

## METHODOLOGY FOR DEVELOPMENT OF THE Q/D ANALYSIS FOR SCREENING SOURCES OF REGIONAL HAZE-FORMING EMISSIONS

### Introduction

Following implementation of the Regional Haze Planning Readiness Assessment Project,<sup>1</sup> a collaborative effort between Ramboll US Corporation (Ramboll) and the Western Regional Air Partnership (WRAP) to evaluate the readiness of WRAP members towards preparing their regional haze (“RH”) state implementation plans due in 2021, Ramboll was asked to assist WRAP with further tasks related to RH planning. The Assessment Project included a survey for WRAP members, the results of which were analyzed and further discussed during WRAP meetings. One insight was that many states are planning to utilize the “Q/D” method as part of their strategy for determining which emission sources might potentially require Reasonable Progress (“RP”) controls.<sup>2</sup> The USEPA *Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period* (“Draft Guidance”) explains that states are expected to evaluate sources of RH-causing pollutants to determine which should have RP controls implemented to limit emissions. The methodology typically used for this is known as the Four-Factor analysis, which evaluates sources based on 1) cost of compliance, 2) time necessary for compliance, 3) energy and non-air quality environmental impacts of compliance, and 4) remaining useful life of any potentially affected sources.<sup>3</sup> Evaluation based on these factors reveals the feasibility of implementing RP controls on the sources analyzed. However, performing a Four-Factor analysis on every emission source could be burdensome, so the Guidance allows for screening out sources that are unlikely to have a significant impact on visibility.<sup>4</sup> As indicated by the results of the survey conducted by Ramboll, many states are planning to use the Q/D method for this initial screening step. Hence, Ramboll was tasked with developing a tool to assist with this screening process and aid users in selecting sources for Four-Factor analysis from the overall stationary source emissions inventories in the western region. In the context of this document, a “source” refers to a single facility and its total emissions.

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<sup>1</sup> WRAP. 2018. *2018 Western States Planning Readiness Survey for Regional Haze State Implementation Plans for the Second Implementation Period*. Available at:

[http://www.wrapair2.org/pdf/WRAP%202018%20RH%20Planning%20Readiness%20Survey%20-%20Synthesis%20Report%20FINAL%20\(including%20figures%20and%20attachments\).PDF](http://www.wrapair2.org/pdf/WRAP%202018%20RH%20Planning%20Readiness%20Survey%20-%20Synthesis%20Report%20FINAL%20(including%20figures%20and%20attachments).PDF). Accessed: April 2019.

<sup>2</sup> 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 can serve as a surrogate for the baseline visibility impact of the facility’s emissions on that Class I Area.

<sup>3</sup> USEPA. 2016. *Draft Guidance on Progress Tracking Metrics, Long-term Strategies, Reasonable Progress Goals and Other Requirements for Regional Haze State Implementation Plans for the Second Implementation Period*. Available at: [https://www.epa.gov/sites/production/files/2016-07/documents/draft\\_regional\\_haze\\_guidance\\_july\\_2016.pdf](https://www.epa.gov/sites/production/files/2016-07/documents/draft_regional_haze_guidance_july_2016.pdf). Accessed: April 2019.

<sup>4</sup> Ibid.

## **Q/D Screening Method**

To assist states in screening through all of the permitted point source facilities within the WRAP and neighboring states in order to determine the most significant sources of RH-forming pollutants, Ramboll prepared a spreadsheet tool using Microsoft Excel (“Excel Tool”) and an Access Database. The Excel Tool and Access Database are designed to show sources’ impacts on nearby Class I Areas (CIAs) based on the ratio of their facility-level emissions (Q) to their distance from the CIA (D), otherwise known as “Q/D”. This metric serves as a surrogate for baseline visibility impact. 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. However, the Draft Guidance also notes that this recommendation may not be fully applicable for Q/D screening, and that ultimately the state should consult with its USEPA regional office about its planned approach.<sup>5</sup>

## **Tool for Q/D Screening**

Understanding the goals of Q/D screening and the applicable guidance from USEPA on how to implement the analysis, Ramboll prepared the aforementioned Excel Tool and Access Database. The Excel Tool and Access Database are designed to be straightforward and user-friendly. The Excel Tool allows the user to display and sort facilities’ emissions based on Q/D values as well as emissions (“Q”) levels. The Excel Tool features pivot tables that display permitted point source facilities by their Q/D values, which are calculated using the sum of all emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and particulate matter less than 10 microns in diameter (PM<sub>10</sub>) (as measured in tons per year), divided by the distance to a CIA (measured in kilometers [km] from the facility to the nearest boundary of the CIA) for all CIAs within 400 km of the source. The source of the emissions data is the 2014 NEIv2 point source emissions inventory with updates by western states<sup>6</sup> and the Excel Tool includes all 2014 NEIv2 point source facilities with a Q larger than 1 tpy. Ammonia (NH<sub>3</sub>) and volatile organic compounds (VOC) emissions by facility were included in the Excel Tool for informational purposes.

The CIAs considered in the analysis include those within the WRAP states and within neighboring states in the CenSARA (Iowa, Nebraska, Kansas, Oklahoma, Texas, Missouri) and LADCO (Minnesota, Wisconsin) regions. In the development of estimates of D, sources within WRAP states were evaluated against the CIAs in both the WRAP region and neighboring states in the CenSARA and LADCO regions, as

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<sup>5</sup> Ibid.

<sup>6</sup> Intermountain West Data Warehouse. 2014. *Western U.S. regional analysis - 2014 NEIv2 Emissions Inventory Review for Regional Haze Modeling*. Available at: <http://views.cira.colostate.edu/wiki/wiki/9191/western-us-regional-analysis-2014-neiv2-emissions-inventory-review-for-regi>. Accessed: April 2019.

long as they were within 400 km of the facility. However, sources within neighboring states in the CenSARA and LADCO regions were only evaluated against CIAs within 400 km in the WRAP region. Distances between CIAs and each point source within 400 km were estimated using facility coordinates<sup>7</sup> and the USEPA Mandatory Class I Area shapefile.<sup>8,9</sup>

The Excel Tool establishes a threshold of 10 tons per year per km (tpy/km) for Q/D and 25 tpy for Q. The user has the ability to view and sort by precursor pollutant for a picture of how they individually affect the facility rankings. In addition to viewing and sorting the Q/D values contributing to impacts at a CIA, the user can view the percent of Q/D screened forward as a percentage of total tracked Q/D by CIA. The user can also view the percent of Q screened forward as a percentage of total tracked Q by state. It should be noted that facilities with Q greater than 4,000 tpy and that are located further than 400 km from a Class I Area will not be screened forward in the Q/D analysis due to the limit on D (despite potentially having a Q/D value greater than 10). There are 150 facilities that fit this criterion. A list of these facilities and associated emissions are shown in Table A-1.

The Access Database gives the user the ability to adjust the screening criteria by toggling the Q and Q/D thresholds. For example, the user can select a Q threshold of 200 tons per year, and only facilities with Q values greater than or equal to 200 tons per year will be screened forward. The Access Database then automatically calculates the percent of the total Q that were screened forward as a percentage of total Q by state. Note, only facilities with D values less than 400 km are included in this analysis. For a specified Q/D threshold, the percent of Q/D screened forward is presented as a percentage of total tracked Q/D by CIA. The goal of this is to allow the user to toggle through options for potential screening thresholds to see what portion of Q and Q/D would be incorporated when the various options are selected.

Ultimately, findings from the development and use of the Excel Tool and Access Database will inform Ramboll's work on another task to be completed for the WRAP, the *Source Control Assessment Considerations* technical memorandum. This document will offer guidance to WRAP members on further evaluating and selecting sources to undergo a Four-Factor analysis for potential RP emissions controls/limits.

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<sup>7</sup> When there were multiple coordinates for a given facility in the NEI, the coordinates for the emissions unit or process with the largest Q were used to represent the facility.

<sup>8</sup> USEPA. 2018. *Mandatory Class I Federal Areas*. Available at: <https://edg.epa.gov/data/public/OAR/OAQPS/Class1/>. Accessed: March 2019.

<sup>9</sup> The USEPA Mandatory Class I Area shapefile includes certain tribal areas that are not covered by the Regional Haze Rule. As a result, those areas have not been included as receptor areas in this analysis.