Next Steps for Area Designations and Implementation of the Sulfur Dioxide National Ambient Air Quality Standard

This paper describes the EPA's updated strategy for completing initial area designations under the June 2010 1-hour primary sulfur dioxide (SO_2) NAAQS. Note that this strategy anticipates further rulemaking and development of guidance by EPA, and may be further refined in response to additional feedback from stakeholders as those products are developed. This paper does not reflect final agency action of any kind, and does not impose any legally binding or enforceable requirements. The strategy reflects a consideration of several factors, including:

- input received from air agencies[1] and other stakeholders;
- consideration of the approach followed for other NAAQS, which is based on identifying NAAQS violations in a manner consistent with the scope of the ambient monitoring network for the relevant pollutant;
- recognition of the use of modeling for SO_2 designations in the past (and the importance of using modeling in the PSD program);
- a focus on priority sources based on the magnitude of source emissions and populations in proximity of emissions, with recognition of resource limitations;
- sufficient time for air agencies to develop the appropriate data to characterize air quality, and
- respect for the responsibilities of air agencies and the federal government established in the designation process under the CAA.

This strategy addresses areas that are <u>not</u> currently associated with a violating monitor and is a complement to our separate effort to designate those areas with violating monitors in June 2013.

<u>Updated Strategy</u>

EPA has developed an updated SO_2 designations strategy regarding which sources and areas would be addressed, how air quality would be characterized for those sources and areas, and when key steps would be taken in the overall process. This strategy contains the following key advantages:

- Complements initial designations that will be made in June 2013 for areas with violating monitors by identifying approaches that would be adopted in new regulatory provisions for characterizing air quality in additional areas;
- Provides an expeditious but workable timeframe for designating additional areas once new regulatory provisions are in place, recognizing the additional time needed for air agencies to monitor air quality near key sources (or alternatively to characterize air quality through air quality modeling);
- Provides flexibility for air agencies to determine the most appropriate and effective approach for characterizing air quality in their jurisdictions – through monitoring, modeling, or a mix of both;
- Provides an orderly process for completing designations that maintains the respective roles of air agencies and EPA; and

[1] The use of the term "air agencies" in this document is intended to include state air agencies, as well as local and tribal air agencies that implement the SO_2 NAAQS.

- Provides incentives and time for air agencies and sources to reduce emissions early and potentially avoid nonattainment designation in certain areas, improving protection of public health sooner than would be otherwise required. This would occur if air agencies and sources take action to limit emissions (*e.g.*, to comply with the Mercury and Air Toxics Standards (MATS) or other requirements) and demonstrate attainment with the 1-hour SO_2 NAAQS before future designation milestone dates pass.

  Important features of this strategy are described in more detail below.

  Focus on Monitoring, with Flexibility for Modeling

EPA believes the starting point for future SO_2 designations should be, as with other NAAQS, a monitoring network to adequately characterize air quality in areas of concern. This strategy for SO_2 seeks to allow regulators to characterize air quality for the SO_2 NAAQS in a manner consistent with the general monitoring network coverage of other NAAQS. As with all implementing programs to attain any NAAQS, there are practical resource constraints to consider when deploying an adequate ambient air quality monitoring network. Several air agency and industry representatives have suggested that area designations should be based on ambient monitoring only. However, the current monitoring network provides relatively limited geographic coverage, and many monitors in the existing network are not sited with the objective of characterizing source-oriented maximum concentrations. Air agencies may be able to move monitors to other locations within their own boundaries, but feedback from air agency representatives indicates that these cases would be very limited. Regarding new monitor locations, preliminary estimates indicate that a new SO_2 monitoring site can cost an air agency anywhere from $50,000 to $100,000 in capital costs. For example, an additional 200 new, source oriented SO_2 monitoring sites would cost $10-20 million. Some air agencies have indicated that certain sources have funded monitoring costs in the past, and they may look to sources to help fund SO_2 monitoring in the future. However, it appears that a strategy devoted exclusively to characterizing air quality through monitoring may not be viable in a number of jurisdictions that lack such funding.

Therefore, while focusing on monitoring as a starting point, EPA recognizes that there are factors and circumstances unique to each air agency that will influence the number of new monitors the air agency may be able to deploy. For this reason, as initially indicated in the preamble to the final rule for the 2010 SO_2 NAAQS[2], and consistent with past practice for SO_2, this updated strategy would maintain air agencies' flexibility to use modeling to characterize "actual" air quality around a source or source region as a surrogate for ambient monitoring. In the 1970's and 1980's, under certain circumstances air quality modeling data were used to characterize SO_2 concentrations for the area designations process. Although modeling also poses resource challenges for air agencies, it can allow for characterization of air quality around sources where monitoring is impractical.

Based on the considerations above, EPA believes that a dual-pathway approach would be most appropriate. This approach allows flexibility to use either monitoring or modeling for the characterization of current SO_2 concentrations. To facilitate the dual-pathway approach, EPA would issue updated rules and guidance to recommend both an acceptable SO_2 monitoring network for a source or source region, and acceptable SO_2 modeling for designation purposes. The modeling guidelines would make clear that for designation purposes, actual emissions from recent years could be

[2] 75 FR 35520, June 22, 2010.

used in the modeling analyses to characterize current air quality, as this more closely matches the actual air quality that would be characterized by a monitoring network.

"Thresholds" for Sources Subject to the Program

In the May-June 2012 stakeholder meetings, EPA presented information indicating that there are 20,000+ SO_2 sources nationally, but that based on 2008 emissions data, a much smaller number - about 480 sources with actual emissions exceeding 2800 tons per year - account for 90% of national SO_2 emissions. A number of stakeholders commented that, given constraints on resources for characterizing air quality through either monitoring or modeling, focusing on the largest sources of emissions (*e.g.,* those included by the "90%" threshold) is a reasonable principle for prioritizing which sources should be evaluated for purposes of assessing attainment of the 1-hour SO_2 NAAQS. Using more recent 2011 emissions data for electric generating units and 2008 data for non-EGUs, we now estimate that about 540 sources, each emitting over 1900 tons of SO_2 per year, account for 90% of national SO_2 emissions.

One important monitoring objective for a NAAQS with localized impacts (such as SO_2 or lead) is to characterize air quality near the largest emitters of the pollutant. Another important NAAQS monitoring objective – and one that some stakeholders suggested that EPA should give more weight -- is to characterize air quality in populated areas, often accomplished through the use of population thresholds in urbanized areas [*e.g.,* Core Based Statistical Areas (CBSAs)] to help assess broad population exposures. Monitoring requirements for several other NAAQS (*e.g.*, 8-hour ozone, $PM_{2.5}$, CO, NO_2) include provisions to monitor air quality in urban areas above specific population levels. Consistent with these two basic objectives that are considered in ambient monitoring network design, EPA suggests proposing the use of a "two-pronged" emissions threshold for this SO_2 designation approach, to apply whether a state elects to use all monitoring or all modeling or a combination of both approaches.

For example, under such an approach, a lower threshold (*e.g.,* 2000-3000 tons per year) would apply to sources located in more densely populated areas (e.g., CBSAs having 1,000,000 or more persons); and a higher threshold (*e.g.,* 5000-10,000 tons per year) would apply to sources located in less densely populated areas outside of such CBSAs. To illustrate potential coverage of possible options, a two-pronged threshold including 3000+ ton sources located in CBSA's with a population of 1,000,000, and 10,000+ ton sources outside of these CBSA's, would cover 202 sources and 66% of national emissions. A two-pronged threshold including 2000+ ton sources located in CBSA's with a population of 1,000,000, and 5000+ ton sources outside of these CBSA's, would cover 341 sources and 81% of national emissions. Potential threshold options would be presented in a future rulemaking. (Note that source and emissions estimates will change to some degree with final 2011 national emission inventory data, which will be available later this year.)

In a future rulemaking, factors to consider in selecting appropriate thresholds could include the comprehensiveness of the total emissions represented; the comparability of source coverage under this approach with typical source coverage of an ambient monitoring network; emission levels for sources in areas with monitored violations; and emission levels associated with "well-controlled" sources. Upon analysis of such factors, EPA would expect to propose a range of threshold options for a minimum level of coverage (preliminary estimates suggest that this range could cover sources accounting for 66% to 90% of national SO_2 emissions). In addition, the basis for the emissions that would be compared to the

threshold (*e.g.,* highest of the most recent three years of data) would need to be defined in the rulemaking.

Implementation Timeline

The EPA recognizes the need to begin implementation of the updated strategy now to avoid unwanted delay in addressing SO_2 sources in unmonitored areas. (Note that EPA will designate a number of nonattainment areas in the next few months based on air quality monitoring data showing violations of the NAAQS, and air agencies will be developing attainment plans for these areas in parallel with addressing the remaining areas discussed in this strategy). While we intend to act quickly on the remaining areas, EPA believes, and many stakeholders strongly agree, that some aspects of such a strategy should be adopted through notice-and-comment rulemaking.

Thus, EPA would begin implementing this strategy by developing a "data requirements" rulemaking directing air agencies to characterize air quality by a date certain for areas with sources covered by the relevant thresholds, in support of new designations recommendations. The rulemaking would also set forth other relevant milestones for implementing the SO_2 designations strategy in these areas, including deadlines for air agencies to recommend nonattainment area boundaries based on the characterization of air quality. To characterize the source areas covered by the rule, the air agency would have the flexibility to choose those sources for which it would install new monitors, and those for which it would conduct modeling to characterize air quality. Monitoring would take longer than modeling because the air agency would need time to site and deploy the new monitors and collect three years of data. Modeling analyses can be done much sooner.

Accordingly, the strategy envisions a future round of designations based first on modeling information, and a later round based on new monitoring information. The rulemaking would set forth a process for air agencies to identify which covered sources or source regions will be monitored and which will be modeled. Air agencies could choose to characterize air quality for additional sources as well. The final designation date in turn will establish the due date for submittal of attainment plans for nonattainment areas designated based on the new data.

Alternatively, air agencies also would have the incentive to work with sources in these areas to avoid a nonattainment designation by establishing and submitting to EPA enforceable emission limitations ensuring that attainment with the SO_2 NAAQS (in the form of permit limits, source-specific SIP revisions, or other permanent and enforceable legal documents) occurs prior to the date that final designations based on modeling information are issued. Note that in areas with multiple nearby sources contributing to the potential nonattainment problem, the air agencies would need to coordinate with all of the sources in the area to ensure the timely adoption and implementation of such enforceable emission limitations and controls in order for the area to avoid a potential nonattainment designation. Notably, as the timeline below indicates, we expect the modeling-based designations to be completed in 2017, which is *after* the current MATS compliance deadline of April 2015, or April 2016 (if a source requests and is granted a 1-year extension to install controls). Therefore, based on the anticipated timeline presented below, this approach would allow air agencies to take into consideration emission reduction measures that will be implemented to comply with that rule.

After considering stakeholder input, the EPA believes that a workable implementation timeline[3] for carrying out this updated strategy would involve the following milestones:

- 4/2013: EPA issues draft technical assistance documents for air quality modeling and monitoring for public review
- 7/2013: EPA issues final technical assistance documents for modeling and monitoring
- Late 2013: EPA proposes data requirements rule for public comment
- Late 2014: EPA finalizes data requirements rule with appropriate revisions based on public comments
- 2015: Air agency, in consultation with sources and EPA, identifies those sources and areas that will deploy new monitoring, and others that instead will be subject to modeling to characterize air quality
- 1/2016: Air agency identifies which sources will deploy new monitoring; air agency also submits modeling protocol for sources to be modeled
- 6/2016: Air agency submits updated monitoring plan
- 1/2017: Air agency has new monitors deployed and operational. Air agency submits modeling analyses for selected sources and nonattainment area boundary recommendations as appropriate. Alternatively, air agency submits enforceable emission limitations and modeling showing attainment for areas to avoid nonattainment designation.
- 8/2017: EPA issues 120-day letters as part of designation process for newly modeled areas
- 12/2017: EPA issues final designations for modeled areas
- 8/2019: SIP attainment demonstrations are due for "modeled" areas that were designated nonattainment in 12/2017
- 5/2020: Air agencies certify 2019 monitoring data and submit designation recommendations based on monitoring data
- 8/2020: EPA issues 120-day letters as part of designation process for areas with new monitoring data
- 12/2020: EPA issues final designations for rest of country, including for new monitored areas
- 8/2022: SIP attainment demonstrations are due for areas designated as nonattainment in 12/2020 based on monitoring data

Background

Designed to protect sensitive individuals from respiratory effects associated with short-term exposures to SO_2, the SO_2 standard was established with a 1-hour averaging time.[4] The reaction of SO_2 with other pollutants in the atmosphere and the contribution of SO_2 to regional air pollution problems such as fine particle formation and acidic deposition are well-understood. However, the highest ambient concentrations of gaseous SO_2 emissions generally occur relatively close to one or a few key

[3] Reminder: this timeline does not include SIP and attainment dates for the areas with current monitored violations that will be designated in June 2013. Also, this timeline does not address what action EPA will take if, based on three full years of data, an existing monitor shows a new violation of the 1-hour NAAQS. Consistent with this updated strategy, in those cases, EPA will work with the affected air agencies to designate the area as nonattainment or the air agency can avoid a nonattainment designation by establishing and submitting to EPA enforceable emission limitations ensuring attainment, as discussed above.

[4] The design value for a monitor is violating the SO_2 primary standard if the average of the 99^{th} percentile of daily maximum 1-hour values for three consecutive years exceeds 75 parts per billion.

SO_2 sources in an area, often within 10-20 kilometers of that parent source or sources. Thus, from an air quality management perspective, the SO_2 NAAQS is considered to be a "source-oriented" NAAQS rather than a "regional" one (*i.e.,* more similar to the lead NAAQS than the ozone NAAQS). Strategies to attain the SO_2 NAAQS are expected to be focused on key point sources. The largest sources of SO_2 include coal-fired electric utilities and industrial boilers, refineries, pulp and paper related industries, and chemical manufacturing.

The traditional NAAQS implementation process begins with the area designations process described in section 107 of the Clean Air Act (CAA), which generally relies on air quality concentrations to be characterized by ambient monitoring data collected by the air agency to identify areas that are exceeding the relevant standard. Typically, the air agency provides EPA with area recommendations and supporting technical information; EPA considers this information and issues a letter to the air agency at least 120 days prior to finalizing the designation which describes its intended designation and boundaries; and the air agency in some cases provides EPA with additional comments or suggested modifications during the 120-day period. (As noted above, air quality modeling data has been used to characterize SO_2 concentrations for the area designations process in some cases, and was later used as the basis for SIP Calls.)

The preamble to the final SO_2 NAAQS noted that although the current SO_2 ambient monitoring network included 400+ monitors nationwide, the scope of the network had certain limitations, and approximately two-thirds of the monitors are not located to characterize maximum concentration source-oriented impacts. It was observed that some areas without monitoring likely have concentrations violating the NAAQS. To address these potential public health impacts, the SO_2 NAAQS preamble and subsequent draft guidance issued in September 2011 recommended that air agencies submit substantive attainment demonstration SIPs based on air quality modeling by June 2013 [under Clean Air Act section 110(a)(1)] that would show how areas expected to be designated unclassifiable and have sources emitting over 100 tons of SO_2 per year would attain and maintain the NAAQS in the future.

A number of commenters expressed concern with this suggested implementation approach, particularly with the number of sources to be modeled (more than 1680 sources had emissions exceeding 100 tons in 2008), and the recommended SIP submission date for areas *without* monitoring being before the SIP due date for violating areas *with* monitoring data. In response, EPA Assistant Administrator Gina McCarthy sent letters to state Environmental Commissioners on April 12, 2012 indicating that EPA wanted to further consult with stakeholders regarding how to best implement this standard and protect public health in an effective manner. The letters also stated that the Agency would not expect air agencies to submit attainment demonstrations by June 2013 for areas not designated as "nonattainment" based on ambient monitoring data. EPA developed a white paper on possible implementation approaches and proceeded to convene three stakeholder meetings in May-June 2012 with environmental group representatives; state, local, and tribal air agency representatives; and industry representatives. On July 27, 2012, EPA also announced that it was extending the deadline for SO_2 NAAQS area designations by an additional year, to June 3, 2013, based on the unavailability of data.[5]

[5] 77 FR 46295, August 3, 2012.

Input from Stakeholders

A number of important comments were provided to EPA in the stakeholder meetings and in writing, and have informed this updated SO_2 NAAQS implementation strategy.[6] Key themes included:

- Several air agency and industry representatives supported basing designations on monitoring data only.
- Other air agencies, however, cited concerns about the cost of establishing new monitoring sites and supported flexibility to use monitoring *or* modeling to characterize air quality for the designations process. However, if modeling is used to characterize air quality for designations, then there was strong sentiment that it should be based on modeling of *actual* emissions (not allowable emissions).
- Environmental groups strongly supported the use of modeling to characterize air quality for future designations.
- All stakeholder groups supported a "threshold" concept to focus implementation on the largest emissions sources and/or sources located in areas with higher population.
- Air agencies asked for sufficient time to conduct the necessary monitoring or modeling, citing the large number of sources to be addressed (even with a threshold), limited resources, and the stringency of the 1-hour standard.
- Many stakeholders stated that any new modeling or monitoring requirements should be established through a notice-and-comment rulemaking process.

[6] See EPA's SO2 implementation website for more information on EPA's May 2012 white paper on SO2 implementation, summaries of the three stakeholder meetings, and the docket including written comments on the white paper at: http://www.epa.gov/oaqps001/sulfurdioxide/implement.html.