



# Technical Updates Modeling & Monitoring

Richard A. (Chet) Wayland, EPA/OAQPS



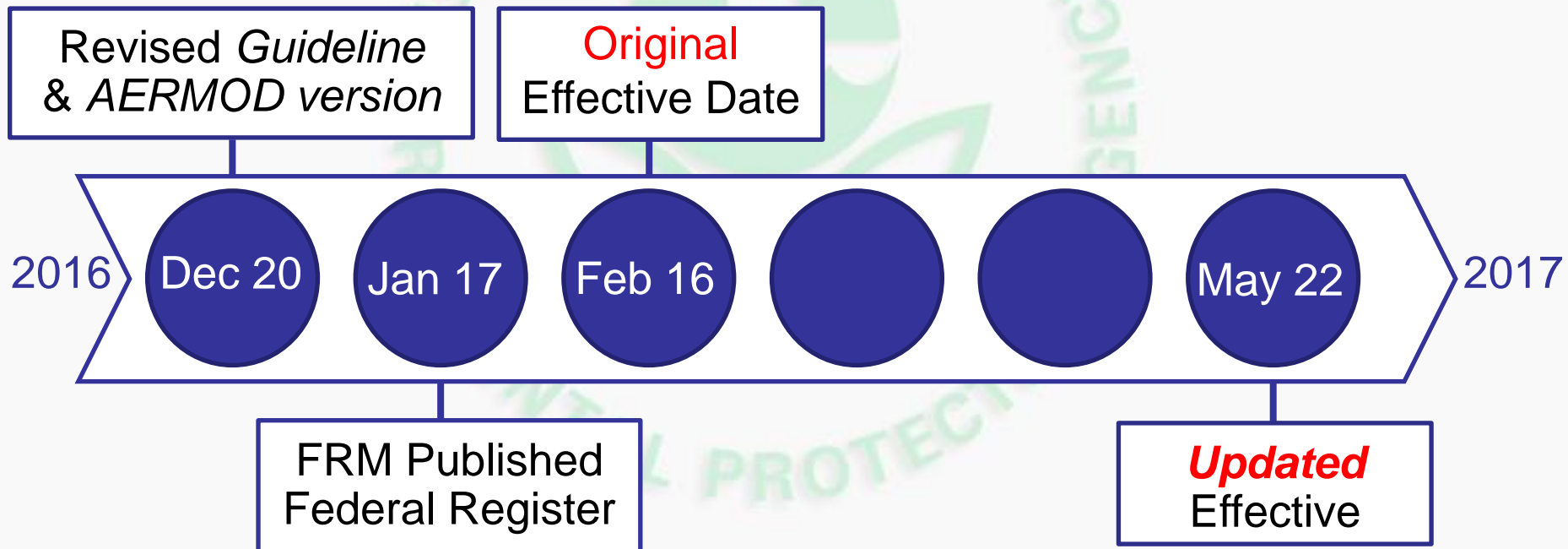
NACAA Fall Meeting  
September 25, 2017



## Presentation Overview

- Final Revisions to EPA's *Guideline on Air Quality Models*
- Air Quality Modeling for Transport
- Air Quality Modeling for Regional Haze
- 2014 NATA Update

# Final Rule to Revise to the *Guideline on Air Quality Models* (Appendix W to 40 CFR Part 51)





# Background

- The *Guideline on Air Quality Models* (*Guideline* or “Appendix W” to 40 CFR Part 51) 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 20, 2016, the EPA . . .
  - finalized several additions and changes to its *Guideline*.
  - 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.



# Final Revisions to Appendix W

- 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](https://www3.epa.gov/ttn/scram/appendix_w-2016.htm)
- At publication, the effective date for the final rule was February 16, 2017.
- Per Presidential directives, the effective date for the Appendix W final rule was delayed until May 22, 2017.
  - No changes to PSD and Transportation Conformity transition periods of 1 and 3 years, respectively, from publication.



## 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 NO<sub>2</sub> 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<sub>2.5</sub>
- 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.



## Information & Outreach

- EPA Webinars
  - Appendix W Overview: Feb 16, 2017
  - Prognostic Met Data: Mar 21, 2017
  - Draft MERPs Guidance: Jan 19, 2017
  - Single Source O<sub>3</sub> & PM<sub>2.5</sub>: July 25, 2017
  - Cumulative Impact Assessments: Aug 3, 2017
- Regional calls/mtgs with states
  - Region 5: Single Source O<sub>3</sub> & PM<sub>2.5</sub>
  - *OAQPS strongly recommended that EPA Regions conduct such calls to engage with states*





# 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



# Final Action: Single-Source Impacts on Ozone and Secondary PM<sub>2.5</sub>

- The EPA believes photochemical grid models are generally most appropriate for addressing ozone and secondary PM<sub>2.5</sub>, 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<sub>3</sub> or PM<sub>2.5</sub> 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<sub>2.5</sub>.
  - 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



# Tier 1 Demonstration Tools

- For Tier 1 assessments, EPA generally expects that applicants would use existing empirical relationships between precursors and secondary impacts based on modeling systems appropriate for this purpose.
- The use of existing credible technical information that appropriately characterize the emissions to air quality relationships will need to be determined on a case-by-case basis.
- Examples of existing relevant technical information that may be used by a permit applicant, in consultation with the appropriate permitting authority, include
  - air quality modeling conducted for the relevant geographic area reflecting emissions changes for similar source types as part of a State Implementation Plan (SIP) demonstration, other permit action, or similar policy assessment
  - air quality modeling of hypothetical industrial sources with similar source characteristics and emission rates of precursors that are located in similar atmospheric environments and for time periods that are conducive to the formation of O<sub>3</sub> or secondary PM<sub>2.5</sub>.



# 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 PM<sub>2.5</sub> 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



# Tier 2 Demonstrations: Case-Specific Modeling

- EPA anticipates few situations where a Tier 2 demonstration would be necessary, we expect most situations could be demonstrated under Tier 1
- No EPA preferred model so case-specific modeling conducted consistent with EPA guidance in consultation with the appropriate permitting authority
  - No alternative model approval but documentation should generally follow criteria in Section 3.2.2(e)
  - EPA issued clarification memorandum on 8/4/17 that provides for the general applicability of the CMAQ and CAMx photochemical models for permit related program demonstrations and NAAQS attainment demonstrations.
- Applicable guidance:
  - Guidance on the Use of Models for Assessing the Impacts of Emissions from Single Sources on the Secondary Formed Pollutants: Ozone and PM<sub>2.5</sub> (EPA-454/R-16-005 December 2016)



## Next Steps

- SILs Guidance: Pacing item for release of MERPs guidance and PM2.5 Precursor Demo guidance
- EPA hosting 2017 R/S/L Modelers workshop in RTP, NC on September 25<sup>th</sup> and 26<sup>th</sup>
  - <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 12<sup>th</sup> Conference on Air Quality Models in late 2018.

# Air Quality Modeling for Ozone Transport





# Update on EPA's Ozone Transport Modeling

- EPA issued a NODA in January 2017 with ozone transport data based on air quality modeling using 2023 as the future analytic year
- We are updating this modeling based on NODA comments and other factors to identify nonattainment and maintenance receptors and interstate “linkages” for 2023
  - Key revisions have been made to the methodologies for projecting emissions for EGUs and the oil and gas sector in addition to updates on plant closures
- The updated modeling will utilize the latest public release version of CAMx (v6.40) with the CB6r4 chemical mechanism
- We believe this modeling can serve multiple purposes in helping states develop SIPs for their 2008 obligations
- This modeling will also be informative for future 2015 ozone NAAQS transport SIPs
- The air quality modeling is in-progress
- We are currently providing the updated emissions inventories to the MJOs and states



# 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

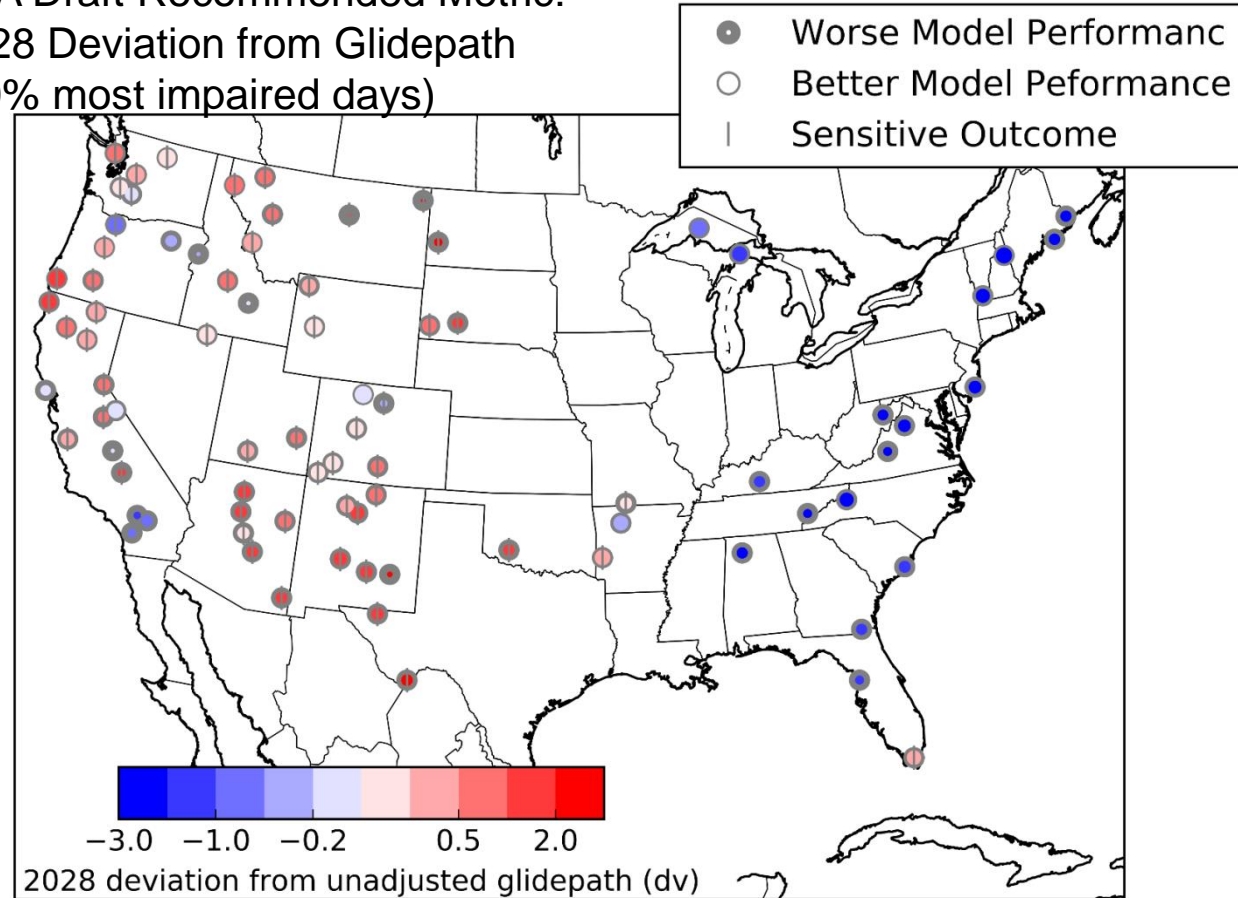
- EPA learned a great deal from this initial 2028 regional haze modeling.
  - We are releasing this information because we want to work collaboratively with MJOs, states, and FLMs to improve the technical foundation of the modeling before it is used for regional haze SIP development.
- EPA has identified 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 2<sup>nd</sup> implementation period.
  - EPA expects to work collaboratively with MJOs, states, and FLMs to make necessary improvements and ultimately update this modeling.



# Deviation from 2028 Unadjusted Glidepath

- The color in the middle of the circle represents the deviation from the 2028 unadjusted glidepath.
- The gray shading represents model performance; the wider the gray outer circle, the worse the model performance.
- The vertical line represents an estimate of uncertainty, indicating whether the site may potentially flip from above the glidepath to below or vice versa.

EPA Draft Recommended Metric:  
2028 Deviation from Glidepath  
(20% most impaired days)



Note that results could also differ if the glidepath endpoint is adjusted to account for international anthropogenic and prescribed fire impacts



## 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 working to provide technical support document that summarizes the platform and initial modeling results along with modeling files in October timeframe
  - 2011 model performance
  - 2028 visibility impairment and glidepath results
  - 2028 source apportionment results
- Engage in more detailed discussions of modeling issues and improvements
  - Subsequent MJO calls/special calls by region
  - Western Modeling Workshop, Sept 6-8<sup>th</sup> in Boulder, CO
  - December Regional Haze National Workshop
  - Other FLM calls/workgroups



# 2014 NATA Update



# 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](http://www.epa.gov/nata)

Using **LEAN** for 2014  
NATA

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### National Air Toxics Assessment

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#### National Air Toxics Assessment

EPA's comprehensive evaluation of air toxics in the United States

On December 17, 2015, EPA released the most recent update to the National Air Toxics Assessment (NATA). NATA contains emissions data from 2011 and uses models to make broad estimates of health risks over geographic areas of the country.

[Learn more](#)

#### NATA Overview

- [Limitations](#)
- [Glossary of Terms](#)
- [Frequent Questions](#)

#### 2011 NATA Assessment

- [2011 Assessment Results](#)
- [2011 NATA Map](#)
- [2011 Assessment Methods](#)

#### Quick Links

- [Previous versions of NATA](#)
- [Other environmental screening tools](#)
- [Learn about risk assessment](#)
- [Hazardous Air Pollutants website](#)
- [Urban Air Toxics website](#)





# 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

# Ambient Monitoring Update



# Discussion Topics



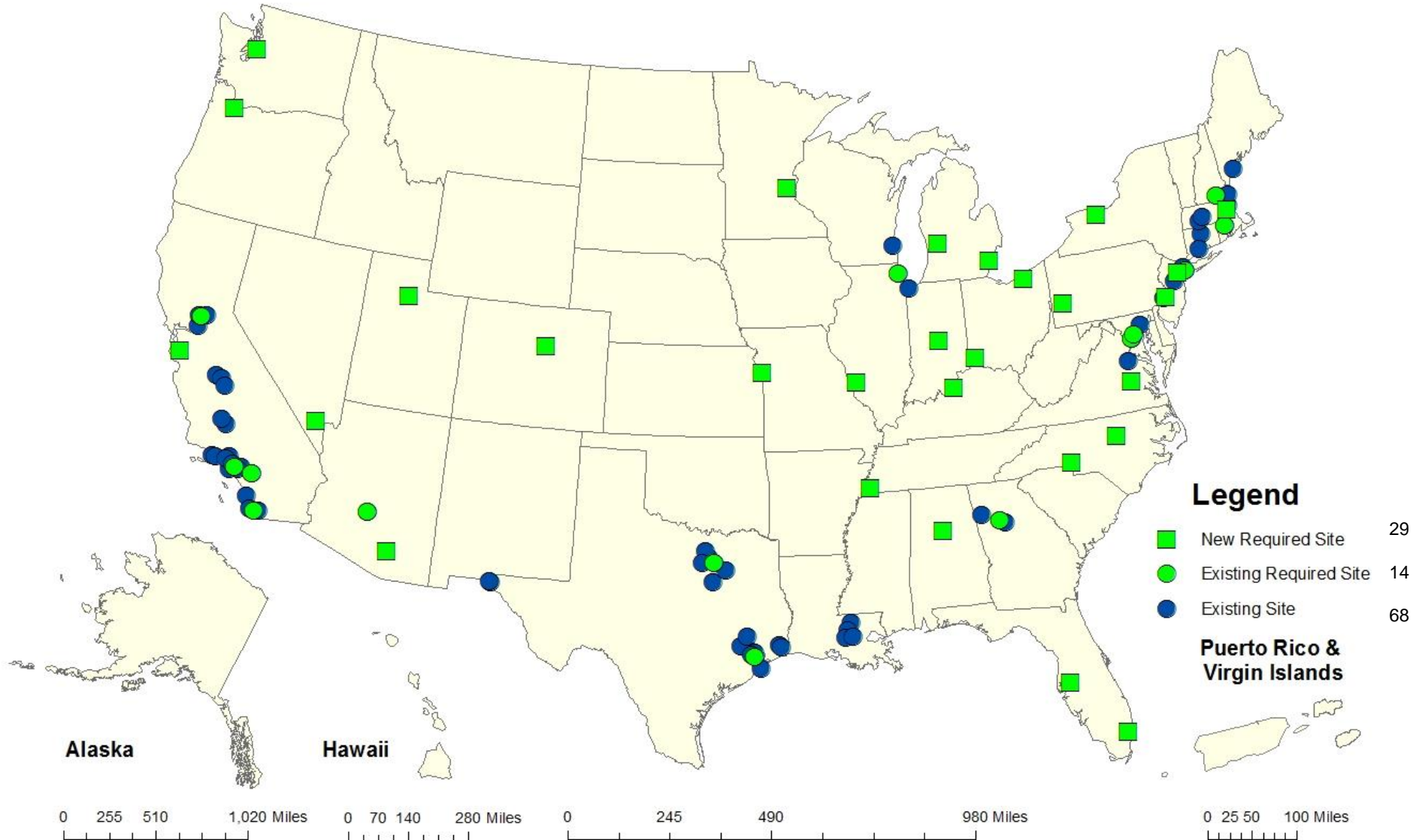
- PAMS Update
- Quality Assurance Activities
- Monitoring Rule Litigation
- Grant Funding
- Other Highlights

# PAMS Timeline and Milestones



- PAMS plan due July 1, 2018 as part of Annual Monitoring Network Plan
- PAMS monitoring at NCore sites will need to start by June 1, 2019
- Enhanced Monitoring Plan (EMP) submitted within two years of designations OR by October 1, 2019, whichever is later
  - Applies to moderate and above NA areas and in the Ozone Transport Region
  - Delays in the designation and classifications process could push EMP deadline to a later date

# Updated PAMS Map



# PAMS Funding Reallocation



- The PAMS funding reallocation was incorporated into the overall 105 funding reallocation
  - The PAMS needs were taken into account as part of the “adequate monitoring network” to ensure adequate funding for each required PAMS site and for states needing to implement an EMP
  - Transition began in FY 2017 and will be carried out over several years

# PAMS Equipment Purchases



- The EPA has funding to ensure that state/local agencies can acquire needed equipment, including:
  - Automated Gas Chromatographs (AutoGCs)
  - True NO<sub>2</sub> instruments, and
  - Ceilometers
- The EPA is developing national contracts to facilitate purchases of these systems using these funds as requested by many monitoring agencies
- States willing and able to purchase the equipment on their own will be sent targeted funding to purchase these three items
  - Alternatively EPA will make the purchases for the states via the National Contracts, and supply the equipment to the states
- The deployment of this equipment is expected to occur over the next few years
  - 12 state/locals have already received equipment money through FY 2017
  - We are working with the remaining states to identify when and how they would like to obtain their equipment

# Quality Assurance

## Technical Systems Audit (TSA)<sup>1</sup>



**TSA Workgroup** - Represented by all regional offices

***Overall Goal of the Workgroup: Develop a more consistent national TSA approach to standardize experience of S/L/T agencies***

**Current activities:**

### **Development of TSA Guidance Document**

- Defines TSA regulatory requirements and frequencies
- Identifies TSA best practices
- Standardizes audit activities
- Provides tools and templates to assist auditors in various TSA activities

### **Development of New TSA Audit Questionnaire**

- Eliminates redundancy
- Eliminates network design topics now addressed in Annual Network Plans
- Clarifies audit questions
- Reorganizes the form to make it easier to complete

**The TSA Guidance Document and questionnaire will be completed by the end of September 2017 and both will be posted to AMTIC**

<sup>1</sup> Per 40 CFR 58 Appendix A – *Technical systems audits of each Primary Quality Assurance Organization (PQAO) shall be conducted at least every 3 years by the appropriate EPA Regional Office and reported to the AQS. If a PQAO is made up of more than one monitoring organization, all monitoring organizations in the PQAO should be audited within 6 years (two TSA cycles of the PQAO).*





## ***What do we hope to achieve through the new guidance?***

- Consistent TSAAs of PQAAs across regions
- Better TSAAs through better planning by the auditors
- Quicker turn around of TSA reports
- Improved follow-up of TSA findings
- Improved experience filling out the questionnaire
- Provide a tool for PQAAs to use auditing their own agencies

***Most importantly, we want the TSAAs to be a more effective tool to assess data quality and help improve the Quality Systems in all of the PQAAs.***

# Quality Assurance Issues



## Through TSA's and Office of Inspector General Reviews<sup>2</sup> we continue to discover:

- Quality Assurance Project Plans (QAPPs) are not meeting CFR and Critical Criteria in key guidance documents
- QAPPs and Standard Operating Procedures (SOPs) do not say the same thing
  - Acceptance criteria in QAPP are not the same as the SOP
- QAPPs are over 5 years old and are not updated to reflect what is in the network or required in the Code of Federal Regulations (CFR)
- ✓ Note: Monitoring regulations in CFR were also revised in 2016 to ensure monitoring organizations with delegated QAPP self-approvals electronically send QAPPs to EPA Regions when they submit the QAPP to the monitoring organizations approving official

<sup>2</sup> Report: Certain State, Local and Tribal Data Processing Practices Could Impact Suitability of Data for 8-Hour Ozone Air Quality Determinations:

# Quality Assurance - Next Steps



- OAQPS is working with EPA Regions to review QAPP data in AQS
  - Revising AQS to include additional language about QAPPs and how to use the data
  - Removing QAPP information for sites that never monitored for a particular pollutant
  - Will add a field that reports the last time a pollutant was monitored to reduce chance of requiring a QAPP for a PQAQ that stopped monitoring that pollutant
- Revising AMP 600 report to identify any QAPP over 5 years old as a major issue (used to be 10 years)
  - Will take effect for CY 2018 data certification (May 2019)

# Monitoring Rule Litigation



- Background: In March 2016, EPA revised its air monitoring regulations. On May 27, 2016 - Sierra Club filed a petition for review with the DC Circuit court on behalf of Earthjustice and the American Lung Association due to concerns related to the process of obtaining public inspection versus public comment, the responsibility of monitoring agencies to respond to public comments in their submitted annual monitoring network plans, and the responsibility of EPA Regional Offices to obtain public comment on network plans.
- Subsequent Actions:
  - January 19, 2017 - Proposed Settlement Agreements under Clean Air Act concerning the submission and approval of ambient air monitoring network plans were posted in the Federal Register with a 30-day public comment period - <https://www.federalregister.gov/documents/2017/01/19/2017-01099/proposed-settlement-agreement-clean-air-act-petition-for-review>
  - February 21, 2017 – public comment period closed. A total of three comments were received – anonymous, Ohio EPA, TCEQ. The state comments request that the referenced guidance documents be put out for public comment – see <https://www.regulations.gov/docket?D=EPA-HQ-OGC-2017-0030>
  - June 13, 2017 – Proposed Settlement Agreements reopened for public comment along with two proposed guidance documents. – Two additional comments received.
  - Administration considering public comments in determining next steps.

# National Program Management Monitoring Appendix



- FY18 National Program Management (NPM) Guidance – Monitoring appendix available on AMTIC
  - <https://www.epa.gov/amtic/national-program-manager-npm-guidance-monitoring-appendix>
- PM<sub>2.5</sub> Transition from section 103 to 105 are to begin in FY18 (dependent on final appropriation)
- National Ambient Air Monitoring Conference planned for late summer 2018

# Notables & Highlights



- Currently reviewing Community Scale Air Toxics grants (30 grants in review)
- On-going analyses of near-road monitoring network data (multiple pollutants)
- Assisting Regions helping States with storm recovery
- Developing new tools to support data review and validation (e.g., DART, AirData, FRM/FEM data quality comparison)
- Developing model SOP's for new PM methods