State of Oregon Department of Environmental Quality

Screening Sources for Four Factor Analysis

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Methods: Selection of sources for analysis

Data Sources

Data	Source
Title V facility location & emission information	Oregon TRAACS – Title V Plant Site Emission Limits and 2017 NEI draft (released 9/3/2019)
ACDP facility location & emission information	Oregon TRAACS – ACDP Plant Site Emission Limits
Mandatory Class 1 Areas shapefile	EPA OAR OAQPS: https://edg.epa.gov/data/public/OAR/OAQPS/Class1/
Oregon State boundary shapefile	US Bureau of Land Management
Columbia River Gorge National Scenic Area shapefile	Columbia River Gorge Commission website: http://www.gorgecommission.org/scenic-area/maps

DEQ chose to screen sources for four factor analysis using the Q/D metric. Q/D is a measurement of the ratio of facility-level emissions (Q) to the distance from the facility to a Class I Area (D), and serves as a surrogate for the baseline visibility impact of the facility's emissions on that Class I Area. Per the Western Regional Air Partnership Methodology, [1]

> *The idea behind this strategy is to target sources with larger Q/D values (and thus, larger assumed impacts to visibility) for Four-Factor analysis by screening them forward and leaving behind less significant sources. This practice is sanctioned by the USEPA in the pertinent Draft Guidance so long as it results in the screening forward of a "combination of major stationary sources, minor stationary sources and minor/area stationary source categories that collectively account for a reasonably large fraction of all the in-state major, minor and area stationary source emissions contributing to any PM species that is a significant portion of the anthropogenic extinction budget." The Draft Guidance goes on to explain that for many source screening analyses, the USEPA considers 80 percent to be a "reasonably large fraction" of the extinction budget to be captured.*

WRAP defined Q/D as:

- Q = $NO_x + SO_2 + PM_{10}$ (tons per year)[2]
- D = distance from a source to the boundary of a Class I Area (km)

[1] Western Regional Air Partnership Technical Support System V2. "Methodology For Development Of The Q/D Analysis For Screening Sources Of Regional Haze-Forming Emissions." **http://views.cira.colostate.edu/tssv2/emissions/qdanalysis.aspx** (accessed 1/10/2020)
[2] EPA. August 2019. "Guidance on Regional Haze State Implementation Plans for the Second Implementation Period." https://www.epa.gov/visibility/visibility-guidance-documents. P. 11.

DEQ chose to calculate Q with PM, NO_x, and SO_2, as these three compounds contribute significantly to visibility impairment in Class I Areas in Oregon on the 20% Most Impaired Days. According to the EPA August 2019 Guidance,

> *The direct and precursor pollutants that can impair visibility include sulfur dioxide (SO_2), nitrogen oxides (NO_x), fine and coarse particulate matter (PM), volatile organic compounds (VOC), and ammonia. When selecting sources for analysis of control measures, a state may focus on the PM species that dominate visibility impairment at the Class I areas affected by emissions from the state and then select only sources with emissions of those dominant pollutants and their precursors.*

In Oregon, the fractions of pollutants and the precursors contributing to visibility impairment at any monitor changes by season, and by region of the state. For instance, from 2013 – 2017, approximately 50% of visibility impairment at Kalmiopsis is due to organic mass, approximately 25% at the Mt. Hood, and 25% at the Starkey and Hells Canyon monitors. Similarly, at Crater Lake, approximately 50% of visibility impairment at the monitor may be attributed to ammonium sulfate, while over 50% of visibility impairment in the Columbia River Gorge can be attributed to ammonium nitrate.

Due to the data available from IMPROVE monitors and in alignment with other WRAP states, DEQ chose to include sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter (PM) in the Q/D analysis.

D was calculated by the GenerateNear function using the Oregon Geolocator in ArcGISPro for all Class I Areas within 400 km of the Oregon state boundary only. This practice is consistent with methodology used by the Western Regional Air Partnership.

In alignment with the methods and criteria developed by the WRAP, the Q/D was calculated for each facility and each Class I Area, if:

- D < 400 km
- Q > 25 tpy

For both Q_{PSEL} and Q_{Actual}.

The goal of selecting sources for four factor analysis was to capture 80% of total Q for major sources (Title V) sources. For this round of the Regional Haze Planning and Implementation Period, a Q_{PSEL} /D greater than or equal to 5 captures 80% of the total Q from major sources for all Oregon CIAs, including sources not located in Oregon.

While Q/D values for the Columbia River Gorge NSA are included in the accompanying spreadsheet for reference, those values were not used to select sources for four factor analysis.

Alternative formats

DEQ can provide documents in an alternate format or in a language other than English upon request. Call DEQ at 800-452-4011 or email deqinfo@deq.state.or.us.