



OFFICE OF STATE AIR PARTNERSHIPS

WASHINGTON, D.C. 20460

March 3, 2026

MEMORANDUM

SUBJECT: Model Clearinghouse review of a case-specific alternative model for characterizing 1-hour SO₂ in complex terrain along the Laurel Ridge in Westmoreland and Cambria Counties, Pennsylvania

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INTRODUCTION

The U.S. Environmental Protection Agency Region 3 (EPA Region 3) office is seeking concurrence from the EPA's Model Clearinghouse (Model Clearinghouse) on their intended approval of an alternative modeling approach to be applied in a Clean Data Determination (CDD) for the Cambria-Westmoreland, PA 1-hour SO₂ nonattainment area. EPA Region 3 seeks this concurrence in accordance with the requirements in the *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W), §3.2.2, which allows for an EPA Regional Office to determine that an alternative model is acceptable in consultation with the Model Clearinghouse.

Portions of Cambria and Westmoreland Counties, Pennsylvania were designated nonattainment for the 2010 1-hour primary SO₂ National Ambient Air Quality Standard (NAAQS) by the EPA, effective January 16, 2025. The Pennsylvania Department of Environmental Protection (PA DEP) and the Conemaugh and Seward Generating Stations were notified in April 2025 of the option for a CDD based on air quality modeling demonstrating attainment of the 1-hour SO₂ NAAQS.

The consulting firm, AECOM, performed extensive sensitivity evaluations of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) and in coordination with the PA DEP concluded that an alternative modeling approach with AERMOD would be necessary to more appropriately characterize the Conemaugh and Seward Generating Stations in the

vicinity of the complex terrain of the Laurel Ridge in Pennsylvania. In this case-specific attainment demonstration being submitted for the CDD, the LOW_WIND non-regulatory option in AERMOD will be applied using a minimum sigma-v value setting of 0.5 m/s rather than the default value of 0.2 m/s. Meteorological and air quality monitor data from a historic Penelec funded field study in the same geographical region of these facilities and the complex topography serves as the basis for the overall performance evaluation of the alternative minimum sigma-v value selected for the CDD modeling demonstration.

REGIONAL OFFICE REVIEW

On January 21, 2026, AECOM submitted the formal alternative model request to the PA DEP and EPA Region 3 on behalf of the Conemaugh and Seward Generating Stations.¹ This alternative model request followed the *Guideline on Air Quality Models*, §3.2.2(b)(iii) regulatory pathway. To meet the requirements of §3.2.2(b)(iii), AECOM provided detailed justification for each of the subsequent 5 criteria listed in §3.2.2(e), which include:

- i. The model or technique has received a scientific peer review;
- ii. The model or technique can be demonstrated to be applicable to the problem on a theoretical basis;
- iii. The databases which are necessary to perform the analysis are available and adequate;
- iv. Appropriate performance evaluations of the model or technique have shown that the model or technique is not inappropriately biased for regulatory application; and
- v. A protocol on methods and procedures to be followed has been established.

EPA Region 3 worked with both the PA DEP and AECOM to thoroughly review and document this submittal to ensure that all of the *Guideline on Air Quality Models*, §3.2.2(e) criteria were reasonable and satisfactorily met. In addition to a comprehensive background on the circumstances surrounding the development of the CDD attainment demonstration and the Penelec funded field study, EPA Region 3 summarizes AECOM's justification to each of the §3.2.2(e) criteria in their February 2, 2025, Model Clearinghouse Concurrence Request Memorandum.² For the brevity of this concurrence response, the Model Clearinghouse will not re-summarize AECOM's justification.

EPA Region 3's review of the alternative model request submitted by AECOM determined that the proposed alternative modeling approach had both a theoretical basis and demonstrated improved model performance following the recommendation in EPA's Protocol for Determining the Best Performing Model.³ Further, EPA Region 3, found that the alternative model justification met all of the aspects of *Guideline on Air Quality Models*, §3.2.2(b)(iii) requirements. Thus, EPA Region 3 determined that an alternative model (with LOW_WIND option with minimum sigma-v setting of 0.5 m/s) is justified for

¹ https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_AECOM_Alternative_Model_Report_Cover_Letter_21JAN26.pdf

- [https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_AECOM_Exhibit A - Laurel Ridge Alternative Model Protocol 26SEP25-Revised 21JAN26_wAttach.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_AECOM_Exhibit_A_-_Laurel_Ridge_Alternative_Model_Protocol_26SEP25-Revised_21JAN26_wAttach.pdf)
- [https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_AECOM_Exhibit B - Laurel Ridge Alternative Model Report 21JAN26_wAttach.pdf](https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_AECOM_Exhibit_B_-_Laurel_Ridge_Alternative_Model_Report_21JAN26_wAttach.pdf)

² https://gaftp.epa.gov/Air/aqmg/SCRAM/mchisrs/26-III-01_Region3_MCHRequest_CambriaWestmorelandPA.pdf

³ Protocol for Determining the Best Performing Model, EPA-454/R-92-025, September 1992, https://www.epa.gov/sites/default/files/2020-10/documents/model_eval_protocol.pdf.

this case-specific application in the CDD for the Cambria-Westmoreland, PA 1-hour SO₂ nonattainment area.

MODEL CLEARINGHOUSE REVIEW

The Model Clearinghouse commends the regular coordination that occurred between AECOM, the PA DEP, and EPA Region 3 specific to the development of this alternative model request, especially considering that this alternative model justification is the first such demonstration with respect to the LOW_WIND non-regulatory option in AERMOD and the first to adjust the minimum sigma-v parameter in the model. The Model Clearinghouse was consulted throughout this ongoing coordination on the appropriate model evaluation methodology and the underlying air quality and meteorological data being utilized from the Penelec funded field study. It was beneficial to all parties involved to engage and agree upon various aspects of the alternative model evaluation throughout the development of the final alternative model request package. Through this iterative and collaborative coordination approach, an agreeable and appropriate characterization of the Conemaugh and Seward Generating Stations in the vicinity of the complex terrain of the Laurel Ridge in Pennsylvania was reached between each party, including the Model Clearinghouse.

As noted above, EPA Region 3 provides a thorough summary of each of the *Guideline on Air Quality Models*, §3.2.2(e) criteria in their February 2, 2025, Model Clearinghouse Concurrence Request Memorandum, including a detailed description of the alternative model evaluation of the adjusted minimum sigma-v parameter. AECOM provided the following statistical measures in the final modeling report:

- A comparison of model predicted 99th percentile design concentration (predicted and observed) at each monitor and considering all monitors for both the default and alternative model derived concentrations
- Quantile-Quantile (Q-Q) plots of the ranked hourly SO₂ predicted and observed concentrations for monitors along the Laure Ridge using the default and alternative model derived concentrations
- Screening and statistical tests and their statistical measures including Robust Highest Concentrations (RHCs), Fractional Bias (FB)/Absolute Fractional Bias (AFB), Composite Performance Measure (CPM), and Model Comparison Measure (MCM). These are further described in the EPA's Protocol for Determining the Best Performing Model.

In all of these metrics, the model performance analysis based upon the Penelec funded field study demonstrated a statistically significant improvement of the alternative minimum sigma-v (0.5 m/s) as compared to AERMOD's default settings (0.2 m/s) and no bias towards underprediction. Given these model performance results and the additional review summarized by EPA Region 3, the Model Clearinghouse agrees that the requirements and subsequent criteria of the *Guideline on Air Quality Models*, §3.2.2(b)(iii) are adequately met.

CONCURRENCE SUMMARY

The EPA Model Clearinghouse fully concurs with EPA Region 3's proposed approval of the January 21, 2026, AECOM alternative model request of an alternative modeling approach to be applied in a CDD for the Cambria-Westmoreland, PA 1-hour SO₂ nonattainment area. The EPA Region 3 review and the AECOM documentation provide a sufficient theoretical basis and supporting scientific justification for

the use of the LOW_WIND non-regulatory option in AERMOD with a minimum sigma-v value setting of 0.5 m/s rather than the default value of 0.2 m/s. This EPA Model Clearinghouse concurrence and the EPA Region 3 alternative model approval for this revised alternative model approach should be considered case-specific and any further regulatory application of the alternative model approach would require further review and approval per the requirements of the *Guideline on Air Quality Models*, §3.2.2.

The EPA Model Clearinghouse encourages EPA Region 3 to respond to AECOM, the PA DEP, and to the docket for federal actions related to the associated CDD with a letter of alternative model approval, as appropriate. The information associated with the EPA Region 3 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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