
VDOT
Virginia Department of Transportation

EPA 12TH CONFERENCE ON AIR QUALITY MODELS (PUBLIC HEARING)

MOBILE SOURCE PANEL

October 2, 2019 – 1 p.m.
Research Triangle Park, NC

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Question 1

AERMOD version 19191 includes two new source types based on ORD's R-LINE model. The RLINE source is a BETA option that brings a new dispersion formulation into AERMOD. The RLINEXT is an ALPHA option based on the RLINE source, but also includes algorithms for depressed roadways and solid barriers and an ALPHA URBAN option to account for urban meteorology.

Please share your thoughts and opinions on EPA's addition of the RLINE sources to AERMOD. In particular, which of the ALPHA options should EPA focus their development efforts for improving the RLINE options in AERMOD for regulatory purposes?

Q1 Response:

1. First, on behalf of AASHTO CES Air Quality, Climate Change and Energy Subcommittee members (state DOTs), we strongly commend EPA for its efforts in developing and implementing these options, and in seeking feedback from state DOTs. In general, DOTs support ongoing R&D efforts to evaluate and improve regulatory models/updates and their application for the transportation sector.

2. On the question of the relative priority of implementing model changes to address solid barriers (including noise walls) and depressed roadways:
   - No survey data are available for state DOTs on this question. Recent feedback from one large state indicated solid barriers have a higher priority “now.”
   - In general, the priority for state DOTs is probably solid barriers (and berms) relative to depressed roadways, as barriers are more prevalent & the potential benefits therefore greater.
   - Information from EPA on the potential benefits in (reduced) design values for each option for “typical” transportation projects would be helpful.

Q1 Response:

3. **Recommendation**: EPA & FHWA develop representative case study examples for the new options, working with state DOTs via the AASHTO CES Air Quality, Climate Change and Energy Subcommittee
   - May use typical cost data for barriers from DOT(s) to develop cost-effectiveness estimates or ranges (given typical barrier costs may vary by state)
   - In addition to solid barriers, may include vegetation if it can be modeled with the new barrier option (or a modified version)
   - A survey could then be done of state DOTs via AASHTO on the new AERMOD options, considering the new case studies and cost-effectiveness information.

Question 2

Please discuss what is the most important development area with regard to the treatment of mobile sources in the AERMOD model that the EPA has not already identified or discussed?

Q2 Response

The most critical needs are:

1) Model evaluation for the *intended regulatory purposes, i.e., all typical transportation facility types, configurations & operating conditions* for which DOTs and other project sponsors are required to conduct modeling under the EPA transportation conformity rule (40 CFR Parts 51 & 93), for the *regulatory tests* (NAAQS & Build/No Build (B/NB))

2) Collection of tracer and other data needed for this purpose.
   - This is the critical first step to comprehensive model evaluation for transportation facilities.
   - Funding options should be explored as a priority.

Q2 Response

- **Why model evaluations against tracer data for all facility types for the regulatory tests (NAAQS & B/NB) are needed:**

1. AERMOD has not been subjected to such comprehensive evaluation to date for all transportation facilities in the absence of the needed tracer data, which are costly to collect.
   - Transportation facilities include highways, interchanges, congested intersections, bus and truck terminals, etc.
   - The tracer studies cited in the last update to Appendix W by EPA included a relatively low volume highway (not high volume), and none of the other transportation facility types listed above.
   - Due diligence requires testing all regulatory applications of the model, and tracer data are needed for this purpose.

2. DOTs are concerned that AERMOD may overestimate design values for transportation projects, at least in specific cases.
   - Recent analyses of near-road PM2.5 in Indianapolis, IN and Providence, RI by STI, Inc., for the Transportation Pooled Fund (TPF) for Near-Road Air Quality*, as reported in a 9/30/2019 webinar of the Transportation Research Board, showed modeled roadway contributions to near-road concentrations substantially exceeded measured values (based on near-road monitoring data) for the high-volume highways they studied.
   - The TPF concluded that the overall uncertainty is "*likely dominated by emissions & dispersion modeling components.*"

** See: http://www.trb.org/ElectronicSessions/recordedsessionsbydate.aspx , For more on the TPF, see: http://nearroadaqpf.com*

Q2 Response

Continued

3. For PM2.5 modeling in particular, accuracy is critical given relatively small margins between typical background concentrations and the applicable NAAQS,
   - The margins may get smaller if the NAAQS is revised downwards in the future, as is currently under consideration by EPA.
   - Model evaluation is critical to assessing accuracy and updating the model as needed to improve accuracy

4. Evaluations need to be extended to address *regulatory tests* (NAAQS & B/NB) for transportation (and not just accuracy of the dispersion model itself)
   - Where has this been done, i.e., assessments of how consideration of uncertainty in the traffic, emissions & dispersion (TED) modeling chain and in background concentrations might affect determinations of compliance with the regulatory tests (NAAQS and B/NB)?
     - The question arises in part given the uncertainties identified for example in the TPF case studies for both modeling and background concentrations
     - Also transparency is important for the National Environmental Policy Act (NEPA), for purposes of which project-level air quality analyses are done for transportation (over & above EPA transportation conformity rule requirements)
   - *For NAAQS tests*: How should the uncertainty (for both the modeling chain & background concentrations) be considered in determining compliance with the NAAQS and in reporting?
   - *For B/NB tests*: How should the uncertainty be considered in determining compliance and in reporting? Specifically, what if the TED modeling chain uncertainty is greater than the differences in B/NB modeled concentrations?

Q2 Response:

Recommendations for Model Evaluation for Transportation

- Generally consistent with 2007 NRC "*Models in Environmental Regulatory Decision-Making*"
- Concepts being explored in NCHRP 25-55, (in progress), in which EPA is an invited advisor

1. Life-Cycle Model Evaluation *(Accuracy/Uncertainty, QA/QC)*

- **Model evaluation against (exhaust-based) tracer data for all facility types, configurations & operating conditions for which modeling is required under the EPA conformity rule**
  - *Dispersion model evaluation done for a low volume highway, & tracer data collection is in progress/planned for a higher volume freeway with & without noise walls (CalTrans study).*
  - *Still need tracer data to assess the models for other facility types (interchanges, intersections, truck & bus terminals, etc.), configurations (e.g., depressed highway) & operating conditions.*

- **Quantify and Communicate Uncertainty**
  - *Emphasized in the 2007 NRC report, consistent with the NEPA emphasis on transparency/disclosure.*
  - *Recommend a comprehensive assessment of uncertainty for the TED modeling chain.*

** National Research Council of the National Academies, "Models in Environmental Regulatory Decision Making", 2007. http://dels.nas.edu/Report/Models-Environmental-Regulatory-Decision-Making/11972*

Q2 Response:

Model Evaluation Recommendations - Continued

- **Test for the "*intended purpose:*" Typical Facility Types, Configurations & Operating Conditions, & Regulatory Tests (NAAQS & B/NB)**
  - *Evaluate whether the NAAQS & B/NB tests can be met with statistical confidence for all transportation facility types etc., or whether limitations need to be specified for the dispersion model(s) & their applications.*
  - *Requires consideration of the uncertainty for the project-level modeling chain of traffic, emissions and dispersion, & in background concentrations*
  - *Fallback: 40 CFR 93.123(b)(2): "Where quantitative analysis methods are not available, the demonstration required by § 93.116 for projects described in paragraph (b)(1) of this section must be based on a qualitative consideration of local factors."*
- **Peer Review (with federal and state DOTs)**
  - *Need ongoing consultation and coordination with federal and state DOTs and their consultants, with timely access to all data and information to be considered or applied in model evaluations.*

2. Model Development: Model Parsimony Design Objective

- "*Models used in the regulatory process should be no more complicated than is necessary to inform regulatory decisions*" (NRC, 2007)
- *Applies for all models, with particular emphasis for screening models (relative to refined)*
- *Includes consideration of proportionality & the need for efficiency/streamlining*

Question 3

Do you envision priorities related to mobile source modeling issues changing in the near future (5 years)? If so, what shifts do you foresee will take place and what do you believe are or will be the drivers for those shifts?

Q3 Response

- One key change that may occur is that the PM2.5 NAAQS that is currently under review by EPA may be reduced, as noted previously.
  - This would have the effect of further reducing the existing small margins with background concentrations, and therefore placing a greater premium on accuracy in the future for PM2.5 modeling in order to show compliance with the more stringent NAAQS.

- This in turn would mean in turn that greater premiums would be placed on model evaluation and improvement efforts and processes for the regulatory tests (especially the NAAQS test), in order for EPA to deliver updated models with the requisite accuracy.
  - The need for tracer data will be further increased in order to be able to rigorously evaluate model improvement options for all typical transportation facility types.
  - The funding priority for tracer studies would be further increased, as recommended.