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**Draft Technical Support Document**

**WEST VIRGINIA  
Area Designations For the  
2010 SO<sub>2</sub> 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<sub>2</sub>) 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 in the State of West Virginia (“West Virginia” or “WV”) that EPA intends to initially designate nonattainment based on monitored violations.

**Table 1. Nonattainment Area Designations for West Virginia**

<b>Area</b>	<b>West Virginia’s Recommended Designation of Areas/Counties</b>	<b>EPA’s Intended Designation of Areas/Counties</b>
Steubenville, OH-WV* Brooke, WV Jefferson, OH (partial)—Cross Creek, Steubenville, Warren and Wells Townships	Nonattainment N/A	Nonattainment Nonattainment
Wheeling, WV-OH* Marshall, WV Belmont, OH (partial)—Mead Township	Nonattainment N/A	Nonattainment Nonattainment

\* This is a multi-state nonattainment area. Additional information on boundary recommendations and analyses can be found in the draft technical support document for the State of Ohio.

**Background**

On June 2, 2010, EPA revised the primary SO<sub>2</sub> NAAQS (75 FR 35520) 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 99<sup>th</sup> percentile of 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<sub>2</sub>. 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<sub>2</sub> has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard.

### **EPA's SO<sub>2</sub> Designation Approach**

Section 107(d) of the CAA requires that no later than one 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. 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, they have an opportunity to demonstrate why any proposed modification is 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 SO<sub>2</sub> 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, metropolitan planning organization), among any other information deemed relevant to establishing appropriate area designations and boundaries for the 1-hour SO<sub>2</sub> NAAQS.

The March 24, 2011 memo recommended that area boundaries be defaulted to the county boundary unless additional provided 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 West Virginia for designations of the 1-hour SO<sub>2</sub> standard and any modifications from these recommendations regarding areas for which there are monitored violations of the NAAQS.

#### ***Definitions 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<sub>2</sub> 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<sub>2</sub> NAAQS** – 75 ppb, national ambient air quality standard for SO<sub>2</sub> promulgated in 2010. Based on the 3-year average of the 99<sup>th</sup> 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

### Introduction

In West Virginia's designation recommendation letter to EPA, dated May 23, 2011, Randy Huffman, Secretary of the West Virginia Department of Environmental Protection (WVDEP), recommended that Brooke, Hancock, Marshall, Monongalia, and Wood counties be designated as nonattainment for the 2010 SO<sub>2</sub> NAAQS based on monitored air quality data from 2008-2010. On January 22, 2013, West Virginia submitted a revised recommendation letter to EPA indicating that subsequent air monitoring data (2010-2012) suggests that the air quality has significantly improved in three of those counties: monitors in Hancock, Monongalia, and Wood are no longer showing violations of the 2010 1-hour SO<sub>2</sub> standard. The letter indicated that the data had been uploaded into EPA's Air Quality System (AQS).

Based on EPA's technical analysis, EPA intends to initially designate two areas as nonattainment (Table 1) based on monitored violations of the NAAQS. The Steubenville, OH-WV Nonattainment Area consists of Brooke County, WV and a portion of Jefferson County, OH (Cross Creek, Steubenville, Warren and Wells Townships). The Wheeling Nonattainment Area consists of Marshall County, WV and a portion of Belmont County, OH (Mead Township).

The 5 factors were used to analyze the nonattainment areas for 1-hour SO<sub>2</sub> designations:

1. Air quality data. This factor considers the SO<sub>2</sub> air quality monitoring data from EPA's Air Trends website (see <http://www.epa.gov/airtrends/values.html>), including the design values (in ppb) calculated for each monitor in the area for the most recent 3-year period. A monitor's design value indicates whether that monitor violates a specified air quality standard. The 2010 SO<sub>2</sub> NAAQS is met at a monitoring site when the identified design value is valid and less than or equal to 75 ppb as described in Appendix T of 40 CFR part 50. An ambient air monitor whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50, is deemed a violating monitor. A design value is only valid if minimum data completeness criteria are met. An SO<sub>2</sub> design value that meets the NAAQS is generally considered valid if it encompasses 3 years of complete data. A year is complete when all 4 quarters are complete. A quarter is complete when 75% of the days are complete. A day is complete when it has 75% of its hours. Data substitution tests are described in Appendix T of 40 CFR part 50. Areas where monitoring data

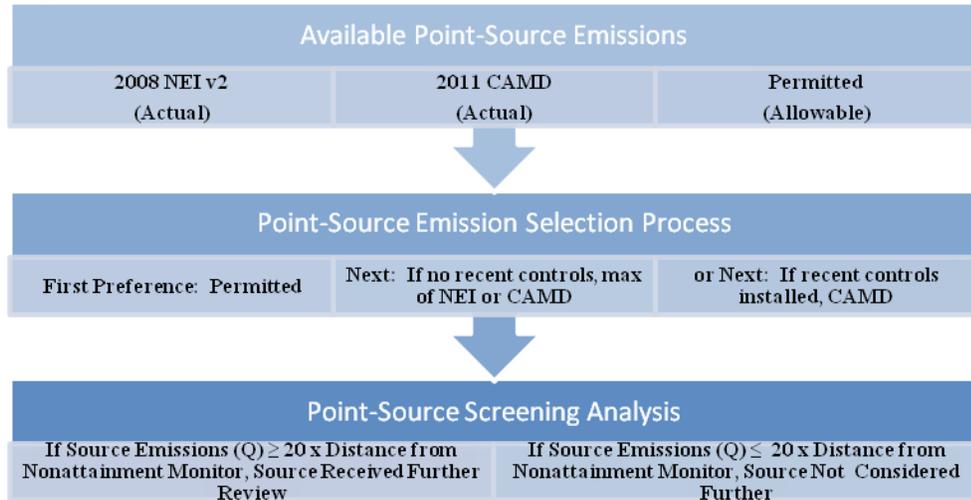
indicate a violation of the 1-hour, 75 ppb primary SO<sub>2</sub> standard will be designated as nonattainment.

2. Emissions and emissions-related data (location of sources and potential contribution to ambient SO<sub>2</sub> concentrations). We reviewed data from the 2008 National Emissions Inventory (NEI), version 2 (v2), which was the most current version of the national inventory available in 2011 when these data were compiled for the designations process, (see <http://www.epa.gov/ttn/chief/net/2008inventory.html>) or other relevant sources of data, such as state inventories or inventories from other federal sources. 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. For example, certain large sources of emissions in or near an area may have installed emission controls or otherwise significantly reduced emissions since 2008. Also any additional information we receive on federally-enforceable emissions control that are not reflected in recent inventories but which will require compliance before final designations are issued were considered. Two source categories from the 2008 NEI were examined: the point source inventory and the nonpoint source inventory. Generally, the point source inventory represents the bulk of the SO<sub>2</sub> emissions in EPA Region III.

Additionally, a source screening analysis, involving an emissions by distance (Q/d) methodology, was used to assess the need to examine point sources for further review which are located within 50 kilometers of a violating monitor. North Carolina's Prevention of Significant Deterioration (PSD) Guidance document ([http://www.ncair.org/permits/mets/psd\\_guidance.pdf](http://www.ncair.org/permits/mets/psd_guidance.pdf)) describes a screening methodology used to identify point sources to be specifically included in a modeled impact analysis. According to this method, a source is considered to be significant and, therefore, included in the modeling analysis if its annual emissions are greater than or equal to twenty (20) times the distance between the source and the point of interest ( $Q/d \geq 20$  or  $Q/20d \geq 1$ ), or as used in this case, the violating monitor. While not used for the same purpose, this methodology was used to identify point sources near a violating monitor for further review.

Point source emissions data are needed to perform the Q/d analysis. Three sources of emissions data were considered for this screening analysis: emissions recorded in the 2008 NEI, the 2011 Clean Air Markets Division (CAMD) reported emissions, and the sources' permitted emission limits. CAMD emissions were limited to sources with continuous emissions monitors (CEMs). Point source emission information from the 2008 NEI and 2010 CAMD represent actual yearly emission totals, and these values are probably less than a point source's allowable or permitted emission limit. Permitted emission limits are generally unavailable since most states lack a central repository or permit database at this time. Emissions used in the Q/d screening analysis were chosen following the steps outlined below in Figure 1.

**Figure 1. Emission Decision Tree**



3. Meteorology (weather/transport patterns). We evaluated meteorological data to help determine how weather conditions, including wind speed and direction, affect the plume of sources contributing to ambient SO<sub>2</sub> concentrations. The National Weather Service maintains surface and upper air monitoring sites across the United States. Automated Surface Observing System (ASOS) (<http://www.weather.gov/asos>) sites collect hourly averaged wind measurements including wind direction and wind speed. Upper air measurements (rawinsonde) are collected at a limited number of sites where vertical wind profiles are taken using weather balloons. Measurements taken at ASOS and rawinsonde sites are often used in dispersion modeling analyses using EPA's AERMOD modeling system.

One-minute meteorological wind fields for an area's nearby airport(s) were downloaded and run through AERMOD's preprocessor AERMINUTE to produce hourly averaged wind fields. This data was then run through Lakes Environmental's WRPLOT software to produce wind roses for the airports, showing predominant wind patterns in the area.

4. Geography/topography (mountain ranges or other air basin boundaries). We examined the physical features of the land that might affect the distribution of SO<sub>2</sub> over an area. Mountains or other physical features may affect the distribution of emissions, and may help define boundaries. Maps depicting elevations and point sources were constructed and evaluated to determine the effects of the topography on point source emissions.
5. Jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organizations). Once the geographic area associated with the area violating the SO<sub>2</sub> standard and the nearby area contributing to violations were determined, we considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary for carrying out the air quality planning and enforcement functions for the nonattainment area. If an existing jurisdictional boundary is used to help define the nonattainment area, it encompasses all of the area that has been identified as meeting the nonattainment definition. These existing boundaries may

include an existing nonattainment or maintenance area boundary, a county or township boundary, a metropolitan area boundary, an air management district, or an urban planning boundary established for coordinating business development or transportation activities. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates are used.

West Virginia recommended the county boundary for all its nonattainment area boundaries, which was the recommended default boundary as per EPA's March 24, 2011 designations guidance. In addition to considering the county boundary, we also examined use of Metropolitan Statistical Areas (MSAs) as the jurisdictional boundary. The U.S. Office of Management and Budget (OMB) defines metropolitan and micropolitan statistical areas according to published standards that are applied to Census Bureau data. The general concept of a metropolitan or micropolitan statistical area is that of a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core (<http://www.census.gov/population/www/metroareas/aboutmetro.html>). Finally, previously established Air Quality Control Regions (AQCRs) were considered as well. The five factor descriptions above are a combination of descriptions from the March 24, 2011 memo and other relevant information pertaining to this TSD.

### **Technical Analysis for the Steubenville, OH-WV Nonattainment Area**

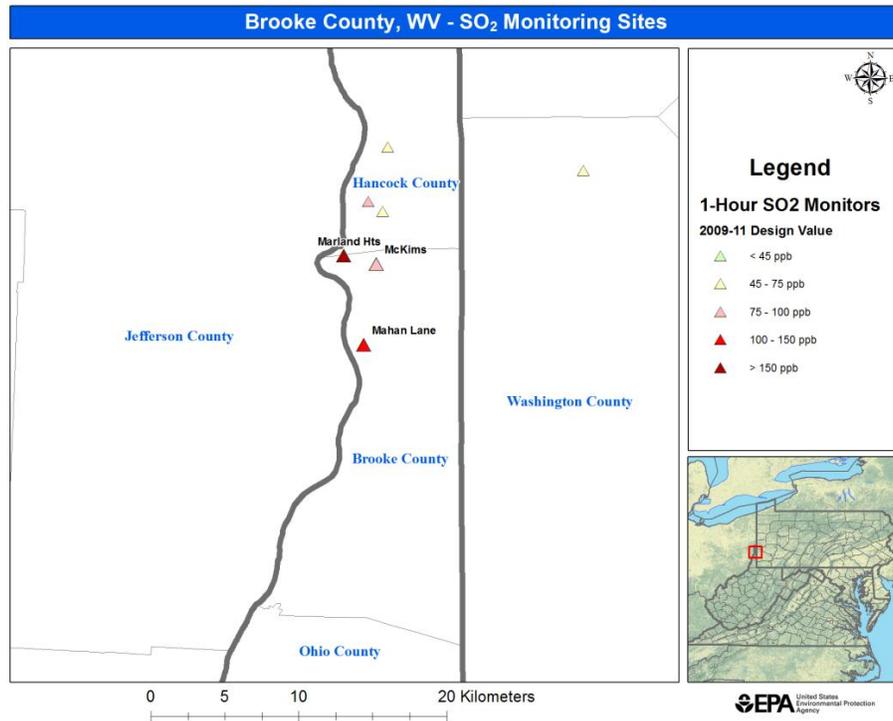
This technical analysis for the Steubenville, OH-WV Nonattainment Area identifies the whole county with a monitor that violates the 2010 SO<sub>2</sub> NAAQS, and evaluates nearby counties for contributions to SO<sub>2</sub> concentrations in the area. For this area, Brooke County has a violating monitor. EPA has evaluated this county and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011 guidance issued by EPA.

Based on EPA's technical analysis described below, EPA intends to expand upon West Virginia's recommendation and initially designate, based on the violating monitor in Brooke County in West Virginia, all of Brooke County and a portion of Jefferson County, Ohio as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Steubenville, OH-WV Nonattainment Area. The analysis in this TSD is primarily for the West Virginia portions of the nonattainment area. The analysis for the Ohio portion (Jefferson County) can be found in the TSD for Ohio.

#### ***Air Quality Data***

This factor considers the SO<sub>2</sub> design values (in ppb) for air quality monitors in Brooke County based on certified data for the 2009-2011 period. Figure 2 depicts the area analyzed and the locations of the violating air quality monitors based on 2009-11 data. The 2010 1-hour SO<sub>2</sub> design values for all the monitors located in Brooke County are shown in Table 2.

**Figure 2.**



**Table 2. Brooke County Monitor Trends: 1-Hour SO<sub>2</sub> 99<sup>th</sup> % and Design Values in ppb**

Monitor	ID	99 <sup>th</sup> %					Design Value	Design Value
		2007	2008	2009	2010	2011	2008-10	2009-11
Mahan Lane	54-009-0005	131	168	82	131	143	127	119
McKims	54-009-0007	168	137	81	92	75	103	83
Marland Heights	54-009-0011	169	159	143	143	219	148	174

All three monitors in Brooke County violated based on both 2008-10 and 2009-11 data. One-hour SO<sub>2</sub> monitor design values within Brooke County range from about 140% to almost twice the 1-hour SO<sub>2</sub> NAAQS. There are significant differences in Brooke County's design values. These differences occur between monitors that are generally within ten kilometers of one another and suggest substantial 1-hour SO<sub>2</sub> gradients exist in the northwest portion of Brooke County where the monitors are located.

An additional monitor in Jefferson County, Ohio is also showing a monitored violation of the 2010 SO<sub>2</sub> NAAQS, as discussed in the TSD for Ohio. Based on evidence that violations are occurring in Brooke County, West Virginia and Jefferson County, Ohio, EPA intends to initially designate a nonattainment area that includes the sources in the area that contribute to these monitored violations.

***Emissions and Emissions-Related Data***

Evidence of SO<sub>2</sub> 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<sub>2</sub> and any change in SO<sub>2</sub> 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. West Virginia did not provide updated emissions information, therefore EPA relied on the 2008 NEI emissions data (NEI08V2).

Table 3 shows total emissions of SO<sub>2</sub> in tons per year (tpy) for violating and potentially contributing counties in and around the Steubenville, OH-WV Nonattainment Area and sources emitting greater than 100 tpy of SO<sub>2</sub> according to the 2008 NEI. Similar information for the Ohio portion of this nonattainment area can be found in the TSD for Ohio.

**Table 3. SO<sub>2</sub> Emissions in Steubenville, OH-WV Nonattainment Area**

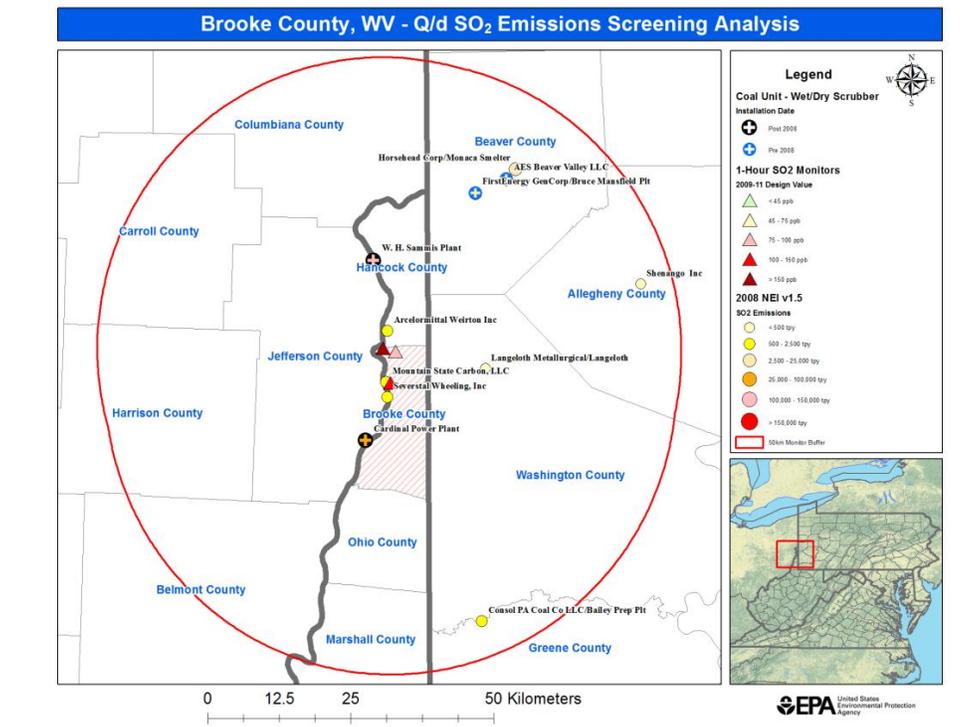
County	Facility Located in State Recommended Nonattainment Area?	Facility			Total Facility SO <sub>2</sub> Emissions (tpy)	Total County SO <sub>2</sub> Point Emissions (tpy)
		Name	EIS	Coordinates (lat, long)		
Brooke, WV	Yes	Mountain State Carbon, LLC	4864311	40.34361, -80.60667	731	767
Jefferson, OH	Yes	W.H. Sammis Plant	8190811	40.5308, -80.6311	102,195	136,297
Jefferson, OH	Yes	Cardinal Power Plant	8115711	40.2522, -80.6486	33,317	136,297
Jefferson, OH	Yes	Severstal Wheeling, Inc.	8190711	40.31974, -80.6042	700	136,297
Beaver, PA	Yes	First Energy Gen Corp/Bruce Mansfield Plant	3853711	40.6344, -80.42	11,019	17,584
Beaver, PA	Yes	AES Beaver Valley LLC	8141311	40.6558, -80.3556	3,113	17,584
Beaver, PA	Yes	Horsehead Corp/Monaca Smelter	7991511	40.67058, -80.3365	3,320	17,584
Lawrence, PA	No	Orion Power Midwest/New Castle Power Plant	3776611	40.9378, -80.3681	12,923	14,532
Lawrence, PA	No	ESSROC/Bessemer	6595011	40.9745, -80.49011	910	14,532
Lawrence, PA	No	CEMEX/Wampum Cement Plant	6621611	40.87825, -80.3247	674	14,532

Allegheny, PA	Yes	Bay Valley Foods, LLC	8521211	40.45343, -79.98584	487	35,844
Allegheny, PA	Yes	Shenango Inc	7407611	40.492, -80.07968	333	35,844
Washington, PA	Yes	Langeloth Metallurgical	4778911	40.36346, -80.401	186	3,746
Greene, PA	No	Consol PA Coal Co LLC/Bailey Prep Plant	3746711	39.97286, -80.41215	581	160,808

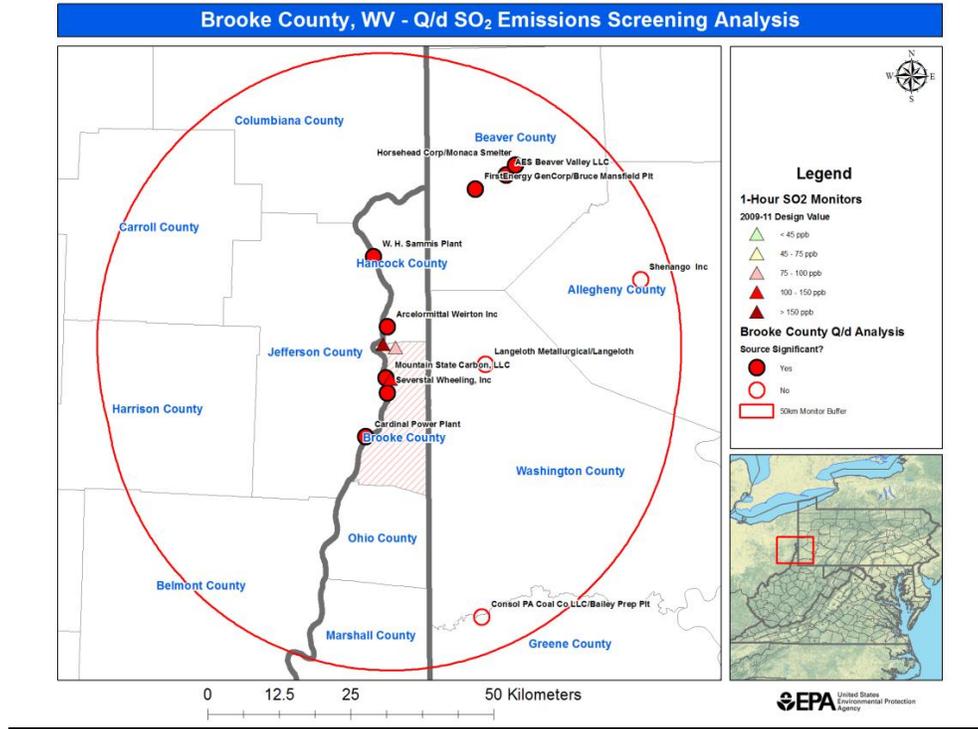
Using point source emissions data, the emissions by distance (Q/d) screening methodology was used to identify sources within 50 kilometers (km) of a violating monitor in Brooke County for further review.

A total of eleven point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of at least one of the nonattainment monitors in the county. Of these eleven point sources, one source is located in Brooke County; one source is located in Hancock; three sources are in neighboring Jefferson County, OH; three are located in Beaver County, PA; and one source emitting more than 100 tpy is located in each of the following PA counties: Allegheny, Greene, and Washington County. Following the Q/d methodology, eight of the eleven sources were identified for further review. These sources are W.H. Sammis Plant, Arcelormittal Weirton, Inc., Mountain State Carbon, LLC, Serverstal Wheeling, Inc., Cardinal Power Plant, First Energy Gen Corp/Bruce Mansfield Plant, AES Beaver Valley LLC, and the Horsehead Corp/Monaca Smelter.

**Figure 3.**



**Figure 4.**



**CAMD Emissions Analysis**

Emissions from sources included in EPA’s CAMD database (<http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>) were reviewed to determine if more recent emissions are available for sources near the violating monitors.

Not all emissions sources within 50 km of the violating monitors are included in the CAMD database. The sources who did report their annual emissions to CAMD are listed in Table 4.

**Table 4. CAMD 2008-11 Emissions Summary of SO<sub>2</sub> Emissions in tpy**

Facility	County	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011
AES Beaver Valley	Beaver	Not Available	3,500	1,491	3,086
First Energy/Bruce Mansfield	Beaver	11,117	17,704	8,971	21,196
W.H. Sammis Plant	Jefferson	102,619	73,614	12,761	4,202
Orion Power/New Castle Power Plant	Lawrence	12,923	7,629	5,442	7,510
Cardinal Power Plant	Jefferson	32,497	34,751	32,522	25,116

## Emissions Controls

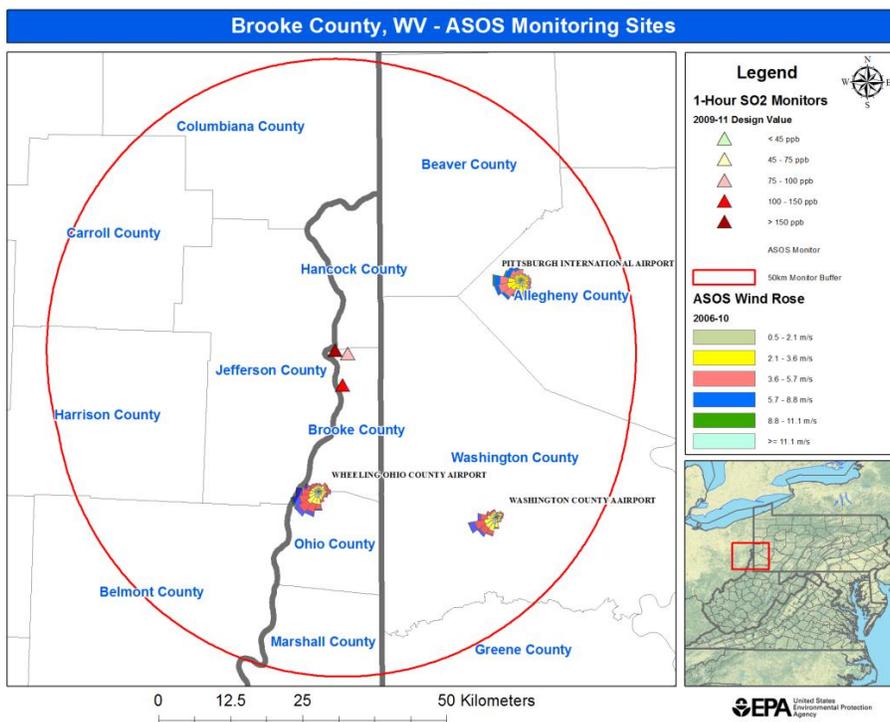
Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis represent emissions levels taking into account any control strategies implemented on stationary sources in the Steubenville, OH-WV Nonattainment Area up to and including 2008. Although EPA has not received any additional information on emissions reductions resulting from controls put into place after 2008, EPA has collected additional information from the 2008 NEI and CAMD.

Four sources have Flue Gas Desulfurization (FGD) units installed on them. Two sources, the H. W. Sammis and Cardinal power plants, both in Jefferson County, OH, have installed controls in a phased-in approach since 2008. Both the Bruce Mansfield power plant in Beaver County and the AES Beaver Valley plant have had controls on-line since the facilities became operational in the mid 1970's. Additionally, the Bruce Mansfield power plant has recently completed upgrades to its controls.

### ***Meteorology (weather/transport patterns)***

Evidence of source-receptor relationships between specific emissions sources and high SO<sub>2</sub> 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 data from sites that collected hourly averaged wind measurements including wind direction and speed for 5 years. The two closest meteorological monitoring sites currently operating near the violating monitors in Brooke County are at the Wheeling/Ohio County Airport and the Pittsburgh International Airport. An ASOS and rawinsonde site is located at the Pittsburgh International Airport. The Washington County Airport in PA was also included. However, the data recovery at this site was not as complete as at the Pittsburgh and Wheeling sites. One-minute meteorological wind fields for the Pittsburgh and Wheeling ASOS sites was downloaded and run through AERMOD's preprocessor AERMINUTE to produce hourly averaged wind fields. These data along with the Washington County data recovered from the Pennsylvania State Climatologists Office were then run through Lakes Environmental's WRPLOT software to produce wind roses for the surface sites nearest the Brooke County monitors.

**Figure 5.**



Wind rose plots for Pittsburgh International, Wheeling/Ohio County and Washington County airports show there are slightly different wind distribution patterns. At Pittsburgh International airport, the prevailing surface winds are predominantly out of the west with secondary peaks out of the southwest and northwest, whereas the winds at the Wheeling, Ohio County airport are predominantly out of the southwest. These slightly different wind patterns between the sites are probably due to differences in local topography.

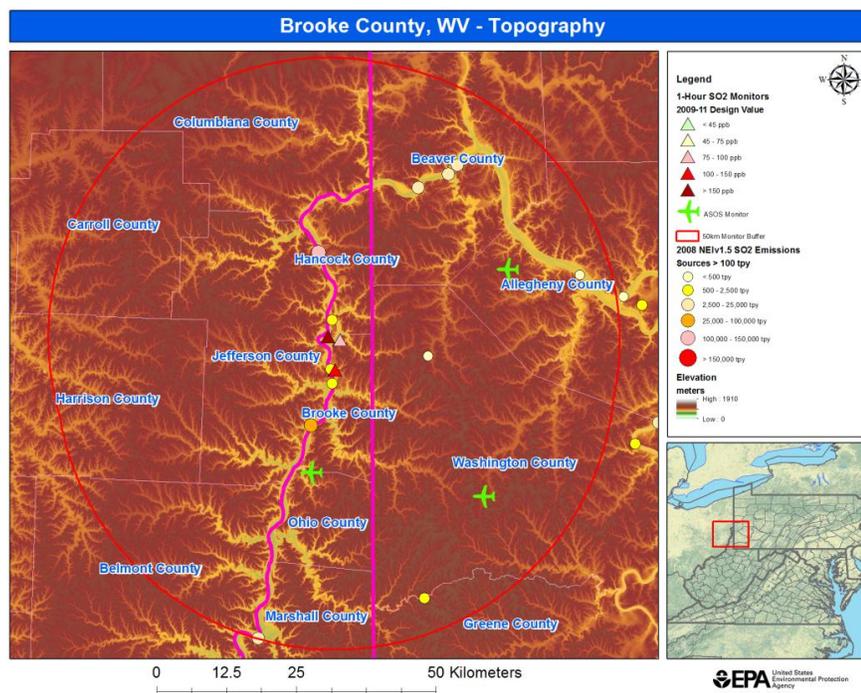
Given this information, with a dominant southwest wind at the Wheeling, Ohio County airport, EPA is not prepared to conclude that smaller sources in Hancock County and the large sources located northeast of the violating monitors, specifically those in Lawrence and Beaver Counties (ie. ESSROC/Bessemer and Orion Power Midwest/New Castle Power Plant, First Energy Gen Corp/Bruce Mansfield Plant, AES Beaver Valley LLC, Horsehead Corp/Monaca Smelter) are likely to be contributing to the violating Brooke County monitors. These prevailing wind patterns, however, show that the emissions from large sources in Jefferson County are likely impacting the violating monitors in Brooke County.

***Geography/topography (mountain ranges or other air basin boundaries)***

Figure 6 below depicts elevations and locations of point sources near Brooke County, which lies on the eastern side of the Ohio River. The county's elevated terrain contrasts with the lower elevations of the Ohio River and its tributaries that pass through the counties. This creates sharp contrasts in elevation with the Ohio River sitting around 200 meters above mean sea level and the adjacent mountains exceeding 350 meters.

Most of the large (>100 tpy) point sources in this region reside within the Ohio River Valley. It should be noted that the three surface meteorological sites reviewed in the previous section are located at higher elevations than most of the point sources, and therefore sources may be subject to different wind patterns, which could influence local dispersion patterns. It is unlikely, however that this would impact the transport of pollutants from large sources west of the violating monitors given that the emissions from those sources are significant.

**Figure 6.**



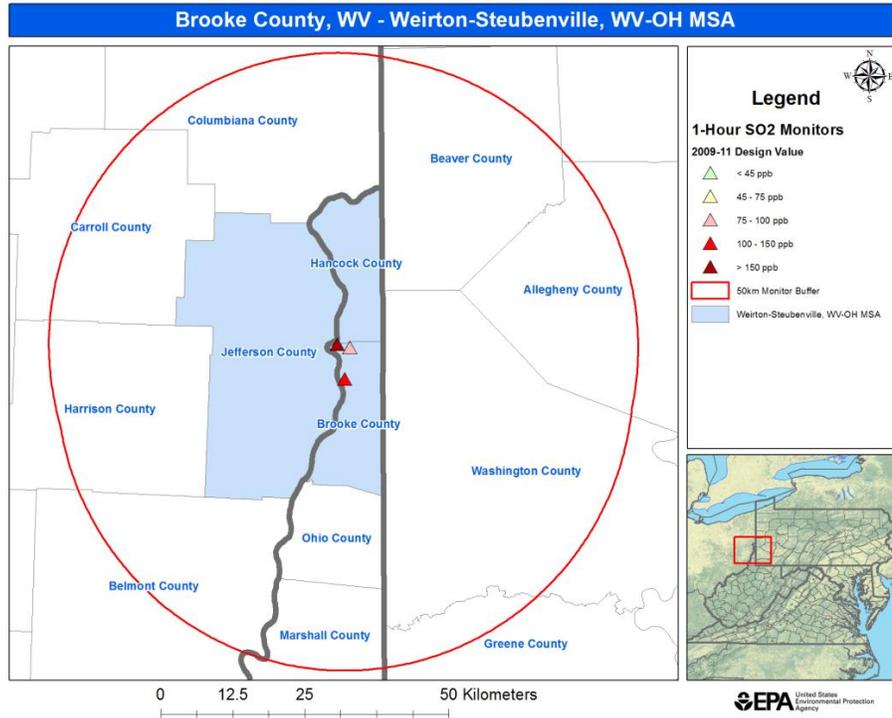
### ***Jurisdictional boundaries***

Although there is no existing maintenance boundary (i.e. a previous nonattainment area) in Brooke County for the 1971 primary SO<sub>2</sub> NAAQS, there are two other possible pre-existing boundaries that can be considered: the Weirton-Steubenville, WV-OH MSA and the Steubenville-Weirton-Wheeling AQCR. The Weirton-Steubenville, WV-OH MSA contains Brooke County and Hancock County, WV along with Jefferson County, OH. The Steubenville-Weirton-Wheeling AQCR consists of Hancock, Brooke, Ohio, and Marshall Counties in West Virginia along with Columbiana, Jefferson, Belmont and Monroe Counties in Ohio.

The Weirton-Steubenville, OH-WV MSA lies within the 50 kilometer buffer extending from both the Brooke County monitors. Drawing the nonattainment boundary along the Weirton-Steubenville, WV-OH MSA would bring in all of the large sources identified in the emissions screening analysis presented earlier that likely impact the violating monitors in Brooke County. Although this boundary is a viable option for the nonattainment area boundary, using this boundary would also bring sources into the nonattainment area that might not be contributing to the violating monitors in Brooke County. For these reasons, it would be practical at this point to

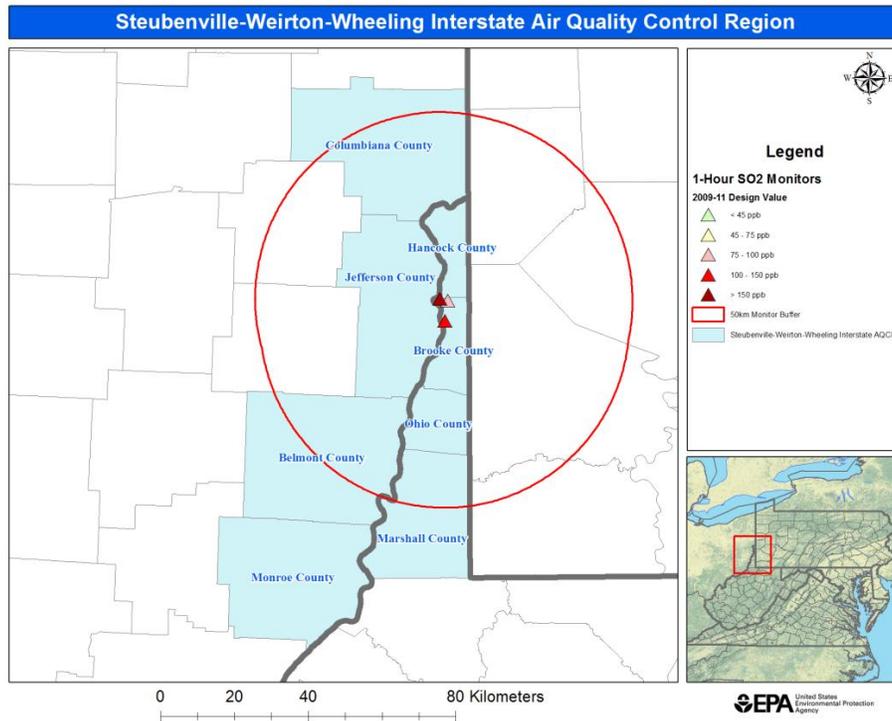
only initially include the portions of the county with the large sources contributing to the violating monitors in Brooke County in the nonattainment area.

**Figure 7.**



The Steubenville-Weirton-Wheeling Interstate AQCR, codified in the Code of Federal Regulations (CFR) § 81.33, is another possible nonattainment boundary. The area is much larger than the Weirton-Steubenville, WV-OH and includes eight counties, four each in Ohio and West Virginia. The Steubenville-Weirton-Wheeling Interstate AQCR includes sources which EPA is not prepared to conclude are likely to contribute to the monitored violations in Brooke County. For this reason it would not be practical to use the AQCR as the initial nonattainment boundary that is based on the violating monitors.

**Figure 8.**



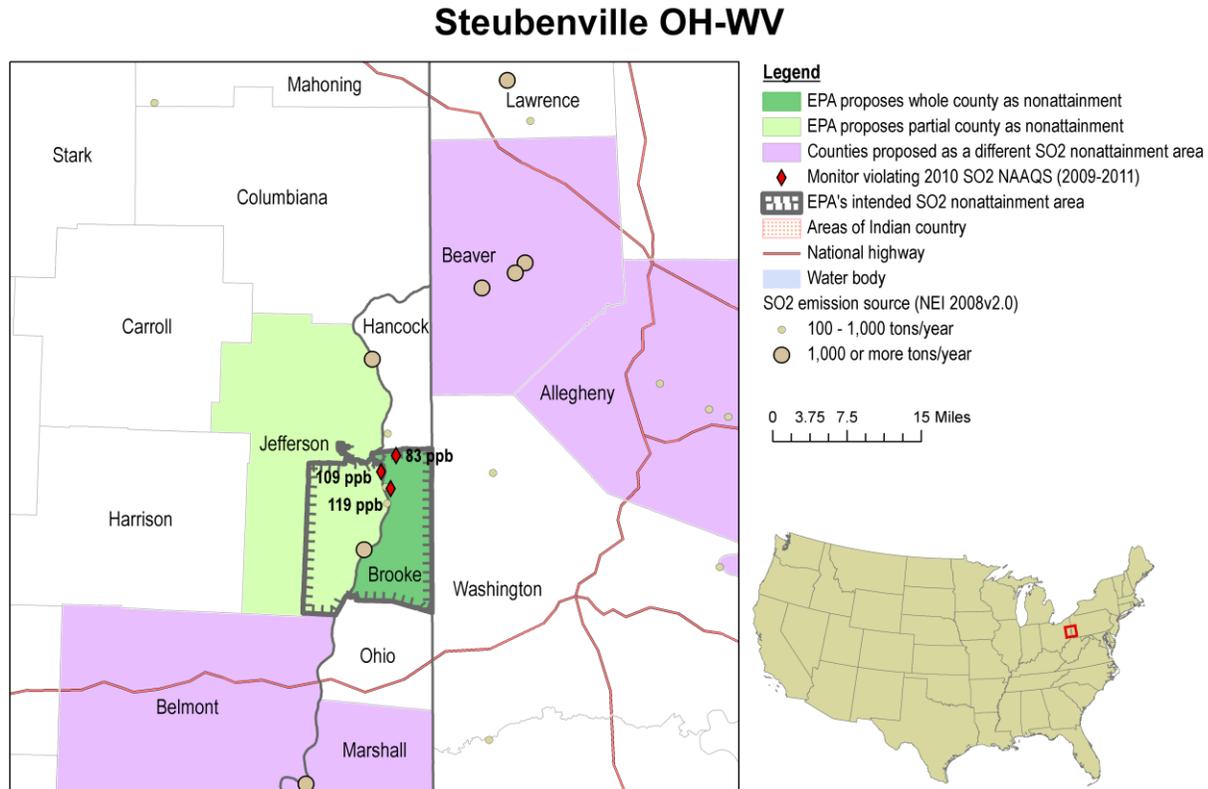
### ***Conclusion for the Steubenville, OH-WV Nonattainment Area***

After considering the factors described above, EPA intends to find that the appropriate initial boundary for the Brooke County, WV locations with violating monitors is a multi-state nonattainment area consisting of Brooke County and a portion of Jefferson County in Ohio as identified in Table 1 with area name Steubenville, OH-WV Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS.

The air quality monitors in Brooke County show violations of the 2010 SO<sub>2</sub> NAAQS, based on certified 2009-2011 air quality data. Jefferson County is a nearby area with sources that EPA finds contribute to the SO<sub>2</sub> concentrations in Brooke County. Available emissions, meteorological data, and geographical data suggest that large emission sources west and southwest of the monitors likely impact the monitors and contribute to SO<sub>2</sub> NAAQS violations in Brooke County.

Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass the appropriate initial nonattainment area based on violating monitors in Brooke County in West Virginia.

**Figure 9.**



### **Technical Analysis for the Wheeling, WV-OH Nonattainment Area**

This technical analysis for the Wheeling, WV-OH Nonattainment Area identifies the whole county with a monitor that violates the 2010 SO<sub>2</sub> NAAQS, and evaluates nearby counties for contributions to SO<sub>2</sub> concentrations in the area. For this area, Marshall County, WV has a violating monitor. EPA has evaluated this county and nearby counties based on the weight of evidence of the factors recommended in the March 24, 2011 guidance issued by EPA.

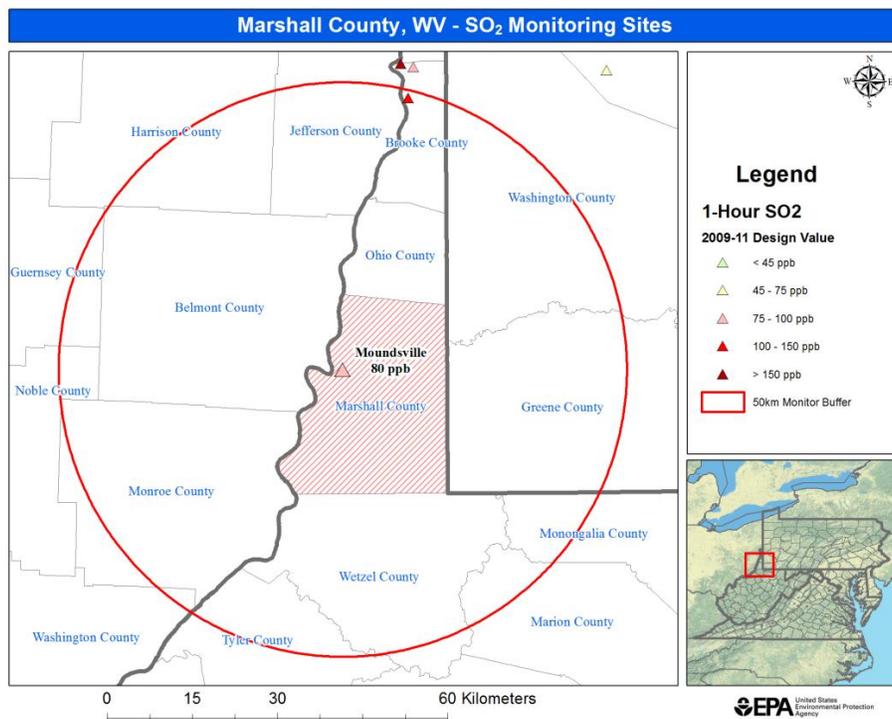
Based on EPA's technical analysis described below, EPA is intending to expand upon West Virginia's recommendation and initially designate based on the monitored violations in Marshall County in West Virginia and a portion of Belmont County (Mead Township), OH as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Wheeling, WV-OH Nonattainment Area. The analysis in this TSD is primarily for the West Virginia portion of the nonattainment area, although some information for the Ohio portion may be included. The full analysis for the Ohio portion can be found in the TSD for Ohio.

### ***Air Quality Data***

This factor considers the SO<sub>2</sub> air quality monitoring data, including design values (in ppb) calculated for all air quality monitors in Marshall County, WV in the Wheeling, WV-OH Nonattainment Area based on certified 2009-11 data. Figure 10 depicts the area analyzed and

the location of the violating air quality monitor. The data for the monitor located in Belmont County, Ohio is presented in the TSD for Ohio.

**Figure 10.**



The 2010 1-hour SO<sub>2</sub> design value for the monitor located in Marshall County is shown in Table 5.

**Table 5. Marshall County Monitor Trend: 1-Hour SO<sub>2</sub> 99<sup>th</sup> % and Design Value in Parts Per Billion (ppb)**

Monitor Name	Monitor Air Quality System ID	99 <sup>th</sup> %					Design Value	Design Value
		2007	2008	2009	2010	2011	2008-10	2009-11
Moundsville	54-051-1002	161	113	61	101	79	92	80

One-hour SO<sub>2</sub> design values appear to be generally falling over the last four years though there is insufficient data to clearly establish a definitive trend. The Marshall County monitor's 99<sup>th</sup> % concentration for 2009 is significantly lower than its other values. The severe recession during 2009 or decreases in local source emissions in the vicinity of the monitor could have contributed to the monitor's lower concentrations in that year.

***Emissions and Emissions-Related Data***

Evidence of SO<sub>2</sub> 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<sub>2</sub> and any change in SO<sub>2</sub> 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. West Virginia did not provide updated emissions information, therefore EPA relied on the 2008 NEI emissions data (NEI08V2).

Table 6 shows total emissions of SO<sub>2</sub> in tons per year (tpy) for violating and potentially contributing counties in and around the Wheeling Nonattainment Area and sources emitting greater than 100 tpy of SO<sub>2</sub> according to the 2008 NEI. This information for the Ohio portion (Belmont County) of this nonattainment area can be found in the TSD for Ohio.

**Table 6. SO<sub>2</sub> Emissions in the Wheeling Nonattainment Area**

County	Facility Located in State Recommended Nonattainment Area?	Facility			Total Facility SO <sub>2</sub> Emissions (tpy)	Total County SO <sub>2</sub> Point Emissions (tpy)
		Name	EIS	Coordinates (lat, long)		
Marshall, WV	Yes	Ohio Power – Kammer Plant	6902411	39.8464, -80.8189	32,050	51,576
Marshall, WV	Yes	PPG Industries, Inc.	4878711	39.74694, -80.8542	7,693	51,576
Marshall, WV	Yes	Rain CII Carbon Moundesville Calcining	4985611	39.83694, -80.81889	7,630	51,576
Marshall, WV	Yes	Ohio Power - Mitchell Plant	6902311	39.8297, -80.8153	3,024	51,576
Marshall, WV	Yes	Columbian Chemicals Company	5002011	39.79917, -80.82139	1,180	51,576
Belmont, OH	Yes	R.E. Burger Plant	8120011	39.9094, -80.7608	15,126	15,126
Jefferson, OH	Yes	Cardinal Power Plant	8115711	40.2522, -80.6486	33,332	136,297

Monroe, OH	No	Ormet Primary Aluminum	7983111	39.70444, -80.84222	2,442	2,442
Greene, PA	No	Consol PA Coal Co LLC/Bailey Prep Plant	3746711	39.97286, -80.41215	581	160,808
Brooke, WV	Yes	Mountain State Carbon, LLC	4864311	40.34361, -80.60667	731	767
Jefferson, OH	Yes	Severstal Wheeling, Inc.	8190711	40.31974, -80.6042	700	136,297
Monongalia, WV	Yes	Consol Blacksville #2 Prep Plant	6773711	39.71056, -80.2942	191	83,325

### Q/d Screening Analysis

Using point source emissions data, the emissions by distance (Q/d) screening methodology was used to identify sources within 50 km of a violating monitor in Marshall County for further review. A total of 12 point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of the monitor in Marshall County. Of these 12 point sources, five are located in Marshall County, WV; two sources emitting more than 100 tpy are in neighboring Jefferson County, OH; one source is located in each of the following counties: Belmont County, OH; Monroe County, OH; Brooke County, WV; Monongalia County, WV; and Greene County, PA. Following the Q/d methodology, we determined that nine of the twelve sources should be further reviewed. These sources are R.E. Burger Plant; Ohio Power/Kammer Plant; Ohio Power/Mitchell Plant; Columbian Chemicals Company; Rain CII Carbon Moundsville Calcining; PPG Industries, Inc.; Ormet Primary Aluminum; Cardinal Power Plant; and Consol PA Coal Co. LLC/Bailey Prep Plant.

Figure 11.

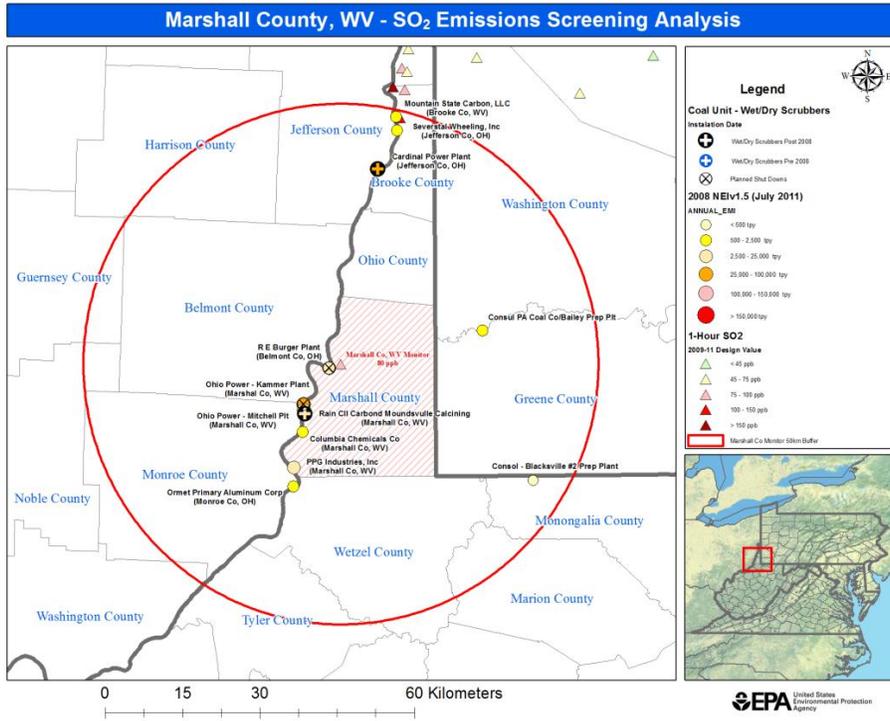
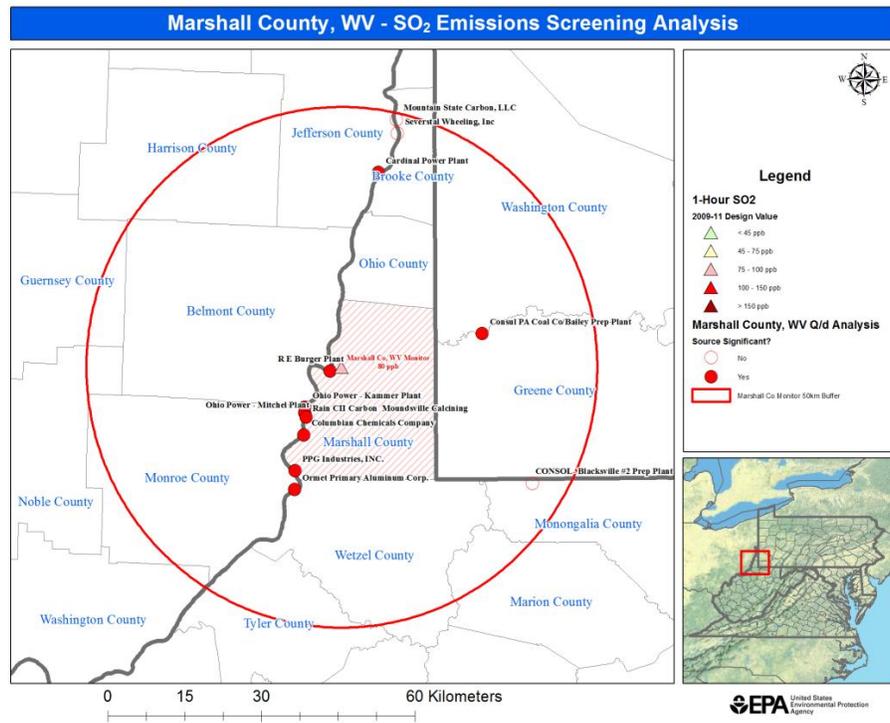


Figure 12.



## CAMD Emissions Analysis

Emissions from sources included in EPA's CAMD database (<http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>) were used to determine if lower emissions could have been responsible for the significant drop in the 2009 99<sup>th</sup> % 1-hour SO<sub>2</sub> concentrations at the Marshall County monitor.

Not all emissions sources within 50 km of the Marshall County monitor are included in the CAMD database; only four sources within 50 km of the Marshall County monitor reported their SO<sub>2</sub> emissions to the CAMD database, including two sources located in Ohio. These sources and their reported annual emissions are listed in Table 7 along with their distance from the Marshall County monitor.

**Table 7. CAMD 2008-11 Emissions Summary of SO<sub>2</sub> Emissions in tpy**

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011
R.E. Burger Plant	Belmont	2.4	15,126	5,988	12,719	Not available
OH Power - Kammer Plant	Marshall	10.6	32,044	16,756	14,127	16,712
OH Power - Mitchell Plant	Marshall	11.8	3,019	3,173	4,448	4,518
Cardinal Power Plant	Jefferson	38.1	32,497	34,751	32,522	25,116

\* Distance from Marshall County, WV SO<sub>2</sub> monitor in kilometers.

SO<sub>2</sub> emissions at the four CAMD sources show some interesting patterns. The Cardinal and Mitchell power plants have had relatively stable emissions between 2008 and 2010 but emissions at the Cardinal plant showed a decrease in 2011. CAMD emissions at the Kammer Power Plant have declined by about 50%. The R.E. Burger power plant had a significant drop (over 50%) in emissions in 2009. This drop in emissions seems to be responsible for the sudden decline in SO<sub>2</sub> monitoring levels in 2009. This conclusion is based on the CAMD emission trends and the relatively short distance between the facility and the Marshall County monitor. It also appears that the R.E. Burger Plant is the primary source impacting the Marshall County monitor.

### Emissions Controls

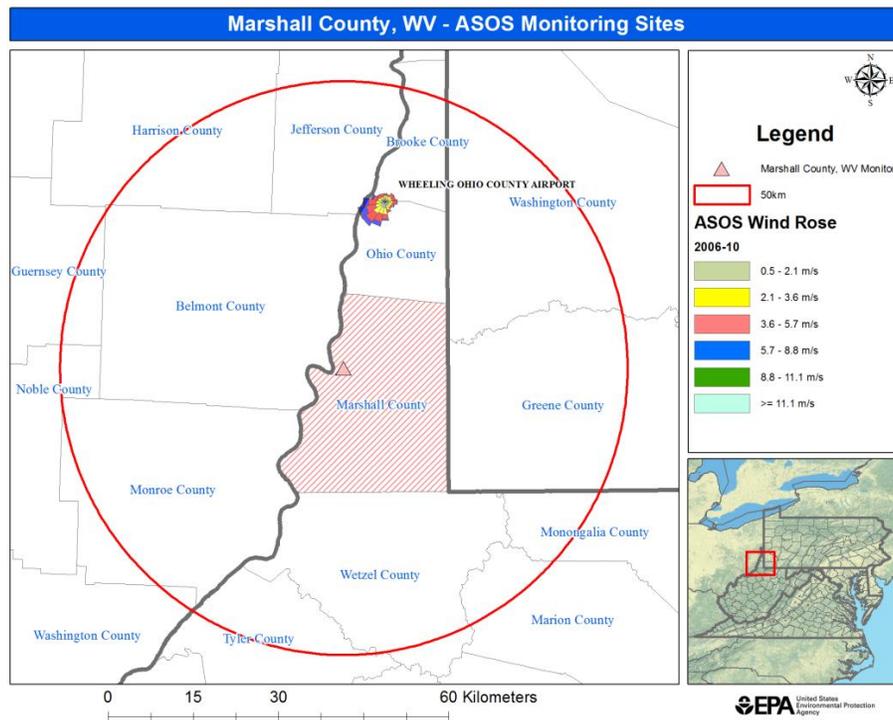
Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis represents emissions levels while accounting for any control strategies implemented on stationary sources in the Wheeling, WV-OH Nonattainment Area up to and including 2008. Although EPA has not received any additional information on emissions reductions resulting from controls put into place after 2008, EPA has evaluated additional information from the 2008 NEI and CAMD.

Two sources (Cardinal and Mitchell power plants) have recently installed FGD units on them. Additionally, two sources (R.E. Burger and Kammer Power Plants) have planned to shut down portions of or all of their coal units. If the R.E. Burger Power Plant shuts down its coal units, based on monitoring trends and the CAMD information reviewed here, it is quite probable that the monitor in Marshall County will no longer detect violations of the 1-hour SO<sub>2</sub> NAAQS.

***Meteorology (weather/transport patterns)***

Evidence of source-receptor relationships between specific emissions sources and high SO<sub>2</sub> 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 data from sites that collected hourly averaged wind measurements including wind direction and speed for 5 years. There appears to only be one ASOS and one rawinsonde site located near the violating monitor in Marshall County. The closest surface site is the Wheeling/Ohio County Airport approximately 30 kilometers north of the Marshall County monitor. A rawinsonde site is located at the Pittsburgh International Airport located approximately 77 kilometers to the northeast. One-minute meteorological wind fields for the Wheeling/Ohio County Airport site was downloaded and run through AERMOD’s preprocessor AERMINUTE to produce hourly averaged wind fields. This data was then run through Lakes Environmental’s WRPLOT software to produce wind roses for the Wheeling, Ohio County Airport, the surface site nearest the Marshall County monitor.

**Figure 13.**

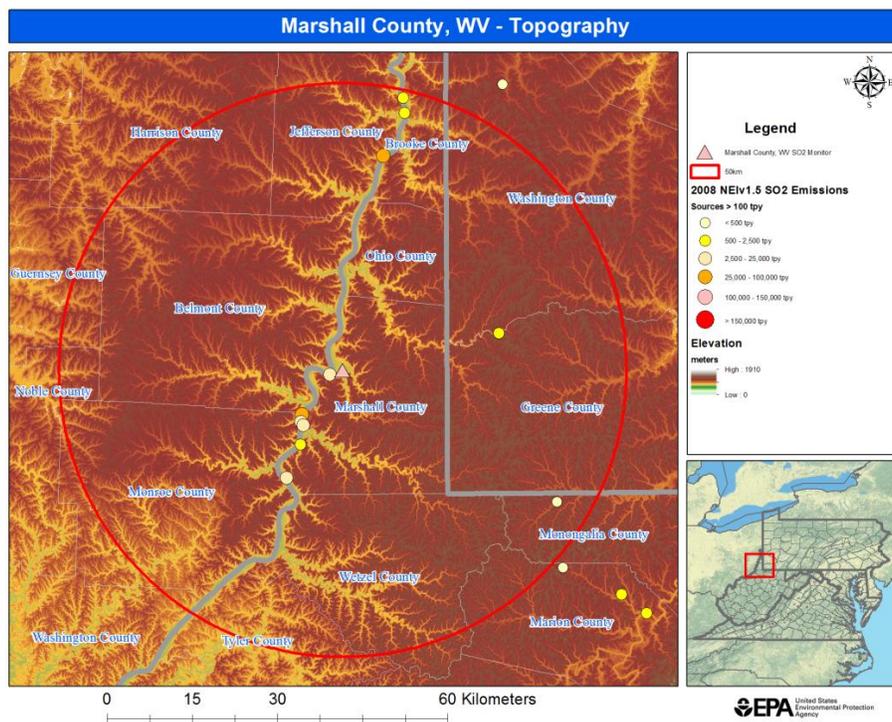


The wind rose indicates that at the Wheeling/Ohio County Airport, the prevailing surface winds are predominantly out of the southwest and west. Given this information, the sources west and southwest of the violating monitor, particularly those within close proximity of the violating monitor, are likely to have the greatest impact on the violating monitor in Marshall County. EPA is not prepared to conclude that sources north and east (ie. Cardinal Power Plant and Consol PA Coal Co LLC/Bailey Prep Plant) are likely to contribute to the violating monitor in Marshall County.

***Geography/topography (mountain ranges or other air basin boundaries)***

Figure 14 below depicts elevations and locations of point sources near Marshall County. Marshall County lies on the eastern side of the Ohio River. The county's elevated terrain contrasts with the lower elevations of the Ohio River and its tributaries that pass through the county. This creates sharp differences in elevation with the Ohio River sitting just under 200 meters above mean sea level and the adjacent mountains often exceeding 350 meters. Nearly all of the point sources within 50 kilometers of the Marshall County monitor lie along the Ohio River. Although the surface meteorological site reviewed in the previous section may be located at a somewhat higher elevation than most of the point sources, the difference in elevation is not significant enough where it is likely that there would be substantial differences in wind patterns between the two locations. Therefore, local dispersion patterns are likely predominantly from the southwest/west as well and sources located southwest and west of the monitor are likely to contribute to nonattainment in Marshall County.

**Figure 14.**

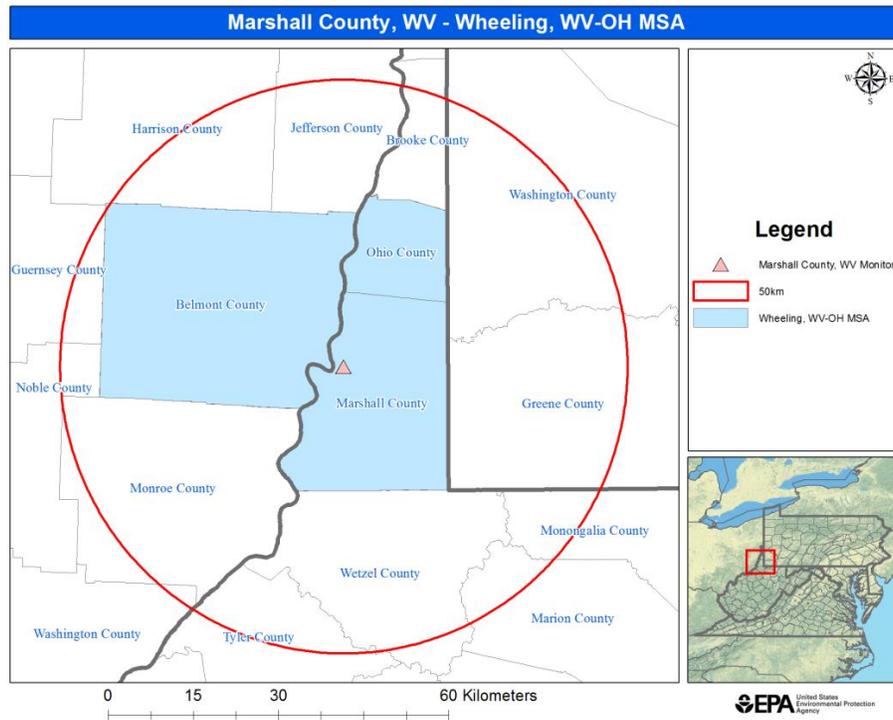


### *Jurisdictional boundaries*

There is no existing nonattainment/maintenance boundary for the previous 1971 primary SO<sub>2</sub> NAAQS for the Wheeling, WV-OH Nonattainment Area. However, there are other possible boundaries that can be considered: the Wheeling, WV-OH MSA and the Steubenville-Weirton-Wheeling AQCR. The Wheeling, WV-OH MSA contains Marshall County and Ohio County, WV along with Belmont County, OH. The Steubenville-Weirton-Wheeling AQCR consists of Hancock, Brooke, Ohio, and Marshall Counties in West Virginia along with Columbiana, Jefferson, Belmont and Monroe Counties in Ohio.

The Wheeling, WV-OH MSA lies within the 50 kilometer buffer extending from the Marshall County monitor. Drawing the nonattainment boundary along the Wheeling, WV-OH MSA would bring in several sources identified in the emissions screening analysis presented earlier and the nonattainment monitor located in Belmont County, OH. Although this boundary is a viable option for the nonattainment area boundary, using this boundary would bring small sources (less than 100 tpy) into the nonattainment area that EPA is not prepared to conclude are likely to be contributing to the violating monitor in Marshall County. For these reasons, it would be practical to only initially include the portions of Belmont County which contain the large sources contributing to the violating monitor in Marshall County in the nonattainment area.

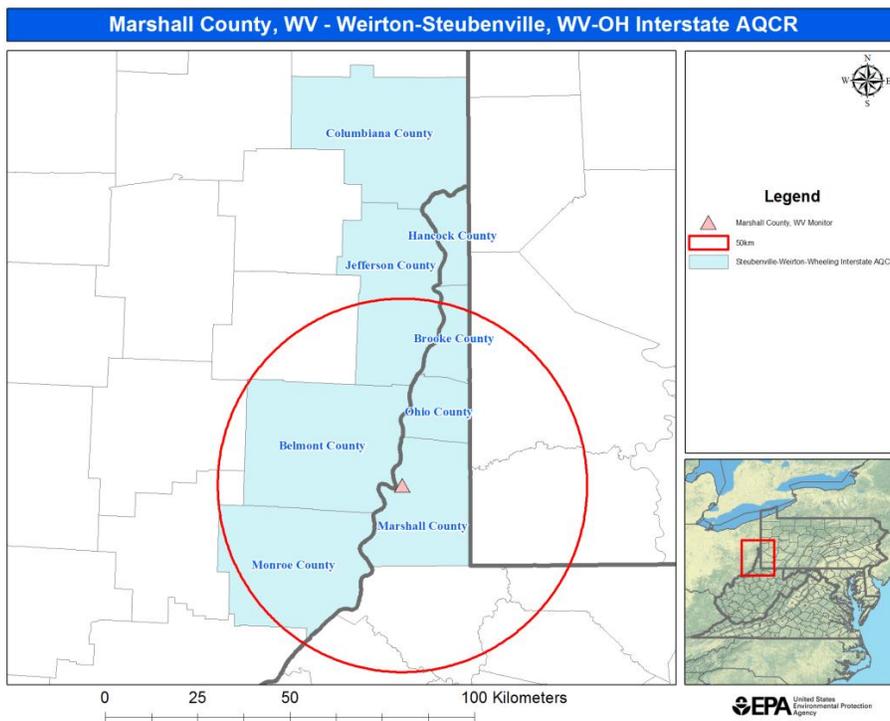
**Figure 15.**



The Steubenville-Weirton-Wheeling Interstate AQCR, codified in the Code of Federal Regulations (CFR) § 81.33, is another possible nonattainment boundary. The area is much larger

than the Wheeling, WV-OH MSA and includes eight counties, four each in Ohio and West Virginia. The Steubenville-Weirton-Wheeling Interstate AQCR includes sources which EPA is not prepared to conclude are likely to contribute to the violating monitor in Marshall County. For this reason, it would not be practical to use the AQCR as the initial nonattainment boundary based on the violating monitor.

**Figure 16.**



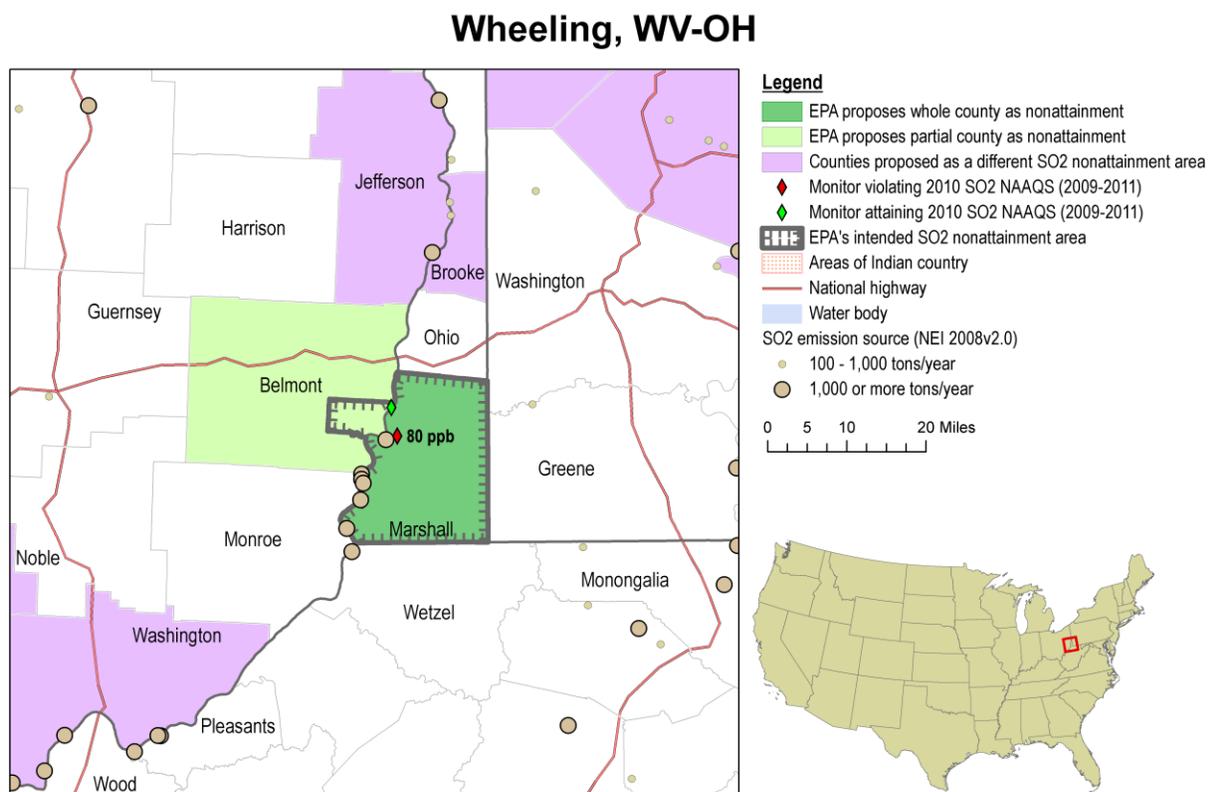
### ***Conclusion for the Wheeling, WV-OH Nonattainment Area***

After considering the factors described above, EPA intends to find that the appropriate initial boundary for the Marshall County, WV location with the violating monitor is a multi-state nonattainment area consisting of Marshall County, WV and a portion of Belmont County, OH as identified in Table 1 with area name Wheeling, WV-OH Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS.

The air quality monitor in Marshall County, WV shows a violation of the 2010 SO<sub>2</sub> NAAQS, based on certified 2009-2011 air quality data. Belmont County, OH is a nearby area with sources that EPA finds likely to contribute to the SO<sub>2</sub> concentrations in Marshall County. The monitor in Marshall County shows high concentrations of SO<sub>2</sub> emissions in the vicinity. Meteorological data suggests that emissions from large sources southwest/west of the monitor (located in both Marshall County, WV and Belmont County, OH) likely impact the monitor and contribute to SO<sub>2</sub> NAAQS violations in Marshall County. Available emissions data further suggests that the large sources most likely contributing to nonattainment in Marshall County are

those nearest (for example, the R.E. Burger Plant) the violating monitor in Marshall County. Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass the appropriate initial nonattainment area indicated by the violating monitor in Marshall County.

**Figure 17.**



**EPA’s Area Designations Conclusion for West Virginia**

EPA has reviewed the information above and intends to find that it is appropriate to initially designate based on violating monitors the counties and/or portions of counties listed in Table 1 as nonattainment for the 2010 SO<sub>2</sub> NAAQS. EPA intends to designate Brooke and Marshall Counties (see Table 1), as nonattainment after considering the factors and information described in this technical support document. The nonattainment area boundaries that EPA describes above are based on the five factors which include: air quality data, emissions-related data, meteorology, geography/topography, and jurisdictional boundaries. Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass sufficient initial areas that do not meet (or that contribute to ambient air quality in a nearby area that does not meet) the 2010 SO<sub>2</sub> NAAQS based on the monitored violations.