O₃/PM₂.₅/Regional Haze Modeling Guidance Update

Brian Timin EPA/OAQPS
December 18, 2014
Ozone/PM$_{2.5}$/Regional Haze Modeling Guidance

- **Old:** “Guidance on the use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, PM$_{2.5}$, and Regional Haze” April 2007

- **Updated:** [Draft] Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM$_{2.5}$, and Regional Haze” December 2014
Revised Guidance

- Updated draft released on December 3, 2014
  - External comments will be accepted until March 13, 2015
- The guidance reflects EPA’s recommendations for how air agencies should conduct air quality modeling to satisfy model attainment demonstration requirements for the ozone and PM$_{2.5}$ NAAQS, as well as regional haze reasonable progress analyses.
  - The document is guidance and thus does not impose any binding or enforceable requirements.
  - Modeling (and related) requirements are contained in the respective ozone and PM$_{2.5}$ implementation rules, and the regional haze rule.
Recommended Attainment Demonstration Modeling Process

- Develop conceptual model
  - What is the nature of the air quality problem?
- Develop a modeling protocol
  - Outline the types of modeling and data analysis that is deemed appropriate for the situation
    - This may vary, especially for PM$_{2.5}$, due to the different types of PM problems
- Goal of attainment demonstration modeling is to adequately demonstrate that the NAAQS will be attained in the future
  - May not be a one size fits all solution
- Weight of evidence will often be part of the attainment demonstration process
  - Balance of modeling and data analysis should be considered as part of the protocol development process
Modeled Attainment Tests

- All O3/PM$_{2.5}$/RH modeled attainment tests use model estimates in a “relative” sense
  - Models are better at predicting relative changes in concentrations than absolute concentrations

- Relative Response Factors (RRFs) are calculated by taking the ratio of the model’s future to current predictions of PM$_{2.5}$ or ozone

- RRFs are calculated for ozone and for each component of PM$_{2.5}$ and regional haze
Revised Guidance Contents
Section 2- Model Setup

- Conceptual description
- Modeling protocol
- Episode selection
- Modeling domain
- Air quality model
- Meteorological inputs
- Emissions inputs
- Initial and boundary conditions
Guidance Contents
Section 3- Model Performance

- Operational evaluation
- Ambient measurement networks
- Diagnostic evaluation
  - Dynamic evaluation
Guidance Contents
Section 4- Attainment Tests

- Ozone attainment test
- Annual PM$_{2.5}$ attainment test
- 24-hr PM$_{2.5}$ attainment test
- Local area analysis
- Estimating design values in unmonitored areas
- Regional haze uniform rate of progress analysis
- Weight of Evidence
Guidance Changes and Updates

- Major reorganization of format and chapters
- Updates to all language and references
- No major updates to:
  - Conceptual model
  - Modeling protocol
  - Choosing a model
Changes and Updates

- No major updates to:
  - Modeling resolution
    - Horizontal resolution recommendation: 12km or finer
  - Calculation of base year design values in the relative attainment test
    - Continue to recommend use of a 5 year “weighted” average design values (average of 3 design value periods)
  - Annual average PM\textsubscript{2.5} attainment test
  - 24-hr average PM\textsubscript{2.5} attainment test
    - Incorporated updated 24-hr test from June 2011 guidance memo
Updates

- Ozone attainment test
  - Relative test revised to focus on 10 highest base year modeled days (at each monitor location)
    - Avoids averaging too many days into the RRF calculation
      - NAAQS based on 4th high; RRF should also be based on highest days
      - With lower NAAQS (75 ppb or lower), some sites could have 50 or more modeled days above the NAAQS
  - Revised RRF calculation
    - 10 highest base year modeled days from episodes/season
    - Select highest modeled cell from 3X3 matrix of cells surrounding the monitor
      - High base year grid cell; pair in space with same grid cell in future (old test could be unpaired in space)
    - 60 ppb minimum threshold
  - Revised test can be easily applied to any level of the NAAQS
Other Updates

- Model performance evaluation
  - Updated recommended analyses and performance statistics (and references)
    - No recommended quantitative performance goals
- Emissions modeling and inputs
  - Emissions modeling section revised to account for new and improved emissions models and tools
  - Language revised to be consistent with recently released (April 2014) draft SIP emissions inventory guidance: http://www.epa.gov/ttn/chief/eidocs/eiguid/2014revisedeigu idance.pdf
Other Updates

- Weight of Evidence (WOE)
  - Added additional information on analyses that were not previously covered (e.g. voluntary measures)
    - Attempted to account for types of information contained in an Ozone Transport Commission WOE white paper
  - Three main WOE categories
    - Additional modeling analyses
    - Trends in ambient air quality and emissions
    - Additional emissions controls/reductions
  - Removed previously recommended quantitative concentration WOE ranges
    - Ranges were not well supported and subject to misuse
Coordination with the Ozone and PM$_{2.5}$ Implementation Rules and Appendix W

- Language was changed and removed in some sections to reflect decisions that should be mandated by rule (not guidance)
  - Placeholders for language to be added after the ozone and PM$_{2.5}$ implementation rules are finalized
    - What future year to model?
    - What modeling analysis is required for a RACM analysis?
    - Is an unmonitored area analysis (UAA) required?
      - How are results from an UAA used?
    - Requirements for modeling in near-road areas
  - Appendix W issues
    - Actual vs. allowable emissions
    - Appropriate models and techniques for single source assessments for ozone and/or secondary PM
      - Details on single source secondary pollutant modeling will be contained in a separate guidance document
Model Attainment Test Software (MATS)

- Software to apply the recommended modeled attainment tests
  [http://www.epa.gov/scram001/modelingapps_mats.htm](http://www.epa.gov/scram001/modelingapps_mats.htm)
  - Performs ozone, PM$_{2.5}$, and regional haze tests
  - Interpolates ambient data (where necessary) for ozone and PM$_{2.5}$ tests
  - Creates “fused” spatial fields for unmonitored area analysis
    - Fused fields using ambient data and model output

- MATS version 2.6.1 was released at the same time as the revised draft guidance
  - Incorporates revisions to the ozone attainment test
  - Updated ambient datasets (through 2012)
Next Steps

- Outreach to state/local agencies
- Comments due March 13, 2015
- The release of “Final” or updated draft guidance depends on the timing of the ozone and PM implementation rules and the nature of the comments.
  - EPA encourages states to follow the recommendations in the draft guidance until an updated version is released.
  - States with upcoming attainment demonstration deadlines should consult with their EPA Regional Office to determine the appropriate course of action.