Oregon Air Quality Modeling

Cleaner Air Oregon and Short-term NAAQS Guidance

Northwest Environmental Business Council Conference (12/7/2022)

Overview

Cleaner Air Oregon Modeling

- Background & Applicability
- Key Components
- Observations and Reflections

NAAQS Short-term Modeling

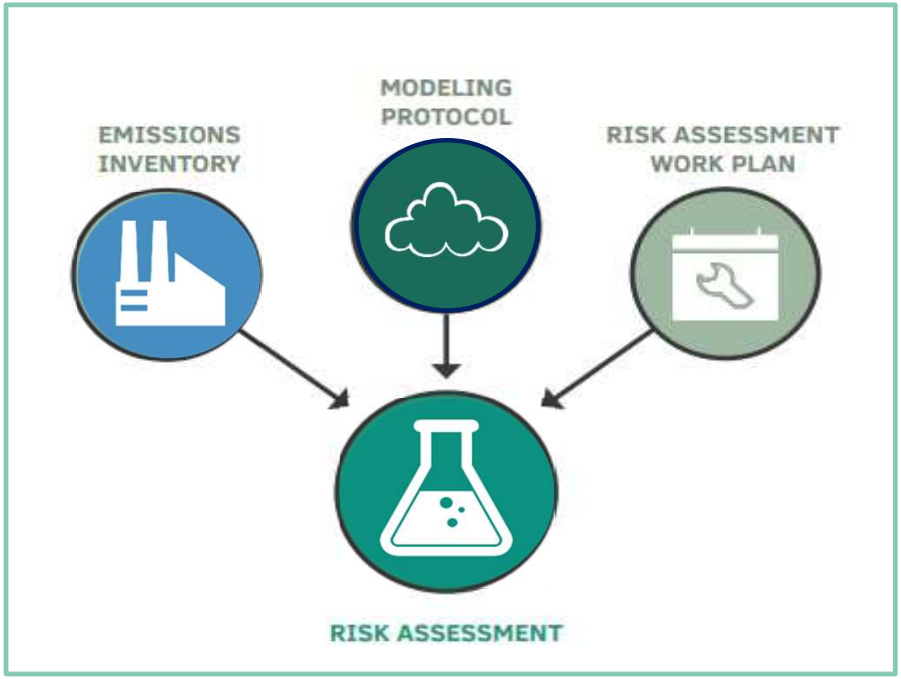
- Background & Applicability
- Implementation
- Important Considerations

CAO Risk Assessment Modeling

Industrial Air Toxics Permitting in Oregon

CAO Risk Assessment Process

1. Emissions Inventory
   - What is being emitted and how much?
2. Modeling Protocol
   - How will the emissions disperse around the community?
3. Risk Assessment Work Plan
   - How will risk be calculated?
4. Risk Assessment

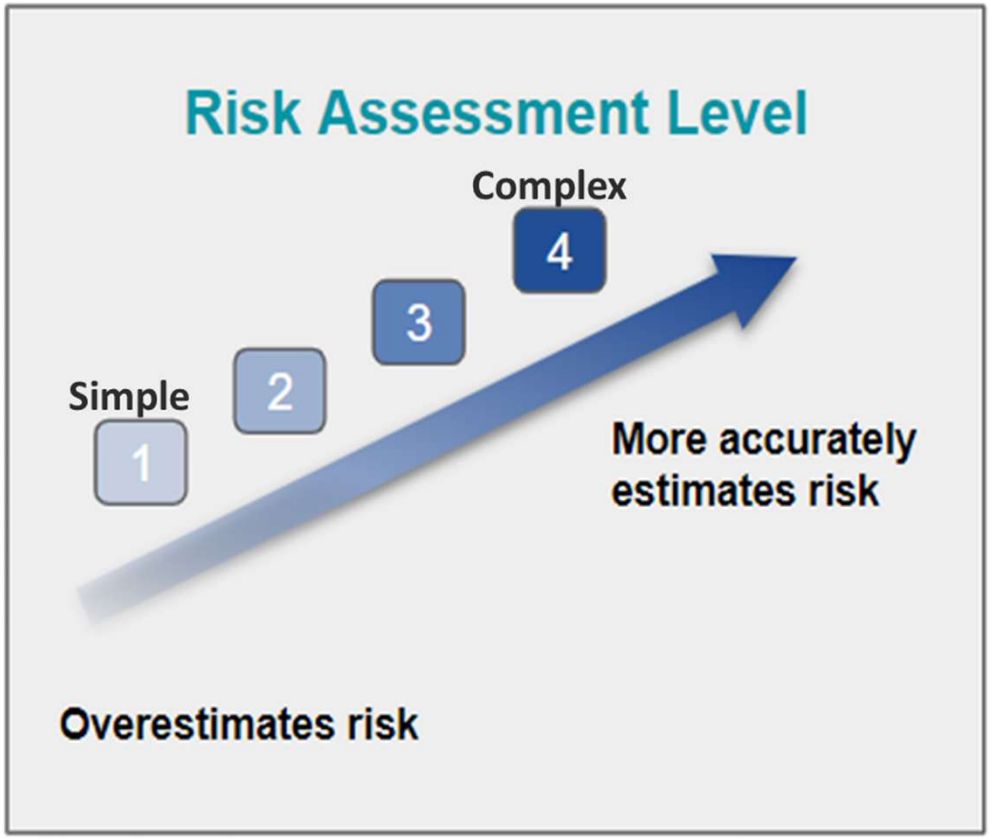


When is Modeling Required?

- All Simple, Standard, and Title V sources must perform a Risk Assessment
- Existing facilities[1] called in according to predetermined prioritization groupings
- New facilities[2] must perform risk assessment prior to obtaining permit
- Unpermitted sources may be required to assess risk
- Permit modifications

[1] – Sources constructed or operating before November 2018
[2] – Includes sources that have relocated after November 2021

Risk Assessment Levels and Modeling



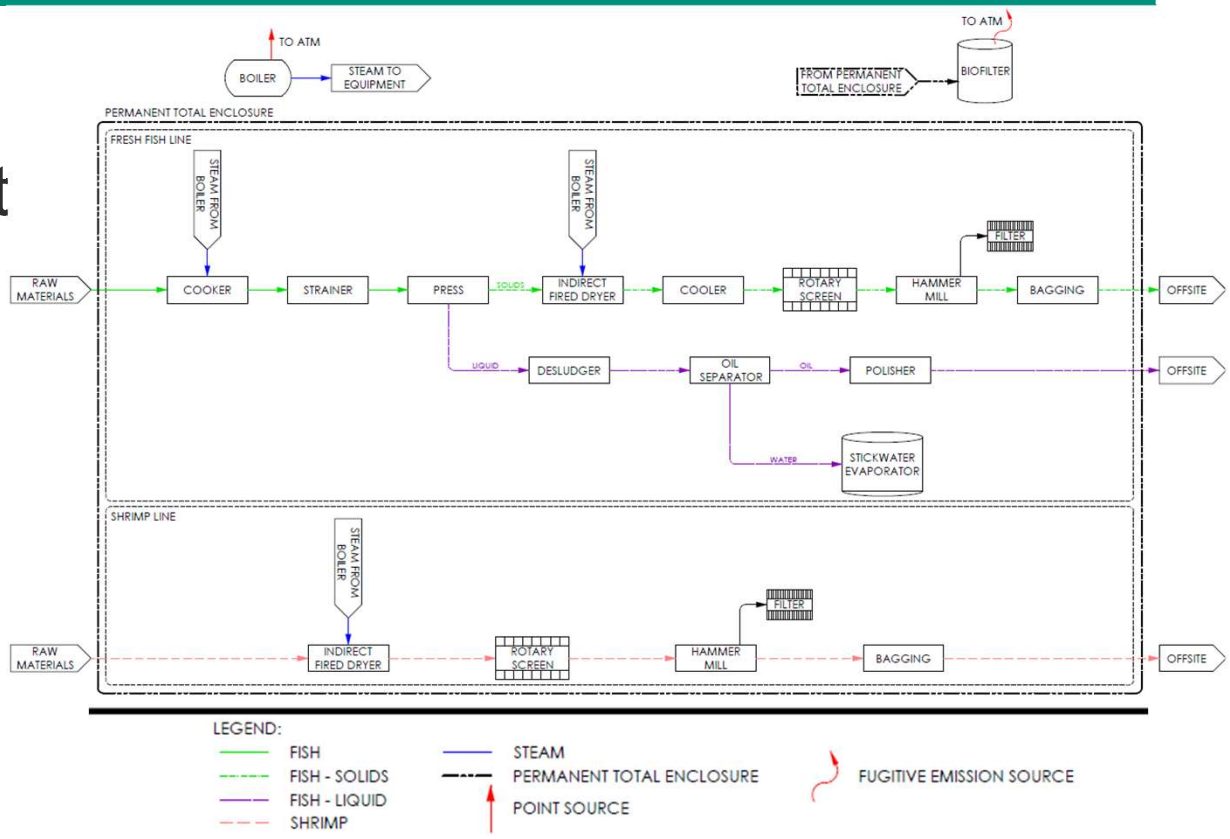
- Level 1 – DEQ provided dispersion factors
- Level 2 – worst case meteorological data or DEQ provided modeling (AERSCREEN)
- Level 3 – requires numerical dispersion modeling (AERMOD)
- Level 4 – adjustments to exposure assumptions or additional studies

CAO Modeling Process

Model to Use	Level 1	Level 3
Identify Toxic Emission Units (TEUs) and Input Parameters	• Emissions data • Stack heights • Fugitive parameters	• Stack velocity and temperature • Downwash parameters • Terrain and land use
Identify Exposure Locations	• Closest receptors only	• Gridded receptor map • Receptor designation • Zoning and aerial review
Meteorology	• DEQ provided	• 1-yr onsite or 5-year NWS • 3-years prognostic MMIF
Calculate Exposure Concentrations or Risk	• DEQ calculated dispersion tables	• AERMOD results • Emissions approach

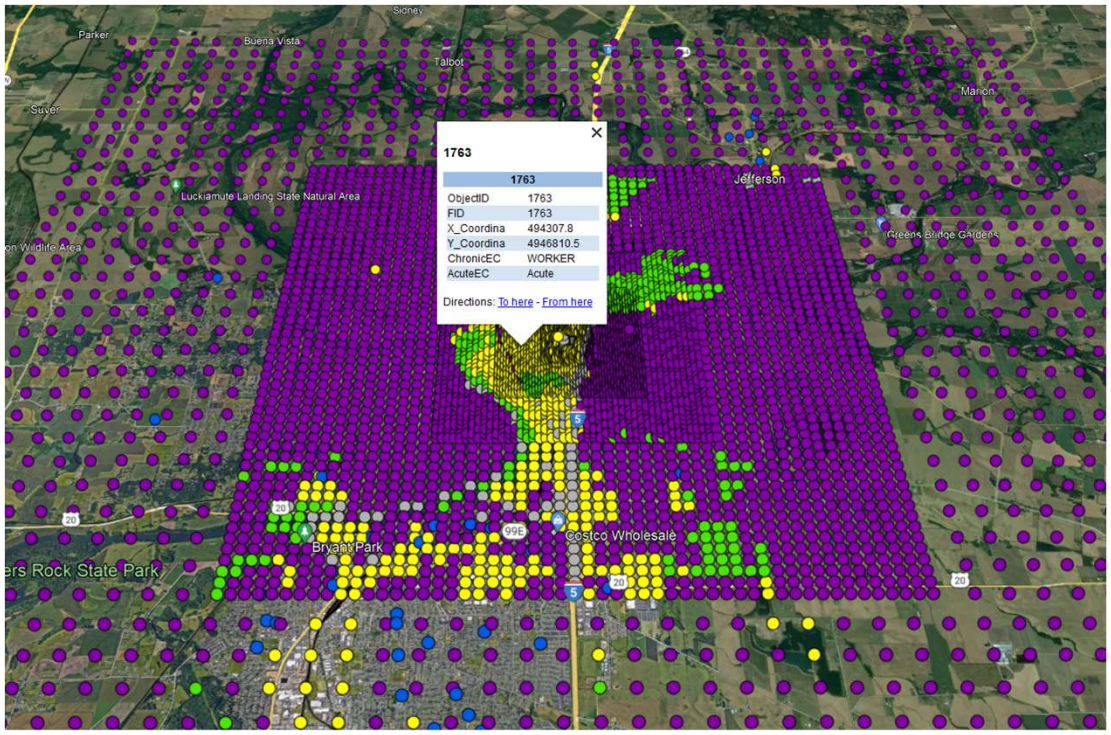
Emissions Inventory Data

- Activity levels
- Toxics Emissions Unit (TEU) designation
- Capture/control efficiency
- Release point designation
- Emission rates



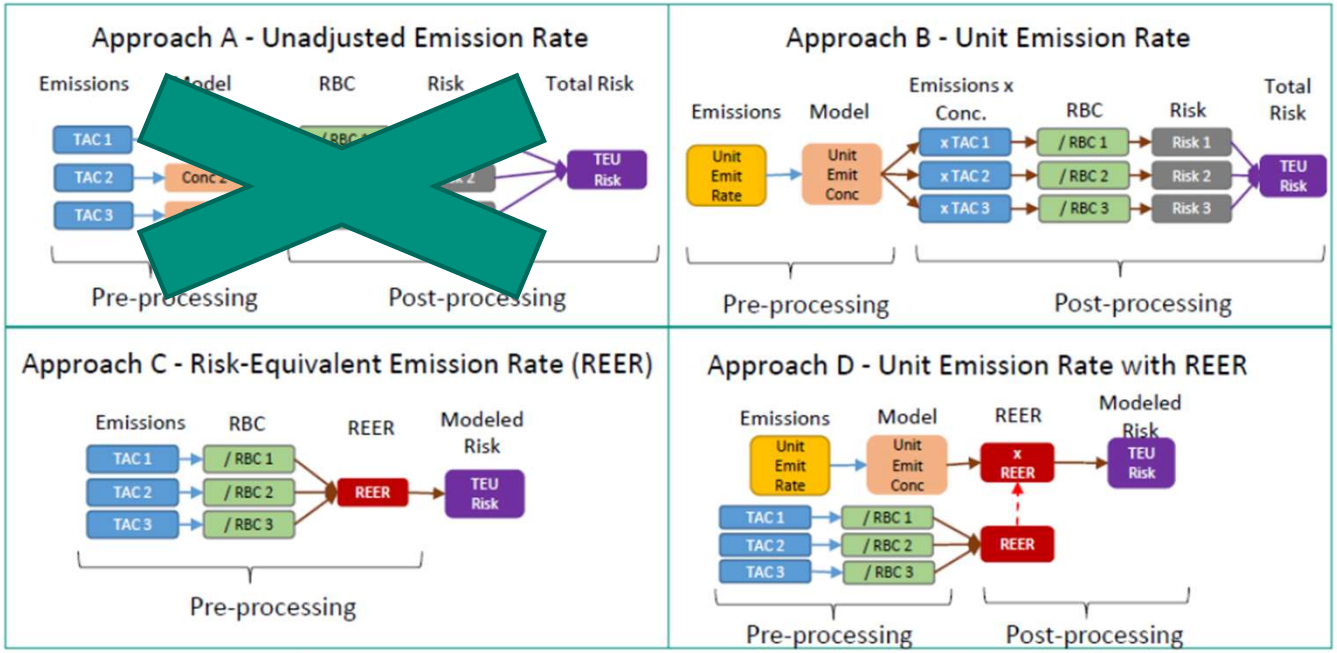
Receptors & Exposure Locations

- Based on underlying zoning
  - Residential
  - Nonresidential adult (i.e., worker)
  - Nonresidential child
  - Acute
- Receptor/Exposure location crosswalk required
- Land use adjustments may be permitted (AQ502)
- Variable receptor grid spacing issues



Level 3 Modeling Approaches

Figure 3. Emission Approaches for CAO



Definitions:
TAC = Toxic Air Contaminant RBC = Risk-Based Concentration
TEU = Toxics Emission Unit REER = Risk-Equivalent Emission Rate

Observations & Reflections

- A Tale of Two Crosswalks
  - Emissions Inventory and Modeling Protocol
  - Receptor and Exposure Location
- Modeling parameters and assumptions may lead to permit conditions
- Forethought and communication are key to efficient approvals
- Online resources available

Short-term NAAQS Modeling

Requirement updates for AQ permitting

Background & Applicability

- Why
  - Significant Emission Rates (SERs) were designed to meet long-term (annual) National Ambient Air Quality Standards (NAAQS)
  - SERs were not created to meet short-term NAAQS
- What
  - 1-hour NO_2 and SO_2
  - 24-hour $PM_{2.5}$
- Who
  - All New Sources
  - Modified sources above SER for any pollutant (except VOCs)
  - Existing sources when requested (possibly at renewal or in a letter)
  - Any Type 2 and Type 3 NCs – beginning **March 1, 2023**

Implementation

Information	Annual NAAQS	Short-term NAAQS (NEW)
Applicable Averaging Time: Pollutant	Annual: PM_{10}, $PM_{2.5}$, NO_2	1-hour: NO_2, SO_2 24-hour: $PM_{2.5}$
Compare Emissions to a significance threshold	SER [OAR340-200-0020(161)]	SET
SIL Analysis [OAR 340-200-0020 (162)]	Only if SER is exceeded	Only if SET is exceeded, Facilities may skip straight to Cumulative Analysis, if desired.
NAAQS Cumulative Impact Analysis [OAR340-225]	Only if SIL is exceeded	If SET or SIL is exceeded
Include Background Conc.	Yes	Yes
Include Competing Source	Yes	Yes, except may not be needed for 1-hour standards

Pollutant	Trial SET
24-hour $PM_{2.5}$	5 lbs/day
1-hour SO_2	3 lbs/hr
1-hour NO_x	3 lbs/hr

https://www.oregon.gov/deq/aq/aqPermits/Pages/NAAQS-Requirements.aspx

Important Considerations

- Modeling parameters and assumptions may lead to permit conditions
- Intermittent sources may require more complicated modeling
- Must submit separate documents from CAO modeling submittals

Thank you!

- Questions?
- Contacts:

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