

Modeling for SO₂ implementation

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Workshop

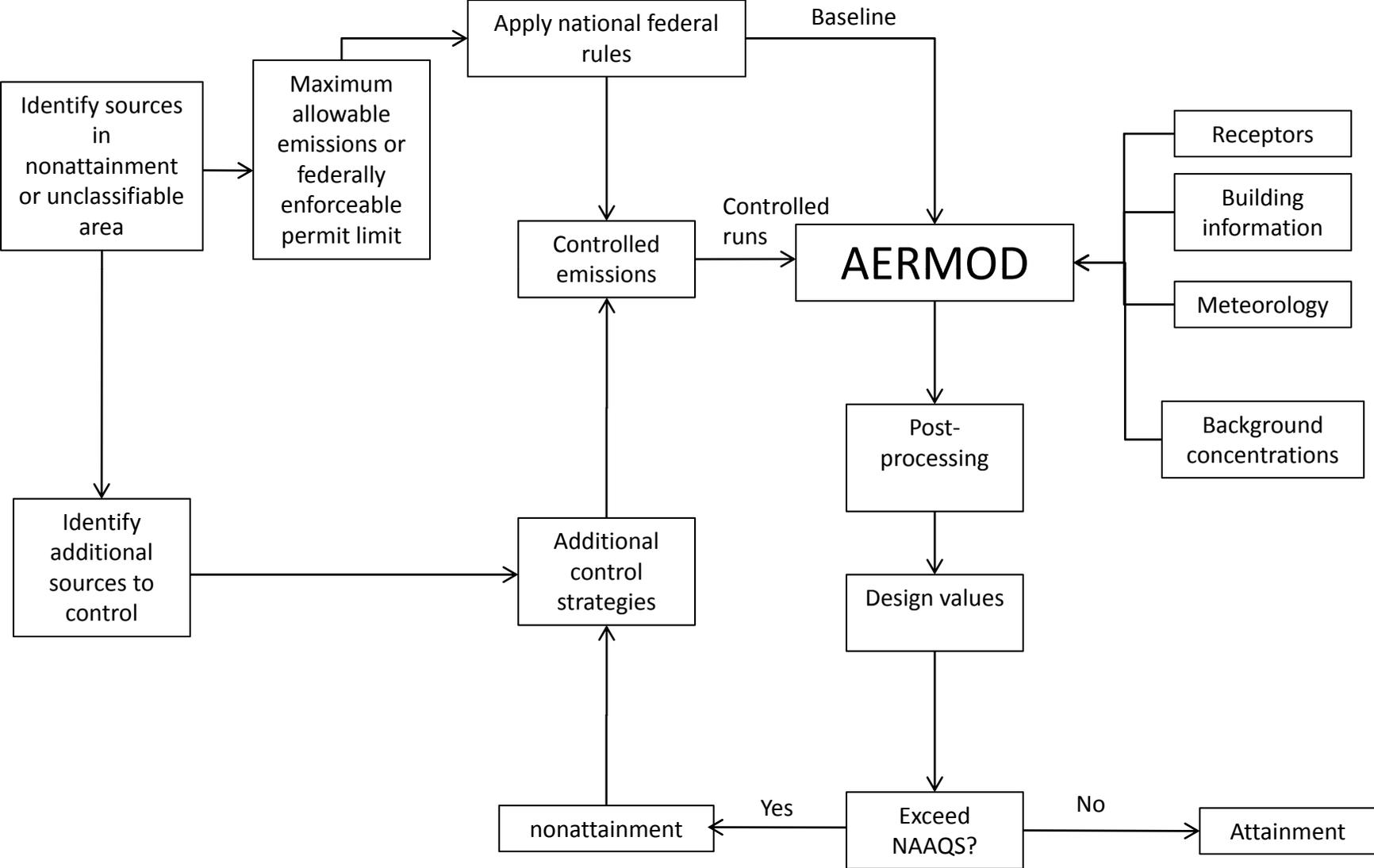
SO₂ Implementation Guidance

- Modeling guidance for
 - Nonattainment areas (nonattainment SIPs)
 - Unclassifiable areas (maintenance SIPs)

SO₂ implementation modeling guidance

- Modeling guidance for SIP attainment demonstration
- Topics included:
 - Model selection = AERMOD as EPA preferred near-field dispersion model
 - Modeling domain and sources to model
 - Source inputs including use of maximum allowable emissions or federally enforceable permit limits
 - Meteorological inputs
 - Inclusion of monitored background concentrations
 - Use of modeling to determine attainment status
 - Documentation requirements

Modeling methodology



Modeling domain and receptors

- Should include sources thought to cause or contribute to a NAAQS violation in a nonattainment area or sources influencing an unclassifiable area.
 - If area boundaries determined during designations process, these sources should have already been identified
- Receptor placement should be adequate to determine concentration gradients and extend out to areas of no violations.

Emissions and source characterization

- Maximum allowable emissions or federally enforceable limits should be basis of emissions used in modeling
 - Follow Section 8.1 of Appendix W
 - Emission input data can be calculated using Table 8-1
 - Federal Rules expected to be in place by attainment date can be factored in emissions
 - Use of allowables or permits consistent with current SO₂ guidance (1993)
- Source characterization
 - Source release parameters should reflect modeled emissions levels
 - If modeling controlled emissions for attainment demonstration, release parameters should reflect source “with controls in place”
 - Accurate locations
 - Sources and Buildings (if needed for downwash)
 - Urban vs. rural classification
 - Important in determining dispersion coefficients

Emissions calculations

TABLE 8-1.—MODEL EMISSION INPUT DATA FOR POINT SOURCES ¹

| Averaging time | Emission limit (#/MMBtu) ² | × | Operating level (MMBtu/hr) ² | × | Operating factor (e.g., hr/yr, hr/day) |
|---|--|---|---|---|---|
| Stationary Point Source(s) Subject to SIP Emission Limit(s) Evaluation for Compliance with Ambient Standards (Including Areawide Demonstrations) | | | | | |
| Annual & quarterly | Maximum allowable emission limit or federally enforceable permit limit. | | Actual or design capacity (whichever is greater), or federally enforceable permit condition. | | Actual operating factor averaged over most recent 2 years. ³ |
| Short term | Maximum allowable emission limit or federally enforceable permit limit. | | Actual or design capacity (whichever is greater), or federally enforceable permit condition. ⁴ | | Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological data base). ⁵ |
| Nearby Source(s)^{6 7} | | | | | |
| Same input requirements as for stationary point source(s) above. | | | | | |
| Other Source(s)⁷ | | | | | |
| If modeled (subsection 8.2.3), input data requirements are defined below. | | | | | |
| Annual & quarterly | Maximum allowable emission limit or federally enforceable permit limit. ⁶ | | Annual level when actually operating, averaged over the most recent 2 years. ³ | | Actual operating factor averaged over the most recent 2 years. ³ |
| Short term | Maximum allowable emission limit or federally enforceable permit limit. ⁶ | | Annual level when actually operating, averaged over the most recent 2 years. ³ | | Continuous operation, i.e., all hours of each time period under consideration (for all hours of the meteorological data base). ⁵ |

¹ The model input data requirements shown on this table apply to stationary source control strategies for STATE IMPLEMENTATION PLANS. For purposes of emissions trading, new source review, or prevention of significant deterioration, other model input criteria may apply. Refer to the policy and guidance for these programs to establish the input data.

Meteorology

- 5-years of representative National Weather Service data or at least one year of site-specific data (Appendix W)
 - 3-year standard does not pre-empt use of 5 years of NWS data
 - Calculate design values for modeled period , not 3-year averages
 - Example: Modeling 2005-2010, do not need to calculate 3-year averages for 2005-2007, 2006-2008, 2007-2009, and 2008-2010
 - Recommend use of AERMINUTE hourly averaged winds to supplement standard NWS observations to reduce calms and missing data
 - Important for hourly standard

Background concentrations

- Conservative 1st tier: maximum 1-hour concentration from background monitor
- Monitored design value from most recent 3-years of monitor data
- Multi-year average of 99th percentile of seasonal by hour of day concentrations

Relevant guidance

- Guideline on Air Quality Models (Appendix W)
- Memoranda
 - Applicability of Appendix W Modeling Guidance for the 1-hour SO₂ National Ambient Air Quality Standard, August 23, 2010
 - Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard, March 1, 2011
 - Area designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, March 24, 2011.
- AERMOD Implementation Guide
- AERMOD, AERMET, AERMAP, AERMINUTE, AERSCREEN, and AERSURFACE user's guides

Non-modeling technical demonstration of attainment

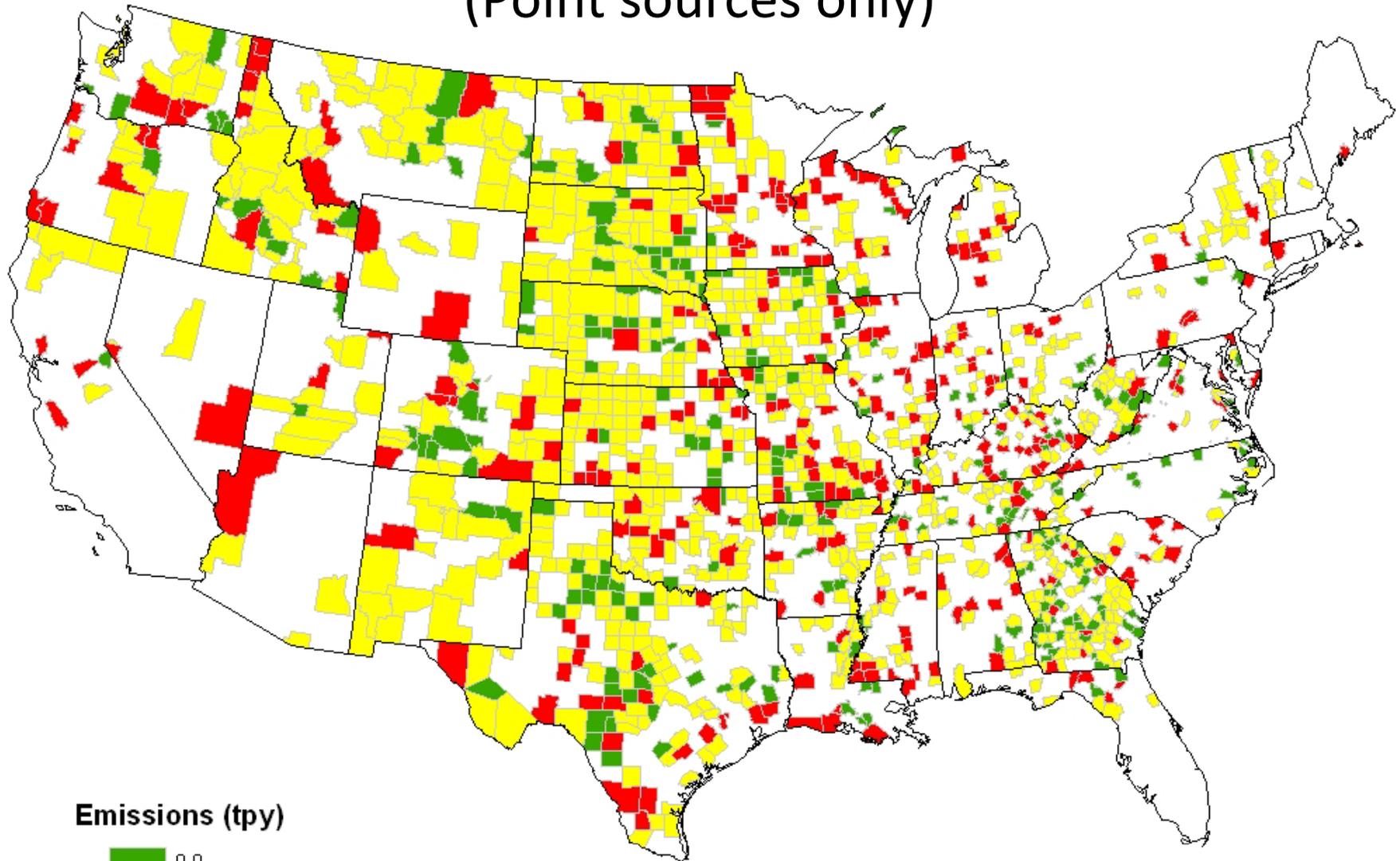
Background

- SO₂ screening modeling indicates no clear and simply relationship between emissions and violation of new 1-hour standard
 - Other influential factors such as source configuration, terrain, downwash effects, etc
- Need to address what technical demonstration is sufficient for attainment determination in lieu of modeling for areas with no or few small sources.
- Therefore, we are proposing an approach that can be followed by states for consideration by the EPA reviewing authority

Guidance for technical demonstration of attainment without modeling

- Complete modeling for nonattainment areas and any unclassifiable areas with 100+ ton sources and/or smaller sources that could cause or contribute to nonattainment
- Determine nonattainment and unclassifiable areas based on modeling results
- For remainder of state with small or no sources, use results from prior modeling to map and aid in demonstrating attainment. If a source or sources model NAAQS violations, consider the following:
 - How far do the violations extend from the source?
 - How far is the source from the target county?
 - If the source's violations do not extend to the target county, then it is a reasonable conclusion that source may not contribute to nonattainment in the target county
- If no modeling already performed for counties around the target county and no plans to model, then best professional judgment will be needed. The source should be mapped and the following issues considered:
 - How far are sources from the target county?
 - What are the maximum allowable emissions?
 - What are the stack parameters?
 - Would downwash or terrain play a role in dispersion toward the county?
 - What is the meteorology? A wind rose would be of use here.
- Answers to those questions can aid in demonstrating attainment status
- Note, screening model may still be necessary in some cases to verify a hypothesis that a source will not cause/contribute to a NAAQS violation in the target county.

Locations of zero and low emission counties (Point sources only)



Emissions (tpy)



* Based on 2005 NEI

Example Demonstration

QUESTIONS?