Draft Guidance on Area Designations for the 2015 Revised Ozone National Ambient Air Quality Standards

The purpose of this guidance is to provide information on the schedule and process for initially designating areas for the purpose of implementing the 2015 revised primary and secondary ozone national ambient air quality standards (NAAQS). In addition, this memorandum identifies important factors that the Environmental Protection Agency intends to evaluate in making final nonattainment area boundary decisions for these standards. The EPA recommends that states and tribes also consider these factors in making their recommendations for area designations and nonattainment area boundaries. As for prior designations for the ozone NAAQS, the EPA will also consider any other relevant information in making designation determinations. Please share this memorandum with state and tribal air agencies in your region.

On October 1, 2015, the EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292, October 26, 2015). In that action, the EPA strengthened both standards to a level of 0.070 parts per million, while retaining their indicators, averaging times, and forms. The EPA revised the ozone standards based on an integrated assessment of an extensive body of new scientific evidence, which substantially strengthens our knowledge regarding ozone-related health and welfare effects, the results of exposure and risk analyses, the advice of the Clean Air Scientific Advisory Committee, and consideration of public comments.

The revised primary standard provides increased protection for children, older adults, and people with asthma or other lung diseases, and other at-risk populations against an array of adverse health effects including reduced lung function, increased respiratory symptoms and pulmonary inflammation and asthma exacerbations; effects that contribute to emergency department visits or hospital admissions; and mortality. The revised secondary standard provides protection of natural forests from adverse growth-related effects and is expected to provide increased protection from other effects of potential public welfare significance, including crop yield loss and visible foliar injury.

Clean Air Act Designation Requirements

Section 107(d) of the Clean Air Act (CAA) governs the process for initial area designations after the EPA establishes a new or revised NAAQS. Under section 107(d) of the CAA, states are required to submit area designation recommendations to the EPA. This submission must happen by a date specified by the EPA, which cannot be sooner than 120 days, or later than 1 year, after promulgation of the new or revised NAAQS. If, after careful consideration of these recommendations, the EPA intends to promulgate a designation different from a state's recommendation, then the EPA must notify the state at least 120 days prior to promulgating the final designation and must provide the state an opportunity to comment on the intended modification. The EPA may choose to modify a state's recommended designation as it relates to the status of an area or as it relates to the boundaries of an area. The CAA requires the EPA to complete the initial designation process within 2 years of promulgation of a new or revised NAAQS, unless the Administrator has insufficient information to make initial designation decisions in the 2-year time frame. In such circumstances, the EPA may take up to 1 additional year to

make initial area designation decisions (i.e., no later than 3 years after promulgation of the standard). While section 107(d) of the CAA specifically addresses the designations process between the EPA and states, the EPA intends to follow the same process to the extent practicable for tribes that choose to make initial designation recommendations pursuant to section 301(d) of the CAA regarding tribal authority and the Tribal Authority Rule (TAR) (63 FR 7254, February 12, 1998). To provide clarity and consistency in doing so, in December 2011, the EPA issued a guidance memorandum concerning the involvement of tribes in the designations process.[1] In accordance with the TAR and the December 2011 tribal designations guidance, and in consultation with the tribes, the EPA intends to designate tribal areas on the same schedule as designations for states. If a state or tribe does not submit designation recommendations, then the EPA will promulgate the initial designations that the agency deems appropriate.

Schedule for Initial Ozone Area Designations

State governors should submit, and tribes can choose to submit, their initial designation recommendations for the 2015 ozone NAAQS to the EPA no later than 1 year following promulgation of the revised NAAQS, i.e., by October 1, 2016. Because the form of the 2015 ozone NAAQS relies on a 3-year average, we recommend that states and tribes base their recommendations on air quality data from the 3 most recent years of quality assured monitoring data available at that time, i.e., 2013 to 2015. However, states and tribes may also have preliminary information about 2016 monitoring data that could help inform their recommendations. Based upon these monitoring data and any other available information, states and tribes should identify areas as attainment, nonattainment, or unclassifiable.[2] If the EPA believes it is necessary to make any modifications to a state's or tribe's initial recommendations, including area boundaries, then the EPA will notify the state or tribe by letter of the intended modification no later than 120 days prior to finalizing the designation. These notifications are commonly known as the "120-day letters." Consistent with the statutory requirement that the EPA designate areas no later than 2 years following promulgation of a revised NAAQS, the EPA expects to complete the initial area designations by October 1, 2017. Thus, the EPA intends to issue the 120-letters no later than June 2, 2017. If a state or tribe has additional information that it wants the EPA to consider with respect to a designation recommendation that the EPA plans to modify, then the EPA requests that such information be submitted no later than 60 days from the date of the 120-day letter. This schedule will ensure that the EPA can fully consider any such additional information prior to issuing final designations. Also, although section 107(d) of the CAA explicitly exempts the designation process from the public notice and comment rulemaking process, the EPA intends to consider public input in the

[1] Guidance to Regions for Working with Tribes during the National Ambient Air Quality Standards (NAAQS) Designations Process. Memorandum from Stephen D. Page, Director, EPA OAQPS to Regional Administrators, Regions I-X. December 20, 2011. Available at *http://www.epa.gov/ttn/oarpg/t1/memoranda/20120117naaqsguidance.pdf*.

[2] For the initial area designations for the 1997 ozone NAAQS and the 2008 ozone NAAQS, the EPA used a designation category of "unclassifiable/attainment" for areas that were monitoring attainment and for areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to nearby violations. The EPA reserved the category "unclassifiable" for areas where the EPA could not determine based on available information whether the area was meeting or not meeting the NAAQS and the EPA had not determined that the area contributed to a nearby violation. While states can submit recommendations identifying areas as "attainment," the EPA expects to continue to use the "unclassifiable/attainment" category for designations for the 2015 ozone NAAQS.

designation process. Accordingly, we plan to provide a 30-day public comment period immediately following issuance of the 120-day letters responding to the designation recommendations from states and tribes.[3] Attachment 1 summarizes this anticipated schedule.

Defining Nonattainment Areas

Section 107(d)(1) of the CAA directs the EPA to designate an area "nonattainment" if it is violating the NAAQS or if it is contributing to a violation of the NAAQS in a nearby area. Thus, the first step in the designation process is to identify air quality monitoring sites with data that show a violation of the 2015 ozone NAAQS. Violations are identified using data from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors that are sited and operated in accordance with 40 CFR part 58. Procedures for using the air quality data to determine whether a violation has occurred are given in 40 CFR part 50 Appendix U, as revised in conjunction with the final rule for the 2015 ozone NAAQS (80 FR 65292, October 26, 2015). For designations for the 2015 ozone NAAQS, the EPA intends to evaluate areas using the most recent complete three consecutive calendar years of quality-assured, certified air quality data in the EPA Air Quality System (AQS).[4] In accordance with 40 CFR 58.15, states are required to certify their air monitoring data for the previous year by May 1 of each year. Although generally the EPA will use such data only if they have been certified by the reporting organization, data not certified by the reporting organization can nevertheless be used if the deadline for certification has passed and the EPA judges the data to be complete and accurate. We expect that in providing designation recommendations to the EPA by October 1, 2016, states and tribes will review and rely on air quality data from 2013 to 2015. States and tribes may also review and consider preliminary 2016 data, although those data cannot be relied on until they are either certified in accordance with 40 CFR 58.15 or the date for certification has passed. Air quality monitoring data from 2016 are required to be certified and quality assured by May 1, 2017. Because the certification date will have passed and the data will be available, the EPA expects to base final designation decisions by October 1, 2017, on data from 2014 to 2016.[5] For this reason, the EPA encourages states and tribes to review and consider preliminary 2016 air quality data in their designation recommendations. States and tribes may also update their designation recommendations based on 2016 data once the data have met the certification requirements.

The EPA notes that in past designations, some states have chosen to certify air quality data prior to the certification deadline (i.e., "early certify") so that the EPA could rely on the newer data for designations.

[3] Section 107(d)(2) explicitly provides that designations are exempt from the notice and comment provisions of the Administrative Procedure Act (APA). Likewise, designations under section 107(d) of the CAA are not among the list of actions that are subject to the notice and comment procedures of CAA section 307(d). Thus, neither the CAA nor the APA require notice and comment rulemaking for promulgation of the designations for these or any other NAAQS. However, the EPA intends to solicit direct public comment on its preliminary responses to the initial area designation recommendations of the states and tribes because we believe this process will be useful to gather additional information and to assure that the agency is more directly aware of issues raised by initial area designations.

[4] This information is available on the EPA's website at *http://www2.epa.gov/aqs*.

[5] In the final rule for the 2015 ozone NAAQS, the EPA also finalized changes to the ambient air monitoring requirements applicable to the ozone NAAQS. In 32 states and the District of Columbia, the final rule extends the ozone season. The new ozone season requirements do not take effect until January 1, 2017.

For multi-state nonattainment areas, there have been situations where some, but not all, of the states with portions in the area have chosen to early certify their data. In such cases, the "most recent air quality data" for the area is a mix of two different 3-year periods – an earlier time period for those states that did not early certify data and a later time period for those states that chose to early certify. The most common situation is where one state that is part of the multi-state area early certifies data that show attainment of the NAAQS. The other is where one state early certifies data that show a violation. The EPA's position is that the agency cannot review mixed years of data to conclude that an area is attaining the standard; the decision must be based on the same 3-year period for all portions of the area. In contrast, if the early certified data for one state's portion of a multistate area indicate a violation of the NAAQS, the EPA's position is that the agency must consider the violating monitor and assess what nearby areas contribute to the violation.[6]

The process for evaluating the appropriate designation for areas that are not violating the NAAQS, but may be contributing to the violations of the NAAQS in a violating area, is discussed below in connection with the process for determining appropriate nonattainment area boundaries.

Exceptional Events and Designations

When certain criteria are met, the CAA and the EPA's implementing regulations specified in the Final Rule on the Treatment of Data Influenced by Exceptional Events (72 FR 13560, March 22, 2007)[7] allow for the exclusion of air quality monitoring data from design value calculations when there are exceedances caused by exceptional events. A design value describes the air quality status of a given location relative to the level of the NAAQS. A design value calculated using a data set from which exceptional event-influenced data have been excluded has the potential to affect initial area designations and nonattainment area classifications for the 2015 ozone NAAQS.

In the 2015 ozone NAAQS final rule, the EPA established schedules for air agencies to flag data influenced by exceptional events and submit related documentation for data that will be used in the initial designations process for the 2015 ozone NAAQS (*see* Attachment 2). Although some of these deadlines are accelerated compared to the general schedule timelines in the 2007 Exceptional Events Rule, they were promulgated to align closely with the timing of the initial designations recommendations from states and tribes in October 2016 and/or the EPA's expected issuance of 120-day letters pertaining to designations by June 2017. These schedules reflect the EPA's interest in ensuring that we can fully consider exceptional events claims that could influence the final designations decisions.

[6] The Court of Appeals for the D.C. Circuit upheld this approach as reasonable. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

[7] On November 10, 2015, the EPA proposed revisions to the 2007 Exceptional Events Rule and announced the availability for public comment of a draft guidance document, which applies the proposed rule revisions to wildfire events that could influence monitored ozone concentrations. *See* 80 FR 72840, November 20, 2015. The EPA intends to finalize these rule revisions and the wildfire guidance by the October 1, 2016, date by which states, and any tribes that wish to do so, are required to submit their initial designation recommendations for the 2015 ozone NAAQS.

The EPA regional offices are encouraged to work with states and tribes with exceptional events claims to prioritize and expedite the demonstration development and review process for those claims that have the potential to influence regulatory decisions, such as the initial designations process. Similarly, the EPA encourages states and tribes to contact and collaborate with the appropriate EPA regional office after identifying any exceptional events that influence ambient air quality concentrations in a way that could potentially affect designations for the 2015 ozone NAAQS. The EPA has developed interim exceptional events implementation guidance documents that air agencies can use when reviewing potential exceptional events and developing appropriate exceptional event demonstrations. Additional information and examples of exceptional event submissions and best practice components can be found at the EPA's exceptional events website located at *http://www2.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events.*

Nonattainment Area Analyses and Boundary Determination

The EPA believes that the boundaries for each nonattainment area should be evaluated and determined on a case-by-case basis considering the specific facts and circumstances unique to the area. Section 107(d) explicitly requires that the EPA designate as nonattainment not only the area that is violating the pertinent standard, but also those nearby areas that contribute to the violation in the violating area. After identifying each monitor that indicates a violation of the 2015 ozone NAAQS in an area, the EPA will determine which nearby areas contribute to the violation(s).

Ground-level ozone is not emitted directly into the air, but is formed by chemical reactions primarily between oxides of nitrogen (NOx) and volatile organic compounds (VOC) that are attributable to a variety of emission sources commonly found throughout urbanized areas. Because ozone and its precursor emissions are pervasive and readily transported, the EPA believes it is important to examine ozone-contributing emissions across a relatively broad geographic area associated with a monitored violation. Thus, for analyzing whether nearby areas contribute to a violating area, the EPA intends to consider information relevant to designations associated with the counties in the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA) in which the violating monitor(s) are located. The CBSAs and CSAs are delineated by the Office of Management and Budget (OMB) as part of their Metropolitan and Micropolitan Statistical Area program.[8] The CBSA is a collective term that refers to both Metropolitan Statistical Areas (MSAs) and Micropolitan Statistical Areas (Micropolitan Areas), which are distinguished by size. An MSA has at least one urban area with a population of at least 50,000. A Micropolitan Area has at least one urban area with a population of at least 10,000, but less than 50,000. Each CBSA consists of a county or counties associated with at least one urban core, plus adjacent counties having a high degree of social and economic integration with the core as measured

[8] OMB adopted revised standards for defining Metropolitan and Micropolitan Statistical Areas on December 27, 2000 (65 FR 82229). These standards established the terms CBSA and CSA. In 2010, OMB further revised the standards for delineating Metropolitan and Micropolitan Statistical Areas (75 FR 37246, June 28, 2010). The statistical areas are delineated based on U.S. Census Bureau information. The EPA intends to use the 2010 standards and the associated lists of CBSAs and CSAs issued in February 2013. These lists and their geographic components are provided at *http://www.census.gov/population/metro/*.

through commuting ties with the counties containing the core.[9] A CSA includes two or more adjacent CBSAs.

The EPA previously reviewed relevant information associated with OMB statistical area boundaries when analyzing nonattainment areas for the 1997 and 2008 ozone standards. We believe this is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated.[10] The EPA emphasizes it does not intend the statistical area boundary to be a presumed nonattainment area boundary. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA or CSA.[11] Where a violating monitor is not located in a CBSA or CSA, the EPA intends to review relevant information associated with the county containing the monitor and, if appropriate, other adjacent nearby counties. The EPA will determine the nonattainment area boundaries through a weight-of-evidence analysis for the area based on synthesizing the assessments of the five factors identified below. In relatively urbanized areas, the nonattainment area boundary may include an entire metropolitan area. In rural locations, the nonattainment area boundary may include one or more small population centers, each with sources that contribute to a violating monitor. In some cases, the boundary for a nonattainment area may include portions of two or more states, thus resulting in a multistate area. This approach to designations has been upheld by numerous courts under a variety of challenges.

Consistent with past designations for ozone NAAQS, for area-specific analyses through which the EPA intends to determine area boundaries, the EPA will evaluate information relevant to five factors: air quality data, emissions and emissions-related data, meteorology, geography/topography, and jurisdictional boundaries. The EPA also recommends that states and tribes base their boundary recommendations on an evaluation of information relevant to these five factors. Attachment 3 describes these factors in general and provides guidance regarding analyses relevant to each of these factors.[12] Additionally, the EPA, states and tribes may identify and evaluate other relevant information or circumstances specific to a particular area to support nonattainment area boundary recommendations.

[9] The geographic components of CBSAs are counties and equivalent entities (boroughs and census areas in Alaska, parishes in Louisiana, independent cities in Maryland, Missouri, Nevada, and Virginia, and municipios in Puerto Rico).
[10] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. Miss. Comm'n on Envtl. Quality v. EPA, 790 F.3d 138, 160 (D.C. Cir. 2015).
[11] The EPA notes that for the purpose of the designations for the 1-hour ozone standards at the time the CAA was amended in 1990, CAA section 107(d)(4)(A)(iv) and (v) specified the use of the OMB statistical areas as the boundaries that applied by operation of law for the then-existing nonattainment areas classified as Serious, Severe, and Extreme, unless a governor made a demonstration to the satisfaction of the EPA Administrator that a portion did not contribute.
[12] In the designation guidance for the 2012 $PM_{2.5}$ NAAQS, the EPA used these same five factors. In prior designation guidance for the ozone and $PM_{2.5}$ standards, the EPA identified nine factors to consider in making designation recommendations: emissions data, air quality data, population density and degree of urbanization, traffic and commuting patterns, growth rates and patterns, meteorology, geography/topography, jurisdictional boundaries, and level of control of emission source. In the area analyses to support the designations for the 2008 ozone standards, the EPA grouped the emissions-related factors together in the emissions and emissions-related data factor, resulting in five overall factors. The Court has upheld the EPA's use of a multi-factor test for designations multiple times. See Mississippi Commission on Env. Quality v. EPA 709 F.3d 138 (D.C. Cir. 2015); *ATK Launch Sys., Inc. v. EPA*, 669 F.3d 330 (D.C. Cir. 2012); *Catawba Cnty., v. EPA*, 571 F.3d 20 (D.C. Cir. 2009).

While the EPA generally believes it is appropriate to include the entire violating or contributing county in an ozone nonattainment area, we recognize that, in some cases, an assessment of relevant information may support inclusion of only part of a county. For example, as has been the case in past designations, there may be low elevation areas (e.g., valleys) with poor air quality in violation of the NAAQS due to restricted atmospheric dispersion where higher elevations (e.g., mountainous areas) in the same county can be shown not to have sources of emissions that contribute to the violation. Alternatively, partial county boundaries may be appropriate in situations where the sources located in a contributing county are located only in a portion of a large county that is otherwise not contributing to the nearby violations. Particularly in the western United States where counties are large, including only partial counties in a designated nonattainment area may be appropriate. For defining partial county boundaries, the EPA recommends the use of well-defined legal jurisdictional boundaries such as townships, census blocks, immovable landmarks (e.g., major roadways), or other permanent and readily identifiable boundaries.

In addition, as provided for in the December 20, 2011, guidance titled, "Policy for Establishing Separate Air Quality Designations for Areas of Indian Country," tribes may recommend that the EPA designate areas of Indian country separately from the adjacent state areas.[13] This guidance provides for a nationally consistent approach for evaluating such designation recommendations from tribes. The policy was designed to recognize tribal sovereignty in air quality management matters affecting Indian country.

Nonattainment Area Classifications

As provided in CAA section 181(a)(1), at the time of initial designations, the EPA will classify all nonattainment areas according to the severity of the ozone air quality problem. The classification categories are Marginal, Moderate, Serious, Severe-15, Severe-17 and Extreme. The EPA previously interpreted the air quality thresholds associated with each classification through rulemaking for both the 1997 and 2008 ozone NAAQS. We intend to take a similar approach for the revised 2015 ozone NAAQS and will finalize the rulemaking no later than the promulgation of the final designations.

Under CAA section 181(a)(4), the EPA has the discretion to reclassify a nonattainment area to a higher or lower classification (also known as a bump up or a bump down) within 90 days of the effective date of the initial designation and classification if the area would have been classified in another category had the area's design value been 5 percent greater or 5 percent less than the level on which the initial classification was based. The EPA does not intend to exercise its authority independently to initiate a reclassification of an area to a higher or lower classification. Rather, the EPA intends to rely on a state or tribe to submit a request for such a reclassification. As part of the action to designate and classify areas in 1991 for the 1-hour NAAQS, the EPA developed criteria for evaluating a state's request to reclassify a particular area to a lower classification. *See* 56 FR 56698, November 6, 1991. The EPA intends to continue to use the same approach for purposes of evaluating a request to reclassify an area to a lower classification for the 2015 ozone NAAQS. In the *Federal Register* action to designate areas for the 2015 ozone NAAQS, the EPA will provide the schedule for submitting a reclassification request

[13] Memorandum from Stephen D. Page, Director, EPA OAQPS to Regional Administrators, Regions I-X. December 20, 2011. Available at [ADD WEB LINK].

under section 181(a)(4) that would allow sufficient time for the EPA to make a determination within the 90-day period allowed under the CAA.

Section 181(b)(3) of the CAA allows a state to voluntarily request that the EPA reclassify a nonattainment area in that state to a higher classification. The EPA must grant the request. Multistate nonattainment areas present a special case because the area is not wholly in one state and classifications apply areawide. For multistate nonattainment areas, the EPA strongly encourages all of the states with a portion included in the nonattainment area to consult and agree prior to submission of a reclassification request. Section 181(b)(3) does not place a time limit on the opportunity for a state to request a voluntary reclassification of a nonattainment area to a higher classification. These voluntary reclassifications can be done at any time.

Rural Transport Areas

The EPA recognizes that violations of the ozone standards in some rural areas may be almost entirely attributable to emissions from upwind areas. Section 182(h) provides the EPA with the discretion to treat an ozone nonattainment area as a "rural transport area" (RTA), provided the area meets certain criteria. Regardless of the area's classification under section 181(a), an RTA is deemed to have fulfilled all ozone-related planning and control requirements if it meets the CAA's planning requirements for areas classified as Marginal.[14] To qualify as an RTA, the EPA must determine that the nonattainment area boundary does not include and is not adjacent to an MSA[15] and that the area does not contain VOC and NOx emissions sources that make a significant contribution to monitored ozone concentrations in the area, or in other areas. A nonattainment area that includes, or is adjacent to, a Micropolitan Statistical Area or that is too sparsely populated to be included in a statistical area, may be able to qualify as an RTA.

States and tribes that believe a potential nonattainment area qualifies for treatment as an RTA are encouraged to request, as part of their recommendations, that the EPA use the section 182(h) authority and to work with the EPA to develop and review information that would satisfy the CAA's RTA criteria. In general, the EPA expects a rural nonattainment area that has few or insignificant sources of ozone precursors to encompass a relatively small geographic area due to the lack of emission sources.[16] Therefore, partial county boundaries may be appropriate. The EPA expects this to be especially relevant in the western United States, where many of the counties are large. The EPA intends to respond to any

[14] The requirements applicable to ozone transport regions supersede the Marginal requirements for RTAs.
[15] The rural transport area criteria in section 182(h) restrict rural transport areas to those nonattainment areas that do not include and are not adjacent to any part of a "MSA" or "CMSA" as defined at the time of the 1990 CAA amendments. The OMB issued revised statistical area standards in 2000 that replaced the pre-existing MSA and CMSA definitions and established the terms "CBSAs" and "CSA." In 2010, OMB further revised the standards. The CBSA is a collective term that includes MSAs and Micropolitan Statistical Areas. The EPA interprets the references to both MSA and CMSA in CAA section 182(h) to refer to OMB's current definition of MSA. *See* 80 FR 12264, March 6, 2015. The EPA believes this interpretation of CAA section 182(h) is consistent with the original scope of CAA section 182(h) as promulgated in 1990.
[16] A relatively small area boundary may present special challenges in complying with certain nonattainment area requirements, including conformity for federal projects and new source review offsets. States may wish to consider these challenges in making nonattainment boundary recommendations to the EPA for rural areas during the designation process.

RTA request submitted during the designation process at the time the EPA promulgates the initial area designations. However, the EPA notes that a state or tribe may also request RTA treatment for a nonattainment area after the initial designations are completed. Attachment 3 provides information on conducting an analysis to support an RTA request.

Unclassifiable Areas

In certain cases, there may be insufficient information to support a designation of nonattainment or attainment for an area. For example, there may be monitors that indicate an exceedance of the NAAQS, but the monitoring data may be incomplete or the monitors may not be sited and operated in accordance with the regulatory requirements of 40 CFR part 58. In recommending boundaries for an unclassifiable area, states should consider which nearby areas contribute to ambient air quality within the impacted area. The EPA notes that if sufficient information later becomes available indicating a monitor in the unclassifiable area is violating the NAAQS and the EPA redesignates the area to nonattainment, the EPA likely would conduct a weight-of-evidence analysis as described in Attachment 3 of this guidance to determine the appropriate area boundaries.

Attainment Areas

Once the EPA has determined the boundaries for nonattainment areas (areas that are violating the NAAQS or contributing to a nearby violation) and any unclassifiable areas, the EPA intends to designate the remainder of the state as unclassifiable/attainment.[17] The EPA requests that states and tribes recommend how they would like the boundaries drawn for their unclassifiable/attainment areas. For designations for the 1-hour and two previous 8-hour ozone NAAQS, states have elected to draw boundaries for the unclassifiable/attainment areas in a variety of ways, including as "rest of state" or "entire state," by Air Quality Control Regions, by county, by previous nonattainment area boundaries, or by a combination of methods. The EPA recommends that the boundaries of unclassifiable/attainment areas generally not be smaller than a county.

Summary

This memorandum provides the EPA's preliminary views on the process for determining initial area designations and boundaries for the 2015 ozone NAAQS. Any guidance contained herein is not binding on states, tribes, the public or the EPA. The EPA will make the designations determinations and nonattainment area boundary decisions in the final action that designates all areas for the 2015 ozone standards. When the EPA promulgates the initial area designations, those decisions will be binding on states, tribes, the public and the EPA as a matter of law.

Three attachments provide additional information relevant to the initial ozone area designations process.

[17] As indicated in footnote 2, in the initial designations for previous ozone NAAQS, the EPA used a designation category of "unclassifiable/attainment" for areas that were monitoring attainment and for areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to nearby violations. The EPA expects to continue this approach for designations for the 2015 ozone NAAQS.

Attachment 1 is an anticipated timeline of important milestones in the initial area designations process for the 2015 ozone NAAQS. Attachment 2 identifies the promulgated exceptional event schedule for initial data flagging and submission of exceptional event demonstrations. Attachment 3 provides information on the five factors that the EPA intends to consider in evaluating and making decisions on nonattainment area boundaries and provides guidance regarding analyses relevant to support each of the factors. Attachment 3 also provides information on conducting an analysis to support an RTA request.

Staff in the EPA's Office of Air Quality Planning and Standards are available for assistance and consultation throughout the initial area designation process. Questions on this guidance may be directed to Carla Oldham at (919) 541-3347 or Denise Scott at (919) 541-4280.

Attachments (3)

ATTACHMENT 1

ANTICIPATED TIMELINE FOR 2015 OZONE NAAQS DESIGNATION PROCESS	
Milestone	**Date**
The EPA promulgates 2015 Ozone NAAQS rule	October 1, 2015
States and tribes submit recommendations for ozone designations to the EPA	No later than October 1, 2016
The EPA notifies states and tribes concerning any intended modifications to their recommendations (120-day letters)	No later than June 2, 2017 (120 days prior to final ozone area designations)
The EPA publishes public notice of state and tribal recommendations and the EPA's intended modifications, if any, and initiates 30-day public comment period	On or about June 9, 2017
End of 30-day public comment period	On or about July 10, 2017
States and tribes submit additional information, if any, to respond to the EPA's modification of a recommended designation	No later than August 7, 2017
The EPA promulgates final ozone area designations	No later than October 1, 2017

ATTACHMENT 2

Revised Schedule for Exceptional Event Flagging and Documentation Submission for Data to be Used in Initial Area Designations for the 2015 Ozone NAAQS

NAAQS Pollutant/ Standard/(Level)/ Promulgation Date	Air Quality Data Collected for Calendar Year	Event Flagging & Initial Description Deadline	Detailed Documentation Submission Deadline
Ozone/ Primary and Secondary 8-hour Standards (0.070 parts per million) Promulgated October 1, 2015	2013, 2014, 2015	July 1, 2016	October 1, 2016
	2016	May 31, 2017	May 31, 2017

ATTACHMENT 3

Factors the EPA Plans to Consider in Determining Nonattainment Area Boundaries in Designations for the 2015 Ozone NAAQS and Guidance on Analyses to Support these Factors

For initial area designations for the 2015 ozone national ambient air quality standards (NAAQS), the Environmental Protection Agency will rely on monitoring data to identify areas to be designated nonattainment due to monitored violations of the standard. Consistent with the directives of the Clean Air Act (CAA) and with previous area designation processes, the EPA will then determine the appropriate nearby[18] areas to include within the nonattainment area boundary for the violating area, based on emissions that contribute to these violations. For each monitor or group of monitors indicating a violation of the NAAQS, the EPA intends to assess information related to five factors for the purpose of establishing the appropriate geographic boundaries for designated ozone nonattainment areas. The EPA will evaluate relevant information from the entire area (i.e., Core Based Statistical Area/ Combined Statistical Area) containing the violating monitor(s) and any adjacent counties or nearby areas that have the potential to contribute. For those portions of the area where an evaluation of the available information clearly establishes that emissions sources do not contribute to exceedances at the violating monitor(s), the EPA believes it would be appropriate to exclude that portion of the area from the nonattainment area. This weight-of-evidence approach to determining area boundaries could result in nonattainment areas consisting of an entire metropolitan area, single counties, or, in cases supported by relevant evidence, partial counties, including partial counties within larger urban areas or in relatively isolated locations. While technical assessments can help to define the magnitude or relative magnitude of contribution from nearby areas, the EPA is not setting a threshold contribution level or "bright line" test for determining whether a contributing area should be included within the boundaries of a given nonattainment area. Section 107(d) of the CAA does not require the EPA to set a threshold contribution. As was done in prior NAAQS designations, the EPA believes that the contribution determination should be made through a case-by-case evaluation of the relevant facts and circumstances in each nonattainment area.

As a framework for area-specific analyses to support nonattainment area boundary recommendations and final boundary determinations, the EPA believes it is appropriate to evaluate the following five factors:

1. air quality data,
2. emissions and emissions-related data,
3. meteorological data,
4. geography/topography, and
5. jurisdictional boundaries.

The EPA notes that these five factors are comparable to the factors that states and tribes and the EPA have used successfully for analytical purposes in prior designations. The recommendation of these

[18] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

factors is not intended to indicate that other relevant information should not be considered in the initial area designations process, as appropriate. Where a state or tribe includes additional information or analysis as part of its recommendation, the EPA will evaluate that information as part of its review in determining the appropriate nonattainment area designation.

This attachment is intended to provide guidance regarding available data that states and tribes may wish to assess when evaluating these five factors. This guidance also provides insight into the EPA's subsequent review and evaluation of the state and tribal nonattainment area boundary recommendations. The guidance offers suggestions about techniques and approaches; it does not contain requirements to be strictly followed and should not be read as prescriptive with respect to the specific techniques recommended.

The EPA recognizes that some of the recommended assessments can be resource intensive. To help mitigate this potential concern, the EPA intends to provide an Ozone Designations Mapping Tool to assist air agencies in developing their area designation and nonattainment boundary recommendations and to provide the relevant data to facilitate the analyses. The EPA will make the Ozone Designations Mapping Tool available on the ozone designations website.[19] The table below outlines the datasets that the EPA expects to make available to the public on the ozone designations website and the expected date of availability. Design values for the 3-year period 2012 – 2014 are currently available[20] and will also be posted on the ozone designations website. The EPA will update this website during the initial area designations process as other relevant datasets are identified.

Datasets the EPA will Provide via the EPA Ozone Designations Website

Dataset	**Expected Availability Date**
2013 – 2015 Ozone Design Values	Summer 2016
2014 – 2016 Ozone Design Values	Summer 2017
Nitrogen Oxide (NO_x)/VOC Point sources and county level emissions and Vehicle Miles Traveled (VMT) from 2011 National Emissions Inventory (NEI)[21] version 2	February 2016
County and Census Tract Population	February 2016
HYSPLIT Trajectory data *	February 2016
Geography/Topography *	February 2016
Jurisdictional Boundaries *	February 2016

* Separate datasets will not be provided. The information will be part of the web-based Ozone Designations Mapping Tool.

This guidance also offers recommendations concerning how states and tribes may wish to describe the basis for their initial designations recommendations. The EPA recommends that states and tribes articulate those recommendations in a narrative format. Thus, this guidance provides some direction

[19] *http://www3.epa.gov/ozonedesignations/*
[20] *http://www3.epa.gov/airtrends/values.html*
[21] The 2014 NEI may not be available for initial designation recommendations. If it becomes available, then it will be considered in lieu of the 2011 NEI.

regarding the content and structure of a narrative that describes the problem in a potential nonattainment area with monitors violating the NAAQS. A comprehensive narrative would articulate a conceptual model of the area that explains the nature and causes of the ozone air quality problem in the specific area, identifies the scope and scale of the air quality problem in that area, and describes all nearby emission sources that contribute to the problem.[22] For multi-state or multi-jurisdictional areas, the EPA encourages states and tribes to work collaboratively to develop a single narrative. However, the EPA anticipates that states or tribes with areas contributing to potential multi-state designated nonattainment areas could also develop a conceptual model that describes only the contribution from the areas within their jurisdiction to the larger nonattainment area, rather than attempting to describe the scope and scale of the air quality problem throughout the entire area. Where a single area-wide narrative on the causes of the ozone air quality problem is not developed, the EPA will collectively use the information in all relevant submittals, along with other relevant data, to make its decision on the extent and designation of the multi-state area.

The underlying analytical framework of the recommended narrative can be summarized as follows:

- Determine violating monitors with design values greater than the NAAQS and gather data that enables an assessment of potential nearby contributing areas and the emissions sources (NO_x and VOC) in those areas.

- Assess and characterize the spatial and temporal differences in ozone concentrations within the area using data from Federal Reference Method (FRM)/Federal Equivalent Method (FEM) ozone monitors, as well as data from other FRM/FEM ozone monitors in nearby areas, if available.

- Areas may find it useful to assess and characterize the area-specific sensitivity of ozone formation to NO_x and VOC emissions. The amount of ozone formed in any given area depends on the amount of NO_x, VOC, and sunlight available to interact in a set of complex chemical reactions to form ozone. Depending on the local situation, peak ozone concentrations may be NOx-sensitive, VOC-sensitive, or a mix of the two depending upon other conditions. Understanding the relative role of local NO_x and VOC emissions sources to ozone formation in the area violating the NAAQS helps identify which nearby emissions sources may be contributing to the monitored violations. Ambient data analyses and/or photochemical modeling simulations can be used to assess and characterize local ozone sensitivities.

- The information identified in the previous bullets can be evaluated in conjunction with emissions data and emissions-related data (e.g., vehicle miles traveled and population) to determine which source categories and source regions are contributing to the monitored violations.

[22] Chapter 2.1 of the EPA's Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze has a detailed description of how to develop a sound conceptual description of an air quality problem. The document is located at: *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf*.

- Once the emissions and air quality assessments have been evaluated, it is valuable to then assess the meteorology during the ozone season in the violating area. Weather patterns will have a large impact on the determination of contributing source regions. This analysis may further help to identify the relative magnitude of contributions from emission sources in nearby areas.

- Additionally, it may be useful to assess any geographic/topographic information, which could have consequences for transport, meteorology, and ozone formation in the area.

- Finally, all of the above assessments would be aggregated or synthesized into a consistent narrative that describes the relationship between sources in the analysis area and the measured exceedances. It will also be useful to assess jurisdictional considerations that could be relevant in identifying a nonattainment area boundary. This synthesis should represent a collective "weight-of-evidence" regarding the most appropriate boundaries for the nonattainment area.

While the general 5-factor framework is expected to be comprehensive and provide the foundation for each assessment of area boundaries, the extent of the analyses may vary on an area-by-area basis based on the nature, cause, and extent of the ozone air quality problem. This guidance suggests analyses of certain data sets that can be useful to assess which nearby areas contribute to nonattainment in a given area. In cases where more highly-resolved or newer data sets are available that are not explicitly mentioned in this guidance, states and tribes should consider their use. If these data are used, the EPA recommends that the states or tribes fully describe the data and their derivation in their supporting documentation for the designation recommendation.

The following sections provide more detail on the five factors and the weight-of-evidence approach that the EPA plans to consider when evaluating state and tribal recommendations and determining nonattainment area boundaries for the 2015 ozone NAAQS.

1. Air Quality Data

Ozone in the troposphere is a secondary pollutant formed by photochemical reactions of precursor gases and is not directly emitted from specific sources. Ozone is formed by atmospheric reactions involving two main classes of precursor pollutants: VOCs and NO_x. The formation of ozone is a complex, nonlinear function of many factors, including the intensity of sunlight, atmospheric mixing, the concentration of ozone precursors in the air, and the rates of chemical reactions of these precursors. Ozone is largely regional in nature with some higher values occurring in locations with ozone-conducive emissions, meteorological conditions, or transport patterns.

The first step in identifying an area to be designated nonattainment and to determine an appropriate nonattainment area boundary is to identify all monitored violations of the NAAQS using the most recently available design values. The EPA determines NAAQS compliance by considering the design value for each air quality monitoring site. The design value for the 2015 ozone NAAQS is the 3-year

average of the annual 4th highest daily maximum 8-hour average concentrations.[23] Only ozone measurement data collected in accordance with the quality assurance (QA) requirements[24] using approved FRM/FEM monitors can be used for NAAQS compliance determinations. The EPA uses FRM/FEM measurement data residing in the EPA's Air Quality System (AQS) to calculate the ozone design values. Individual measurements that the EPA determines to be "exceptional" in accordance with the Exceptional Events Rule[25] (such as days with poor air quality caused by wildland fire) are not included in these calculations. State and tribal monitoring agencies are required to annually certify data submitted to AQS by May 1st of the subsequent year.[26] A tribal monitoring agency must certify its data if the tribe is monitoring for regulatory purposes. A tribe may also be specifically required to certify its data under terms of a grant from EPA. Tribes should consult with the appropriate Regional office on questions regarding regulatory monitoring and the certification process. The EPA typically extracts ambient data from AQS and calculates official design values for regulatory purposes shortly after the certification due date. The design values calculated using this data undergo review by the EPA regional offices, and the final design values are then posted on a public website.[27] Initial state and tribal designation recommendations due October 1, 2016, should focus on design values based on air quality data from 2013 to 2015; however, the EPA intends to make final designation decisions using design values based on the 2014 to 2016 certified air quality data.

In addition to identifying monitors where the most recent design values violates the NAAQS, examining historical ozone air quality measurement data (including previous design values) can improve our understanding of the nature of the ozone ambient air quality problem in an area and thereby, inform decisions regarding the nonattainment area boundary. Since ozone concentrations are substantially impacted by meteorological conditions, including local wind patterns and synoptic weather patterns, the frequency and spatial distribution of exceedances of the standards can vary from year-to-year. This can be revealed by examining how frequently exceedances of the standard have occurred at the monitor with the highest design value for the area and at other monitor locations in the area under consideration, and how the spatial pattern in ozone concentrations across the area varies over time. This information can help to identify spatial and temporal patterns in the air quality of a given area and, when combined with other information from the 5-factor review, can help identify nearby areas with emissions sources contributing to an area with a monitored violation.

[23] The specific methodology for calculating the ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50, appendix U.
[24] The QA requirements for ozone monitoring data are specified in 40 CFR part 58, appendix A.
[25] Final Rule on the Treatment of Data Influenced by Exceptional Events (72 FR 13560, March 22, 2007). Note, on November 10, 2015, the EPA proposed revisions to the 2007 Exceptional Events Rule and issued a draft guidance document for wildfire ozone events. The EPA intends to finalize the rule revisions and guidance before the October 1, 2016, deadline for state and tribal designations recommendations.
[26] Data certification requirements can be found in 40 CFR, part 58.15. The EPA has developed guidance related to the data certification process that can be found at: *http://www3.epa.gov/ttn/amtic/qacert.html*.
[27] Design values for ozone can be found at: *http://www3.epa.gov/airtrends/values.html*.

2. Emissions and Emissions-Related Data

The sources and levels of emissions of ozone-precursor pollutants are important factors in the initial area designations process. As noted above, ambient ozone is formed through complex atmospheric processes. Air quality in a nonattainment area is also typically the result of a combination of regional and local emissions. In the designations process, for each area with a violating monitor, the EPA evaluates the current emissions data from nearby counties to assess each county's potential contribution to ozone concentrations at the violating monitor(s) in the area under evaluation. It should be noted that while ozone can be transported many hundreds of miles and sources of emissions that are very distant from the potential nonattainment area may also contribute to monitored ozone levels, these far upwind emissions are not considered in the designation determination to be "nearby" sources.[28] Therefore, the evaluation of the area is also a means to differentiate between the impact of emissions from more distant sources and from sources in nearby areas that should be included as part of the designated nonattainment area. For initial area designations, we intend to examine current emissions of identified sources of NO_x and VOC, as guided by the local conceptual description of NO_x- and VOC-limited areas. The EPA expects that some local NO_x and VOC emissions contributions from mobile and stationary sources and transport from nearby areas can contribute to higher ozone levels at the violating monitors. Analyses should include reviewing data from the latest NEI and other relevant sources, as available. The analysis should also include examining the magnitude of county-level emissions and the geographic locations of NO_x and VOC sources.

Analyzing the magnitude and spatial extent of emissions provides information about potential spatial gradients in ozone precursor emissions. Combining these analyses (e.g., magnitude of emissions and point of release) with meteorological information can inform the evaluation of the degree of contribution from nearby areas In addition, if the most recent emission inventories do not reflect conditions for the same time period as the air quality data being used to determine the nonattainment designation, then information provided on changes in emissions will be considered. These changes may include emissions reductions due to permanent and enforceable emissions controls and may include emissions increases from new sources or at existing sources.

The EPA believes that it will be appropriate to use 2011 NEI version 2 data because that will be the most recent national emissions inventory information available at the beginning of the designations process. The NEI includes data, generally on an annual basis at the county level. Emissions from large stationary sources at a specific location are also available. More detailed inventories (higher resolution than county estimates) may also be available for some areas, although not in the NEI.[29] To supplement the NEI county-level data, the EPA will provide information that could be used to understand spatial allocation within a county including the location and magnitude of large point sources. Additionally,

[28] The Court of Appeals for the D.C. Circuit upheld the EPA's interpretation of the term "nearby" as being reasonable and consistent with the statute. *Miss. Comm'n on Envtl. Quality v. EPA*, 790 F.3d 138, 160 (D.C. Cir. 2015).

[29] The EPA develops gridded emissions by applying temporal (e.g., seasonal variations in emissions as reported to the NEI) and spatial (e.g., incorporates latitude and longitude location information as reported to the NEI) adjustments to the county-based NEI estimates to produce the more finely resolved gridded emissions. These emissions are generally available at a 12 km resolution, but may be available at finer resolutions for certain localities that have been the focus of special modeling studies.

states and tribes may wish to review gridded emissions data, which are generally available at 12 km grid resolution. These data, which can be provided by the EPA, have been created to cover emissions levels in the contiguous 48 states for 2011. These gridded emissions data can be provided by the EPA on an annual basis or for shorter time periods such as the ozone season. Additionally, states or their regional organizations may have their own versions of gridded emissions for more recent years that could potentially be considered.

Population and degree of urbanization

The EPA has consolidated population and degree of urbanization within the emissions and emissions-related data factor as these elements supplement and help to inform the analysis of emissions data. The EPA intends to provide data such as population by county and census tract. An analysis of population and degree of urbanization may provide indicators of the location of emissions-related activities within the county.

The EPA expects that states and tribes may have independently developed datasets to better inform these elements. The EPA believes that population information such as the location and recent trends in population growth and the patterns of residential and commercial development can serve as potential indicators of the probable location and magnitude of emissions sources that may contribute to ozone concentrations in a given nonattainment area.

Traffic and commuting patterns

The EPA recommends examining the location of major transportation arteries and information on traffic volume and commuting patterns in and around the area containing a violating monitor. This may include examining the number of commuters in each nearby county who drive to a county within the area that has a violating monitor, the percent of total commuters in each county who commute to other counties with violating monitors within the metropolitan area, and the total VMT for each county. Areas with higher VMT and commuting activity can be an indicator of the location of mobile source emissions that may contribute to ozone concentrations at the violating monitor.

The NEI is one source of the county-wide VMT data and facilitates relative comparisons of traffic and commuting patterns between counties in a larger area.[30] However, more detailed assessments provided by states or tribes could help to highlight the magnitude and location of emissions activity. The EPA will provide gridded VMT data; however, these estimates may not correspond directly with VMT data developed by state or local agencies.

[30] NEI county-level VMT estimates are developed in a top-down approach from Federal Highway Administration estimates of statewide VMT by road class that are allocated to counties based on surrogates. Accordingly, the NEI estimates do not always compare well to detailed area-specific studies that are developed in a more robust way (e.g., travel demand model data).

3. Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may support determination of nonattainment area boundaries.

One basic type of meteorological analysis involves assessing potential source-receptor relationships in the area on days with high ozone concentrations using wind speed and wind direction data. A more sophisticated and accurate assessment involves modeling air parcel trajectories to help understand complex transport situations. The HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) modeling system may be useful for some areas to produce trajectories that illustrate the 3-dimensional paths traveled by air parcels to a violating monitor. The EPA will provide back trajectories for violating monitors, for each day of high ozone concentration (i.e., daily maximum 8 hour values that exceed the NAAQS) at those monitors. States or tribes can choose to do additional HYSPLIT modeling and guidance is provided below. If a trajectory model other than HYSPLIT is used, states or tribes should provide detailed information about the technique, how it is used, and why it is preferred over HYSPLIT.

Preparing and running a HYSPLIT modeling analysis

Atmospheric trajectory models use meteorological data and mathematical equations to simulate 3-dimensional transport in the atmosphere. Generally, the position of particles or parcels of air with time are calculated based on meteorological data such as wind speed and direction, temperature, humidity, and pressure. Model results depend on the spatial and temporal resolution of the atmospheric data used, and also on the complexity of the model itself. The HYSPLIT model[31] is frequently used to produce trajectories for assessments associated with determining nonattainment area boundaries. HYSPLIT contains models for trajectory, dispersion, and deposition; however, analyses recommended here only use the trajectory component. The trajectory model, which uses existing meteorological forecast fields from regional or global models to compute advection (i.e., the rate of change of an atmospheric property caused by the horizontal movement of air) and stability, is designed to support a wide range of simulations related to the atmospheric transport of pollutants.

HYSPLIT trajectories may be produced for various combinations of time and locations. When HYSPLIT trajectories are produced for specific monitor locations for days of high ozone concentrations (e.g., daily maximum 8-hour values that exceed the NAAQS), the results illustrate the potential source region for the air parcel that affected the monitor on the day of the high concentration.

While HYSPLIT is a useful tool for identifying meteorological patterns associated with exceedance events, HYSPLIT trajectories alone do not conclusively indicate contribution to measured high concentrations of ozone. Therefore, they cannot be used in isolation to determine inclusion or exclusion of an area within a nonattainment boundary. While a HYSPLIT trajectory analysis alone cannot yield a conclusion that a particular region contributes to ozone concentrations, a set of HYSPLIT trajectories that show no wind flow from a particular region on any day with high ozone concentration

[31] *http://ready.arl.noaa.gov/HYSPLIT.php*

measurements might provide support for discounting that region as contributing to ozone concentrations. HYSPLIT trajectories are very useful in combination with information on the location and magnitude of ozone precursor emissions sources.

A HYSPLIT backward trajectory, the most common trajectory used in assessments associated with determining nonattainment area boundaries, is usually depicted on a standard map as a single line extending in two dimensional (x,y) space from a starting point, regressing backward in time as the line extends from the starting point. An individual trajectory can have only one starting height; HYSPLIT can plot trajectories of different starting heights at the same latitude/longitude starting point on the same map, automatically using different colors for the different starting heights. HYSPLIT will also include a vertical plot of the trajectories in time, with colors corresponding to the same trajectory in the (x,y) plot. This display can be easily misinterpreted as having finer accuracy than the underlying model and data.

It is important to observe the overall size of the plot, its width and length in kilometers, and consider the size of an individual grid cell in the input meteorological data set. These input grid cells are usually 40 km in width and length, so the total area of a trajectory plot may be limited. It is also important to understand the trajectory line itself. The line thickness is predetermined as a user option, so its thickness does not imply coverage other than to represent the centerline of an air parcel's motion calculated to arrive at the starting location at the starting time. Uncertainties are clearly present in these results, and these uncertainties change with trajectory time and distance traveled. One should avoid concluding a region is not along a trajectory's path if the center line of that trajectory missed the region by a relatively small distance.

Detailed information for downloading, installing, and operating HYSPLIT can be found at these websites:
http://ready.arl.noaa.gov/HYSPLIT.php
http://www.arl.noaa.gov/documents/reports/hysplit_user_guide.pdf
http://www.arl.noaa.gov/documents/reports/arl-224.pdf

HYSPLIT's many setup options allow great flexibility and versatility. However, careful selection and recording of these options is necessary to provide reviewers the ability to reproduce the model results. The following paragraphs describe the options that should be recorded, at a minimum, to enable another party to reproduce a HYSPLIT model run.

Model Version. If the HYSPLIT trajectory is produced via the NOAA Air Resources Laboratory (ARL) website (*http://ready.arl.noaa.gov/HYSPLIT_traj.php*), note the *"Modified:" date* in the lower-left corner of the webpage, as well as the date the trajectory was produced. If the trajectory is produced using a stand-alone version of HYSPLIT, note *the release date*, which will be displayed after exiting the main graphical user interface (GUI) screen.

Basic Trajectory Information. Note the *starting time* (YY MM DD HR), the *duration of the trajectory* in hours, and whether the trajectory is *backward or forward.* Note the *latitude and longitude*, as well as the *starting height*, for each *starting location*. Starting height is given by default in meters above ground level (AGL) unless another option is selected. Starting heights are typically no less than 100 meters

AGL to avoid direct interference of terrain, and are typically no greater than 1500 meters AGL to confine the air parcel within the mixed layer. Some trajectories can escape the mixed layer, and this result would be considered in the interpretation.

Starting height and starting location will identify the 3-dimensional location of the trajectory's latest endpoint in time if a backward trajectory is selected (i.e., the start of a trajectory going backward in time). Backward trajectories used in analyses associated with designations typically have a trajectory duration of 24 hours. Considering the geographic proximity of areas under consideration in ozone designations, air parcel locations within this proximity are almost always within the last 24 hours of travel to the trajectory endpoint. Air parcel locations more than 24 hours prior to trajectory end time are rarely found within this proximity.

Input Meteorological Data Set. Note the *input meteorological data set* used in the HYSPLIT model run. The *original file name* provides sufficient information to identify the data set.

Meteorological data fields to run the model are already available for access through the HYSPLIT menu system, or by direct FTP from ARL. The ARL web server contains several meteorological model data sets already converted into a HYSPLIT compatible format in the public directories. Direct access via FTP to these data files is built into HYSPLIT's graphical user interface. The data files are automatically updated on the server with each new forecast cycle. Only an email address is required for the password to access the server. The ARL analysis data archive consists of output from the Global Data Analysis System (GDAS) and the NAM Data Analysis System (NDAS - previously called EDAS) covering much of North America. Both data archives are available from 1997 in semi-monthly files (SM). The EDAS was saved at 80 km resolution every 3-hours through 2003, and then at 40 km resolution starting in 2004. Detailed information on all meteorological data available for use in HYSPLIT can be found in the HYSPLIT4 Users Guide.[32]

It is possible to run the stand-alone HYSPLIT program on user-supplied meteorological data. This could be advantageous when the horizontal resolution or model physics used by ARL is inferior to other existing datasets. If a state or tribe chooses to use meteorological data not already on the ARL web server, the state or tribe should document the reason for this choice and should provide detailed information about the substituted meteorological dataset.

Vertical Motion Options. HYSPLIT can employ one of five different *methods for computing vertical motion*. A sixth method is to accept the vertical motion values contained within the input meteorological data set, effectively using the vertical motion method used by the meteorological model that created the data set. In a typical HYSPLIT application, EPA selects the option to accept the vertical motion values contained within the input meteorological data set. The user should note which method was selected as well as the value chosen for *the top of the model*, in meters AGL.

Trajectory Display Options. The HYSPLIT trajectory model generates a text output file of end-point positions. The end-point position file is processed by another HYSPLIT module to produce a Postscript

[32] *http://www.arl.noaa.gov/documents/reports/hysplit_user_guide.pdf*

display file or output files in other display formats. Some parameters, such as map projection and size, can be automatically computed based on the location and length of the trajectory, or they can be manually set by the user. While these display options do not directly affect the trajectory information itself, noting these options will eliminate possible misinterpretation of identical trajectories because of differing display options. An important display option is the choice of *vertical coordinate*, usually set to meters AGL for these assessments.

4. Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the airshed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. For example, valley-type topographical features can cause local stagnation episodes where vertical temperature inversions effectively "trap" air pollution. Under these conditions, emissions can accumulate leading to periods of elevated ozone concentrations. These inversions may be limited in extent and, therefore, the areas with inversions may need to be separated from areas at altitudes above the top of the inversion layer in locations where exceedances are associated with this type of event. Conversely, higher altitude mountaintop sites might experience a greater influence from long range transport and associated transport episodes in comparison to nearby areas at a lower altitude. Similarly, the absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given violating area.

5. Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, existing jurisdictional boundaries may be considered for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates should be used.

Weight-of-Evidence Analysis Based on the Five Factors

In making designations recommendations for violating areas or contributing areas, and the nonattainment area boundaries for such areas, the EPA recommends that states and tribes consider the five recommended factors together and use a weight-of-evidence approach for this analysis. As explained above, the starting point for evaluating the factors is the air quality analysis. Of particular importance are the location(s) of the violating monitor(s) based on 2013-2015[33] data and the

[33] The EPA intends to consider 2014-2016 data as soon as these data are available.

characteristics of those violations. Once the characteristics of the violations are established, one can begin to assess which nearby emissions sources and source regions may have contributed to those violations. This contribution evaluation should generally consider the location and magnitude of emissions, and the potential for these emissions to contribute to the ambient conditions at the violating monitors as informed by the meteorological and geographical/topographical analysis factors. The guiding principle for this evaluation should be to include, within the boundaries of the nonattainment area, nearby areas with emissions of ozone precursors (NO_x and VOC) that contribute to the violating monitor on days that exceed the NAAQS. The final factor, jurisdictional boundaries, should be considered to refine the nonattainment area boundary to ensure meaningful air quality planning and regulation during the NAAQS implementation phase. As in prior designations for ozone NAAQS, the EPA believes that it is appropriate to use already-established air planning boundaries where possible, to assure continued effective planning and implementation.

The EPA believes that the 5-factor analysis described here is generally comprehensive and intends to use the weight-of-evidence approach based on these five factors in establishing the nonattainment boundaries for the 2015 ozone NAAQS. As noted earlier, the EPA intends to provide an Ozone Designations Mapping Tool to assist air agencies in developing their area designation and nonattainment boundary recommendations and to provide the relevant data to facilitate the analyses. The EPA will make the Ozone Designations Mapping Tool available on the ozone designations website.

The EPA also recognizes the potential value of additional data or methodologies not already specified in this guidance that states or tribes may elect to submit to qualitatively describe or quantify the relative contributions from contributing areas to violating monitors. In some cases, these supplemental methodologies (e.g., source apportionment modeling) may be used to synthesize the various factors, such as air quality, emissions, and meteorological data into quantitative estimates of the contributions from specific areas.

Source Apportionment Modeling

Source apportionment modeling refers to an augmented instrumentation of traditional regional photochemical Eulerian models which allows the model to track the impacts of NO_x and VOC emissions from user-defined source regions on predicted ozone concentrations in a particular grid cell. Emissions are tracked with source apportionment through ozone formation, transport, and deposition processes in the host photochemical model.[34,35] Source apportionment modeling combines into a single analysis several of the factors that the EPA believes are important for determining nonattainment area boundaries: air quality data, emissions, meteorology, and geography/topography. Consequently, this modeling may help identify possible areas for inclusion in the nonattainment area because of their contribution to violations in nearby areas with violating monitors.

[34] Dunker, A. M., Yarwood, G., Ortmann, J. P., and Wilson, G. M. Comparison of source apportionment and source sensitivity of ozone in a three-dimensional air quality model, Environ. Sci. Technol., 36, 2953–2964, 2002.
[35] Kwok, R.H.F, Baker, K.R., Napelenok S.L., Tonnesen, G.S. Photochemical grid model implementation and application of VOC, NO_x, and O_3 source apportionment, Geoscientific Model Development, 8(1), 99-114, 2015.

The EPA does not require states or tribes to conduct source apportionment modeling as part of the initial area designations process for the 2015 ozone NAAQS. However, some states used source apportionment modeling in their boundary determinations for the 2008 ozone NAAQS. The EPA is not producing source apportionment modeling assessments for any areas as part of the initial area designations process for the 2015 NAAQS. Like other aspects of the factor analyses, source apportionment modeling produces information that can help to determine potential boundaries for the area that should be designated nonattainment. Where provided by states or tribes, source apportionment results will be considered as just one part of an overall assessment of the potential nonattainment area boundaries. The EPA recognizes that while there are uncertainties associated with interpreting source apportionment outputs, it can be a useful technique for comparing the relative contribution of individual county emissions of ozone precursor emissions in a more sophisticated manner.

If a state chooses to conduct source apportionment modeling, the EPA recommends that model episodes are of sufficient duration to capture the entire range of meteorological and emissions conditions that can lead to ozone violations in a particular area. Further, we recommend that states and tribes follow the relevant EPA guidance for photochemical modeling attainment demonstrations[36] when establishing their source apportionment modeling platform. In establishing the parameters of a source apportionment modeling exercise, the violating monitor(s) would typically comprise the receptor(s) in the analysis. When summarizing the outputs from the source apportionment modeling, it is suggested that the relative contributions from nearby source regions be compared against one another. It is expected that the focus of the source apportionment modeling would be identifying each source region's contribution to ozone levels near or exceeding the level of the ozone NAAQS. While the EPA does not believe it is appropriate to establish an *a priori* threshold contribution level, a relative comparison of the modeled contribution of each source region should reveal where there are potential contributing sources that should be included within the nonattainment area.

Rural Transport Areas

Section 182(h) of the CAA identifies a category of ozone nonattainment areas referred to as rural transport areas (RTAs). An RTA is treated as a Marginal area for purposes of ozone-related planning and control requirements, regardless of the area's classification. In order for an area to qualify as an RTA, the nonattainment area must meet two criteria. First, the nonattainment area cannot be adjacent to, or include any part of a metropolitan statistical area, as defined by the Office of Management and Budget. Second, the NO_x and VOC emissions from sources within the area cannot make a significant contribution to ozone concentrations in the area itself, or in other areas. The first criterion was discussed earlier in this guidance memo. This portion of the document provides guidance to states and tribes regarding the information that should be submitted to the EPA as part of a demonstration for the second criterion. The EPA believes that a multi-factor, weight-of-evidence approach is needed to demonstrate that emissions within a potential RTA do not contribute significantly to the local ozone nonattainment problem or to ozone nonattainment downwind. The factors are similar in nature to the ones described

[36] Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze. December 2014. Located at: *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf*.

above to guide development of nonattainment designation boundaries: air quality data, emissions estimates, meteorological transport patterns, and geography/topography.

In most instances, the first step in demonstrating that the NO_x and VOC emissions in a potential RTA do not significantly contribute to ozone in the area itself is the development of a conceptual description of the nature of ozone exceedances in the area.[37] This conceptual description should summarize the spatial and temporal patterns of ozone exceedances in the area and begin to identify hypotheses as to which processes and sources are likely most responsible for those high ozone values. To the extent that the conceptual description suggests that transport from upwind areas is largely responsible for the local ozone problem, the RTA demonstration should then further analyze existing ambient monitoring data, meteorological transport patterns, and local and regional emissions estimates to construct a weight-of-evidence argument that concludes the upwind contributions dominate any local contributions.

When compiling a weight-of-evidence based RTA demonstration, it may be valuable to consider an analysis of regional surface ozone monitoring data to see if there is a clear signal of an ozone plume being generated over an upwind area and being transported downwind as the day proceeds, reaching the potential RTA area after the time in which local photochemical production of ozone would have ceased. It also may be useful to look at any available ozone precursor data in or near the local area as a way to assess the chemical nature of a particular air mass. One indication of a photochemically-aged ozone plume that was likely formed from upwind emissions and transported away from its source origin, would be situations in which high ambient ozone and total reactive nitrogen (NO_y) values were observed in locations with relatively low ambient concentrations of NO_x. In other cases, there may be data available about the 3-dimensional chemical state of the atmosphere (e.g., from aircraft, satellites, or other relevant instrumentation) that can help characterize the role of transported ozone from upwind areas.

In terms of the meteorological factor, using HYSPLIT to estimate the back trajectories of air parcels on high ozone days can provide valuable information about the transport path and potential origin of the ozone pollution. We expect that for most areas that would qualify for treatment as an RTA, most, if not all, back trajectories on high ozone days would suggest long-path trajectories with source origins well away from the local area and with little potential for recirculation of the local emissions.

Finally, for the emissions factor, the relative magnitude of local emissions in any potential RTA is also a key consideration in determining if local sources contribute significantly to the ozone problem in the area. If the NO_x and VOC inventories for a particular area are appreciably less than those for other areas for which there is evidence demonstrating contribution to the ozone nonattainment problem (i.e., from the ambient and meteorological analyses), this provides support for concluding that the transport component is overwhelming any local ozone production. A simple approach to assessing the potential importance of local emissions is to compile county-level emissions inventory estimates for each county potentially along the trajectories that are expected to contribute to ozone in the potential RTA. If the

[37] Chapter 2.1 of EPA's Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze has a detailed description of how to develop a sound conceptual description of an air quality problem. *http://www3.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.*

emissions from upwind contributing counties are substantially larger than what is being emitted locally, then this suggests that the impact of the local emissions may not be significant. The EPA recommends that any comparative assessments of emissions be based on the most current available inventories.

It is also possible to assess the contribution of local NO_x and VOC emissions to the ozone in the area using photochemical air quality modeling. "Zero-out" modeling can provide an estimate of the total local impact by calculating the difference between the model estimates from a base case run and the estimates from a simulation in which the man-made emissions of NO_x and VOC are removed from the potential RTA. If the response of the model is small (i.e., even with zero local emissions, there is still a local ozone problem due to transport), it would support a determination that local emissions sources make a small contribution to ozone concentrations in the area. Additionally, source apportionment modeling can be used to estimate the contributions of user-defined source regions (or source categories) to total modeled ozone in an area. These types of modeling analyses can be resource-intensive and the EPA does not expect areas to rely on these models unless they have already been completed for other purposes. In some cases, there may be existing regional or national modeling simulations that can be leveraged to support an RTA demonstration. States and tribes are encouraged to consult with their EPA regional office on potentially available information.

The analyses described above focus on showing that local emissions do not significantly impact high ozone in the local area. Similar analyses would be appropriate to demonstrate that local emissions do not significantly impact ozone concentrations in other areas. It is unrealistic to expect that a state or tribe could analyze impacts on every possible downwind area Instead, we recommend that the state or tribe consider the effects of local emissions on the nearest potential nonattainment areas, in a qualitative sense using some of the data analyses described above.

In general, the EPA believes the geographical restrictions of section 182(h)(1) will limit the number of areas eligible for treatment as an RTA. States or tribes requesting that the EPA treat an ozone nonattainment area as an RTA are encouraged to conduct the technical analyses discussed above as part of a multi-factor, weight-of-evidence demonstration. Documentation that describes each analysis performed and the aggregate determination that emissions in the candidate area do not make a significant contribution to ozone concentrations in that area or in other downwind (current or potential) nonattainment areas should be submitted to the appropriate EPA regional office. Any state or tribe seeking an RTA determination for an area is encouraged to work closely with the appropriate EPA regional office to coordinate the analytical plan for such a demonstration.