



Oregon Department of Environmental Quality

Summary of 2019 Toxics Release Inventory for Oregon

June 2022

Executive summary

The U.S. Environmental Protection Agency Toxics Release Inventory includes emissions data for on-site releases of toxic chemicals to air, water, and land from operating facilities. This Oregon Department of Environmental Quality TRI summary considers only TRI releases to air in 2019 in Oregon. There were approximately 375 TRI facilities in Oregon emitting 139 TRI pollutants in 2019 statewide. TRI emissions data are estimates made by the facilities themselves, which are then reported to the TRI for each chemical emitted. These estimates are not measurements, but instead are mathematical calculations of what each facility estimates it is emitting.

DEQ's Air Quality Division created this summary of 2019 TRI data to make it more easily understood by other DEQ staff and by the general public. However, EPA is the keeper of the original 2019 TRI database and is the appropriate agency to contact if complex questions arise. Information in this summary may be used by DEQ to identify emissions from facilities that might need further evaluation. DEQ pulled 2019 TRI data directly from EPA's TRI database and created spreadsheets to obtain lists of statewide TRI chemicals, lists of emitting facilities and their locations, amounts of chemicals emitted by each facility, and identify any trends in chemical emissions that have occurred over the past 9 years.

In 2019, the total amount of emissions of all TRI chemicals statewide was 11,582,925 pounds. To identify which TRI chemicals were emitted in the highest amounts, the top 20 highest emissions statewide were identified and further evaluated in this summary. The TRI chemical emissions estimates comprising the 20 highest emissions, from highest to lowest, include:

1. Ammonia
2. Methanol
3. Hydrochloric acid
4. Formaldehyde
5. Hydrogen sulfide
6. Acetaldehyde
7. Styrene
8. Methyl isobutyl ketone
9. Xylenes (mixed isomers)
10. Nitric acid
11. n-Butyl alcohol
12. Toluene
13. Phenol
14. Chlorine dioxide
15. Trichloroethylene
16. Hydrogen fluoride
17. Ethylbenzene
18. Sulfuric acid
19. Copper and copper compounds
20. Cresol (mixed isomers)

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Ammonia and methanol were estimated to have been emitted in the millions of pounds in 2019. Please refer to Section 2.1 for pounds emitted in 2019 statewide for the 20 chemicals listed above.

Because DEQ is also interested in identifying emissions of cancer-causing and noncancer-causing but toxic TRI chemicals, DEQ ranked the top 20 cancer-causing and the top 20 noncancer TRI chemicals by comparing chemical toxicity to amounts emitted. This gives DEQ a very rough idea of facility emissions that might be of more concern than others in terms of possible adverse health effects. These three lists of “top 20” chemicals contained overlap, resulting in a final list of 40 TRI chemicals which are further evaluated in this summary.

In addition, facilities that appear to be responsible for the majority of emissions of some of these 2019 TRI chemicals include:

- **Ammonia** (6,293,794 lbs.) was estimated to be emitted almost entirely (93%) by Dyno-Nobel – St Helens Plant located in Deer Island, Columbia County.
- **1,3-Butadiene** (50 lbs.) was estimated to be emitted entirely (100%) by Douglas County Forest Products, located in Roseburg, Douglas County.
- **Cobalt and cobalt compounds** (335 lbs.) was estimated to be emitted almost entirely (98%) by Orchid Orthopedic Solutions Oregon Inc., located in Oregon City, Clackamas County.
- **Copper and copper compounds** (24,435 lbs.) were estimated to be emitted almost entirely (85%) by Vigor Industrial, located in Portland, Multnomah County.
- **Cresol** (mixed isomers (23,492 lbs.) was estimated to be emitted entirely (100%) by Georgia-Pacific Toledo, located in Toledo, Lincoln County.
- **Methyl isobutyl ketone** (167,397 lbs.) was estimated to be emitted almost entirely (99.8%) by TDY Industries Inc. dba Wah Chang, located in Albany, Linn County.
- **Phosgene** (635 lbs.) was estimated to be emitted entirely (100%) by TDY Industries Inc. dba Wah Chang, located in Albany, Linn County.
- **Sulfuric acid** (25,067 lbs.) was estimated to be emitted entirely (100%) by the Boardman Plant, located in Boardman, Morrow County.
- **Tetrachloroethylene** (8,827 lbs.) was estimated to be emitted entirely (100%) by the Boeing Company of Portland, located in Portland, Multnomah County.
- **Toluene diisocyanates** (30 lbs.) were estimated to be emitted entirely (100%) by FXI, Inc., located in Portland, Oregon.
- **Trichloroethylene** (43,323 lbs.) was estimated to be emitted entirely (100%) by Entek International LLC, located in Lebanon, Linn County.

Further details are available in Section 3.1. Emissions of TRI chemicals from Oregon facilities that do not currently have air permits were also identified. This information is presented in Section 3.2.

1.0 Evaluating Toxics Release Inventory Data for Oregon

1.1 How the Toxics Release Inventory works

If a facility is emitting a pollutant in large enough amounts to exceed TRI limits, or thresholds, then that facility must submit emissions estimates for that pollutant to the TRI, as required by the EPA. There are basically three types of TRI thresholds:

- 1) If a facility **manufactures or processes** a chemical that is estimated to be emitted at greater than 25,000 pounds per year, and that chemical is *not* persistent, bioaccumulative, or toxic (“PBT” as defined per the Inventory), that facility must submit an emissions estimate to the TRI for that chemical.

“Persistent” means the chemical does not break down easily and stays around for a long time.
“Bioaccumulative” means that the chemical travels to the tissues of humans, animals, or plants and builds up to higher concentrations in that tissue over time. “Toxic” means the health effects a chemical has, such as causing cancer or things like liver damage.
- 2) Emissions estimates must also be submitted to the TRI if a chemical that is “**otherwise used**” at the facility and is *not* persistent, bioaccumulative, or toxic is emitted at greater than 10,000 pounds/year. The term “otherwise used” includes any use of a toxic chemical contained in a mixture or other trade name product or waste, that is not covered by the terms *manufacture* or *process*.
- 3) The TRI also has a list of 21 persistent, bioaccumulative, or toxic chemicals that must be reported at much lower levels if manufactured, processed, or otherwise used by a facility. For example, **per- and polyfluoroalkyl substances** must be reported if emitted at over 100 pounds in a year; polychlorinated biphenyls if over 10 pounds in a year; and dioxins and dioxin-like compounds if over 0.1 gram in a year.

TRI data only indicate which emitted chemicals are estimated to exceed any of the thresholds discussed above. It does not consider the human health risks associated with the amounts of the chemicals reported.

As explained for the three types of thresholds described above, facilities calculate and report these estimates to the TRI. Facilities can only be penalized by the EPA if they under-report their emissions. Based on experience with previous TRI data, DEQ found that facilities sometimes provided overestimates of their emissions. Although this is not a common occurrence, it is one reason for DEQ’s review of TRI data.

1.2 EPA releases a new tool called AirToxScreen

For this 2019 summary, DEQ pulled TRI data directly from the TRI database. This differs from the DEQ summary of 2018 TRI data, for which DEQ pulled TRI data from the Emissions Inventory System. The EIS contained TRI data that had been reviewed by EPA and the states, corrected if necessary, and then added to the EIS database along with other types of air data.

However, in 2021, EPA initiated a new process for evaluating emissions inventory system data, called AirToxScreen. Release of AirToxScreen data will take place annually rather than every three years, as happened previously with National Air Toxics Assessment reports. EIS data was used to produce the earlier NATA reports mentioned above, the last of which evaluated 2014 EIS data. The first AirToxScreen results released in 2021 provide 2017 emissions data for the U.S. Thus, the way that TRI data was reviewed by EPA and the states changed at that point.

1.3 Doubling of total TRI statewide air toxics emissions estimates for Oregon from 2018 to 2019

In 2019, a large increase in TRI estimates for total air toxics emissions in Oregon occurred, as shown in [Table 1](#). In 2018, the total air toxics emissions estimate for Oregon statewide was 6,031,742 pounds. In 2019, this number increased to 11,582,925 pounds, which represents close to a doubling of TRI total air toxics emissions for Oregon in 2019. This increase is due to a single industrial source’s emissions of ammonia, and that source is the Dyno-Nobel St. Helens Plant, located in Deer Island, Oregon, in Columbia County. Prior to the 2019 TRI

data release, the initial ammonia emissions estimate submitted by Dyno-Nobel to the TRI was always about 10 times higher than the emissions number after it was reviewed and corrected by EPA for use in the EIS. However, as explained in the previous section, DEQ pulled TRI data directly from the TRI database for this 2019 TRI summary, which might mean the ammonia emissions for Dyno-Nobel are overestimated.

2.0 How 2019 TRI air toxics data were ranked

2.1 Top 20 most highly emitted TRI chemicals

TRI air toxics can be ranked by listing them in order of highest to lowest emissions, measured in pounds per year. This will show us which TRI chemicals are being emitted in the highest amounts. For the purposes of this summary, the top 20 most highly-emitted TRI chemicals are identified, and are listed below in order from highest to lowest.

Top 20 most highly emitted TRI chemicals	Emissions in 2019 (in pounds)
Ammonia	6,293,794
Methanol	2,456,067
Hydrochloric acid	327,178
Formaldehyde	252,262
Hydrogen sulfide	246,686
Acetaldehyde	230,653
Styrene	180,635
Methyl isobutyl ketone	167,397
Xylene (mixed isomers)	159,868
Nitric acid	105,856
n-Butyl alcohol	90,986
Toluene	90,401
Phenol	61,473
Chlorine dioxide	54,208
Trichloroethylene	43,323
Hydrogen fluoride	32,852
Ethylbenzene	29,912
Sulfuric acid	25,107
Copper and copper compounds	24,435
Cresol (mixed isomers)	23,492

2.2 Ranking systems related to carcinogenic potency and noncarcinogenic toxicity of TRI chemicals

Although TRI data is not used to estimate human health risks, DEQ weighted the Oregon TRI data by comparing emissions amounts to chemical-specific risk-based concentrations. This is done primarily to provide DEQ Air Quality staff with additional information on chemicals being emitted that have cancer-causing and/or toxic effects on body organs or systems.

Risk-based concentrations indicate the toxic potency of carcinogenic chemicals and noncarcinogenic chemicals (refer to Cleaner Air Oregon program rules in Oregon Administrative Rule 340-245-8010 - Table 2-Risk-Based Concentrations). A highly toxic chemical emitted in small amounts might be of more concern than a less-toxic chemical emitted in large amounts. It depends on the specific circumstances at a facility.

To make a comparison possible, chemical-specific emission amounts were divided by the risk-based value for that chemical. This calculation gives an approximate result that allows DEQ to see which TRI chemical emissions reported for Oregon may be of greater concern for human health. Ranking lists for carcinogenic chemicals and noncarcinogenic chemicals are available below. Note that some chemicals have both carcinogenic and noncarcinogenic effects, and so there will be some overlap between the two lists.

Rank	Weighted by cancer potency and emissions	Weighted by noncancer toxicity and emissions
1.	Dioxins and dioxin-like compounds	Dioxins and dioxin-like compounds
2.	Polycyclic aromatic hydrocarbons	Hydrogen sulfide
3.	Chromium and chromium compounds	Chlorine
4.	Formaldehyde	Chlorine dioxide
5.	Acetaldehyde	Nickel and nickel compounds
6.	Trichloroethylene	Formaldehyde
7.	Epichlorohydrin	Sulfuric acid
8.	Ethylbenzene	Trichloroethylene
9.	Nickel & nickel compounds	Manganese and manganese compounds
10.	Benzene	Hydrochloric acid
11.	Naphthalene	Hydrogen fluoride
12.	Tetrachloroethylene	Ammonia
13.	Benzo(g,h,i)perylene	Lead & lead compounds
14.	1,3-Butadiene	Cobalt
15.	Methyl tert-butyl ether	Phosgene
16.	Toluene diisocyanates	Acetaldehyde
17.	Pentachlorophenol	Epichlorohydrin

Rank	Weighted by cancer potency and emissions	Weighted by noncancer toxicity and emissions
18.	Hexachlorobenzene	Toluene diisocyanates
19.	NA	Acrolein
20.	NA	Chromium and chromium compounds

NA: There are only 18 air toxics listed in the cancer risk-weighted group, because only 18 carcinogenic air toxics had related emissions estimates in the 2019 TRI for Oregon.

Dioxins and dioxin-like compounds have the Number One ranking related to both cancer and noncancer potency per amount emitted. Dioxins and dioxin-like compounds, as is true for many chemicals or chemical groups, are known to have both cancer and noncancer effects. So, dioxins and dioxin-like compounds are ranked as the chemical of most potential concern in both the cancer and noncancer risk-weighted categories for Oregon 2019 TRI data.

2.3 Permitted facilities that emitted the majority of Top 20 TRI chemicals in 2019

Important conclusions about 2019 TRI data in Oregon can be drawn from [Table 2](#), which presents the facilities estimated to emit the top 20 highest amounts of emissions, and the top 20 air toxics ranked by cancer and noncancer toxicity. The first of these is identification of the 20 TRI chemicals that were estimated to have been emitted in the highest amounts statewide in 2019. Another is that emissions of TRI carcinogenic chemicals and non-carcinogenic chemicals are roughly ranked to provide an idea of which chemicals may be of most concern for human health risk. Because there is overlap between the three ranked top 20 chemicals, a final list of 40 chemicals was identified, along with which facilities are emitting the higher amounts of each chemical and the potential health effects of each chemical, as presented in Table 2. However, as stated previously, most of the TRI emissions come from permitted facilities, which are allowed certain emissions limits. Finally, a list of facilities which submitted 2019 TRI data but did not have Oregon air permits was identified in Section 3.2. All these parameters help DEQ to monitor and control emissions coming from facilities operating in Oregon.

Ranking processes used by DEQ are described in Sections 2.1. and 2.2. The facilities emitting the larger amounts of the 40 chemicals are referred to here as Majority Emitters for the purposes of this summary only. Facilities that were estimated to emit more than one of the total 40 chemicals in the three types of ranking lists are presented in Table 2 in the same-color font or same-color shading to make them more easily identifiable. In addition, brief summaries of the health effects related to each of the 40 pollutants are provided in Table 2.

Amounts of each chemical emitted vary widely. For example, ammonia was estimated to be emitted by more than six facilities for a total of 6,345,047 pounds released statewide in 2019, while dioxins and dioxin-like compounds were only emitted at a total of 4.5 pounds statewide in 2019. The amounts of dioxins and dioxin-like compounds appear to be comparatively very small, but these compounds are known to be much more toxic than ammonia. So, it is helpful to know both the amount of a chemical emitted and how toxic that chemical is.

The emissions shown in Table 2 represent estimated amounts submitted to the TRI by the facilities themselves. Although TRI data are based on emissions estimates rather than monitored data, DEQ uses the TRI as a tool to stay aware of pollutants and facilities that might need further consideration. Most of the chemicals in Table 2 are emitted by facilities that are already permitted by the DEQ Air Quality division and thus typically have permit-required limits for emissions which are more stringent than TRI thresholds. Some of these facilities are also regulated through the Cleaner Air Oregon program utilizing human health risk assessment methods. Facilities called in by Cleaner Air Oregon are required to control, treat, or cease their emissions based on the human health risks associated with them.

2.4 Air pollutants emitted in 2019 by at least one Oregon TRI facility, but which do not have toxicity information

Some TRI pollutants were emitted by Oregon facilities in 2019 that do not have available toxicity information, and so do not appear in Cleaner Air Oregon Table 2 – Toxicity Reference Values, OAR 340-247-8020. This means their potential health risks cannot be evaluated unless new toxicity information becomes available for these chemicals in the future. These include:

1. Barium
2. Boron trichloride
3. Butyl acrylate
4. n- Butyl alcohol
5. Catechol
6. Creosote
7. Dicyclopentadiene
8. Dimethyl phthalate
9. Ethylene
10. Formic acid
11. 4,4-Isopropylidenediphenol
12. Methyl acrylate
13. N-methyl-2-pyrrolidone
14. Molybdenum trioxide
15. Nitrate compounds
16. Pyridine
17. Zinc compounds

3.0 2019 TRI emissions in Oregon that might need further consideration

Table 2 lists the 40 TRI pollutants of most concern based on the ranking systems described earlier, as well as the permitted facilities that emitted the majority of each of those pollutants in Oregon in 2019. Many of the facilities in Table 2 have been, are being, or will be called in by the Cleaner Air Oregon program to assess potential human health risks related to their emissions. Further information on the Cleaner Air Oregon facility call-in process can be found here: [CAO Facility Prioritization](#). Facilities being called in by Cleaner Air Oregon are sorted into four Prioritization Groups. Prioritization Groups were determined by DEQ considering each facility's assigned Prioritization Score and available Qualitative Data. Results are compiled into the following groups:

- Group 1: (20) facilities to be called-in during the first year
- Group 2: (20) facilities to be called in the second year
- Group 3: (315) lower-priority facilities to be called in as resources permit or if new information becomes available
- Group 4: (8) facilities that will not be called in due to closure or not emitting air toxics

3.1 Facilities responsible for nearly 100% of the emissions of a specific chemical

There are some Majority Emitters that are responsible for especially large percentages of pollutant emissions. As stated previously, these emission amounts have been estimated and reported by the companies themselves. Examples of such emissions include:

- **Ammonia** (6,293,794 lbs.) was estimated to be emitted almost entirely (93%) by Dyno-Nobel – St Helens Plant located in Deer Island, Columbia County. (This is a Group 3 facility in the Cleaner Air Oregon program.)

- **1,3-Butadiene** (50 lbs.) was estimated to be emitted entirely (100%) by Shell Portland Distribution Terminal, located in Portland, Multnomah County. (Group 3; source is named Equilon Enterprises LLC under CAO)
- **Cobalt and cobalt compounds** (335 lbs.) were estimated to be emitted almost entirely (98%) by Orchid Orthopedic Solutions Oregon Inc., located in Oregon City, Clackamas County. This facility was also estimated to emit 27% (144 lbs.) of the chromium and chromium compounds recorded statewide in 2019. (Group 2)
- **Copper and copper compounds** (24,435 lbs.) were estimated to be emitted almost entirely (85%) by Vigor Industrial, located in Portland, Multnomah County (Group 3)
- **Cresol** (mixed isomers (23,492 lbs.) was estimated to be emitted entirely (100%) by Georgia-Pacific Toledo, located in Toledo, Lincoln County. (Group 1, currently conducting an air toxics assessment)
- **Methyl isobutyl ketone** (167,397 lbs.) was estimated to be emitted almost entirely (99.8%) by TDY Industries Inc. dba Wah Chang, located in Albany, Linn County. (Group 2)
- **Phosgene** (635 lbs.) was estimated to be emitted entirely by TDY Industries Inc. dba Wah Chang, located in Albany, Linn County. This facility was also estimated to emit 45% (461 lbs) of the nickel and nickel compounds statewide in 2019. (Group 2)
- **Sulfuric acid** (25,067 lbs.) was estimated to be emitted entirely (100%) by the Boardman Plant, located in Boardman, Morrow County. (Group 4).
- **Tetrachloroethylene** (8,827 lbs.) was estimated to be emitted entirely (100%) by the Boeing Company of Portland, located in Portland, Multnomah County. This facility was also estimated to emit 32% (328 lbs) of the nickel and nickel compounds statewide in 2019. (Group 2)
- **Toluene diisocyanates** (30 lbs.) were estimated to be emitted entirely (100%) by FXI, Inc., located in Portland, Oregon. (Group 3)
- **Trichloroethylene** (43,323 lbs.) was estimated to be emitted entirely (100%) by Entek International LLC, located in Lebanon, Linn County. This is a Group 1 facility that is currently conducting a risk assessment overseen by Cleaner Air Oregon. (Group 1, currently conducting an air toxics assessment)

3.2 Emissions from unpermitted facilities

It is important to identify chemicals estimated to be emitted from facilities in Oregon which do not currently have air quality permits, so that the DEQ can determine whether each facility operates in a way that requires an air quality permit. There are 66 facilities in Oregon that reported TRI estimates for 2019 but are not under permit by Oregon DEQ's Air Quality division, as shown in [Table 3](#). Many of these facilities reported zero emissions in 2019 for chemicals they may have emitted in the past. This is a tool DEQ can use to keep track of unpermitted facilities that might need an air permit.

Some of these unpermitted facilities were estimated to emit amounts of a particular chemical that may need further consideration, as listed below. Facilities are required to contact the DEQ Air Quality permitting program if they think they may be emitting chemicals that would require them to get a DEQ Air Permit. To obtain an air permit, a facility must undergo a review process by DEQ that uses specific criteria to determine if a permit is needed. The Cleaner Air Oregon program may become involved and would regulate the facility based on how much human health risk its emissions were causing. The TRI is just one tool that can be used to help identify unpermitted facilities that need an air permit.

- **Styrene** – 7,589 lbs. of this chemical were estimated to be emitted by Becklin Holdings Inc. located in Grants Pass.
- **Hydrogen fluoride** – 1,032 lbs. of this chemical were estimated to be emitted by Cascade Columbia Distribution, located in Sherwood.
- **Diisocyanates** -- Ultimate RB, located in McMinnville, Oregon, emitted 502 lbs. of diisocyanates in 2019. Toluene diisocyanates were added to the TRI list of reportable chemicals in 1990. In 1995, a group of 20 diisocyanate compounds, listed as "Category Code N120, Diisocyanates" was added to the TRI list of chemicals, in addition to TDI. This allows facilities like Ultimate RB that emit diisocyanates to

lump them under the Diisocyanates category, rather than having to report individual diisocyanate compounds.

Contact

If you have specific questions for DEQ or would like this data in another format, please contact Sue MacMillan, Air Toxics Science and Policy Analyst, at 503-875-7741 or susan.macmillan@deq.oregon.gov.

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