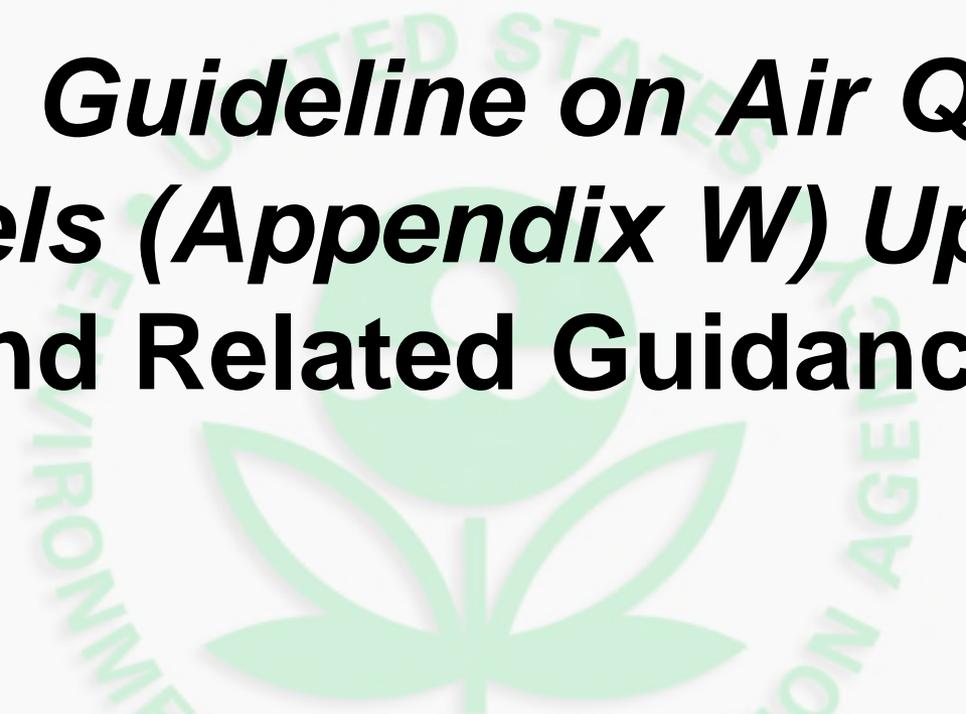# EPA's *Guideline on Air Quality Models (Appendix W) Update* and Related Guidance

AWMA Meeting

May 10, 2017

Presentation Topics

1) Introduction and Overview of Final Rule

2) Updates to EPA's AERMOD Modeling System

3) Updates to 3-Tiered Demonstration Approach for NO_2

4) Status of Mobile Source Models

5) Addressing Single-Source Impacts on Ozone and Secondary $PM_{2.5}$

6) Status of CALPUFF and Assessing Long-Range Transport for PSD Increment and Regional Haze

7) Role of EPA's Model Clearinghouse

8) Streamlining of Modeling Procedures for Cumulative Impact Analysis

9) Updates on Use of Meteorological Input Data for Regulatory Dispersion Modeling

10) Update on SILs Guidance for Ozone and Fine Particles

REVISIONS TO THE *GUIDELINE ON AIR QUALITY MODELS - Appendix W*

- On December 20, 2016, EPA finalized several additions and changes to its *Guideline on Air Quality Models* ("Appendix W" to 40 CFR Part 51)

- Appendix W is used by EPA, states, tribes, and industry for regulatory air modeling to:
  - Prepare and review permits for new sources of air pollution (NSR and PSD permits)
  - Revise their plans detailing strategies for reducing emissions and improving air quality in State or Tribal Implementation Plans (SIPs or TIPs)

- On December 20th, EPA also released a revised regulatory version of the preferred near-field modeling system, **AERMOD**, reflective of the final rule

- EPA expects the Appendix W revisions and associated model enhancements will increase the efficiency and accuracy of regulatory modeling demonstrations.

- The final rule was published in the **Federal Register** on January 17, 2017.
  - Rule Docket (ID No. EPA-HQ-OAR-2015-0310).
  - Federal Register Version of Final Rule is available on SCRAM.
  - Response to Comments Document can be found in the rule docket

- 2017 Appendix W final rule information and supporting material / documentation is available via EPA's SCRAM website:
  - https://www3.epa.gov/ttn/scram/appendix_w-2016.htm

- At publication, the effective date for the final rule was February 16, 2017. Per a Presidential directive on January 20, 2017, the effective date for the Appendix W final rule and 29 other EPA regulations was delayed until March 21, 2017. Appendix W and 4 others have since been further delayed until May 22, 2017 to give Agency officials the opportunity for review.

Updates to EPA's AERMOD Modeling System

- Regulatory versions of the AERMOD dispersion model and AERMET meteorological processor have been updated

  - AERMET updated to v16216, with Model Change Bulletin (MCB) MCB 7 and AERMOD updated to v16216r, with MCB 12

- Major Changes:

  - ADJ_U* now a regulatory option in AERMET (except when used with site-specific turbulence measurements)

  - Prognostic Meteorology may now be used (MMIF)

  - Buoyant Line Plume (BLP) model incorporated into AERMOD

  - Revised options and treatment of NOx/NO2 chemistry

  - LOWWIND3 was proposed as a regulatory option in AERMOD but was not promulgated as a regulatory option in v16216 (Potential for under prediction of concentrations, especially if used with ADJ_U* and/or with observed turbulence data)

Current Regulatory version of AERMOD

- December release of AERMOD v16216 was found to have bugs that did not affect concentrations:
  - BETA flag requirements, compilation issues on certain platforms

- Bug also was identified that does affect concentrations for limited cases with AREACIRC sources

- Needed to retain 16216 version number for clarity related to versions with App W, but need to differentiate from original release of 16216 with bug fixes:
  - Output files will report "16216r" for clarity.

Updates to 3-Tiered Demonstration Approach for NO$_2$

- The EPA is finalizing several modifications to the NO$_2$ Tier 2 and 3 screening techniques incorporated into AERMOD as proposed
  - For the Tier 2 approach, EPA is replacing the existing Ambient Ratio Method (ARM) option with a revised ARM2 option
  - For the Tier 3 approach, EPA is incorporating the existing detailed screening options of the Ozone Limiting Method (OLM) and Plume Volume Molar Ratio Method (PVMRM) into the regulatory version of AERMOD as regulatory (or DFAULT) options
    - EPA is replacing the previous PVMRM option with a revised PVMRM option (proposed with the option name PVMRM2)

- Because of the additional input data requirements and complexities associated, the Tier 3 options shall be used for regulatory application **in consultation (not approval as previous) with the EPA Regional Office and appropriate reviewing authority**

Summary of EPA Final Actions for Mobile Source Modeling

- Replaced CALINE3 with AERMOD as the Appendix A preferred dispersion model for mobile source modeling of inert pollutants
  - AERMOD has updated dispersion science relative to CALINE3
  - Model intercomparisons show that AERMOD outperforms CALINE3
  - Simplified implementation of mobile source modeling for CAA requirements

- 3-year grace period for transition from CALINE3 to AERMOD
  - Proposed a 1 year transition period after final rule
  - Based on comments from external stakeholders, we extended period to 3 years

- While CALINE3 was replaced for refined modeling, CAL3QHC still allowed for screening modeling for CO

Addressing Single-Source Impacts on Ozone and Secondary PM$_{2.5}$

- The EPA has finalized a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary PM$_{2.5}$
  - Tier 1 demonstrations would involve use of technically credible relationships between emissions and ambient impacts based on existing modeling studies deemed sufficient for evaluating a project source's impacts.
  - Tier 2 demonstrations would involve case-specific application of chemical transport modeling (e.g., with an Eulerian grid or Lagrangian model)

- MERPs as a Tier 1 Demonstration Tool
  - In the preamble of the Appendix W NPRM, EPA discussed plans to develop a PSD compliance demonstration tool for ozone and PM2.5 precursors called Modeled Emission Rates for Precursors (MERPs)
  - For PSD, separate MERPs can be developed to relate:
    - volatile organic compounds (VOCs) and/or nitrogen oxides (NOx) to O3
    - sulfur dioxide (SO2) and/or NOX to secondary PM2.5
  - Draft "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program" (EPA-454/R-16-006 December 2016)
    - Draft guidance was released on 12/2/16 for public comment, prior to App W FRM signature. Comment period ended on March 31st, 2017

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Status of CALPUFF

- EPA has removed CALPUFF as a preferred model for long-range transport and now considers it a screening technique along with other Lagrangian models without alternative model approval (per Section 4.2.1) for addressing PSD increment beyond 50 km from a new or modifying source

- For NAAQS demonstrations, EPA does not consider a LRT assessment necessary beyond 50 km for inert pollutants except for situations where near-field compliance is not required (*e.g.*, OCS source)

- No change in ability to use CALPUFF in the near-field as an alternative model if appropriately approved under Section 3.2 of Appendix W

- Flexibility to the user community in estimating single-source secondary pollutant impacts with emphasis on chemical transport models that include Lagrangian puff models and Eulerian grid (*e.g.*, photochemical transport) models

Role of EPA's Model Clearinghouse

- In the final revisions to the *Guideline*, the EPA is codify the long-standing process of the Regional Offices consulting and coordinating with the Model Clearinghouse (MCH) on all approvals of alternative models and techniques

- Restated… while the Regional Administrators are the delegated authority to issue such approvals under Section 3.2.2 of the *Guideline*, all **alternative model approvals will be issued only after consultation with the EPA's MCH** and formal documentation through a concurrence memorandum that indicates that the alternative model requirements in section 3.2.2 have been met

Updates to Modeling Procedures for Cumulative Impact Analysis

- The EPA continues to caution against the literal and uncritical application of very prescriptive procedures for conducting NAAQS and PSD increments modeling compliance demonstrations as described in Chapter C of the 1990 *draft* New Source Review Workshop Manual
  - Following such procedures in a literal and uncritical manner has led to practices that are overly conservative and unnecessarily complicate the permitting process

- The EPA provided a renewed emphasis on the development and vetting of a modeling protocol with the appropriate reviewing authority to discuss aspects of the input data and assessment technique, to identify potential issues, and to help streamline the entire compliance demonstration process
  - To assist with model protocol development, EPA revised the Air Quality Analysis Checklist on the SCRAM website and will continue to update it based on Regional Office and reviewing authority feedback

Updates on Use of Meteorological Input Data for Regulatory Dispersion Modeling

- Types of Meteorological Input Data Available for dispersion modeling:
  - 1 year of observed site-specific/representative data
  - 5 years of National Weather Service/ASOS
  - 3 years of prognostic meteorological data

- Guideline recommends the routine use of AERMINUTE output when processing meteorological data from NWS ASOS sites
  - Captures data previously lost in hourly observations due to calm and variable wind METAR coding

- Prognostic Meteorology Option
  - Mesoscale Model InterFace Program (MMIF)
  - Translates meteorological model output into dispersion model inputs
  - Three most recent consecutive years recommended
  - Observed data still preferred over prognostic
  - EPA has generated AERMET input files for 2013-2015 for the entire CONUS
  - MMIFv3.3 available on SCRAM released with Final Signature
  - MMIF Guidance - https://www3.epa.gov/ttn/scram/appendix_w/2016/MMIF_Guidance.pdf

Update on SILs Guidance for Ozone and Fine Particles

- Draft guidance released for 60-day comment period on Aug 1, 2016

  - https://www.epa.gov/nsr/draft-guidance-comment-significant-impact-levels-ozone-and-fine-particle-prevention-significant

- Webinar held on Aug 18, 2016

  - https://www.epa.gov/scram/air-modeling-announcements

- Current status:

  - OAQPS working to finalize guidance

  - Hopefully issue final guidance in Summer 2017

Questions?

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