State of Oregon Department of Environmental Quality

Existing Facility Hazard Index Calculations and Noncancer Risk Action Levels

Revised On: 8/7/2020

Hazard Index (HI) calculations are required when evaluating both chronic and acute noncancer risk at exposure locations for the purposes of a CAO risk assessment.

For new facilities, all TACs are compared to an HI = 1. The hazard index is calculated using equations 1, 2, and 3 below.

For existing facilities, the CAO rules separate Toxic Air Contaminants (TACs) with noncancer Risk Based Concentrations (RBCs) into two distinct groups based on their Toxics Best Available Control Technology (TBACT) Risk Action Levels (RALs). Each of these TACs is listed in OAR 340-245-8040 Table 4 as having either a TBACT RAL of HI = 3 (an "HI 3 chemical") or a TBACT RAL of HI = 5 (an "HI 5 chemical").

The Aggregate TEU Level, Source Permit Level and Community Engagement Level RALs don't differentiate between HI 3 and HI 5 chemicals. To calculate a hazard index for comparison to these RALs, use equations 1, 2, and 3 below.

The TBACT Level, Risk Reduction Level and Immediate Curtailment Level RALs treat HI 3 and HI 5 chemicals differently. To compare to these RALs, calculate a Risk Determination Ratio using Equation 4 below. If a facility emits only HI 3 chemicals or HI 5 chemicals, it is also acceptable to use Equation 1 or 2 and compare that HI value in the RALs table. [see OAR 340-245-0200(5)]. If the noncancer risk for a facility is HI < 3.0, then the calculation of the RDR is not required as it only applies at the TBACT RAL.

Equation 1:

$$Hazard\ Index_{\ HI\ 3\ chemicals} = \sum \frac{Modeled\ Concentration_{HI\ 3\ chemicals}}{RBC}$$

Equation 2:

$$Hazard\ Index_{\ HI\ 5\ chemicals} = \sum \frac{Modeled\ Concentration_{HI\ 5\ chemicals}}{RBC}$$

Equation 3:
This is used for new sources, and existing sources for comparison to the Aggregate TEU Level, Source Permit Level and Community Engagement Level.

$$Hazard\ Index_{\ Total} = Hazard\ Index_{\ HI\ 3\ chemicals} + Hazard\ Index_{\ HI\ 5\ chemicals}$$

Equation 4:
This is used for existing sources for comparison to the TBACT Level, Risk Reduction Level and Immediate Curtailment Level.

$$Risk\ Determination\ Ratio\ (RDR) = \frac{Hazard\ Index_{\ HI\ 3\ chemicals}}{3} + \frac{Hazard\ Index_{\ HI\ 5\ chemicals}}{5}$$

When evaluating the final noncancer risk for your facility at the required exposure locations, HI3 and HI5 risk estimates should be rounded off to the nearest whole number, but RDR estimates should be

rounded off to one decimal place. [OAR 340-245-0200(4)(a)(A)] Please see Table 1 below to determine how the final noncancer risk compares with the correlated RALs.

Please refer to Appendix A of the Health Risk Assessment Guidance Recommended Procedures for example risk assessment calculations involving RDRs for existing facilities, including analyses based on target organ systems.

Use the values in Table 1 below to determine compliance for the final maximum noncancer risk from your facility. [OAR 340-245-8010 Table 1]

Table 1: Existing Facility Noncancer Risk Action Levels (RALs)

	Existing Facility Noncancer Risk Action Levels (RALs)					
	Aggregate TEU Level	Source Permit Level	Community Engagement Level	TBACT	Risk Reduction	Immediate Curtailment
If facility emits only HI3 chemicals	HI 0.1	HI 0.5	HI 1	HI 3	HI 6	HI 12
If facility emits only HI5 chemicals				HI 5	HI 10	HI 20
If facility emits HI3 and HI5 chemicals				RDR 1.0	RDR 2.0	RDR 4.0