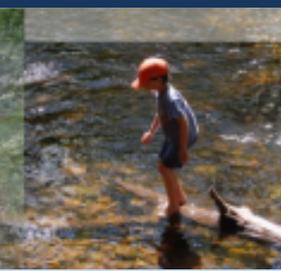
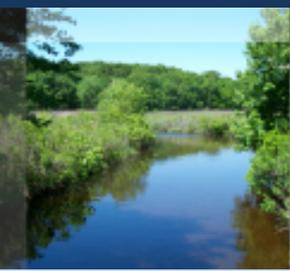
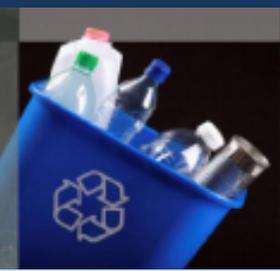




Connecticut Department of Energy and Environmental Protection



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

11th Modeling Conference

Proposed Revisions to the Guideline On Air Quality Models 40 CFR Part 51 Appendix W

September 10, 2015

SIPRAC Meeting

Sam Sampieri



Connecticut Department of Energy and Environmental Protection

Executive Summary

- The presentation will outline proposed revisions to the Guideline on Air Quality Models 40 CFR Appendix W (EPA 2015)
- Enhancements and bug fixes to the AERMOD modeling system (AERMOD 15181, AERMET 15181 & AERSCREEN 15181)
- What is the biggest take away from the proposed revisions?
- How does EPA's proposed revisions to Appendix W affect future revisions to Connecticut's Ambient Impact Analyses Guideline

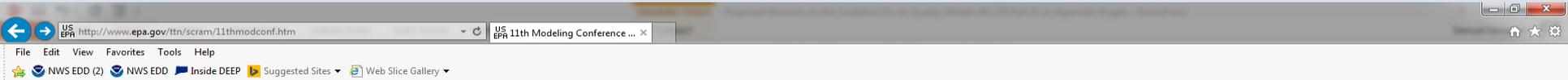


11th Modeling Conference

- Mandated by the Clean Air Act (CAA) Section 320
 - Two Day Conference every 3 years
 - Initially used to standardized modeling procedures
 - Provides a forum for public comments on the Guideline and associated revisions to help improve modeling techniques with new and improved models as we advance (CRSTER, ISCST/CTDMPLUS/AERMOD).
 - Day 1 AM: EPA summarizes proposed revisions to Appendix W, Guideline On Air Quality Models and the latest updates to the AERMOD modeling system.
 - Day 1 PM: Public Comments after lunch (Industry and Consultants).
 - Day 2 AM: Public Comments in the morning. Conference ended by noon about a half day early!



11th Modeling Conference Web Page



Technology Transfer Network Support Center for Regulatory Atmospheric Modeling

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11th Conference on Air Quality Modeling

You will need Adobe Acrobat Reader to view the Adobe PDF files on this page. See [EPA's PDF page](#) for more information about getting and using the free Acrobat Reader.

Proposed Rulemaking Information:

On July 14, 2015, the Administrator signed a proposal to revise the *Guideline on Air Quality Models*. The *Guideline* provides EPA-recommended models and other techniques, as well as guidance for their use, for predicting ambient concentrations of air pollutants. EPA's proposed changes would, enhance the formulation and application of the agency's AERMOD dispersion model, prescribe modeling techniques for secondarily formed fine particle and ozone pollution for single sources and makes various editorial improvements.

- [Federal Register Publication - Notice for the 11th Conference on Air Quality Modeling and Proposed Rulemaking - Revision to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter](#) (PDF, 720KB)
- [Docket \(ID No. EPA-HQ-OAR-2015-0310\) for the 11th Modeling Conference](#)
- [Fact Sheet](#) (PDF, 25K)

EPA will accept comments on the proposal for 90 days through **October 27, 2015**. All supporting documentation and proposed model code is available through the [Docket \(ID No. EPA-HQ-OAR-2015-0310\)](#) and through this 11th Conference on Air Quality Modeling website.

Conference and Public Hearing Information:

On July 14, 2015, the EPA also announced the 11th Conference on Air Quality Modeling and invited the public to participate in the conference. The conference, mandated by Section 320 of the Clean Air Act, was held on the EPA RTP Campus from August 12th through 13th, 2015. The conference was focused on the proposed revisions to the *Guideline on Air Quality Models* (CFR Title 40, Part 51, Appendix W) and served as the public hearing for these proposed revisions.

The 11th Conference on Air Quality Modeling began with a morning of EPA presentations providing an overview of the various proposed revisions to the *Guideline*. The remainder of the conference was dedicated to public presentations that provided comment to the EPA on the proposed rulemaking. All of the presentations are available below. The full transcripts from both days of the conference and public hearing will be made available on this webpage as soon as possible. The presentations along with the transcripts will also be submitted to the proposed rulemaking docket.

- [11th Modeling Conference - Final Agenda](#) (PDF, 109K)
- [11th Modeling Conference - Presentations](#)
- [11th Modeling Conference - Attendee List](#) (PDF, 107KB)
- [11th Modeling Conference - Day 1 Transcripts - 08/12/2012 - Available 4-6 Weeks after the Conference](#)
- [11th Modeling Conference - Day 2 Transcripts - 08/13/2012 - Available 4-6 Weeks after the Conference](#)

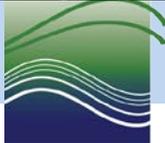
Please direct any additional questions concerning the 11th Conference on Air Quality Modeling or related to the proposed rulemaking to Mr. George Bridgers, email: Bridgers.George@epa.gov.

Material for Review and Presentation at the 11th Conference on Air Quality Modeling:

Updates to EPA's AERMOD Modeling System

Based on studies presented and discussed at the [10th Conference on Air Quality Modeling](#), and additional relevant research since 2010, the EPA and other researchers have conducted additional model evaluations and developed changes to the model formulation of the [AERMOD Modeling System](#) to improve model performance in its regulatory applications. We are proposing the following updates to the AERMOD Modeling System to address a number of technical concerns expressed by stakeholders:

- A proposed option incorporated in AERMET to adjust the surface friction velocity (u^*) to address issues with AERMOD model overprediction under stable, low wind speed conditions.
- A proposed low wind option in AERMOD to address issues with model overprediction under low wind speed conditions. The low wind option will increase the minimum value of the lateral turbulence intensity (σ -v) from 0.2 to 0.3 and adjusts the dispersion coefficient to account for the effects of horizontal plume meander on the plume centerline concentration. It also eliminates upwind dispersion which is incongruous with a straight-line, steady-state plume dispersion model such as AERMOD.
- Modifications to AERMOD formulation to address issues with overprediction for applications involving relatively tall stacks located near relatively small urban areas (no user input is required).
- Proposed regulatory default options in AERMOD to address plume rise for horizontal and capped stacks based on the July 9, 1993, Model Clearinghouse memorandum, with adjustments to account for the PRIME algorithm for sources subject to building downwash.
- A proposed buoyant line source option, based on the BLP model, has been incorporated in AERMOD.
- Proposed updates to the NO_x Tier 2 and Tier 3 screening techniques coded within AERMOD, including the replacement of the Ambient Ratio Method (ARM) Tier 2 option with a revised ARM2 option and the replacement of the Plume Volume Molar Ratio Method (PVMRM) Tier 3 option with a revised PVMRM2 option. Both the PVMRM and PVMRM2 Tier 3 options are being made available in the proposed version of AERMOD to facilitate testing and evaluation of the EPA's proposed replacement of PVMRM option with new PVMRM2 option.



Appendix W Proposed & Published in the FEDERAL REGISTER

Proposed Rulemaking, Revision to the Guideline on Air Quality Models

“Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and fine Particulate Matter; Proposed Rule” (EPA, Federal Register Wednesday, July 29, 2015 40 CFR Part 51 Appendix W; Docket ID No. EPA-HQ-OAR 2015-0310)

90-day comment period, ending on October 27, 2015. Anyone can comment from state, local agencies, industry, consultants and, last but not least, you as a private citizen of the United States. There will be no extension to the comment period. EPA’s goal to make proposed revisions to the Guideline On Air Quality Models **FINAL**, prior to **the 2016 Presidential Election**. EPA anticipates Final Rulemaking of Appendix W will be complete in the Spring 2016

EPA’s Summary of Proposed Updates!

http://www.epa.gov/ttn/scram/11thmodconf/presentations/1-3_Overview_11thMC.pdf



Connecticut Department of Energy and Environmental Protection

Appendix W Proposed Revisions

- Updates to current EPA-preferred models to address the latest state of the science and model options
- Editorial changes and expanding Section 5 in Appendix W to make it read more logically and a bit easier to follow
- Expanded Section 5 to incorporate new screening and analytical techniques to address ozone and secondary PM_{2.5} impacts from single sources.
- Major revision for performing multi-source modeling analyses to determine NAAQS/PSD compliance
- Increase the role of Model Clearinghouse – Proposed Rule Making
- AERSCREEN preferred screening model, replaces SCREEN3!
 - Added shoreline fumigation & inversion break-up (part of SCREEN3)



Appendix W Proposed Revisions, CON'T

- No longer requires the use of CALPUFF or other Lagrangian puff model for LRT assessments (still used by FLM and BART Apps.).
 - CALPUFF can still be used for screening and PSD LRT analyses
- Near field modeling is sufficient to demonstrate compliance with the NAAQS. EPA doesn't consider LRT beyond 50 km necessary for inert pollutants (i.e. SO₂, NO₂, primary PM_{2.5} and CO) necessary. 1990 Draft New Source Workshop Manual, a bit obsolete at 25 years old.
- Moved GEP discussion from Section 6 to Section 7
- Updates on the use of Meteorological Input Data
 - Use of AERMINUTE with AERMET to reduce calm hours
 - MMIF program that converts prognostic met data into AERMOD (the most recent 3 years are preferred)



Appendix W Proposed Revisions, CON'T?

Proposed Section 5: Models for Ozone & Secondarily formed PM_{2.5} (Petition by Sierra Club - granted by EPA administrator in 2012)

- Include modeling single source Ozone and secondarily formed PM_{2.5} impacts using photochemical models?
 - For Ct sources in most cases (99%) NO.

EPA proposes a two tiered approach for both O₃ and PM_{2.5}

- Tier 1 – Existing Technical Information i.e. results from existing photochemical modeling and published empirical estimates of specific source impacts (MERPS).



Appendix W Proposed Revisions CON'T

- Tier 2 – Use of photochemical grid models (CMAQ & CMAX).

CT WILL HAVE VERY FEW, IF ANY, PROPOSED/MODIFIED SOURCES THAT WILL REQUIRE PHOTOCHEMICAL GRID MODELING under the Major and Minor NSR programs. (However, since CT is in Non-attainment for Ozone, some photochemical modeling could be helpful! Currently, DEEP staff training and obtaining computer capabilities for regional photochemical modeling analyses for planning).

- Separate Rulemaking: clarify PM_{2.5} SILs and propose a new 8-Hour SIL for Ozone

MERPS: Modeled Emissions Rates for Precursors



Appendix W Proposed Revisions CON'T

So a MERP will be: 1) higher than Significant Emission Rates (SERs) and 2) more appropriate for evaluating the impacts of criteria pollutants as precursors to Ozone (NO_x & VOCs) and $\text{PM}_{2.5}$ (NO_2 & SO_2).

EPA intends to pursue separate rulemaking to effectively demonstrate that if a source \leq MERPS; it is expected to be less than a SIL; compliance achieved (Tier 1 accomplished); no further analyses is required!

$\text{PM}_{2.5}$ MERPS: SO_2 and NO_2 Precursors XX TPY

Ozone MERPS: NO_x and VOCs Precursors XX TPY



Appendix W Proposed Revisions CON'T

- Regulatory default for plume rise from horizontal/capped stacks (Exit Velocity of 0.001 m/s- 1993 Tikvart Memo, EPA)
- “Multi-tiered Approach for estimating NO₂ Concentrations” (EPA 2015)
- Tier 1 Full Conversion Approach – Most Conservative
 - Tier 2 Ambient Ratio Method - **ARM2 for 1-hr NO₂ (0.5, 0.9); ARM Annual NO₂ Modeling (0.8)**
 - Tier 3 Detailed Screening - PVMRM for tall and or isolated sources, OLM for near surface releases such as area and line sources.
 - Updates to the NO₂ Tier 2 and Tier 3 techniques coded in AERMOD. Essentially, these techniques will become default and will no longer require prior approval from reviewing authorities. This proposal **reduces administrative burden on states and EPA.**



AERMOD Modeling System Updates (15181)

EPA released AERMOD version 15181; replaced regulatory version 14134 to address several enhancements, bug fixes & BETA options

- Fixed AERMOD formulation to **address over-prediction for applications involving tall stacks located near small urban centers**
- Tier 3 screening - new PVMRM2: relative dispersion during unstable conditions and total dispersion during stable conditions.
- LOWWIND3 “Beta” Option: increases lateral turbulence (sigma-v from 0.2 to 0.3 dispersion coefficient), eliminates upwind dispersion and uses an “effective” sigma-y value that replaces the centerline concentration, accounting for meander but sets concentrations to zero (0) for receptors that are than $6 * \text{sigma-y}$ off plume centerline.



AERMOD Modeling System Updates (15181), CON'T

- AERMET 15181: Modified ADJ_U* Beta Option w/Bulk Richardson # applicable for very stable low wind conditions.

- modified formulation for M-O length for ADJ-U* and for wind speeds below the “critical” wind speed.

Added Mesoscale Model Interface (MMIF) program: pre-processor to process prognostic met data (WRF) in lieu of site specific met data

- Data is then processed through AERMET for AERMOD.

NO ACTION NECESSARY! DEEP processes all ASOS met data as default!

- AERSCREEN 15181: Added subroutines (SCREEN3) Shoreline Fumigation and Inversion Break-up. As a result, F Stability and stack top wind speed at 2.5 m/s added in when invoking these options....

Can be used for screening modeling applications now!



Biggest Take Away!

- Multi-Source NSR NAAQS/PSD Modeling: Proposal to model nearby sources using the most recent **2 years of ACTUAL EMISSIONS DATA**
 - For nearby sources use EPA's & DEEP's Emissions Data Bases such as CAMD and EMIT for example
- If no data, default to latest permitted conditions such as allowable emission rates.
- **HOWEVER, A NEW/MODIFIED MAJOR/MINOR SOURCE PERMIT APPLICANT MUST PERFORM MODELING, USING PROPOSED/MODIFIED ALLOWABLE EMISSIONS.**
- Short Term Emissions (lbs/hr) modeled for the 1, 8 & 24 hr. NAAQs
- Annual Emissions (TPY) can be modeled for the Annual NAAQs.



Biggest Take Away-We Must All Work Together!

In order for Connecticut to be ahead of the curve on both multi-source modeling, and ozone/secondarily form $PM_{2.5}$ impact analyses:

- 1) Emissions and source data should be up to date and reflect the most recent 2 years of major and minor source permitted data in CTDEEP/EPA data bases such as EMIT. This will allow Stakeholders and Consultants to download source data to perform multi-source modeling in a timely manner as not to slow the permitting process.

Sam's Dream!

- 1) In-stack NO_2/NO ratio data calculated and made available to the public. Easier for sources to pass the stringent 1-Hour NO_2 standard with real data! (i.e. Turbine In-stack ratio = 0.1, default = 0.5)



Revisions Applicable To AIAG

- All current and proposed regulatory updates in Appendix W and the AERMOD modeling system will be incorporated into CTDEEP's AIAG next revision (last update December 2009, next update in 2016)
 - Revise SO₂, NO₂ and PM_{2.5} modeling procedures and analyses
 - Update the background section to account for EPA's latest methods
 - Add AERSCREEN as the preferred screening model of choice
 - Anticipate screening out Ozone and secondary PM_{2.5} based on EPA's proposed tiered approach
 - **Take your comments into consideration as we did in 2009!**



Questions

Questions??

Thank you!

