

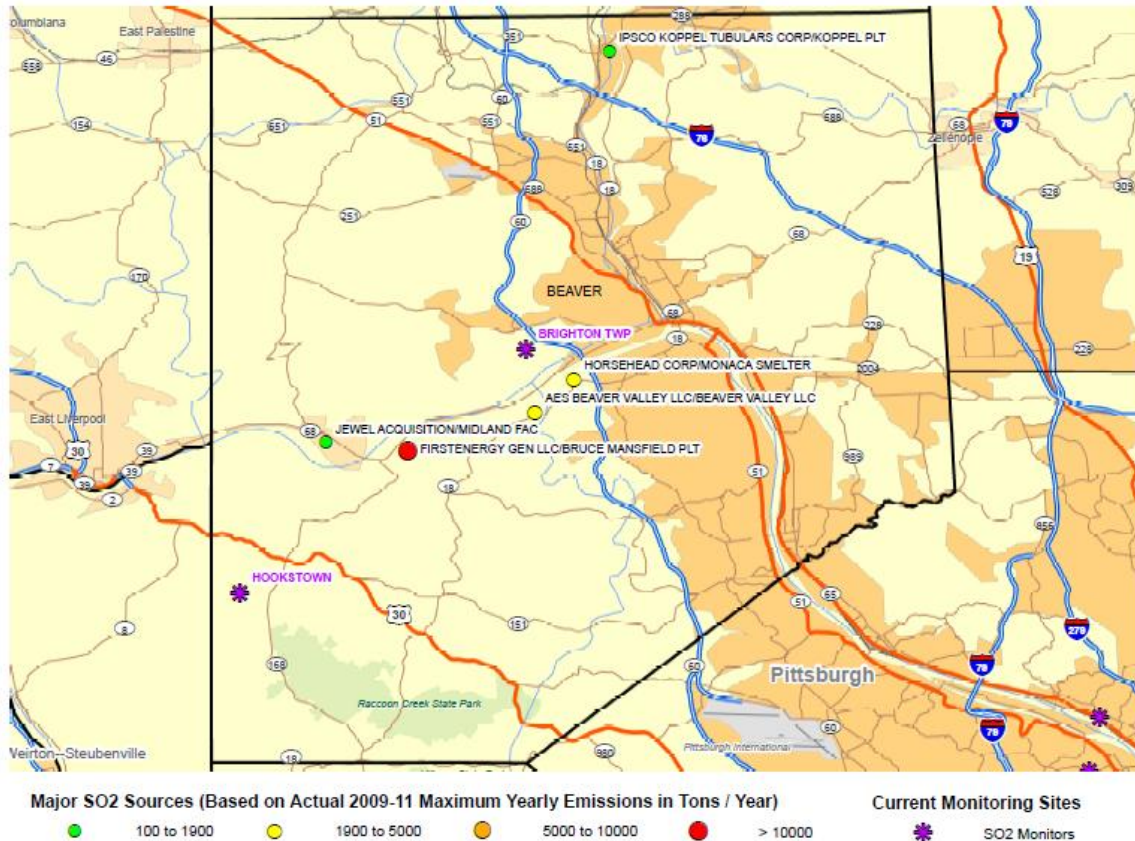
ENCLOSURE 2
Pennsylvania's April 8, 2013 Letter
Regarding 1-hour SO₂ Designations

BEAVER COUNTY

On February 7, 2013, the EPA released its proposal for 1-hour SO₂ designation areas across the Commonwealth of Pennsylvania. With the exception of EPA's addition of portions of Armstrong County, EPA's intended designations agreed with the Department's original 1-hour SO₂ nonattainment area recommendations, submitted on June 23, 2011. This includes designating of all of Beaver County as a 1-hour SO₂ nonattainment area. In that June 23, 2011 letter, the Department also stated that it may alter its recommendations after performing additional analyses. After further consideration and analysis, the Department recommends reducing the Beaver County 1-hour SO₂ nonattainment area to only include six municipalities located in Beaver County. The Department's revised 1-hour SO₂ designation recommendation includes: Brighton, Potter and Vanport Townships and Industry, Midland, and Shippingport Boroughs. The reasons for the recommended modification are described in the following sections..

Overview

The Department recommended in its June 23, 2011, letter to EPA that Beaver County be designated as nonattainment for 1-hour SO₂ NAAQS (of 75 parts per billion (ppb)) because the county contains an air monitoring station that is violating the NAAQS, the Brighton Township monitor. At the end of 2012, the Brighton Township monitor (AIRS ID 420070005), situated in the central portion of Beaver County, had a 1-hour SO₂ design value of 149 ppb. Beaver County also contains four major SO₂ sources that reported over 100 tons per year of SO₂ emissions in the 2009 to 2011 period that are within 5 miles of the monitor: Jewel Acquisition-Midland (Jewel Acquisition), which is located 5 miles to the southwest of Brighton Township, First Energy Generation-Bruce Mansfield (Bruce Mansfield), which is located 4.5 miles southwest of the Brighton Township monitor, Allegheny Energy Beaver Valley (AES Beaver Valley), which is located 2 miles to the south of Brighton Township monitor, and Horsehead Corporation-Monaca Smelter (Horsehead-Monaca), which is located 1.5 miles to the southeast of the Brighton Township monitor. A map displaying the major SO₂ sources proximity to the Brighton Township monitor is provided below:

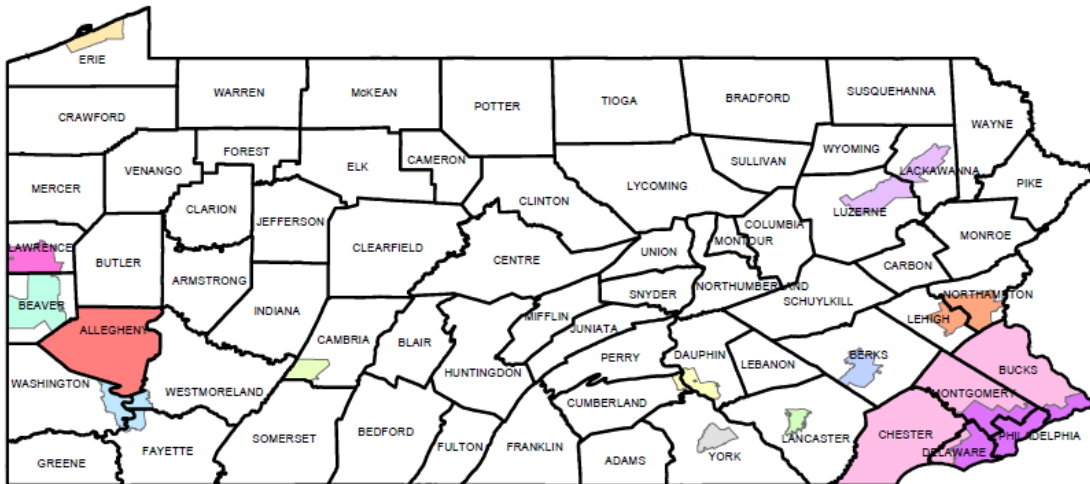


The following analysis will focus on the significance of these four sources' proximity to the Brighton Township monitor.

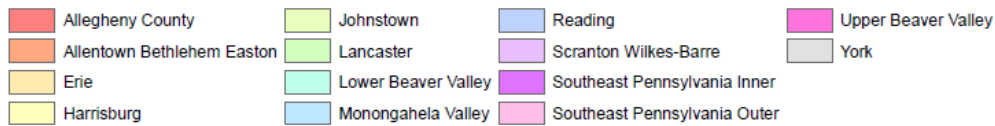
Justification for a Smaller Nonattainment Area

1. Beaver County has been previously classified as Nonattainment for SO₂

On February 12, 1980, EPA designated the geographic area defined as the Lower Beaver Valley Air Basin as "nonattainment" for the primary SO₂ standard then in effect (45 FR 9262). A map of the air basins within Pennsylvania is provided below.



Air Basins

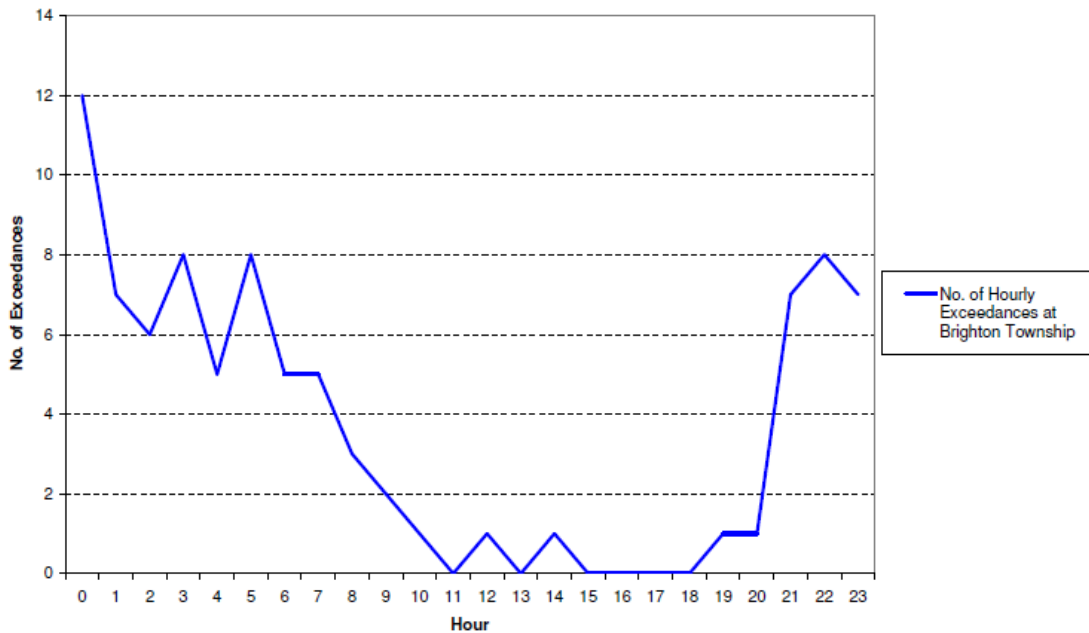


On April 2, 1984, the EPA redesignated the Lower Beaver Valley Air Basin as attainment for the primary SO₂ standard (49 FR 13039). EPA’s original SO₂ nonattainment area boundary demonstrates that an area smaller than the Beaver County boundary has been used in the past and can be used now.

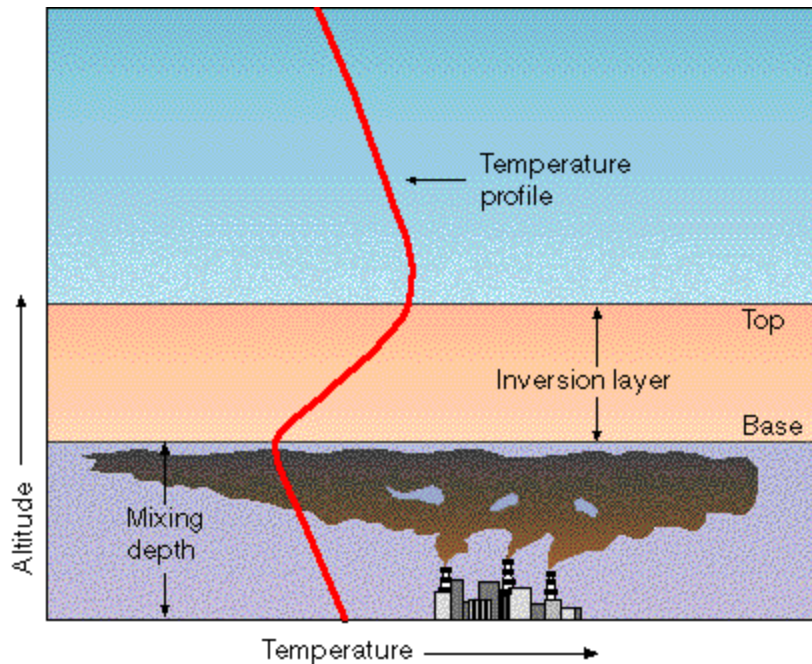
2. Analysis of Daily Timing of 1-hour SO₂ Exceedances at the Brighton Township Monitor Coupled with Topography

For the Department’s June 23, 2011, 1-hour SO₂ nonattainment area recommendation, the Department analyzed the Brighton Township monitor’s hourly SO₂ data from 2008 through 2010 to determine the time of day that the 1-hour SO₂ exceedances were occurring. The following graph displays the time of day when the Brighton Township monitor was measuring exceedances of the 1-hour SO₂ NAAQS from 2010 through 2012.

No. of Hourly SO₂ Exceedances at Brighton Township
2010-2012

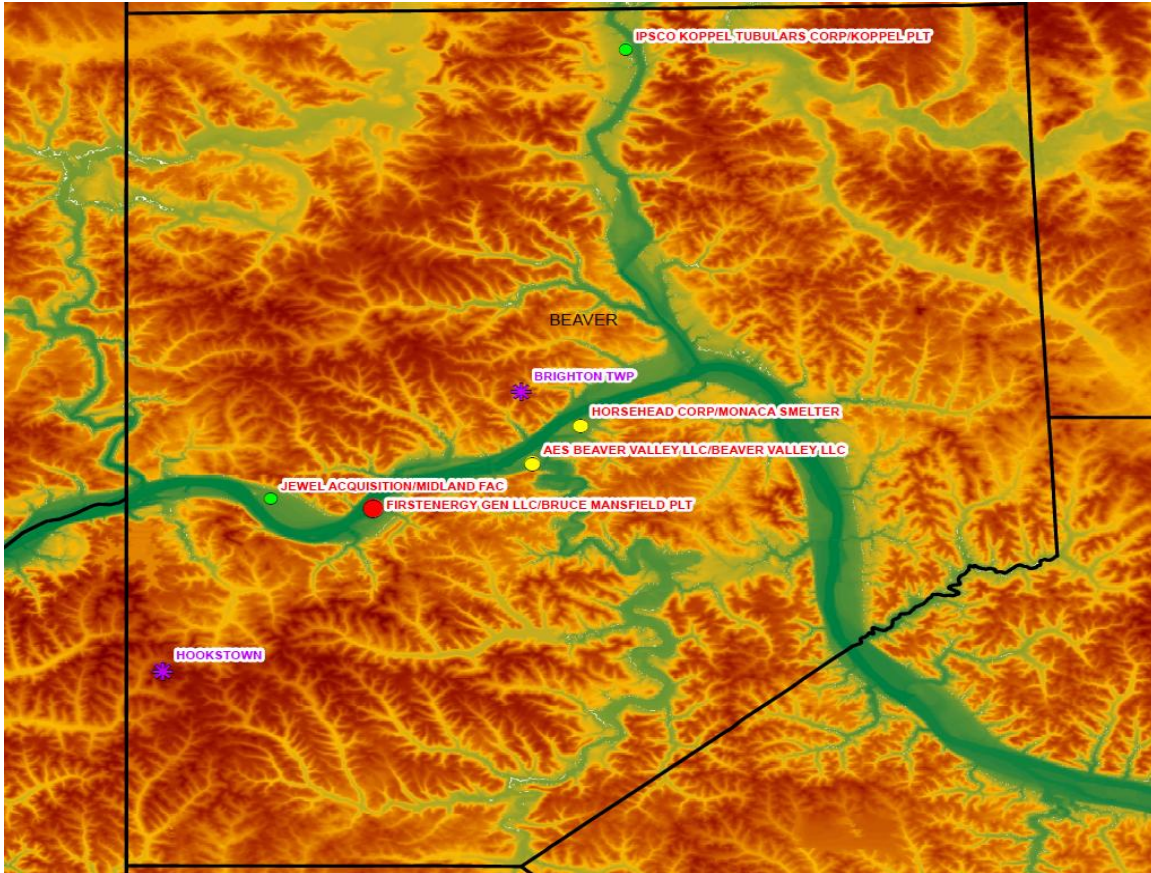


Consistent with the 2008 through 2010 time period, all of the exceedances from 2010 through 2012 occurred during the late night to early morning period. This indicates inversions are occurring and are contributing to the higher SO₂ concentrations. The highest 1-hour SO₂ concentrations were occurring during this time of day because this is the period of the day that, while under the influence of an inversion, the air undergoes the least amount of vertical mixing. Meteorologically speaking, the daily weather on these days can be viewed as follows: during the early morning hours under the influence of high pressure and clear skies, the ground is able to cool more than the air aloft, forcing an inversion to set up over the region. An illustration of this phenomenon appears below:



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Pollution originating from within the boundary layer will effectively be trapped near the surface. Such is the case in Beaver County during an inversion. In addition, the area's terrain contributes to this phenomenon. The Jewel Acquisition, Bruce Mansfield, AES Beaver Valley and Horsehead-Monaca facilities are situated within the Ohio River valley (surrounded by higher terrain to its north and south). A map displaying Beaver County's terrain is below.

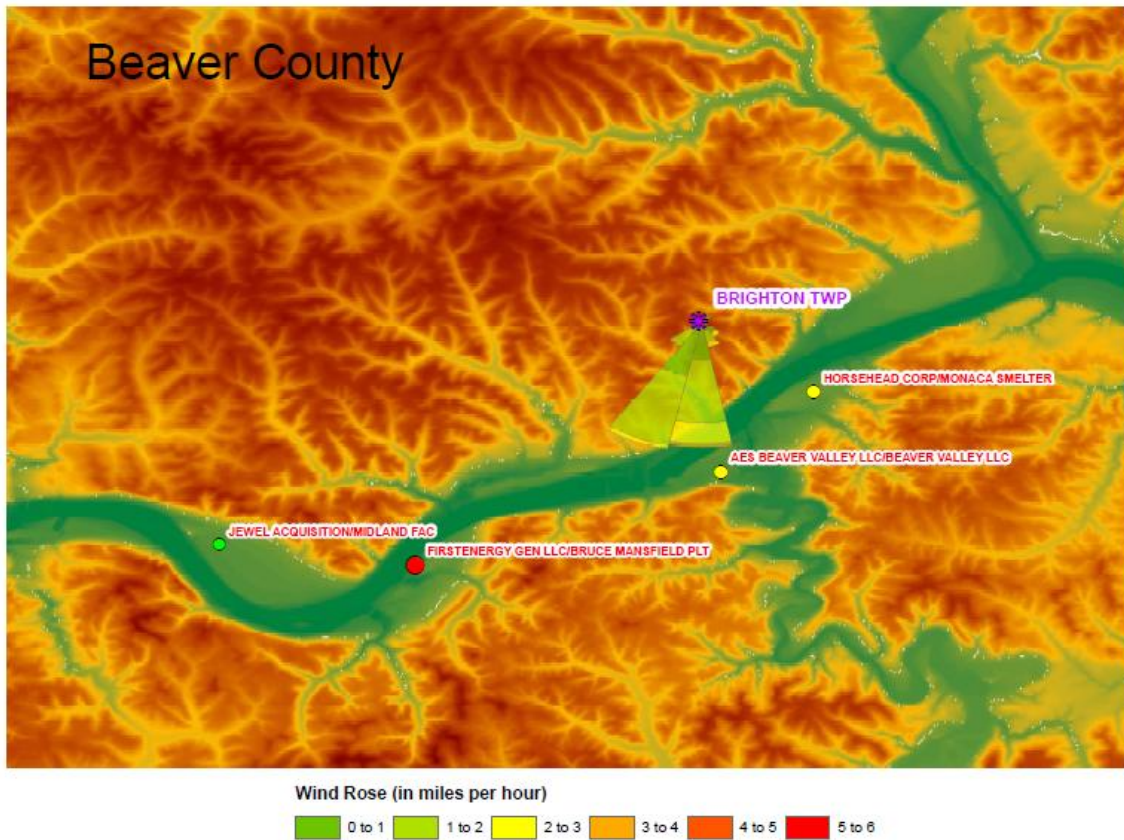


The Brighton Township monitor is situated at an elevation of 1190 feet. In contrast, the three facilities in the Ohio River valley have a base elevation of between 710 and 780 feet. Any emissions that are exhausted from the sources with lower stack heights under stable atmospheric conditions (in an inversion) are likely to rise to the base of the inversion layer and then disperse (as the illustration above shows). The complex terrain surrounding the river valley would only strengthen the inversions over the region. Because the Brighton Township monitor sits at an elevation 410 feet above the highest river valley elevation, the pollution from these three sources is likely to impact the Brighton Township monitor as it rises in the river valley so long as the wind travels south to north in the river valley (because the three major facilities are to the south of the Brighton Township monitor). Reason 3 below will discuss the importance of this observation. Overall, the frequencies of inversions along with the complex terrain in the Beaver County are two driving factors that influence the level of the 1-hour SO₂ concentrations.

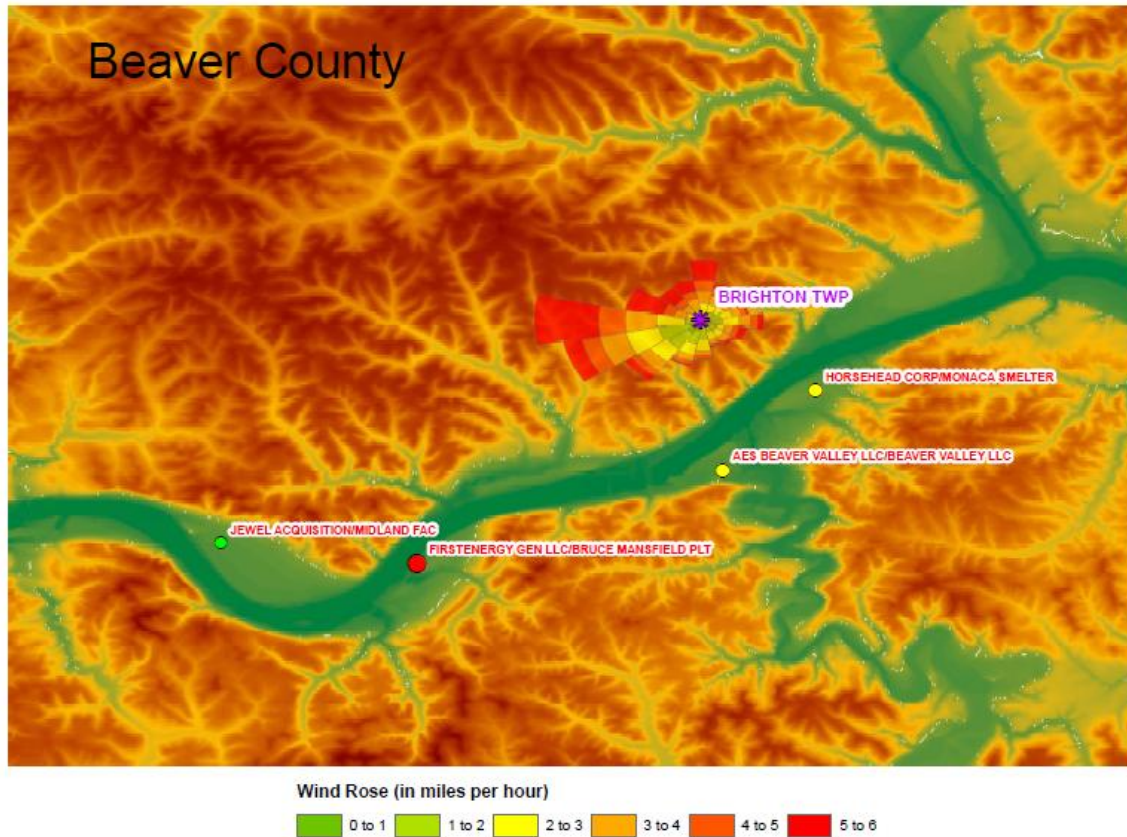
3. Analysis of the Wind Direction and Wind Speed Associated with 1-hour SO₂ Exceedances

In the Department's June 23, 2011, 1-hour SO₂ nonattainment area recommendation, the Department analyzed the 2008 through 2010 wind direction and wind speed at the Brighton Township monitor during the hours when 1-hour SO₂ exceedances occurred.

The following map displays a wind rose of the times when the Brighton Township monitor exceeded the 1-hour SO₂ standard from 2010 through 2012.



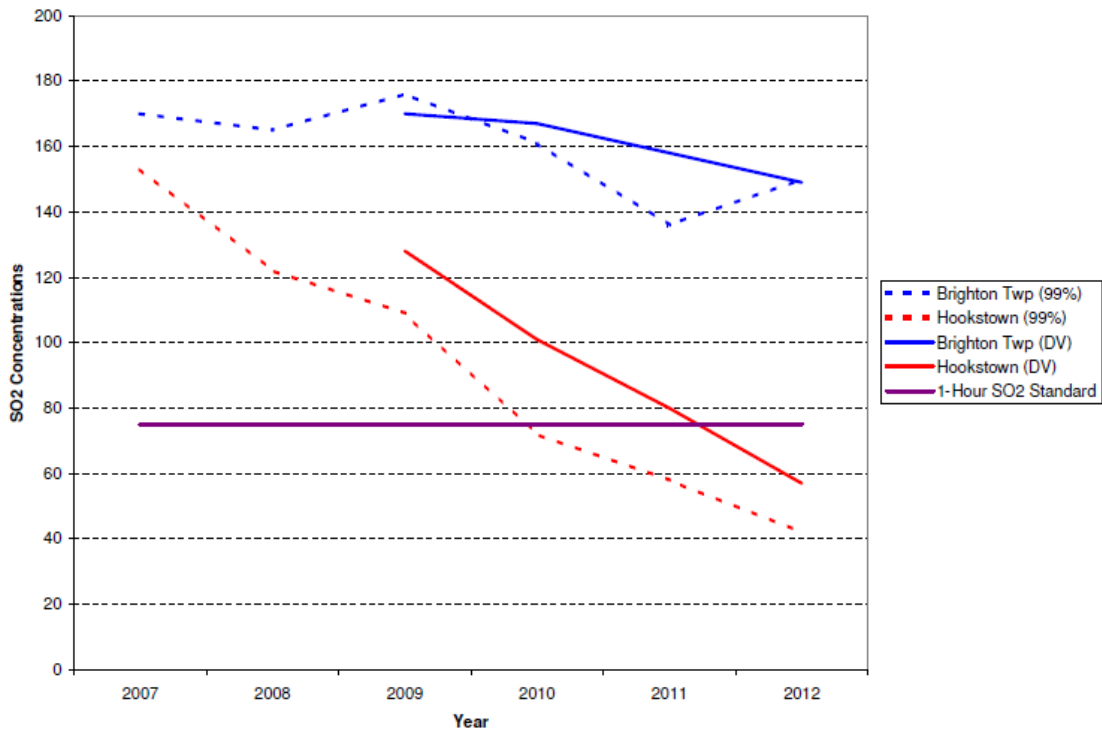
The trend is the same as in the 2008 through 2010 time period. The winds are light and are from a southerly direction. The light winds are indicative of conditions during inversions and the southerly winds indicate that pollution coming from the direction of the three major SO₂ facilities is impacting 1-hour SO₂ concentrations being measured at the Brighton Township monitor. Contrast this map with the wind rose during all hours of the 2010 through 2012 period.



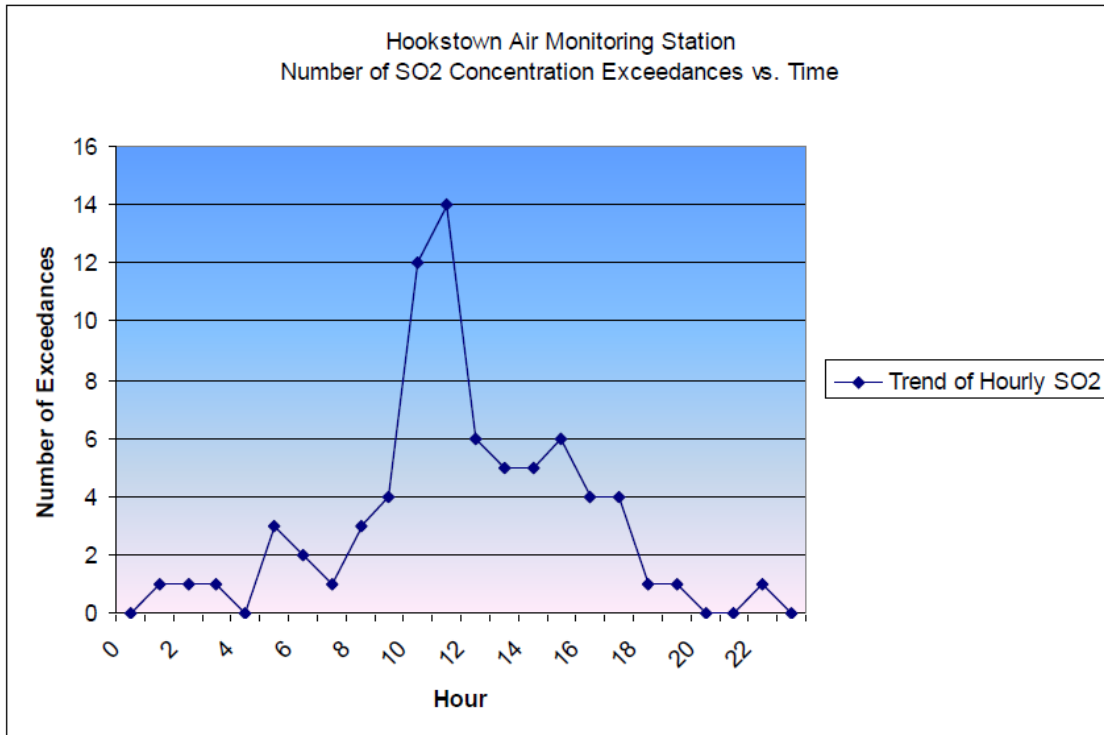
The “all hours” wind rose indicates that the hourly winds varied evenly from all directions during the 2010 through 2012 time period. This strongly indicates that the winds measured at the Brighton Township monitor are representative of the local meteorological conditions that are occurring within the Ohio River valley and are causing the 1-hour SO₂ NAAQS exceedances.

4. Analysis of Design Value Trends between Brighton Township and Hookstown

In the Department’s June 23, 2011, 1-hour SO₂ nonattainment area recommendation, the Department analyzed Brighton Township’s 1-hour SO₂ monitoring data along with Hookstown’s (AIRS ID 420070002) 1-hour SO₂ monitoring data. The analysis was focused on the 2008 through 2010 time period since that was the most recent data set readily available. At the time, both Brighton Township SO₂ monitor (with a 1-hour SO₂ design value of 167 ppb) and Hookstown SO₂ monitor (with a 1-hour SO₂ design value of 101 ppb) were in nonattainment of the 1-hour SO₂ NAAQS. Since then, 1-hour SO₂ monitoring data for two more years has been submitted to the EPA Aerometric Information Retrieval System (AIRS) database. The most recent time period (2010 through 2012) now indicates that the Hookstown monitor is measuring attainment of the 1-hour SO₂ NAAQS by a large margin (the 2012 design value is 57 ppb). A graph displaying the 2007 through 2012 downward trend of the yearly 99th percentile 1-hour SO₂ concentrations (in ppb) along with the yearly 1-hour SO₂ design values (in ppb) is provided below.



As documented in the graph above, the 1-hour SO₂ yearly 99th percentile and yearly design value SO₂ concentrations have been decreasing faster at the Hookstown monitor than at the Brighton Township monitor. In the Department's June 23, 2011, 1-hour SO₂ nonattainment area recommendation, the Department discussed the time during the day that the 1-hour SO₂ exceedances were occurring. A copy of that graph is displayed below.



Most of the exceedances of the 1-hour SO₂ NAAQS measured at the Hookstown monitor during the 2008 through 2010 time period occurred during the middle of the day. This indicates regional transport. The highest 1-hour SO₂ concentrations occurred during this time of day because the atmosphere undergoes the most vertical mixing. The daily weather on these days can occur as follows: During the early morning hours, an inversion sets up over the region; Just above the inversion, there is a mixed layer that encompasses a different air mass than that at the surface; During the early morning, the inversion limits vertical mixing within the boundary layer; As the morning progresses, more mixing occurs as the surface begins to warm; It is at this time that the air mass aloft gets mixed down to the surface; A highly modified air mass, like the one potentially over the Hookstown monitor, can impact the monitor once the air mass mixes down to the surface during the daytime heating process.

In addition, the Hookstown monitor is situated in the western portion of Beaver County. There are no major sources of SO₂ within 5 miles of the Hookstown monitor. In fact, the positioning of the Hookstown monitor gives the Department the ability to measure SO₂ concentrations coming into Beaver County from out-of-state emission sources. Overall, the drastic decline in the 1-hour SO₂ yearly 99th percentile and yearly design value concentrations can be attributed to the installation of SO₂ controls (i.e., scrubbers) on the major power plants to the west of Beaver County. Hookstown is now attaining the 1-hour SO₂ NAAQS and this supports the Department's new recommendation to reduce the size of the Beaver County nonattainment area.

Conclusion

Considering the facts as described above, the Department is recommending reducing the nonattainment area within Beaver County to the municipalities of Brighton, Potter and Vanport Townships and Industry, Midland, and Shippingport Boroughs. The municipalities and boroughs that the Department recommends EPA designate as nonattainment are a portion of the Lower Beaver Valley Air Basin, which has been designated nonattainment for SO₂ in the past. The analysis of the time of day that the 1-hour SO₂ exceedances occur, coupled with an analysis of the topography and the wind speed and direction during the 1-hour SO₂ exceedances, results in the conclusion that the Beaver County 1-hour SO₂ nonattainment area should be reduced. Finally, the most recent design value monitoring data at the Hookstown monitor shows compliance with the 1-hour SO₂ NAAQS. For all of these reasons the Department recommends the nonattainment area boundary be reduced to the municipalities listed in this attachment. A map of the proposed 1-hour SO₂ nonattainment area is provided below.

