
Technical Support Document (TSD)

**Tennessee
Area Designations For the
2010 SO₂ Primary National Ambient Air Quality Standard**

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO₂) 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 is initially designating “nonattainment” based on monitored violations. EPA is not yet prepared to designate other areas in Tennessee.

Table 1. Nonattainment Area Designations for Tennessee

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

Background

On June 2, 2010, EPA revised the primary SO₂ 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 met at an ambient air quality monitoring site when the 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations is less than or equal to 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a)-(b). 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 SO₂. 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 SO₂ has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard.

EPA’s SO₂ 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 may 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 followed the same process for tribes, pursuant to section 301(d) of the CAA and Tribal Authority Rule (40 CFR Part 49). Therefore, we are designating tribal areas, in consultation with the tribes, on the same schedule as state designations. Tennessee does not have any tribal areas affected by this designation. If a state or tribal government does not submit designation recommendations, EPA is promulgating the designations that it deems appropriate. If a state or tribal government disagreed with EPA's intended area designations as released on February 7, 2013, it had an opportunity to demonstrate why any proposed modification was inappropriate.

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 SO₂ 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 SO₂ 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, tribal governments 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 state for designations of the 1-hour SO₂ 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 SO₂ 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 that a state or tribal government has recommended to EPA to 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 SO₂ NAAQS** - 75 ppb, national ambient air quality standard for SO₂ 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

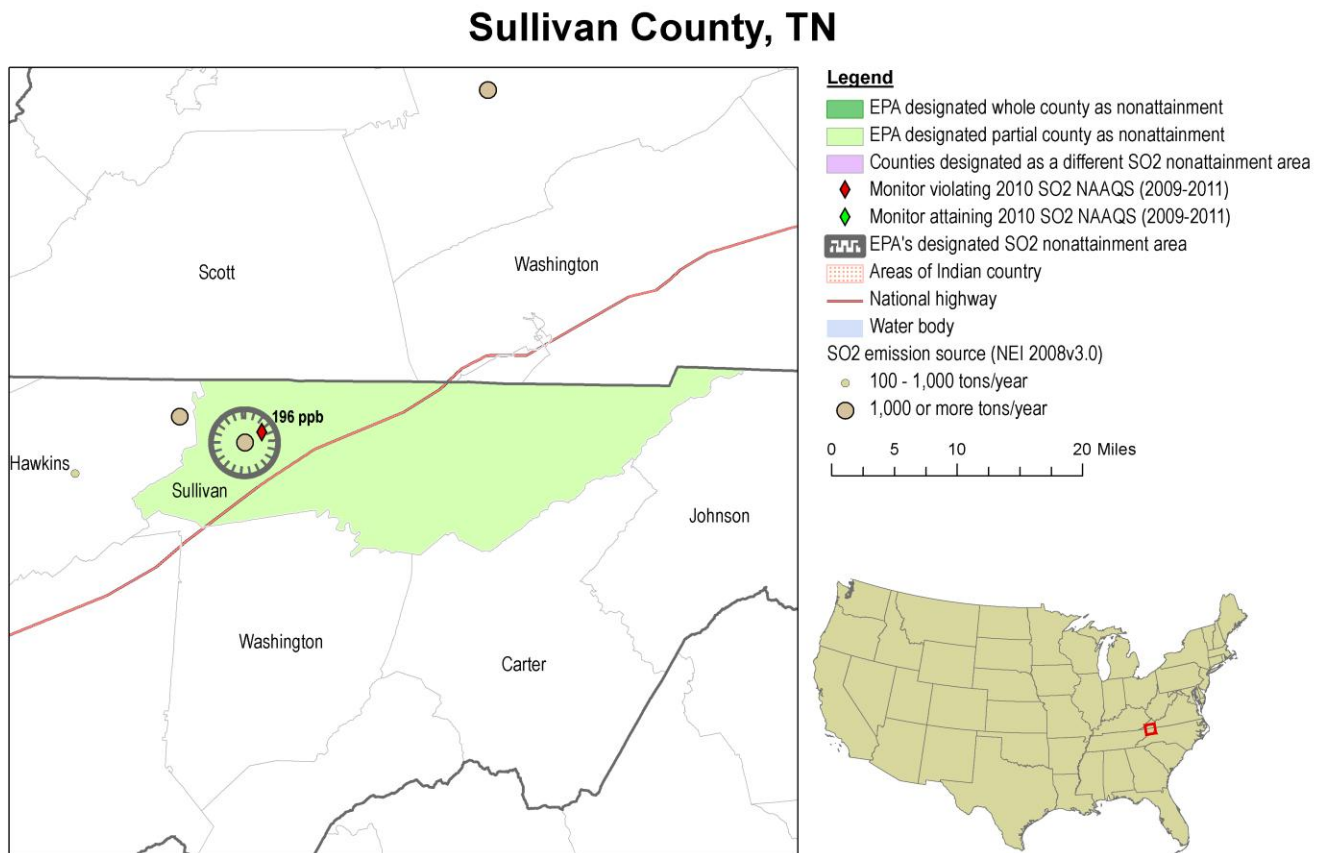
Technical Analysis for Sullivan County

Introduction

This technical analysis for Sullivan County identifies the partial county with a monitor that violates the 2010 SO₂ NAAQS based on 2009-2011 data, and evaluates nearby counties for contributions to SO₂ 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.

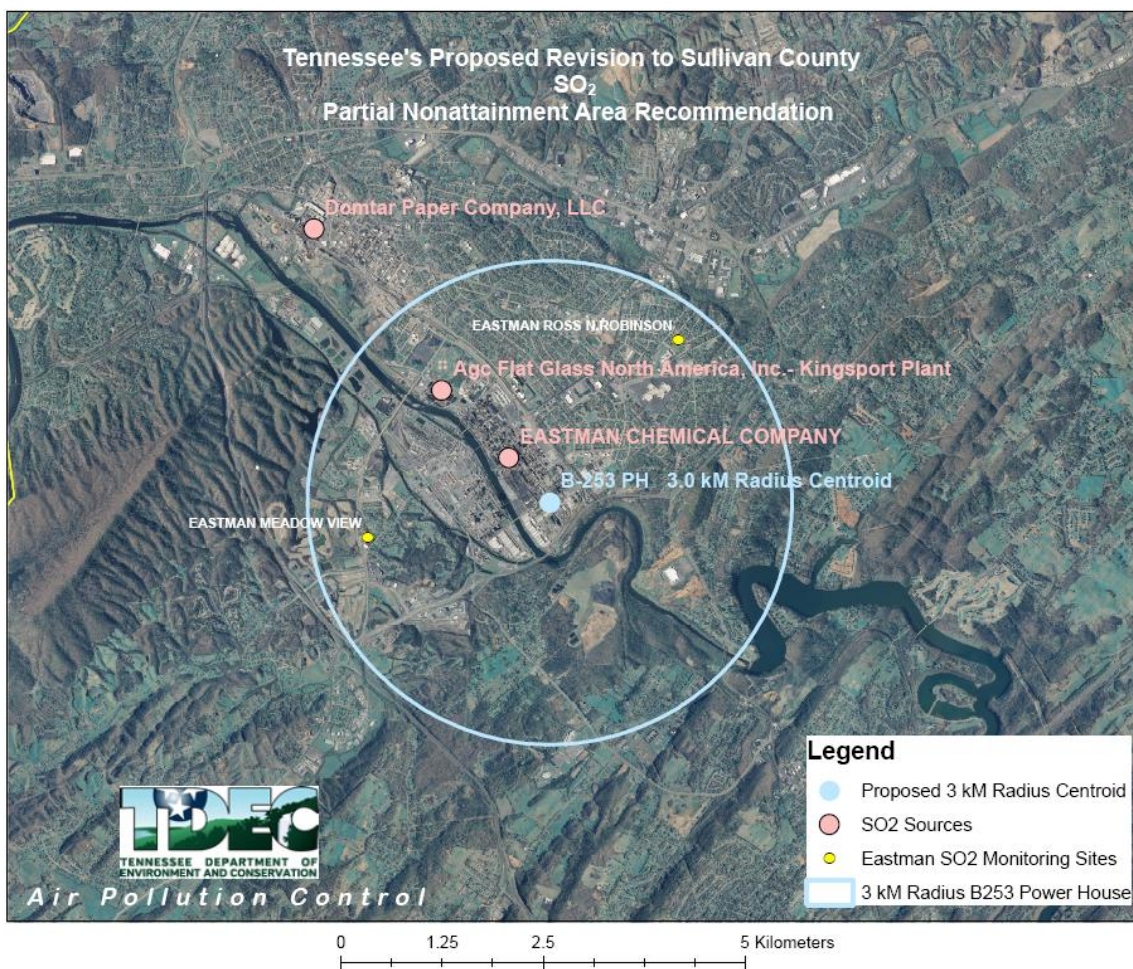
Figure 1: Locations and Design Values of Monitors in the Sullivan County Area (need new map)



In May 2011, the Tennessee Department of Environment and Conservation's (TDEC's) Commissioner Robert J. Martineau recommended that Sullivan County be designated as "nonattainment" for the 2010 SO₂ NAAQS based on monitored air quality data from 2008-2010. Tennessee updated the recommendations with letters dated June 3, 2011, January 23, 2012, January 28, 2013, and May 1, 2013. The State refined its 2011 SO₂ nonattainment area recommendations to define a portion of Sullivan

County which consists of a 3-kilometer radius circle centered at coordinates 36.5186 N; 82.5350 W 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. 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 initially designating a portion of Sullivan County in Tennessee as nonattainment for the 2010 SO₂ NAAQS as part of the Sullivan County nonattainment area, based upon currently available information. This county is listed above in Table 1. EPA is not yet prepared to designate other areas in Tennessee.

Detailed Assessment

Air Quality Data

This factor considers the SO₂ 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 SO₂ 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 SO₂ 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 SO₂ 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 SO₂ and any growth in SO₂ 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 also provided updated emissions information in the May 5, 2013, letter for 2011 for Domtar Paper Company, showing the emissions from that facility were 27 tons. Additionally, EPA relied on the 2008 National Emissions Inventory (NEI) emissions data (NEI08V3) for all other sources in the area.

Table 3 shows total emissions of SO₂ (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 SO₂

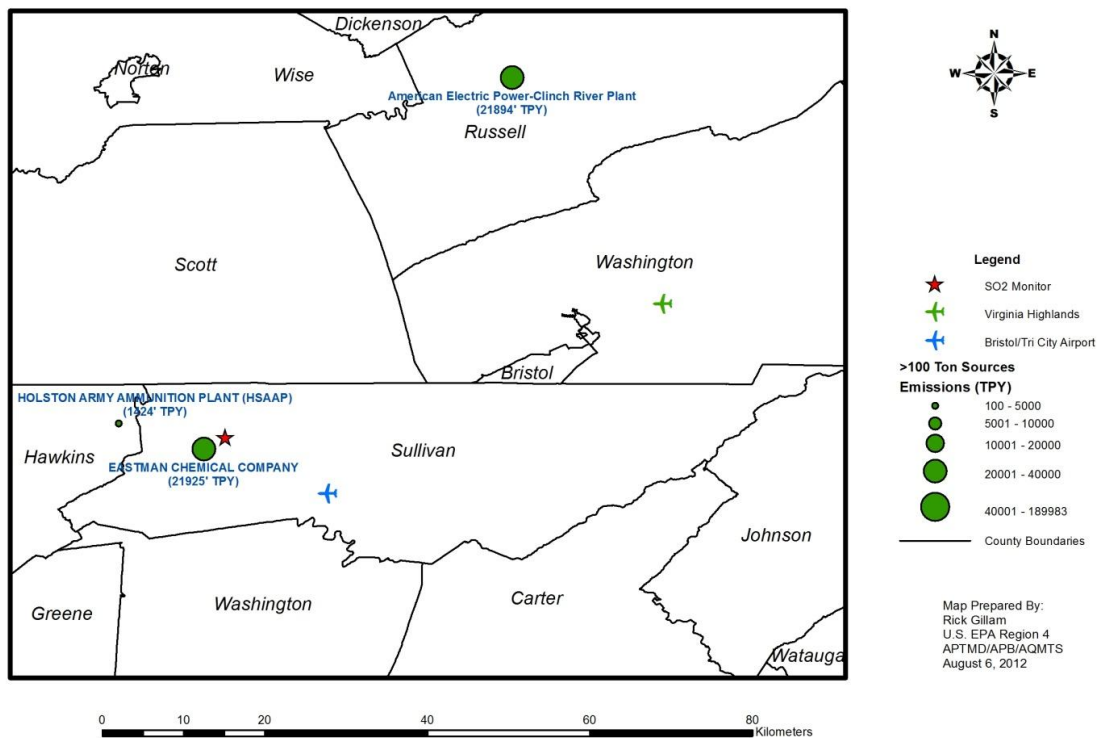
according to the 2008 NEI. The county that contains all or part of the Sullivan County nonattainment area for the 2010 SO₂ NAAQS is shown in **bold**.

Table 3. Annual SO₂ Emissions (NEI08V3)

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 SO₂ Nonattainment Area with Nearby SO₂ Monitors and SO₂ Emissions Sources

Sullivan County, Tennessee SO₂ Monitor, Meteorological Data and 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 SO₂ 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 SO₂ 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 SO₂ 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 SO₂ 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 SO₂ 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 SO₂ NAAQS at the violating monitor with wind data from the Bristol/Tri-City Airport.

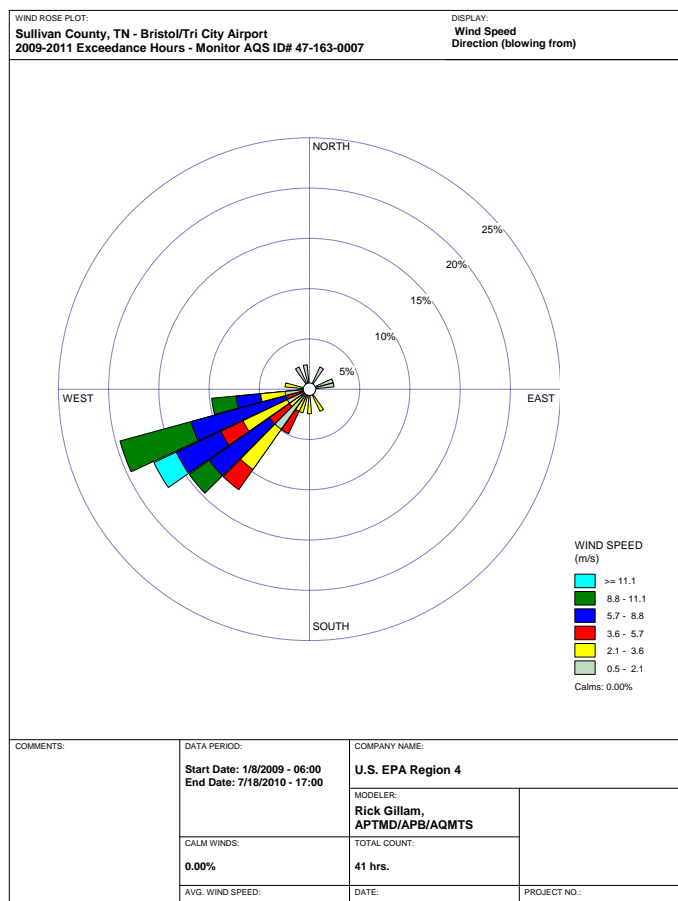
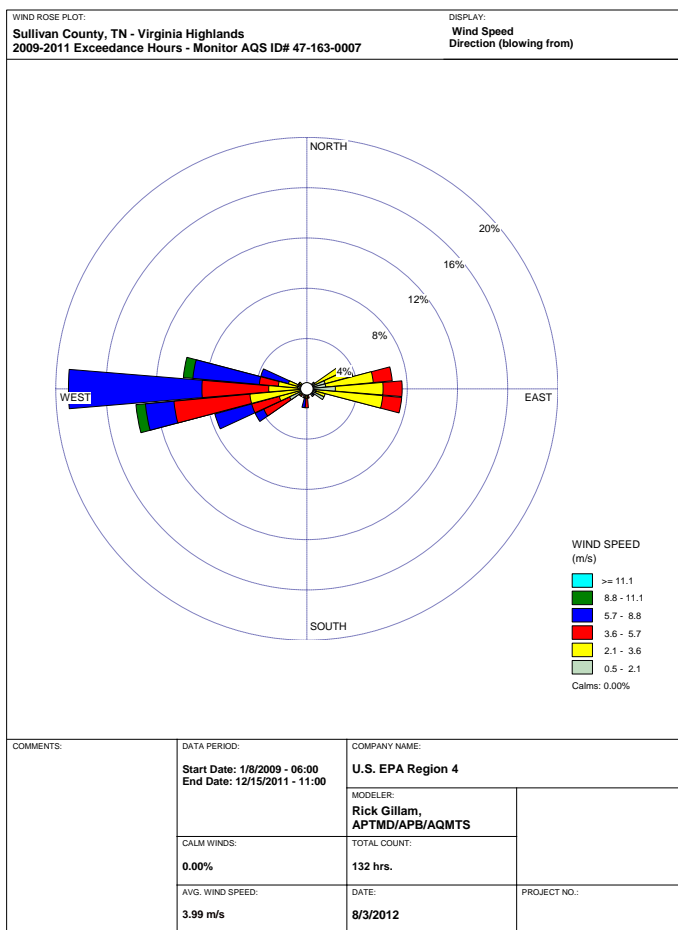


Figure 5 shows a wind rose of the hours exceeding the 1-hr SO₂ NAAQS (75 ppb) at the Sullivan County violating monitor. The wind rose was developed using wind data from the Virginia Highlands site.

Figure 5. Wind Rose of 2009-2011 hours exceeding the 1-hr SO₂ 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 monitor's design value. 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's 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 SO₂ 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 SO₂ 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 are slightly less elevated in the south.

The violating SO₂ monitor and the major SO₂ 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 initial 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 prior SO₂ 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 finds that it is appropriate to agree with the State of Tennessee's recommendation to initially designate nonattainment the portion of Sullivan County contained in a 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 SO₂ NAAQS, based on 2009-2011 air quality data. Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundary described herein encompasses the appropriate initial area that does not meet the 2010 SO₂ NAAQS, based on the violating monitor. We are not yet prepared to conclude that other areas and sources are contributing to the monitored violation or to possible other violations, and are not including such areas and sources in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.