cancer risks based on ATS data is another tool that DEQ uses to focus on potential problem areas and facilities. In Jackson County, there are several census tracts that have cancer risks of approximately 3 in a million due to toxic air contaminant emissions in the Point Source category. A risk level of 3 in a million is triple the acceptable cancer risk value of 1 in a million. Higher point source cancer risks in certain tracts are flags for DEQ to investigate that tract.

Risk from emissions coming from a single facility may be masked by the larger geographic area that represents the census tract that contains that facility. Controlling higher-risk emissions coming from facilities that impact people in close proximity to them is the focus of Cleaner Air Oregon. DEQ wants to protect people near any facility that might be exposing residents to unacceptable human health cancer risks, despite average cancer risk in the related census tract appearing acceptable.

Many census tracts in Multnomah County appear to be very high, ranging up to 49 in a million due to the apparent presence of hexavalent chromium. However, hexavalent chromium emissions were mistakenly overestimated by a facility on the border of east Portland and west Gresham, The Boeing Company. This incorrect emissions data impacted the estimation of cancer risks in many census tracts surrounding the facility, making it look as if hexavalent chromium concentrations in the air were present at dangerously high levels. After reviewing the data, DEQ determined that actual levels of hexavalent chromium were about 100 times lower and did not result in unacceptable levels of human health risk. But that fact the initial levels looked so high prompted DEQ to track down the source of the emissions, which resulted in the discovery that the levels had been overestimated. This correction was provided to U.S. EPA.

### **4.3 Cancer risk by pollutant and by source category in Oregon**

It is difficult to discuss the risk from a particular pollutant without also discussing the risk related to the *source category* where the pollutant comes from. For example, the pollutant carbon tetrachloride has a cancer risk that drives, or makes up the largest part of, the cancer risk related to the source category of Background. Background includes pollutant concentrations in air that cannot be attributed to more-specific source categories like residential wood smoke or on-road vehicles.

The pollutants having the highest cancer risks statewide are presented first, followed by descriptions of each source category for which cancer risks are also estimated.

Any toxic air pollutant with a **statewide** cancer risk greater than one in a million is discussed below. These include cancer risks from highest to lowest:

- Formaldehyde (17 in one million)

- Benzene (3.2 in one million)
- Carbon tetrachloride (3 in one million)
- Acetaldehyde (2.5 in one million)
- Naphthalene (2.5 in one million)
- Polycyclic aromatic hydrocarbons/polycyclic organic matter or PAHPOM (2 in one million)

In every Oregon county, formaldehyde drives the cancer risk estimate – in other words, it contributes the highest cancer risk to each county’s total cancer risk. In fact, formaldehyde contributes roughly 50 to 100 percent of the cancer risk in most Oregon counties. The source categories that contribute the most to these formaldehyde levels are secondary formation in air, biogenics, residential wood combustion, and fire, typically in that order. Secondary formation of formaldehyde occurs through the chemical oxidation of volatile organic compounds present in air, and reactions between ozone and certain alkene compounds.

In general, the second largest contributor to cancer risk in Oregon is benzene, which originates from residential wood smoke, light-duty vehicles that use gas as fuel (cars, vans, SUVs, pickup trucks), and fires. The third largest contributor is carbon tetrachloride, which, as explained above, is a background air pollutant common to every state within the continental U.S.

The AirScreenTox Database indicates that acetaldehyde originates from secondary formation and biogenics, for the most part. Acetaldehyde is ubiquitous in the ambient environment. It is an intermediate product of plants emitting oxygen after taking up carbon dioxide and formed as a product of incomplete wood combustion in fireplaces and woodstoves, coffee roasting, smoking, vehicle exhaust fumes, and coal refining and waste processing. Residential fireplaces and woodstoves are the two highest sources of emissions, followed by various industrial emissions.

Naphthalene comes primarily from nonpoint sources of solvents and coatings, residential wood combustion, and fires. Residential wood combustion and fires are also the primary producers of PAHPOM, a grouping of chemicals containing polycyclic aromatic hydrocarbons and polycyclic organic matter.

Figure 1 below shows the amount of cancer risk each source category contributed to the air in Oregon in 2018 compared to the total cancer risk for the state of 28.2 in a million. The related source categories are described below.

**Secondary formation** --Secondary pollutants are pollutants formed in the atmosphere from interactions of certain volatile organic compounds like benzene, toluene, alkenes, alkanes, and isoprene with sunlight and with each other, secondarily creating pollutants such as acetaldehyde, acrolein, and formaldehyde. Most of the formaldehyde in the atmosphere comes from the secondary photochemical oxidation of methane and other VOCs. A smaller amount of formaldehyde is emitted directly from a few facilities in Oregon; formaldehyde would be called a primary pollutant in these cases. Because chemicals in our air can be converted to different and at times more harmful chemicals, it is important to regulate types and amounts of emissions with pollution control equipment, cleaner vehicles and substituting less reactive alternatives. Secondary formation made up 38 percent of the cancer risk in Oregon 2018, which makes it the highest source category contributor of cancer risk.

**Nonpoint** – Nonpoint emissions are emitted over a wide area rather than from a single point source, and can include areas such as urban streets, residential neighborhoods, and other

places where air pollutants are released through our everyday activities in a diffuse way. For example, in Multnomah County, the source category of Nonpoint includes emissions of residential wood combustion at a cancer risk of 6 in a million.

**Fire** – Fire produces emissions of many toxic air pollutants. Types of fires that were evaluated for the 2018 ATS data include wildfires, prescribed fires, cropland fires, and grassland fires. Wildfire smoke, for example, is comprised of a mixture of gaseous pollutants (like carbon monoxide), hazardous air pollutants (like polycyclic aromatic hydrocarbons [PAHs]), water vapor, and particle pollution. During the latter half of 2018, Oregon and Washington experienced an extreme fire season of multiple wildfires that lasted weeks and burned large areas of forest and resulted in smoky conditions in many counties in Oregon. Counties in the southwestern corner of Oregon had high cancer risks related to large fires including the Klondike Creek and Taylor Creek fires. These counties include Josephine (12 in a million cancer risk due to fire), Coos (9 in a million), Curry (9 in a million), Klamath (6 in a million), and Jackson (5 in a million).

**On Road** – On-road emissions are generated primarily by moving vehicles on highways and roads, such as passenger cars and trucks, commercial trucks and buses, and motorcycles. Generally, larger cities have higher levels of traffic and are adjacent to busier highways. The related cancer risk for On Road emissions will be higher in these areas. Statewide, cancer risk related to this source category is 2 in a million. Cancer risks from On Road emissions are roughly similar by county to statewide cancer risk.

**Biogenics** – Biogenics are naturally-occurring pollutants in air that come from vegetation and in some cases, soil. Biogenic sources can emit formaldehyde, acetaldehyde and methanol; and formaldehyde and acetaldehyde tend to be key risk drivers in air. Statewide, cancer risk related to this source category is 2.5 in a million. County-wide and statewide cancer risks from Biogenics emissions are roughly similar.

**Background** -- Background levels of pollutants in air are ambient air concentrations averaged over broad geographic regions. Statewide, cancer risk related to this source category is 2 in a million. Cancer risk from Background emissions will be much lower by county. Statewide, cancer risk related to this source category is 2.5 in a million. County-wide and statewide cancer risks from Background emissions are roughly similar.

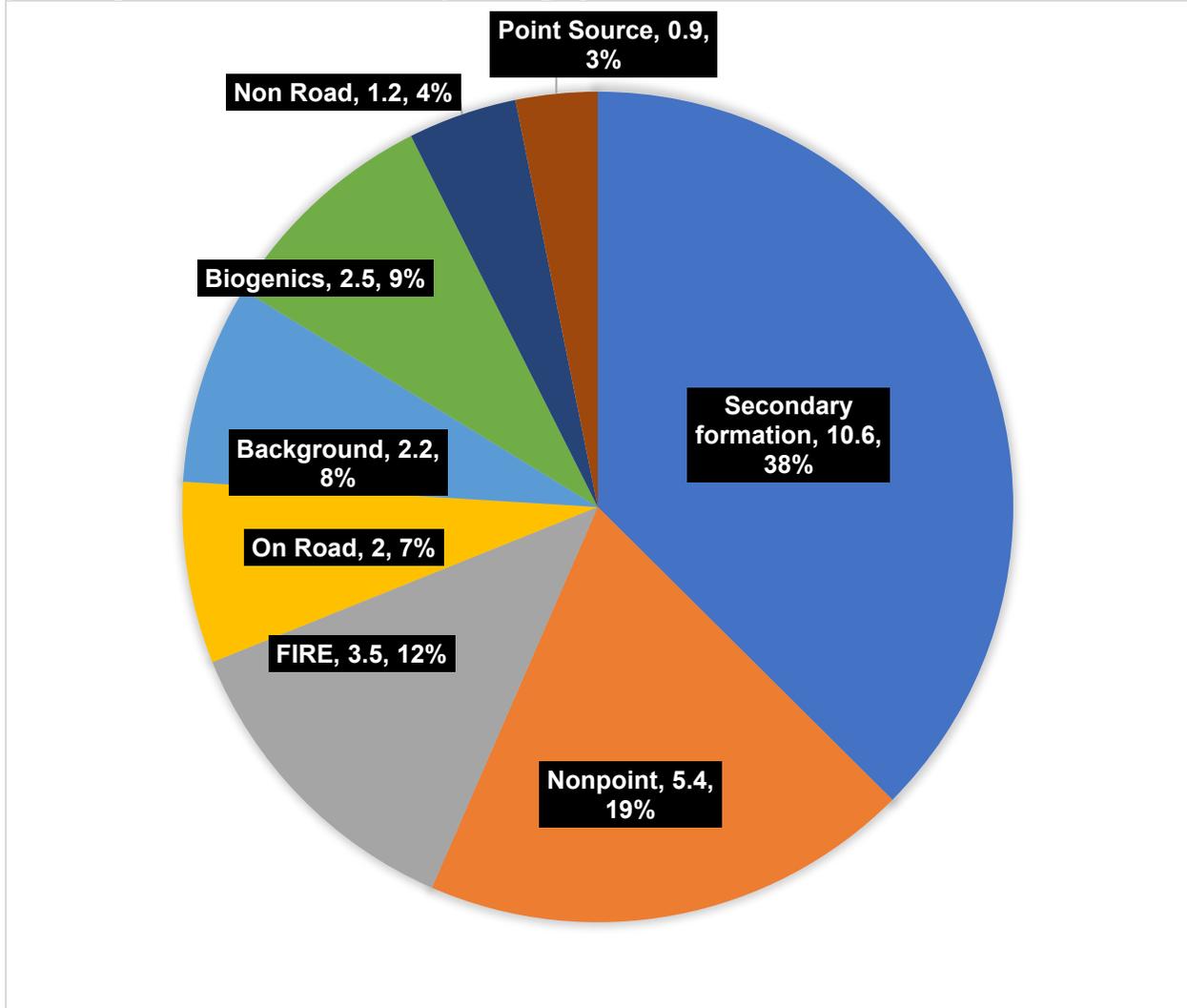
One example of a toxic air pollutant that is typically attributed to background is carbon tetrachloride. It was widely used as an aerosol propellant from the 1950s to the mid-1970s, when its use began to decline due to the availability of other propellant types and because of recognition of its ozone-depleting properties. In 2000, carbon tetrachloride use in the U.S. was phased out completely. However, carbon tetrachloride is still ubiquitous in air in the U.S. due its slow breakdown time.

**Non Road** – These emissions come from mobile sources not used on roads and highways for transportation of passengers or freight, such as aircraft; heavy equipment, locomotives, marine vessels, recreational vehicles, and small engines and tools – for example, lawn mowers and leaf blowers. Statewide, cancer risk related to this source category is 1 in a million, which is low compared to most of the other source categories. Cancer risks from Non Road emissions are roughly similar to statewide cancer risk by county.

**Point Source** – These emissions come from specific locations, or points of emissions. This primarily refers to stack and fugitive emissions from operating industrial and commercial

facilities. The ATS 2018 data for Oregon indicates that 0.9 per million cancer risk (out of a statewide total cancer risk of 28.2 in a million) is due to industrial emissions statewide. When averaged statewide or at the county level, emissions from industrial facilities that may impact localized communities in census tracts, contribute a smaller portion of cancer risk. However, in Multnomah County, the cancer risk related to Point Source emissions is greater than 3 in a million. Multnomah County contains the highest number of point sources, or facilities in the state. In each of the other 35 counties, county-wide point source cancer risk is below 1 in a million.

**Figure 1: Oregon’s cancer risk per million people in 2018 based on source categories, and percentage of statewide cancer risk per category. Total cancer risk statewide was 28.2 in a million.**



#### 4.4 Importance of ATS data review by Oregon DEQ

Using the ATS Mapping Tool described above, emissions from specific facilities can be identified within a tract, and a bar chart presents how many tons of a particular chemical are being emitted by each facility in that tract. The tons of emissions from a facility do not themselves represent actual cancer risk. As explained in more detail in Section 4.2, risks in

specific census tracts can be higher than the average risk for the county those census tracts are in. DEQ looks for these kinds of anomalies when evaluating ATS data for Oregon.

The Toxics Release Inventory is a tool that DEQ can use to double-check emissions estimates from operating facilities. The TRI is an EPA database which displays emissions estimates submitted to EPA by the facilities themselves. When a possible high risk from a facility is identified using the ATS data, those results can be checked against the reported emissions estimates available in the TRI database.

DEQ also requires all facilities with an individual operating permit to report their air toxics emissions every three years beginning in 2020. There isn't any threshold for reporting; if the facility emitted the pollutant to the air, they must report it to DEQ. This is another resource to track pollution emitted, although the process is limited by the 3-year restriction imposed by Oregon law on DEQ's ability to require this reporting.

If preliminary evidence indicates that there might be risk levels and emission amounts high enough to be a concern for human health, DEQ can focus resources and staff on bringing these emissions down.

## 5.0 Conclusions and risk reduction efforts

ATS data for 2018 indicates that emissions in Oregon create a level of concern for cancer risk, but little to none for noncancer risk. EPA considers the cancer risk in Oregon as 30 in a million, a rounded value from the mathematical result of 28.2 in a million. This puts Oregon on par with similar state-wide cancer risks in the neighboring states of Washington and California, and similar to the cancer risks in about half of U.S. states and to the U.S. as a whole, each of which has a cancer risk of 30 in a million. Statewide cancer risk in Oregon appears to have decreased slightly from 32.9 in a million in 2017 to 28.2 in a million in 2018.

The pollutant that drove cancer risk in Oregon statewide based on the 2018 ATS data is formaldehyde, at 17 in a million, which is approximately 60 percent of the statewide total pollutant cancer risk of 28.2 in a million. The *source category* driving cancer risk is secondary formation which, as a source category with a cancer risk of 10.6 in a million, makes up about 38 percent of the total statewide cancer risk. The link between these two types of cancer risks is that formaldehyde emissions are due primarily to the secondary formation of this pollutant in air, from chemical reactions between VOCs and nitrogen oxides in the presence of sunlight. VOCs and NOx come from natural and human-related sources. Industrial activities and vehicle emissions are two of the largest human-related sources of these chemicals and which are addressed through current, ongoing DEQ regulation by Cleaner Air Oregon, the Vehicle Inspection Program and strategies aimed at transitioning vehicles to cleaner fleets.

Formaldehyde is also generated during wildfires, and in 2018 wildfire smoke and emissions were heavy and prolonged in Oregon and in Washington. The large number of acres burned in Oregon and Washington in 2017 was the result of an intense fire season, and acres burned in 2018 in these two states were even higher. Wildfires are devastating and unpredictable, and in 2018, Josephine County had the highest cancer risk in Oregon, of 35.7 in a million. The high cancer risks in Josephine County were due primarily to big wildfires and the related smoke that occurred in Oregon and other parts of the Pacific Northwest in 2018.

Oregon has had a wildfire-fighting program in place for a long time, but climate change has caused lower water and snow levels, higher temperatures and drier vegetation over the last few years, which makes wildfire activity much more likely to happen and for fires to be larger and hotter than previous years. The Oregon Department of Forestry's Fire Protection Program is tasked with protecting 16 million acres of forest in Oregon. Recently (as of 2024 and 2025), innovative tools such as wildfire detection cameras, air sensors, and artificial intelligence are being used to monitor weather conditions and provide detection of wildfires in their early stages.

The higher cancer risks in Multnomah County of 35.5 in a million appear to be due to residential wood combustion and to emissions from industrial facilities. The Oregon Legislature, DEQ, and the Multnomah County Health Department have been working consistently on lowering levels of residential wood smoke in Oregon with programs that include things like woodstove change-outs. Wood burning releases particulate matter into the air, creating poor air quality in areas where wood-burning stoves are commonly used. Oregon uses Federal standards to help control the levels of particulate matter in air, and the Oregon Legislature has supported the effort to reduce wood smoke through education and outreach, public advisory systems, and wood stove change-out programs.

When averaged statewide or at the county level, emissions from industrial facilities (point sources) contribute a small proportion of the overall risk as discussed in Sections 4.2 and 4.3. However, it is possible that cancer risks in individual census tracts, near where people live, can be higher due to nearby facility emissions. DEQ's air permitting program, air toxics program and Cleaner Air Oregon program are all aimed at monitoring, controlling, and reducing emissions and lowering health risks from facilities like these. This is why DEQ carefully evaluates annual ATS data received from EPA and then applies resources if necessary to reduce emissions in neighborhoods.

The pollutant benzene contributes the second-highest cancer risk in Oregon, at 3 in a million. Benzene is a common air pollutant associated with vehicle emissions. Controlling and reducing vehicle emissions of benzene and other VOCs help to decrease cancer risk from air emissions. Many state agencies are involved in laws and programs aimed at reducing vehicle emissions. For starters, DEQ has programs in place to replace dirty diesel engines, which release multiple toxic air pollutants. Oregon House Bill 2007 requires the phase-out of 1997 and older diesel engines by 2023, and 2010 and older diesel engines by 2029. Replacement of older diesel engines on school buses is part of this approach, through the School Bus Replacement Program. DEQ offers grants annually, depending on available funding, to businesses, local governments, and equipment owners for replacement of older diesel engines with cleaner alternatives through the Diesel Emissions Mitigation Grant Program.

There are also other ongoing programs that help protect the health of Oregonians through their own pollution reduction efforts. Oregon Executive Order No. 20-04, issued on March 10, 2020, from the Governor's office, set science-based Greenhouse Gas emissions reductions goals, setting the state on a path to reduce its GHG emissions by at least 45 percent below 1990 emissions levels by 2035, and at least 80 percent below 1990 emission levels by 2050. Goals set for the reduction of GHG emissions will also reduce the pollutants like benzene and thus reduce these additional statewide cancer risks.

The Oregon Department of Land Conservation and Development and the Land Conservation and Development Commission subsequently initiated rulemaking related to the Executive Order.

In July 2022, the LCDC adopted 89 Climate-Friendly and Equitable Communities rules, which generally require local government to adopt zoning regulations and amend their transportation system plans in specific ways meant to reduce the use of automobiles. In addition, reduction of GHG emissions would help decrease the levels of NOx, which in turn help lower levels of secondary formation of air pollutants like formaldehyde.

In November 2024, Oregon's regulation governing body, the Environmental Quality Commission, adopted rules to establish the Climate Protection Program in Oregon as part of Oregon Administrative Rule 340-273, setting an enforceable declining cap on GHG emissions from fossil fuels used in Oregon including diesel, gasoline, and natural gas. The emissions cap described in these rules requires 50 percent emissions reduction by 2035, and 90 percent emissions reduction by 2050. These rules also support reductions of other types of air pollution and focus on improving public health in environmental justice communities and other Oregon communities. Lastly, the Oregon Department of Transportation published the Climate Action Plan, 2021-2026, in July of 2021. It presents details and goals aimed at reducing carbon emissions from transportation and the impacts climate is having on moving people and goods in the state.

As new and better information on emerging chemicals and on toxicity studies related to air pollutants becomes available, DEQ will update information related to the agency's evaluation of each annual ATS dataset moving forward. As is true with any project or program that depends on scientific data, the science behind how this data is interpreted and used will evolve over time. As we continually learn more, we will get better at controlling these emissions, reducing cancer risk, and recognizing any new chemicals that need to be considered and controlled.

## **Contact**

If you have specific questions for DEQ or would like this data in another format, or if in your own research on air emissions, you find something that seems questionable and you're unable to resolve the issue on your own, please contact Sue MacMillan, Air Toxics Science and Policy Analyst, at (503) 875-7741 or [susan.macmillan@deq.oregon.gov](mailto:susan.macmillan@deq.oregon.gov)

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