Development of Significant Emission Thresholds (SETs) for Oregon's Short Term NAAQS Program

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February 3, 2022

Basis for Short-Term NAAQS Program

- Significant Emission Rates (SERs) protect against long-term standards
- Developed when short-term standards didn't exist
- Not necessarily protective of short-term standards
- Focus on:
  - 1-hr NO_x
  - 1-hr SO_2
  - 24-hour $PM_{2.5}$

Basis for Program (con't)

- June 9, 2021 – Oregon DEQ internal memorandum, followed by
- September 1, 2021 – Short-Term NAAQS Compliance Internal Management Directive that applies to
  - New sources
  - Existing sources
- Sources may be required to conduct short-term modeling even if emissions are below SERs to ensure compliance with the short-term NAAQS
- More information:
  - https://www.oregon.gov/deq/aq/aqPermits/Pages/NAAQS-Requirements.aspx

Sources subject to Program

- All new Simple, Standard, and Title V sources
- Existing sources called in to the Cleaner Air Oregon (CAO) program may opt to conduct modeling concurrently
- Existing sources with a major modification having emissions equal to or greater than the SER of any pollutant other than VOCs. NAAQS modeling required of total facility emissions for 1-hr NO2, 1-hr SO2, and 24-hr PM2.5 if no previous modeling
- Existing sources on a priority call-in list (in planning stage)
- Existing sources at permit renewal (in planning stage)

Short-term Emission Threshold (SET)

- Need equivalent of SER for short-term standards
- Facility emissions **below** short-term threshold will not require further modeling
- Facility emissions equal to or **greater than** short-term threshold will require modeling
  - SIL Analysis
  - Cumulative Impact Analysis, as necessary

Development of SET

Goals

- Screen **out** facilities unlikely to cause NAAQS violations
- Screen **in** facilities that may cause NAAQS violations

Challenges

- Facilities with large emissions but tall stack/large property may not be a concern
- Facilities with lower emissions but short stack/small property may be a problem

Modeling Basis

- Cleaner Air Oregon Dispersion Factors
  - Based on maximum 24-hour exposure at 100m distance and 10m stack
  - 1 hour standards: Convert dispersion factor to lbs/hr

OAR 340-245-8050 Table 5
Level 1 Risk Assessment Tool
Dispersion Factors

Table 5B: Stack Emission Dispersion Factors for 24 hour Exposure (µg/m^3 / pounds/day)

Stack	Exposure Location Distance (meters)												
Ht (m)	50	60	70	80	90	100	110	120	130	140	150	160	170
5	8.3	7.1	6.1	5.2	4.4	3.8	3.2	2.7	2.4	2.1	1.8	1.6	1.4
10	3.8	3.4	3.1	2.8	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5
15	1.8	1.6	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.00	0.95	0.91	0.87
20	1.6	1.3	0.91	0.86	0.82	0.77	0.73	0.69	0.65	0.62	0.59	0.56	0.54
25	0.97	0.93	0.85	0.64	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36
30	0.62	0.59	0.57	0.55	0.49	0.34	0.32	0.31	0.30	0.29	0.28	0.27	0.26
35	0.42	0.41	0.39	0.38	0.37	0.34	0.29	0.22	0.21	0.21	0.20	0.20	0.19
40	0.30	0.29	0.28	0.28	0.27	0.26	0.25	0.22	0.17	0.15	0.15	0.15	0.14
45	0.22	0.22	0.21	0.21	0.20	0.20	0.19	0.19	0.17	0.16	0.12	0.11	0.11
50	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.14	0.14	0.13	0.12	0.10	0.082

SET Derivation

- Calculation of SETs based on target concentrations.
- The target concentrations that were evaluated:
  - SILs
  - PSD Increments
  - NAAQS
  - NAAQS – Background
- Back Calculate Emission Rate (hourly)

$$SET\left[\frac{lbs}{hr}\right] = \frac{Conc_{target}\left[\frac{\mu g}{m^3}\right]}{DF\left[\frac{\frac{\mu g}{m^3}}{\frac{lbs}{day}}\right] \times 24\left[\frac{hr}{day}\right]}$$

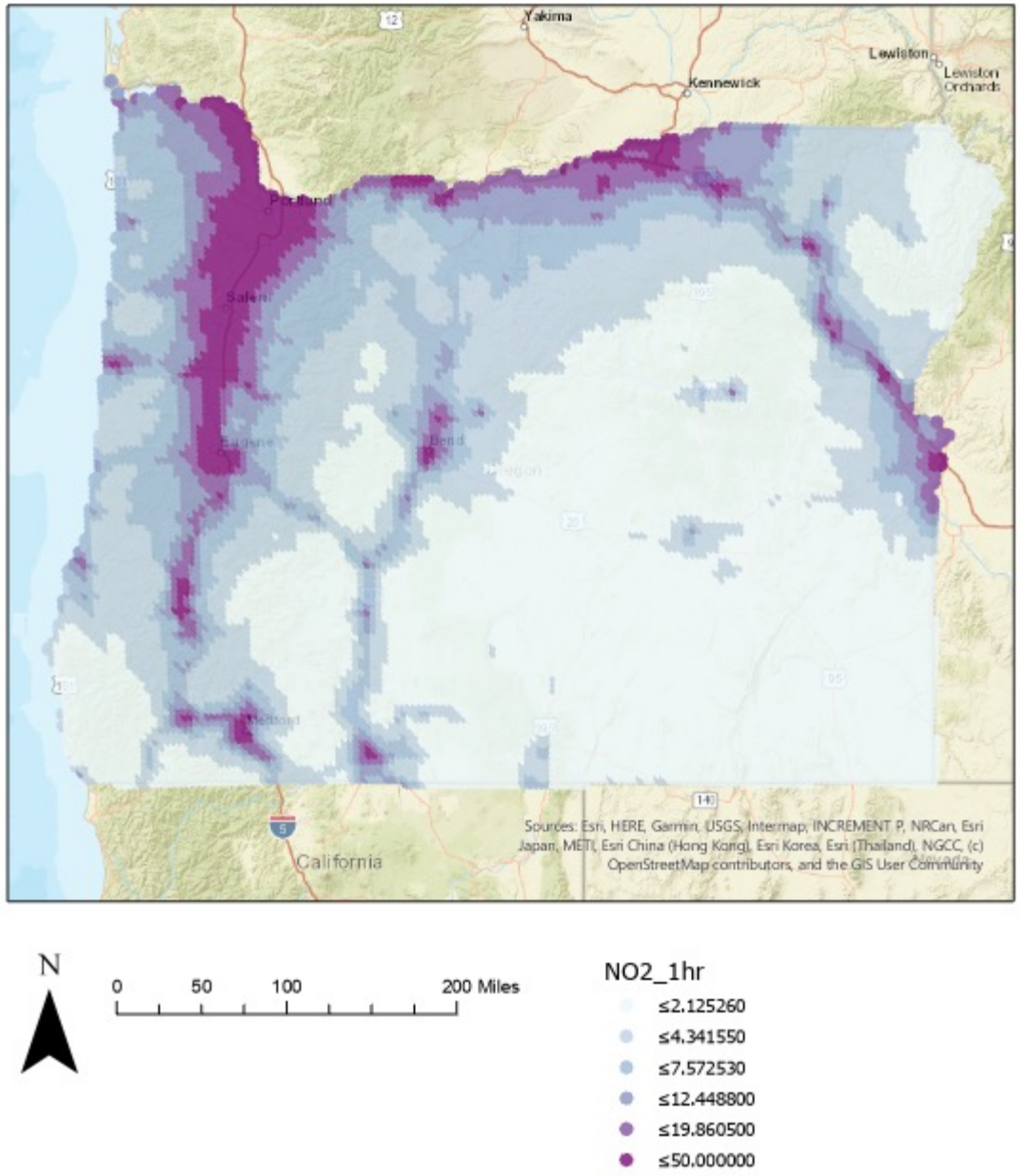
Background

- NWAirquest Design Values
- Factors considered for use of DVs in establishing SETs
  - Limitations of the representativeness of the DVs
  - Spatial distribution
  - Numerical distribution
  - Types and numbers of sources in areas of high background

NO_x Background

- 1-hour standard = 188 µg/m^3
- High background linked to transportation network (I-5 and I-84)
  - Max = 79.48 µg/m^3
  - 98%ile = 46.436 µg/m^3
- Other state thresholds

State	NO_x 1 hr threshold (lbs/hr)
IDEQ: Level 1	0.2
IDEQ: Level 2	2.4
SWCAA	0.46
Colorado Interim	0.46
Oregon Trial SET	3



NO_x Trial SET

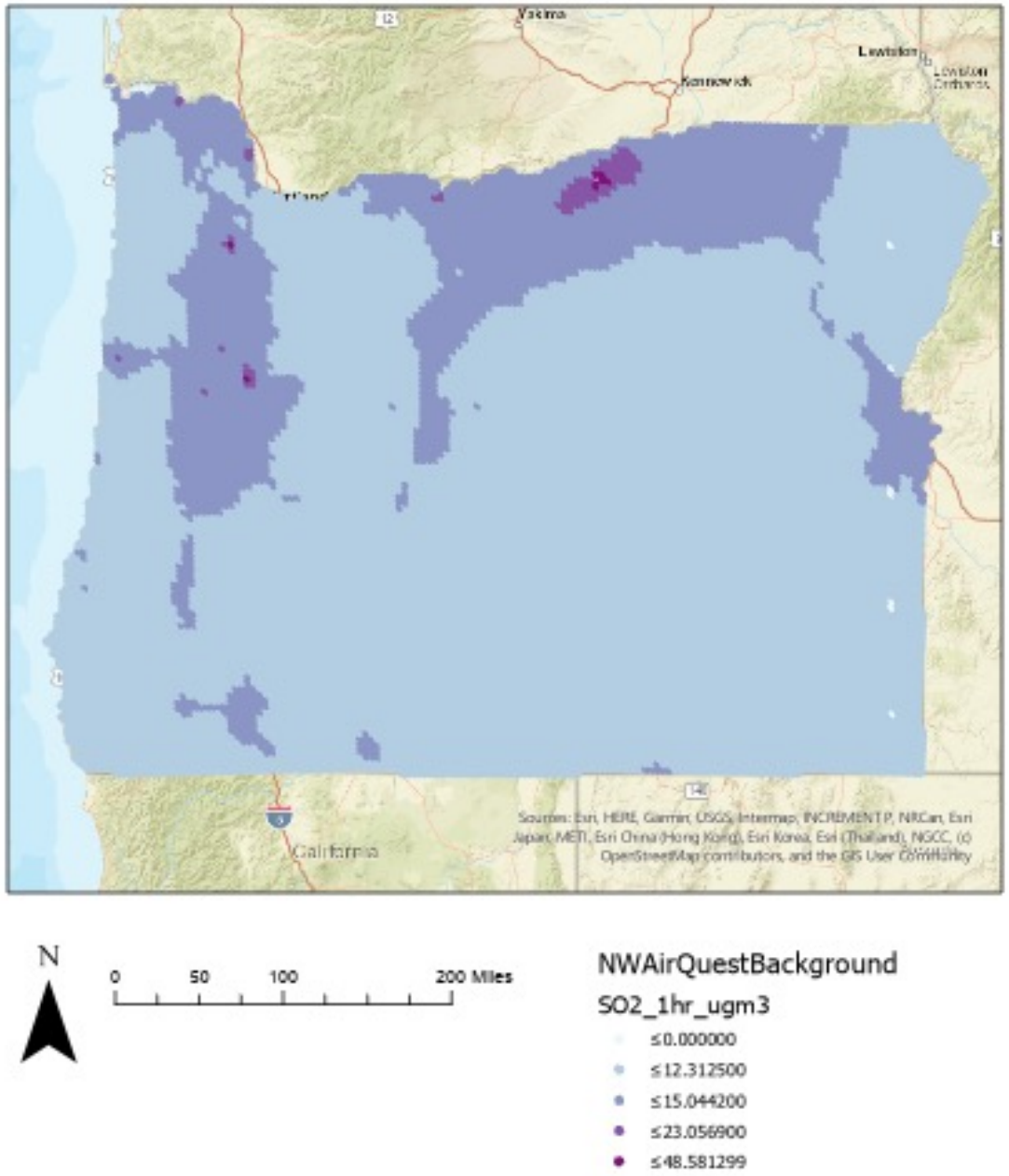
- DEQ evaluated possible SETs ranging from 0.8 lbs/hr to 5 lbs/hr
- Full NAAQS analysis would allow a NO2/NOx ratio.
  - DEQ conservatively applied an 80% ratio to SET calculation (EPA default value)
- 3 lbs/hr protects > 99% of Oregon background values

Blue areas indicate high background where facilities may exceed NAAQS at 3 lbs/hr

SO_2 Background

- 1-hour standard = 196 µg/m^3
- Mostly uniform across the state, few hotspots
  - Max = 55.09 µg/m^3
  - 98%ile = 13.38 µg/m^3
- Other state thresholds

State	SO_2 1 hr threshold (lbs/hr)
IDEQ: Level 1	0.21
IDEQ: Level 2	2.5
SWCAA	0.46
Colorado Interim	0.46
Oregon Trial SET	3



SO2 Trial SET

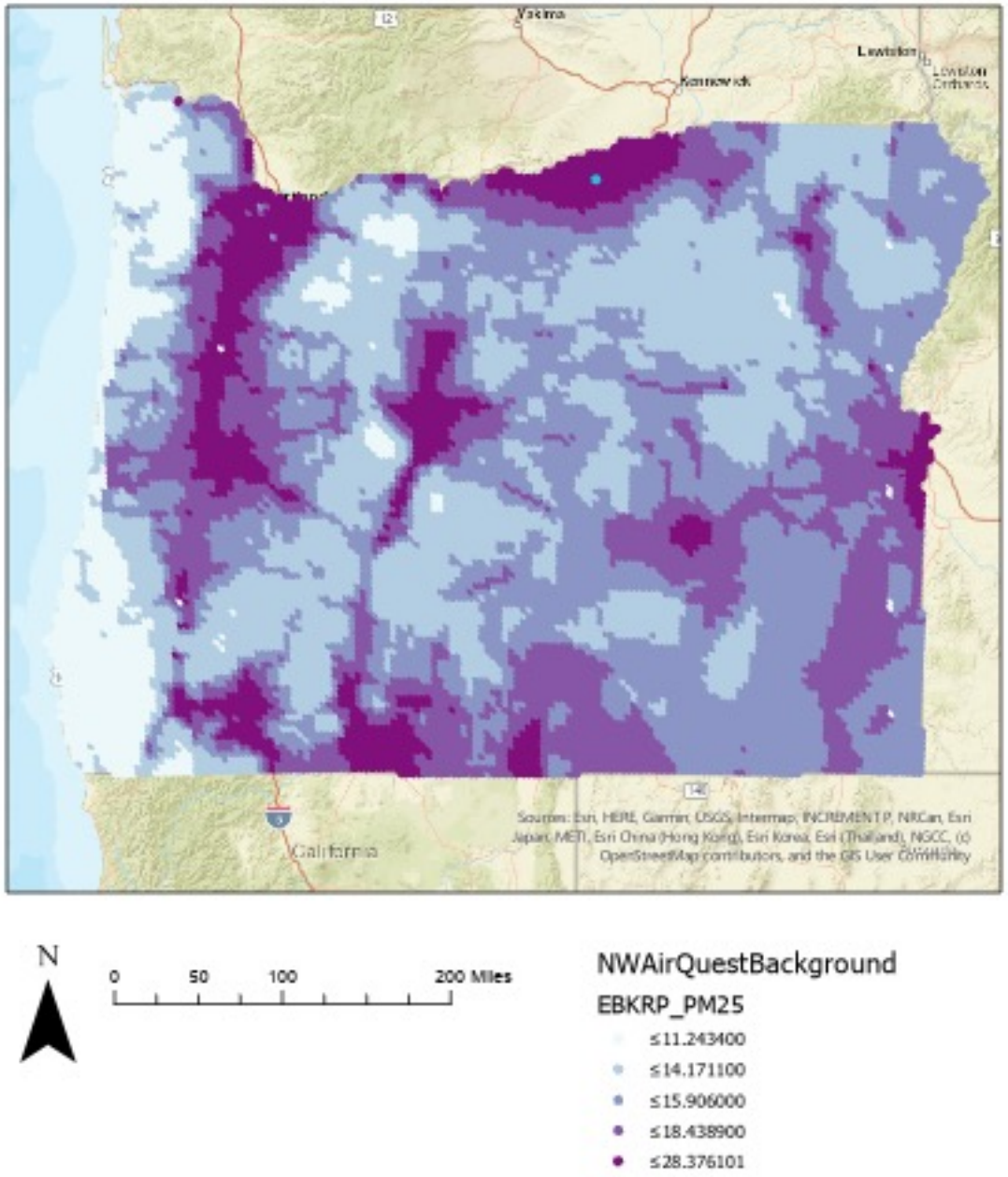
- DEQ evaluated possible SETs ranging from 0.9 lbs/hr to 5 lbs/hr
- 3 lbs/hr protects > 99.9% of Oregon background values

Blue areas indicate high background where facilities may exceed NAAQS at 3 lbs/hr

PM2.5 Background

- 24-hour standard = 35 µg/m^3
- High background linked to valley locations
  - Max = 28.38 µg/m^3
  - 98%ile = 20.39 µg/m^3
- Other state thresholds

State	$PM_{2.5}$ 24-hr modeling (lbs/day)
IDEQ: Level 1	1.3
IDEQ: Level 2	15.12
SWCAA	2.74
Colorado Interim	11
Oregon Trial SET	5



PM2.5 Trial SET

- DEQ evaluated possible SETs ranging from 2 lbs/day to 9 lbs/day
- 5 lbs/day protects > 99.6% of Oregon background values
- Boardman Area may see decreasing background due to closure of power plant

Blue areas indicate high background where facilities may exceed NAAQS at 5 lbs/day

Preliminary Trial SET

Pending management approval

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

Trial Period and 3-year Re-evaluation of SET

- SETs have two main objectives
  - Screen out facilities that are not likely to cause NAAQS exceedances
  - Screen in facilities that may cause NAAQS exceedances
- Current SETs are based on NAAQS-backgrounds: what refinements can be made to these as a target concentrations?
- Evaluation of short-term emission data may result in changes in the values of the SETs to better achieve the objectives

Questions?