Modeling / Regional Transport: National Perspectives

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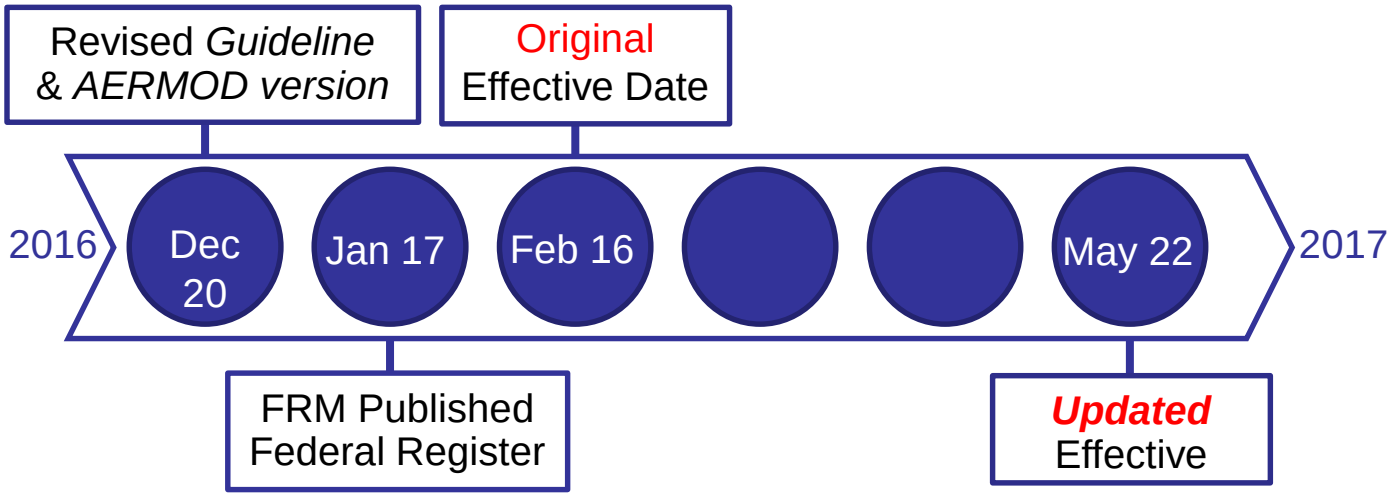
Appendix W

Final Rule to Revise to the *Guideline on Air Quality Models*

(Appendix W to 40 CFR Part 51)



Appendix W: Main Final Actions

- Science improvements to AERMOD Modeling System
  - ADJ_U* options to address technical concerns and improve model performance under extremely light winds and stable conditions
  - Enhanced treatment of horizontal and capped stacks
  - Addition of a buoyant line source option
  - Updates to the NO2 screening techniques, including a new Tier 2 Ambient Ratio Method (ARM) and revised Tier 3 Plume Volume Molar Ratio Method (PVMRM)
  - AERSCREEN as the recommended screening model for simple and complex terrain for single sources
- Long Range Transport (LRT) screening approach
- Single-Source Impacts on Ozone and Secondary $PM_{2.5}$
- Removal of BLP, CALINE, and CALPUFF as EPA preferred models

Appendix W: Main Final Actions (cont)

- Provide for use of prognostic met data in dispersion modeling for PSD compliance demonstrations
  - Effort to provide more flexibility
  - Improve meteorological inputs for areas where:
    - No representative NWS station
    - Prohibitive or infeasible to collect adequate site-specific data
  - EPA provided the Mesoscale Model InterFace Program (MMIF) that post-processes WRF simulation data for input to AERMOD
    - Also, made publicly available both national, 12km raw WRF data and MMIF processed data for 2013-2015.
    - Coordinated with Multi-Jurisdictional Organizations (MJOs) in an effort to most effectively distribute this data to the states.

Final Action: Single-Source Impacts on Ozone and Secondary $PM_{2.5}$

- The EPA believes photochemical grid models are generally most appropriate for addressing ozone and secondary $PM_{2.5}$, because they provide a spatially and temporally dynamic realistic chemical and physical environment for plume growth and chemical transformation.
- Lagrangian models (e.g. SCICHEM) applied with a realistic 3-dimensional field of chemical species could also be used for single source O_3 or $PM_{2.5}$ assessments.
- The EPA has finalized in Section 5 of revised *Guideline* a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary $PM_{2.5}$.
  - Tier 1 demonstrations involve use of technically credible relationships between emissions and ambient impacts based on existing modeling results or 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).
- Section 5 does not provide a requirement for chemical transport modeling

MERPs as a Tier 1 Demonstration Tool

- EPA has provided technical guidance that will provide a framework for development of Tier 1 demonstration tools under Appendix W for PSD permitting.
  - 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)
- The draft guidance provides a framework on how to arrive at values for MERPs based on existing relevant modeling or newly developed area specific modeling that source/states can utilize in their PSD compliance demonstrations.
  - The guidance does not endorse a specific MERP value for each precursor.
  - Public comments made available on SCRAM on May 26, 2017
- Currently reviewing comments and plan to provide a revised version of the guidance in late 2017 that addresses public comments with emphasis on:
  - More clarity on use of MERPs at national, regional and local level with more detail in the examples provided in the guidance

Next Steps

- SILs Guidance: Pacing item for release of MERPs guidance and PM2.5 Precursor Demo guidance
- EPA hosted 2017 R/S/L Modelers workshop in RTP, NC on September 25th and 26th
  - https://www.epa.gov/scram/2017-regional-state-and-local-modelers-workshop
- Continue discussions to improve science in AERMOD, specifically research coordination with ORD and stakeholders on
  - LOWWIND related options
  - Downwash algorithms (updates and/or replace PRIME)
  - Mobile source modeling (RLINE)
  - Evaluation of Offshore & Coastal Dispersion Model (OCD)
- Further engagement with the stakeholder community leading up to the 12th Conference on Air Quality Models in late 2018.

Air Quality Modeling for Regional Haze

Regional Haze Air Quality Modeling

- To complement proposed rule and draft guidance related to Regional Haze program, EPA conducted modeling for a 2028 future year that provides updated information on regional haze visibility impairment for use by EPA and states.
- Overview of EPA modeling platform
  - 2011 base year, meteorology and boundary conditions
  - 12km national modeling domain
  - 2028 future year emissions
    - Extension of the 2023 emissions projections used for the recent ozone transport NODA (see: *https://www.epa.gov/air-emissions-modeling/2011-version-63-platform*)
  - 2028 CAMx source apportionment (PSAT) by major national source sectors (not by state)
    - 19 tags including EGUs, on-road mobile, fires, etc.

2028 Regional Haze Modeling Caveats

- EPA has identified a number of uncertainties associated with the initial 2028 regional haze modeling analysis.
  - Important model performance issues that need to be addressed before the results can be confidently used in some areas.
  - The visibility impairment contribution from some source categories is uncertain and likely to change with platform updates
  - The analysis uses the EPA draft recommended natural conditions to calculate the glidepath (i.e., the "unadjusted glidepath").
- EPA recommends using these initial results only as a first step in the process of developing technically sound regional haze modeling for the 2nd implementation period.
  - EPA expects to work collaboratively with MJOs, states, and FLMs to make necessary improvements and ultimately update this modeling.

Working with MJOs/States/FLMs

- Coordinate with MJOs, FLMs, and states, in an effort to improve inputs to the base case and 2028 regional haze modeling platform(s).
  - Base year emissions inventory improvements
  - Updates to emissions projections
  - Issues related to appropriate fire and windblown dust inputs for RH modeling
  - Boundary condition updates
  - Post-processing of modeling results
    - Recommended procedures in the photochemical modeling guidance
  - Estimation of “natural conditions” and possible adjustments to draft recommended values
  - Adjustments to glidepath endpoint to account for international anthropogenic and prescribed fire impacts

Regional Haze Modeling: Next Steps

- EPA technical memorandum dated October 19, 2017 provides technical support document that summarizes the platform and initial modeling results along with modeling files that include:
  - 2011 model performance
  - 2028 visibility impairment and glidepath results
  - 2028 source apportionment results
- Engage in more detailed discussions of modeling and emissions issues and improvements
  - Subsequent MJO calls/special calls by region
  - Western Modeling Workshop, Sept 6-8th in Boulder, CO
  - December Regional Haze National Workshop
  - Other FLM calls/workgroups

NATA

National Air Toxics Assessment (NATA)

- NATA is a screening-level characterization of air toxics across the nation
- Designed to help state, local agencies and tribes identify locations, sources and pollutants of interest for further study

2011 NATA released Dec 2015
www.epa.gov/nata

Using **LEAN** for 2014 NATA

2014 NATA Update

- Based on 2014 NEI Version 2 with hybrid modeling approach using photochemical (CMAQ) and dispersion (AERMOD) models
  - Scheffe et al. *Hybrid Modeling Approach to Estimate Exposures of Hazardous Air Pollutants (HAPs) for the National Air Toxics Assessment (NATA)*. Environmental Science & Technology. pp. 12356−12364, October 2016.
- Emissions & modeling improvements from 2011 NATA
  - Improved spatial allocation for nonpoint, onroad and nonroad categories
  - Improved meteorological inputs (WRF prognostic met data via MMIF tool)
  - Added more CMAQ HAPs
- Conducted NATA review process with State/local/tribal agencies
  - Point: Sept 2016-June 2017, other categories: June 2017-Aug 2017
  - Held several webinars, provided documentation and draft results in Map App and other formats
  - Incorporating comments into the NEI and v2 modeling
  - Will provide a preview for SLT before it is released to the public
- Targeting completion in 2018

Transport Modeling: Updated 2023 AQ Modeling to Identify Nonattainment & Maintenance Receptors

Overview

- AQ modeling to identify nonattainment and maintenance receptors in 2023 has been completed
- Analysis to determine contributions is in-progress
- The 2023 modeling reflects a number of updates based on comments from the January 2017 NODA and other factors
  - Key updates were made to the methods for projecting emissions from EGUs and the oil and gas sector
  - EGU reductions in the updated 2023 base case reflect compliance with the CSAPR Update; emissions reductions from CPP were not included
  - The methodology for projecting future-year ozone design values was adjusted to more closely represent ozone at coastal monitoring sites
  - Considering potential refinements aimed at improving the robustness of the ozone contribution metric

2023 Results for 2008 NAAQS

- For the 2008 NAAQS there are no projected nonattainment or maintenance sites outside of California
  - However, there are 4 sites that are projected to be just barely “clean” for the 2008 NAAQS
  - These sites have maximum 2023 design values between 75 and 75.9 ppb
    - Two sites in Fairfield Co. CT with max DVs of 75 and 75.9
    - One site in Suffolk Co. NY with a max DV of 75.5; and
    - One site in Sheboygan Co. WI with a max DV of 75.1
  - The results of the updated 2023 modeling are generally consistent with the 2023 NODA modeling
    - Note that the only maintenance receptor outside of CA in the NODA modeling is now “clean” in the updated 2023 modeling

2023 Results for 2015 NAAQS

- For the 2015 NAAQS there are 11 nonattainment receptors and 14 maintenance-only receptors outside of California
  - 6 of the 11 nonattainment receptors and 8 of the 14 maintenance receptors have 2023 design values between 71 and 71.9 ppb (i.e., within 1 ppb of being "clean")
  - In addition, there are 19 other sites that have 2023 max design values between 70 and 70.9 ppb (i.e., within 1 ppb of being maintenance-only receptors)

- Preliminary list of areas outside of CA with nonattainment or maintenance-only receptors

(# of nonattainment/maintenance-only receptors; *indicates Max 2023 DV between 71 and 71.9 ppb)

  - Allegan Co., MI (0/1*)
  - Baltimore-Harford Co (0/1)
  - NYC
    - Coastal CT (2/2)
    - NY (1/1)
  - Dallas (1/1)
  - Denver (3/3)
  - Detroit (0/1*)
  - Houston (2/2)
  - Milwaukee (1/0)
  - Phoenix (0/2*)
  - Sheboygan Co., WI (1/0)