Air Dispersion Modeling 101

Business & The Environment Conference • Expo

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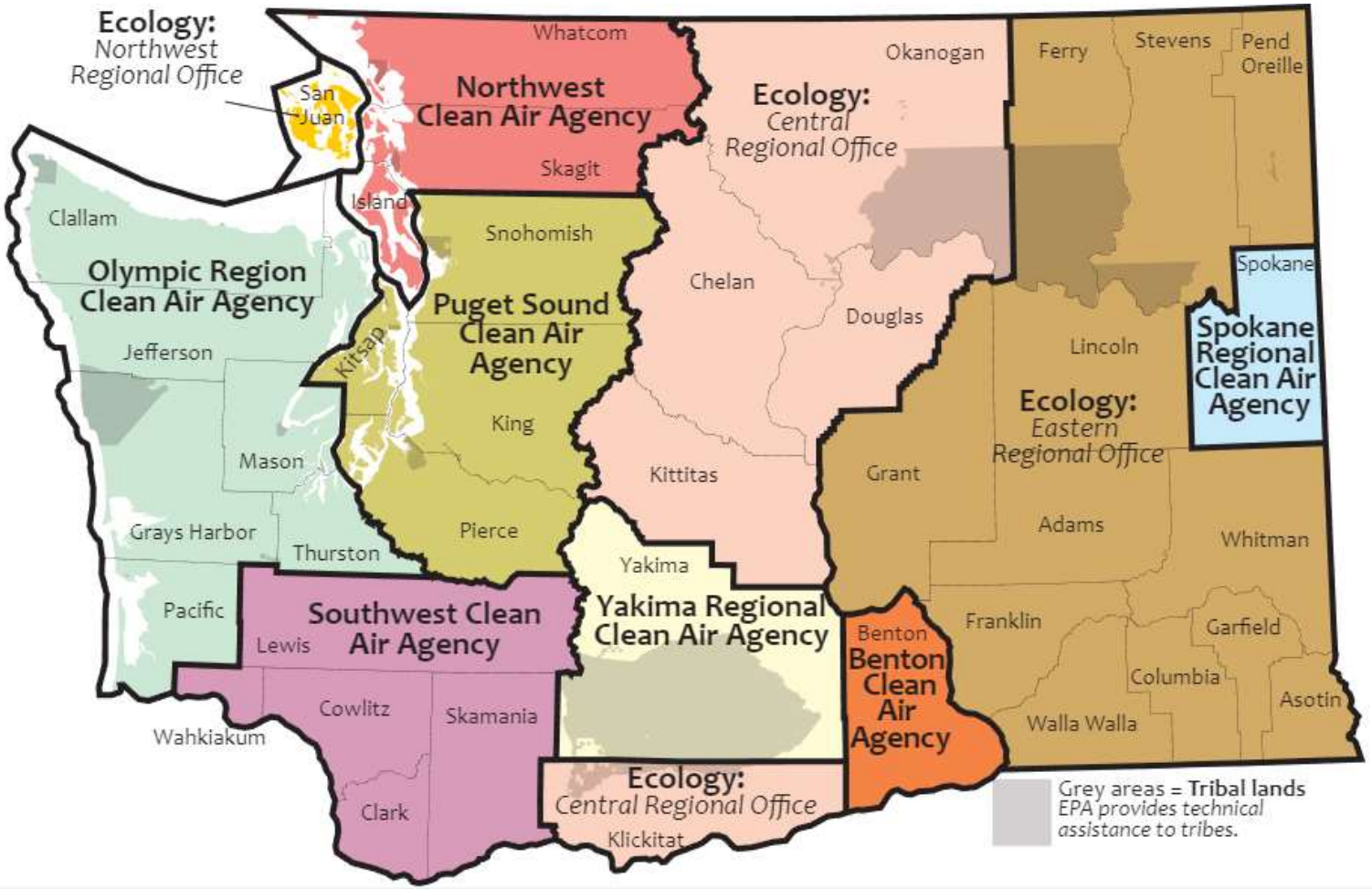

Source: Washington State Dept. of Ecology website

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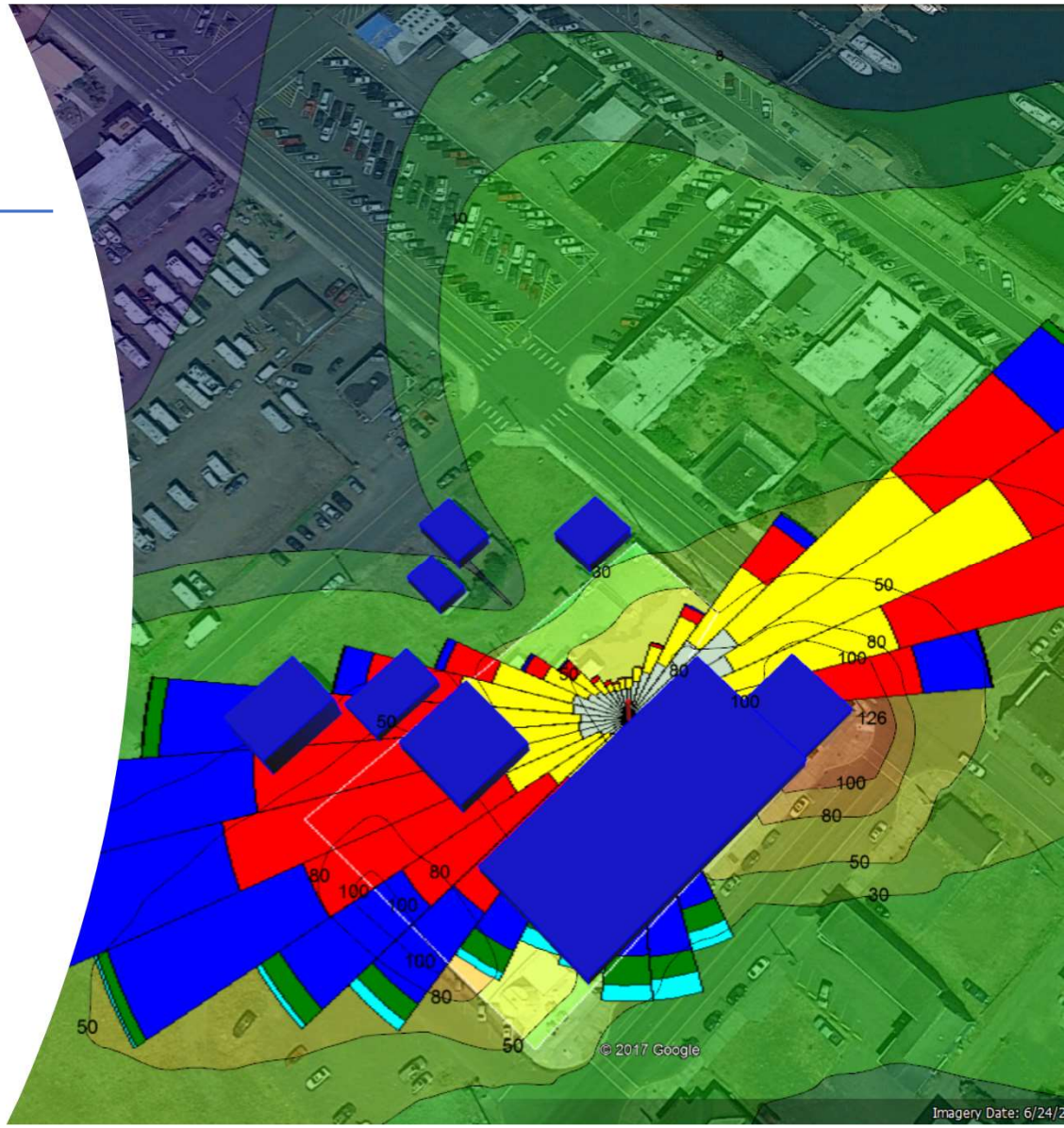
When is modeling required?

To demonstrate one, or both, of the following as part of a NOC application:

1. **Ambient Air Quality –** Emissions from the new stationary source cannot cause or contribute to a violation of any ambient air quality standard
   ORCAA Rule 6.1.4(3)

2. **Air Toxics -** If there are increases in toxic air pollutant (TAP) emissions, the requirements of Washington's Controls for New Sources of Toxic Air Pollutants under Chapter 173-460 WAC must be met
   ORCAA Rule 6.1.4(5)



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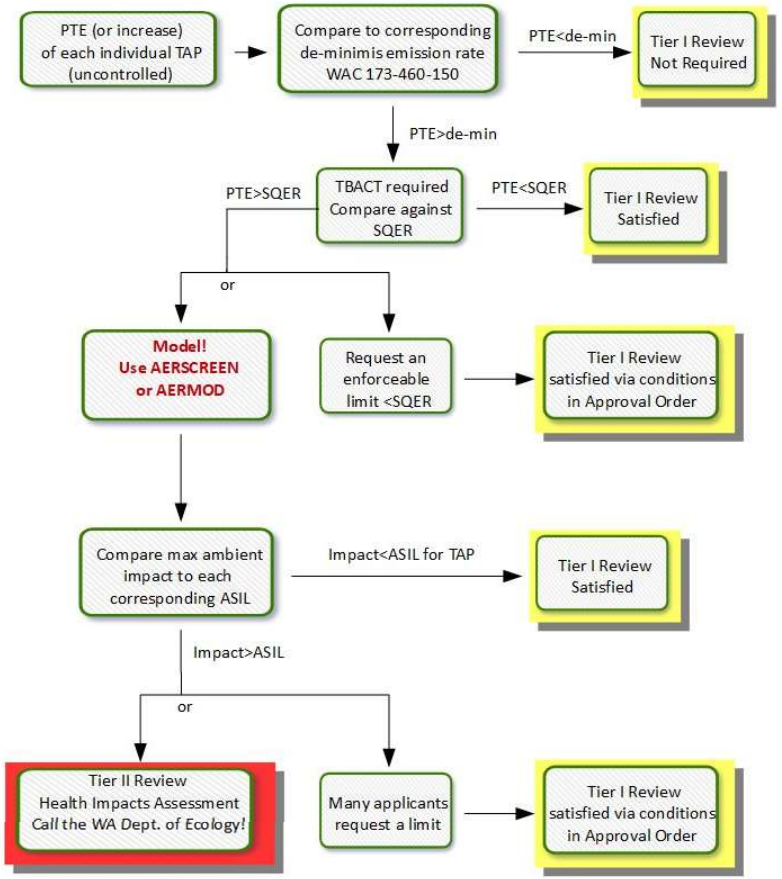

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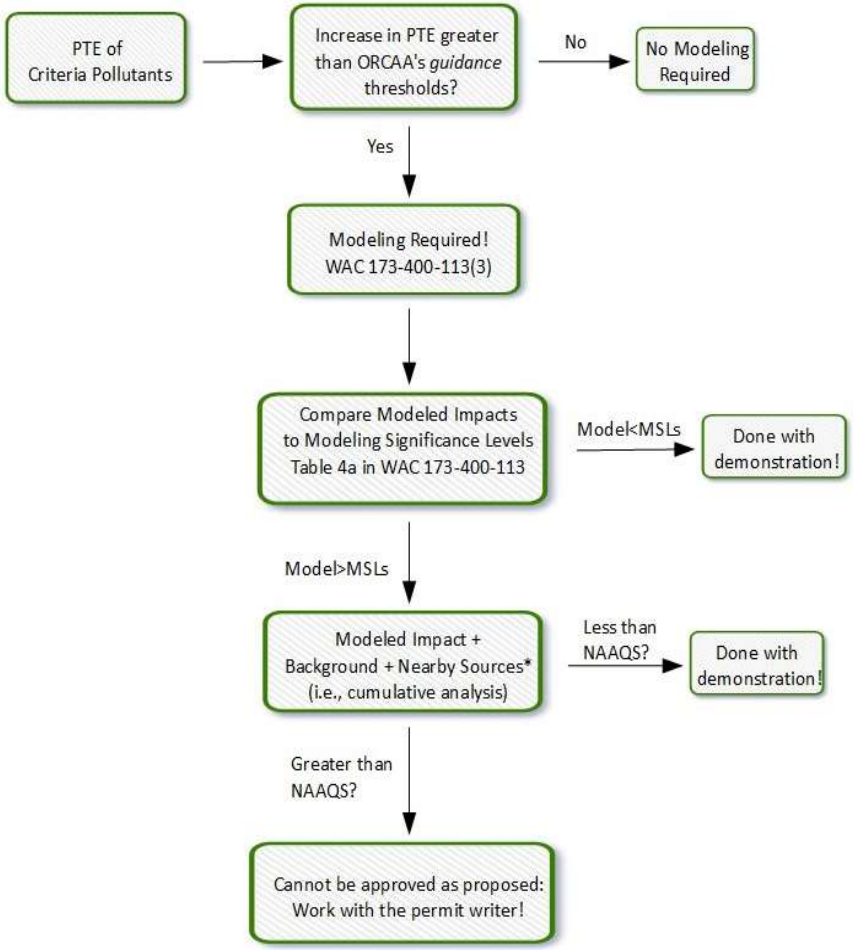
TAP Analysis Compliance Demonstration Roadmap (Chapter 173-460 WAC)

- Over 400 TAPs listed
- WA state Air Toxics Rule is a 3-Tiered approach; ORCAA only reviews Tier I analysis.
  - Tier II and Tier III are reviewed and approved by the WA State Dept. of Ecology
- Work with the agency to ensure PTE calculations are accurate to avoid the “trickle down” of errors
  - There are 1-hr, 24-hr, and annual ASILs. Determining PTE specifically for each is a **crucial** and often overlooked step.
- Can utilize a screening tool such as AERSCREEN, or refined modeling using AERMOD



*If a monitored background concentration does not include effects from existing emissions at the facility, all emissions – not just increases – must be modeled. Nearby sources may need to be included in this analysis if they are not adequately included in the background concentrations. Call your permitting authority!

Criteria Pollutant Demonstration Roadmap (NAAQs)

Allowable emissions from the proposed new source or the increase in emissions from the proposed modification will not cause or contribute to a violation of any ambient air quality standard. If the modeled concentrations of allowable emissions from the proposed new source or the increase in emissions from the proposed modification are below the levels in Table 4a, the proposed source does not contribute to a violation of an ambient air quality standard. WAC 173-400-113(3)

- All ORCAA's counties are either attainment or unclassifiable (no maintenance or nonattainment areas) for all criteria pollutants
- Work with the agency to ensure PTE calculations are accurate to avoid the "trickle down" of errors
- Can utilize a screening tool such as AERSCREEN, or refined modeling using AERMOD
- Background concentrations lookup tool: https://arcg.is/1jXmHH

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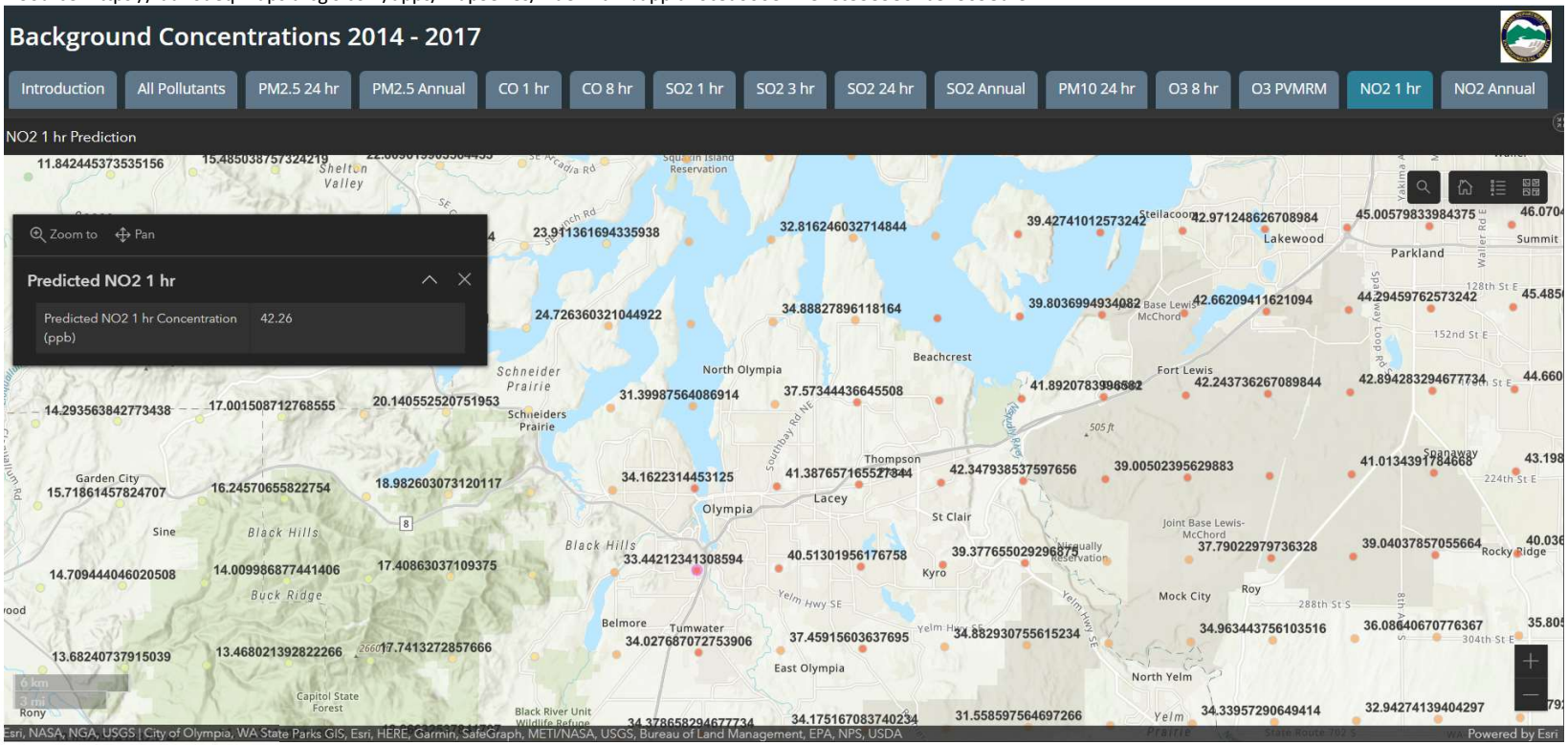
Background Lookup Tool for Criteria Pollutants

Source: https://idahodeq.maps.arcgis.com/apps/MapSeries/index.html?appid=0c8a006e11fe4ec5939804b873098dfe



- Search by location and pollutant

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These background concentrations could be used in support of most minor source permit applications in Washington, Oregon and Idaho, <u>after speaking with your permitting authority.</u>

What does ORCAA look for in a refined modeling protocol?

- **Highly recommended that applicants submit a modeling protocol to ORCAA for review prior to conducting refined modeling**
- No specific format is required for protocol narratives
- The most recent version of AERMOD is used (at the time of submittal) with US EPA regulatory default options
- Urban/Rural discussion if necessary (most of ORCAA's jurisdiction is rural)
- Detailed facility layout: boundaries, locations of emission sources, buildings/structures, etc.
- Source parameter descriptions and justifications where needed (e.g., volume, area, etc.) and emission rates for release points
- Receptor grid descriptions
- Operating scenarios (e.g., bypass) for all applicable averaging times
- Justification for any "non-regulatory" or "non-default" setup/data handling

Errors we commonly see in applications...

- **Incorrect emission rate calculations for the appropriate averaging times (e.g., peak hourly vs. annual operating scenarios)**
- Not using the flagpole receptor option for TAP; should be 1.5 m to approximate human breathing zone
- Not accounting for nearby sources that may have discernable impacts; sometimes DVs from NW AirPACT is not enough!
- Missing pollutants (e.g., PTE and modeling addresses PM-10 but not PM-2.5) and missing averaging periods for a pollutant
- Receptor grid for TAPs – ORCAA uses the receptor grid spacing recommended by the Dept. of Ecology for their Health Impact Assessment (Tier II); applicants commonly use this nested grid for NAAQS as well (table to the right)

Distance from Source (m)	Grid Spacing (m)
0- 150	12.5
150-400	25
400-900	50
900-2,000	100
2,000-4,500	300
>4,500	600

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