
Technical Support Document

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

Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), EPA must designate areas as either “nonattainment,” “attainment,” or “unclassifiable” for the 2010 1-hour sulfur dioxide (SO₂) primary national ambient air quality standard (NAAQS). The CAA defines a nonattainment area as one that does not meet the NAAQS or that contributes to poor air quality in a nearby area that does not meet the NAAQS. Table 1 below identifies the counties or portions of counties in the Commonwealth of Pennsylvania (“Commonwealth or “Pennsylvania” or “PA”) that EPA is initially designating nonattainment based on monitored violations. EPA is not yet prepared to designate other areas in Pennsylvania, and will address them in a future final designations action.

Pennsylvania submitted designation recommendations on June 23, 2011. On February 6, 2013, EPA sent out a letter with intended designations for Pennsylvania. Pennsylvania responded in a letter dated April 8, 2013. Table 1 below identifies the portions of counties in the Commonwealth that EPA is initially designating “nonattainment” based on monitored violations. In Pennsylvania’s April 8, 2013 letter, they indicated that only partial counties should be included in the proposed Allegheny, Beaver, and Warren Nonattainment Areas and that no portion of Armstrong County should be included in the Indiana County Nonattainment Area. In addition to comments from the Commonwealth, EPA received comments from NRG Energy supporting EPA’s proposed nonattainment area for Allegheny County in so far as a portion of Washington County should not be included in the nonattainment area. EPA also received comments from the Allegheny County Health Department and U. S. Steel which indicated that while a portion of Allegheny County should be nonattainment, a portion of Washington County PA should be part of the Allegheny County nonattainment area. Specific technical comments from the Commonwealth and the additional commenters will be addressed in this TSD in the discussion for the appropriate nonattainment areas.

Table 1. Nonattainment Area Designations for Pennsylvania

Area	Pennsylvania’s Recommended Designations of Areas/Counties	EPA’s Designations of Areas/Counties
Allegheny, PA Allegheny County (partial) City of Clairton, City of Duquesne, City of McKeesport, Borough of Braddock,	Nonattainment**	Nonattainment

Borough of Dravosburg, Borough of East Mckeesport, Borough of East Pittsburgh, Borough of Elizabeth, Borough of Glassport, Borough of Jefferson Hills, Borough of Liberty, Borough of Lincoln, Borough of North Braddock, Borough of Pleasant Hills, Borough of Port Vue, Borough of Versailles, Borough of Wall, Borough of West Elizabeth, Borough of West Mifflin, Elizabeth Township, Forward Township, North Versailles Township		
Beaver, PA Beaver County (partial) Industry Borough, Midland Borough, Shippingport Borough, Brighton Township, Potter Township and Vanport Township	Nonattainment	Nonattainment
Indiana, PA Indiana County Armstrong County (partial) Elderton Borough Plumcreek Township South Bend Township	Nonattainment Unclassifiable	Nonattainment Nonattainment
Warren, PA Warren County (partial) City of Warren, Conewago Township, Glade Township, Pleasant Township	Nonattainment	Nonattainment

** PA's response did not include the following portions of Allegheny County: City of Duquesne, Borough of Braddock, Borough of East Mckeesport, Borough of East Pittsburgh, Borough of North Braddock, Borough of Wall, North Versailles Township

Background

On June 2, 2010, EPA revised the primary SO₂ NAAQS (75 FR 35520), by establishing a new 1-hour standard at a level of 75 parts per billion (ppb) which is met at an ambient air quality monitoring site when the 3-year average of the annual 99th percentile of the daily maximum 1-hour average concentrations does not exceed 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a)-(b). EPA has determined that this is the level necessary

to provide protection of public health with an adequate margin of safety, especially for children, the elderly and those with asthma. These groups are particularly susceptible to the health effects associated with breathing SO₂. The Agency is revoking the two prior primary standards of 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year because 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 SO₂ has not been revised, so EPA is not designating areas in this process on the basis of the secondary standard.

EPA's SO₂ Designation Approach

Section 107(d) of the CAA requires that 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 tribal government does not submit designation recommendations, EPA will promulgate the designations that it deems appropriate. States and tribal governments were given an opportunity to demonstrate why any proposed modification is inappropriate where their recommendations disagreed with EPA's intended designations.

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 evaluated in determining boundaries for areas designated nonattainment. These 5 factors include: 1) air quality data; 2) emissions and emissions-related data (location of sources and potential contribution to ambient SO₂ concentrations); 3) meteorology (weather/transport patterns); 4) geography/topography (mountain ranges or other air basin boundaries); and 5) jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organization), among any other information deemed relevant to establishing appropriate area designations and boundaries for the 1-hour SO₂ NAAQS.

The March 24, 2011 memo recommended that area boundaries be defaulted to the county boundary unless additional 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, tribal governments and/or EPA may support a different boundary than a default county boundary.

In this technical support document (TSD), EPA discusses its review and technical analysis of the recommendations submitted by the Commonwealth and other commenters in response to EPA's proposed nonattainment area designations for Pennsylvania for the 1-hour SO₂ standard which were also made available for public comment (78 FR 11124) on February 15, 2013.

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 SO₂ NAAQS, based on the most recent three years of air quality monitoring data, or contributes to a violation in a nearby area.
- 2) **Recommended nonattainment area** – an area a state or tribal government has recommended to EPA to be designated as nonattainment.
- 3) **Violating monitor** – an ambient air monitor meeting all methods, quality assurance and citing criteria and requirements whose valid design value exceeds 75 ppb, as described in Appendix T of 40 CFR part 50.
- 4) **2010 SO₂ NAAQS - 75 ppb**, national ambient air quality standard for SO₂ promulgated in 2010. Based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations
- 5) **Design Value** – a statistic that describes the air quality status of a given area relative to the level of the NAAQS.

Nonattainment Designations

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 SO₂ NAAQS based on monitored air quality data from 2008-2010. The Commonwealth provided its 5-factor analysis for each of these four counties as part of its designation recommendation. On April 8, 2013, the Commonwealth submitted a response to EPA’s 120-day letter and recommended that only portions of Allegheny County, Beaver and Warren Counties be designated as nonattainment. Pennsylvania also indicated that no portion of Armstrong County should be designated nonattainment. EPA received additional comments on the proposed Allegheny County nonattainment area from three commenters.

Based on EPA’s technical analysis, EPA is initially designating four areas as nonattainment (Table 1) based on monitored violations of the NAAQS: 1) the Allegheny, PA Nonattainment Area, which consists of the following portions of the county: City of Clairton, City of Duquesne, City of McKeesport, Borough of Braddock, Borough of Dravosburg, Borough of East McKeesport, Borough of East Pittsburgh, Borough of Elizabeth, Borough of Glassport, Borough of Jefferson Hills, Borough of Liberty, Borough of Lincoln, Borough of North Braddock, Borough of Pleasant Hills, Borough of Port Vue, Borough of Versailles, Borough of Wall, Borough of West Elizabeth, Borough of West Mifflin, Elizabeth Township, Forward Township, and North Versailles Township; 2) the Beaver PA Nonattainment Area, which consists of: Industry Borough, Midland Borough, Shippingport Borough, Brighton Township, Potter Township and Vanport Township; 3) the Indiana PA Nonattainment Area, which consists of Indiana County in its entirety and the following portions of Armstrong County: Elderton

Borough, Plumcreek Township and South Bend Township; and 4) the Warren PA Nonattainment Area, which consists of the City of Warren, Conewago Township, Glade Township, and Pleasant Township.

The 5 factors were used to analyze the nonattainment areas for 1-hour SO₂ designations:

1. Air quality data. This factor considers the SO₂ 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 three year period 2009-2011. Additional information provided regarding monitored data and analysis of data from 2010-2012 from the Commonwealth in their response to EPA's 120 day letters as well as information provided by other commenters was also considered. A monitor's design value indicates whether that monitor violates a specified air quality standard. The 2010 SO₂ NAAQS is met at a monitoring site when the identified design value is valid and less than or equal to 75 ppb, as determined in accordance with Appendix T of 40 CFR part 50. 40 CFR 50.17(a)-(b). 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 SO₂ 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 75% of its hours are complete. 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 SO₂ standard will be designated as nonattainment.
2. Emissions and emissions-related data (location of sources and potential contribution to ambient SO₂ concentrations). EPA reviewed data for the point source and non point source categories from version 3 of the 2008 National Emissions Inventory (NEI) which is the most current version of the national inventory now available (see <http://www.epa.gov/ttn/chief/net/2008inventory.html>), additional emissions information from the Commonwealth and other commenters was considered as well as information from the EPA 2012 Clean Air Markets Division (CAMD) and Pennsylvania's EFACTS system. Generally, the point source inventory represents the bulk of the SO₂ emissions in Pennsylvania.

EPA examined recent revisions to the 2008 NEI (version 3) and 2012 CAMD emissions data and emissions changes appeared to be minimal.
3. Meteorology (weather/transport patterns). EPA originally evaluated meteorological data to help determine how weather conditions, including wind speed and direction, affect sources contributing to ambient SO₂ 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.

The Commonwealth also included discussions on impacts of temperature inversions and air-parcel trajectories from the National Oceanic and Atmospheric Administration's (NOAA) Air Resource Lab's HYbrid Single-Particle Lagrangian Integrated Trajectory or HYSPLIT model. EPA will discuss some of these analyses in the individual nonattainment areas sections of this document.

4. Geography/topography (mountain ranges or other air basin boundaries). EPA examined the physical land features and their possible impacts SO₂ concentrations. 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. EPA also considered any additional information provided by the Commonwealth and other commenter's in relation to specific areas.
5. Jurisdictional boundaries As discussed in the Pennsylvania TSD that was included in the docket as part of EPA's proposal for nonattainment areas (78 FR 11124) on February 15, 2013, EPA reviewed several possible boundaries but generally used county boundaries for the proposed Pennsylvania nonattainment areas. In response to EPA's proposal, Pennsylvania generally recommended that the boundaries for all but one nonattainment area (Indiana) consist of partial counties and that boundaries could be determined based on more local jurisdictions such as cities, boroughs, and townships.

Technical Analysis for the Allegheny PA Nonattainment Area

In EPA's 120 day letter, EPA proposed that the initial Allegheny PA Nonattainment Area consist of Allegheny County in its entirety. In response to EPA's 120 day letter, the Commonwealth and the Allegheny County Health Department (ACHD) recommended that only a portion of Allegheny County be included in the final nonattainment area. ACHD also requested that a portion of Washington County also be included in the nonattainment area. A commenter on behalf of US Steel also indicated that a portion of Washington County should be included while a commenter on behalf of NRG Energy agreed with EPA's original proposal that did not include areas outside Allegheny County. Each commenter provided some information to support their response.

Based on EPA’s technical analysis described below, EPA concurs with the Commonwealth and ACHD to the extent that only a portion of Allegheny County needs to be included as part of this initial nonattainment designation. However, EPA is adding some additional municipalities in Allegheny County to the nonattainment area to those municipalities suggested by the Commonwealth and ACHD. See the information in Table 1 for detailed information on municipalities included in the nonattainment area. In regard to Washington County, EPA agrees with the Commonwealth and generally NRG Energy and is not adding a portion of Washington County to the initial nonattainment area as suggested by ACHD and U. S. Steel. The EPA will address these and other initially excluded areas and their sources in a future final designations action.

Air Quality Data

This factor considers the SO₂ design values (in ppb) for air quality monitors in Allegheny County based on certified data for the 2009-2011 time period. As supporting information, the Commonwealth and ACDH reported that the preliminary 2010-12 design value at the Liberty monitor, located in the southeast portion of Allegheny County was 141 ppb. Monitors in other portions of Allegheny County and nearby Washington County do not show violations of the standard and have significantly lower concentrations than Liberty. Monitors not showing violations of the 1-hour SO₂ NAAQS in other portions of the county support reducing the initial nonattainment area to include only portions of southeastern Allegheny County.

One-hour SO₂ design values for the five monitors located in Allegheny County are shown in Table 2.

Table 2. Allegheny County Monitor Trends: 1-Hour SO₂ 99th % and Design Values in Parts Per Billion (ppb)*

Monitor Name	Monitor Air Quality System ID	99 th %					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
Liberty	42-003-0064	192	111	131	141	165	128	146
South Fayette	42-003-0067	74	52	53	39	28	48	40

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

The Commonwealth also included an analysis of exceedances from 2010-12. They noted that exceedances at the Liberty monitor primarily occurred during the overnight hours and further

explained that this tendency for exceedances to occur during the overnight hours was due to nocturnal inversions interacting with local emission sources. EPA reviewed exceedances from 2007 to 2011 and found a similar pattern with elevated SO₂ concentrations occurring at the Liberty monitor primarily during the overnight hours. Similar patterns are also observed in Liberty's PM-2.5 concentrations.

Emissions and Emissions-Related Data

Emissions

Table 3 shows total emissions of SO₂ in tons per year (tpy) for sources in and around the Allegheny Area and sources emitting or contributing greater than 100 tpy of SO₂ according to the 2008 NEI.

Table 3. SO₂ Emissions in Allegheny Area

County	Facility Located in State's Original Recommended Nonattainment Area?	Facility Name	2008 NEI Total Facility SO₂ Emissions (tpy)	2011 eFACTS Total Facility SO₂ Emissions (tpy) **	CAMD 2012 SO₂ Emissions (tpy) except as noted
Allegheny	Yes	Us Steel Corporation - Irvin Plant	475	419	
Allegheny	Yes	Shenango Inc	333	372	
Allegheny	Yes	Orion Power Midwest Cheswick Station	30,300	9,290	1,911
Allegheny	Yes	Uss Corporation - Edgar Thomson Works	1,536	1,279	
Allegheny	Yes	Uss - Clairton Works	1,517	1,468	
Allegheny	Yes	Bellefield Boiler Plant	795	0.4	
Allegheny	Yes	Bay Valley Foods, LLC	487	313	
Washington	No	Orion Power/Elrama Power Station	2,572	428	250
Washington	No	Allegheny Energy/Mitchell Power Station	934	864	1,570
Westmoreland	No	Arcelormittal Monesson	396		

		LLC/Monesson Coke Plant			
Washington	No	Langeloth Metallurgical	186	31	

**** 2011 SO₂ emissions from PA DEP eFACTS**

(http://www.ahs.dep.pa.gov/eFACTSWeb/criteria_facilityemissions.aspx)

The Commonwealth provided an analysis of exceedances in 2012 at the Liberty monitor and daily emissions from the Elrama facility. It should be noted that according to the comment letter from NRG Energy and other comments from the Commonwealth that the Elrama facility has not been operating since June 2012. However, CAMD indicates that Elrama Unit 4 operated for 342 hours in the third quarter of 2012 but no units at Elrama operated since that time through first quarter of 2013. NRG also indicated that more exceedances were recorded at the Liberty monitor between 2010-2012 versus 2007-2009 even though emissions from the Elrama facility were much higher during 2007-2009. The Commonwealth also provided analyses showing that on 23 days of exceedances at the Liberty monitor in 2012 the Elrama facility was only operating on three of those days and emitted less than 10 tons of SO₂ on any of the three days. While ACHD reviewed 2010 emissions data, they simply identified sources that would need further analysis based on EPA's Q/d methodology. U. S. Steel also generally contends that the area where the Elrama facility is located should be included in the nonattainment area but this view is not informed by more recent information such as the analysis provided by the Commonwealth indicating that more recent emissions from Elrama appeared to have little impact on exceedances of the standard especially in 2012. Therefore there does not appear to be sufficient information to include the Elrama facility in Washington County in the initial nonattainment area at this time, and we will further address this source in a future final designations action.

In addition to Elrama, EPA extracted the Mitchell power plant's SO₂ emissions data from its CAMD website for 2011 and 2012. Mitchell's emissions (from CAMD) increased from 862 tpy in 2011 to 1,570 tpy in 2012. This was primarily due to an increase in hours of operation for Mitchell's large coal unit. This unit was operated for 4,756 hrs in 2011 and 6,047 hrs in 2012. Averaged annual emissions at Mitchell were relatively unchanged between 2011 (0.21 lbs/MMbtu) and 2012 (0.25 lbs/MMbtu). Mitchell's coal unit is controlled and appears to be well operated, achieving about 90% removal efficiency on average. EPA does not feel there is sufficient information to include the Mitchell power plant in the initial nonattainment area at this time, and will further address this source in a future final designations action. Also other sources in Washington county and Westmoreland County in the table above appear to have relatively small emissions and are not likely to be contributing to violations in Allegheny County. These areas and sources will be addressed in a future designations action.

The Cheswick power plant appears to be the largest SO₂ emission source in Allegheny County. Cheswick's emissions, however, have been significantly scaled back since installation and operation of its SO₂ control equipment. Information from EPA's CAMD website indicates a large decrease in between the 2011 and 2012 annual SO₂ emissions which is primarily due to increased control efficiency. In 2011, Cheswick's coal-fired unit ran for 6,160 hrs at an annually averaged emission rate of 0.71 lbs/MMbtu. In 2012, Cheswick's coal unit ran slightly less at

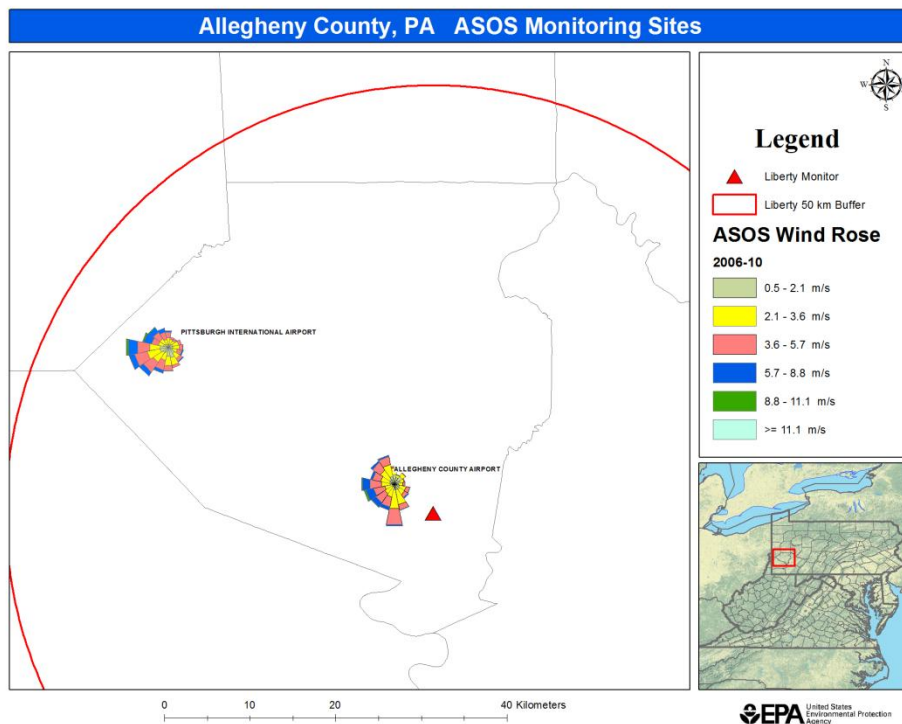
5,715 hrs with an annually averaged emission rate of 0.15 lbs/MMbtu. In light of Cheswick's lower emission rates, distance (~24 km) from the Liberty monitor, and minimal change in the monitored values at Liberty, EPA is not prepared at this time to include this source in the initial nonattainment area, and will further address it in a future final designations action.

EPA summarized SO₂ emissions from PA DEP's eFACTS in table 3. After the Cheswick power plant, the next three largest SO₂ emission sources are U.S. Steel facilities. These include the Clariton Coke Works, the Edgar Thompson Works and the Irvin Plant, which are considered part of U.S. Steel's Mon Valley Works. County emissions suggest these three U.S. steel facilities should be included in the nonattainment area.

Meteorology (weather/transport patterns)

Evidence of source-receptor relationships between specific emissions sources and high SO₂ values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered 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 1.

Figure 1.



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*).

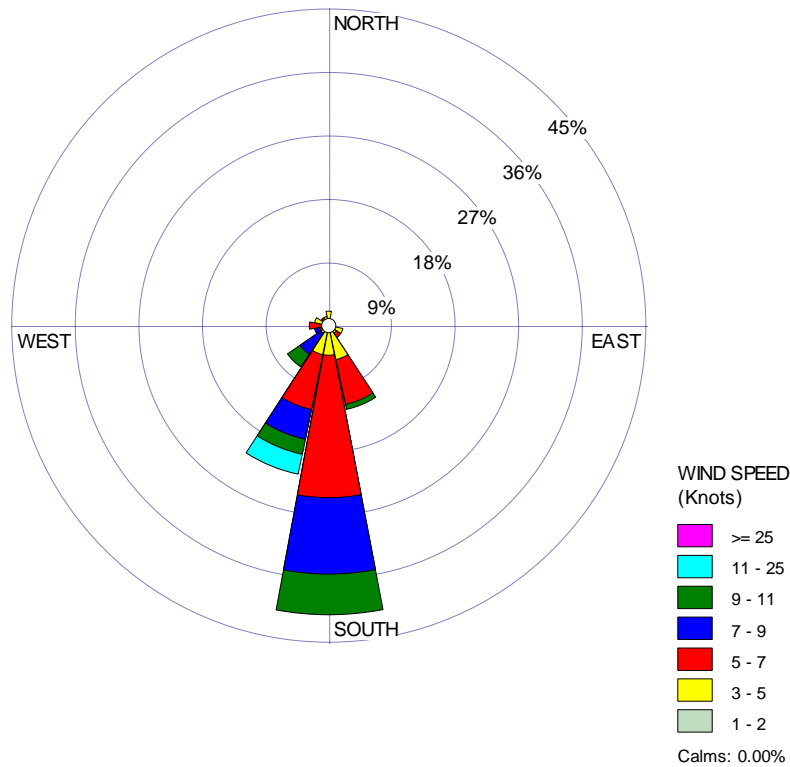
The Commonwealth conducted an analysis of the Liberty monitor’s wind measurements from 2010 through 2012. They specifically examined winds during hours in which the Liberty monitor exceeded the 1-hr SO₂ NAAQS and then compared them to the entire data set. Winds were mainly from the southwest during exceedance hours. A similar wind direction tendency was noted for the entire data set though it was not as pronounced as the exceedance only wind fields.

EPA conducted a similar analysis using winds from the Allegheny County Airport, located about 4.5 km to the northwest of the Liberty monitor. Pennsylvania noted that the Allegheny Airport sits at a higher elevation than the Liberty monitor and therefore may not measure some of the local wind patterns that are thought to contribute to the Liberty monitor’s exceedances of the 1-hr SO₂ NAAQS.

EPA downloaded the 1-minute ASOS files for 2009 through 2011 and processed them into one-hour wind files using its AERMET preprocessor. Adjustments were made to the ASOS wind data to account for local time. The one-hour AERMET wind files were then processed using

Lakes Environmental's WRPLOT program to produce a wind rose for those hours (with valid wind data) that exceeded the 1-hr SO₂ NAAQS. EPA constructed a wind rose, shown in figure 2 is similar to the one that Pennsylvania constructed. This suggests local flow patterns and possibly the nonattainment problem in general may be slightly more widespread than indicated in the Commonwealth's analysis.

Figure 2.

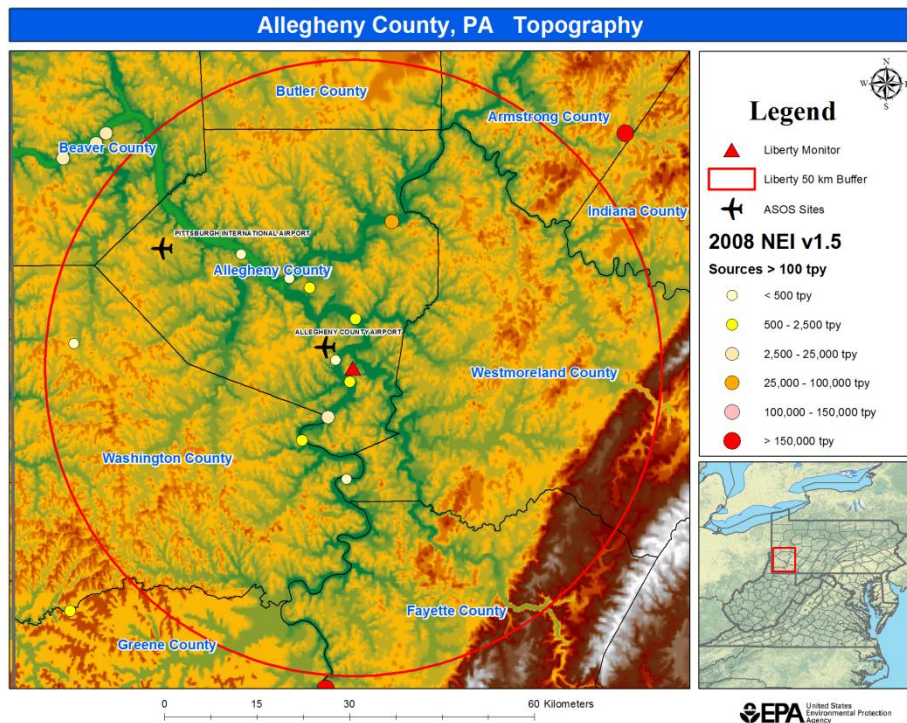


Geography/topography (mountain ranges or other air basin boundaries)

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 3 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 3.



Jurisdictional boundaries

EPA provided information about all boundaries considered prior to proposing nonattainment areas and this information can be found in the Pennsylvania TSD as part of the docket on proposed designations (78 FR 11124) and is not restated here. EPA originally proposed including all of Allegheny County in the initial nonattainment area. However additional information provided by the Commonwealth and ACHD in response to EPA’s proposal demonstrates that the monitors and sources of concern within Allegheny County are only a portion of the county. However EPA noted that the area of the county suggested for inclusion by the Commonwealth and ACHD as part of the Allegheny PA Nonattainment Area did not include portions of the county where the Edgar Thompson Works was located. EPA feels this source is

impacting SO₂ values in the county and has also included this portion of the county in the initial nonattainment area. Therefore, EPA is designating the portions of Allegheny County as identified in Table 1 as nonattainment.

Conclusion for the Allegheny Nonattainment Area

After considering the factors described above, EPA finds that the portions of Allegheny County that are nonattainment for the 2010 SO₂ NAAQS include the following: City of Clairton, City of Duquesne, City of McKeesport, Borough of Braddock, Borough of Dravosburg, Borough of East McKeesport, Borough of East Pittsburgh, Borough of Elizabeth, Borough of Glassport, Borough of Jefferson Hills, Borough of Liberty, Borough of Lincoln, Borough of North Braddock, Borough of Pleasant Hills, Borough of Port Vue, Borough of Versailles, Borough of Wall, Borough of West Elizabeth, Borough of West Mifflin, Elizabeth Township, Forward Township, and North Versailles Township. These areas are identified in Table 1 with the area name Allegheny PA Nonattainment Area. Refer to Figure 4 for a depiction of the nonattainment area.

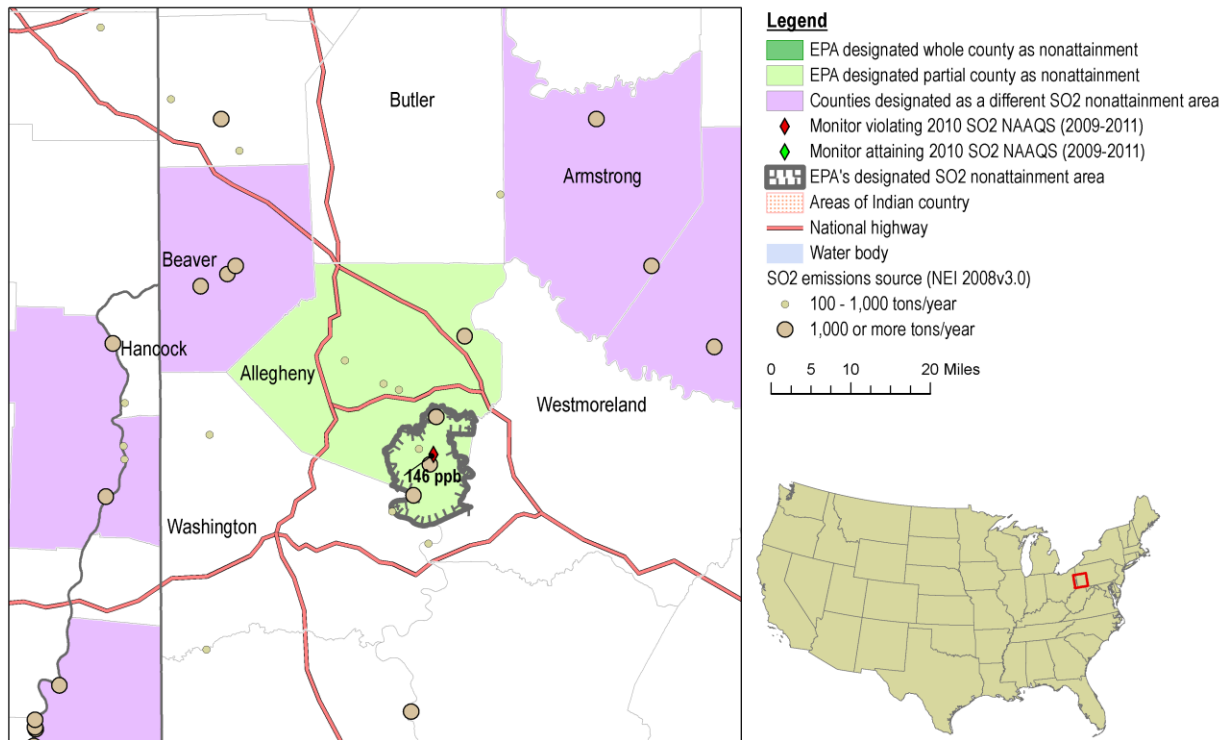
The air quality monitor which is the Liberty monitor in this area of Allegheny County shows violations of the 2010 SO₂ NAAQS, based on certified 2009-2011 air quality data and additional data from 2012 provided by the Commonwealth and ACHD. Additionally, in response to EPA's 120-day letter, the Commonwealth and ACHD provided supporting information as referenced in the five factor analysis that assisted EPA in concluding that only a portion of Allegheny County should be initially included in the Allegheny County, PA Nonattainment Area, leaving remaining portions to be addressed in a future final designations action. Available emissions, meteorological data, and geographical data suggest that the sources in the cities, boroughs and townships as identified in Table 1 contribute to SO₂ NAAQS violations in Allegheny County.

Current information about sources located in Washington County as described above is not sufficient for us to conclude at this time to that they are likely to contribute to nonattainment at the Liberty monitor in Allegheny County. We will further address these sources in a future final designations action.

Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass the nonattainment area based on the violating monitor in Allegheny County in Pennsylvania. Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation or to other possible violations are not included in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.

Figure 4.

Allegheny, PA



Technical Analysis for the Beaver Nonattainment Area

In EPA's 120 day letter, EPA proposed that the initial Beaver PA Nonattainment Area consist of Beaver County in its entirety. In response to EPA's 120 day letter, the Commonwealth recommended that only a portion of Beaver County (Industry Borough, Shippingport Borough, Midland Borough, Brighton Township, Potter Township and Vanport Township) be included in the nonattainment area and provided an analysis to support their response.

Based on EPA's technical analysis described below, EPA agrees with Pennsylvania's recommendation and is initially designating a portion of the county as nonattainment for the 2010 SO₂ NAAQS based on the violating monitors in Beaver County. The Beaver PA Nonattainment Area consists of Industry Borough, Shippingport Borough, Midland Borough, Brighton Township, Potter Township and Vanport Township.

Air Quality Data

This factor considers the SO₂ air quality monitoring data, including design values (in ppb) calculated for all air quality monitors in Beaver County based on certified data for the 2009-2011 period. In addition, more recent air monitoring data included in the Commonwealth's response to EPA's proposal was also considered.

The 2011 1-hour SO₂ design value for the monitors located in Beaver County is shown in Table 4.

Table 4. Beaver County Monitor Trends: 1-Hour SO₂ 99th % and Design Value in Parts Per Billion (ppb)

Monitor Name	Monitor Air Quality System ID	99 th %					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 SO₂ design values at the Hookstown monitor have been falling over the last several years. As supporting information, the Commonwealth indicated that the preliminary 2012 design value for this monitor is 57 ppb while the 2012 design value at the Brighton monitor was 149 ppb. These values were confirmed by EPA. Monitors within the 50 kilometer zone of the violating monitors in the neighboring counties in PA (Lawrence, Allegheny and Washington) are not recording violations.

The Commonwealth also looked at exceedances at the Brighton Township and Hookstown monitors in Beaver County. Both monitors showed distinctly different patterns as to when 1-hr SO₂ exceedances occurred. The Brighton Township monitor tended to have exceedances during the overnight hours while exceedances at the Hookstown monitor tended to occur during the daytime hours. EPA examined 1-hr SO₂ concentrations from 2009-11 for both monitors and generally confirmed the Commonwealth's findings. EPA would add that while exceedances at the Brighton Township monitor generally occurred during the overnight hours, there were still a number of exceedances observed during the daytime. EPA also calculated the correlation coefficients for both the Brighton Township and Hookstown monitors. One-hour SO₂ concentrations from the Brighton Township and Hookstown monitors are not well correlated, which supports designating only a portion of Beaver County as nonattainment.

Emissions and Emissions-Related Data

Emissions

In response to EPA’s letter, the Commonwealth indicated that four major sources with SO₂ emissions over 100 tpy for the 2008-2011 period are located within 5 miles of the Brighton Township monitor, which is still showing violations of the NAAQS. The Commonwealth identified the sources as: Jewel Acquisition -Midland, First Energy Generation Bruce Mansfield, Allegheny Energy Beaver Valley and Horsehead Corporation-Monaca Smelter. All of these sources are included in the portion of Beaver County that is designated nonattainment. Table 5 shows total emissions of SO₂ in tons per year (tpy) for sources in and around the Beaver Area which are emitting greater than 100 tpy of SO₂ according to the 2008 NEI.

Table 5. SO₂ Emissions in the Beaver Nonattainment Area

County	Facility Located in Original State Recommended Nonattainment Area?	Facility Name	Total Facility SO₂ Emissions 2008 NEI v3(tpy)	CAMD 2012 Total SO₂ Point Emissions (tpy)
Beaver, PA	Yes	First Energy/Bruce Mansfield Plant	11,019	19,082
Beaver, PA	Yes	Horsehead Corp./Monaca Smelter	3,320	
Beaver, PA	Yes	AES Beaver Valley	3,113	3,205
Jefferson, OH	Yes	W.H. Sammis Plant	102,197	4,064
Jefferson, OH	Yes	Cardinal Power Plant	33,317	8,144
Jefferson, OH	Yes	Severstal Wheeling, Inc.	700	
Westmoreland, PA	No	Arcelormittal Monesson LLC/Monesson Coke Plant	396	
Brooke, WV	Yes	Mountain State Carbon, LLC	731	
Hancock, WV	Yes	Arcelormittal Weirton Inc.	597	
Lawrence, PA	No	Orion Power Midwest/New Castle Power Plant	12,923	4,995
Lawrence, PA	No	ESSROC/Bessemer	910	

Lawrence, PA	No	CEMEX/ Wampum Cement Plant	674	
Allegheny, PA	Yes	Shenango Inc	333	
Allegheny, PA	Yes	Bellefield Boiler Plant	795	
Allegheny, PA	Yes	Bay Valley Foods, LLC	487	

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 SO₂ 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 2008-12 Emissions Summary of SO₂ Emissions in tpy

Facility	County	Distance*	CAMD- 2008	CAMD- 2009	CAMD- 2010	CAMD- 2011	CAMD- 2012
AES Beaver Valley	Beaver	3.2	Not Available	3,500	3,416	3,086	3,205
First Energy/Bruce Mansfield	Beaver	7.6	11,117	17,704	21,757	21,196	19,082
W.H. Sammis Plant	Jefferson	11.3	102,619	73,614	12,761	4,202	4,064
Orion Power/New Castle Power Plant	Lawrence	28.1	12,923	7,629	9,572	7,510	4,995
Cardinal Power Plant	Jefferson	36.6	32,497	34,751	32,522	25,200	8,144

*Distance from Beaver County SO₂ monitor in kilometers.

Emissions Controls

EPA has evaluated additional information from the 2008 NEI and CAMD and notes that SO₂ emissions at four of the five CAMD sources have operating SO₂ 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. SO₂ emissions from 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 plant may be responsible for the declining SO₂ concentrations observed at the Hookstown monitor near the PA-WV border. The Commonwealth also indicated that the decline in SO₂ at the Hookstown monitor was likely due to SO₂ controls at major power plants to the west of Beaver County. At this time EPA is not including any portions of counties outside of Beaver county in the nonattainment area since it is unlikely they are impacting the remaining violating monitor in Beaver County. In some instances sources may be included in other initial nonattainment areas. Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation or to other possible violations are not included in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.

Meteorology (weather/transport patterns)

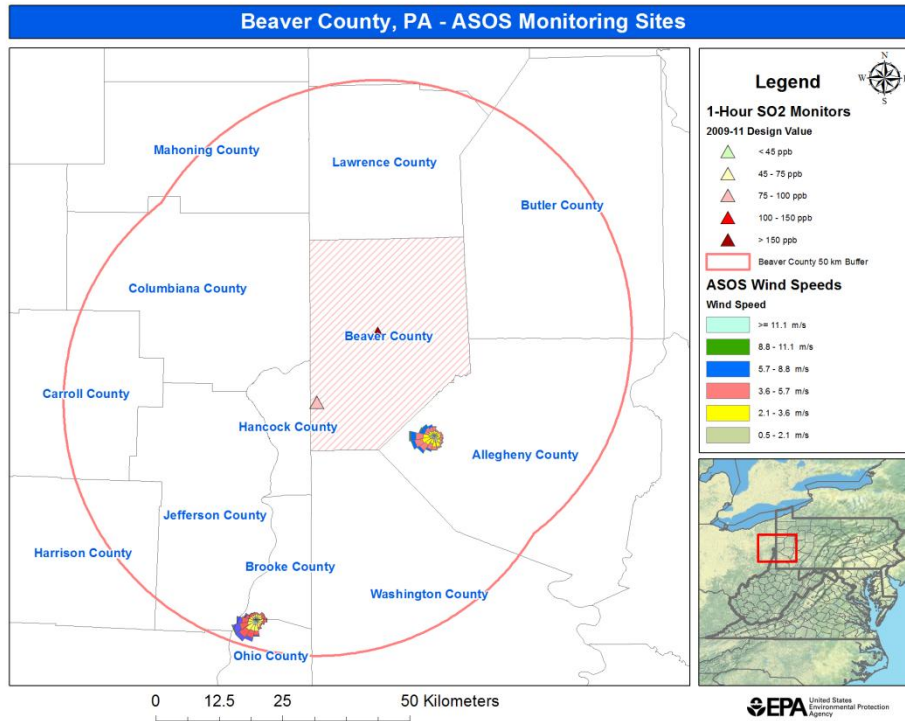
Evidence of source-receptor relationships between specific emissions sources and high SO₂ values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered data from 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 5). 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 at this time 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. We will further address these sources in a future final designations action.

The Commonwealth presented wind roses from the Brighton Township monitor for periods when the monitor exceeded the 1-hr SO₂ NAAQS and the entire period. Wind directions were generally limited to a southerly direction during hours when 1-hr SO₂ concentrations exceeded the NAAQS. Pennsylvania suggested that the predominant wind directions during periods of exceedances were due to inversions and local sources.

EPA examined stack heights from the 2005 NEI for the four local sources included in Pennsylvania’s proposed nonattainment area. Three of the four sources (Bruce Mansfield, AES Beaver Valley, Horsehead Corporation) have stacks exceeding 200 ft making emissions from these sources difficult to trap under nocturnal inversions. Additional information on this topic is found in the section below. Despite this shortcoming, EPA generally agrees that local sources are impacting the Brighton Township monitor.

Figure 5.



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

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. The Commonwealth also provides similar analyses in their response.

As noted in the section on Meteorology, EPA examined stack heights from the 2005 NEI. This information in addition to elevation information was used to determine the approximate release height for the four (4) sources nearest the Brighton Township monitor. Stack heights at Bruce Mansfield are listed at 950 ft making the release height well above the surrounding terrain and ensuring that emissions from this source are not overly influenced by nocturnal inversions. Stack heights at the Jewel Acquisition/Midland facility are generally less than 80 ft making impact from this source more local. Stack heights at AES Beaver Valley and Horsehead Corporation are in the 200-400 ft range. Release heights for both of these sources are approximately the same elevation as the Brighton Township monitor making direct impacts from these sources more likely. This may explain the wind patterns during periods of exceedances that the Commonwealth included in its analysis.

Jurisdictional boundaries

EPA provided information about all boundaries considered prior to proposing nonattainment areas and this information can be found in the Pennsylvania TSD as part of the docket on proposed designations (78 FR 11124) and is not restated here. EPA originally proposed including all of Beaver County in the nonattainment area. However additional information provided by the Commonwealth in response to EPA's proposal demonstrates that the monitors and sources of concern in this area of the Commonwealth that are most likely impacting the violating monitor are all located in Industry Borough, Shippingport Borough, Midland Borough, Brighton Township, Potter Township and Vanport Township. Therefore, EPA is designating these portions of Beaver County as the initial Beaver PA Nonattainment Area.

Conclusion for the Beaver PA Nonattainment Area

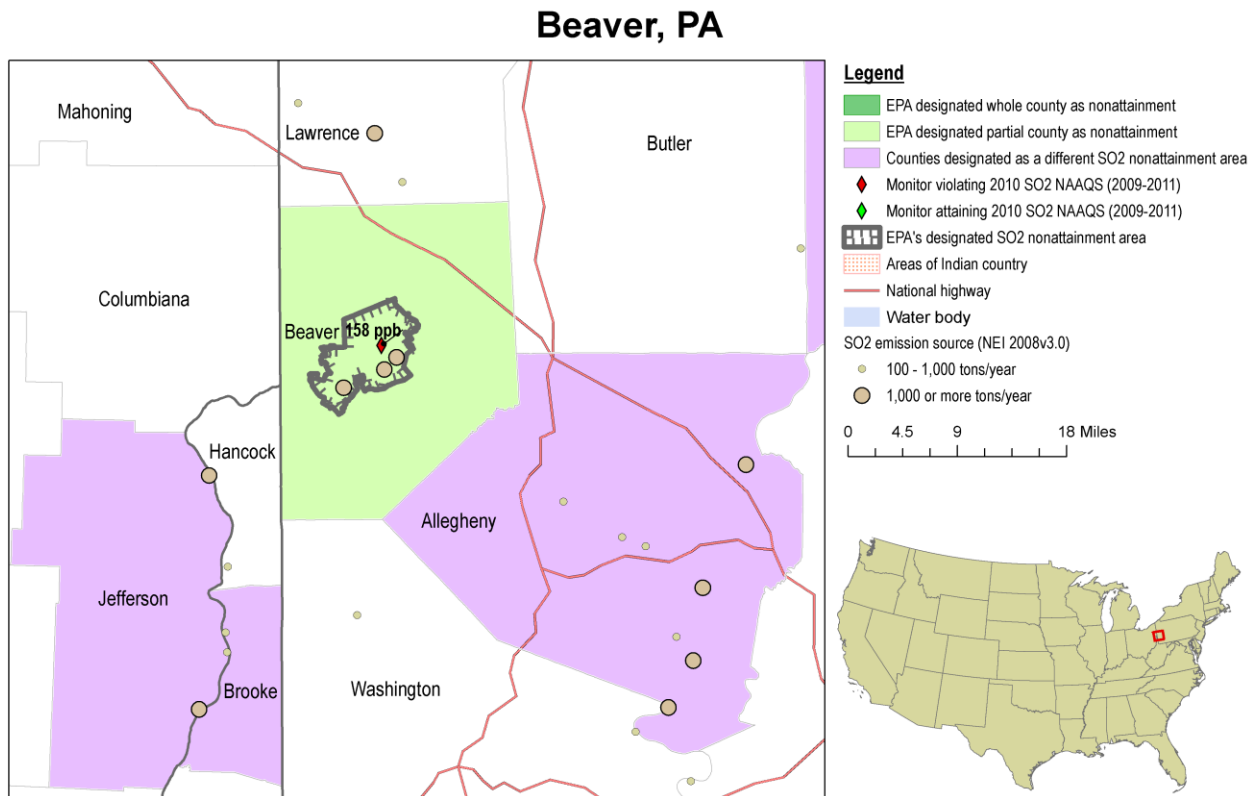
After considering the factors described above, EPA finds that the boundary for the portion of Beaver County, PA with a current violating monitor consists of the portion of Beaver County that include Industry Borough, Shippingport Borough, Midland Borough, Brighton Township, Potter Township and Vanport Township.

The air quality monitor in this area of Beaver County shows violations of the 2010 SO₂ NAAQS, based on certified 2009-2011 air quality data and additional data from 2012 provided by the Commonwealth. Available emissions, meteorological data, and geographical data suggest that the sources in the boroughs and townships located within about a 5 km radius of the Brighton Township monitor likely impact and contribute to monitored SO₂ NAAQS violations in Beaver County. Some sources outside Beaver County are also being included in other nonattainment areas in West Virginia. Since the Hookstown monitor is now not showing a violation and sources likely impacting Hookstown have recently had emissions decreases due to the installation and use of SO₂ controls, we are not prepared to conclude that additional areas in the county are likely having a significant impact on the Brighton monitor. Therefore such other areas in the county are not included in the initial Beaver PA Nonattainment Area, and will be further addressed in a future final designations action.

Additionally, in response to EPA’s 120-day letter, the Commonwealth provided supporting information as referenced in the five factor analysis that assisted EPA in concluding that only a portion of Beaver County should be included in the initial Beaver PA Nonattainment Area.

Based on the consideration of all the relevant and available information, as described above, EPA believes that the boundaries described herein encompass the initial nonattainment area based on the violating monitor in Beaver County in Pennsylvania. Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation or other potential violations are not included in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.

Figure 6.



Technical Analysis for the Indiana Nonattainment Area

In EPA's 120 day letter, EPA proposed that the initial Indiana PA Nonattainment Area consist of Indiana County in its entirety and a portion of Armstrong County (Elderton Borough, Plumcreek Township and South Bend Township). In response to EPA's 120 day letter, the Commonwealth agreed that Indiana County in its entirety should be nonattainment but recommended that no portion of Armstrong County be included in the nonattainment area.

Based on EPA's technical analysis described below, EPA agrees in part with the Commonwealth's response and is initially designating all of Indiana County as nonattainment. EPA, however, disagrees with the Commonwealth's recommendation regarding Armstrong County and is also designating the originally proposed portion of Armstrong County along with all of Indiana County as nonattainment for the 2010 SO₂ NAAQS.

Air Quality Data

This factor considers the SO₂ air quality monitoring data, including design values (in ppb) calculated for the 2009-11 time period for all air quality monitors within 50 kilometers of the Indiana County monitor.

The 2009-11 1-hour SO₂ design value for the Strongstown monitor located in Indiana County is shown in Table 7. The Commonwealth also provided data indicating that the 2012 design value was 81 ppb and EPA verified this design value is correct.

Table 7. Indiana County Monitor Trend: 1-Hour SO₂ 99th % and Design Value in Parts Per Billion (ppb)

Monitor Name	Monitor Air Quality System ID	99 th %					Design Value	Design Value
		2007	2008	2009	2010	2011	2008-10	2009-11
Strongstown	42-063-0004	88	92	82	95	68	90	82

The Commonwealth presented information regarding the timing and occurrence of 1-hr SO₂ NAAQS exceedances and noted that exceedances at Strongstown generally occurred during the daytime hours. EPA examined Strongstown's SO₂ concentrations from the 2009-11 time period and confirmed that exceedances of the 1-hr SO₂ NAAQS generally occur during the daylight hours though overnight peak concentrations at Strongstown can still be quite high.

The Commonwealth also examined and compared design value trends at the Strongstown monitor in Indiana County, PA and the York monitor in York County, PA. The York monitor has shown significant decreases in 1-hr SO₂ concentrations after the installation of SO₂ controls

at the nearby Brunner Island power plant. In contrast, the Commonwealth pointed out that concentration trends at Strongstown have shown little decline even with controls being installed at the nearby Keystone power plant in Armstrong County and suggested that this lack of change at the Strongstown monitor indicates sources other than Keystone are impacting the monitor.

EPA reviewed the number of exceedances at Strongstown over the 2007-2011 time period and found a slight decrease in the number of 1-hr SO₂ exceedances (see Table 7). This result may indicate that while controls at Keystone may not be affecting overall SO₂ concentrations as much as observed near the Brunner Island power plant they likely contributed to fewer exceedances (post 2009) measured at the Strongstown monitor. This result suggests Keystone is still impacting the monitor. Note that no statistical analysis was performed on the Commonwealth's analysis of design value trends or EPA's analysis of exceedance trends.

Table 7. Indiana County Monitor Exceedance Trend: 1-Hour SO₂ Exceedances over the 2007-11 Time Period

	2007	2008	2009	2010	2011
Strongstown Exceedances	11	8	4	7	2

Emissions and Emissions-Related Data

Evidence of SO₂ emissions sources in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county-level emissions data for SO₂ and any change in SO₂ emitting activities since the date represented by those emissions data.

Emissions Table 8 shows total emissions of SO₂ 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 SO₂ according to the 2008 NEI.

Table 8. SO₂ Emissions in the Indiana Nonattainment Area -

County	Facility Located in State Recommended Nonattainment Area?	Name	Total Facility SO₂ Emissions (tpy) 2008 NEI	CAMD 2012 Total SO₂ Point Emissions (tpy)
Indiana, PA	Yes	Homer City Generating Station	102,486	99,774
Indiana, PA	Yes	Seward Generating Station	15,549	4,333
Indiana, PA	Yes	Genon Conemaugh	6,286	6,312

		Plant		
Armstrong, PA	No	Keystone Power Station	189,983	29,420
Cambria, PA	No	Colver Power Project	2,576	2,547
Cambria, PA	No	Cambria Cogen	2,782	1,755
Cambria, PA	No	Ebensburg Cogen	1,815	2,033
Blair, PA	No	Norfolk Southern Railway Co/ Juniata Locomotive Shops	392	

SO₂ emissions for 2011 are available on PA DEP's eFACTS website (http://www.ahs.dep.pa.gov/eFACTSWeb/criteria_facilityemissions.aspx). Surveying the 2011 regional emission information confirms that Keystone was the second largest point source in the Commonwealth behind Homer City.

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 2008-12 Emissions Summary of SO₂ Emissions in tpy

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011	CAMD-2012
Colver Power Project	Cambria	10.3	Not Available	30,759	2,901	2,881	2,547
Ebensburg Cogen	Cambria	18.9	Not Available	2,044	2,404	1,937	2,003
Seward Power Plant	Indiana	19.8	7,771	7,756	8,458	7,003	4,333
Cambria Cogen	Cambria	20.4	Not Available	6,947	2,070	1,942	1,755
Conemaugh	Indiana	23.2	6,282	7,222	7,056	7,189	6,312
Homer City Generating Station	Indiana	24.1	102,484	101,334	112,951	83,596	99,774
Keystone	Armstrong	37.1	189,994	113,137	39,114	46,441	29,420

*Distance from Indiana County, PA SO₂ monitor in kilometers.

Emissions Controls

EPA's 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 SO₂ 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/Dry Scrubber	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

The Commonwealth noted the controls recently installed on Keystone Units 1 and 2. These controls decreased Keystone's SO₂ emissions by approximately 85% in 2012. Annual SO₂ emissions data for Keystone and Conemaugh, which are similarly sized facilities, was pulled from EPA's CAMD website. Table 10 shows annual emissions and emission rates (in lbs/MMbtu) for both plants in 2012. This table shows that while both plants are similar in size

their annual emissions and average annual emission rates are significantly different. Keystone’s annual emissions are four and a half times larger than Conemaugh even though Keystone’s units were run less than Conemaugh’s in 2012. Keystone’s units average annual emission rate was four to almost six times higher than Conemaugh. This illustrates that while emission controls are important, control efficiency may be equally important.

Table 11. Keystone and Conemaugh’s 2012 CAMD SO₂ Emissions with calculated average annual emission rate in lbs/MMbtu.

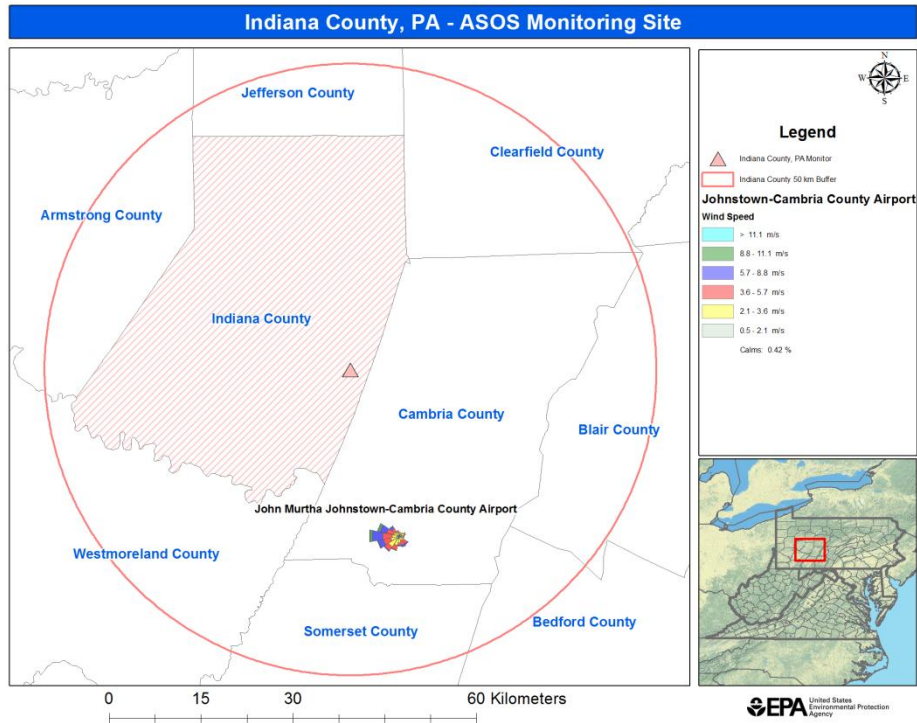
Facility Name	County	Unit ID	Year	SO ₂ (tons)	Heat Input (MMBtu)	Operating Time	Gross Load (MW-h)	Avg lbs/Mmbtu
Conemaugh	Indiana	1	2012	2,963	51,080,093	7,808	5,594,629	0.12
Conemaugh	Indiana	2	2012	3,349	53,881,056	8,121	5,781,428	0.12
Keystone	Armstrong	1	2012	17,383	51,332,293	7,653	5,503,604	0.68
Keystone	Armstrong	2	2012	12,037	44,348,039	6,281	4,718,662	0.54

Meteorology (weather/transport patterns)

Evidence of source-receptor relationships between specific emissions sources and high SO₂ values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered 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 7). Predominant winds generally ranged from the west over the 2006-10 time period. Given this information, EPA is not at this time 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. We will further address these sources in a future final designations action.

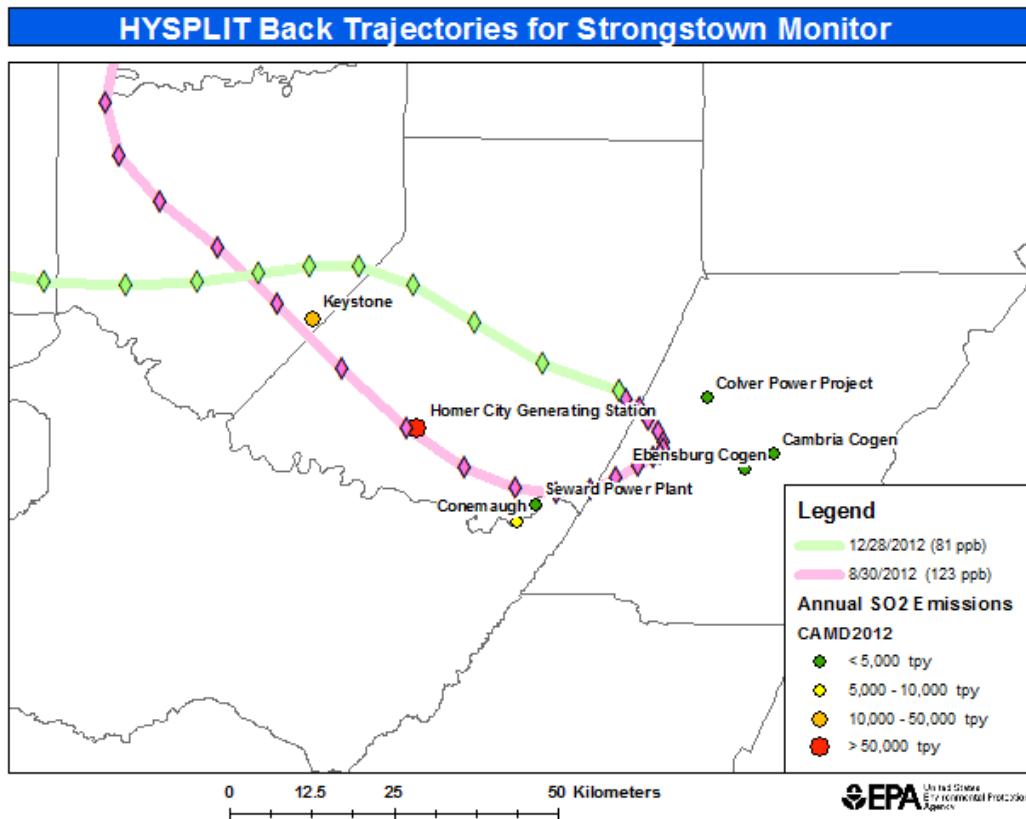
Figure 7.



The Commonwealth constructed back trajectories using the NOAA Air Resource Laboratory's HYSPLIT trajectory model. Back trajectories were run for exceedances before and after SO₂ controls were installed on the Keystone power plant in Armstrong County, PA. The Commonwealth used these trajectories to illustrate that while there were significant SO₂ emission reductions at Keystone, concentrations were only 5 ppb lower after controls were installed and concluded that "[T]his illustrates that Keystone cannot be considered the sole contributor in either of the violations, even though the trajectories on these two days originate from the region surrounding Keystone."

EPA examined the Commonwealth's trajectory analysis and constructed its own back trajectories for 2010-12 using NOAA's HYSPLIT trajectory model (figure 8). Daily emissions from EPA's CAMD were also examined to determine the level of power plant operations at the time exceedances occurred. The analyses indicate that emissions from the Keystone power plant in Armstrong County are contributing to exceedances and noncompliance with the 1-hr SO₂ NAAQS at the Strongstown monitor. EPA acknowledges and agrees with the contention that Keystone is not the sole contributor to exceedances at Strongstown but it appears the Keystone power plant is contributing to nonattainment in Indiana County and should be included within the initial nonattainment area based on monitored nonattainment at the monitor in Indiana County.

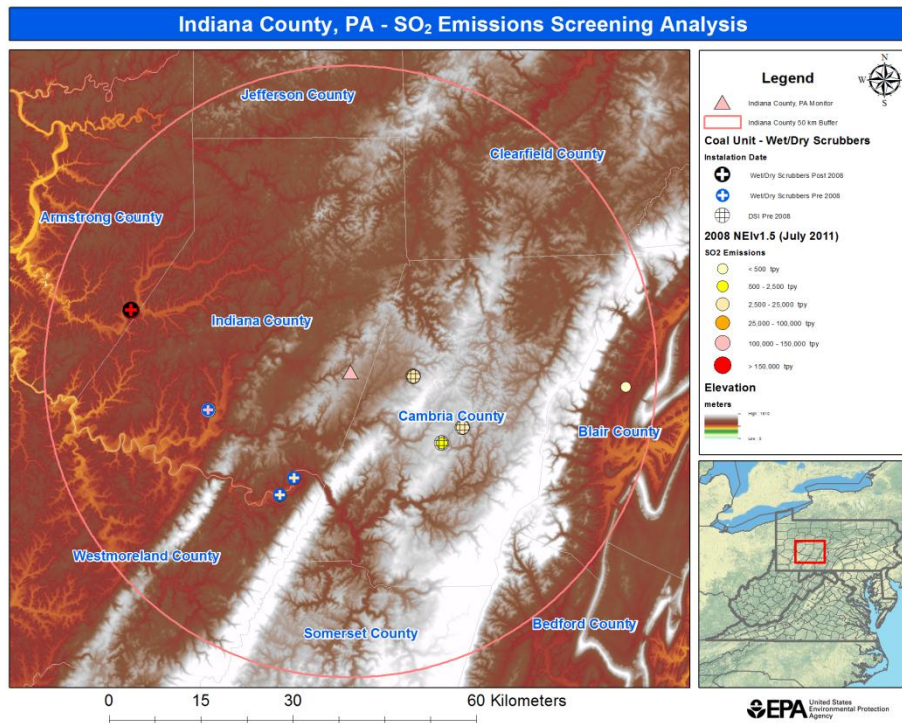
Figure 8.



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

Figure 8 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.

Figure9.



The Commonwealth included analysis of terrain and approximate release heights (base elevation plus stake heights) for the Keystone and Homer City power plants. The analysis noted that there is intermediate terrain (terrain above the release height) between Keystone and the Strongstown monitor. These, according to the Commonwealth, would likely lead to larger impacts on terrain features west of the Strongstown monitor and not at the Strongstown monitor itself.

There are stack height differences between the Commonwealth's information and EPA's information on stack heights. Base elevations for both power plants and the Strongstown monitor appear to be correct. Stack heights for Keystone units 1 and 2 found in EPA's Large Power Plant Effluent Study (LAPPES) and the 2005 NEI are listed at 244 m or 800 ft. This gives Keystone an approximate release height of 1,800 ft (stack height plus base elevation), which is similar to the elevation of the Strongstown monitor (~1,900 ft). The Commonwealth's approximate release height for Keystone was 1,573 ft, significantly lower than EPA's estimate.

If EPA's estimated release heights for Keystone are correct then there would be much less if any intermediate terrain between Keystone and the Strongstown monitor. Regardless, the Commonwealth's contention that intermediate terrain would significantly lessen the impact of Keystone's emissions is unlikely. While maximum plant impacts from Keystone would most undoubtedly fall close to the facility, Keystone's emissions would have ample time to disperse vertically, especially during daytime hours when vertical mixing is enhanced. Based on the Commonwealth's and EPA's analysis, exceedances are more likely to occur at the Strongstown monitor during these times. Vertical distribution via plume rise and daytime plume mixing would indicate that emissions from the Keystone power plant in Armstrong County, PA are significantly impacting the Strongstown monitor.

Jurisdictional boundaries

EPA provided information about all boundaries considered prior to proposing nonattainment areas and this information can be found in the Pennsylvania TSD as part of the docket on proposed designations (78 FR 11124) and is not restated here. EPA originally proposed including all of Indiana County and a portion of Armstrong County (list portions) in the nonattainment area. Although the Commonwealth does not agree that a portion of Armstrong County should be included, EPA is including the originally proposed portions of Armstrong County in the initial Indiana County Nonattainment Area. Therefore, EPA is designating all of Indiana County and Elderton Borough and Plumcreek and South Bend Townships in Armstrong County PA as the Indiana PA Nonattainment Area.

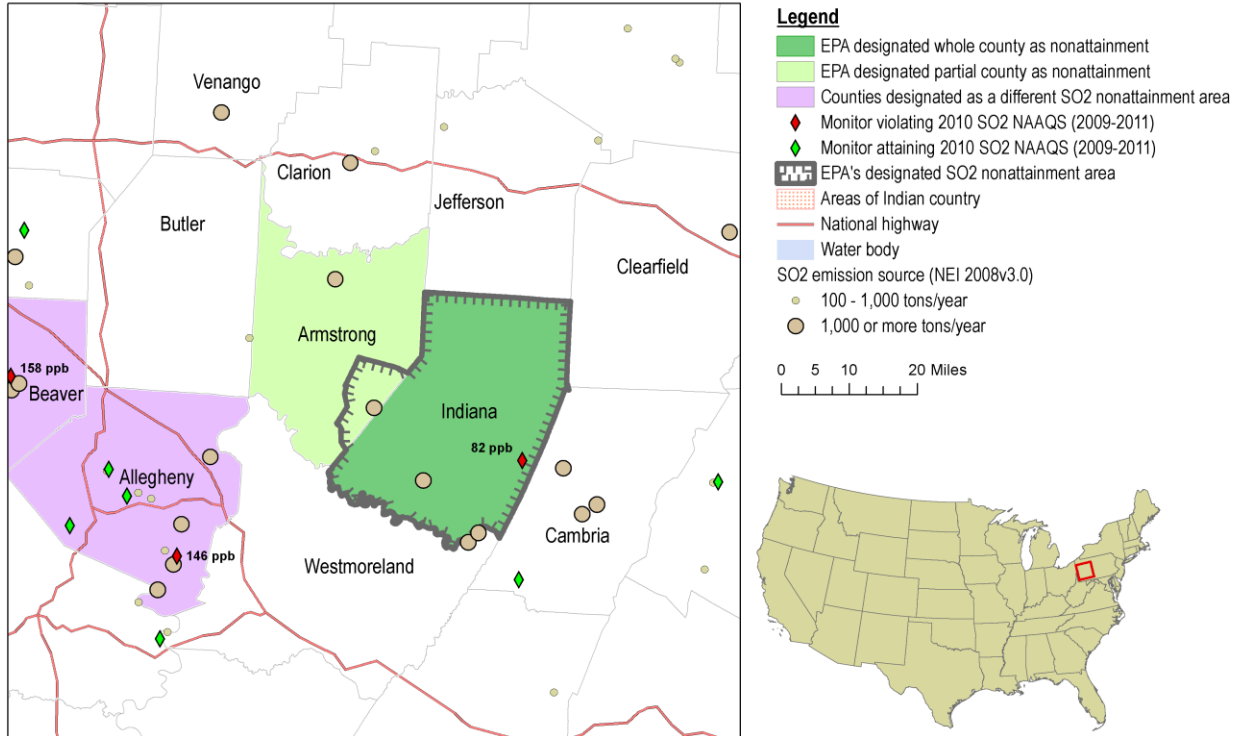
Conclusion for the Indiana Nonattainment Area

After considering the factors described above, EPA is initially designating all of Indiana County and a portion of Armstrong County (Elderton Borough, Plumcreek Township and South Bend Township) based on the violating monitor in Indiana County, as the Indiana PA Nonattainment Area for the 2010 SO₂ NAAQS. Sources examined in Cambria and Blair counties have relatively small emissions and are generally upwind of the violating monitor, so at this time, these sources and areas are not included in the initial nonattainment area. However, these sources will be addressed in a future final designations action.

The air quality monitor in Indiana County shows a violation of the 2010 SO₂ NAAQS, based on 2009-2011 air quality data and data provide by the Commonwealth. The nearby Keystone power plant in neighboring Armstrong County likely contributes to nonattainment in Indiana County as well. Previous studies as discussed in the TSD that accompanied the proposed nonattainment area boundary (78 FR 11124) 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 SO₂ NAAQS violations in Indiana County. 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 should be initially designated as nonattainment due to causing or contributing to the monitored violation of the 2010 SO₂ NAAQS in Indiana County.

Figure 10.

Indiana, PA



Technical Analysis for the Warren Nonattainment Area

In EPA's 120 day letter, EPA proposed that the initial Warren PA Nonattainment Area consist of Warren County in its entirety. In response to EPA's 120 day letter, the Commonwealth recommended that only a portion of Warren County (the City of Warren and Conewago, Glade and Pleasant Townships) be included in the nonattainment area and provided an analysis to support their response.

Based on EPA's technical analysis described below, EPA agrees with Pennsylvania's recommendation and is initially designating a portion of the county as nonattainment for the 2010 SO₂ NAAQS based on the violating monitors in Warren County. The Warren PA Nonattainment Area consists of Conewago, Glade and Pleasant Townships and the City of Warren.

Air Quality Data

This factor considers the SO₂ air quality monitoring data, including the design value (in ppb) calculated for the air quality monitor in Warren County based on certified data for the 2009-2011 period.

The 2010 1-hour SO₂ design value for the monitor located in Warren County is shown in Table 12.

Table 12. Warren County Monitor Trend: 1-Hour SO₂ 99th % and Design Value in Parts Per Billion (ppb)

Monitor Name	Monitor Air Quality System ID	99 th %					Design Value	Design Value
		2007	2008	2009	2010	2011	2008-10	2009-11
Warren	42-123-0004	153	146	113	109	94	123	105

The Commonwealth indicated that the design value for 2010-2012 was 102 ppb and this was confirmed by EPA.

The Commonwealth examined hourly SO₂ concentrations at the Warren County, PA monitor and noted exceedances of the 1-hr SO₂ NAAQS generally occurred during the overnight hours. This was attributed to limited mixing during nocturnal inversions. EPA examined the Warren County, PA monitor's hourly SO₂ concentrations from 2009-11 and confirmed that peak concentrations and exceedances primarily occur during the overnight hours. This would support that meteorological conditions, namely nocturnal inversions, are contributing to exceedances in the area of the Warren County, PA monitor.

Emissions and Emissions-Related Data

Evidence of SO₂ emissions sources in the vicinity of a violating monitor is an important factor for determining whether a nearby area is contributing to a monitored violation. For this factor, EPA evaluated county-level emissions data for SO₂ and any change in SO₂ emitting activities since the date represented by those emissions data.

Emissions

Table 13 shows total emissions of SO₂ in tons per year (tpy) for violating and potentially contributing counties in and around the Warren Area in Region III emitting greater than 100 tpy of SO₂ according to the 2008 NEI.

Table 13. SO₂ Emissions in the Warren Nonattainment Area

County	Facility Located in State's Original Recommended Nonattainment Area?	Facility Name	Total Facility SO ₂ Emissions (tpy)	CAMD 2012 (tpy)
Warren, PA	Yes	United Refining Warren Plant	1,612	
McKean, PA	No	American Refining Group/Bradford	1,479	
Chautauqua, NY	No	Samuel A. Carlson Generating Station	3,736	215

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 SO₂ emissions to CAMD.

Table 14. CAMD 2008-12 Emissions Summary of SO₂ Emissions in tpy

Facility	County	Distance*	CAMD-2008	CAMD-2009	CAMD-2010	CAMD-2011	CAMD-2012
Samuel A.	Chautauqua	28.41	3,736	1,885	1,272	664	

Carlson Generating Station							215
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*Distance from Warren County SO₂ monitor in kilometers.

Emissions Controls

Under this factor, EPA considers the existing level of control of emission sources. No SO₂ 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 SO₂ values at violating monitors is another important factor in determining the appropriate contributing areas and the appropriate extent of the nonattainment area boundary. For this factor, EPA considered 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.

The Commonwealth included a wind analysis that shows wind directions are primarily from the east during hours in which the Warren County, PA monitor exceeds the 1-hr SO₂ NAAQS. No data was submitted to support this analysis. Pennsylvania's analysis, however, appears to make sense given the primary SO₂ source near the monitor resides to the east.

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

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 original 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 SO₂ NAAQS. Given this information, EPA is not prepared at this time 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. We will further address these sources in a future final designations action. Additional information provided in the

Commonwealth's recent response further supports the recommendation that only a portion of Warren County which includes the United Refining source should be included in the initial nonattainment Area.

Jurisdictional boundaries

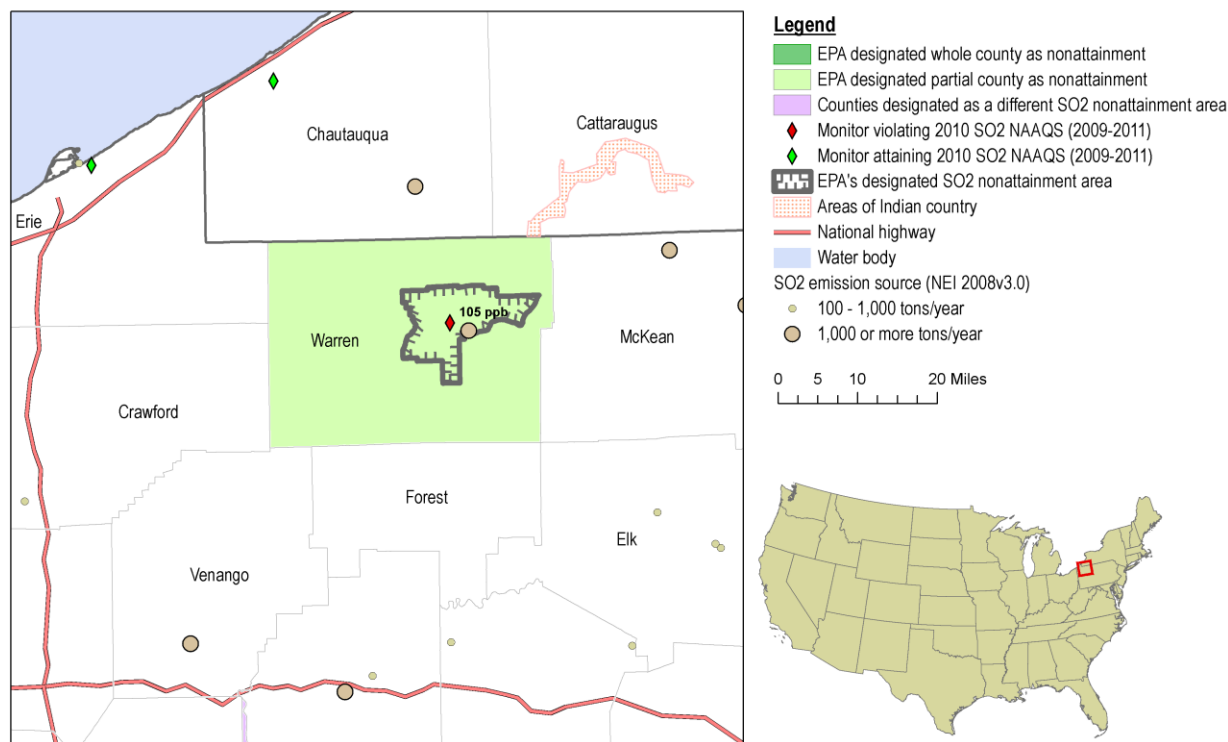
EPA provided information about all boundaries considered prior to proposing nonattainment areas and this information can be found in the Pennsylvania TSD as part of the docket on proposed designations (78 FR 11124) and is not restated here. EPA originally proposed including all of Warren County in the nonattainment area. However additional information provided by the Commonwealth in response to EPA's proposal demonstrates that the monitor and sources of concern in this area of the Commonwealth that are most likely impacting the violating monitor are all located within the City of Warren, Conewago Township, Glade Township and Pleasant Township. Therefore, EPA is initially designating these portions of Warren County as the Warren, PA nonattainment area.

Conclusion for the Warren Nonattainment Area

After considering the factors described above, EPA is designation the following portions of Warren County as the Warren PA Nonattainment Area: Conewago Township, Glade Township, Pleasant Township and the City of Warren. The air quality monitor in Warren County shows a violation of the 2010 SO₂ NAAQS, based on certified 2009-2011 air quality data and additional data provided by the Commonwealth. This monitor indicates that there are high concentrations of SO₂ 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 SO₂ NAAQS violations in Warren County. Additional information provided by the Commonwealth also supports this analysis. EPA believes that the boundaries described herein encompass the appropriate initial area that does not meet the 2010 SO₂ NAAQS. Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation are not included in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.

Figure 11.

Warren, PA



EPA's Area Designations Conclusion for Pennsylvania

EPA has reviewed the information above and is designating based on monitored violations the counties and/or portions of counties listed in Table 1 as nonattainment for the 2010 SO₂ NAAQS. EPA considered 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 nonattainment in a nearby area) the 2010 SO₂ NAAQS. Areas and sources that we are not yet prepared to conclude are contributing to the monitored violation are not included in this initial nonattainment area. In a subsequent round of designations we will further address such areas and sources and make

final designations decisions for areas that are not currently included in the nonattainment area designation addressed in this TSD.