

Planning for Implementation of EPA's Data Requirements Rule for the 1-hour SO₂ NAAQS: Strategic Planning, Monitoring, and Modeling Techniques



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AWMA-RMSS January 20, 2016

Outline of Presentation

- The SO₂ Data Requirements Rule
 - Background
 - Affected sources
 - Time tables
 - On-going requirements
- Recommendations and Strategy
 - Conduct initial modeling for strategic information
 - Decide on either modeling or monitoring path
 - Modeling path options
 - Monitoring path option
- Conclusions

1-Hour SO₂ NAAQS

- 1-hour daily maximum primary standard
 - Standard issued **June 22, 2010** (75 FR 35520)
 - 75 ppb (196.5 µg/m³)
 - Form of standard: 99th percentile peak daily 1-hour maximum
 - Averaged over 3 years
- Standard became effective **August 23, 2010**
- Area designations due with two years after promulgation of a new or revised NAAQS
- Areas designated non-attainment subject to:
 - SIP plans to achieve attainment within 5 years
 - More stringent permitting for new or modified sources

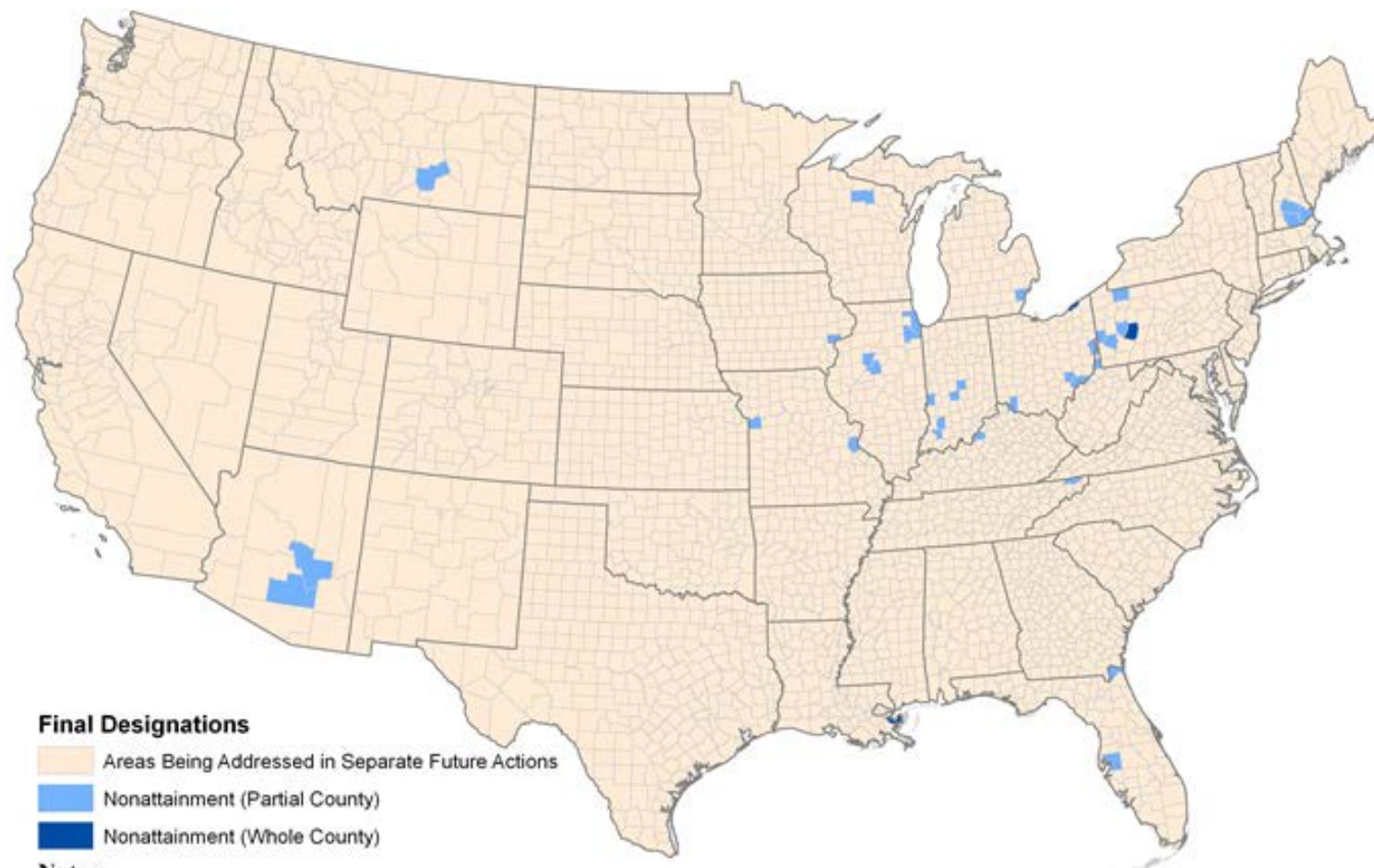


2010 SO₂ NAAQS Implementation

- Initial non-attainment area designations for 1-Hour SO₂ NAAQS based on violating monitors (Round 1)
 - 29 areas in 16 states designated in July 2013
- Rest of country has not been designated. Area status “deferred”. Undesignated areas will be designated in three future rounds from 2016-2020
 - Round 2 – Accelerated schedule for high emitting power plants (2016)
 - Round 3 – Modeling based designations (2017)
 - Round 4 – Monitoring-based designations (2020)

1-hour SO₂ Designation Process – Mostly Deferred Status

Map of EPA Nonattainment Designations



Notes:

EPA is not designating as nonattainment any areas outside the Continental US in Round 1.

Background on Data Requirements Rule

- EPA has determined that SO₂ is a unique pollutant with large local concentration gradients
- The SO₂ Data Requirements Rule is EPA's approach to resolving most of the United States SO₂ area designation status
- Each “applicable source” identified by the states and EPA must be addressed with either a modeling or monitoring analysis
- Exemption for sources willing to take enforceable limitation to an annual emissions level less than 2,000 tons per year

SO₂ Data Requirements Rule

- Final rule was signed on **August 10, 2015**.
- Published in the *Federal Register* (80 FR 51052) on **August 21, 2015**
- Under the DRR, air agencies will provide additional air quality data characterizing 1-hour peak concentrations and source-oriented impacts
- Timetables for data submittals
- Draft technical assistance documents (TAD) provide guidance on modeling/monitoring
- More Information available at:
<http://www.epa.gov/oaqps001/sulfurdioxide/implement.html>

DRR Source Applicability Threshold

- Source applicability threshold is 2,000 tons per year (tpy) of actual SO₂ emissions in most recent year for which data are available.
 - Addresses about 86% of SO₂ emissions nationwide
- Data submitted annually pursuant to requirements of acid rain program and/or Air Emissions Reporting Rule may be used for evaluating applicability
- Air agencies retain discretion to require air quality characterization for additional sources
 - In areas with multiple clustered sources below the threshold
 - Suspected NAAQS compliance due to terrain, low stacks, downwash

DRR Compliance Timelines

- **January 15, 2016:** Air agency identifies sources exceeding threshold and other sources for which air quality will be characterized.
- **July 1, 2016:** For identified sources the air agency will specify which approach (monitoring, modeling or establishing an enforceable limit) it plans to characterize air quality.
 - Air agency also accordingly submits a monitoring plan, modeling protocols, or descriptions of planned limits on emissions to less than 2,000 tpy.

DRR Compliance Timelines (Continued)

- **January 2017:** Multiple deadlines in **January 2017**
 - New monitoring sites must be operational by **January 1, 2017**
 - Modeling analyses must be submitted to EPA by **January 13, 2017**
 - Documentation of federally enforceable emission limits and compliance must be submitted to EPA by **January 13, 2017**
- **December 31, 2017:** EPA completes Round 3 area designations based on modeling data
- **December 31, 2020:** EPA completes Round 4 designations for all remaining areas

March 2015 Court-Ordered Designation Schedule for High Priority Sources

– By **July 2, 2016:**

- Areas that have monitored violations of the 2010 SO₂ standard based on 2013– 2015 air quality data; and
- Areas that contain any stationary source not announced for retirement that according to EPA's Air Markets Database emitted in 2012 either (a) more than 16,000 tons of SO₂; or (b) more than 2,600 tons of SO₂ or had an average emission rate of at least 0.45 lbs SO₂/MMBtu.

– Designation recommendations for “Round 2” were due to EPA by **September 18, 2015**

- 68 coal-fired power plants specifically listed in the Consent Decree

Creation of the State Lists for Sources to be Characterized

- **January 15, 2016:** States submit a list of sources subject to the rule to EPA
- The longer the lists, the more work that a state brings upon itself, so will there be an incentive to keep the lists as short as possible?
- This could be an interesting process that is not consistent from state to state, but EPA will also be reviewing the lists
- A source could be removed from the list by agreeing to an SO₂ limit under 2,000 tons per year effective by **January 13, 2017**
- The creation of the lists is a very critical milestone, because...
 - those sources not on a state list may never need to be “characterized”; they will be presumed to be in attainment or unclassifiable areas

July 1, 2016 Deadline Details for Monitoring Approach

- Submit relevant information on monitoring sites to EPA :
 - Available for use ... draft non-binding Monitoring Technical Assistance Document:
 - <http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf>
 - Include any new monitoring sites established to meet the DRR in annual monitoring plan update per 40 CFR 58.10
- Operate as State and Local Air Monitoring Stations (SLAMS) or in equivalent manner
- Report data quarterly to AQS; annual certification by May 1 of following year (i.e. 2017 data will be certified by **May 1, 2018**)

July 1, 2016 Deadline Details for Modeling Approach

- Submit modeling protocol:
 - Available for use... draft non-binding Modeling Technical Assistance Document:
 - <http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2ModelingTAD.pdf>
- Timing with proposed revision to the Guideline on Air Quality Models (40 CFR 50, Appendix W)
 - Correction for low-wind conditions in AERMOD
 - Currently a non-default option
 - EPA expecting to take final action on proposed Appendix W revisions around this same time frame

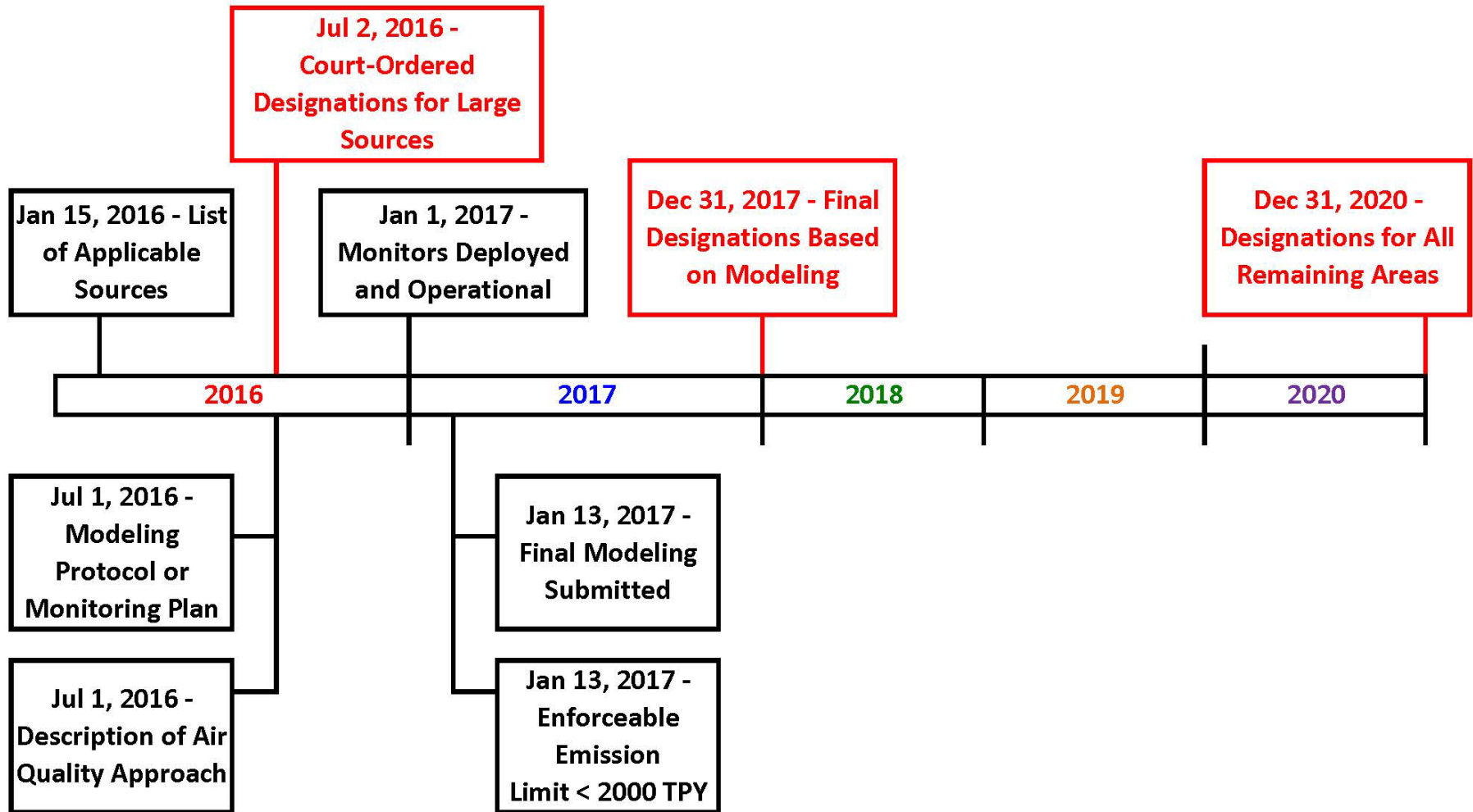
July 1, 2016 Deadline Details for Modeling Approach (Continued)

- Departure from traditional regulatory modeling to represent “monitoring” data
 - Model 3 most recent years with actual emissions rather than allowable or PTE
 - Use of full stack height regardless of whether GEP height is exceeded
 - Placement of model receptors only where a monitor could reasonably be sited
 - TAD for modeling provided detail on guidance

January 13, 2017 Deadline for Federally Enforceable Emissions Limits

- In lieu of characterizing areas around listed 2,000 tpy or larger sources, air agencies may indicate by **July 1, 2016** that they will adopt enforceable emissions limitations that will limit those sources' emissions to below 2,000 tpy
- Enforceable limits must be adopted and effective by **January 13, 2017**
- If the emissions are limited to be below 2,000 tpy, then no characterization analysis is required, although the state could ask for one.

Timeline for Future 1-hour SO₂ Area Designations



On-going Data Requirements for Areas Designated “Attainment”

– Monitored Areas

- Monitors generally must continue operation
- Eligibility to cease monitoring if the monitored design value is no greater than 50% of the 1-hour SO₂ NAAQS in either the first or second 3-year period of operation
- EPA must approve cessation of monitoring

– Modeled Areas

- For modeled sources that used actual emissions, annual reporting by July 1 of the calendar year after the effective date of the area’s designation assessing annual SO₂ emissions of each applicable source.
- Air Agency’s annual report shall include a recommendation regarding whether additional modeling is needed.
- Annual report not required if modeling with actual emissions shows design values no greater than 50% of the 1-hour SO₂ NAAQs



Recommendations and Strategy

Key Decisions for Sources Subject to DRR

- Notify EPA on selected strategy by **July 1, 2016**
- Take federally enforceable limits to < 2,000 tpy by **January 13, 2017**
- If You Select Monitoring
 - Submit a monitoring plan before **July 1, 2016**
 - Start monitoring, collecting validated data by **January 1, 2017**
 - Monitor continuously for at least 3 years
- If You Select Modeling
 - Submit a modeling protocol before **July 1, 2016**
 - Demonstrate compliance with no permit modifications
 - Model with 3 years of actual emissions (CEM or well-documented estimates), actual stack height, and meteorological data
 - Submit modeling compliance demonstration by **January 13, 2017**.
 - Demonstrate compliance with lower permit limits in place by **January 13, 2017**.

Recommendation – Know the Modeling Outcome

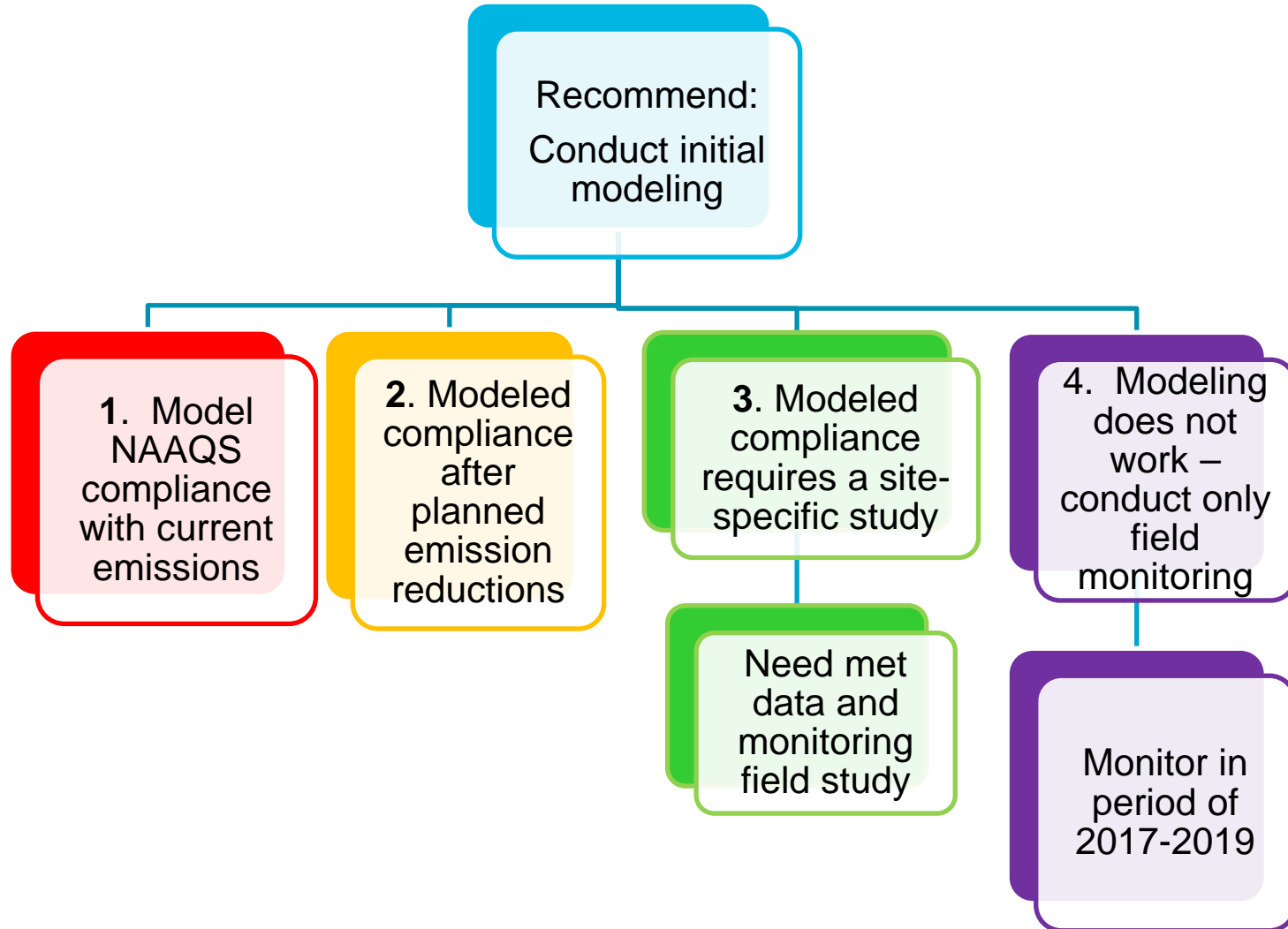
Before it's too late to react, know the modeling result

- Conduct initial modeling soon
 - Consider attorney-client privilege arrangement
 - Update all model inputs including facility layout, fenceline
 - Results will help determine the best strategy; varies for each facility
 - If your source has significant modeling challenges, it is possible that monitoring may be the best approach
- Factor in any emission reductions per other regulations
 - May need modeling to demonstrate compliance due to emission change

Tips:

- **Modeling tends to over-predict, especially in complex terrain with a single level of meteorological data**
- **There are still several model updates “in the works” that could provide more realistic results**

Overarching Flowchart for SO₂ Implementation: Possible Modeling Strategy Outcomes



How to Decide on Modeling vs. Monitoring

- If you “pass” with modeling, that is the quickest way to an attainment result
- A “failure” with modeling can lead to onerous emission limitations if they are caused by a model that needs refinements
- In those cases, there is good justification for relying upon monitoring if modeling refinements are not approved by the State
- States should be advised to consider the proposed changes to AERMOD version 15181 as being in place by **July 1, 2016** and allow their use now
- Monitoring “buys” 3 years for deferring a final attainment outcome but at the cost of monitoring for at least 3 years

The Monitoring Option

- For this option, a 3-year field monitoring program would be needed from **2017-2019**
 - Further monitoring could be required at peak impact location(s) indefinitely, even with favorable results, if the readings are close to the NAAQS
 - Applicable sources may need to fund monitor installation and operation
 - The data will need to be certified by the Agency for use in the attainment demonstration
- A monitoring plan would need to be in place by **July 2016**, in time for field deployment by **January 1, 2017** – this is a tight schedule!
- Remember that for sources of any emission size, the **2017-2019** monitoring “window” is the only opportunity to avoid a modeling path

How to Design the Monitoring Network

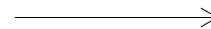
- Location and number of monitors needs to be documented and defended with the monitoring plan
- Discuss with air agency in advance of the **July 1, 2016** deadline, so that the monitoring plan can be reviewed quickly
- Document that monitors are placed in areas of expected high concentrations
- Models can help with this, but if the models are not credible, then this is not an optimal approach
- Other approaches can use short-term monitoring with FRM equipment, or with passive samples to get the pattern of concentrations

Recommendations for Determining Monitoring Placement

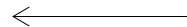
- Placement of monitors can be informed by an initial study; each situation is unique and there is no specific EPA guidance on placement and number of monitors:
 - Modeling to determine directions and distances of peak impacts
 - Passive monitoring (short-term samples) to determine concentration patterns
 - Short-term fixed or mobile monitoring study



Passive monitor



Mobile monitor



Recommendations for Monitoring during 2017-2019

- If monitoring is required, then meteorological monitoring is recommended
 - can determine meteorological conditions associated with peak monitored conditions.
- Control upset and malfunction conditions to the maximum extent possible
- Gather hourly emissions data during the monitoring period
 - keep track of high emission periods if correlated with high monitored concentrations
- Watch monitoring, meteorological, emissions, and data
 - to gain understanding of what causes high observed concentrations

Summary

- SO₂ Data Requirements Rule will require characterization study for hundreds of individual facilities (actual SO₂ emissions > 2,000 tpy or, more likely, within 20 km of such sources); lists were due **January 15, 2016**
- Initial strategic modeling for affected sources should be done soon, well before **mid-2016**
- Modeled NAAQS compliance is the quickest “off ramp”
- Adverse modeling results could lead to either refined modeling, modeling for reduced emissions, or the monitoring path
- Monitoring path requires siting plan by **July 1, 2016** and operation by **January 1, 2017**
- Monitoring should be done with careful records of emissions and met data to understand any high observations

Questions?



Thank You!



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