
DRAFT Technical Support Document (TSD)

Tennessee
Area Designations For the
2010 SO_2 Primary National Ambient Air Quality Standard

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must initially designate areas as either "unclassifiable," "attainment," or "nonattainment" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to poor air quality in a nearby area that does not meet the NAAQS. Table 1 below identifies the counties or portions of counties (or areas of Indian Country) in Tennessee that EPA intends to designate "nonattainment" based on monitored violations.

Table 1. Nonattainment Area Designations for Tennessee

Area	Tennessee Recommended Designation of Areas/Counties	EPA's Intended Designation of Areas/Counties
Sullivan County Area Sullivan County (partial)	Nonattainment	Nonattainment

Background

On June 2, 2010, EPA revised the primary SO_2 NAAQS (75 FR 35520, June 22, 2010) by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is attained when the 3-year average of the 99th percentile of the daily maximum 1-hour average concentration at each monitor in an area does not exceed 75 ppb. EPA has determined that this is the level necessary to provide protection of public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO_2. The Agency is revoking the two prior primary standards of 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year because the standards will not add additional public health protection given a 1-hour standard at 75 ppb. Accordingly, EPA is not designating areas in this process on the basis of either of these two prior primary standards. Similarly, the secondary standard for SO_2 has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard.

EPA's SO_2 Designation Approach

Section 107(d) of the CAA requires that not later than 1 year after promulgation of a new or revised NAAQS, state Governors must submit their recommendations for designations and boundaries to EPA. This deadline was in June 2011. Section 107(d) also requires EPA to provide a notification to states of no less than 120-days prior to promulgating an initial area designation that is a modification of a state's recommendation. EPA has reviewed the State's recommendations and has notified the Governor through a letter signed by the Regional Administrator of any intended modifications. While language in

section 107 specifically addresses states, we intend to follow the same process for tribes, pursuant to section 301(d) of the CAA and Tribal Authority Rule (40 CFR Part 49). Therefore, we intend to designate areas of Indian Country, in consultation with the tribes, on the same schedule as state designations. If a State or Tribe did not submit designation recommendations, EPA will promulgate the designations that it deems appropriate. If a State or Tribe disagrees with EPA's intended area designations, it has an opportunity to demonstrate why any proposed modification is inappropriate. Tennessee does not have any tribes affected by this intend designation.

Designations guidance was issued by EPA through a March 24, 2011, memorandum from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. This memorandum identifies factors EPA intends to evaluate in determining boundaries for areas designated nonattainment. These 5 factors include: 1) Air quality data; 2) Emissions and emissions-related data (location of sources and potential contribution to ambient SO_2 concentrations); 3) Meteorology (weather/transport patterns); 4) Geography/topography (mountain ranges or other air basin boundaries); and 5) Jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations), among any other information deemed relevant to establishing appropriate area designations and boundaries for the 1-hour SO_2 NAAQS.

The March 24, 2011, memo recommended that area boundaries be defaulted to the county boundary unless additional information justifies a larger or smaller boundary than that of the county. EPA believes it is appropriate to evaluate each potential area on a case-by-case basis, and to recognize that area-specific analyses conducted by states, tribes and/or EPA may support a different boundary than a default county boundary.

In this TSD, EPA discusses its review and technical analysis of the recommendations submitted by the states and/or tribes for designations of the 1-hour SO_2 standard and any modifications from these recommendations.

Definition of important terms used in this document:

1) **Designated "nonattainment" area –** an area which EPA has determined, based on a state recommendation and/or on the technical analysis included in this document, has violated the 2010 SO_2 NAAQS, based on the most recent three years of air quality monitoring data, or contributes to a violation in a nearby area.

2) **Recommended nonattainment area –** an area a State or Tribe has recommended to EPA be designated as nonattainment.

3) **Violating monitor –** an ambient air monitor meeting all methods, quality assurance and citing criteria and requirements whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50.

4) **2010 SO_2 NAAQS -** 75 ppb, national ambient air quality standard for SO_2 promulgated in 2010. Based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

5) **Design Value** – a statistic that describes the air quality status of a given area relative to the level of the NAAQS.

Nonattainment Designations

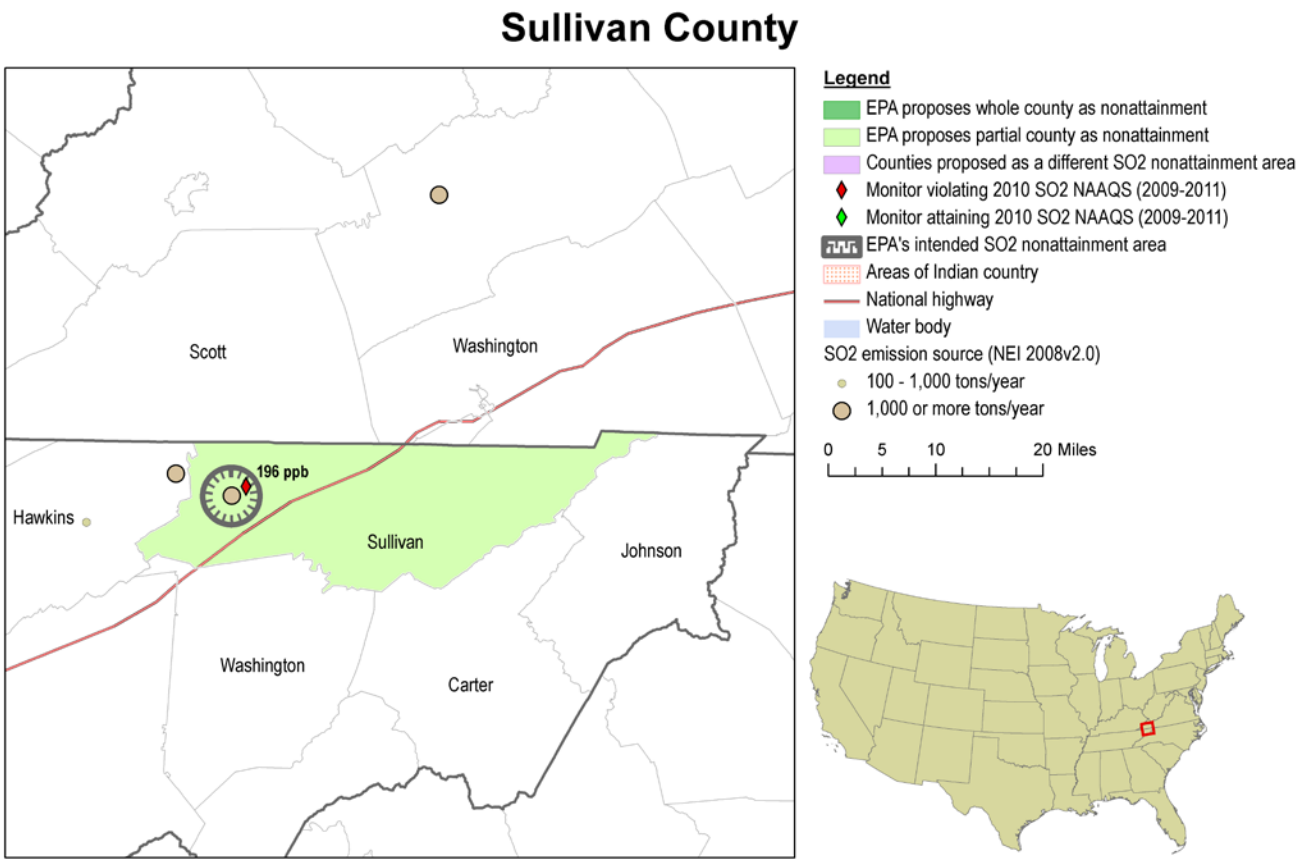
Technical Analysis for Sullivan County

Introduction

This technical analysis for Sullivan County identifies the partial county with a monitor that violates the 2010 SO_2 NAAQS based on 2009-2011 data, and evaluates nearby counties for contributions to SO_2 concentrations in the area. EPA has evaluated this county and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011, issued EPA guidance.

Figure 1 is a map of the area analyzed showing the locations and design values of air quality monitors in the Area, and the counties surrounding any violating air quality monitors.

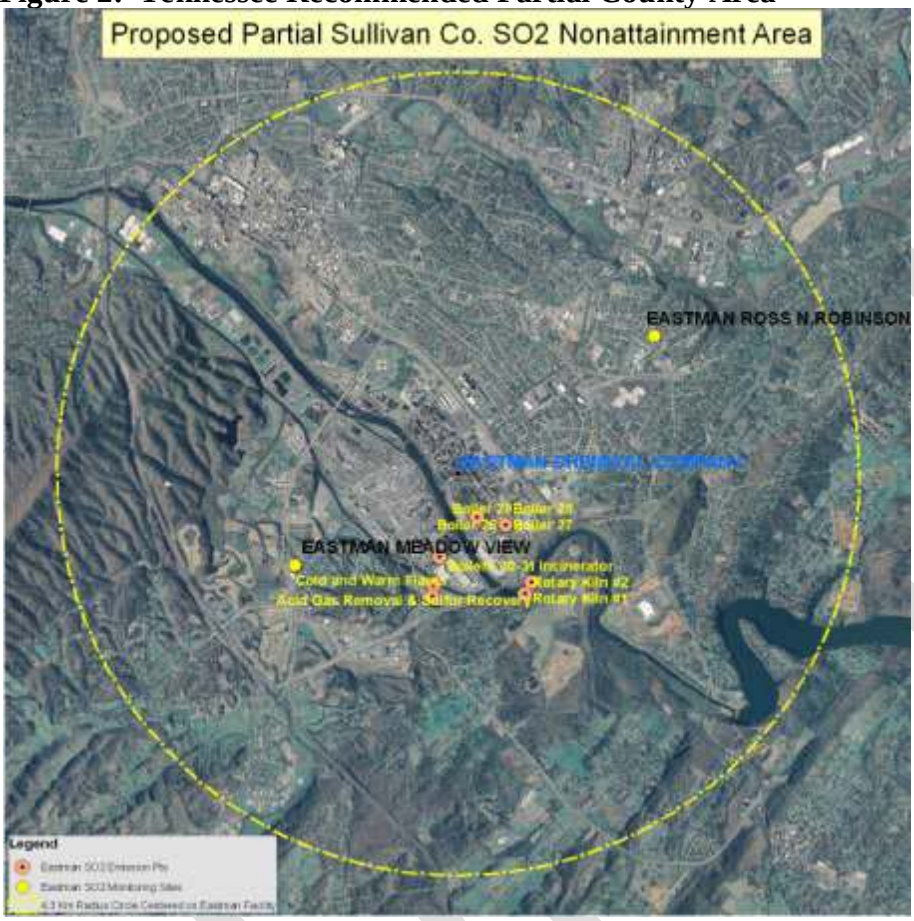
Figure 1: Locations and Design Values of Monitors in the Sullivan County Area



In May 2011, the Tennessee Department of Environment and Conservation's Commissioner Robert J. Martineau recommended that Sullivan County be designated as "nonattainment" for the 2010 SO_2 NAAQS based on monitored air quality data from 2008-2010. Tennessee updated the recommendations with letters dated June 3, 2011, January 23, 2012, and January 28, 2013. The State refined its 2011 SO_2 nonattainment area recommendations to define a portion of Sullivan County which consists of a 4.3-kilometer radius circle centered on a point that encompasses the Eastman Chemical Company facility

and the one violating monitor in the County. The State also included in this boundary the other monitor in the County which has incomplete data. This partial county boundary also encompasses two local SO_2 sources, AFG Industries and Domtar Paper Company. This circle is defined with a center point of approximately 36.522 degrees latitude and -82.542 degrees longitude. A map of this recommendation is provided in Figure 2.

Figure 2: Tennessee Recommended Partial County Area



Based on EPA's technical analysis described below, EPA is intending to designate a portion of Sullivan County in Tennessee as nonattainment for the 2010 SO_2 NAAQS as part of the Sullivan County nonattainment area, based upon currently available information. This county is listed above in Table 1.

Detailed Assessment

Air Quality Data

This factor considers the SO_2 air quality monitoring data, including the design values (in ppb) calculated for all air quality monitors in Sullivan County in the Sullivan County Area and the surrounding area based on data for the 2009-2011 period.

TDEC Commissioner Robert J. Martineau's recommendation was based on data from the Federal Equivalent Method monitor located in the State (Tennessee Designation Recommendation Letter, June 3, 2011), in accordance with 40 CFR Part 53.

The 2011 SO_2 NAAQS design values for the county in the Sullivan County area and surrounding area are shown in Table 2.

Table 2. Air Quality Data for Nonattainment Designations in Sullivan County, Tennessee

County	State Recommended Nonattainment?	Monitor Name	Monitor Air Quality System ID	Monitor Location	SO_2 Design Value, 2009-2011 (ppb)
Sullivan County, TN	Yes	EASTMAN ROSS N. ROBINSON	47-163-0007	36.5348, -82.5171	196

Monitors in **Bold** have the highest 2009-2011 design value in the respective county.

Sullivan County shows a violation of the 2010 SO_2 NAAQS. Therefore, some area in this county and possibly additional areas in surrounding counties must be designated nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for inclusion in a nonattainment area. Each area has been evaluated based on the weight of evidence of the five factors and other relevant information.

Emissions and Emissions-Related Data

Evidence of SO_2 emissions sources in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county level emissions data for SO_2 and any growth in SO_2 emitting activities since the date represented by those emissions data.

Emissions

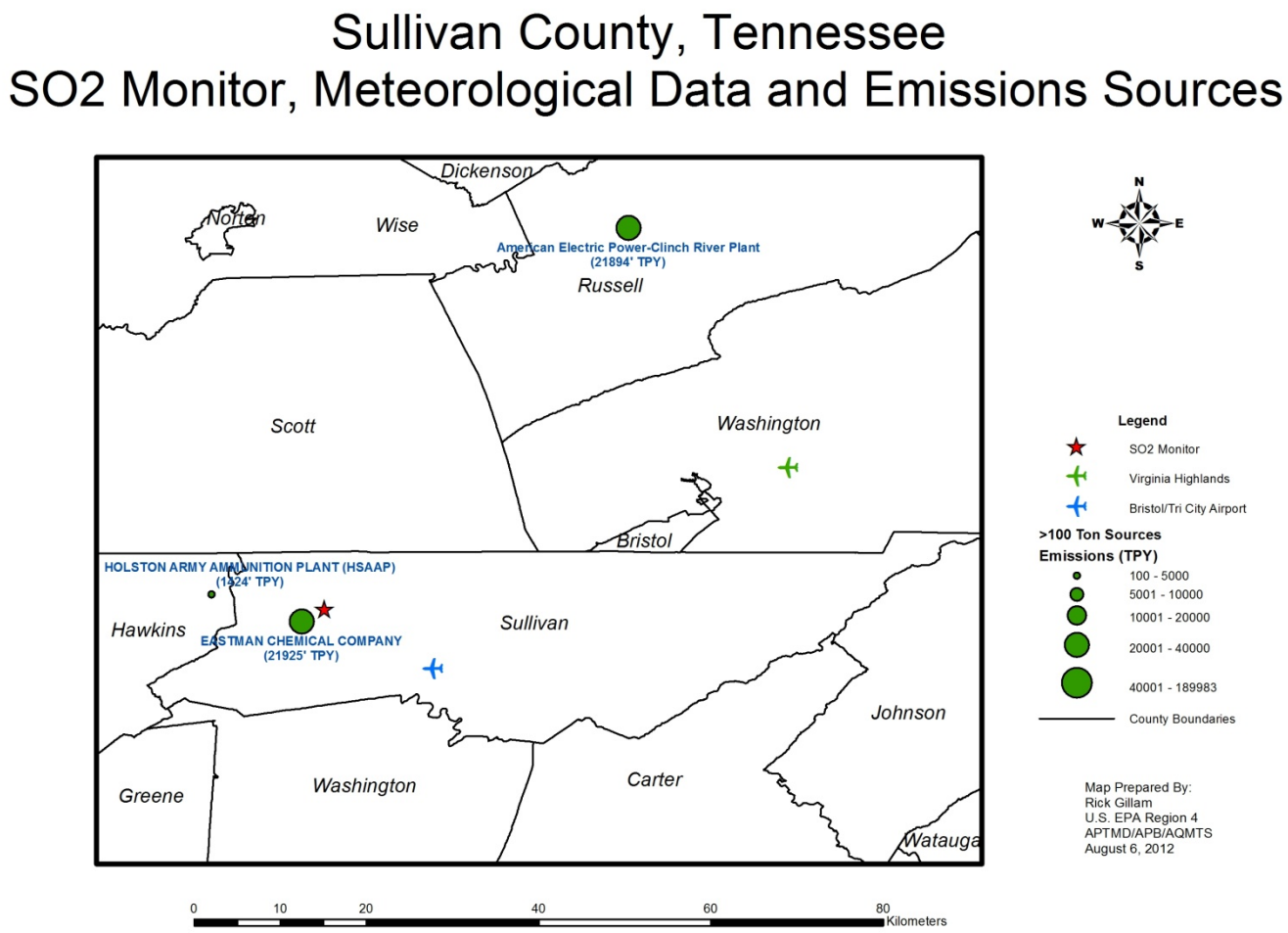
EPA recognizes that there might be no new information on any changes in emissions that may have occurred after 2008, but would consider more recent years if available. While Tennessee provided 2008 emissions data, the State did not provide updated emissions information since 2008 and therefore, EPA relied on the 2008 National Emissions Inventory (NEI) emissions data (NEI08V2).

Table 3 shows total emissions of SO_2 (given in tpy) for violating and potentially contributing counties in and around the Sullivan County Area, including sources emitting greater than 100 tons per year of SO_2 according to the 2008 NEI. The county that contains all or part of the Sullivan County nonattainment area for the 2010 SO_2 NAAQS is shown in **bold.**

Table 3. Annual SO_2 Emissions (NEI08V2)

County	Facility >100 tpy (EIS or State Facility ID)	Facility Emissions (tpy)	Total County SO_2 Emissions (tpy)
Sullivan County, TN	Eastman Chemical Company	21,925	26,159
	Domtar Paper Company	892	
	AFG Industries – Blue Ridge Plant	49	

Figure 3: Map of Bradley and McMinn Counties SO_2 Nonattainment Area with Nearby SO_2 Monitors and SO_2 Emissions Sources



Emissions Controls

The emissions data used by EPA in this technical analysis and provided in Table 3 represent emissions levels taking into account any control strategies implemented on stationary sources in the Sullivan

County Area up to and including the year 2008. EPA has not received any additional information on emissions reductions resulting from federally enforceable controls put into place after 2008.

Meteorology (weather/transport patterns)

Evidence of source-receptor relationships between specific emissions sources and high SO_2 values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered recent hourly meteorological data from the NWS site nearest to the violating monitor to determine which wind vectors were associated with 1-hour SO_2 exceedances. For the Sullivan Area, 2009-2011 meteorological data was evaluated from two NWS sites in the area. The two sites are the Bristol/Tri City Airport (ID # 723183-13877) and the Virginia Highlands site (ID# 724058-53818). Figure 3 shows a map of the SO_2 monitor location, meteorological data locations, and the major emissions sources in the area. The Bristol/Tri City Airport is approximately 12 km southeast of the violating monitor and the Virginia Highlands site is approximately 50 kilometers northeast of the violating monitor. Data from the Virginia Highlands site was evaluated because data was not available after July 2010 from the Bristol/Tri City Airport site. The primary SO_2 emissions source nearby is the Eastman Chemical Company facility, located approximately 2.5 kilometers southwest from the violating monitor.

Figure 4 shows a wind rose of the hours exceeding the 1-hr SO_2 NAAQS (75 ppb) at the Sullivan County violating monitor. The wind rose was developed using wind data from the Bristol/Tri City Airport site.

Figure 4. Wind Rose of 2009-2011 hours exceeding the 1-hr SO_2 NAAQS at the violating monitor with wind data from the Bristol/Tri-City Airport.

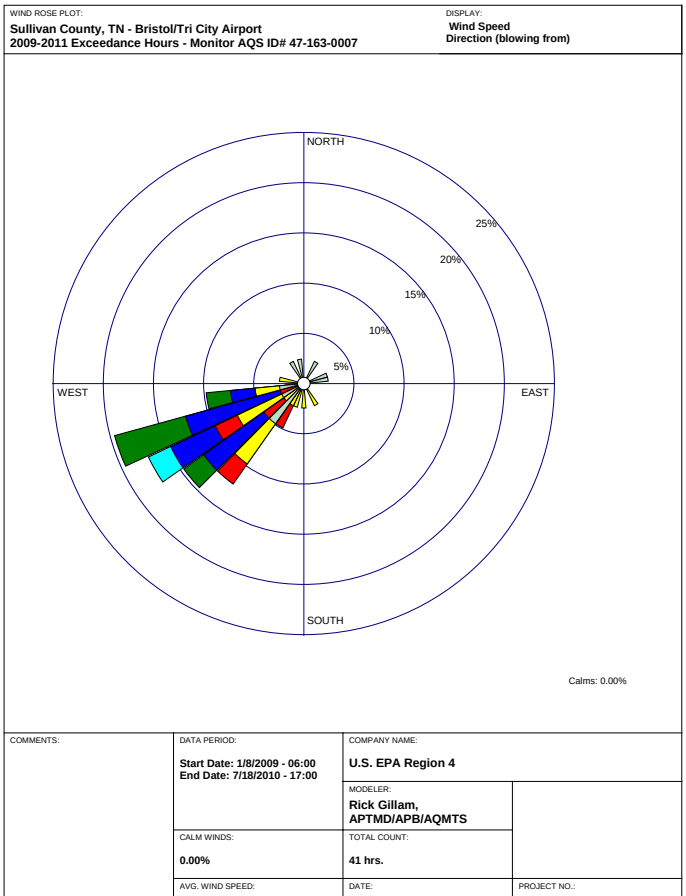
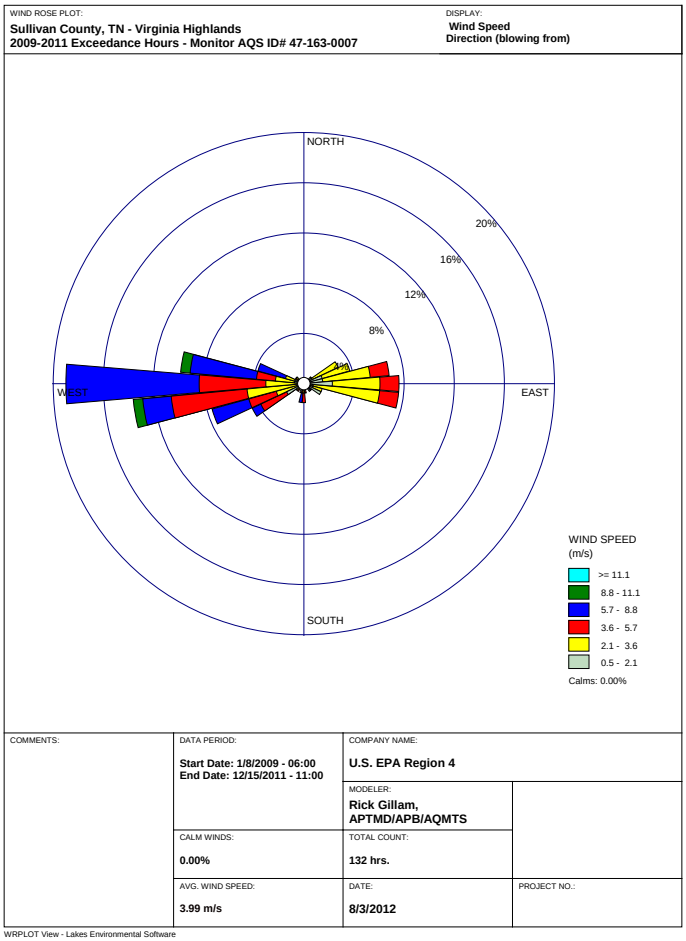


Figure 5 shows a wind rose of the hours exceeding the 1-hr SO_2 NAAQS (75 ppb) at the Sullivan County violating monitor. The wind rose was developed using wind data from the Virginia Highlands site.

Figure 5. Wind Rose of 2009-2011 hours exceeding the 1-hr SO_2 NAAQS at the violating monitor with wind data from the Virginia Highlands site.



Figures 4 and 5 show that the majority of the exceeding hours have winds blowing from the southwest and west with generally moderate wind speeds. As can be seen in Figure 3, the Eastman Chemical Company facility is located approximately 2.5 kilometers southwest of the monitor. No other major sources are located near the violating monitor in the southwest to west direction. Therefore, the Eastman Chemical facility is likely the major contributor to the violations at the monitor. It should be noted that since the Virginia Highlands site is located approximately 50 kilometers from the Area, the winds measured there are generally representative of the area, but may differ somewhat from the actual wind patterns near the violating monitor.

Two additional points should be noted. First, the State submittal indicates that for Sullivan County the winds are climatologically from the west, west-southwest, and southwest. Second, Eastman Chemical Company is undertaking a study to collect representative, site-specific meteorology data around the facility for use in future modeling of the facility's emissions. Additionally, the Eastman Chemical Company is planning to expand its SO_2 monitoring network in conjunction with a project to install and operate a new on-site meteorological monitoring station that will operate for a minimum of one year. This data will be useful for future analyses of SO_2 air quality in the Area.

Geography/Topography (mountain ranges or other air basin boundaries)

Most of Sullivan County is located in the Ridge and Valley Geographic Region, which covers 7,703 square miles and is situated between the Cumberland Plateau and the Unaka Mountains. Sullivan County is a rural area with urban centers. The topography of this region consists of long linear ridges with elevations of 1100 to 1500 feet, and parallel lowland valleys, where the elevations vary from 700 to 1000 feet. The ridges and valleys are typically oriented from northeast to southwest. Generally, the ridges and valleys have a higher elevation in the northern part of the region and slightly less elevated in the south.

The violating SO_2 monitor and the major SO_2 emissions source (Eastman Chemical Company) in the Sullivan County area are both located in a broad valley at an elevation of approximately 1,200 feet. There are ridges up to approximately 2,100 feet within 5 kilometers from the Eastman Chemical Company, and the violating monitor. These ridges potentially affect the wind directions and pollutant transport. However, the Eastman Ross N. Robinson monitor is located in relatively flat terrain about 2.5 kilometers to the east northeast of the Eastman facility. Therefore, this factor did not play a significant role in determining the nonattainment boundary.

Jurisdictional Boundaries

Once EPA identified the general areas that the Agency anticipated would be included in the nonattainment area, EPA then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas.

No area in Sullivan County has been or is currently designated nonattainment for a SO_2 NAAQS, so EPA had no boundary related to previous nonattainment designations to consider for this area. Therefore, this factor did not play a significant role in determining the nonattainment boundary.

Modeling Analysis for Nonattainment Area Boundaries

The State did not supply air quality dispersion modeling for the Sullivan County Area.

Other Relevant Information

There is no other relevant information that EPA considered for this Area.

Conclusion

After considering the factors described above, EPA intends to find that it is appropriate to agree with the State of Tennessee's recommendation to designate nonattainment the portion of Sullivan County contained in a 4.3-kilometer radius circle centered on a point that encompasses the Eastman Chemical Company facility and the one violating monitor in the County. EPA's conclusion is premised on the fact that the air quality monitor in Sullivan County shows a violation of the 2010 SO_2 NAAQS, based on 2009-2011 air quality data. Two additional sources are captured within the boundary. Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundary described herein encompasses the entire area that does not meet the 2010 SO_2 NAAQS.