

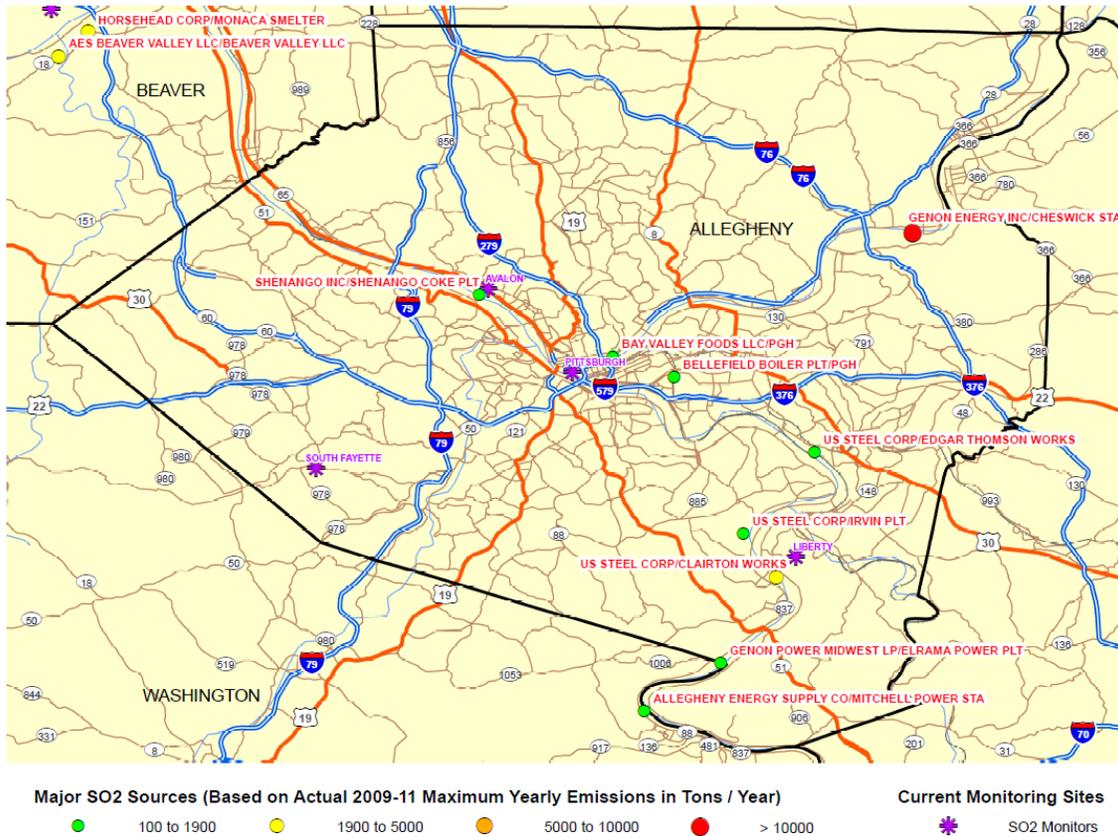
ENCLOSURE 3  
Pennsylvania's April 8, 2013 Letter  
Regarding 1-hour SO<sub>2</sub> Designations

ALLEGHENY COUNTY

On February 7, 2013, the EPA released its proposal for 1-hour SO<sub>2</sub> 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 SO<sub>2</sub> nonattainment area recommendation, submitted on June 23, 2011. This includes designating all of Allegheny County as a 1-hour SO<sub>2</sub> nonattainment area. In its 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 Allegheny County 1-hour SO<sub>2</sub> nonattainment area to only fifteen municipalities. The Department's revised 1-hour SO<sub>2</sub> designation recommendation includes: the City of Clairton, the City of McKeesport, Dravosburg, Elizabeth, Glassport, Jefferson Hills, Liberty, Lincoln, Pleasant Hills, Port Vue, Versailles, West Elizabeth and West Mifflin Boroughs, and Elizabeth and Forward Townships in Allegheny County. The reasons for reducing the Allegheny County nonattainment area are described in the following sections.

**Overview**

The Department recommended in its June 23, 2011, letter to EPA that Allegheny County be designated as nonattainment for 1-hour SO<sub>2</sub> (of 75 parts per billion (ppb)) because the county contains an air monitoring station that is violating the NAAQS, namely the Liberty monitor. At the end of 2012, the Liberty monitor (AIRS ID 420030064), situated in the southeastern portion of Beaver County, had a 1-hour SO<sub>2</sub> design value of 141 ppb. Allegheny County also contains numerous major SO<sub>2</sub> sources that reported over 100 tons per year of SO<sub>2</sub> emissions in the 2009 to 2011 period. In addition, two major SO<sub>2</sub> sources are situated just over the county boundary in Washington County. A map displaying the major SO<sub>2</sub> sources proximity to the Liberty monitor is provided below:



The following analysis will focus on the significance of the proximity of two major SO<sub>2</sub> sources (US Steel Corporation–Clairton Coke Works (US Steel–Clairton) and US Steel Corporation Irwin Plant (US Steel–Irwin)), to the Liberty monitor. The distances to these facilities are as follows: the US Steel–Clairton facility is located 1.5 miles to the south of the Liberty monitor, US Steel–Irwin is located 2.0 miles to the west of the Liberty monitor.

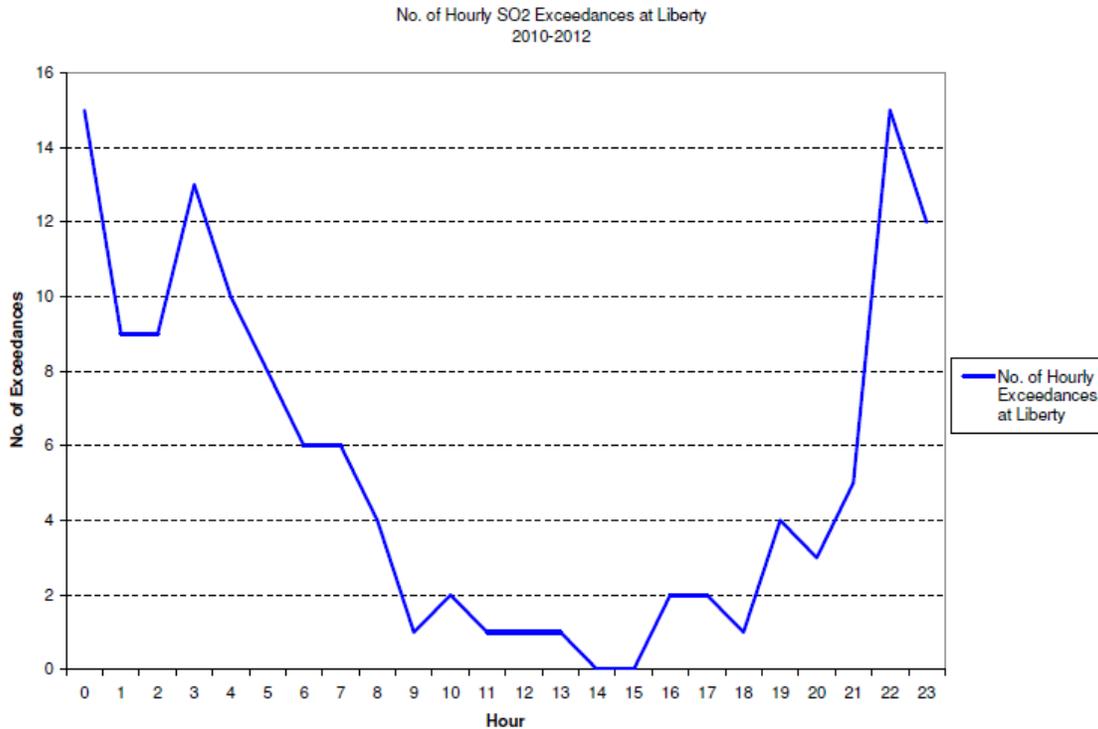
1. Allegheny County has previously been classified as nonattainment for SO<sub>2</sub>

On March 3, 1978, EPA designated all of Allegheny County as “nonattainment” for the primary SO<sub>2</sub> standard (43 FR 8962). This designation was reaffirmed on September 12, 1978 (43 FR 40502), effective upon publication. Then, on October 21, 1981, EPA reduced in size the Allegheny County SO<sub>2</sub> nonattainment area to “the area within a two-mile radius of the Hazelwood monitor” (46 FR 51607). Finally, on July 21, 2004, the EPA redesignated the nonattainment area defined as “the area within a two-mile radius of the Hazelwood monitor” to attainment (69 FR 43522).

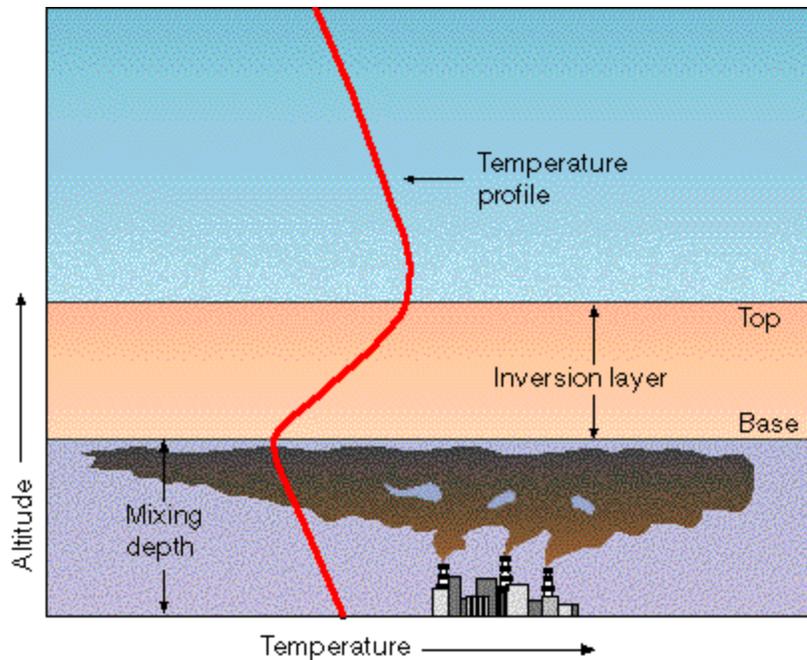
Therefore, there is precedent in Allegheny County to have an area defined as nonattainment for SO<sub>2</sub> that is smaller than the county boundary.

2. Analysis of Daily Timing of 1-hour SO<sub>2</sub> Exceedances at the Liberty Monitor Coupled with Topography

For the Department’s June 23, 2011, 1-hour SO<sub>2</sub> nonattainment area recommendation, the Department analyzed the Liberty monitor hourly SO<sub>2</sub> data from 2008 through 2010 to determine the time of day that the 1-hour SO<sub>2</sub> exceedances were occurring. The following graph displays when the Liberty monitor was measuring exceedances of the 1-hour SO<sub>2</sub> NAAQS from 2010 through 2012.

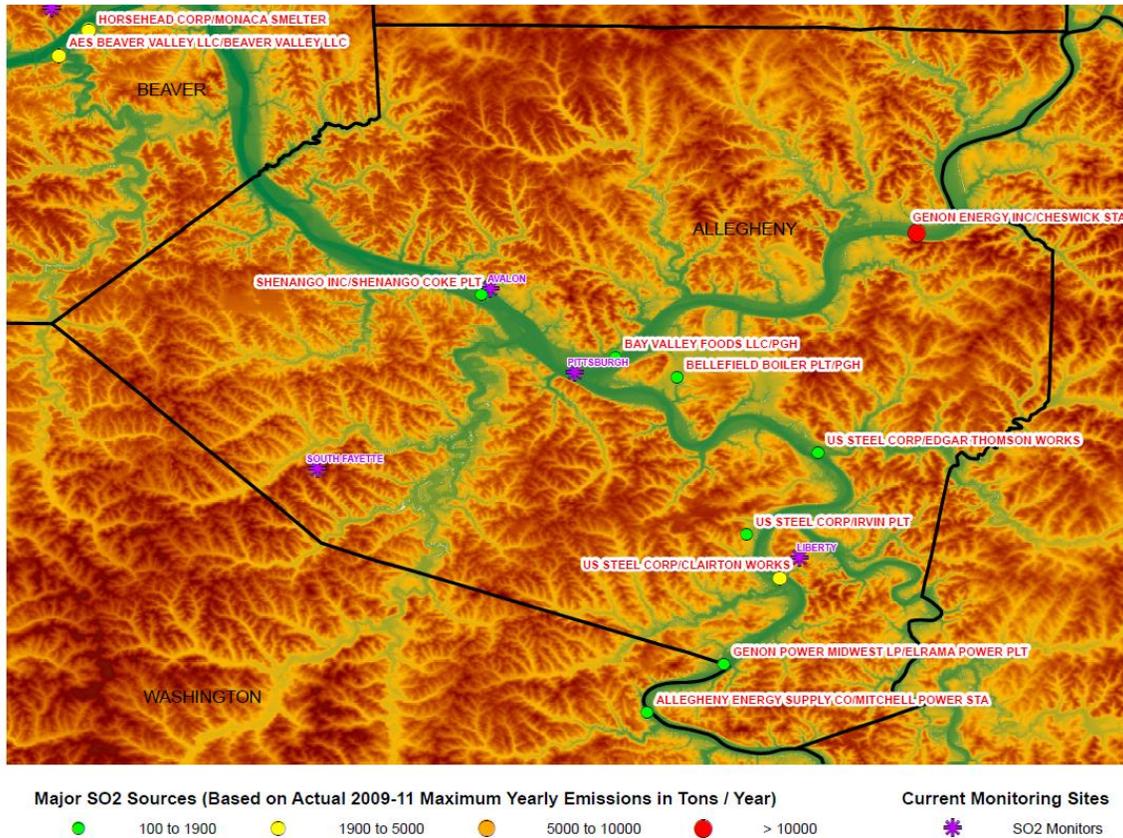


Consistent with the 2008 to 2010 time period, most of the exceedances from 2010 through 2012 occurred during the late night to early morning period. This indicates that inversions are occurring and are contributing to the higher SO<sub>2</sub> concentrations. The highest 1-hour SO<sub>2</sub> concentrations 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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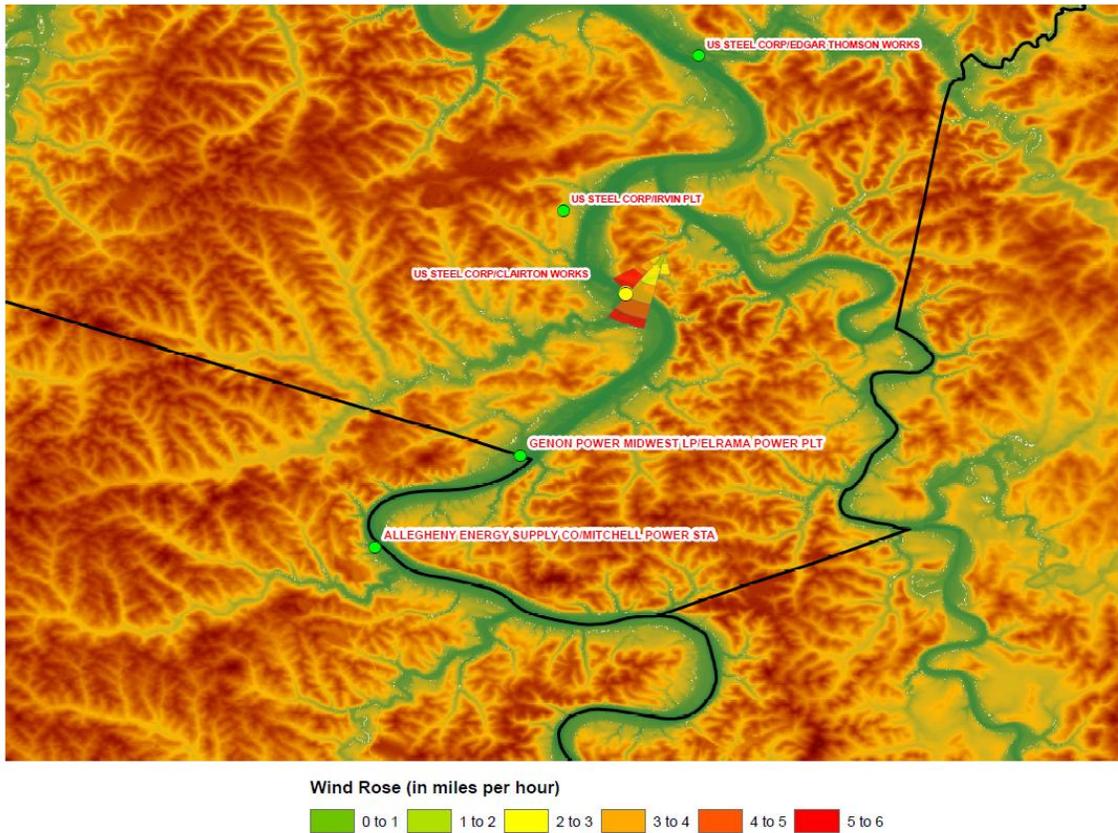
Pollution originating from within the boundary layer will effectively be trapped near the surface. Such is the case for Allegheny County's Liberty Monitor during an inversion. In addition, the area's terrain contributes to this phenomenon. The US Steel–Clairton facility is situated within the Monongahela River valley (surrounded by higher terrain to its north). A map displaying Allegheny County's terrain is below.



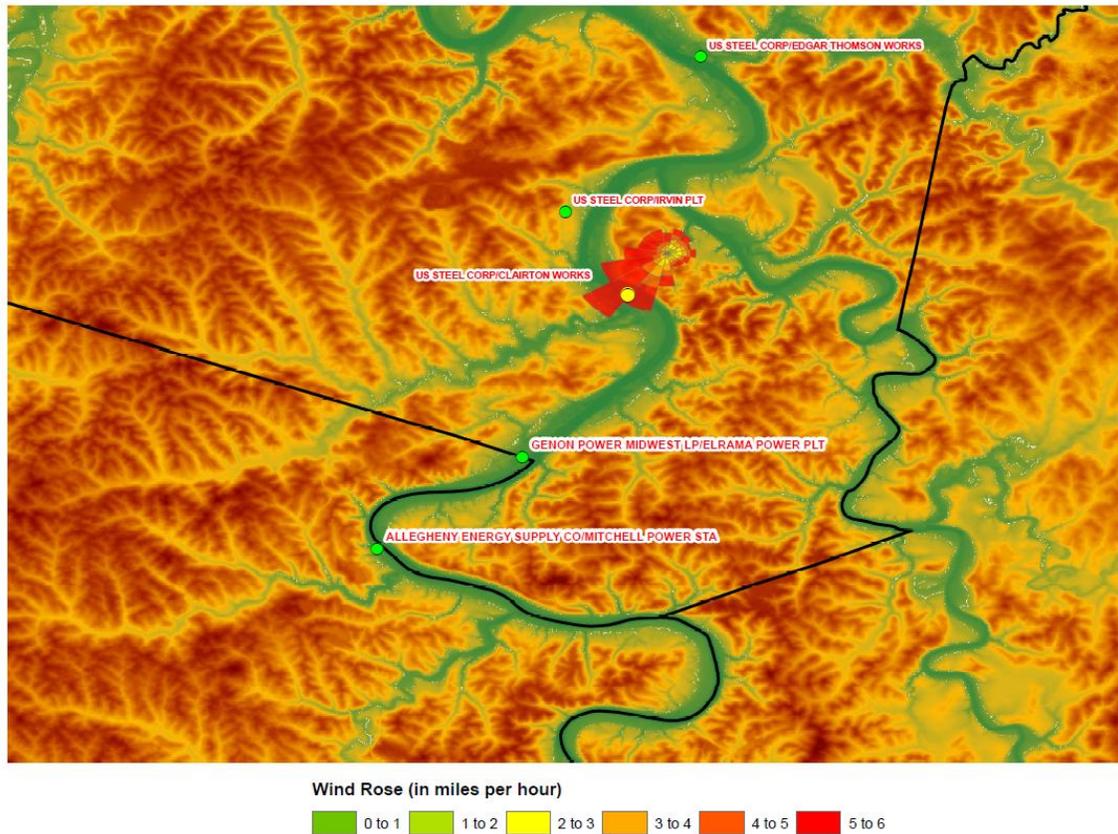
The Liberty monitor is situated at a base elevation of 1065 feet. In contrast, the three facilities in the Monongahela River valley have a base elevation of between 755 and 760 feet. Any emissions that are exhausted from the sources with lower stack heights under stable atmospheric conditions (in an 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 Liberty monitor sits at an elevation 300 feet above the highest river valley elevation, the pollution from these three sources is likely to impact the Liberty monitor as it rises in the river valley as long as the wind travels from southwest to northeast in the Monongahela River valley (because the three major facilities are to the south and west of the Liberty monitor). Reason 3 below will discuss the importance of this observation. Overall, the frequencies of inversions along with the complex terrain in the southeastern portion of Allegheny County are two driving factors that influence the level of the 1-hour SO<sub>2</sub> concentrations.

### 3. Analysis of the Wind Direction and Wind Speed Associated with 1-hour SO<sub>2</sub> Exceedances

In the Department's June 23, 2011, 1-hour SO<sub>2</sub> nonattainment area recommendation, the Department analyzed the 2008 through 2010 wind direction and wind speed at the Liberty monitor during the hours when 1-hour SO<sub>2</sub> exceedances occurred. The following map displays a wind rose of the times when the Liberty monitor experienced exceedances of the 1-hour SO<sub>2</sub> standard from 2010 through 2012.



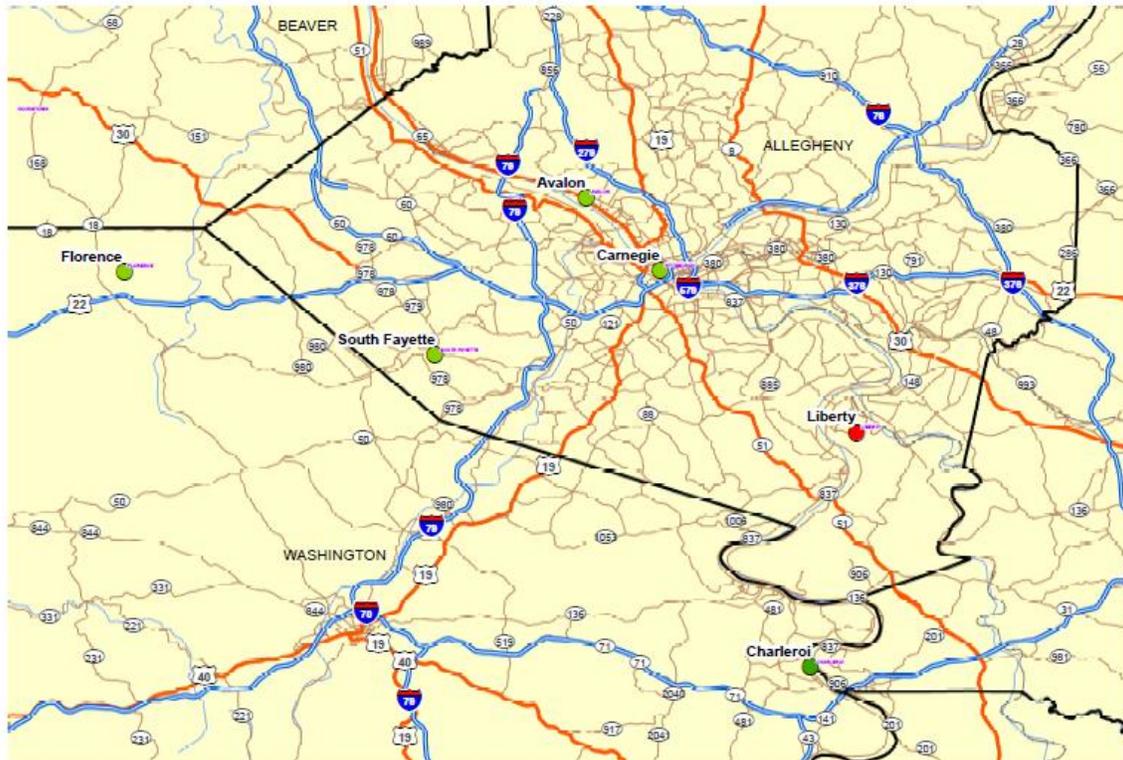
The trend is the same as in the 2008 through 2010 time period. The winds are light and from a southerly direction. The light winds are indicative of conditions during inversions and the southerly winds indicate that pollution coming from the direction of the three major SO<sub>2</sub> facilities is impacting 1-hour SO<sub>2</sub> concentrations being measured at the Liberty 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 Liberty monitor are representative of the local meteorological conditions that are occurring within the Monongahela River valley and are causing the 1-hour SO<sub>2</sub> NAAQS exceedances.

#### 4. Analysis of Existing Air Quality Surrounding the Liberty Monitor

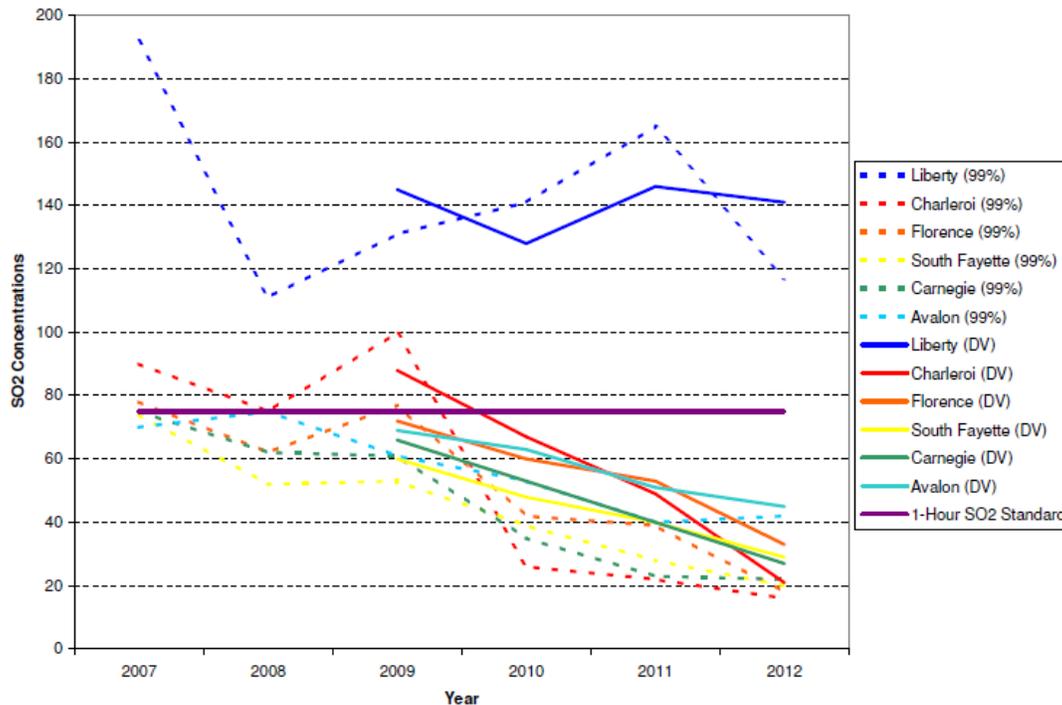
There are five SO<sub>2</sub> monitors (operated by the Department and the Allegheny County Health Department) in the proximity of the Liberty SO<sub>2</sub> monitor, all of which are currently monitoring attainment of the 1-hour SO<sub>2</sub> NAAQS. The locations of these monitors are shown on the map below.



Preliminary 2012 SO<sub>2</sub> Design Values

- Below 25 ppb
- 25 to 45 ppb
- 45 to 65 ppb
- 65 to 75 ppb
- Above 75 ppb

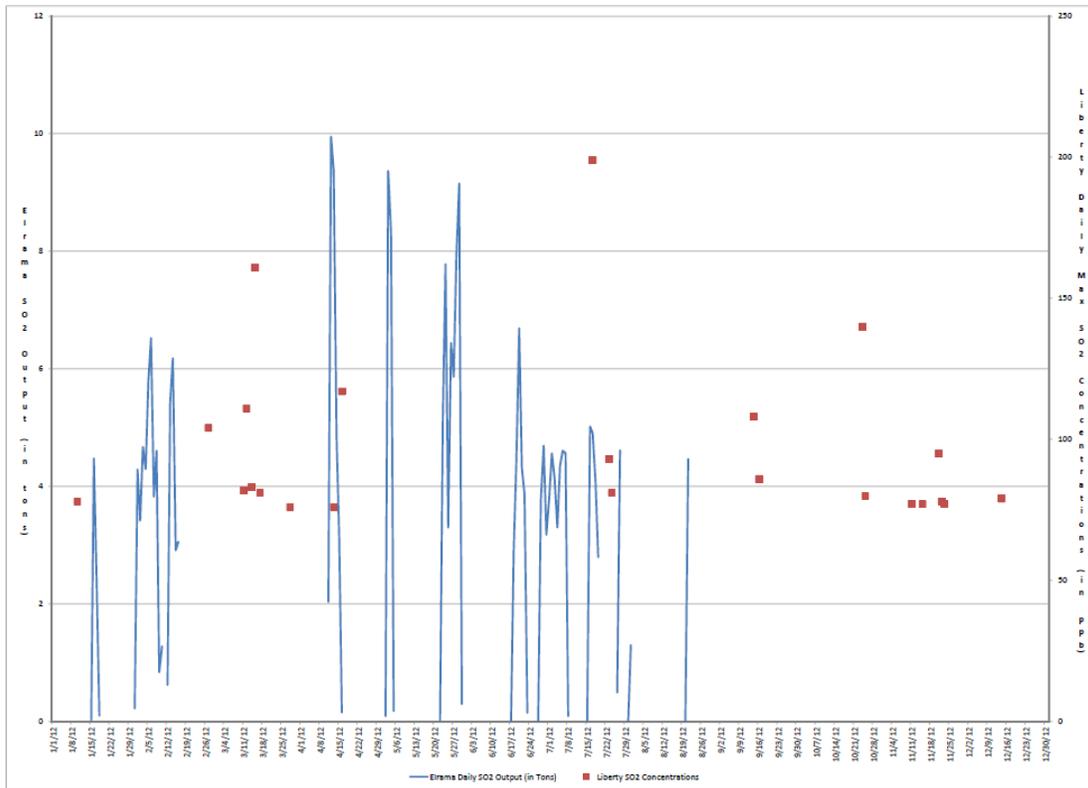
In addition, all of these monitors have documented a drastic decline in the 1-hour SO<sub>2</sub> yearly 99<sup>th</sup> percentile concentrations and yearly design values. A graph displaying this downward trend relative to the Liberty monitor is provided below.



As documented in the above graph, the other three SO<sub>2</sub> monitors (South Fayette, Carnegie and Avalon) that have complete SO<sub>2</sub> data from 2010 through 2012 in Allegheny County are all monitoring concentrations that show attainment of the 1-hour SO<sub>2</sub> NAAQS. This is further justification that EPA’s proposed Allegheny County 1-hour SO<sub>2</sub> nonattainment area should be reduced in size.

#### 5. Analysis of 2012 Daily Genon-Elrama SO<sub>2</sub> Emissions and Daily Liberty SO<sub>2</sub> Exceedances

The Department also examined the 2012 Daily Genon-Elrama SO<sub>2</sub> Emissions and compared them to Daily Liberty SO<sub>2</sub> Exceedances to determine the impact of the SO<sub>2</sub> emissions on the Liberty monitor measured SO<sub>2</sub> concentrations. On February 29, 2012, Genon Energy announced that it would be shutting down eight of its power facilities, including Elrama, by mid-2015. Genon-Elrama was shut down in June 2012. For 2012, daily SO<sub>2</sub> emission data from the EPA’s Clean Air Markets Division (CAMD) database (<http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>) was downloaded and compared with the Liberty’s daily SO<sub>2</sub> exceedances. The graph below shows the daily SO<sub>2</sub> output from Genon-Elrama in 2012 and compares it to when the Liberty monitor saw exceedances of the SO<sub>2</sub> NAAQS.

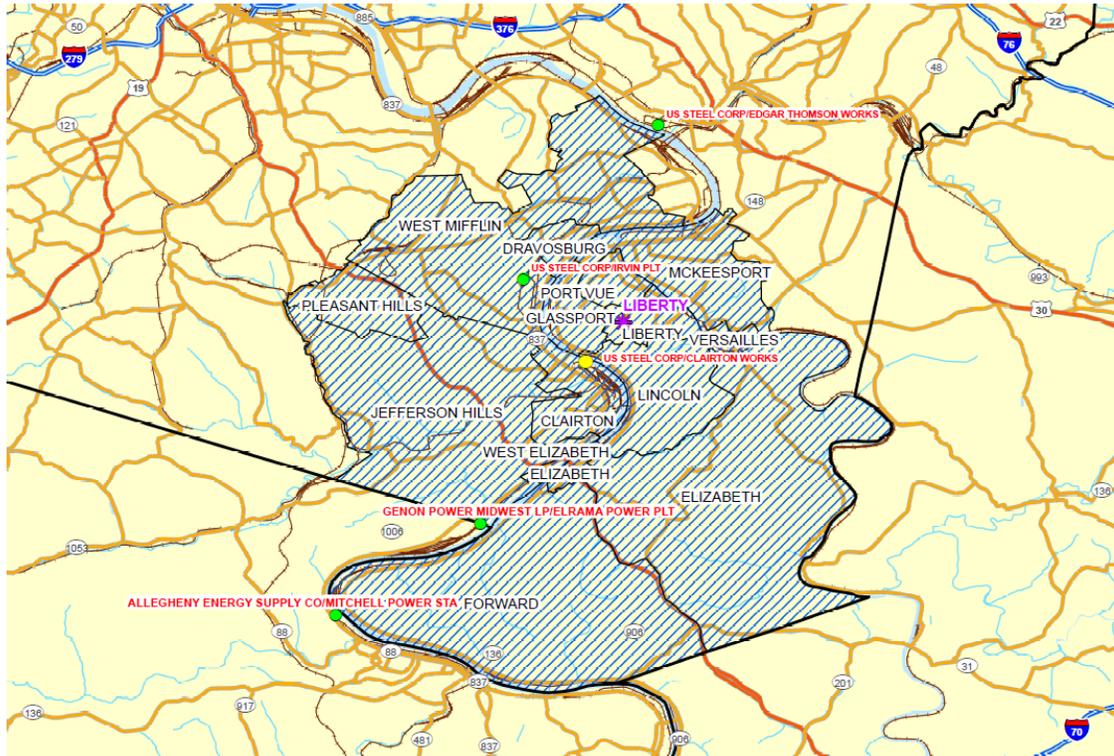


Of the 23 SO<sub>2</sub> exceedance days measured by the Liberty monitor, Genon-Elrama was only operating on three of those days. On those three days, Genon-Elrama emission totals were relatively low and Genon-Elrama only emitted 9.38 tons of SO<sub>2</sub> on 4/13/13, 0.156 tons of SO<sub>2</sub> on 4/16/13, and 4.899 tons of SO<sub>2</sub> on 7/17/13. Even though the wind was blowing primarily out of the southwest on exceedance days (as demonstrated in Reason 3 above), other large contributors (that did not include the source (Genon-Elrama) closest to the Liberty monitor in Washington County) are more likely the cause of those exceedances.

## Conclusion

After considering the facts as described above, the Department is recommending reducing the nonattainment area within Allegheny County to the City of Clairton, the City of McKeesport, Dravosburg, Elizabeth, Glassport, Jefferson Hills, Liberty, Lincoln, Pleasant Hills, Port Vue, Versailles, West Elizabeth and West Mifflin Boroughs, and Elizabeth and Forward Townships. The municipalities the Department recommends EPA designate as nonattainment for SO<sub>2</sub> follows an outline similar to that which EPA has used in the past (i.e., reducing the Allegheny County SO<sub>2</sub> nonattainment area in 1981 to the two-mile radius surrounding the Hazelwood monitor). In addition, the analysis of the time of day of the 1-hour SO<sub>2</sub> exceedances, coupled with an analysis of the topography and the wind speed and direction during the 1-hour SO<sub>2</sub> exceedances, results in the conclusion that the Allegheny County 1-hour SO<sub>2</sub> nonattainment area's size should be reduced. Finally, the most recent design value monitoring data at five SO<sub>2</sub> monitors in

the proximity of the Liberty monitoring site all show compliance with the 1-hour SO<sub>2</sub> standard. For all of these reasons the Department recommends the nonattainment area boundary be reduced to the fifteen municipalities listed in this attachment. A map of the proposed reduced 1-hour SO<sub>2</sub> nonattainment area is provided below.



**Proposed SO<sub>2</sub> Nonattainment Area**

 Allegheny

**Current Monitoring Sites**

 SO<sub>2</sub> Monitors