Monitoring & Modeling Updates

AAPCA Spring Meeting

Tuscon, Arizona

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Ambient Air Monitoring Issues

Background on IG Issues

The EPA IG issued a Management Alert on February 6, 2017 with these key issues: [https://www.epa.gov/office-inspector-general/report-certain-state-local-and-tribal-data-processing-practices-could]

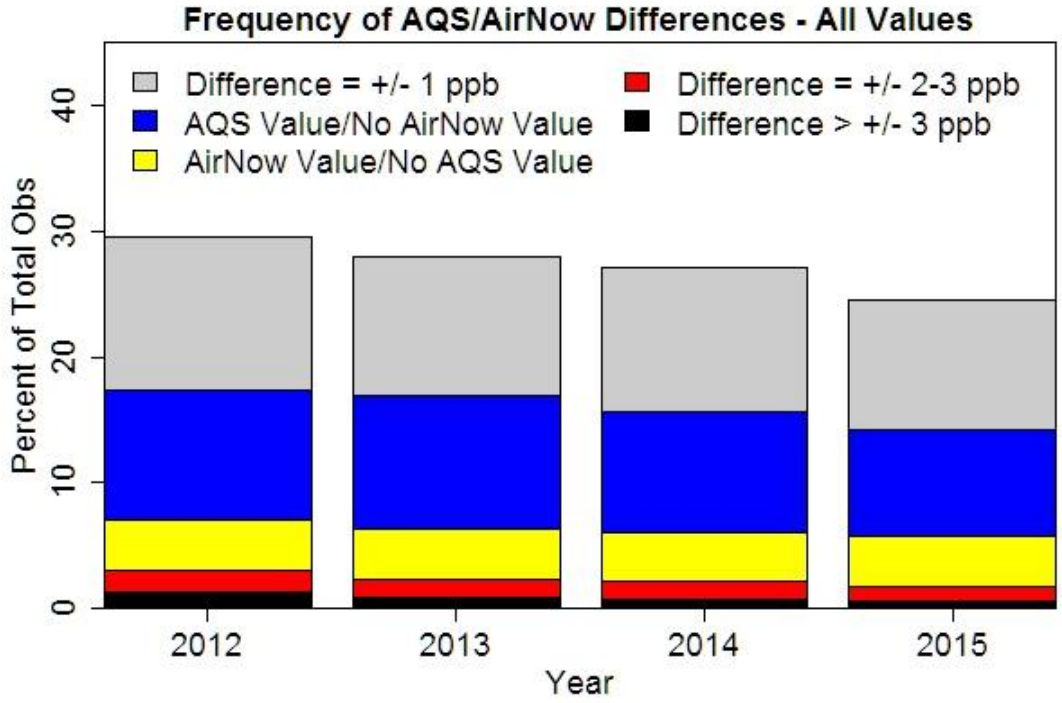
1. Two states did not process ozone data according to recommended practices in EPA's 2013 Quality Assurance Handbook by zero adjusting their raw ozone data based on the results of quality control checks known as zero checks. As a result, data reported by AirNow and the Air Quality System (AQS) indicate that nationally about 26 percent of the raw data reported to AirNow were different than what was reported to AQS.

2. These states were not validating data in accordance with recommended critical criteria in EPA's 2013 Quality Assurance Handbook.

3. There is a risk that state and local air monitoring agencies' Quality Assurance Project Plans (QAPPs) that have not been approved in the last five years have not been updated to include EPA's revised criteria.

Issue #1- Zero Checks

- OAQPS has conducted an independent analysis of the AQS/AirNow data in order to check the IG's conclusions that 26% of ozone data were different between AQS and AirNow for 2012-2014
- EPA's reanalysis examined the following for 2012-2015:
  - All hourly concentration data in AQS and AirNow, with additional focus on values over 60 ppb
  - Developed state-level summaries to identify any potential QA concerns



Based on this preliminary analysis, only **2 percent of the data** show differences which may represent a legitimate concern in terms of quality assurance practices. **An OAQPS look at 2013-2015 design values showed no impact on designations for the 2015 standard.**

EPA is also developing language to provide cautionary statements about performing zero adjustments. The revised Quality Assurance Handbook will also note that agencies may still perform this adjustment if done properly.

Issue #1 – Next Steps

- EPA response to Management Alert was released on February 10, 2017. Available on OIG web site.
- OAQPS will update the analysis to include 2016 data once the data is certified.
- We will continue to work with the Regional Offices to ensure that all States are meeting the established QA criteria on zero checks.

Issue #2 - Validation

- The IG report indicated that several states were not validating ozone data according to established critical criteria in the QA Handbook. Specifically, EPA has established the following:
  - Several states were not using the plus or minus 7% critical criteria for validating data based on required periodic QC checks
  - Additional states were not necessarily invalidating ambient data (and the QC checks) that failed the 7% criteria
- OAQPS is currently working with the regions to further investigate the extent of this issue
- OAQPS is working closely with the Regions to also ensure that all QAPPs and monitoring agency practices are aligned with critical criteria
- Regions and states will also be asked to work together to invalidate data affected by the failed QC checks

Issue #3 - QAPPs

- Risk that state and local air monitoring agencies' Quality Assurance Project Plans (QAPPs) have not been approved in the last five years.
- EPA Steps:
  - Required that monitoring organizations and the EPA Regions record QAPP submittals and approvals in AQS in the 2016 ambient monitoring rule finalized in March 2016.
  - Revised the data certification report to flag any PQAO whose QAPP approval is more than five years ago.
  - Developing a report by PQAO of air monitoring agencies whose QAPPs are more than five years old and request that they correct this situation prior to the 2017 data certification process.

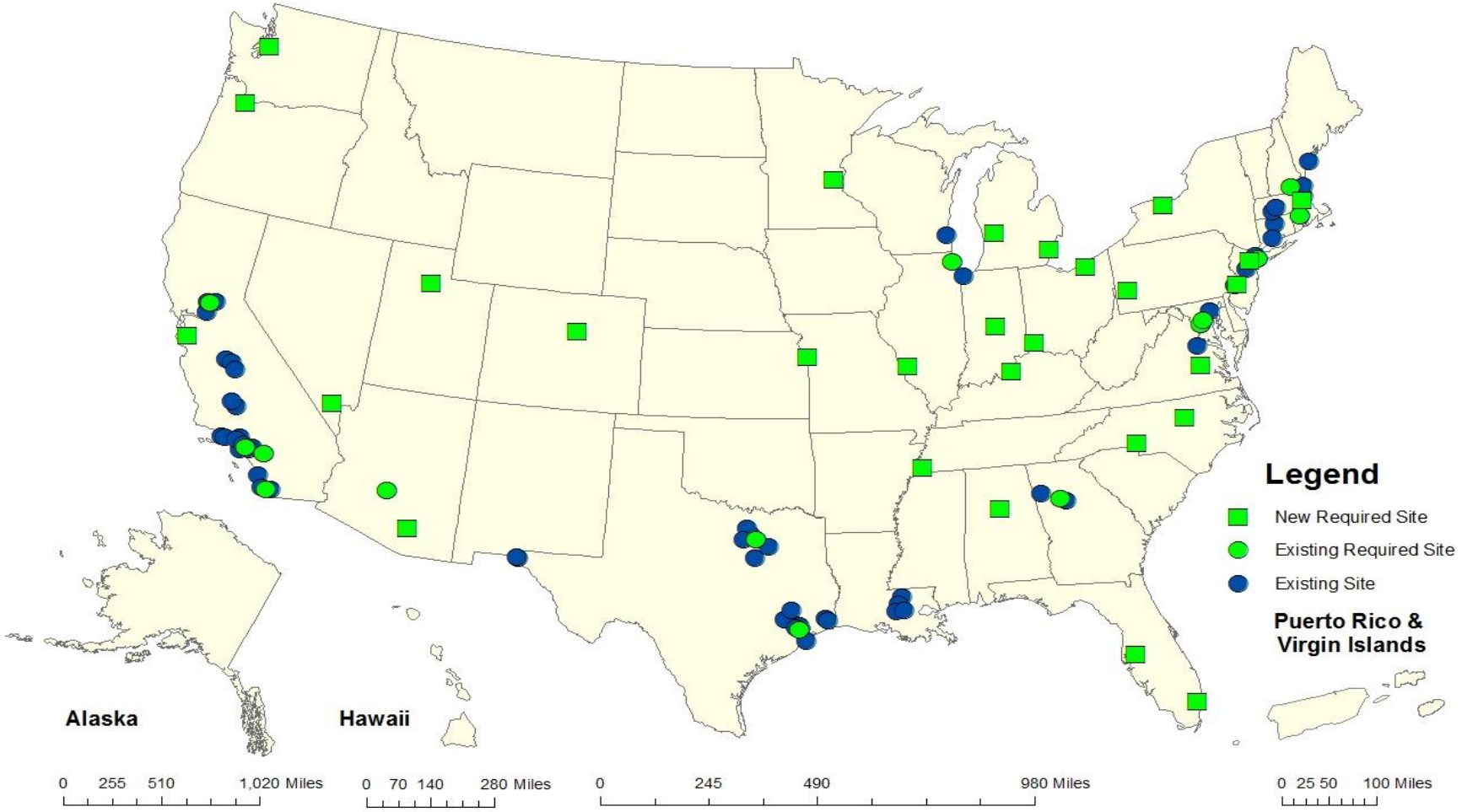
Going Forward – Advice for States

- Essential that SOPs and QAPPs be reviewed for consistency with CFR and QA Handbook
- Ensure that QA positions are filled and that training takes place. Resources include:
  - APTI QA 470 course (being revised)
  - QA 101 slides from Monitoring Conferences
    - https://www.epa.gov/amtic/quality-assurance-training-2016-naamc
  - Regional workshops
  - QA Eye from national QA Workgroup
    - https://www3.epa.gov/ttn/amtic/qanews.html
- Work with Regions to follow up on recommendations from TSA's
- Use available analytical tools to proactively review data and results from QC checks and audits

Updates to PAMS Network Design

- Major changes to the PAMS requirements were finalized in October 2015 as part of the ozone NAAQS review
- Replaced the existing 20 year-old multi-site, enhanced ozone network design with an updated 2-part network design
  - Requiring PAMS measurements to be collocated with existing NCore sites in areas with population of 1 million or more irrespective of Ozone NAAQS attainment status
    - Results in a stable network of approximately 40 required sites with improved spatial distribution and reduced redundancy
    - Includes a waiver for historically low ozone areas
    - Includes an option to make PAMS measurements at an alternative location (e.g., an existing PAMS site) which may cross CBSA or even state boundaries
  - Require states with moderate or above ozone non-attainment areas and states in the Ozone Transport Region to develop and implement an Enhanced Monitoring Plan (EMP)
    - Provides support for flexible approaches for collecting data to understand ozone issues in new and existing high ozone areas

New and Existing PAMS Sites



PAMS Timeline and Milestones

- PAMS plan due July 1, 2018 as part of Annual Network Plan
  - Consider moving this up to July 1, 2017 if waivers are needed!
- PAMS monitoring at NCore sites will need to start by June 1, 2019
  - We have 12 early implementing programs who will receive funding this fiscal year to buy equipment
- EMPs submitted within two years of designations or by October 1, 2019, whichever is later
  - Some areas may want to move this up to 2018 where non-required existing sites may be involved

Other Key Monitoring Initiatives

- Elimination of Phase 3 monitoring requirement for near-road NO_2 network (does not affect other aspects of near-road requirements)
  - https://www.gpo.gov/fdsys/pkg/FR-2016-12-30/html/2016-31645.htm
- Solicitation for community scale air toxics proposals for projects designed to assist state, local and tribal communities (closed on March 22, 2017)
  - https://www.epa.gov/grants/community-scale-air-toxics-ambient-monitoring-grant-fy-2017
- Ongoing assistance for air toxics monitoring projects in Louisiana and Indiana, and upcoming in West Virginia and Pennsylvania (Pittsburgh)

Appendix W and other Modeling Issues

Revision to the *Guideline on Air Quality Models*

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

- The *Guideline* is used by the EPA, states, tribes, and industry to prepare and review permits for new sources of air pollution. State and tribal air agencies also use the Guideline to revise their plans detailing strategies for reducing emissions and improving air quality known as State or Tribal Implementation Plans

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

- The EPA expects the *Guideline* revisions and associated model enhancements will increase the efficiency and accuracy of regulatory modeling demonstrations

Revision to the *Guideline on Air Quality Models (Cont.)*

- 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 20th, the effective date for the Appendix W final rule and some other EPA regulations have now been delayed until May 22, 2017 to give Agency officials the opportunity for further review and consideration of these regulations.

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
  - Mesoscale Model InterFace Program (MMIF)

Regulatory version of AERMOD

- The 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.
  - AERMOD updated to v16216r, with MCB 12.
- AERMOD and AERMET options NOT finalized in v16216
  - LOWWIND3 was proposed as a regulatory option in AERMOD but was not promulgated as a regulatory option in v16216 because it was found to have a potential for under prediction of concentrations, especially if used with ADJ_U* and/or with observed turbulence data

Regulatory version of AERMOD (*Cont.*)

- December release of AERMOD v16216 was found to have bugs that did not affect concentrations:
  - BETA flag requirements, compilation issues on certain platforms
- Bug was identified that affected concentrations for AREACIRC sources in some cases;
- Need 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.

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
- 3-year grace period 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

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 a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary $PM_{2.5}$.
  - Tier 1 demonstrations would involves use of technically credible relationships between emissions and ambient impacts based on existing modeling studies or results 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) to evaluate a project source's impacts.

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 $PM_{2.5}$ precursors called Modeled Emission Rates for Precursors (MERPs).
- MERPs are a type of Tier 1 demonstration tool under the PSD permitting program that provides a scientifically credible screening approach to relate maximum downwind impacts with a critical air quality threshold (e.g., a SIL).
- For PSD, separate MERPs may be developed to relate:
  - volatile organic compounds (VOCs) and/or nitrogen oxides (NO_x) to O_3
  - sulfur dioxide (SO_2) and/or NO_X to secondary $PM_{2.5}$

MERPs: O_3 and Secondary $PM_{2.5}$

- 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.
- Draft guidance was released on December 2, 2016 for public comment, prior to App W FRM signature. Comment period has been extended to March 31, 2017.
  - A data distribution and errata memorandum regarding the draft MERPs guidance was released on February 23, 2017.

Tier 2 Demonstrations: Case-Specific Modeling

- A Tier 1 demonstration is not a requirement before performing a Tier 2 demonstration
- EPA anticipates few situations where a Tier 2 demonstration would be necessary, we expect most situations could be demonstrated under Tier 1
- Guidance on the Use of Models for Assessing the Impacts of Emissions from Single Sources on the Secondarily Formed Pollutants: Ozone and PM2.5 (EPA-454/R-16-005 December 2016)

Role of the EPA's Model Clearinghouse

- In the final revisions to the *Guideline*, the EPA is codifying the long-standing process of the Regional Offices consulting and coordinating with the EPA's Model Clearinghouse (MCH) on all approvals of alternative models and techniques.
  - The Administrators responsibility for approving alternative models is still delegated to the Regional Offices via Appendix W.
  - However, any alternative model approvals will happen with coordination, collaboration, and concurrence with Headquarters through the MCH.
- The MCH Operational Plan was substantially revised and reissued with the Appendix W final rule.
  - Model Clearinghouse: Operational Plan - [EPA-454/B-16-008]
  - Reference the MCH Status Update presentation from the November 2016 Regional, State, and Local Modelers' Workshop and read the revised MCH Operation Plan for a thorough discussion on the MCH Process.
    - http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2016/Presentations/1-5_Update_on_Model_Clearinghouse-2016RSL-GMB.pdf

Future Dispersion Modeling Work

- Continue to improve science in AERMOD, specifically research coordination with ORD and stakeholders on
  - Downwash algorithms (incl. source characterization issues)
  - Mobile source modeling (RLINE)
  - Evaluation of Offshore & Coastal Dispersion Model (OCD)
  - Instrumented modeling techniques for photochemical models (secondary pollutants)
- Improved technical coordination via IWAQM sub-teams
  - Transportation planning (w/ OTAQ) to better coordinate with FHWA, FTA, and FAA
  - Over-water modeling to better coordinate with BOEM
- Further engagement with the stakeholder community leading up to the 12th Conference on Air Quality Models in 2018.

For More Information of the Revisions to Appendix W and related Guidance

- Please reference the following webinar slides…
  - Revisions to Appendix W Informational Webinar:
    - https://www3.epa.gov/ttn/scram/appendix_w/2016/Appendix_W-WebinarPresentation.pdf
  - Draft MERPs Guidance Webinar:
    - https://www3.epa.gov/ttn/scram/appendix_w/2016/MERPs_WebinarPresentation_01192017.pdf
  - Webinar on Use of Prognostic Met Data for NSR Permitting Modeling
    - https://www3.epa.gov/ttn/scram/appendix_w/2016/MMIF-WebinarPresentation.pdf

SO_2 Updates

Overview of AERMOD Memo

- Signed on March 8, 2017 and available here: https://www3.epa.gov/ttn/scram/guidance/clarification/SO2_DRR_Designation_Modeling_Clarificaiton_Memo-03082017.pdf

- No new modeling or remodeling is required for states that have already submitted modeling to meet the DRR air quality characterization requirements

- When version 15181 is used with ADJ_U*, there is an underprediction bias
  - Version 16216r, the current regulatory version of AERMOD, corrected the bug and was released on Dec. 20, 2016
  - There are several instances where states that were using AERMOD with the ADJ_U* option to satisfy the DRR modeling deadline of January 13, 2017 used the older version containing the bug

Overview of AERMOD Memo (con't)

EPA recommendation for Round 3 SO_2 designations due December 31, 2017:

- EPA will consider all modeling that is submitted, including 3rd party submissions using the current regulatory version of AERMOD, when making designations determinations

- State, local, and tribal agencies that submitted modeling for the DRR that used the ADJ_U* option with AERMOD version 15181 should consider remodeling using the current regulatory version of AERMOD

- State, local, and tribal agencies that submitted modeling for the DRR that ***did not*** use the ADJ_U* option with AERMOD version 15181 may regard that modeling as sufficient+ for informing the Round 3 designations

+ assumes no other technical issues present

DRR and Round 3 Designations

Summary of AAPCA member states' DRR pathway selections for source areas which we estimate will be designated in Round 3 (December 31, 2017) ~ 190 total sources (109 modeling, 43 monitoring, 29 taking new limits, 1 shutdown, 8 other)

EPA Region 1:

- Maine - 1 source modeling

EPA Region 3:

- Virginia - 4 sources modeling; 4 sources taking limits; 3 sources monitoring
- West Virginia - 7 sources modeling; 3 sources taking limits; (additionally, 1 source indicated it would model but hasn't submitted anything yet)

EPA Region 4:

- Alabama – 10 sources modeling; 4 sources taking limits; 1 source monitoring
- Florida - 11 sources modeling; 1 source taking limit
  - Note also that a monitor in Citrus Co. is showing a preliminary 3-year design value > 75 ppb
- Georgia - 4 sources modeling; 3 sources taking limits; 1 source monitoring
- Kentucky - 9 sources modeling; 4 sources taking limits; 3 sources monitoring
- Mississippi - 2 sources modeling; 2 sources taking limits; 1 source shutting down
- North Carolina - 4 sources modeling; 5 sources monitoring
- South Carolina - 5 sources modeling; 3 sources taking limits
- Tennessee - 4 sources modeling; 1 source taking limit

DRR and Round 3 Designations (cont.)

EPA Region 5:

- Indiana - 11 sources modeling (additionally, 2 sources indicated they would model but haven't submitted anything yet); 1 source monitoring
- Ohio – 9 sources modeling; 4 sources taking limits; 2 sources monitoring
  - Note also that the monitor in Cuyahoga Co. is showing a preliminary 3-year design value > 75 ppb

EPA Region 6:

- Arkansas - 4 sources modeling
- Louisiana – 6 sources modeling; 1 source taking limit (1 Parish pending); (additionally, 3 sources indicated they would model but haven't submitted anything yet); 5 sources monitoring
- Texas – 1 source modeling; 13 sources monitoring

EPA Region 8:

- North Dakota – 4 sources modeling; 1 source monitoring
- Wyoming – 9 sources modeling, 8 sources monitoring

EPA Region 9:

- Arizona – 3 sources modeling
- Nevada – 1 source modeling

NODA for 2015 Transport

2015 O3 NAAQS Preliminary Interstate Transport Data

- Section 110(a)(2)(D)(i)(I) requires states to submit SIPs to address interstate transport within 3 years of promulgation of a new NAAQS
  - For the 2015 ozone NAAQS, the deadline for transport SIP submittal is October 2018
- On January 6, 2017 EPA published in the FR a Notice of Data Availability (NODA) containing preliminary interstate transport data relevant to the 2015 ozone NAAQS
  - The intent of the NODA is to help states begin the process to plan and develop 110 SIPs for this NAAQS
- Content of Transport NODA
  - Projected ozone design values for 2023 (attainment year for moderate nonattainment areas) for individual monitoring sites, nationwide
  - Projected 2023 ozone contributions from individual states to each monitoring site, nationwide
- The comment period for the NODA ends on April 6, 2017
  - EPA is seeking comment on methodologies used to project emissions and ozone concentrations and contributions to 2023
- The input and output data files created by EPA for the NODA modeling have been provided to the MJOs for distribution to the states

O3, PM2.5 & RH Modeling Guidance

Ozone/$PM_{2.5}$/Regional Haze Modeling Guidance

- [Draft] Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze" December 2014
  - http://www.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf
- 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.

Modeling Guidance Updates

- Finishing guidance updates to reflect:
  - Recent rules
    - 2008 ozone NAAQS implementation rule (2015)
    - $PM_{2.5}$ implementation rule (2016)
    - Regional haze rule (2016)
  - Coordination with the recent updates to the Emissions Inventory SIP Guidance (https://www.epa.gov/air-emissions-inventories/air-emissions-inventory-guidance-implementation-ozone-and-particulate) [Latest version from 12/16]
  - General information and reference updates
  - Addressing public comments

Modeling Guidance Updates

- No major updates to the ozone or $PM_{2.5}$ attainment tests
  - Ozone- attainment test based on 10 highest modeled days (same as 2014 draft)
  - $PM_{2.5}$- no changes
- Modeling of regional haze reasonable progress goals
  - Updated references to ambient data metrics to reflect 20% “clearest” and 20% “most impaired” days (instead of 20% best and worst days)
  - There are no new updates to the modeled visibility calculation methodology.
- Any future technical updates will be discussed with air agencies and stakeholders before further revisions to the guidance.
- Timing of release of the revised modeling guidance is uncertain.
  - Will likely need to inform new management with regard to the purpose and contents of the guidance before public release.

Regional Haze Modeling

EPA Regional Haze Modeling

- Updated Regional Haze modeling
  - 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.

EPA Regional Haze Modeling

- Model results
  - Visibility will be projected to 2028 using 2009-2013 IMPROVE ambient data
    - Examine projected visibility (relative to the glidepath) using old and new metrics.
  - Source apportionment results will be used to quantify the modeled visibility impairment to each Class I area from each of the tagged sectors.
- Timing of release of the 2028 regional haze modeling is uncertain.
  - Will likely need to inform new management with regard to the details and results of the regional haze modeling before public release.