Technical Support Document:

Intended Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard

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U.S. Environmental Protection Agency
Office of Air and Radiation
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This electronic file includes Chapters 1 and 2. Chapters 3 through 12, which mainly address EPA's intended nonattainment areas, except where otherwise noted, are available as separate electronic files. Each chapter is separately paginated and footnoted.

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Technical Support Document:

Chapter 1
Background and History of the Intended Round 4 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard

1. Overview

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (EPA, we, or us) must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. See CAA section 107(d)(1)(A)(i)-(iii).

In this action, EPA defines a nonattainment area as an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA has determined either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS. An attainment/unclassifiable area is defined as an area that, based on available information including (but not limited to) appropriate monitoring data and/or modeling analyses, EPA has determined meets the NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS.[1,2] An unclassifiable area is defined as an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.

EPA is under a December 31, 2020, deadline to designate all remaining undesignated areas as required by the U.S. District Court for the Northern District of California.[3] This deadline is the final of three deadlines established by the court for EPA to complete area designations for the 2010 SO_2 NAAQS. The remaining undesignated areas are: 1) those areas which, under the court order, did not meet the criteria that required designation in Round 2 and also were not required to

[1] Historically, EPA has designated most areas that do not meet the definition of nonattainment as "unclassifiable/attainment." EPA has reversed the order of the label to be "attainment/unclassifiable" to better convey the definition of the designation category and so that the category is more easily distinguished from the separate unclassifiable category. *See* 83 FR 1098 (January 9, 2018) and 83 FR 25776 (June 4, 2018).
[2] The term "designated attainment area" is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA's approval of a state-submitted maintenance plan.
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).

be designated in Round 3 due to installation and operation of a new SO_2 monitoring network by January 2017 in the area meeting EPA's specifications referenced in EPA's SO_2 Data Requirements Rule (DRR)[4], and 2) those areas which EPA has not otherwise previously designated for the 2010 SO_2 NAAQS.

In previous final actions, as explained in the next section, EPA has issued designations for the 2010 SO_2 NAAQS for most areas of the country.[5] We are referring to the set of designations being finalized by the deadline of December 31, 2020, as "Round 4" or the final round of the designations process for the 2010 SO_2 NAAQS. After these Round 4 designations are completed, there will be no remaining undesignated areas for the 2010 SO_2 NAAQS.

This technical support document (TSD) addresses designations for all of the remaining undesignated areas in the United States for the 2010 SO_2 NAAQS. This chapter, Chapter 1 of the TSD, includes background information and definitions that apply to all the areas in our intended designations. Chapter 2 of the TSD addresses areas that have no violating SO_2 monitors which EPA intends to designate either attainment/unclassifiable or unclassifiable. Finally, Chapters 3 through 12 of the TSD address areas that EPA intends to designate nonattainment, except where otherwise noted.[6]

2. Background and History

The Administrator signed a final rule revising the primary SO_2 NAAQS on June 2, 2010. The rule was published in the *Federal Register* on June 22, 2010 (75 FR 35520) and became effective on August 23, 2010. Based on the Administrator's review of the air quality criteria for oxides of sulfur (SO_x) and the primary NAAQS for SO_x as measured by the indicator compound SO_2, EPA revised the primary SO_2 NAAQS to provide requisite protection of public health with an adequate margin of safety. Specifically, EPA established a new 1-hour SO_2 standard at a level of 75 parts per billion (ppb), which is met at an ambient air quality monitoring site when the 3-year average of the annual 99th percentile of daily maximum 1-hour average concentrations is less than or equal to 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a) and (b). The EPA also established provisions to revoke both the existing 24-hour and annual primary SO_2 standards, subject to certain conditions. *See* 40 CFR 50.4(e).

Current scientific evidence links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (e.g., while exercising or playing). Studies also show a connection between short-term

[4] *See* 80 FR 51052 (August 21, 2015), codified at 40 CFR part 51 subpart BB.
[5] Most areas of the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), December 13, 2016 (81 FR 89870), January 9, 2018 (83 FR 1098) and April 5, 2018 (83 FR 14597). EPA is not reopening these previous designation actions in this current Round 4 of designations under the 2010 SO_2 NAAQS, except where specifically discussed.
[6] In the state-specific chapters, the term "this TSD" is sometimes used to refer to that particular state-specific chapter rather than the entire TSD.

exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics. EPA's NAAQS for SO_2 is designed to protect against exposure to the entire group of SO_x. SO_2 is the component of greatest concern and is used as the indicator for the larger group of gaseous SO_x. Other gaseous SO_x (e.g., SO_3) are found in the atmosphere at concentrations much lower than SO_2.

Emissions that lead to high concentrations of SO_2 generally also lead to the formation of other SO_x. Control measures that reduce SO_2 can generally be expected to reduce people's exposures to all gaseous SO_x. This is expected to have the important co-benefit of reducing the formation of fine sulfate particles, which pose significant public health threats. SO_x can react with other compounds in the atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death.[7] EPA's NAAQS for particulate matter are designed to provide protection against these health effects.

In the notice of proposed rulemaking for the revised SO_2 NAAQS (74 FR 64810; December 8, 2009), EPA issued proposed guidance on our approach to implementing the standard, including our approach to initial area designations. EPA solicited comment on that guidance and, in the notice of final rulemaking (75 FR 35520; June 22, 2010), provided further guidance concerning implementation of the standard and how to identify nonattainment areas and boundaries for the SO_2 NAAQS. Subsequently, on March 24, 2011, EPA provided additional designations guidance to assist states with making their recommendations for area designations and boundaries.[8] That guidance recommended, among other things, that monitoring data from the most recent 3 consecutive years be used to identify a violation of the SO_2 NAAQS. This is appropriate because the form of the SO_2 NAAQS is calculated as a 3-year average of the 99th percentile of the yearly distribution of daily maximum 1-hour average SO_2 concentrations (specifically the most recent 3 consecutive calendar years).

In the March 24, 2011 guidance, EPA stated that the perimeter of a county containing a violating monitor would be the initial presumptive boundary for nonattainment areas, but also stated that the state, tribe, and/or EPA could conduct additional area-specific analyses that could justify establishing either a larger or smaller area. EPA indicated that the following factors should be considered in an analysis of whether to exclude portions of a county and whether to include additional nearby areas outside the county as part of the designated nonattainment area: 1) air quality data; 2) emissions-related data; 3) meteorology; 4) geography/topography; and 5) jurisdictional boundaries, as well as other available data. The EPA indicated that states and tribes may identify and evaluate other relevant factors or circumstances specific to a particular area.

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[7] *See* Fact Sheet titled, "Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide" at https://www.epa.gov/sites/production/files/2016-05/documents/final_primary_naaqs_factsheet.pdf.

[8] *See*, "Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards," memorandum to Regional Air Division Directors, Regions I-X, from Stephen D. Page, dated March 24, 2011, available at https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/20110324_page_so2_designations_guidance.pdf.

After EPA promulgates a new or revised NAAQS, EPA is required to designate all areas of the country as either "nonattainment," "attainment," or "unclassifiable," for that NAAQS pursuant to section 107(d)(1)-(2) of the CAA. The process for designating areas following promulgation of a new or revised NAAQS is contained in section 107(d) of the CAA. The CAA requires EPA to complete the initial designations process within 2 years of promulgating a new or revised standard. If the Administrator has insufficient information to make these designations by that deadline, the EPA has the authority to extend the deadline for completing designations by up to 1 year. On July 27, 2012, EPA announced that we had insufficient information to complete the designations for the 1-hour SO_2 standard within 2 years and extended the designations deadline to June 3, 2013 (77 FR 46295; August 3, 2012).

For the 2010 SO_2 NAAQS, states' designation recommendations were due to EPA by June 3, 2011. Designation recommendations and supporting documentation were submitted by 49 states, the District of Columbia, four territories, and five tribes to EPA by that date. After receiving these recommendations, and after reviewing and evaluating each recommendation, EPA provided responses to the states and tribes regarding certain areas on February 7, 2013. The state and tribal letters, including the initial recommendations, EPA's February 2013 responses to those letters, any modifications, and the subsequent state comment letters, are in the separate docket for that first round of SO_2 designations, at Docket ID NO. EPA-HQ-OAR-2012-0233.[9]

Although not required by section 107(d) of the CAA, EPA also provided an opportunity for members of the public to comment on the EPA's February 2013 response letters. EPA completed the first round of SO_2 designations on July 25, 2013, designating 29 areas in 16 states as nonattainment (78 FR 47191; August 5, 2013). EPA based this first round of final SO_2 designations on monitored SO_2 concentrations from Federal Reference Method and Federal Equivalent Method monitors that are sited and operated in accordance with 40 CFR parts 50 and 58. In the preamble to that action, EPA stated that in separate future actions, we intended to address designations for all other areas for which EPA was not yet prepared to issue designations and that were consequently not addressed in that final rule. With input from a diverse group of stakeholders, EPA developed a comprehensive implementation strategy for the future SO_2 designations actions that focuses resources on identifying and addressing unhealthy levels of SO_2 in areas where people are most likely to be exposed to violations of the standard.

Following the initial August 5, 2013, designations, three lawsuits were filed against EPA in different U.S. District Courts, alleging the agency had failed to perform a nondiscretionary duty under the CAA by not designating all portions of the country by the June 2, 2013, deadline. In an effort intended to resolve the litigation in one of those cases, EPA and the plaintiffs, Sierra Club and the Natural Resources Defense Council, filed a proposed consent decree with the U.S. District Court for the Northern District of California. On March 2, 2015, the court entered the consent decree and issued an enforceable order for EPA to complete the area designations by three specific deadlines according to the court-ordered schedule.

On August 21, 2015 (80 FR 51052), EPA separately promulgated a rule requiring states to undertake air quality characterization for areas with SO_2 sources meeting certain criteria, called

[9] Many documents related to EPA's 2010 SO_2 NAAQS designations are also available on the SO_2 designations Web site at https://www.epa.gov/sulfur-dioxide-designations.

the Data Requirements Rule (DRR). The DRR required state air agencies to provide additional monitoring or modeling information to characterize air quality in areas associated with sources meeting certain criteria or that have otherwise been listed under the DRR by EPA or state air agencies, or to instead impose federally enforceable emission limitations on those sources restricting their annual SO_2 emissions to less than 2,000 tons per year (tpy), or provide documentation that the sources have been shut down, by specified dates. The information generated by implementation of the DRR can help inform the designations addressed in this TSD and subsequent actions.

EPA issued two updated designations guidance documents on March 20, 2015, and July 22, 2016.[10] These memoranda superseded earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and identify factors that EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS or contribute to air quality in nearby areas that are in violation of the 2010 SO_2 NAAQS. The guidance also contained the factors EPA intended to evaluate in determining the boundaries for all remaining areas in the country, consistent with the court's order and schedule. These factors include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries. This guidance was supplemented by two non-binding technical assistance documents intended to assist states and other interested parties in their efforts to characterize air quality around SO_2 sources through air dispersion modeling or ambient air quality monitoring for sources that emit SO_2. Notably, EPA's documents titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (SO_2 NAAQS Designations Modeling TAD) and "SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document" (SO_2 NAAQS Designations Monitoring TAD), were first made available as drafts to states and other interested parties in spring of 2013. Both of these documents were updated in February 2016. The SO_2 NAAQS Designations Modeling TAD was updated again in August 2016.[11] On March 8, 2017, the EPA issued a memo to clarify what version of the American Meteorological Society/Environmental Protection Agency Regulatory Mode (AERMOD) modeling system code is the most appropriate for consideration by the Agency in the SO_2 designations process.[12]

According to the court-ordered schedule, EPA was required to complete a second round of SO_2 designations by no later than July 2, 2016. The court order specified that in the second round, the EPA must designate two groups of areas: (1) areas that have newly monitored violations of the

[10] *See* "Updated Guidance for Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard," memorandum to Regional Air Division Directors, Regions 1-10, from Stephen D. Page, dated March 20, 2015, available at https://www.epa.gov/sites/production/files/2016-04/documents/20150320so2designations.pdf, and "Area Designations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard – Round 3," memorandum to Regional Air Division Directors, Regions 1-10, dated July 22, 2016, available at https://www.epa.gov/sites/production/files/2016-07/documents/areadesign.pdf.

[11] *See* SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document (February 2016), available at https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf, and SO2 NAAQS Designations Modeling Technical Assistance Document (August 2016), available at https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf.

[12] Clarification on the AERMOD Modeling System Version for Use in SO_2 Implementation Efforts and Other Regulatory Actions, Richard A. Wayland to EPA Regional Air Division Directors. This memo is available at https://www3.epa.gov/ttn/scram/guidance/clarification/SO2_DRR_Designation_Modeling_Clarification_Memo-03082017.pdf.

2010 SO_2 NAAQS and (2) areas that contain any stationary sources that had not been announced as of March 2, 2015, for retirement and that, according to EPA's Air Markets Database, emitted in 2012 either (i) more than 16,000 tons of SO_2, or (ii) more than 2,600 tons of SO_2 with an annual average emission rate of at least 0.45 pounds of SO_2 per one million British thermal units. Specifically, a stationary source with a coal-fired electric generating unit that, as of January 1, 2010, had a capacity of over 5 megawatts and otherwise meets the emissions criteria, is excluded from the July 2, 2016, deadline if it had announced through a company public announcement, public utilities commission filing, consent decree, public legal settlement, final state or federal permit filing, or other similar means of communication, by March 2, 2015, that it will cease burning coal at that unit.

On July 12, 2016, and on December 13, 2016, (81 FR 45039 and 81 FR 89870, respectively), EPA published *Federal Register* notices completing the Round 2 air quality designations for 65 areas in 24 states for the 2010 SO_2 NAAQS including 7 nonattainment areas, 41 unclassifiable/attainment areas, and 17 unclassifiable areas. EPA and state documents and public comments related to these two actions are in the docket for the second round of SO_2 designations at Docket ID NO. EPA-HQ-OAR-2014-0464.

According to the court-ordered schedule, EPA was required to complete the third round of SO_2 designations by no later than December 31, 2017. The court order specified that in the third round, EPA designate all remaining undesignated areas in which, by January 1, 2017, states have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's DRR. This included: (1) areas associated with sources meeting DRR emissions criteria that states have chosen to characterize using air dispersion modeling, (2) the areas associated with sources for which states imposed emissions limitations on DRR-listed sources to restrict their SO_2 emissions to less than 2,000 tpy, (3) the areas associated with sources for which states provided documentation of a permanent shut down of a DRR-listed source, (4) areas where previously existing SO_2 monitoring networks were appropriately sited to characterize DRR source areas, and (5) other areas not specifically required to be characterized under the DRR.

On January 9, 2018 and April 5, 2018, (83 FR 1098 and 83 FR 14597, respectively) EPA published *Federal Register* notices completing the designations for the Round 3 areas subject to the December 31, 2017 deadline, designating 6 areas nonattainment, 22 areas unclassifiable, and the remaining areas of the United States as attainment/unclassifiable that were not, pursuant to the DRR, operating a new EPA-approved monitoring network. EPA and state documents and public comments related to these two actions are in the docket for the third round of SO_2 designations at Docket ID NO. EPA-HQ-OAR-2017-0003.

In Round 4, EPA intends to designate all remaining undesignated areas by December 31, 2020, through an assessment and characterization of air quality based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data from January 2017 forward, pursuant to the DRR; however, other available evidence and supporting information, such as air dispersion modeling in certain situations, may also be considered.

An updated designations guidance document was issued by EPA through a September 5, 2019, memorandum from Peter Tsirigotis, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Regional Air Division Directors, U.S. EPA Regions 1-10.[13] To better reflect the Round 4 designations process, this memorandum supplements, where necessary, prior designations guidance documents on area designations for the 2010 primary SO_2 NAAQS issued on March 24, 2011, March 20, 2015, and July 22, 2016. This memorandum identifies factors that EPA intends to evaluate in determining whether areas are in violation of the 2010 1-hour SO_2 NAAQS. The document also contains the factors that EPA intends to evaluate in determining the boundaries for all remaining areas in the country. These factors include: 1) air quality characterization via ambient monitoring and/or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

In EPA's September 2019, memorandum, we note that Round 4 area designations will be based primarily on ambient monitoring data, including data from existing and new EPA-approved monitors that have collected data at least from January 2017 forward, pursuant to the DRR. In addition, EPA may evaluate air dispersion modeling submitted by state air agencies for two specific circumstances. First, states may submit air dispersion modeling to support the geographic extent of a nonattainment boundary. Second, states may submit air dispersion modeling to demonstrate that new permanent and federally enforceable SO_2 emissions limits provide for attainment of the NAAQS and represent a more accurate characterization of current air quality at the time of designation than does monitoring of past air quality

The following are definitions of important terms used in this TSD for all states in our Round 4 intended designations:

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. See 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the 2010 SO_2 NAAQS.
3) Intended designated nonattainment area –an area that, based on available information including (but not limited to) monitoring data and/or appropriate modeling analyses, EPA intends to determine either: (1) does not meet the 2010 SO_2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Intended designated attainment/unclassifiable area – an area that, based on available information including (but not limited to) appropriate monitoring data and/or appropriate modeling analyses, EPA intends to determine meets the 2010 SO_2 NAAQS and does not likely contribute to ambient air quality in a nearby area that does not meet the NAAQS.
5) Intended designated unclassifiable area – an area for which the available information does not allow EPA to determine whether the area meets the definition of a nonattainment area or the definition of an attainment/unclassifiable area.
6) Modeled violation – a modeled design value impact above the 2010 SO_2 NAAQS demonstrated by air dispersion modeling.

[13] https://www.epa.gov/sites/production/files/2019-09/documents/round_4_so2_designations_memo_09-05-2019_final.pdf

7) Recommended attainment area – an area that a state, territory, or tribe has recommended that EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that EPA designate as unclassifiable.
10) Recommended attainment/unclassifiable (or unclassifiable/attainment) area – an area that a state, territory, or tribe has recommended that EPA designate as attainment/unclassifiable (or unclassifiable/attainment).
11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to EPA.