Planning for Implementation of EPA’s Data Requirements Rule for the 1-hour SO$_2$ NAAQS: Strategic Planning, Monitoring, and Modeling Techniques

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AWMA-RMSS January 20, 2016
Outline of Presentation

– The $\text{SO}_2$ 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 SO$_2$ NAAQS

– 1-hour daily maximum primary standard
  • Standard issued **June 22, 2010** (75 FR 35520)
  • 75 ppb (196.5 µg/m$^3$)
  • Form of standard: 99$^{th}$ 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 SO$_2$ NAAQS Implementation

– Initial non-attainment area designations for 1-Hour SO$_2$ 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 SO$_2$ Designation Process – Mostly Deferred Status

Map of EPA Nonattainment Designations

Final Designations
- Areas Being Addressed in Separate Future Actions
- Nonattainment (Partial County)
- Nonattainment (Whole County)

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 SO$_2$ is a unique pollutant with large local concentration gradients

– The SO$_2$ Data Requirements Rule is EPA’s approach to resolving most of the United States SO$_2$ 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
SO$_2$ 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

Source applicability threshold is 2,000 tons per year (tpy) of actual SO$_2$ emissions in most recent year for which data are available.

- Addresses about 86% of SO$_2$ 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
– **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.
– 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 SO$_2$ 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 SO$_2$; or (b) more than 2,600 tons of SO$_2$ or had an average emission rate of at least 0.45 lbs SO$_2$/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 SO$_2$ 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
– 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](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)
– Submit modeling protocol:
  • Available for use... draft non-binding Modeling Technical Assistance Document:
  • [http://www.epa.gov/oaqps001/sulfurdioxide/pdfs/SO2ModelingTAD.pdf](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 AERMODE
  • Currently a non-default option
  • EPA expecting to take final action on proposed Appendix W revisions around this same time frame
– 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
– 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 $\text{SO}_2$ Area Designations

- **Jul 2, 2016** - Court-Ordered Designations for Large Sources
- **Jan 15, 2016** - List of Applicable Sources
- **Jul 1, 2016** - Description of Air Quality Approach
- **Jul 1, 2016** - Modeling Protocol or Monitoring Plan
- **Jan 1, 2017** - Monitors Deployed and Operational
- **Jan 13, 2017** - Final Modeling Submitted
- **Jan 13, 2017** - Enforceable Emission Limit < 2000 TPY
- **Dec 31, 2017** - Final Designations Based on Modeling
- **Dec 31, 2020** - Designations for All Remaining Areas
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 SO$_2$ Implementation: Possible Modeling Strategy Outcomes

Recommend: Conduct initial modeling

1. Model NAAQS compliance with current emissions
2. Modeled compliance after planned emission reductions
3. Modeled compliance requires a site-specific study
   Need met data and monitoring field study
4. Modeling does not work – conduct only field monitoring
   Monitor in period of 2017-2019
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
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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