OFFICE OF AIR QUALITY PLANNING AND STANDARDS
RESEARCH TRIANGLE PARK, NC 27711

September 20, 2024

MEMORANDUM

SUBJECT: Model Clearinghouse review of a site-specific alternative approach to demonstrate modeled attainment of the 2010 SO_2 NAAQS at the Alcoa West Aluminum Smelter in Massena, New York

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THROUGH: Rick Ruvo, Director
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INTRODUCTION

EPA Region 2 is seeking concurrence from the EPA Model Clearinghouse on their intended approval of an alternative modeling approach as part of New York State Department of Environmental Conservation's (NYSDEC) attainment demonstration of the 2010 SO_2 National Ambient Air Quality Standard (NAAQS) for the St. Lawrence County, New York 1-hour SO_2 non-attainment area that surrounds the Alcoa Massena West aluminum smelter facility (hereafter, Alcoa Massena). On June 18, 2024, NYSDEC requested approval to use a site-specific alternative modeling approach that involves categorizing two roof vents at Alcoa Massena as a series of four-point sources, instead of categorizing each roof vent as a buoyant line (BUOYLINE) source. This method would be modeled in conjunction with the two other site-specific non-guideline modeling approaches[1] that were approved by EPA Region 2 on September 20, 2022 and concurred by the EPA Model Clearinghouse on October 14, 2022 (Record No: 22-II-03).[2]

[1] Those two alternative modeling approaches, which modify inputs to the EPA preferred guideline model, AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model), included using a neutral lapse rate in the lower 100 meters of the atmosphere and incorporating the 2019 draft version of BPIPPRM (Building Profile Input Program for PRIME, Plume Rise Model Enhancements).

[2] https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=22-II-03.

Given that the June 18, 2024, NYSDEC request modifies the underlying emissions characterization of Alcoa Massena that was used to justify the June 20, 2022, alternative model approval, this previous alternative model approval must be reconsidered along with the revised emissions characterization of the two roof vents and other emissions sources at the facility and the revised alternative model justification and evaluation. Through the EPA Region 2 review and proposed approval and the EPA Model Clearinghouse concurrence in this formal action, a new alternative modeling approval can be issued for Alcoa Massena that can appropriately be included with the NYSDEC attainment demonstration for the St. Lawrence County, New York 1-hour SO_2 non-attainment area.

REGIONAL OFFICE REVIEW

EPA Region 2 provides a comprehensive overview of Alcoa Massena and the lineage of the alternative modeling activities for this facility and the associated 1-hour SO_2 attainment demonstration in their August 19, 2024, EPA Model Clearinghouse concurrence request memorandum.[3] The EPA Region 2 memorandum also includes the alternative model justification package (NYSDEC request letter and Alcoa Massena modeling protocol) submitted by NYSDEC on June 18, 2024. The EPA Model Clearinghouse will refrain from restating this contextual information and will encourage readers to reference the "Background and Project Overview" section of the EPA Region 2 memorandum.

An alternative model is evaluated from both a theoretical and a performance perspective before it is selected for use. NYSDEC requested to allow the use of an alternate modeling approach for their air quality modeling analysis, per the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W), Section 3.2.2(b), Condition (2), for their 1-hour SO_2 attainment demonstration. Section 3.2.2(b)(2) specifically states, "If a statistical performance evaluation has been conducted using measured air quality data and the results of that evaluation indicate the alternative model performs better for the given application than a comparable model in Appendix A…" There are additional elements for Condition (2) describing the necessary statistical performance evaluation procedures and techniques for determining acceptability of a model found in Section 3.2.2(d).

There were three sets of statistical evaluation tests provided in the alternative justification package and used to assess the modified model performance, including quantile-quantile (Q-Q) plots for each monitor, comparisons of the modeled and observed 5-year average 1-hour average design concentration for each monitor, and use of the Robust Highest Concentration (RHC) as part of EPA's Cox-Tikvart procedure. EPA Region 2 reviewed and confirmed that each of the statistical tests demonstrated improvement in performance with the modified model.

EPA Region 2's review of the alternative model request submittal provided by NYSDEC determined that the proposed alternative modeling approach had both a theoretical basis and demonstrated improved model performance, per Section 3.2.2(d). Therefore, EPA Region 2 deems the proposed alternative modeling approach acceptable for the 1-hour SO_2 attainment demonstration for Alcoa Massena.

MODEL CLEARINGHOUSE REVIEW

As described in the introduction to this EPA Model Clearinghouse concurrence response memorandum, NYSDEC is requesting a revision to a previously approved alternative model given modification to the underlying emissions characterization of Alcoa Massena from the original alternative model justification and evaluation. The primary modification was a shift to characterize two roof vents as a series of four-point sources, instead of categorizing each roof vent as a buoyant line (BUOYLINE) source. Otherwise,

[3] https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/24-II-02_Region2_MCHRequest_AlcoaMassena.pdf.

the previous two site-specific non-guideline modeling approaches that were formerly reviewed and approved remain unchanged. While the overall percentage of SO_2 emissions change with the revision in source characterization is small, there is still a requirement to reevaluate and redo the alternative model performance evaluation with the revised emission characterization to confirm that the elements of Section 3.2.2(d) are still satisfied and the revised alternative model package is approvable, which NYSDEC and Alcoa have done and provided.

The EPA Model Clearinghouse's review of the site-specific non-guideline modeling approaches of using a neutral lapse rate in the lower 100 meters of the atmosphere and incorporating the 2019 draft version of BPIPPRM for Alcoa Massena in the revised alternative modeling package remain unchanged. The previous October 14, 2022, EPA Modeling Clearinghouse concurrence response memorandum[4] outlines our detailed review and concurrence with the use of these two alternative modeling approaches in this case-specific situation.

Further, the EPA Model Clearinghouse notes and commends the extensive amount of coordination that occurred between EPA Region 2, NYSDEC, and Alcoa specific to the revised characterization of the SO_2 emissions associated with the two roof vents over these past two years. Through this iterative and collaborative coordination approach, an agreeable and appropriate source characterization of each roof vent as a series of four-point sources has been reach between each party, including the EPA Model Clearinghouse.

CONCURRENCE SUMMARY

The EPA Model Clearinghouse fully concurs with EPA Region 2's proposed approval of the June 18, 2024, NYSDEC alternative model request for the Alcoa Massena West aluminum smelter facility located in St. Lawerence County, NY that involves categorizing two roof vents as a series of four-point sources, instead of categorizing each roof vent as a buoyant line (BUOYLINE) source, in conjunction with two other site-specific non-guideline modeling approaches that were previously approved by EPA Region 2. The EPA Region 2 review and the NYSDEC and Alcoa documentation provide a sufficient theoretical basis and supporting scientific justification for the use of the revised emissions characterization and alternative model approach. This EPA Model Clearinghouse concurrence and the EPA Region 2 alternative model approval for this revised alternative model approach should be considered case-specific and any further regulatory application of these alternative model approaches would require further review and approval per the requirements of the *Guideline*, Section 3.2.

The EPA Model Clearinghouse encourages EPA Region 2 to respond to NYSDEC and to the docket for federal actions related to the associated SIP revision with a letter of alternative model approval, as appropriate. The information associated with the EPA Region 2 alternative model approval and the EPA Model Clearinghouse concurrence should be available for comment during the appropriate public comment period(s).

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[4] https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/22-II-03_MCHResponse_Region2_AlcoaMassena.pdf.