



Fact Sheet

How Cleaner Air Oregon assesses health risks

The Cleaner Air Oregon program requires commercial and industrial facilities to assess potential health risks to nearby communities from exposure to Toxic Air Contaminant, or TAC, emissions. The CAO program evaluates both cancer and noncancer risks at various locations around a facility where people live, work, attend school, and play. For more information about cancer and noncancer risks, please see the [Excess Cancer Risk](#) and [Noncancer Health Risk](#) fact sheets.

This document explains how DEQ uses scientific information on the toxicity of air contaminants, emissions information from facilities, and air quality modeling to assess health risks at different locations nearby a facility.

Understanding the science that informs the health risk assessment

Health risks associated with TAC emissions are based on of two factors:

1. **Toxicity** is a measure of how harmful a contaminant is.
2. **Exposure** is how much, how long, and how often a person comes into contact with a contaminant.

The **toxicity** of a TAC is established through the creation of health-based standards called **Toxicity Reference Values**, or **TRVs**. DEQ and the Oregon Health Authority develop **TRVs**, for individual contaminants based on scientific information that shows the amount of a contaminant that someone can breathe before negative health effects occur. DEQ and OHA rely on authoritative sources, like the U.S. Environmental Protection Agency, for the best available science to set these values. DEQ and OHA may either adopt these values directly or propose adjustments to ensure they meet Oregon's health protective standards.

TRVs are established for both **cancer** and **noncancer** health risks. The noncancer health risks are further divided into **chronic** (long-term, greater than one year) and **acute** (short-term, 24-hour), risks. This means that a single contaminant can have up to three TRVs. DEQ uses these TRVs to set the health protective regulatory values in the CAO program.

Exposure to TACs is measured through an air quality modeling process that reviews emissions information from a facility, including both annual (chronic) and 24-hour (acute) emissions. This model also considers information like stack heights and temperatures, nearby terrain and building heights, and meteorological data to improve its accuracy. The results of the air model provide the ground-level amount of a TAC emission that someone may be exposed to at various locations near the facility.

CAO uses the following exposure locations around a facility to establish how long and how often someone may be exposed to a TAC:

- **Residential** – these are chronic exposure locations where people live.
- **Nonresidential** – these are chronic exposure locations where adults work, and children attend school or day care.

Translation or other formats

[Español](#) | [한국어](#) | [繁體中文](#) | [Русский](#) | [Tiếng Việt](#) | [العربية](#)

800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

- **Acute** – these include the chronic locations as well as other areas where people may spend several hours per day, such as a parks

DEQ makes different, protective exposure assumptions for these different exposure locations. For example, DEQ assumes that at a residential location, someone is exposed to a contaminant every day of their life for 70 years, for 24-hours per day. Residential exposure assumptions are the most protective. For nonresidential locations, there are different assumptions for adults and children.

Understanding Risk-Based Concentrations

Risk-Based Concentrations, or RBCs, are the regulatory standards for the CAO program. RBCs are created using **exposure scenarios** which combine the toxicity for a specific TAC and the exposure assumptions of the different locations near a facility. For example, an exposure scenario could be “residential noncancer chronic risk”, “nonresidential child cancer risk”, or “noncancer acute risk”. To assess risk from these different exposure scenarios, the CAO program establishes different **RBCs** for exposure scenarios that apply to a TAC. A single contaminant could have up to seven RBCs. Please see the diagram at the end of this fact sheet to learn more about how toxicity and exposure combine to create **RBCs**.

In addition to the assumptions for different exposure locations, some TACs require further adjustments to ensure DEQ accurately assesses risk. DEQ considers if contaminants don't easily break down and are able to be deposited in soil or end up in foods. In these cases, DEQ includes additional routes of exposure like incidental soil ingestion, skin contact, or consumption of contaminated garden plants and breast milk. Also, if a contaminant causes cancer by specifically interfering with genetic material, the potential increased risk to children is considered. These adjustments lead to more health protective **RBCs**. To learn more about these adjustments please see the [Health Risk Assessment Recommended Procedures](#).

Understanding how DEQ regulates risk under CAO

During a CAO Risk Assessment, DEQ compares the results of the air model, which shows how much of a contaminant someone at that location may be exposed to, against the **RBC** for that **exposure scenario**. This comparison is done for all TACs emitted from a facility for all exposure scenarios.

At each modeled location, the calculated risks from all the TACs are summed. Then, results from locations with the highest risk for cancer, noncancer chronic, and noncancer acute effects are compared against **Risk Action Levels**, or **RALs**. These levels were set by the Oregon legislature and indicate what actions DEQ can take if risk exceeds specified levels. If a facility's risk exceeds the lowest RALs, they will require permit conditions to limit risk from their emissions. If higher RALs are exceeded, the facility could also be required to notify the public of their Risk Assessment results, hold a public meeting, or install controls and reduce risk. For more on RALs and CAO program requirements please see [Risk Action Levels fact sheet](#).

Program name and contacts

Cleaner Air Oregon Program, Oregon Department of Environmental Quality
Apollonia (Apple) Riberdy, Program Coordinator
J.R. Giska, Program Manager

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. Visit DEQ's [Civil Rights and Environmental Justice page](#).

TRVs and RBCs

LIST OF SCIENTIFIC AGENCIES



U.S. Department of
Health and Human Services
Agency for Toxic Substances
and Disease Registry



OEHH
SCIENCE FOR A HEALTHY CALIFORNIA



IRIS
Integrated Risk Information System



PPRTV – Provisional
Peer-Reviewed Toxicity
Value



State of Oregon
Department of
Environmental Quality

TOXICITY REFERENCE VALUES (TRVs)

Exposure Time

Exposure Frequency

Exposure Duration

Early Life Adjustment Factor
(ELAF)

Multi-pathway Adjustment Factor
(MPAF)

RISK-BASED CONCENTRATIONS (RBCs)

- Resident
- Non-Resident Child
- Worker



Constant exposure
Inhalation only



Number of
hours
exposed

Number
of days
exposed



Number
of years
exposed

For some
cancer causing
chemicals



For chemicals
that
bioaccumulate