# Cleaner Air Oregon
# Dispersion Modeling and Risk Assessment Protocol

for

**Orrco™**
*The oil recycler.*

Oil Re-Refining Company, Inc.
Klamath Falls, Oregon

Prepared by:

**CASCADE ENVIRONMENTAL MANAGEMENT**

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# ACRONYM AND ABBREVIATION LIST

CAO - Cleaner Air Oregon
DF – Dispersion Factor
ft – Feet
ft2 – Square Feet
lbs/yr – Pounds per Year
m - Meter(s)
µg/m$^3$ - Micrograms Per Cubic Meter
OAR – Oregon Administrative Rule
ODEQ - Oregon Department of Environmental Quality
ORRCo - Oil Re-Refining Company, Inc.
PTE – Potential to Emit
RAL - Risk Action Level
RBC - Risk-Based Concentration
TAC - Toxic Air Contaminant
TEU - Toxic Emissions Unit

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## 1.0 Introduction

A modeling protocol is required prior to conducting, or using, air dispersion modeling for Cleaner Air Oregon risk assessments. The modeling protocol addresses modeling considerations such as model level selection, identification of toxic emission units, exposure locations, and exposure scenarios.

## 2.0 Source Characterization

### 2.1 Facility Description

Oil Re-Refining Company, Inc. (ORRCo) operates a used oil recycling facility at 1291 Laverne Avenue in Klamath Falls, Oregon. ORRCo is a recycler of used oil and used oil related products, such as used oil filters, absorbents, and anti-freeze. Figure 1 provides a vicinity site map.



**Figure 1. Vicinity Site Map**

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The facility is comprised of numerous storage tanks as well as a boiler to supply heat to the recycling processes. Figure 2 provides the site layout. The property boundary is shown in green while the area of the facility the toxic emissions units (TEUs) are located is outlined in red.
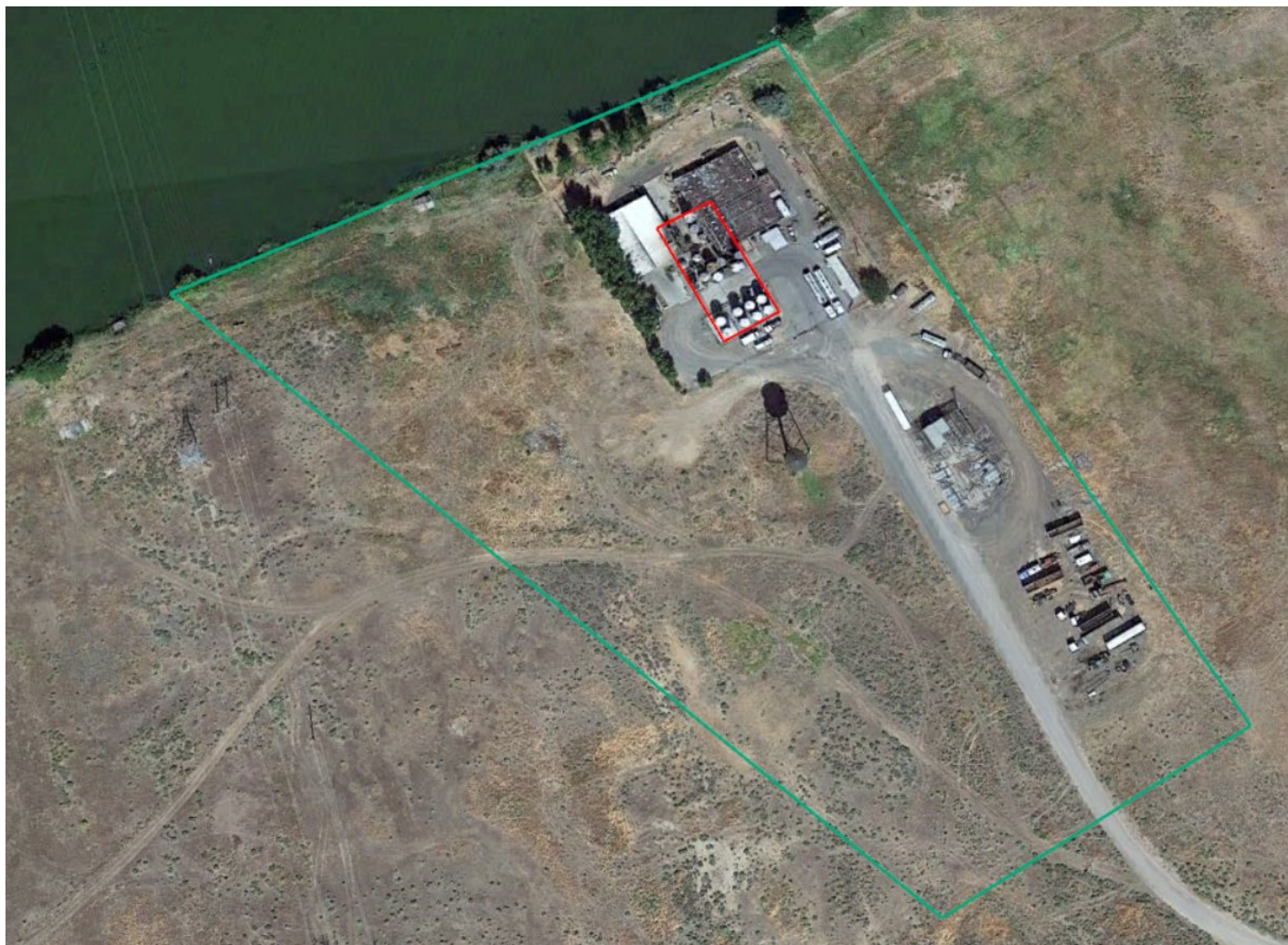


**Figure 2. Site Layout and Property Boundary**

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Figure 3 shows the TEU layout at the facility.

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Figure 4 provides a process flow diagram showing the TEUs at the facility.
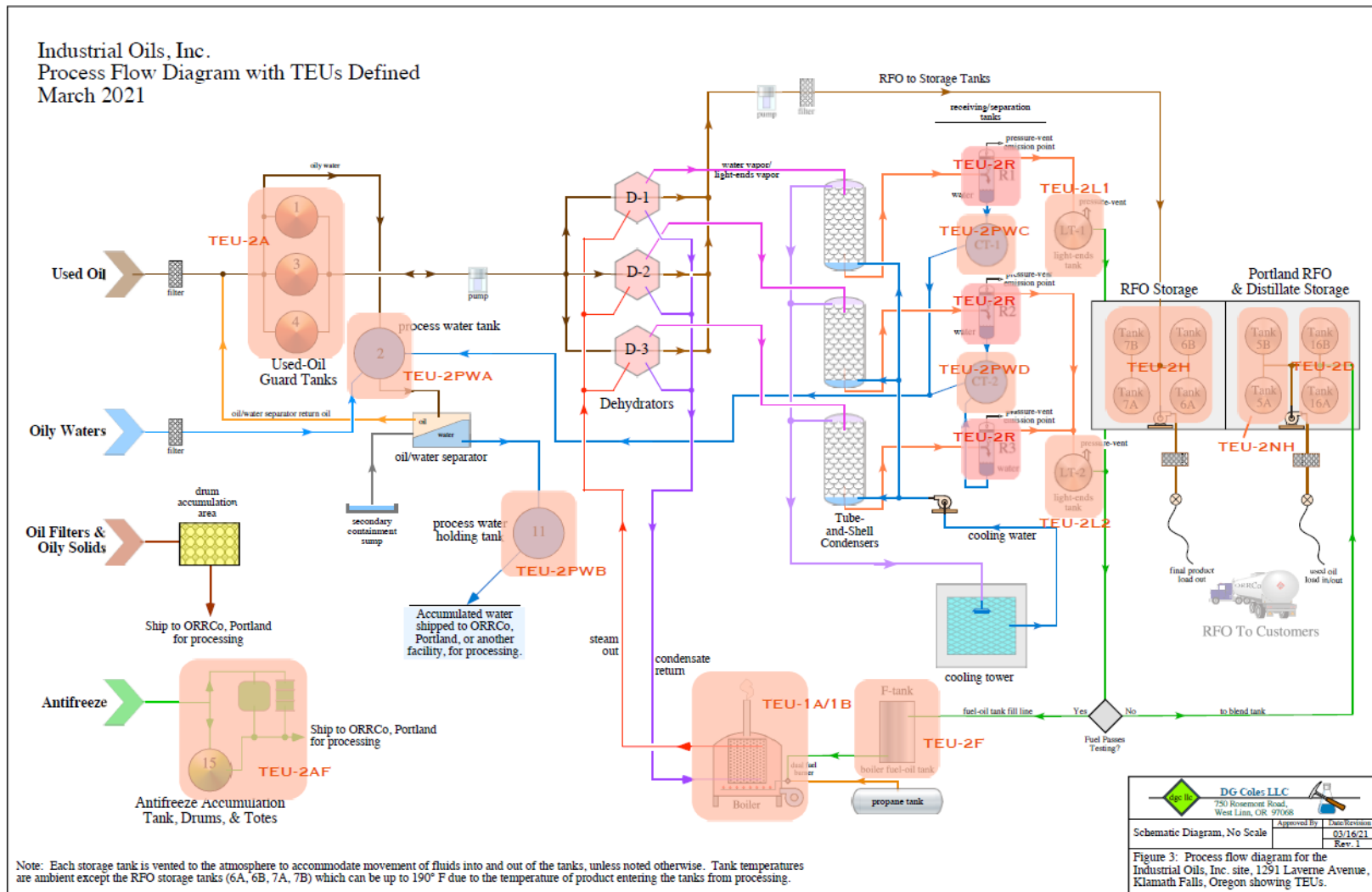


**Figure 4. Process Flow Diagram**

## 2.2 Topography and Receptors

The facility and nearest receptors of concern are located on fairly flat terrain as Figure 5 shows.
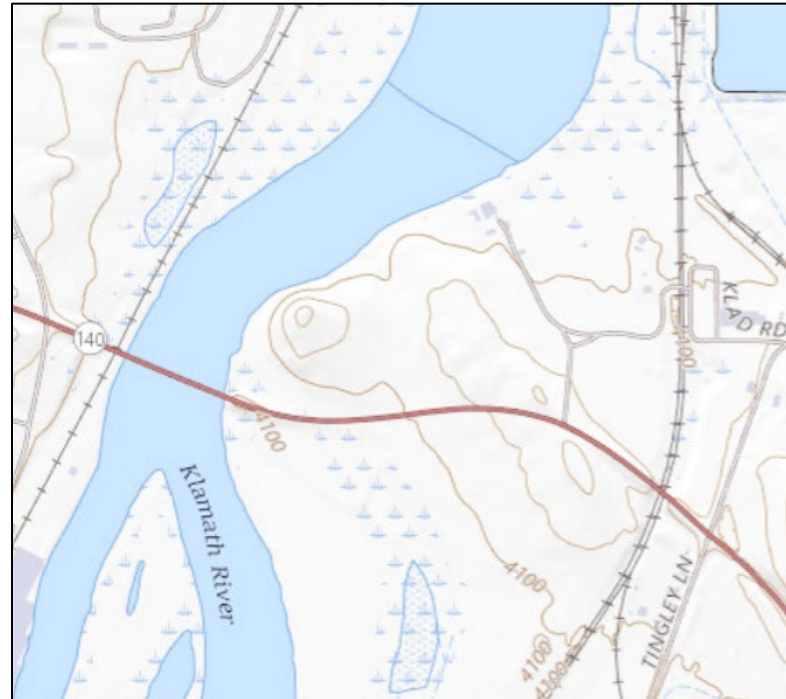


**Figure 5. Topography at Site and Receptors**

The location of the receptors of concern is provide in Figure 6. Land uses from zoning maps are also shown in Figure 6. The yellow areas are zoned residential while the grey areas are zoned heavy industrial.

The distances from the closest TEU to the nearest receptors of concern are also shown. These receptors will be detailed further in section 3 of this modeling protocol.

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**Figure 6. Land Use and Receptor Location Map**

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## 2.3 Air Toxics Emissions Inventory

The air toxics emission inventory for use in this Cleaner Air Oregon risk assessment was approved by ODEQ on August 27, 2021, with one additional edit provided to ORRCo on September 17, 2021. Table 2-1 presents a summary of the annual and maximum daily throughput scenarios for ORRCo while Appendix A provides a complete listing of each Toxic Air Contaminant (TAC) associated with each TEU.

**Table 2-1 Toxic Emission Units Emissions Summary***

| Toxics Emissions Unit ID | Unit Description | Emission Type | Annual - Chronic [units/year] | | | Max Daily - Acute [units/day] | | | Units (e.g. hours operation, tons material, gallons) | Description/Type |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actual | Requested PTE | Capacity | Actual | Requested PTE | Capacity | | |
| TEU-1A | Auxiliary Boiler - Fuel Oil | Point | 7,789 | 104,000 | 146,000 | 400 | 400 | 400 | Gallons | Fuel Oil Combusted |
| TEU-1B | Auxiliary Boiler - Propane | Point | 0 | 190,951 | 268,066 | 0 | 734 | 734 | Gallons | Propane Combusted |
| TEU-2A | Used Oil Storage Tanks | Fugitive | 882,844 | 3,000,000 | 5,000,000 | 20,000 | 20,000 | 20,000 | Gallons | Throughput |
| TEU-2NH | PDX RFO Storage Tanks | Fugitive | 294,038 | 600,000 | 1,500,000 | 18,000 | 18,000 | 18,000 | Gallons | Throughput |
| TEU-2H | RFO Storage Tanks | Fugitive | 819,000 | 2,500,000 | 4,600,000 | 18,000 | 18,000 | 18,000 | Gallons | Throughput |
| TEU-2L1 | Light Ends #1 Process Tank | Fugitive | 41,408 | 100,000 | 170,000 | 2,000 | 2,000 | 2,000 | Gallons | Throughput |
| TEU-2L2 | Light Ends #2 Process Tank | Fugitive | 29,220 | 150,000 | 230,000 | 4,000 | 4,000 | 4,000 | Gallons | Throughput |
| TEU-2AF | Spent Antifreeze Storage Tank | Fugitive | 75,000 | 150,000 | 250,000 | 4,000 | 4,000 | 4,000 | Gallons | Throughput |
| TEU-2D | Distillates Storage Tanks | Fugitive | 200,000 | 500,000 | 850,000 | 10,000 | 10,000 | 10,000 | Gallons | Throughput |
| TEU-2R | Recovery/Separator Tanks | Fugitive | 200,000 | 400,000 | 400,000 | 4,500 | 4,500 | 4,500 | Gallons | Throughput |
| TEU-2F | Boiler Fuel Oil Tank | Fugitive | 63,734 | 106,500 | 148,500 | 2,500 | 2,500 | 2,500 | Gallons | Throughput |
| TEU-2PWA | Process Water Storage Tank | Fugitive | 400,000 | 500,000 | 700,000 | 18,000 | 18,000 | 18,000 | Gallons | Throughput |
| TEU-2PWB | Process Water Storage Tank | Fugitive | 200,000 | 250,000 | 350,000 | 2,500 | 2,500 | 2,500 | Gallons | Throughput |
| TEU-2PWC | Process Water Storage Tank | Fugitive | 75,000 | 75,000 | 75,000 | 3,000 | 3,000 | 3,000 | Gallons | Throughput |
| TEU-2PWD | Process Water Storage Tank | Fugitive | 50,000 | 50,000 | 50,000 | 3,000 | 3,000 | 3,000 | Gallons | Throughput |
| TEU-1C | Auxiliary Boiler - RFO | Point | 55945 | 0 | 0 | 354 | 0 | 0 | Gallons | Fuel Oil Combusted |

*Actual throughput is for calendar year 2019.

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# 3.0 Dispersion Modeling and Risk Assessment Protocol

## 3.1 Model Level Selection and Description

A Level 1 dispersion modeling and risk assessment involves choosing dispersion factors from [OAR 340-245-8050 Table 5] based on site-specific information such as emissions release type and distances to various exposure locations. Additionally, site-specific information such as stack height and building area can be used. A Level 1 analysis is proposed for this facility's risk assessment. The use of the Level 1 screening, dispersion factors should be conservatively representative based on the fairly flat terrain between the facility and the exposure locations.

## 3.2 Exposure Locations and Scenarios

There are four types of exposure locations defined by Cleaner Air Oregon:

1. *Residential exposure* which includes long-term exposure to children and adults.
2. *Nonresident child exposure* which includes schools and daycare facilities.
3. *Worker exposure, or nonresident adult exposure* which includes workers at industrial facilities or in office or commercial buildings.
4. *Acute exposure* which includes areas where people may spend all or several hours of a day, such as parks, sports facilities, or agricultural fields.

There are seven risk exposure scenarios that must be assessed for risk, including noncancer and cancer risks:
1. Residential cancer
2. Residential chronic noncancer
3. Nonresident child cancer
4. Nonresident child chronic noncancer
5. Worker cancer
6. Worker chronic noncancer
7. Acute noncancer

## 3.3 Risk Assessment Workplan

Under the Level 1 analysis, each annual and each maximum daily TAC emission rate will be multiplied by the appropriate dispersion factor from OAR 340-245-8050 Tables 5A, 5B, 5C, and 5D to determine an ambient concentration. Each ambient air concentration will be divided by the appropriate Risk-Based Concentration (RBC) from OAR 340-245-8040 Table 4 for residential and non-residential exposure locations as well as acute exposure locations. Table 3-1

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provides a summary of the receptor distances and dispersion factors for each TEU type. The residential exposure location is chosen as the closest area zoned for residences. The worst-case distance for child exposure is selected as the nearest residence to cover the possible event the residence becomes a daycare facility. And while it is very unlikely anyone would be spending any time in the area surrounding the facility, the acute worst-case scenario is chosen at the nearest property boundary. The worker exposure scenario is also chosen to be at the closest property boundary. Table 3-2 provides dispersion factors for each TEU and exposure scenario.

**Table 3-1 TEU Type, Receptor Distances, and Dispersion Factors**

| TEU Type | Residential Exposure Name | Closest Distance (m) / Dispersion Factor (ug/m3/lbs/yr) | Child Exposure Name | Closest Distance (m) / Dispersion Factor (ug/m3/lbs/yr) | Work Exposure Name | Closest Distance (m) / Dispersion Factor (ug/m3/lbs/yr) | Acute Exposure Name | Closest Distance (m) / Dispersion Factor (ug/m3/lbs/yr) |
|---|---|---|---|---|---|---|---|---|
| Stack (worst-case 5m height) | Southeast residences | 514 / 0.000071 | Southeast residences | 514 / 0.000071 | North Property Line | 55 / 0.0033 | North Property Line | 55 / 8.3 |
| Fugitive (worst-case ≤3000 ft2 area and ≤20 ft height ) | Southeast residences | 468 / 0.0001 | Southeast residences | 468 / 0.0001 | North Property Line | 50 / 0.0045 | North Property Line | 50 / 4.8 |

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**Table 3-2 Dispersion Factors (DFs) for Each TEU and Exposure Scenario**

| TEU | Type | DF Residential ug/m3/lbs/yr | DF Child ug/m3/lbs/yr | DF Worker ug/m3/lbs/yr | DF Acute ug/m3/lbs/yr |
|---|---|---|---|---|---|
| TEU-1A | Point | 0.000071 | 0.000071 | 0.0033 | 8.30 |
| TEU-1B | Point | 0.000071 | 0.000071 | 0.0033 | 8.30 |
| TEU-2A | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2NH | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2H | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2L1 | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2L2 | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2AF | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2D | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2R | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2F | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2PWA | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2PWB | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2PWC | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-2PWD | Fugitive | 0.0001 | 0.0001 | 0.0045 | 4.80 |
| TEU-1C | Point | 0.000071 | 0.000071 | 0.0033 | 8.30 |

Then, for each TEU, the pollutant risks will be summed. As there are seven exposure scenarios, there will be seven risk values each TEU. The excess chronic cancer risk value for each TEU will be the maximum of the residential chronic cancer risk, the child chronic cancer risk, or the worker chronic cancer risk. The chronic noncancer risk for each TEU will be the maximum of the residential chronic noncancer risk, the child chronic noncancer risk, or the worker chronic noncancer risk. The facility total excess cancer risk and the facility total excess noncancer risk will be calculated as the sum of the individual TEU respective risks. These sums will be compared to the existing facility Risk Action Levels (RALs) shown in Figure 7.
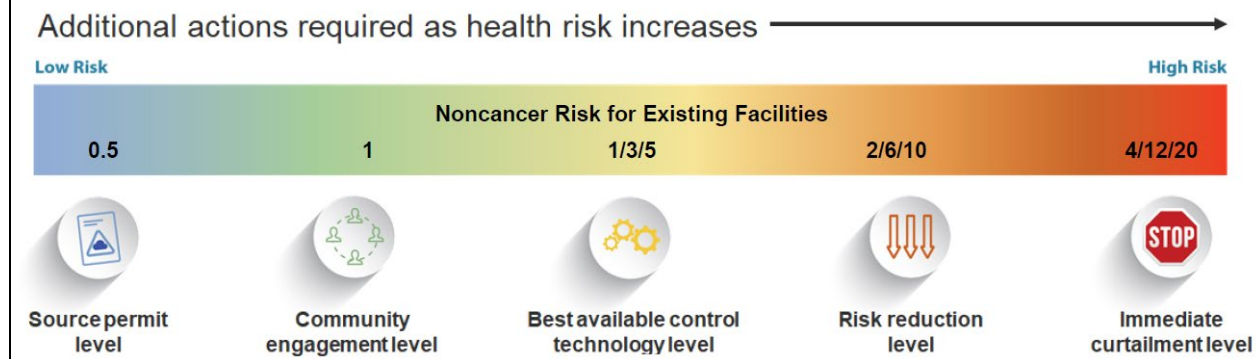
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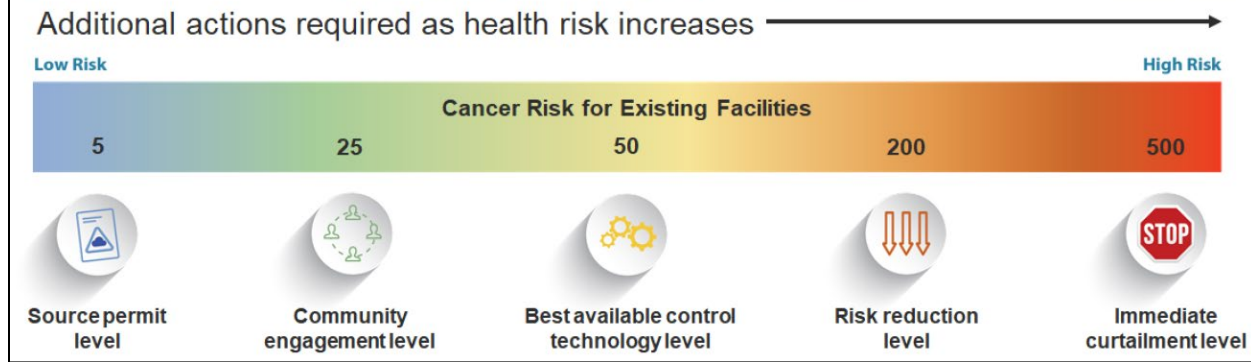
Figure 7. Risk Action Levels

## 3.4 Risk Assessment Report

The following information will be reported in the risk assessment report:

- Summary report detailing the process and findings of the risk assessment.
- Map depicting the source location and nearest exposure locations for residential, child, worker, and acute receptors.
- RBCs, dispersion factors, maximum exposure concentrations, and total excess cancer and noncancer risks for all exposure scenarios, reported by individual TEU and for the facility as a whole.
- Compare total risk across the entire facility to the risk action levels.

Most of the above information is already contained within this modeling and risk assessment protocol.

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