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**Draft Technical Support Document**

**PENNSYLVANIA  
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 Commonwealth of Pennsylvania (“Pennsylvania” or “PA”) that EPA intends to initially designate nonattainment based on monitored violations.

**Table 1. Nonattainment Area Designations for Pennsylvania**

Area	Pennsylvania’s Recommended Designation of Areas/Counties	EPA’s Intended Designation of Areas/Counties
Allegheny, PA Allegheny County	Nonattainment	Nonattainment
Beaver, PA Beaver County	Nonattainment	Nonattainment
Indiana, PA Indiana County Armstrong County (partial) Plumcreek Township South Bend Township Elderton Borough	Nonattainment Unclassifiable	Nonattainment Nonattainment
Warren, PA Warren County	Nonattainment	Nonattainment

**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 concentrations 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 these 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); 5) Jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organization), among any other criteria deemed to be relevant to establishing appropriate areas 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 that of a default county boundary.

In this TSD, EPA discusses its review and technical analysis of the recommendations submitted by Pennsylvania 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 Pennsylvania's designation recommendation letter to EPA, dated June 23, 2011, Michael L. Krancer, Secretary of the Pennsylvania Department of Environmental Protection (PADEP), recommended that Allegheny, Beaver, Indiana, and Warren Counties be designated as nonattainment for the 2010 SO<sub>2</sub> NAAQS based on monitored air quality data from 2008-2010. Pennsylvania provided its 5-factor analysis for each of these four counties as part of its designation recommendation.

Based on EPA's technical analysis, EPA intends to initially designate four areas as nonattainment (Table 1) based on monitored violations of the 2010 SO<sub>2</sub> NAAQS. The Allegheny Nonattainment Area consists of Allegheny County; the Beaver Nonattainment Area consists of Beaver County; the Indiana Nonattainment Area consists of Indiana County and a portion of Armstrong County (Plumcreek and South Bend Townships and Elderton Borough); and the Warren Nonattainment Area consists of Warren County.

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 (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

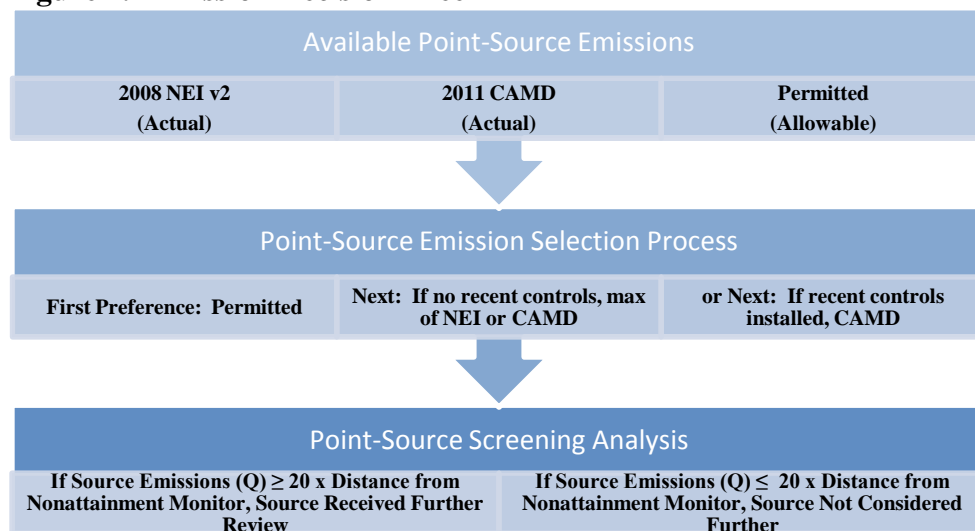
indicate a violation of the 1-hour, 75 ppb primary SO<sub>2</sub> standard will be designated as nonattainment.

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 (NEI08V2), 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 the EPA Region III states.

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 2010 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.

Pennsylvania recommended the county boundary for all its nonattainment area boundaries, which was the 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 Allegheny Nonattainment Area**

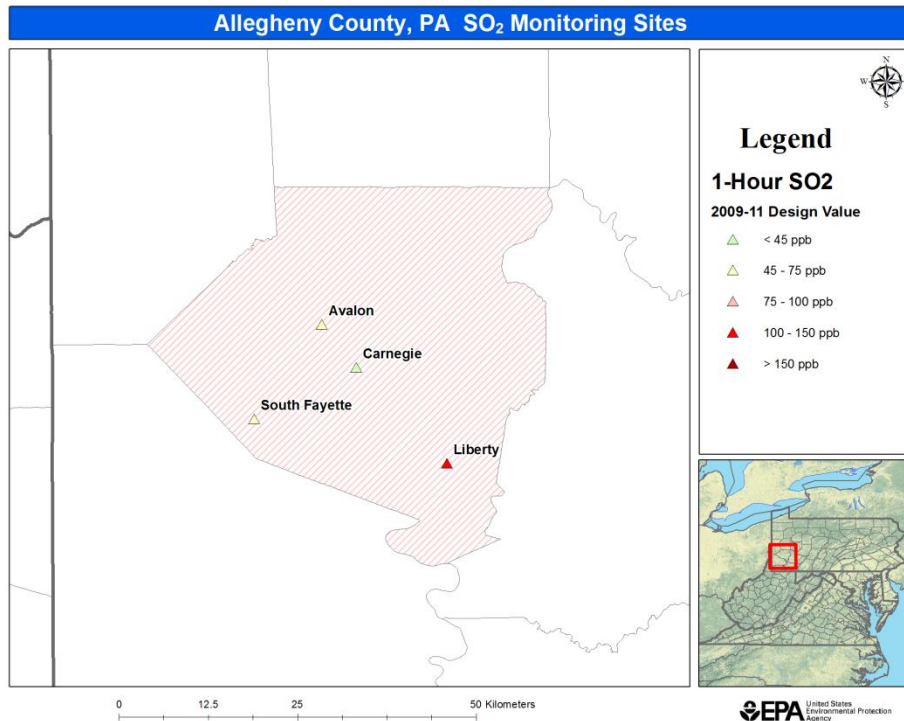
This technical analysis for the intended Allegheny Nonattainment Area identifies the whole county with a monitor that violates the 2010 SO<sub>2</sub> NAAQS, and evaluates nearby counties for contributions to SO<sub>2</sub> concentrations in the area. EPA has evaluated this county and nearby counties 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 agrees with Pennsylvania's recommendation and initially intends to designate, based on the violating monitor, Allegheny County in Pennsylvania as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Allegheny Nonattainment Area.

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

This factor considers the SO<sub>2</sub> design values (in ppb) for air quality monitors in Allegheny County in the Allegheny Area based on certified data for the 2009-2011 period. Figure 2 depicts the area analyzed and the location of the violating air quality monitor (Liberty monitor).

**Figure 2.**



The 2010 1-hour SO<sub>2</sub> design values for the five monitors located in Allegheny County are shown in Table 2.

**Table 2. Allegheny County Monitor Trends: 1-Hour SO<sub>2</sub> 99<sup>th</sup> % and Design Values 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
Avalon	42-003-0002	70	75	61	53	40	63	51
Carnegie	42-003-0010	75	62	61	35	23	53	40
<b>Liberty</b>	<b>42-003-0064</b>	<b>192</b>	<b>111</b>	<b>131</b>	<b>141</b>	<b>165</b>	<b>128</b>	<b>146</b>
South Fayette	42-003-0067	74	52	53	63	28	48	40

\*Monitor in bold has the highest 2009-2011 design value in the respective county.

Allegheny County shows a violation of the 2010 1-hour SO<sub>2</sub> NAAQS (Liberty monitor). Therefore, this county and nearby counties will be reviewed to determine what area should be designated as nonattainment. The absence of a violating monitor alone is not a sufficient reason to eliminate nearby counties as candidates for nonattainment status. Each area has been evaluated based on the five factors and other relevant information.

***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. Pennsylvania 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 Allegheny Area and sources emitting or contributing greater than 100 tpy of SO<sub>2</sub> according to the NEI08V2.

**Table 3. SO<sub>2</sub> Emissions in Allegheny Area (source: NEI08V2)**

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		
Allegheny	Yes	Us Steel Corporation - Irvin Plant	7409411	40.33554, -79.90168	475	35,844
Allegheny	Yes	Shenango Inc	7407611	40.492, -80.07968	333	35,844
Allegheny	Yes	Orion Power Midwest Cheswick Station	8404811	40.53639, -79.79222	30,300	35,844
Allegheny	Yes	Uss Corporation - Edgar Thomson Works	7409311	40.39553, -79.86299	1,536	35,844
Allegheny	Yes	Uss - Clairton Works	8204511	40.3055, -79.877021	1,517	35,844



Allegheny	Yes	Bellefield Boiler Plant	8404711	40.442127, -79.94913	795	35,844
Allegheny	Yes	Bay Valley Foods, LLC	8521211	40.45343, -79.98584	487	35,844
Washington	No	Orion Power/Elrama Power Station	3895011	40.25, -79.9167	2,572	3,746
Washington	No	Allegheny Energy/Mitchell Power Station	3894811	40.2228, -79.9694	934	3,746
Westmoreland	No	Arcelormittal Monesson LLC/Monesson Coke Plant	8330811	40.161547, -79.883469	396	569
Washington	No	Langeloth Metallurgical	4778911	40.36346, -80.401	186	3,746

### Q/d Screening Analysis

Using point source emissions data, the emissions by distance (Q/d) screening methodology was used to identify sources within 50 kilometers (km) of the Liberty monitor that should receive a further review. A total of 11 point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of the Liberty monitor. Of the 11 point sources, seven are in Allegheny County, three are in neighboring Washington County and one is in Westmoreland County. No permit information was available for our analysis and only one source, Cheswick Power Station, had control equipment installed recently (so the CAMD emissions were used for this source). Following the Q/d methodology, we determined that nine of the eleven sources should receive further review. These sources are Orion Power Cheswick Station, Bay Valley Foods, Bellefield Boiler Plant, USS corporation-Edgar Thomson Works, US Steel Corporation, USS Clairton Works, Orion Power Elrama Power Station, Allegheny Energy Mitchell Power Station, and Arcelormittal Monesson Coke Plant (Figures 3-4).

Figure 3.

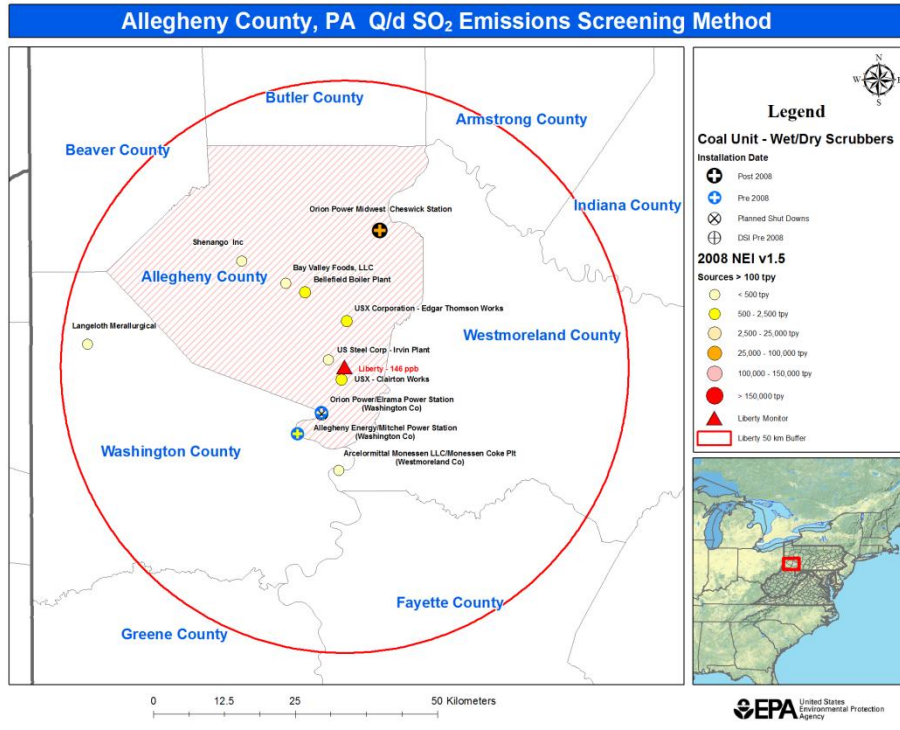
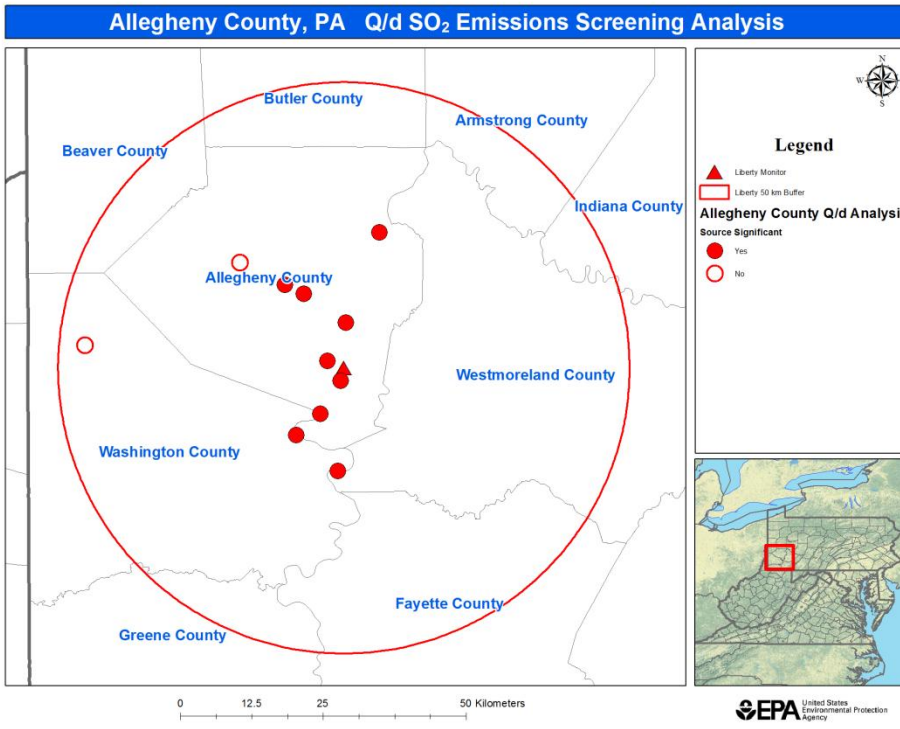


Figure 4.



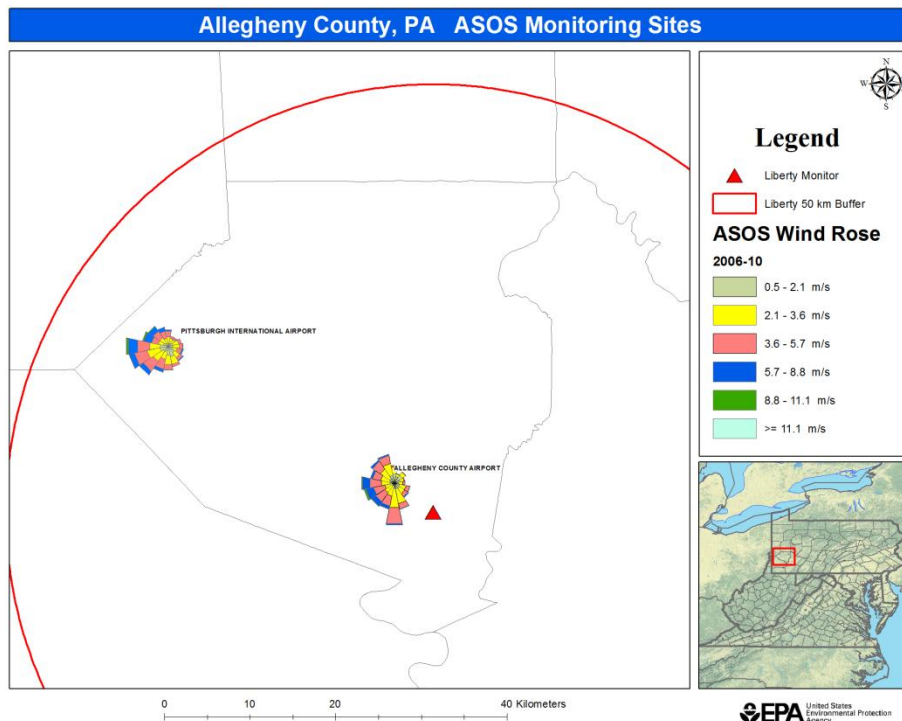
## Emissions Controls

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 emission levels while accounting for any control strategies implemented on stationary sources in the Allegheny 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. Cheswick Power Station, had control equipment installed recently. Elrama Power Station in Washington County has had wet scrubbers installed since the mid 1970's and was scheduled to shut down in June 2012. Mitchell Power Station in Washington County had wet scrubbers installed in 2006 and 2007.

### ***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 are two meteorological monitoring sites currently operating in Allegheny County. An ASOS and rawinsonde site is located at the Pittsburgh International Airport in the western part of the county. Another ASOS site is located at the Allegheny County Airport in the southern portion of the county. The Allegheny County Airport site is closer to the Liberty monitor. Recent wind data from both airports was downloaded and run through AERMOD's preprocessor AERMINUTE to produce hourly averaged wind fields. These data were in turn run through Lakes Environmental's WRPLOT software to produce wind roses for both of the surface ASOS sites in Allegheny County and shown below in Figure 5.

**Figure 5.**



Wind rose plots for Pittsburgh International and Allegheny County airports show differing wind distribution patterns. As shown in the map in Figure 5, the prevailing wind directions at the Allegheny County Airport are predominantly out of the south and west. At the Pittsburgh International Airport, the prevailing winds are predominantly out of the west/southwest. These different wind patterns suggest source emission distributions may be dependent on their locations within the county. Differing wind patterns between the two ASOS sites are probably due to the county's complex topography (see explanation under *Geography/topography*).

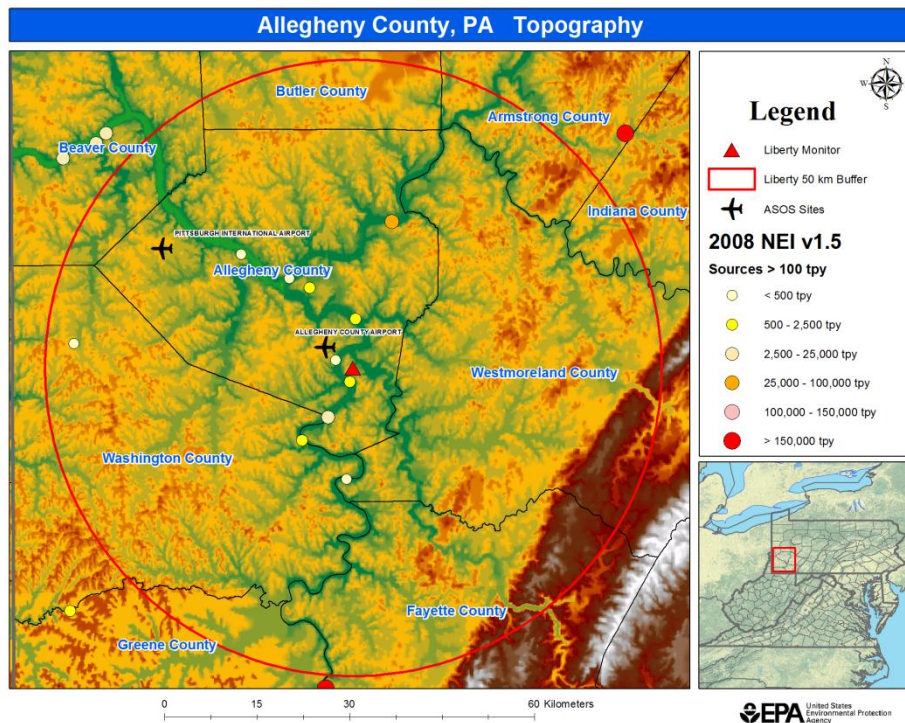
Pennsylvania provided its own analysis of meteorological data. They used wind measurements collected at the Allegheny County Airport from January 2008 to December 2010 and developed a wind rose diagram showing that the wind is primarily out of the west and south at the Allegheny County Airport, with secondary peaks out of the north. During the periods when there are high SO<sub>2</sub> concentrations at the Liberty monitor, the wind is primarily out of the south. In addition, wind speeds are generally stronger, indicating that the winds are unimpeded (from any terrain) from that direction. Pennsylvania notes that the Allegheny County Airport meteorological tower is measuring winds at 55 meters above the Liberty monitor. Therefore, the stronger winds at the Allegheny County Airport could potentially signify the long range transport of pollutants affecting the Liberty monitor.

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

Allegheny County is made up of the high elevations of the Appalachian Mountains with dendritic valleys carved out by the Ohio, Allegheny and Monongahela rivers systems. Higher terrain lies to the southeast (Laurel Ridge). Elevation differences between the river valleys and the ridge tops can exceed 150 meters. See Figure 6 below.

Most of the large (>100 tpy) point sources in Allegheny County reside within the river valleys. This is important since these valleys can create complex wind patterns which will impact sources with low stacks that cannot overcome neighboring elevated terrain causing the emissions to be trapped within the valleys. The ASOS meteorological sites in Allegheny County are both located in the higher elevations of the county. This presents a problem in that the meteorological measurements may not be representative of the valley flows that can occur under certain atmospheric conditions. These atmospheric conditions may define the times of peak concentrations for some emissions sources (low stacks for example). Therefore, the large sources residing within the river valleys are likely to cause localized air quality problems.

**Figure 6.**



### *Jurisdictional boundaries*

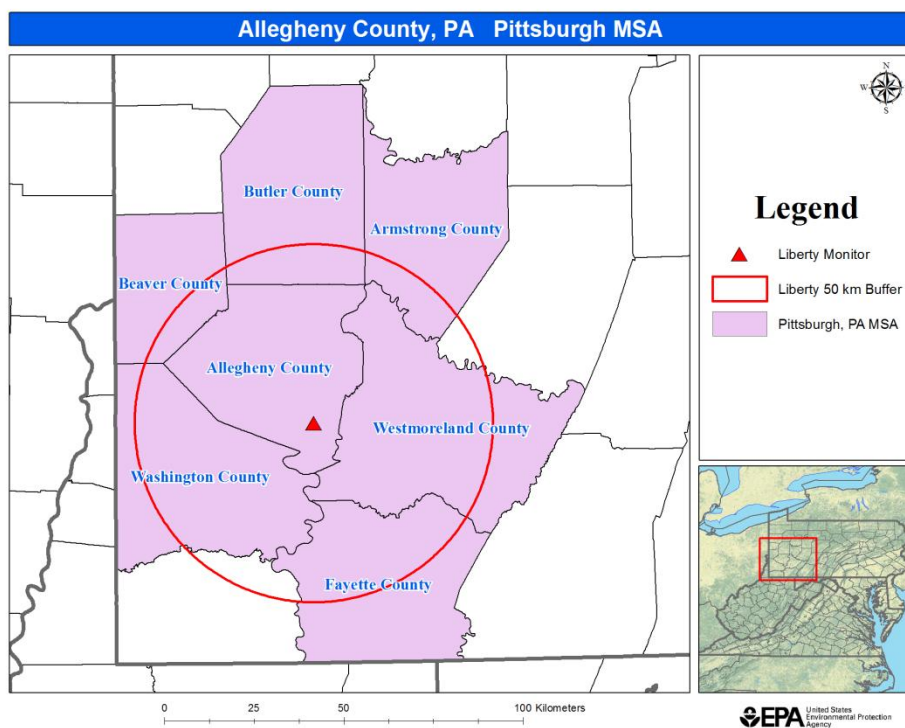
There is an existing maintenance boundary (i.e., previous nonattainment area) for the 1971 primary SO<sub>2</sub> NAAQS in Allegheny County, in Hazelwood, PA that encompasses the area within

a 2-mile radius of the Hazelwood monitor. This boundary is not an appropriate boundary because it is too small and does not encompass any of the sources impacting the current violating monitor (Liberty monitor).

There are other possible boundaries that can be considered: the Pittsburgh, PA MSA and the Southwest Pennsylvania Air Quality Control Region (AQCR). The Pittsburgh, PA MSA contains seven counties: Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland. The Southwest Pennsylvania AQCR consists of Allegheny, Beaver, Butler, Armstrong, Indiana, Westmoreland, Fayette, Greene, and Washington Counties.

Drawing the nonattainment boundary based on the Pittsburgh, PA MSA would add significant areas to the proposed 1-hour SO<sub>2</sub> nonattainment area (Figures 7-8). Portions of the Pittsburgh, PA MSA would extend beyond 50 km from the Liberty monitor. Using the Pittsburgh, PA MSA as the nonattainment boundary would include sources and areas that EPA is not prepared to conclude are likely to have an impact at the Liberty monitor.

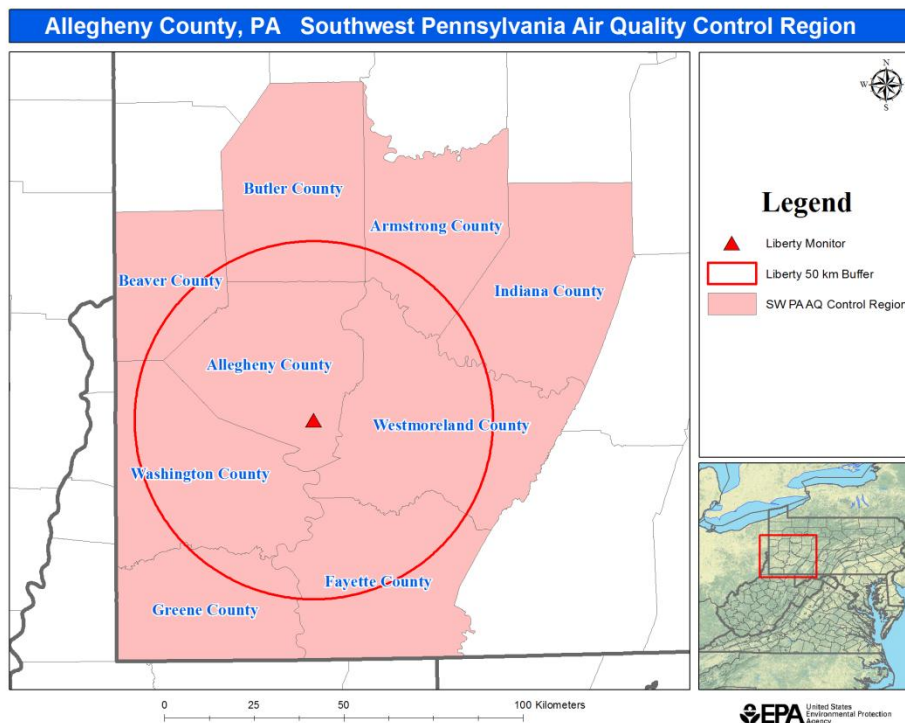
**Figure 7.**



The Southwest Pennsylvania (SW PA) AQCR, codified in the Code of Federal Regulations (CFR) § 81.23, is another possible nonattainment boundary. The SW PA AQCR is similar in size to the Pittsburgh, PA MSA but also includes Indiana and Greene counties (Figure 8). The SW PA AQCR does include all counties that lie within 50 km of the Liberty monitor, but similar

to the Pittsburgh, PA MSA, it includes a significant area outside this buffer that EPA is not prepared to conclude is likely to contain sources contributing to the violating monitor at Liberty.

**Figure 8.**



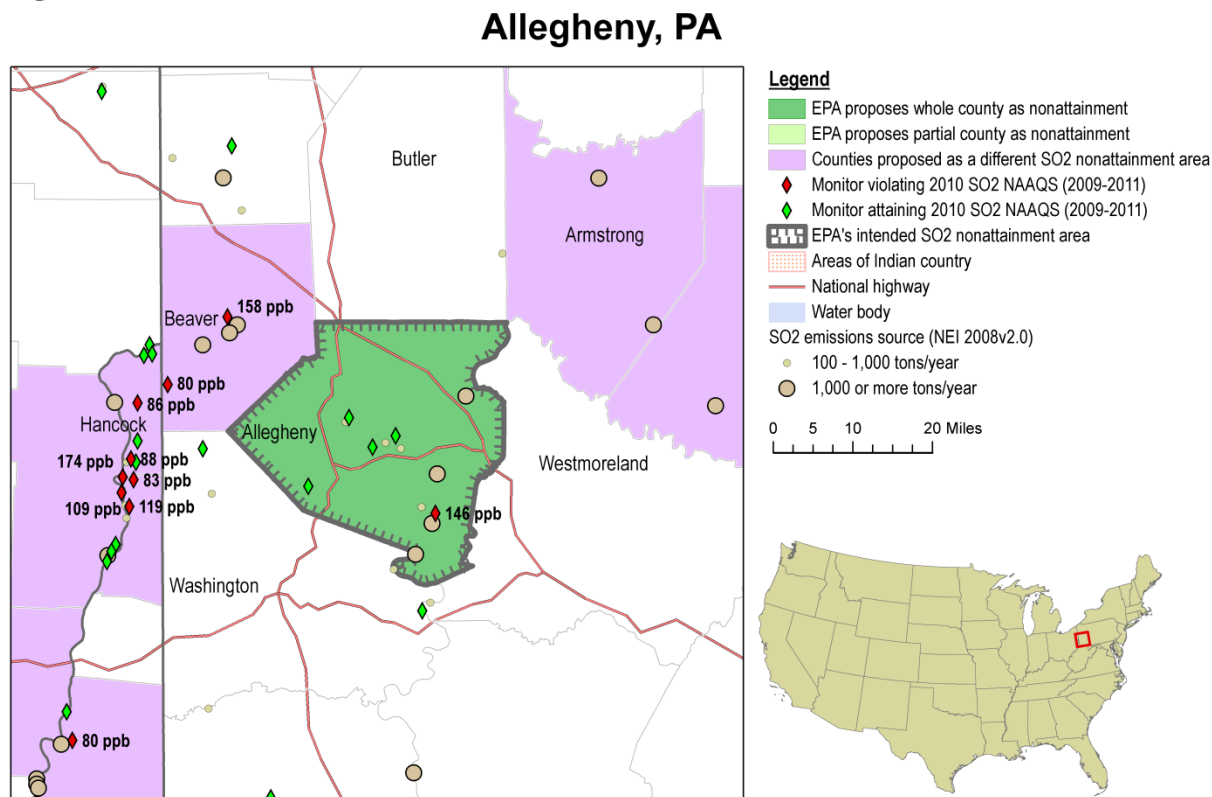
### ***Conclusion for the Allegheny Nonattainment Area***

After considering the factors described above, EPA intends to find that it is appropriate to include Allegheny County as part of the Allegheny Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS.

The Liberty monitor in Allegheny County, based on certified 2009-2011 air quality data, shows high concentration of SO<sub>2</sub> emissions in the vicinity. Although meteorological data suggests that emissions from large sources south and west could potentially contribute to SO<sub>2</sub> NAAQS violations in Allegheny County, based on available information, EPA is not prepared to conclude that emissions from these sources are contributing to the violating monitor in Allegheny County. Elrama Power Station in Washington County has had wet scrubbers installed since the mid 1970's and was scheduled to shut down in June 2012. Mitchell Power Station in Washington County had wet scrubbers installed in 2006 and 2007. The emissions from Monesson Coke Plant in Westmoreland County are relatively low, and it is likely that any impacts from these emissions are localized. Furthermore, the emissions from sources nearest the Liberty monitor in Allegheny County are likely causing the violation at the Liberty monitor. 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 nonattainment area based on the violating monitor for the 2010 SO<sub>2</sub> NAAQS.

**Figure 9.**



### **Technical Analysis for the Beaver Nonattainment Area**

This technical analysis for the Beaver 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. Beaver County has two violating monitors. EPA has evaluated this county and all 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 agrees with Pennsylvania's recommendation and intends to initially designate, based on monitored violations, Beaver County in Pennsylvania as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Beaver Nonattainment Area.

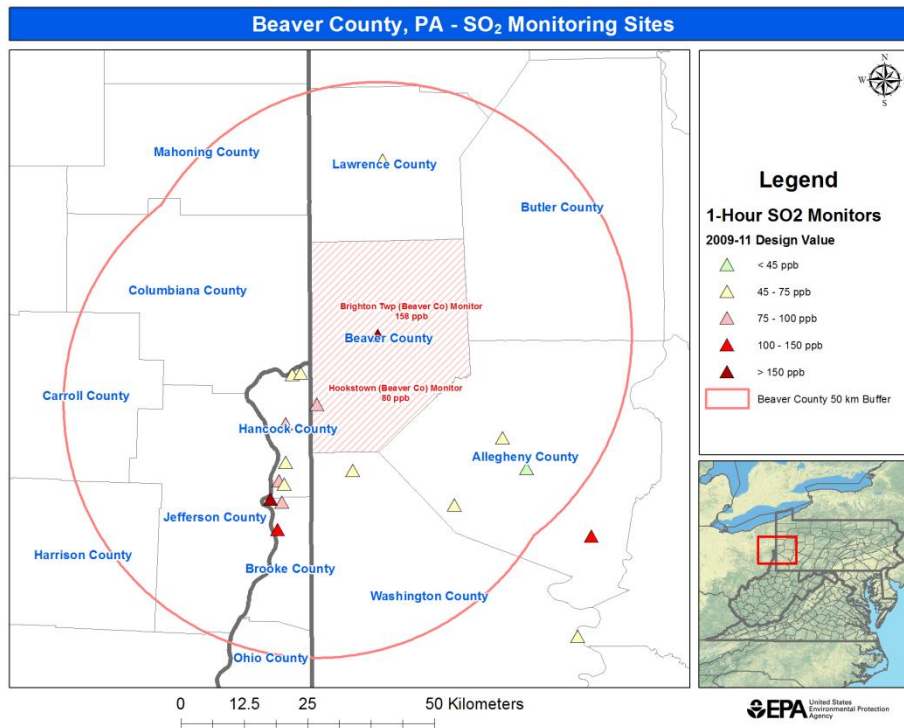
### ***Air Quality Data***

This factor considers the SO<sub>2</sub> air quality monitoring data, including design values (in ppb) calculated for all air quality monitors in Beaver County in the Beaver Area based on certified



data for the 2009-2011 period. Figure 10 depicts the area analyzed and the location of the violating air quality monitors.

**Figure 10.**



The 2010 1-hour SO<sub>2</sub> design value for the monitor located in Beaver County is shown in Table 4.

**Table 4. Beaver County Monitor Trends: 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
Hookstown	42-007-0002	153	122	109	72	58	101	80
Brighton Township	42-007-0005	170	165	176	161	136	167	158

One-hour SO<sub>2</sub> design values at the Hookstown monitor appear to be generally falling over the last four years though the data are insufficient to clearly establish a definitive trend. Values at the Brighton Township monitor appear to be relatively unchanged. The Hookstown monitor's 99<sup>th</sup> % concentrations have fallen by about a factor of two over the last four years while the Brighton Township monitor has remained relatively stable. Monitors within the 50 kilometer

zone of the violating monitors in the neighboring counties in PA (Lawrence, Allegheny and Washington) are not recording 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. Pennsylvania did not provide updated emissions information, therefore EPA relied on the 2008 NEI emissions data (NEI08V2).

Table 5 shows total emissions of SO<sub>2</sub> in tons per year (tpy) for violating and potentially contributing counties in and around the Beaver Area and sources emitting greater than 100 tpy of SO<sub>2</sub> according to the 2008 NEI.

**Table 5. SO<sub>2</sub> Emissions in the Beaver 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		
Beaver, PA	Yes	First Energy/Bruce Mansfield Plant	3853711	40.6344, -80.42	11,019	17,584
Beaver, PA	Yes	Horsehead Corp./Monaca Smelter	7991511	40.67058, -80.3365	3,320	17,584
Beaver, PA	Yes	AES Beaver Valley	8141311	40.6558, -80.3556	3,113	17,584
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
Westmoreland, PA	No	Arcelormittal Monesson LLC/Monesson Coke Plant	8330811	40.161547, -79.883469	396	569
Brooke, WV	Yes	Mountain State Carbon, LLC	4864311	40.34361, -80.60667	731	767

Hancock, WV	Yes	Arcelormittal Weirton Inc.	6153111	40.42194, -80.60278	597	613
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	Shenango Inc	7407611	40.492, -80.07968	333	35,844
Allegheny, PA	Yes	Bellefield Boiler Plant	8404711	40.442127, -79.94913	795	35,844
Allegheny, PA	Yes	Bay Valley Foods, LLC	8521211	40.45343, -79.98584	487	35,844

### Q/d Screening Analysis

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 Beaver County. A total of 15 point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of the Beaver County monitors. Of these 15 point sources, there are three sources each located in Beaver County, PA, Allegheny County, PA, Lawrence County, PA, and Jefferson County, OH. There is one source each located in Brooke County, West Virginia, one source in Hancock County, West Virginia and one source in Washington County, PA. Following the Q/d methodology, we determined that eleven of the fifteen sources should be considered for additional review. These sources are ESSROC/Bessemer, Orion Power New Castle Power Plant, CEMEX/Wampum Cement Plant, Horsehead-Monaca Smelter, AES Beaver Valley, First Energy Bruce Mansfield Plant, W.H. Sammis Plant, Arcelormittal Weirton Inc., Mountain State Carbon, Severstal Wheeling, Inc., and Cardinal Power Plant (Figures 11-12).

Figure 11.

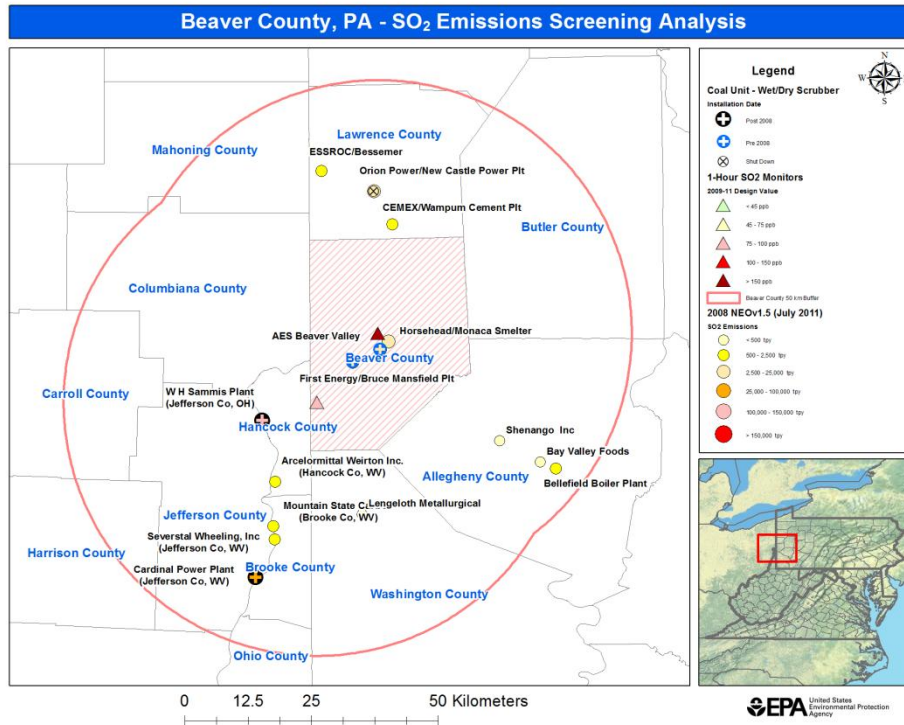
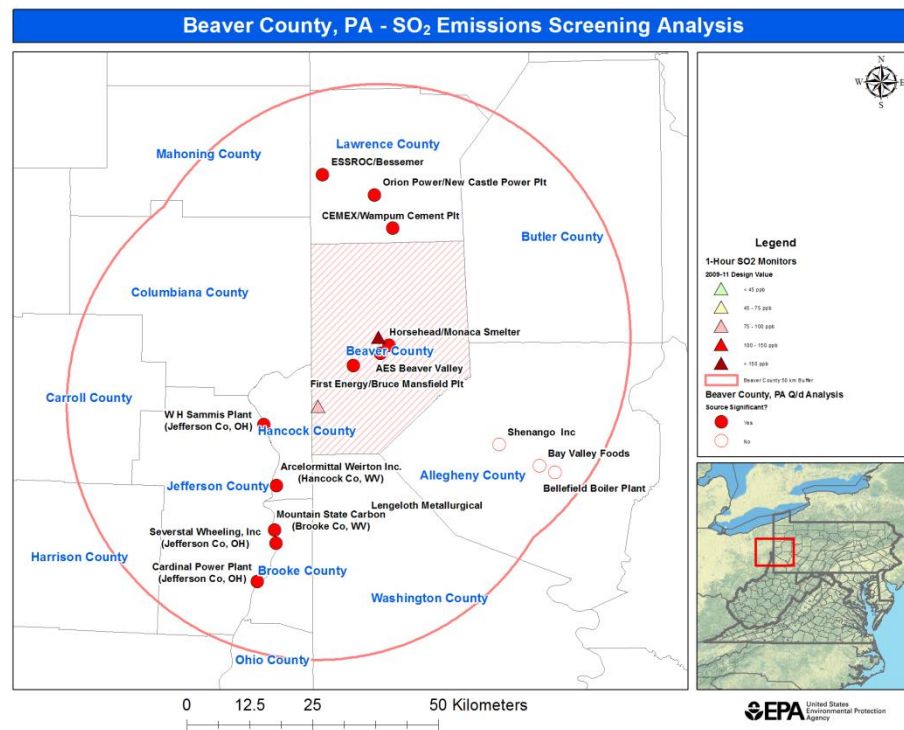


Figure 12.



## CAMD Emissions Analysis

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

Not all emissions sources within 50 km of the Beaver County monitors are included in the CAMD database; only five of the 15 sources within 50 km of the Beaver County monitors reported their SO<sub>2</sub> emissions to the CAMD database. These sources and their reported annual emissions are listed in Table 6 along with their distance from the nearest monitor in Beaver County.

**Table 6. CAMD 2008-11 Emissions Summary of SO<sub>2</sub> Emissions in tpy**

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011
AES Beaver Valley	Beaver	3.2	Not Available	3,500	1,491	3,086
First Energy/Bruce Mansfield	Beaver	7.6	11,117	17,704	8,971	21,196
W.H. Sammis Plant	Jefferson	11.3	102,619	73,614	12,761	4,202
Orion Power/New Castle Power Plant	Lawrence	28.1	12,923	7,629	5,442	7,510
Cardinal Power Plant	Jefferson	36.6	32,497	34,751	32,522	25,116

\*Distance from Beaver County SO<sub>2</sub> monitor in kilometers.

### 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 Beaver 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.

SO<sub>2</sub> emissions at four of the five CAMD sources have operating SO<sub>2</sub> controls on at least some of their units. The Bruce Mansfield and AES Beaver Valley plants had wet scrubbers installed prior to 2008. The Cardinal and W. H. Sammis power plants in Jefferson County, OH recently installed wet scrubbers on their units. SO<sub>2</sub> emissions at the W. H. Sammis plant have fallen significantly since the installation and Cardinal's emissions have decreased as well. Declining emissions at the W. H. Sammis and Cardinal plants may be responsible for the declining SO<sub>2</sub> concentrations observed at the Hookstown monitor near the PA-WV border.

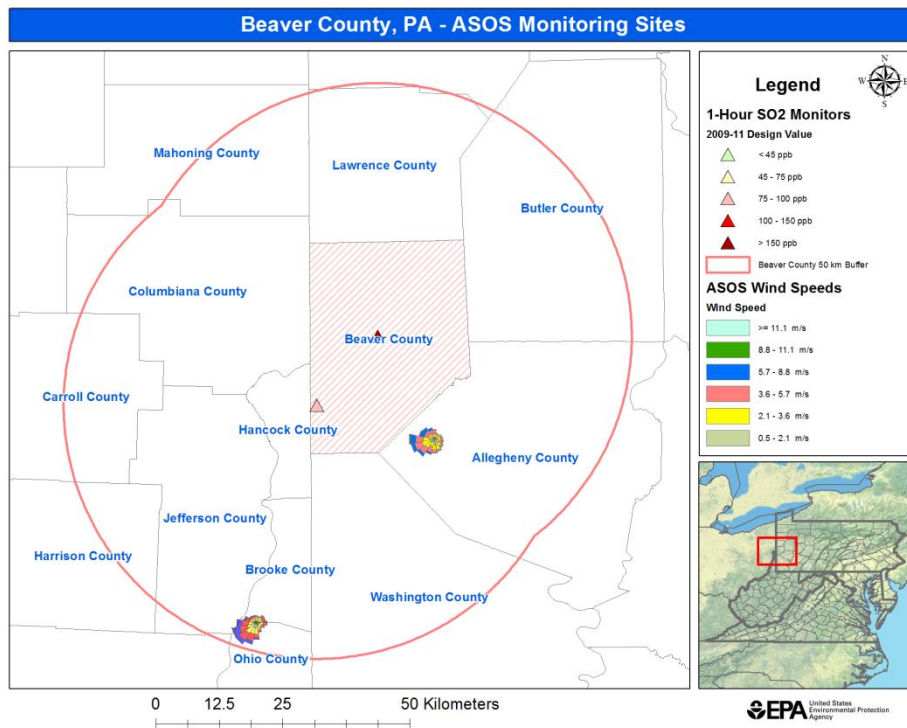
### *Meteorology (weather/transport patterns)*

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 are two ASOS sites located within 50 km of the Beaver County monitors. The closest surface site is at the Pittsburgh International Airport located approximately 22-23 kilometers from either of the Beaver County monitors. The next closest ASOS site is the Wheeling/Ohio County Airport located approximately 44 and 61 kilometers from the Beaver County monitoring sites. The closest rawinsonde site is located at the Pittsburgh International Airport located in western Allegheny County approximately 22-23 km from the monitoring sites.

One-minute meteorological wind fields for the Wood 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 both sites (Figure 13). Predominant winds at the Pittsburgh International Airport were generally from the west over the 2006-10 time period, while winds at the Wheeling Ohio County Airport were generally from the southwest. Given this information, EPA is not prepared to conclude that large sources in Lawrence County (ie. ESSROC/Bessemer, Orion Power New Castle Power Plant, and CEMEX/Wampum Cement Plant) are likely to contribute to the violating monitors in Beaver County.

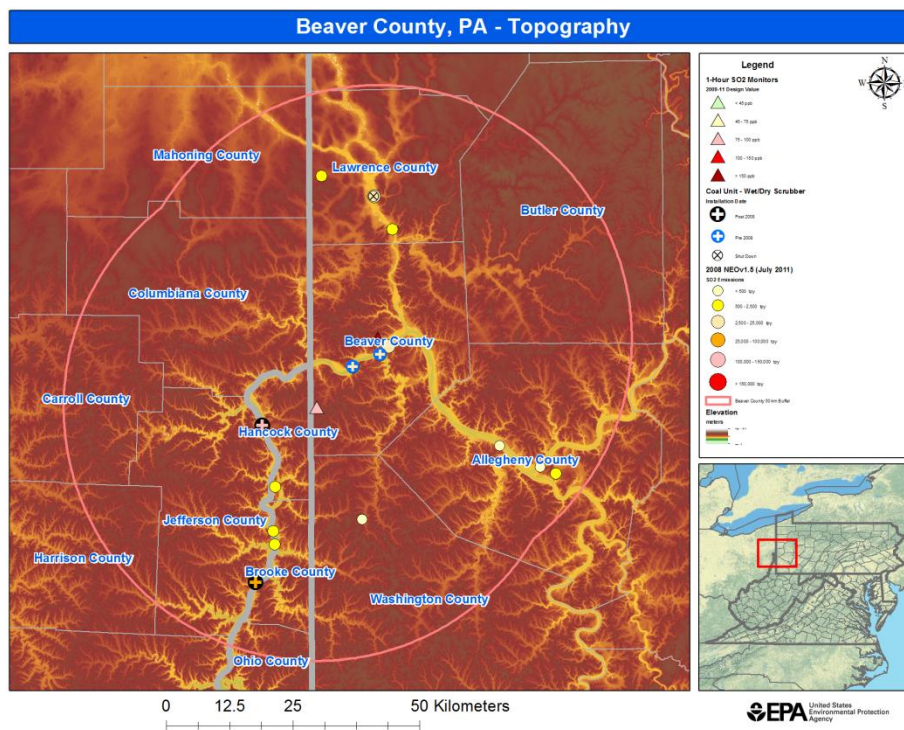
**Figure 13.**



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

Figure 14 below depicts elevations and locations of point sources near Beaver County. The Ohio and Beaver rivers divide Beaver County into roughly three portions. The Ohio River traverses across the county in a roughly east-west direction while the Beaver River flows south into the Ohio River near the Borough of Beaver. The river valleys within Beaver County create sharp contrasts with the surrounding mountains in western Pennsylvania. Elevations in the valleys are in the 220-230 meter range. Higher terrain in the county rises to over 350 meters above mean sea level. Terrain can change quite abruptly between the rivers and the mountains. In neighboring Allegheny County complex valley flows have been noted. These types of flow regimes probably exist in the river valleys of Beaver County also. This is important because the vast majority of large point sources reside in the river valleys.

**Figure 14.**

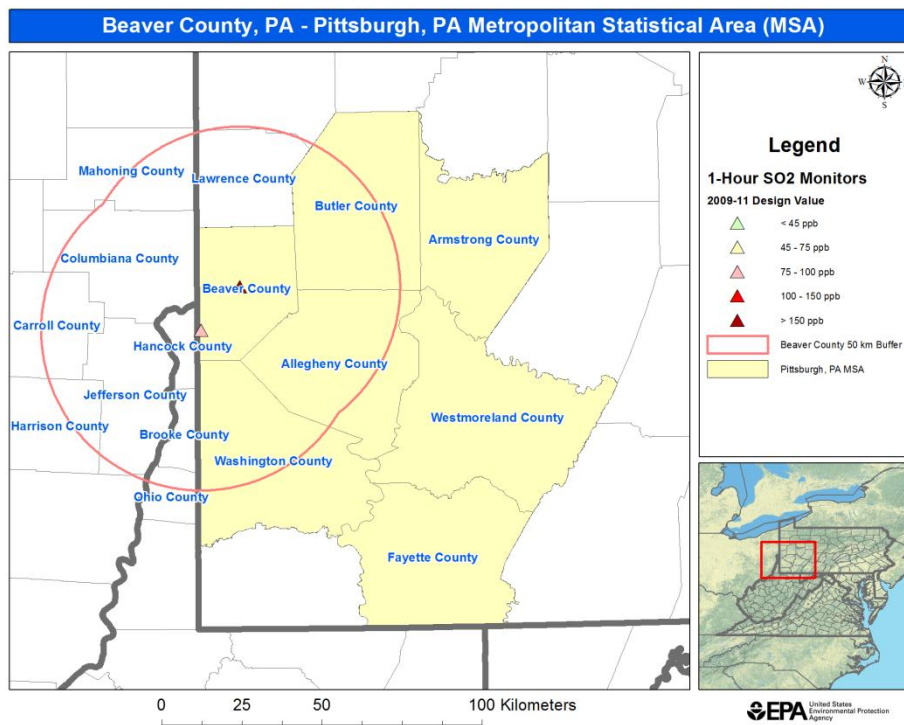


### *Jurisdictional boundaries*

There is no existing nonattainment/maintenance boundary for the 1971 primary SO<sub>2</sub> NAAQS for the Beaver Area, however, there are other possible boundaries that can be considered: the Pittsburgh, PA MSA and the Southwest Pennsylvania Intrastate AQCR. The Pittsburgh, PA MSA is comprised of seven counties: Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland. The Southwest Pennsylvania Intrastate AQCR consists of nine counties: Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Washington, and Westmoreland counties.

The Pittsburgh, PA MSA extends beyond the 50 kilometer buffer from the Beaver County monitors to the east and includes sources outside of the 50 kilometer buffer (Figure 15). Drawing the nonattainment boundary based on the Pittsburgh, PA MSA would add additional areas to Pennsylvania’s designation recommendation for the 1-hour SO<sub>2</sub> nonattainment area and would include sources that EPA is not prepared to conclude are likely to impact the Beaver County monitors.

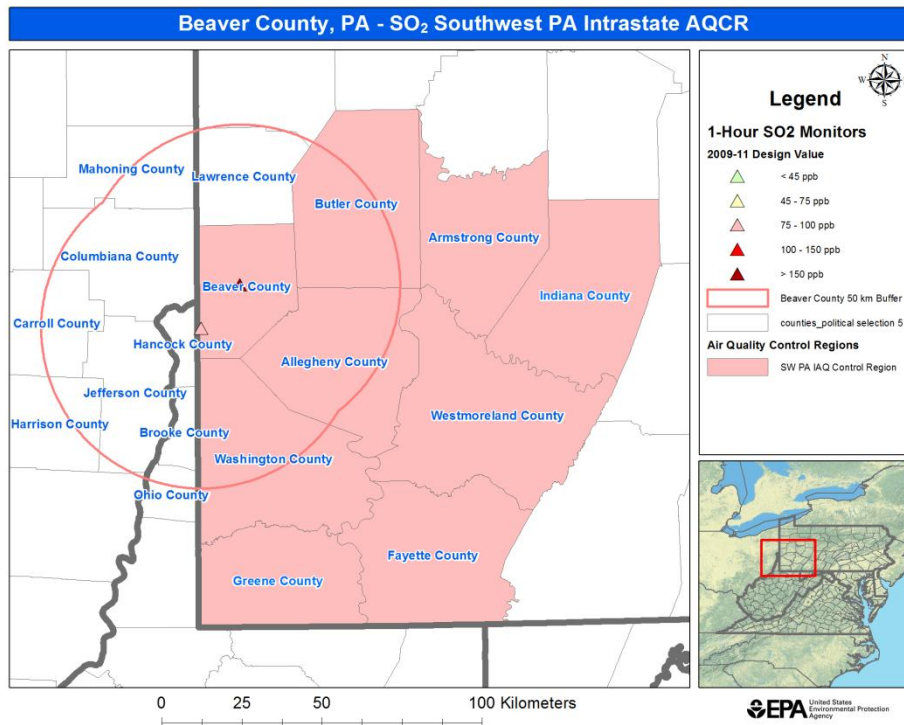
**Figure 15.**



The South Pennsylvania Intrastate AQCR, codified in the Code of Federal Regulations (CFR) § 81.23, is another possible nonattainment boundary. The area is slightly larger than the Pittsburgh, PA MSA and includes nine counties (Figure 16). The South Pennsylvania Intrastate AQCR does not include all of the counties that lie within 50 km of the Beaver County monitors and includes areas with sources which EPA is not prepared to conclude are contributing to the violating monitor. For these reasons it would not be practical to use this air quality control region as the initial nonattainment boundary based on the violating monitor.



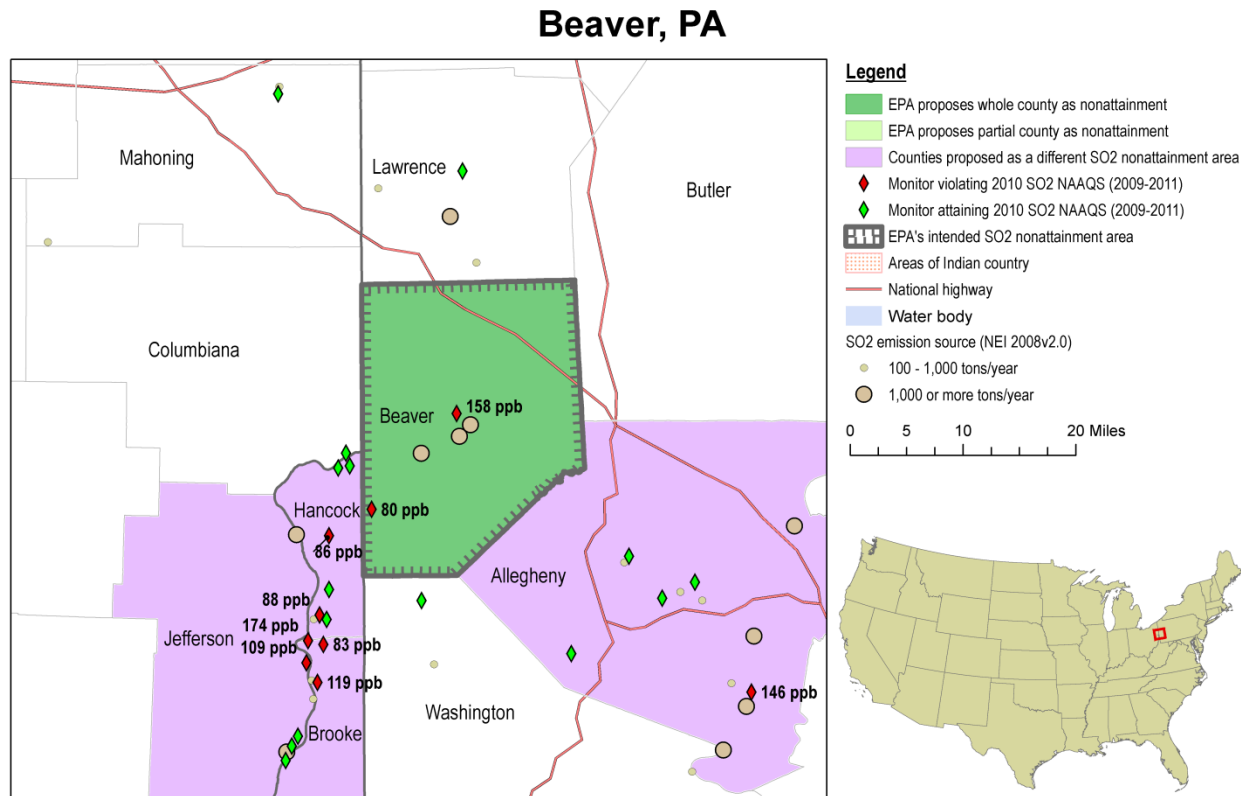
**Figure 16.**



***Conclusion for the Beaver Nonattainment Area***

After considering the factors described above, EPA intends to find that it is appropriate to include Beaver County in the Beaver Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS. The air quality monitors in Beaver County show a violation of the 2010 SO<sub>2</sub> NAAQS, based on certified 2009-2011 air quality data. Meteorological data suggests that emissions from large sources west and southwest of the monitor likely impact the monitor and contribute to SO<sub>2</sub> NAAQS violations in Beaver County. Based on the consideration of all the relevant and available information, as described above, EPA believes that the initial boundaries described herein encompass the area that should be initially designated as nonattainment due to causing or contributing to the monitored violation of the 2010 SO<sub>2</sub> NAAQS in the county. It should be noted that while EPA is not prepared to conclude that some sources located outside the county have some amount of impact in Beaver County, those sources are already included in proposed nonattainment areas (see WV recommendations) and are likely having a larger impact in their own county. Therefore, EPA is not prepared to conclude that neighboring areas contribute to the SO<sub>2</sub> concentrations in Beaver County.

**Figure 17.**



**Technical Analysis for the Indiana Nonattainment Area**

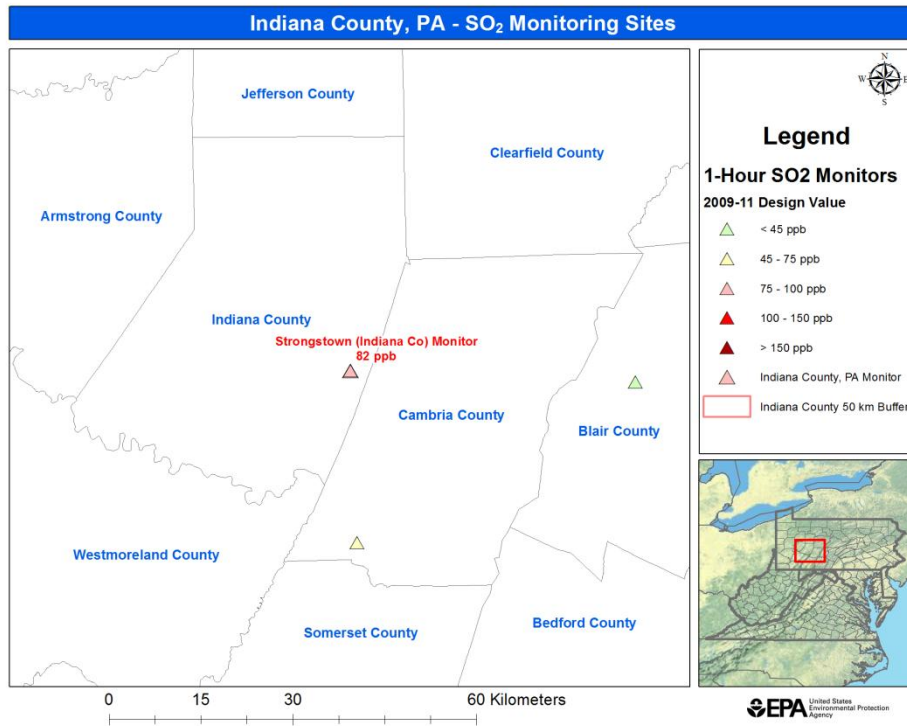
This technical analysis for the Indiana Nonattainment Area identifies the whole county with a monitor that violates the 2010 SO<sub>2</sub> NAAQS, and evaluates nearby counties for contributions to SO<sub>2</sub> concentrations in the area. For this area, Indiana County has a violating monitor. EPA has evaluated this county and all other surrounding counties based on 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 Pennsylvania's recommendation and intends to designate, based on the violating monitor, Indiana County in Pennsylvania along with Plumcreek and South Bend Townships, and Elderton Borough in Armstrong County, as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Indiana Nonattainment Area.

***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 within 50 kilometers of the Indiana County monitor based on data for the 2009-2011 period. Figure 18 depicts the area analyzed and the location of the violating air quality monitor.

**Figure 18.**



The 2010 1-hour SO<sub>2</sub> design value for the monitor located in Indiana County is shown in Table 7.

**Table 7. Indiana 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
Strongstown	42-063-0004	88	92	82	95	68	90	82

***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. Pennsylvania did

not provide updated emissions information, therefore EPA relied on the 2008 NEI emissions data (NEI08V2).

Table 8 shows total emissions of SO<sub>2</sub> in tons per year (tpy) for violating and potentially contributing counties in and around the Indiana County Area in Region III and sources emitting greater than 100 tpy of SO<sub>2</sub> according to the 2008 NEI.

**Table 8. SO<sub>2</sub> Emissions in the Indiana Nonattainment Area**

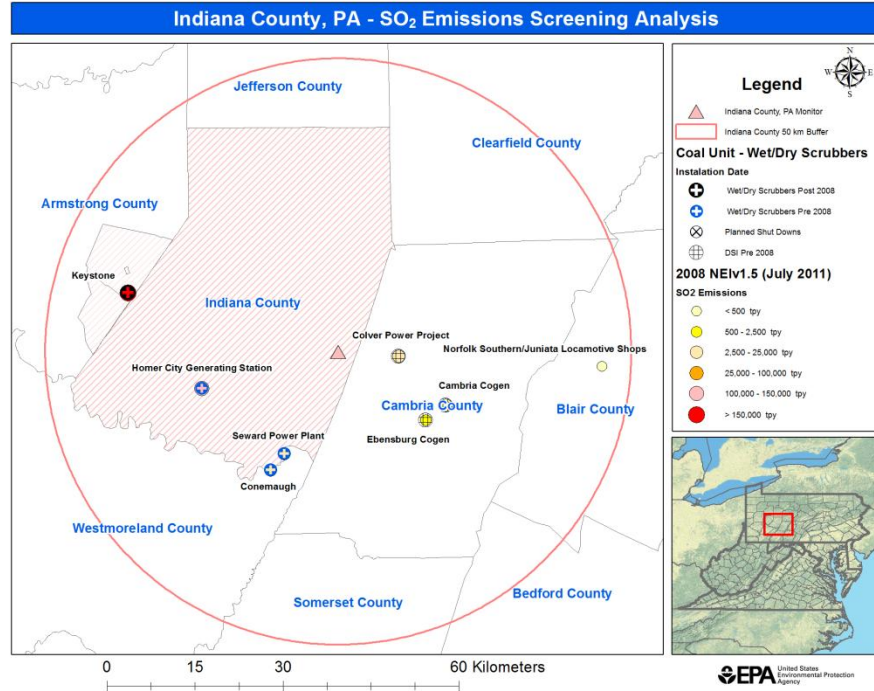
County	Facility Located in State Recommended Nonattainment Area?	Facility			Total Facility SO <sub>2</sub> Emissions (tpy)	Total County SO <sub>2</sub> Point Emissions (tpy)
		Name	EIS	Coordinates		
Indiana, PA	Yes	Homer City Generating Station	3005211	40.511, -79.1968	102,486	124,326
Indiana, PA	Yes	Seward Generating Station	3005111	40.4081, -79.0339	15,549	124,326
Indiana, PA	Yes	Genon Conemaugh Plant	2905911	40.3842, -79.0611	6,286	124,326
Armstrong, PA	No	Keystone Power Station	3866111	40.6604, -79.3411	189,983	211,810
Cambria, PA	No	Colver Power Project	6594411	40.550378, -78.804741	2,576	7,183
Cambria, PA	No	Cambria Cogen	6594511	40.4767, -78.7067	2,782	7,183
Cambria, PA	No	Ebensburg Cogen	6594311	40.455, -78.7472	1,815	7,183
Blair, PA	No	Norfolk Southern Railway Co/ Juniata Locomotive Shops	4730711	40.53289, -78.38533	392	3,955

Q/d Screening Analysis

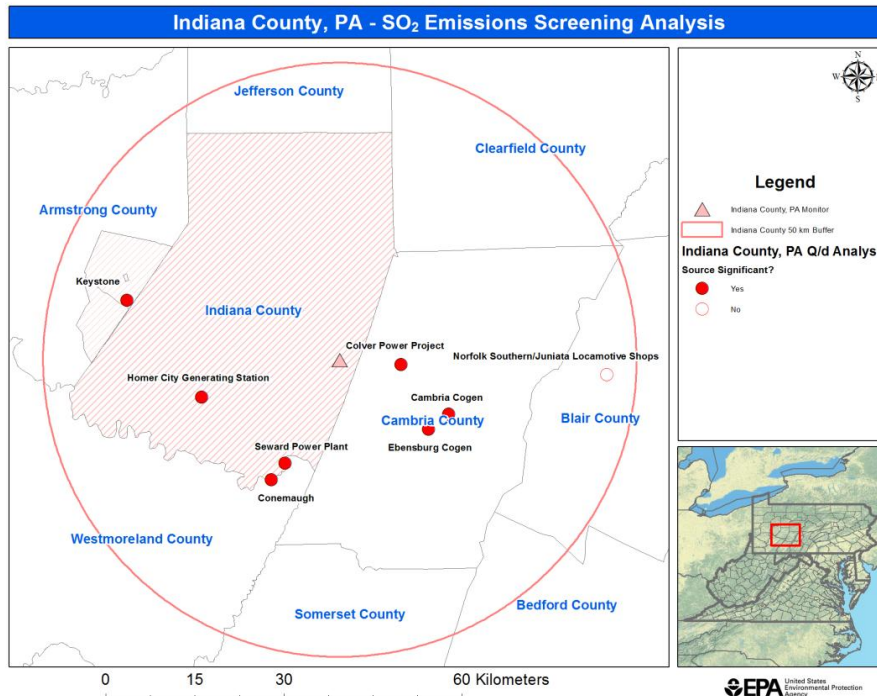
Using point source emissions data, the emissions by distance (Q/d) screening methodology was used to identify sources for further review within 50 kilometers (km) of a violating monitor in Indiana County. A total of eight point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of the monitor in Indiana County. Of these eight point sources, there are three sources each located in Cambria and Indiana counties and one source each in Armstrong and Blair Counties. Following the Q/d methodology, we determined that seven of the eight sources should be further reviewed. These sources are Keystone, Homer City Generating

Station, Seward Power Plant, Conemaugh, Colver Power Project, Cambria Cogen, and Ebensburg Cogen (Figures 19-20).

**Figure 19.**



**Figure 20.**



## 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 see if more recent emissions are available for sources near the Indiana County, PA monitor. Nearly all of the emission sources within 50 km of the Indiana County monitor are included in the CAMD data base since the monitor is essentially surrounded by electric-generating units.

**Table 9. CAMD 2008-11 Emissions Summary of SO<sub>2</sub> Emissions in tpy**

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011
Colver Power Project	Cambria	10.3	Not Available	30,759	2,901	2,881
Ebensburg Cogen	Cambria	18.9	Not Available	2,044	2,404	1,937
Seward Power Plant	Indiana	19.8	7,771	7,756	8,458	7,003
Cambria Cogen	Cambria	20.4	Not Available	6,947	2,070	1,942
Conemaugh	Indiana	23.2	6,282	7,222	7,056	7,189
Homer City Generating Station	Indiana	24.1	102,484	101,334	112,951	83,596
Keystone	Armstrong	37.1	189,994	113,137	39,114	46,441

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

### 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 Indiana 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.

Our review of the coal-fired EGU sources within 50 km of the Indiana County monitor indicates that all of the facilities have some sort of SO<sub>2</sub> emission controls currently operating or planned to be operating (as of 2010). Only two sources were projected to have controls installed after 2008 (Keystone and Homer City). According to EPA's National Electric Energy Data System (NEEDS) database (<http://www.epa.gov/airmarkt/progsregs/epa-ipm/BaseCasev410.html#needs>), the only uncontrolled units within 50 km of the Indiana County monitor are two units at Homer City (see Table 10 below).

**Table 10. Summary of Controls Within 50 km of Strongstown Monitor (from NEEDS database)**

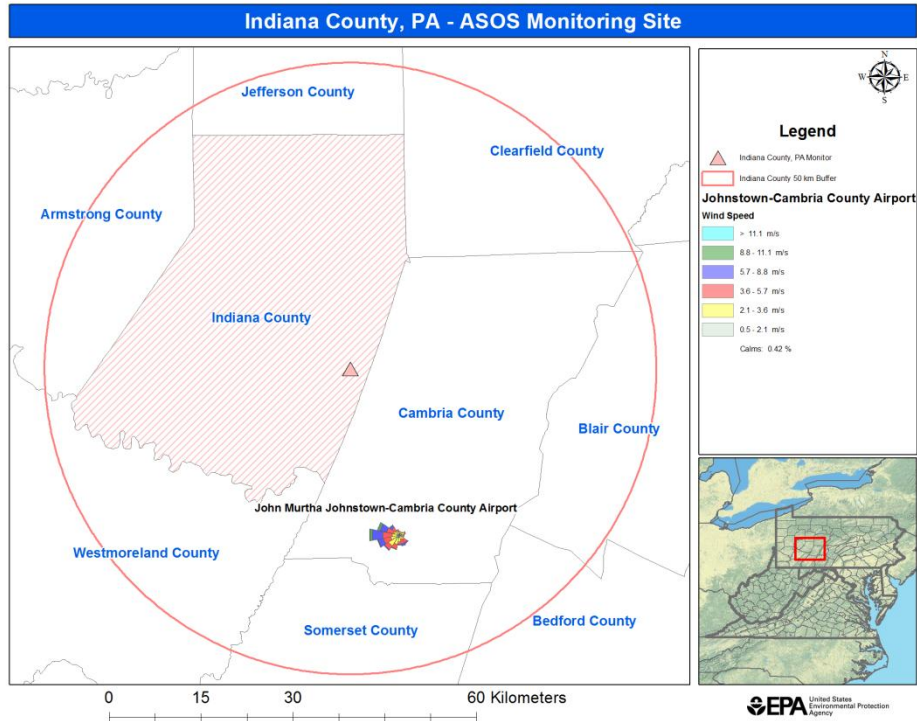
Plant Name	Unit ID	County	Capacity (MW)	On Line Year	Modeled Fuels	Wet/DryScrubber	Scrubber Online
Keystone	1	Armstrong	850	1967	Bituminous	Wet Scrubber	2009
Keystone	2	Armstrong	850	1968	Bituminous	Wet Scrubber	2009
Cambria Cogen	B1	Cambria	44	1991	Waste Coal	Reagent Injection	
Cambria Cogen	B2	Cambria	44	1991	Waste Coal	Reagent Injection	
Colver Power Project	ABB01	Cambria	110	1995	Waste Coal	Reagent Injection	
Ebensburg Power	031	Cambria	49.5	1990	Waste Coal	Reagent Injection	
Conemaugh	2	Indiana	850	1971	Bituminous	Wet Scrubber	1995
Conemaugh	1	Indiana	850	1970	Bituminous	Wet Scrubber	1994
Homer City Station	1	Indiana	620	1969	Bituminous		
Homer City Station	2	Indiana	614	1970	Bituminous		
Homer City Station	3	Indiana	650	1977	Bituminous	Wet Scrubber	2001
Seward	1	Indiana	260.5	2004	Waste Coal	Dry Scrubber	2004
Seward	2	Indiana	260.5	2003	Waste Coal	Dry Scrubber	2004

***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 is only one ASOS site located within 50 km of the Indiana County monitor. The closest surface site is the John Murtha Johnstown-Cambria County Airport located approximately 30 kilometers south-southeast of the Indiana County monitor. The closest rawinsonde site is located at the Pittsburgh International Airport located approximately 105 km west of the Indiana County monitor.

One-minute meteorological wind fields for the Johnstown-Cambria County Airport site 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 Johnstown-Cambria County Airport (Figure 21). Predominant winds generally ranged from the west over the 2006-10 time period. Given this information, EPA is not prepared to conclude that large sources in Cambria County (ie. Colver Power Plant, Cambria Cogen, and Ebensburg Cogen) are likely contributing to the violating monitor in Indiana County.

**Figure 21.**

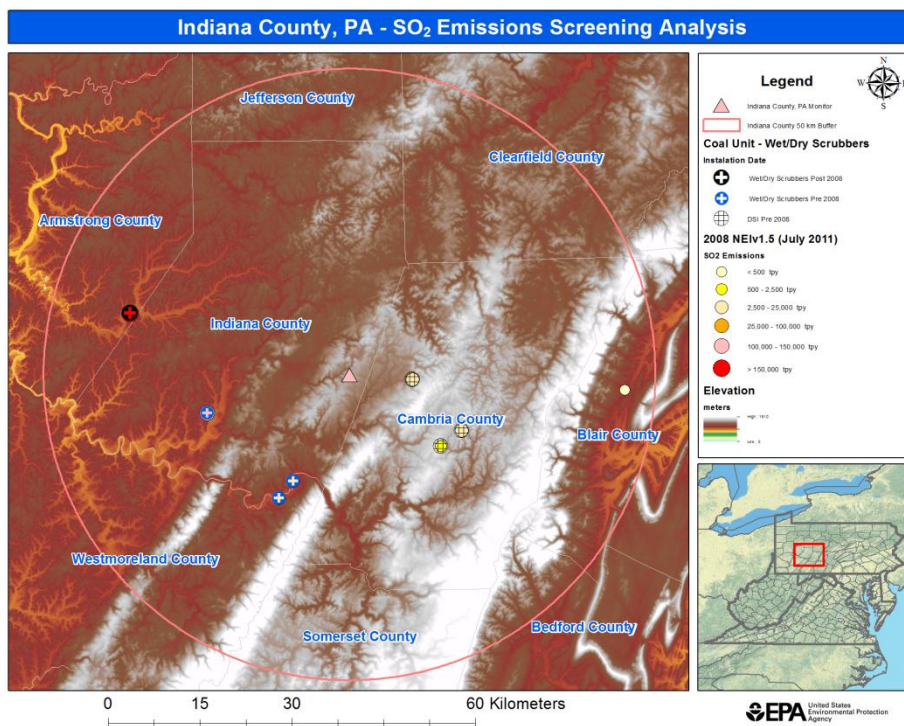


***Geography/topography (mountain ranges or other air basin boundaries)***

Figure 22 below depicts elevations and locations of point sources near Indiana County. Indiana County is located east of Pittsburgh in the Allegheny Mountains. The Conemaugh River forms the southern boundary of the county. Terrain elevations generally rise as you move east culminating along the Chestnut Ridge that marks the eastern boundary of Indiana County. Elevations rise above 600 meters along this ridge with the highest elevations in Pennsylvania located in neighboring Cambria and Somerset Counties.



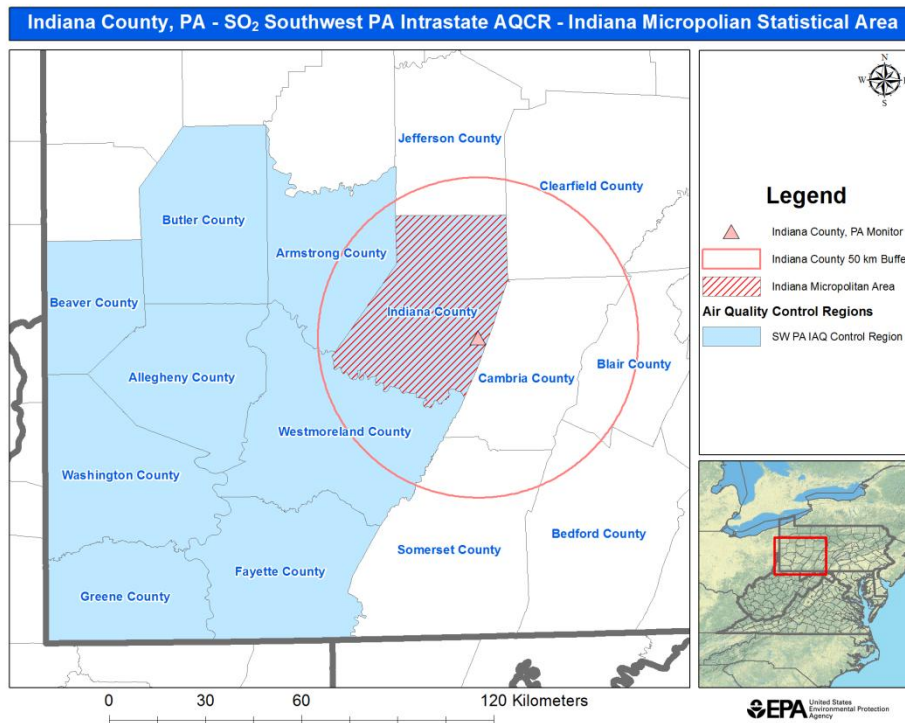
Figure 22.



***Jurisdictional boundaries***

There is no existing nonattainment/maintenance boundary for the previous 1971 primary SO<sub>2</sub> NAAQS for the Indiana Area and Indiana County is not part of any MSA (as of 2009) but is designated as a separate Micropolitan Statistical Area. There is another possible boundary, however, that can be considered: the Southwest Pennsylvania Intrastate AQCR, codified in the Code of Federal Regulations (CFR) § 81.23. The Southwest Pennsylvania Intrastate AQCR consists of Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Washington and Westmoreland Counties (Figure 23). The Southwest Pennsylvania Intrastate AQCR does not include all of the counties that lie within 50 km of the Indiana County monitor and includes areas with sources which EPA is not prepared to conclude are likely to contribute to the violating monitor in Indiana County. For these reasons it would not be practical to use this AQCR as the initial nonattainment boundary.

**Figure 23.**



### ***Other Information***

There have been a number of studies of the Chestnut Ridge area due to the number of large coal-fired power plants in the region. One of the earliest studies was done by the US Department of Health, Education and Welfare in 1970 (Large Power Plant Effluent Study (LAPPES), National Air Pollution Control Administration). A general description of the region's coal fired power plants from this report is included here:

*“[T]hree new mine-mouth stations, Keystone, Homer City and Conemaugh are located approximately equidistant along a NW-SE line 39 kilometers long about 80 kilometers ENE of Pittsburgh. These three stations, combined with the nearby Seward and Shawville stations, form a complex whose total annual production of 47,380,305 megawatt hours exceeds the total electrical output of all but 11 nations of the world.”*

Modeling analyses concerning power plants in the Chestnut Ridge region were conducted in the 1990s and in 2003 at the behest of PADEP to examine compliance with the SO<sub>2</sub> NAAQS.<sup>1</sup> The resulting reports examined impacts on the Chestnut Ridge from some of the larger power plants that lay to the west. A quick check of plant elevations and stack heights revealed that stack tops at Homer City and Keystone are roughly in line with the elevations at the Strongstown SO<sub>2</sub>

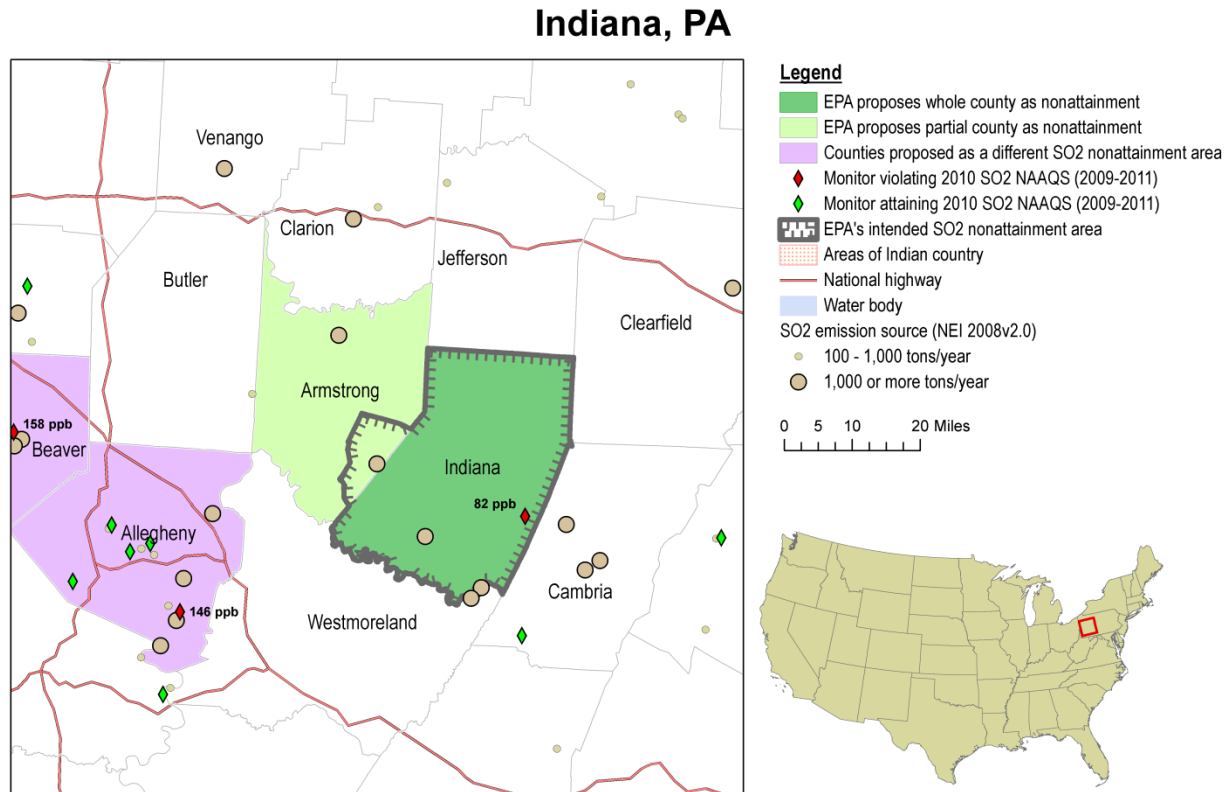
<sup>1</sup> “AERMOD Modeling Analyses for SO<sub>2</sub> NAAQS Compliance for Power Plants in the Laurel Ridge and Chestnut Ridge Region of Pennsylvania (TRC Project No. 33275),” March 2003; Prepared by RC Environmental Corp.

monitor as well as the rest of the Chestnut Ridge. This suggests that violations could be occurring in most of the elevated terrain in eastern Indiana County due to emissions from these power plants.

**Conclusion for the Indiana Nonattainment Area**

After considering the factors described above, EPA intends to find that it is appropriate to initially include, based on the violating monitor, Indiana County and a portion of Armstrong County (Table 1) in the Indiana Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS. The air quality monitor in Indiana County shows a violation of the 2010 SO<sub>2</sub> NAAQS, based on 2009-2011 air quality data. The nearby Keystone Plant in neighboring Armstrong County likely contributes to nonattainment in Indiana County as well. Previous studies have shown that stack tops (of Homer City and Keystone) are at elevations in line with that of the Strongstown monitor in Indiana County. Meteorological data suggests that emissions from large sources west of the monitor likely impact the monitor and contribute to SO<sub>2</sub> NAAQS violations in Indiana County. Based on the consideration of all the relevant and available information, as described above, EPA believes that the initial boundaries described herein encompass the area that should be initially designated as nonattainment due to causing or contributing to the monitored violation of the 2010 SO<sub>2</sub> NAAQS in the county.

**Figure 24.**



## Technical Analysis for the Warren Nonattainment Area

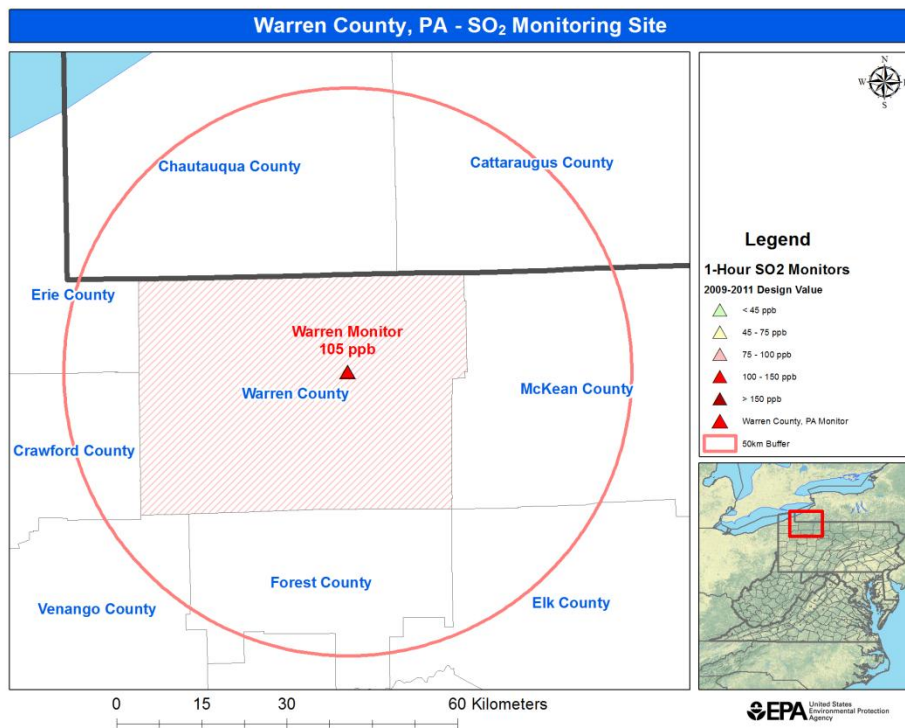
This technical analysis for the Warren Nonattainment Area identifies the whole county with a monitor that violates the 2010 SO<sub>2</sub> NAAQS, and evaluates nearby counties for contributions to SO<sub>2</sub> concentrations in the area. For this area, Warren County has a violating monitor. EPA has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

Based on EPA's technical analysis described below, EPA agrees with Pennsylvania's recommendation and intends to designate Warren County in Pennsylvania as nonattainment for the 2010 SO<sub>2</sub> NAAQS as part of the Warren Nonattainment Area.

### *Air Quality Data*

This factor considers the SO<sub>2</sub> air quality monitoring data, including the design value (in ppb) calculated for the air quality monitor in Warren County in the Warren Area based on certified data for the 2009-2011 period. Figure 24 depicts the area analyzed and the location of the violating air quality monitor.

**Figure 25.**



The 2010 1-hour SO<sub>2</sub> design value for the monitor located in Warren County is shown in Table 11.

**Table 11. Warren 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
Warren	42-123-0004	153	146	113	109	94	123	105

One-hour SO<sub>2</sub> design values at the Warren County monitor have fallen slightly over the last four years. This decline may be attributed to the recent economic recession, which started in 2008. Any statistical trend that could be gleaned from the monitor data, however, should be viewed with caution due to the minimal amount of data currently available.

***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. Pennsylvania did not provide updated emissions information, therefore EPA relied on the 2008 NEI emissions data (NEI08V2).

Table 12 shows total emissions of SO<sub>2</sub> in tons per year (tpy) for violating and potentially contributing counties in and around the Warren Area in Region III and sources emitting greater than 100 tpy of SO<sub>2</sub> according to the 2008 NEI.

**Table 12. SO<sub>2</sub> Emissions in the Warren Nonattainment Area**

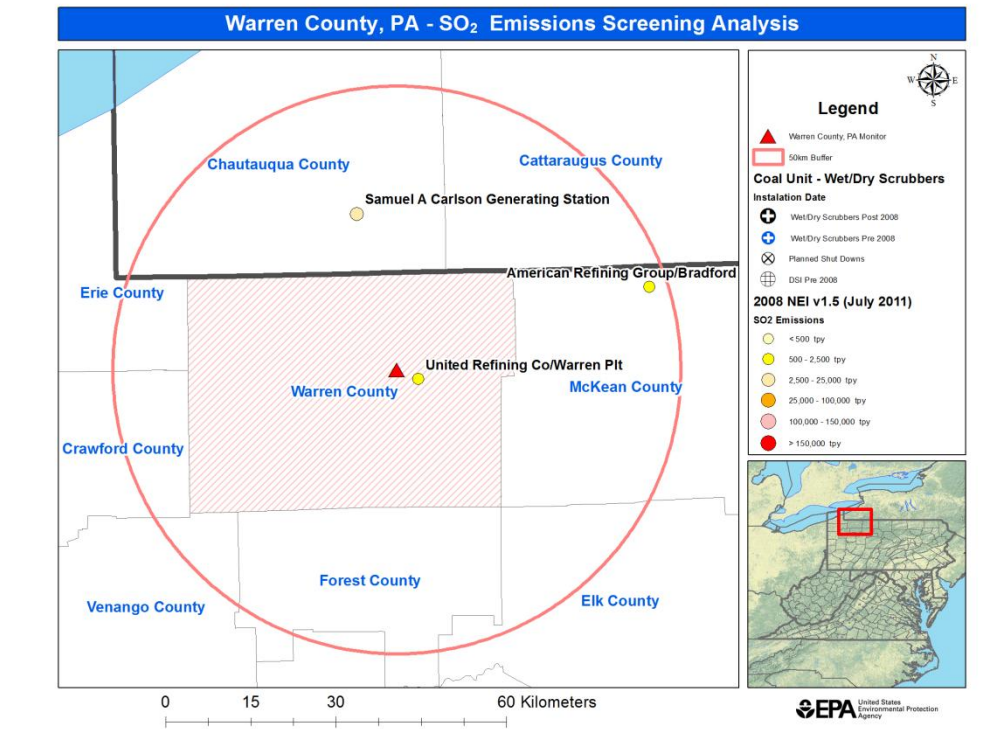
County	Facility Located in State Recommended Nonattainment Area?	Facility			Total Facility SO <sub>2</sub> Emissions (tpy)	Total County SO <sub>2</sub> Point Emissions (tpy)
		Name	EIS	Coordinates		
Warren, PA	Yes	United Refining Warren Plant	4966711	41.82992, -79.12444	1,612	1,616

McKean, PA	No	American Refining Group/Bradford	6532511	41.96686, -78.63013	1,479	3,372
Chautauqua, NY	No	Samuel A. Carlson Generating Station	7806011	42.093543, -79.247679	3,736	14,412

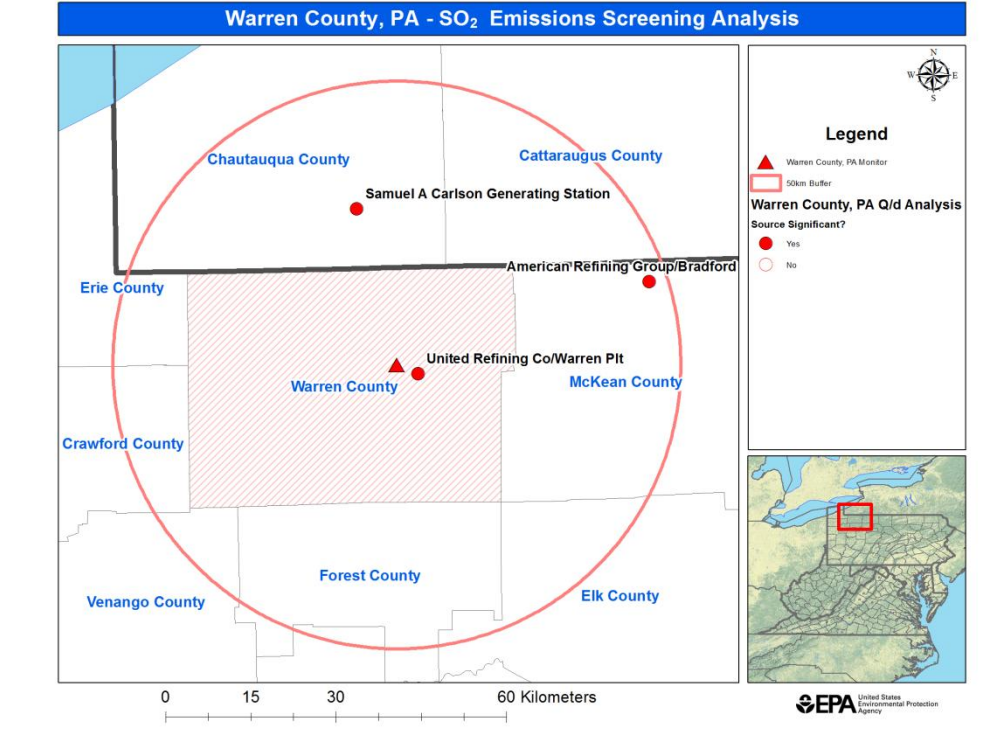
Q/d Screening Analysis

Using point source emissions data, the emissions by distance (Q/d) screening methodology was used to identify sources for additional review within 50 km of a violating monitor in Warren County. A total of three point sources emitting more than 100 tpy (from the 2008 NEI v2) are located within 50 km of the monitor in Warren County. Sources are located in Warren and McKean counties in Pennsylvania and Chautauqua County, NY. Following the Q/d methodology, we determined that all three sources should be further reviewed. These sources are United Refining Warren Plant, American Refining Group-Bradford, and Samuel A. Carlson Generating Station (Figures 26- 27).

**Figure 26.**



**Figure 27.**



**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 see if more recent emissions are available for sources near the Warren County, PA monitor. Only the Samuel A. Carlson Generating Station in Chautauqua County, NY reported its SO<sub>2</sub> emissions to CAMD.

**Table 13. CAMD 2008-11 Emissions Summary of SO<sub>2</sub> Emissions in tpy**

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011
Samuel A. Carlson Generating Station	Chautauqua	28.41	3,736	1,885	1,272	664

\*Distance from Warren County SO<sub>2</sub> monitor in kilometers.

Emissions Controls

Under this factor, EPA considers the existing level of control of emission sources. No SO<sub>2</sub> emission controls were noted on any of the sources within 50 kilometers of the Warren County monitor.

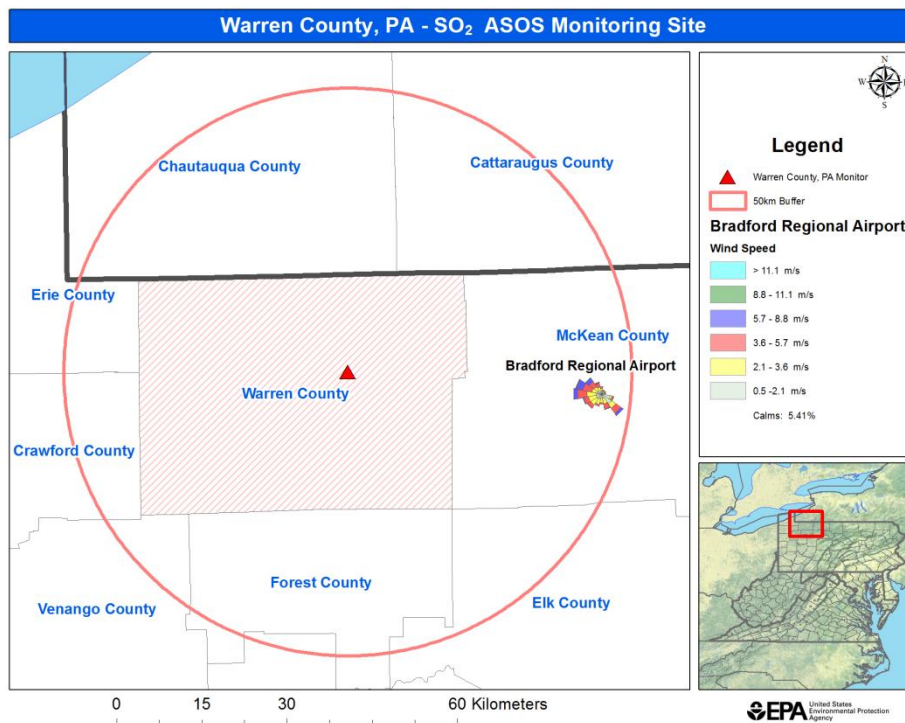
### ***Meteorology (weather/transport patterns)***

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 is only one ASOS site located within 50 km of the Warren County monitor. The closest surface site is the Bradford Regional Airport located approximately 44 kilometers east-southeast of the Warren County monitor. The closest rawinsonde site is located at the Buffalo Niagara International Airport located approximately 130 km north of the Warren County monitor.

One-minute meteorological wind fields for the Bradford Regional Airport site 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 a wind rose for the site (Figure 28). Winds at the Bradford Regional Airport showed a bimodal distribution with the predominant winds coming from the west to northwest with a second distribution coming from the southeast direction during the 2006-10 time period. Given this information, EPA is not prepared to conclude that the large source in McKean County (i.e., American Refining Group) is likely to be adversely impacting the monitor in Warren County.

Pennsylvania's recommendation provided meteorological information from the Warren monitoring location, which is situated within a valley approximately 4 kilometers west of United Refining. Their analysis shows that high SO<sub>2</sub> concentrations at the monitoring site are likely driven by the source that is within close proximity to the air monitor.

**Figure 28.**



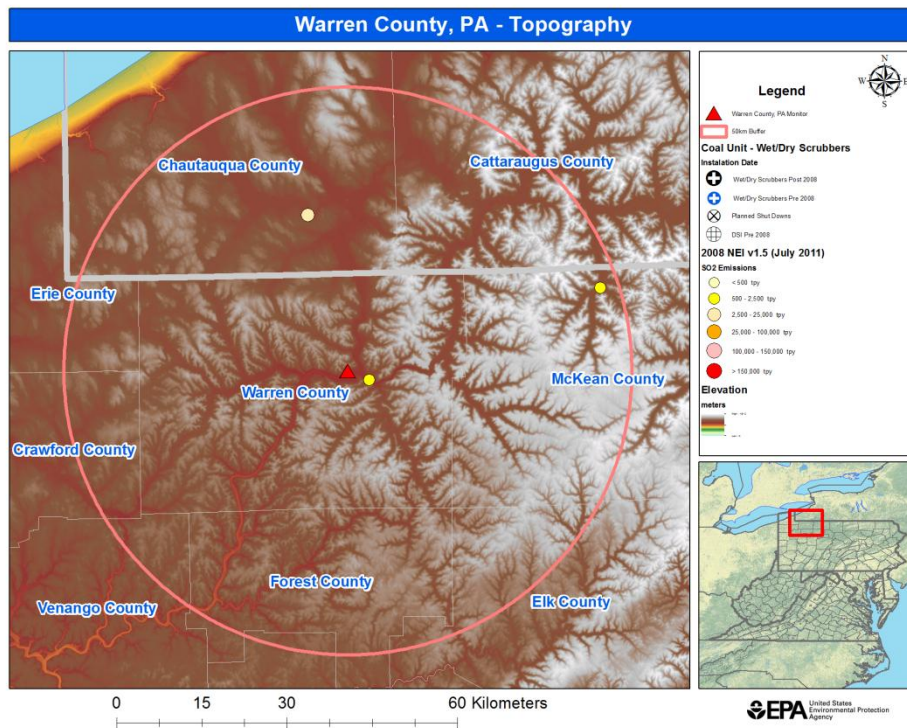


**Geography/topography (mountain ranges or other air basin boundaries)**

Figure 29 below depicts elevations and locations of point sources in the Warren County area. Warren County is located in northwest Pennsylvania in the state's Allegheny Plateau Region. The area is made up of dendritic river valleys cut by the Allegheny River and its tributaries interspersed with higher terrain. Elevations vary from over 600 meters above mean sea level along the plateau to just under 325 meters along the Allegheny River as it drains south into Forest County. Higher terrain lies to the west in McKean County with elevations generally decreasing as one moves west towards Lake Erie.

Pennsylvania's recommendation noted the influence of local topography on the Warren County monitor. Their analysis examined the monitored wind fields and the timing of exceedances and concluded that local topographically-induced meteorological conditions, mainly overnight inversions and complex drainage flows, coupled with a nearby local source contributed to the monitor's noncompliance with the 1-hour SO<sub>2</sub> NAAQS. Given this information, EPA is not prepared to conclude that emissions from the Samuel A. Carlson Generating Station in Chautauqua County, NY nor American Refining-Bradford in McKean County, PA are likely to contribute to the violating monitor in Warren County, PA.

**Figure 29.**

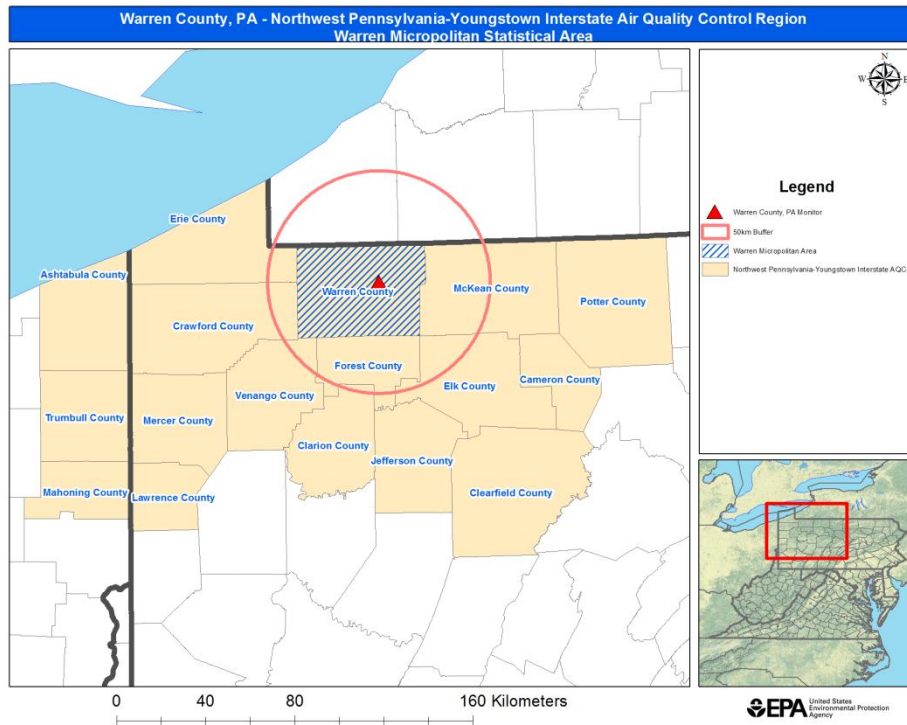


### *Jurisdictional boundaries*

There are two existing maintenance boundaries (i.e., previous nonattainment areas) in Warren County for the 1971 primary SO<sub>2</sub> NAAQS. One consists of Warren Borough, Pleasant Township, and Glad Township, while the other consists of only Conewango Township. These boundaries are not appropriate boundaries because they are too small and would not include large sources that are likely to contribute to nonattainment in Warren County.

Although Warren County is not part of any MSA (as of 2009) and is designated as a separate MSA, there is another possible boundary that can be considered: Northwest Pennsylvania-Youngstown Interstate AQCR, codified in the Code of Federal Regulations (CFR) § 81.74. The Northwest Pennsylvania-Youngstown Interstate AQCR consists of fourteen counties in Pennsylvania and Ohio: Cameron, Clairion, Clearfield, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Potter, Venango, and Warren Counties in PA, along with Ashtabula, Mahoning and Trumbull Counties in Ohio (Figure 30). The Northwest Pennsylvania-Youngstown Interstate AQCR does not include all of the counties that lie within 50 km of the Warren County monitor and includes areas with sources which EPA is not prepared to conclude are contributing to the violating monitor. For these reasons, it would not be practical to use this AQCR as the initial nonattainment boundary.

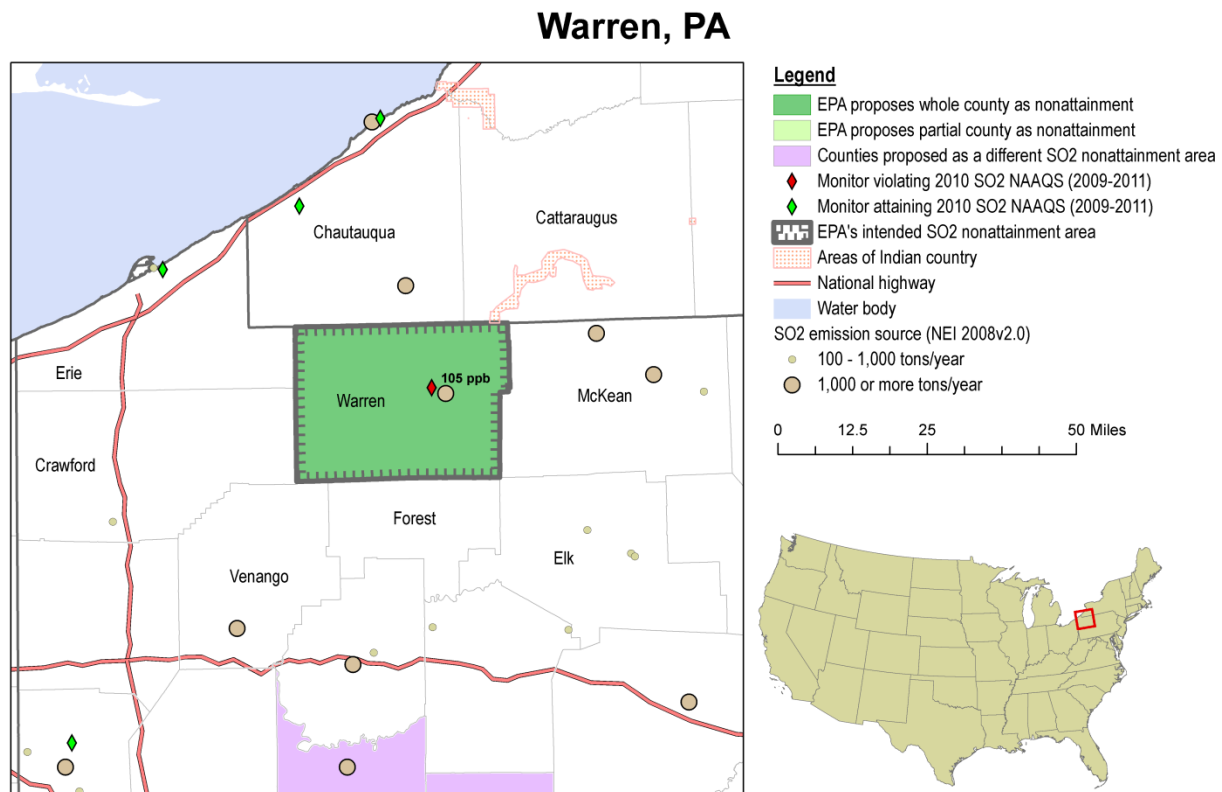
**Figure 30.**



### Conclusion for the Warren Nonattainment Area

After considering the factors described above, EPA intends to find that it is appropriate to include, based on the violating monitor, Warren County in the Warren Nonattainment Area for the 2010 SO<sub>2</sub> NAAQS. The air quality monitor in Warren County shows a violation of the 2010 SO<sub>2</sub> NAAQS, based on certified 2009-2011 air quality data. EPA is not prepared to find that any nearby areas contribute to the monitored violations in Warren County. The monitor in Warren County, based on certified 2009-2011 air quality data, shows high concentrations of SO<sub>2</sub> emissions in the vicinity, and both meteorological and topographical data suggest that emissions from the large source within close proximity of the monitor likely impact the monitor and contribute to SO<sub>2</sub> NAAQS violations in Warren County. Additionally, EPA is not prepared to conclude that, based on meteorological and topographical data, the large sources in neighboring counties are likely to impact the monitor in Warren County. The monitored violation in Warren County is likely driven by the source within close proximity of the monitor (i.e. United Refining-Warren Plant). 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 area that does not meet the 2010 SO<sub>2</sub> NAAQS.

Figure 31.



### **EPA's Area Designations Conclusion for Pennsylvania**

EPA has reviewed the information above and intends to find that it is appropriate to designate based on monitored violations 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 Allegheny, Beaver, Indiana, Warren Counties, and a portion of Armstrong County (Plumcreek and South Bend Townships and Elderton Borough) as nonattainment after considering the factors and information described in this technical support document. The intended 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 the area that does not meet (or that contributes to ambient air quality in a nearby area that should be initially designated as nonattainment due to causing or contributing to the monitored violation of the 2010 SO<sub>2</sub> NAAQS in the county.