

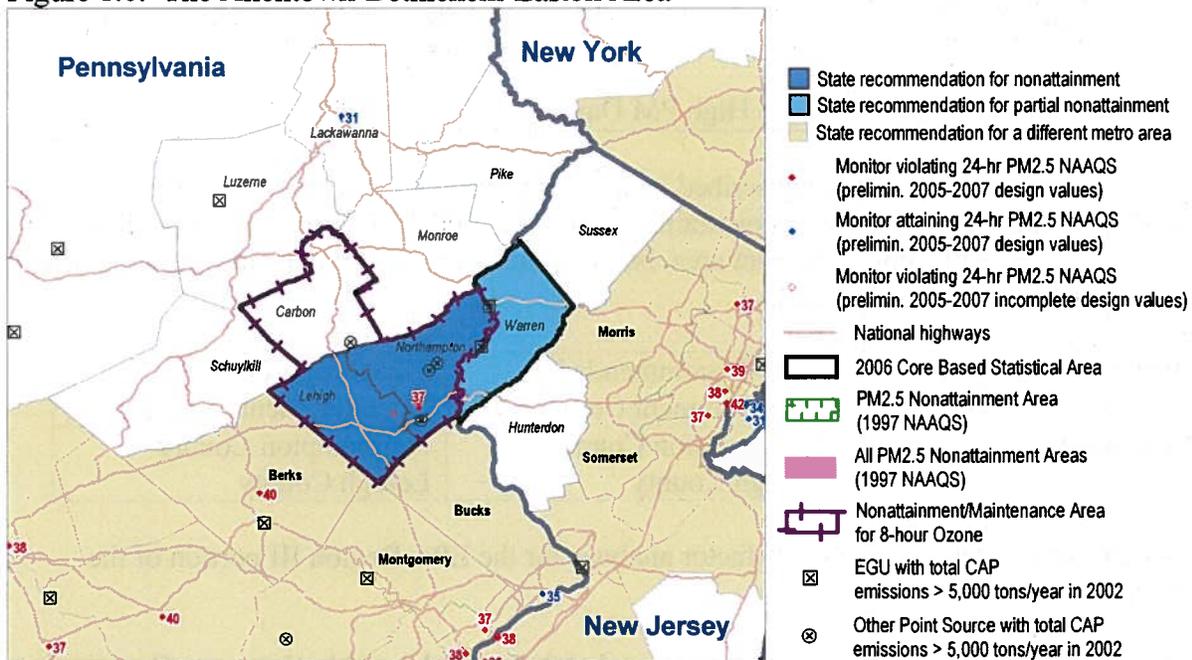
## EPA Technical Analysis for the Allentown-Bethlehem-Easton Area

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Allentown-Bethlehem-Easton area identifies the counties with monitors that violate the 2006 24-hour PM<sub>2.5</sub> standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1.0 is a map which identifies the counties in the Allentown-Bethlehem-Easton area (Allentown Area) and provides other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State.

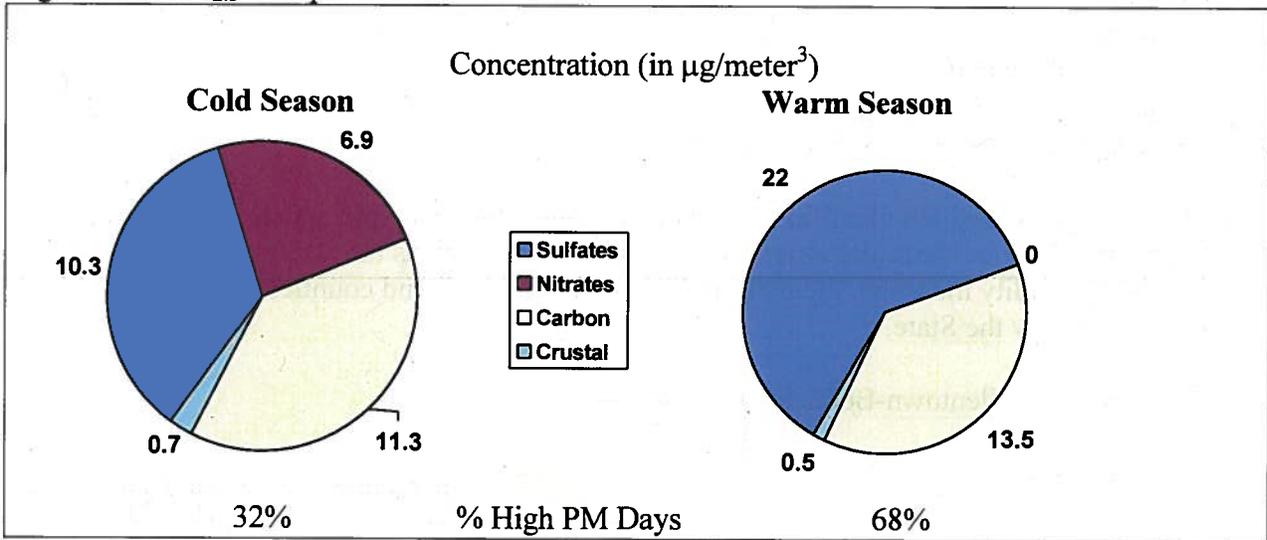
Figure 1.0. The Allentown-Bethlehem-Easton Area



In December 2007, the Commonwealth of Pennsylvania recommended that two counties in Pennsylvania be designated as “nonattainment” for the 2006 24-hour PM<sub>2.5</sub> standard in the Allentown area, based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the commonwealth. (See the December 28, 2007 letter from the Pennsylvania Department of Environmental Protection to EPA, received on January 3, 2008.)

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations occur in both the cold and warm seasons, but more often in the warm season. Figure 1.1 illustrates average concentrations of PM<sub>2.5</sub> components for both warm and cold season high PM<sub>2.5</sub> days.

Figure 1.1. PM<sub>2.5</sub> Composition Data for the Allentown Area



Based on EPA's 9-factor analysis described below, EPA proposes that two counties in Pennsylvania should be designated nonattainment for the 2006 24-hour PM<sub>2.5</sub> air quality standard as part of the Allentown nonattainment area, based upon currently available information. These counties are listed in the table below.

Allentown-Bethlehem-Easton area Pennsylvania	State-Recommended Nonattainment Counties	EPA-Proposed Nonattainment Counties
	Northampton County Lehigh County	Northampton County Lehigh County

The following is a summary of the 9-factor analysis for the EPA Region III portion of the Allentown area.

The Commonwealth of Pennsylvania recommended that Lehigh and Northampton Counties be designated as nonattainment in the Allentown-Bethlehem-Easton area for the 2006 PM<sub>2.5</sub> NAAQS. These same two counties were a Subpart 1 (“Basic”) area for the 1997 8-hour ozone

NAAQS and now make up the Allentown-Bethlehem-Easton 8-hour ozone maintenance area. The violating monitor in the area is in Northampton County.

Lehigh and Northampton Counties are part of the Allentown-Bethlehem-Easton metropolitan statistical area (MSA), along with Carbon County, PA and Warren County, NJ. Carbon and Warren Counties have much lower emissions, populations, and population densities than Lehigh and Northampton Counties. Carbon and Warren Counties also have much lower vehicle miles traveled (VMT) and fewer commuters traveling into and within the MSA. Furthermore, the majority of commuters from Warren and Carbon Counties into and within the MSA are actually commuting within their own home county. Also, Lehigh and Northampton Counties are served by a single metropolitan planning organization (MPO), the Lehigh Valley Planning Commission. Carbon and Warren are in different MPOs. In addition, meteorological data indicates that prevailing winds at the violating monitor in Northampton County on days with elevated PM<sub>2.5</sub> at or near the level of the 2006 24-hour PM<sub>2.5</sub> NAAQS are from the southwest, with occasional high level days when winds are from the north, east, or northeast. This data indicates a large influence from Lehigh, Berks, and Montgomery Counties, and further southwest, but much less influence from either Warren or Carbon Counties.

EPA's technical analysis indicates that Northampton and Lehigh Counties contribute the most to the PM<sub>2.5</sub> nonattainment problem in the Allentown-Bethlehem-Easton area. The area is also affected short and long-range transport primarily from the southwest. Other nearby counties such as Berks and Montgomery Counties affecting the Allentown-Bethlehem-Easton area are in other designated nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and have been recommended for inclusion in those same nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS. For these reasons, EPA has determined that it is appropriate to designate only Northampton and Lehigh Counties in the Allentown-Bethlehem-Easton nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS.

Please note that while EPA is not using metropolitan area boundaries presumptive nonattainment area boundaries for the 2006 PM<sub>2.5</sub> NAAQS, as a starting point, this analysis will consider the four counties in the Allentown-Bethlehem-Easton MSA, Lehigh, Northampton, and Carbon Counties, PA, and Warren County, NJ, as well as the ring of counties surrounding the MSA. Therefore, counties that are beyond that ring of counties surrounding the Allentown-Bethlehem-Easton area will be excluded from further analysis. In addition, if a county is part of another existing nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the state has recommended including it in that other nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS, that county will not be included in this analysis. Accordingly, the following counties will be excluded from further consideration for inclusion in the Allentown nonattainment area.

Counties	Reasons for Exclusion from Further Analysis
Berks, PA	Berks County is part of the Reading nonattainment area for the 1997 PM <sub>2.5</sub> NAAQS and has been recommended for inclusion in the Reading nonattainment area for the 2006 PM <sub>2.5</sub> NAAQS.
Montgomery, PA Bucks, PA Philadelphia, PA	These counties are part of the Philadelphia nonattainment area for the 1997 PM <sub>2.5</sub> NAAQS and have been recommended for inclusion in the Philadelphia nonattainment area for the 2006 PM <sub>2.5</sub> NAAQS. In addition, Philadelphia County is not part of the contiguous ring of counties surrounding the

	Allentown-Bethlehem-Easton area.
Morris, NJ Somerset, NJ	These counties are part of the New York-New Jersey-Long Island nonattainment area for the 1997 PM <sub>2.5</sub> NAAQS and have been recommended for inclusion in the New York-New Jersey-Long Island nonattainment area for the 2006 PM <sub>2.5</sub> NAAQS.
Lackawanna, PA	Lackawanna County is not part of the contiguous ring of counties surrounding the Allentown-Bethlehem-Easton area.

Data for these counties will be included in the tables for the remaining factors. However, no analysis will be conducted regarding that data.

### Factor 1: Emissions Data

For this factor, EPA evaluated county level emission data for the following PM<sub>2.5</sub> components and precursor pollutants: “PM<sub>2.5</sub> emissions total,” “PM<sub>2.5</sub> emissions carbon,” “PM<sub>2.5</sub> emissions other,” “SO<sub>2</sub>,” “NO<sub>x</sub>,” “VOCs,” and “NH<sub>3</sub>.” “PM<sub>2.5</sub> emissions total” represents direct emissions of PM<sub>2.5</sub> and includes: “PM<sub>2.5</sub> emissions carbon,” “PM<sub>2.5</sub> emissions other,” primary sulfate (SO<sub>4</sub>), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO<sub>2</sub> and NO<sub>x</sub>, are part of “PM<sub>2.5</sub> emissions total,” they are not shown in Table 1.0 as separate items). “PM<sub>2.5</sub> emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM<sub>2.5</sub> emissions other” represents other inorganic particles (crustal). Emissions of SO<sub>2</sub> and NO<sub>x</sub>, which are precursors of the secondary PM<sub>2.5</sub> components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH<sub>3</sub> (ammonia) are also potential PM<sub>2.5</sub> precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

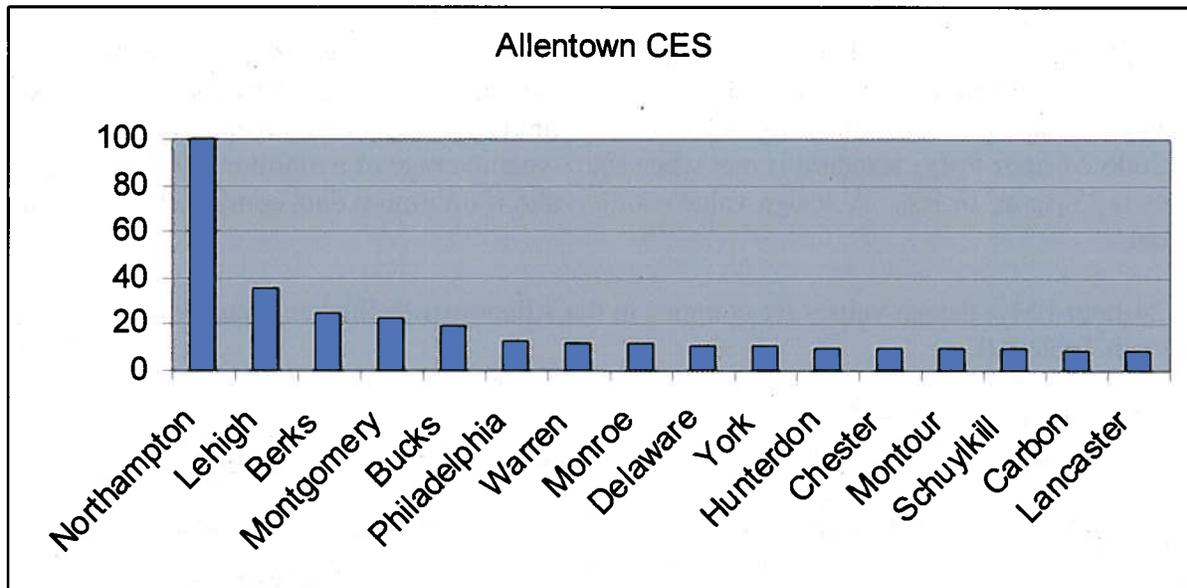
EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html#C](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C).

Table 1.0 shows emissions of PM<sub>2.5</sub> and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Allentown-Bethlehem-Easton area. Counties are listed in Table 1.0 descending order by CES.

Table 1.0. PM<sub>2.5</sub> Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment ?	CES	PM <sub>2.5</sub> emissions total (tpy)	PM <sub>2.5</sub> emissions carbon (tpy)	PM <sub>2.5</sub> emissions other (tpy)	SO <sub>2</sub> (tpy)	NOx (tpy)	VOCs (tpy)	NH <sub>3</sub> (tpy)
Northampton, PA	Yes	100	5,222	665	4,556	60,396	24,620	10,960	807
Lehigh, PA	Yes	35	1,328	501	828	3,749	11,503	13,369	904
Berks, PA	Yes - other area	25	3,378	922	2,456	18,874	18,086	19,117	4,653
Montgomery, PA	Yes - other area	23	2,597	1,118	1,477	5,411	23,306	37,216	1,535
Bucks, PA	Yes - other area	19	2,022	876	1,146	3,951	16,792	26,241	1,834
Philadelphia, PA	Yes - other area	13	2,506	1,248	1,258	11,293	38,733	35,230	1,299
Monroe, PA	No	12	1,153	590	563	1,022	5,245	8,575	281
Warren, NJ	Yes – partial	12	1,105	588	517	563	5,088	5,468	747
Hunterdon, NJ	No	10	769	454	316	556	3,882	5,053	395
Schuylkill, PA	No	10	1,247	547	700	7,239	6,219	6,873	1,137
Carbon, PA	No	9	649	313	336	1,432	2,913	4,271	220
Luzerne, PA	No	7	1,671	783	888	7,157	10,387	14,098	598
Morris, NJ	Yes - other area	5	1,498	953	545	1,177	13,774	22,461	772
Somerset, NJ	Yes - other area	4	801	451	349	577	7,886	9,823	532
Sussex, NJ	No	3	1,270	744	526	669	2,726	11,442	361
Lackawanna, PA	No	1	830	334	496	1,276	6,660	8,753	420
Pike, PA	No	1	802	419	384	266	2,353	3,985	108

Figure 1.2. CES Values for the Allentown-Bethlehem-Easton Area (Including Non-Contiguous Counties)



Based upon the data set forth in Table 1.0, Northampton County has the highest PM<sub>2.5</sub> total emissions and SO<sub>2</sub> emissions, and the second highest NOx emissions, as well as the highest CES score (100). This is one indication that Northampton is contributing the most towards its nonattainment. Lehigh County has the next highest CES (35), which indicates that this county has about one-third as much influence on the area’s nonattainment as Northampton County. Lehigh County’s emissions are low compared to many other counties in this analysis. However,

Lehigh County borders Northampton County, and combined ambient level and meteorological information reflected in the pollution roses for this area indicate that Lehigh is often upwind from the violating monitor on days with high ambient levels of PM<sub>2.5</sub> (see Figure 1.0.).

Philadelphia (CES=13) has the highest NO<sub>x</sub> emissions, while Berks county has the second highest SO<sub>2</sub> emissions. Berks, Montgomery, and Philadelphia Counties have the second, third, and fourth highest PM<sub>2.5-total</sub> emissions, respectively. These counties are in existing nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and have been recommended for inclusion in those same nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS. Berks County is in the Reading nonattainment area. Montgomery and Philadelphia Counties are part of the Philadelphia-Wilmington nonattainment area. Bucks County has the next highest emissions and next highest CES (19). Bucks County is part of the Philadelphia-Wilmington nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS, and has been recommended for inclusion in that nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS.

There are four other counties with CESs of ten or greater, Monroe and Schuylkill Counties in Pennsylvania and Warren and Hunterdon Counties in New Jersey. Of those, Schuylkill and Monroe Counties have the highest emissions, and Warren and Hunterdon Counties have the lowest. Compared to Northampton County, however, the emissions of PM<sub>2.5</sub> and PM<sub>2.5</sub> precursors in these counties are quite low.

## Factor 2: Air Quality Data

This factor considers the 24-hour PM<sub>2.5</sub> design values (in µg/m<sup>3</sup>) for air-quality monitors in counties in the Allentown-Bethlehem-Easton area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air-quality standard. The 2006 24-hour PM<sub>2.5</sub> standard is met when the 3-year average of a monitor's 98<sup>th</sup> percentile values is 35 µg/m<sup>3</sup> or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM<sub>2.5</sub> design values for counties in the Allentown-Bethlehem-Easton area are shown in Table 2.0.

Table 2.0. Air Quality Data

County, State	State Recommended Nonattainment?	Design Values 2003-05 (µg/m <sup>3</sup> )	Design Value 2004-06 (µg/m <sup>3</sup> )	Design Values 2005-07 (µg/m <sup>3</sup> )
Northampton, PA	Yes	36	37	37
Lehigh, PA	Yes	36	No monitor	
Berks, PA	Yes - other area	39	37	38
Montgomery, PA	Yes - other area		Inc	Inc
Bucks, PA	Yes - other area		33	35
Philadelphia, PA	Yes - other area	38	36	38
Monroe, PA	No		No monitor	
Warren, NJ	Yes - partial		34	
Hunterdon, NJ	No		No monitor	
Schuylkill, PA	No		No monitor	

Carbon, PA	No		No monitor	
Luzerne, PA	No	32		
Morris, NJ	Yes - other area	34	31	
Somerset, NJ	Yes - other area		No monitor	
Sussex, NJ	No		No monitor	
Lackawanna, PA	No	33	31	31
Pike, PA	No		No monitor	
Note: Design values shown in red represent violations of the standard.				

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 2006 24-hr PM<sub>2.5</sub> NAAQS for designation purposes.

In this area of analysis, only Northampton, Lehigh, Berks, and Philadelphia Counties in Pennsylvania show violations of the 2006 24-hour PM<sub>2.5</sub> standard. Therefore, these counties are candidates for inclusion in the Philadelphia nonattainment area. However, as stated in Factor 1 - Emissions Data, above, Berks and Philadelphia Counties are already designated nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and Pennsylvania recommended them for inclusion in those same nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS. The violation in Lehigh County was for the 2003-2005 period. Pennsylvania Department of Environmental Protection (PADEP) discontinued this monitor at the end of 2005. In the December 28, 2007 designation recommendation letter, Pennsylvania stated that the 24-hour PM<sub>2.5</sub> design values at the Lehigh County monitor (the "Allentown monitor") and the monitor in Northampton County (the "Freemansburg monitor") were very similar. Specifically, "Twenty-four hour PM<sub>2.5</sub> design values in 2005, the last year both monitors were operating, for Allentown and Freemansburg were 36.4 µg/m<sup>3</sup> and 36.1 µg/m<sup>3</sup> respectively." These monitors are less than 5 miles apart, with the Freemansburg monitor east-northeast (i.e. downwind) of the Allentown monitor.

### Factor 3: Population Density and Degree of Urbanization (Including Commercial Development)

Table 3.0 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data give an indication of whether it is likely that population-based emissions might contribute to violations of the 2006 24-hour PM<sub>2.5</sub> standard.

Table 3.0. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Northampton, PA	Yes	287,334	762
Lehigh, PA	Yes	330,168	948
Berks, PA	Yes - other area	396,236	458

Montgomery, PA	Yes - other area	774,666	1591
Bucks, PA	Yes - other area	619,772	998
Philadelphia, PA	Yes - other area	1,456,350	10220
Monroe, PA	No	162,415	264
Warren, NJ	Yes - partial	110,317	305
Hunterdon, NJ	No	130,042	297
Schuylkill, PA	No	146,996	188
Carbon, PA	No	61,876	160
Luzerne, PA	No	312,795	345
Morris, NJ	Yes - other area	490,084	1019
Somerset, NJ	Yes - other area	319,830	1049
Sussex, NJ	No	152,726	285
Lackawanna, PA	No	209,622	452
Pike, PA	No	56,180	99

The above data indicates that the counties with the highest populations and population densities are in existing nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS and have been recommended for inclusion in those nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS. Lehigh and Northampton Counties have the next highest populations and population densities. Luzerne County has a 2005 population similar to that of Lehigh and Northampton Counties, but its population density is about one-half to one-third that of those counties. Lackawanna County has a higher population density than Luzerne County, but has lower population. Lackawanna County's population density is less than half that of Lehigh County. Warren and Carbon Counties are part of the Allentown-Bethlehem-Easton MSA. However, their 2005 populations and population densities are much smaller than Northampton and Lehigh Counties. Warren County's population and population density are roughly one-third that of Lehigh County. Carbon County's population and population density are roughly one-half that of Warren County.

#### Factor 4: Traffic and Commuting Patterns

This factor considers the number of commuters in each county who drive to another county within the Allentown-Bethlehem-Easton area, the percent of total commuters in each county who commute to other counties within the Allentown-Bethlehem-Easton area, as well as the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4.0). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
Northampton, PA	Yes	2,399	99,230	79	106,210	85
Lehigh, PA	Yes	3,374	131,610	89	129,570	88
Berks, PA	Yes - other area	3,320	147,990	83	7,250	4
Montgomery, PA	Yes - other area	7,527	6,660	2	2,480	1
Bucks, PA	Yes - other area	5,250	3,980	1	3,870	1
Philadelphia, PA	Yes - other area	6,499	469,300	82	471	0

Monroe, PA	No	1,556	5,140	8	7,060	11
Warren, NJ	Yes – partial	1,342	2,410	5	23,440	47
Hunterdon, NJ	No	929	520	1	1,630	3
Schuylkill, PA	No	1,353	7,790	12	3,030	5
Carbon, PA	No	699	6,900	27	19,070	74
Luzerne, PA	No	2,922	990	1	1,450	1
Morris, NJ	Yes - other area	5,398	130	0	1,760	1
Somerset, NJ	Yes - other area	2,702	70	0	360	0
Sussex, NJ	No	889	40	0	1,440	2
Lackawanna, PA	No	1,963	270	0	280	0
Pike, PA	No	584	200	1	360	2

Note: The 2005 VMT data used for Tables 4.0 and 5.0 of the 9-factor analysis has been derived using methodology similar to that described in “Documentation for the final 2002 Mobile National Emissions Inventory,” Version 3, September 2007, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: [ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002\\_mobile\\_nei\\_version\\_3\\_report\\_092807.pdf](ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002_mobile_nei_version_3_report_092807.pdf). The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008. The United States 2000 Census County-to-County Worker Flow Files can be found at: <http://www.census.gov/population/www/cen2000/commuting/index.html>.

The listing of counties in Table 4.0 reflects the number of people commuting to other counties. As with population and population density in Factor 3, counties with the highest VMT are in existing nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and have been recommended for inclusion in those nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS. These areas do not have many commuters into the Allentown-Bethlehem-Easton MSA.

Northampton and Lehigh Counties have the most commuters into and within the MSA. Warren and Carbon Counties have the next highest numbers of commuters into and within the MSA. However, their 2005 VMT are much lower than the VMT in Northampton and Lehigh Counties. Warren and Carbon Counties also have much lower numbers of commuters into and within the MSA. Furthermore, the majority of commuters from Warren and Carbon Counties into and within the MSA are actually commuting within their own home county. Of the 23,440 commuters from Warren County into and within the MSA, 21,034 are commuting within Warren County. Of the 19,070 commuters from Carbon County into and within the MSA, 12,341 are commuting within Carbon County.

Of the remaining counties, only Luzerne County has VMT comparable to Northampton and Lehigh Counties. However, Luzerne County has only 1,450 commuters into the MSA.

### **Factor 5: Growth Rates and Patterns**

This factor looks at population growth for counties in the Allentown-Bethlehem-Easton area from 2000 to 2005, as well as patterns of VMT growth from 1996 to 2005. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

Table 5.0 below shows population, population growth, VMT, and VMT growth for counties that are included in the Allentown-Bethlehem-Easton area.

Table 5.0. Population and VMT Values and Percent Change

Location	Population (2005)	Population % change (2000 - 2005)	2005 VMT (millions)	VMT % change (1996 - 2005)
Northampton, PA	287,334	7	2,399	21
Lehigh, PA	330,168	6	3,374	34
Berks, PA	396,236	6	3,320	11
Montgomery, PA	774,666	3	7,527	73
Bucks, PA	619,772	3	5,250	49
Philadelphia, PA	1,456,350	(4)	6,499	(31)
Monroe, PA	162,415	16	1,556	19
Warren, NJ	110,317	7	1,342	2
Hunterdon, NJ	130,042	6	929	(42)
Schuylkill, PA	146,996	(2)	1,353	(1)
Carbon, PA	61,876	5	699	0
Luzerne, PA	312,795	(2)	2,922	6
Morris, NJ	490,084	4	5,398	56
Somerset, NJ	319,830	7	2,702	39
Sussex, NJ	152,726	6	889	(22)
Lackawanna, PA	209,622	(2)	1,963	14
Pike, PA	56,180	20	584	(8)

Northampton and Lehigh Counties both have experienced moderate population growth, six to seven percent from 2000 to 2005, and high VMT growth, twenty-one to thirty-four percent from 1996 to 2005. The other counties in the MSA, Warren and Carbon, also experienced moderate population growth from 2000 to 2005, five to seven percent. However, Warren, and Carbon Counties have had little to no VMT growth from 1996 to 2005.

Pike and Monroe Counties had high population growth from 1996 to 2005, but their populations are still much lower than the populations of Northampton and Lehigh Counties.

Of the remaining counties that are not part of existing nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, Monroe and Lackawanna Counties had the largest increases in VMT from 1996 to 2005. However, VMT in Monroe and Lackawanna Counties is still lower than VMT in Northampton and Lehigh Counties.

#### **Factor 6: Meteorology (Weather/Transport Patterns)**

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on “high PM<sub>2.5</sub> days” for each of two seasons (an October-April “cold” season and a May-September “warm” season). These high PM<sub>2.5</sub> days are defined as days where any FRM or FEM air quality monitors had 24-hour PM<sub>2.5</sub> concentrations above 95% on a frequency distribution curve of PM<sub>2.5</sub> 24-hour values.

The meteorology factor is also considered in each county's Contributing Emissions Score because the method for deriving this metric included an analysis of trajectories of air masses for high PM<sub>2.5</sub> days.

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figures 6.0 and 6.2 identify 24-hour PM<sub>2.5</sub> values by color and days exceeding 35 µg/m<sup>3</sup> are denoted with a red or black icon. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figures indicate the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

The following pollution roses for Northampton and Lehigh Counties show that the predominant wind in the Allentown-Bethlehem-Easton area on individual days with elevated PM<sub>2.5</sub> levels is from the southwest (See Figures 6.0 and 6.1). However, on some days where PM<sub>2.5</sub> concentrations exceed 35 µg/m<sup>3</sup>, winds are from the north, east, or northeast. This data indicates a larger influence from Lehigh, Berks, and Montgomery Counties, and further southwest. This data supports the inclusion of Lehigh County in this area, and suggests that any emissions from Carbon and Warren County, NJ, influence violations in this area to a far lesser degree.

Figure 6.0. Pollution Trajectory Plot for Northampton County, PA (Site 42-095-0025)

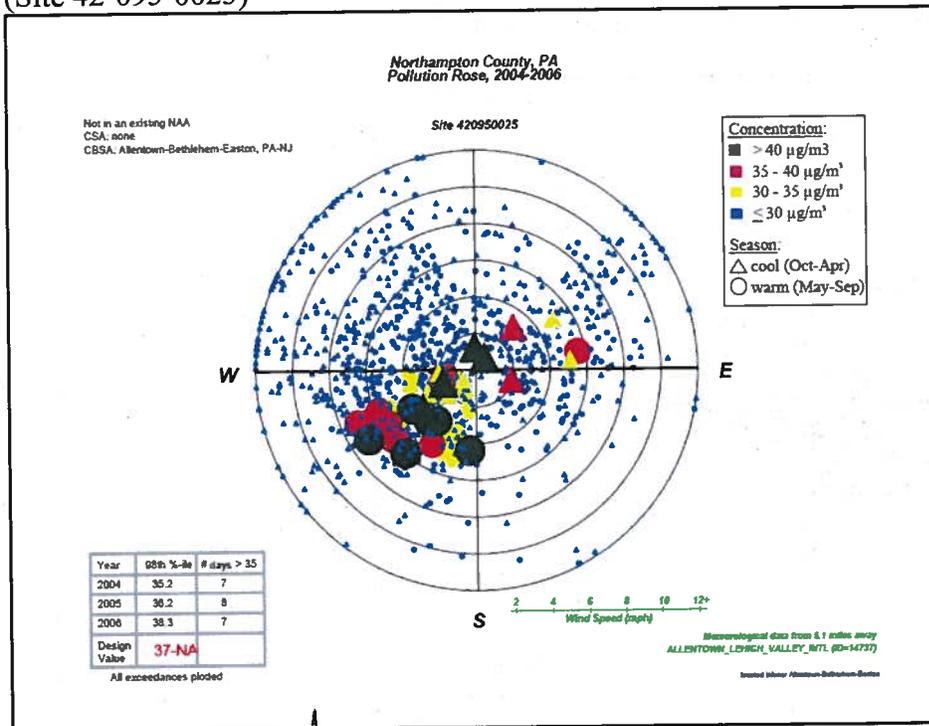
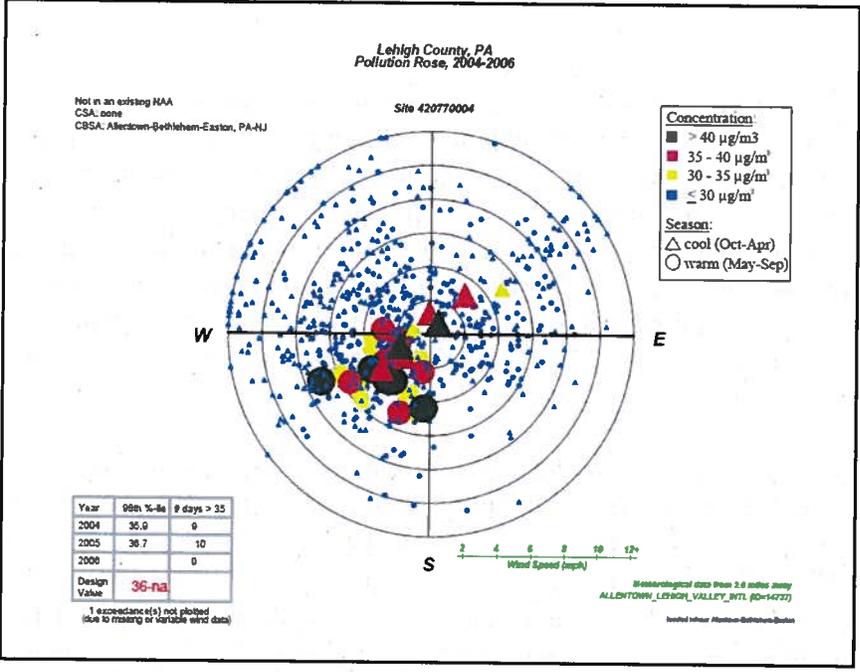


Figure 6.1. Pollution Trajectory Plot Lehigh County, PA  
(Site 42-077-0004)



The following pollution rose (see Figure 6.2) for the Warren County monitor also shows that the predominant wind direction in the area is from the southwest.

Figure 6.2. Pollution Trajectory Plot Warren Lehigh County, NJ  
(Site 44-041-0006)

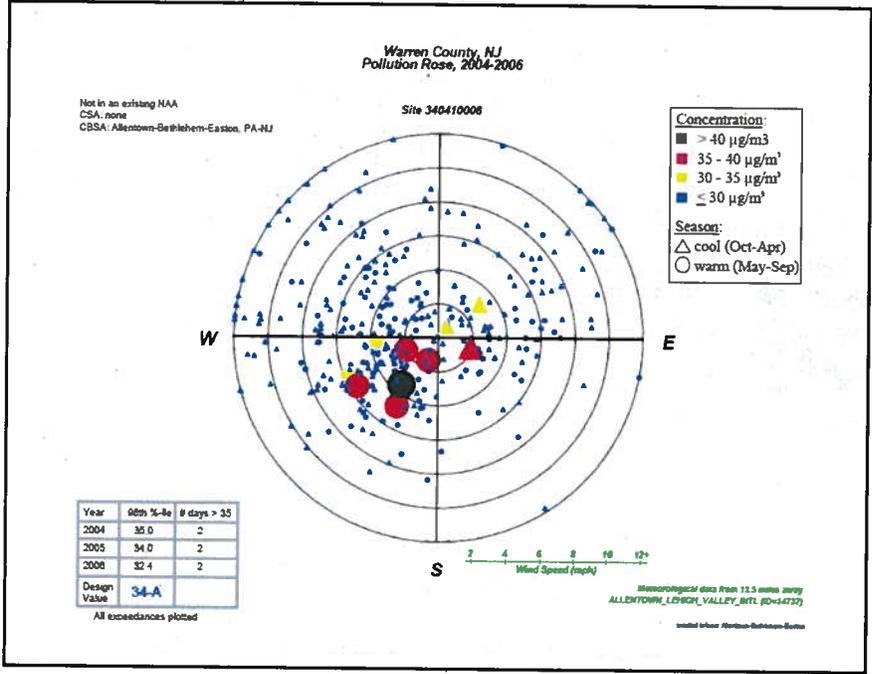
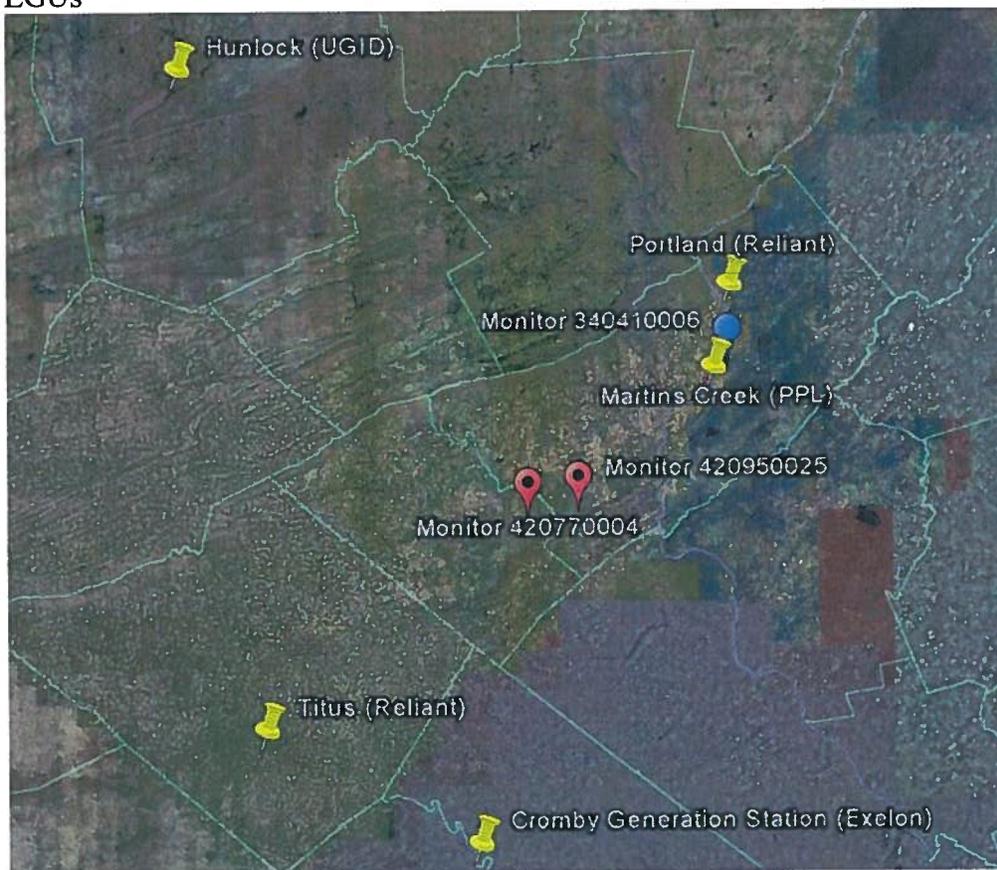


Figure 6.3, below, shows the Northampton, Lehigh, and Warren County monitors, monitors 420950025, 420770004, and 340410006, respectively. Figure 6.3 also includes the four largest electric generating units (EGUs) in the area. The Portland and Martins Creek facilities are in Northampton County, near its border with Warren County. The Hunlock facility is northwest of the Allentown-Bethlehem-Easton area, while the Titus facility is southeast, in Berks County. The Cromby facility is in Chester County, near its border with Montgomery County.

The pollution roses, above, indicate possible influences on the Northampton and Lehigh monitors from the EGUs to the southwest, e.g., the Titus and Cromby facilities. The days exceeding  $35 \mu\text{g}/\text{m}^3$   $\text{PM}_{2.5}$  when winds are predominantly from the north, east, or northeast indicate probable influences from the Portland and Martins Creek facilities.

Figure 6.3. Allentown-Bethlehem-Easton Area Air Quality Monitors and Surrounding Large EGUs



### Factor 7: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of  $\text{PM}_{2.5}$  over the Allentown-Bethlehem-Easton area.

The Allentown-Bethlehem-Easton area does have geographical or topographical barriers affecting air pollution transport within its air shed. In support of its recommendation to group Lehigh and Northampton Counties in the Allentown-Bethlehem-Easton nonattainment area, and to exclude Carbon County, Pennsylvania stated in its December 28, 2007 designation recommendation letter that Lehigh and Northampton Counties are: "...bounded on the north by Blue Mountain providing a significant physical barrier. A broad valley runs from east to west connecting both Lehigh and Northampton counties." Thus, the geographical and topographical features in this area suggest that there is contribution between Lehigh and Northampton, but there is less likely to be contribution between Carbon and the violations in Northampton.

#### **Factor 8: Jurisdictional Boundaries (e.g., Existing PM and Ozone Areas)**

In evaluating the jurisdictional boundary factor, consideration is being given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for PM<sub>2.5</sub> or 8-hour ozone standard) represent important boundaries for state air quality planning.

Northampton, Lehigh, and Carbon Counties were a Subpart 1 ("Basic") nonattainment area for the 1997 8-hour ozone NAAQS. These counties now make up the Allentown-Bethlehem-Easton 8-hour ozone maintenance area.

The Lehigh Valley Planning Commission is the metropolitan planning organization (MPO) for Lehigh and Northampton Counties. Carbon County is part of the Northeastern Pennsylvania Alliance Rural Planning Organization. The MPO for Warren County, NJ is the North Jersey Transportation Planning Authority.

From an EPA Region III perspective, there are no major jurisdictional boundary issues in the Allentown-Bethlehem-Easton area. EPA Region III is recommending that Northampton and Lehigh make up the nonattainment area. The air quality planning for the area will be conducted by the Pennsylvania Department of Environmental Protection. Transportation planning is covered by one MPO, the Lehigh Valley Planning Commission.

Furthermore, in its December 28, 2007 designation recommendation letter, Pennsylvania stated that Lehigh and Northampton Counties' economic based was "integrated," and that Pennsylvania's Allentown-Bethlehem-Easton Air Basin covers portions of both counties. The Air Basin is defined in 25 Pa Code § 121.1. Controls on sulfur compounds for the Allentown-Bethlehem-Easton Air Basin are listed in 25 Pa Code § 123.22.

#### **Factor 9: Level of Control of Emission Sources**

This factor considers emission controls currently implemented in the Allentown-Bethlehem-Easton area.

The emission estimates on Table 1.0 (under Factor 1) include any control strategies implemented by the State in the Allentown-Bethlehem-Easton area during or before 2005 that may influence emissions of any component of PM<sub>2.5</sub> emissions (i.e., total carbon, SO<sub>2</sub>, NO<sub>x</sub>, and crustal PM<sub>2.5</sub>).

In Allentown-Bethlehem-Easton area and the surrounding counties, there may be some emission reductions of SO<sub>2</sub> and NO<sub>x</sub> subsequent to 2005 that are not accounted for elsewhere in this analysis, due to new controls at large electric generating units (EGUs).

Table 9.0 shows emissions and controls (current and projected) for EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions greater than 5000 tons. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) database. Table 9.0 also lists one EGU that is not included in the NEEDS database, but which has comparable SO<sub>2</sub> and NO<sub>x</sub> emissions, the UGI Development Co Hunlock Power Station. Table 9.1 shows emissions for the same EGUs for the years 2002 through 2007. Note that the Cromby facility in Chester County, PA, was included because it is a large facility that is on the border between Chester and Montgomery Counties. The data was obtained from the emissions section of EPA's Clean Air Markets Division (CAMD) website <http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>.

As seen in Tables 9.0 and 9.1, none of the EGUs in the Allentown-Bethlehem-Easton area and surrounding counties put control in place between 2005 and 2007. However, under an agreement with the Commonwealth of Pennsylvania, the Martins Creek facility in Northampton County was required to shut down its two coal-fired units or re-power them with clean-coal technology by September 2007. (See the October 10, 2003 Commonwealth of Pennsylvania E News Release.) According to PPL, Martins Creek's two coal-fired were shut down September 14, 2007. Thus, the emissions from Martins Creek may be significantly reduced by December 2008. (See "Martins Creek at a Glance" <http://www.pplweb.com/ppl+generation/coal+plants/ppl+martins+creek/>)

Table 9.0. EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions > 5000 tons, from the 2006 NEEDS EGU database

County, State	Plant Name	Plant Type	UniqueID Final	2006 SO <sub>2</sub>	2006 NO <sub>x</sub>	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW	
Northampton, PA	Northampton Generating Company	Coal Steam	50888_B_BLR1	0	422		91.6		112.0	
			3113_B_2	18,187	2,207			243.0		
	Portland	Coal Steam	3113_B_1	12,497	1,144			157.0		
			PPL Martins Creek	Coal Steam	3148_B_3	502	434			850.0
					3148_B_4	351	261			820.0
Berks, PA	Titus	Coal Steam	3115_B_3	4,718	708			81.0		
			3115_B_1	4,666	699			81.0		
			3115_B_2	3,954	589			81.0		
Schuylkill, PA	Gilberton Power Co, John B. Rich Memorial Power Station	Coal Steam	10113_B_CFB1	0	101		91.6		40.0	
			10113_B_CFB2	0	100		91.6		40.0	

	Northeastern Power Co, Kline Township Cogen Facility	Coal Steam	50039_B_1	0	161		91.6	50.0
	St Nicholas Cogen Project	Coal Steam	54634_B_1	0	241		91.6	88.0
	Wheelabrator Frackville Energy	Coal Steam	50879_B_BLR1	0	316		91.6	44.5
	WPS Westwood Generation LLC	Coal Steam	50611_B_031	300	289		91.6	30.0
Carbon, PA	Panther Creek Energy Facility	Coal Steam	50776_B_BLR1	0	286		88.9	41.5
			50776_B_BLR2	0	272		88.9	41.5
Chester, PA	Cromby Generating Station	Coal Steam	3159_B_1	3,435	1,581	1982	93.8	48.0
			3159_B_2	178	112			201.0
			3159_B_FB1	3,435	1,581		89.0	48.0
			3159_B_FB2	3,435	1,581		89.0	48.0
Luzerne, PA	UGI Development Co Hunlock Power Station	Coal Steam	3176	4,463.4	493.9	No Data: This facility not in NEEDS EGU Database		

Table 9.1. EGU 2002 to 2007 Emissions from EPA's CAMD

<b>Northampton Generating Company, Northampton County, PA, Facility ID: 50888</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002		No Data			
2003	12	Not Reported	360.9	Not Reported	10,318,197
2004	12		409.5		10,846,447
2005	12		402.2		10,741,008
2006	12		421.8		11,340,606
2007	12		399.4		9,362,013
<b>Portland, Northampton County, PA, Facility ID: 3113</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	24,319.9	3,015.2	2,011,568.0	19,743,819
2003	12	28,245.0	2,976.7	2,022,879.0	19,893,636
2004	12	30,721.1	3,305.9	2,222,961.9	21,764,976
2005	12	29,105.1	3,250.5	2,270,088.4	22,262,122
2006	12	30,685.4	3,357.3	2,260,924.7	22,063,385
2007	12	32,729.9	3,641.5	2,384,956.4	23,282,708
<b>PPL Martins Creek, Northampton County, PA, Facility ID: 3148</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	22,051.0	5,126.3	2,528,754.9	28,188,724
2003	12	24,825.7	6,646.4	3,062,643.0	33,597,993
2004	12	22,679.6	6,552.1	3,087,076.1	33,838,085
2005	12	19,082.8	6,727.7	3,203,767.2	35,757,795

2006	12	16,815.2	3,104.4	1,528,161.4	16,052,217
2007	12	14,972.3	3,667.8	1,670,459.5	18,506,376

**Titus, Berks County, PA, Facility ID: 3115**

Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	13,840.5	1,790.6	1,239,473.3	12,080,730
2003	12	15,892.3	2,088.3	1,344,585.4	13,105,065
2004	12	13,577.7	1,996.2	1,245,216.7	12,136,589
2005	12	14,926.4	2,269.9	1,404,778.6	13,691,829
2006	12	13,338.6	1,997.2	1,258,790.7	12,268,916
2007	12	14,488.7	2,474.4	1,481,640.1	14,440,906

**John B. Rich Memorial Power Station (Gilberton), Schuylkill County, PA, Facility ID: 10113**

Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	No Data				
2003	12	Not Reported	181.2	Not Reported	8,447,864
2004	12		184.4		8,672,682
2005	12		250.3		8,363,092
2006	12		201.2		8,420,582
2007	12		184.5		8,115,721

**Northeastern Power Company, Schuylkill County, PA, Facility ID: 50039**

Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	No Data				
2003	12	Not Reported	145.5	Not Reported	5,420,251
2004	12		165.3		5,654,819
2005	12		103.3		3,425,862
2006	12		160.6		6,227,624
2007	12		151.7		6,008,400

**St Nicholas Cogen Project, Schuylkill County, PA, Facility ID: 54634**

Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	No Data				
2003	12	Not Reported	290.4	Not Reported	9,536,633
2004	12		262.2		9,445,792
2005	12		266.1		9,350,034
2006	12		241.5		9,987,895
2007	12		196.5		9,064,638

**Wheelabrator Frackville Energy, Schuylkill County, PA, Facility ID: 50879**

Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	No Data				
2003	12	Not Reported	283.4	Not Reported	4,745,383
2004	12		301.6		4,821,380
2005	12		309.6		4,923,553
2006	12		316.1		4,734,927

2007	12		348.4		4,956,785
<b>WPS Westwood Generation LLC, Schuylkill County, PA, Facility ID: 50611</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	384.6	248.3	353,653.6	2,946,010
2003	12	363.9	265.7	410,787.0	3,395,849
2004	12	362.8	255.5	412,223.4	3,402,889
2005	12	364.5	392.5	454,330.3	3,748,377
2006	12	299.7	288.8	404,693.5	3,341,946
2007	12	231.0	216.2	307,962.8	2,646,090
<b>Panther Creek Energy Facility, Carbon County, PA, Facility ID: 50776</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002		No Data			
2003	12	Not Reported	577.1	Not Reported	9,715,305
2004	12		544.8		9,074,909
2005	12		493.6		8,487,139
2006	12		558.2		8,775,600
2007	12		531.1		8,270,705
<b>Hunlock Power Station, Luzerne County, PA, Facility ID: 3176</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	3,369.4	447.5	371,025.3	3,363,966
2003	12	3,335.5	425.3	322,886.9	2,991,768
2004	12	3,831.3	552.2	385,821.6	3,602,653
2005	12	4,531.9	451.2	350,218.8	3,263,526
2006	12	4,463.4	493.9	358,886.9	3,420,829
2007	12	3,673.5	558.0	356,647.2	3,410,059
<b>Cromby Generation Station (Exelon), Chester County, PA, Facility ID: 3159</b>					
Year	# Months Reported	SO <sub>2</sub> Tons	NOx Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	3,666.6	1,416.5	888,337.4	9,365,376
2003	12	5,442.3	1,952.5	1,257,579.8	13,222,000
2004	12	6,864.9	2,053.2	1,247,551.4	12,790,103
2005	12	4,989.2	2,104.9	1,221,416.0	12,799,778
2006	12	3,613.5	1,692.7	970,952.9	9,881,506
2007	12	3,446.6	1,973.3	1,062,054.7	10,942,142

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of emissions in this potential nonattainment area may have installed emission controls or otherwise significantly reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants already have installed emission controls or plan to install such controls in the near future, EPA requests additional information on:

- the plant name, city, county, and township/tax district,
- identification of emission units at the plant, fuel use, and megawatt capacity,
- identification of emission units on which controls will be installed, and units on which controls will not be installed,
- identification of the type of emission control that has been or will be installed on each unit, the date on which the control device became / will become operational, and the emission reduction efficiency of the control device,
- the estimated pollutant emissions for each unit before and after implementation of emission controls, and
- whether the requirement to operate the emission control device will be federally enforceable by December 2008, and the instrument by which federal enforceability will be ensured (e.g. through source-specific SIP revision, operating permit requirement, consent decree).

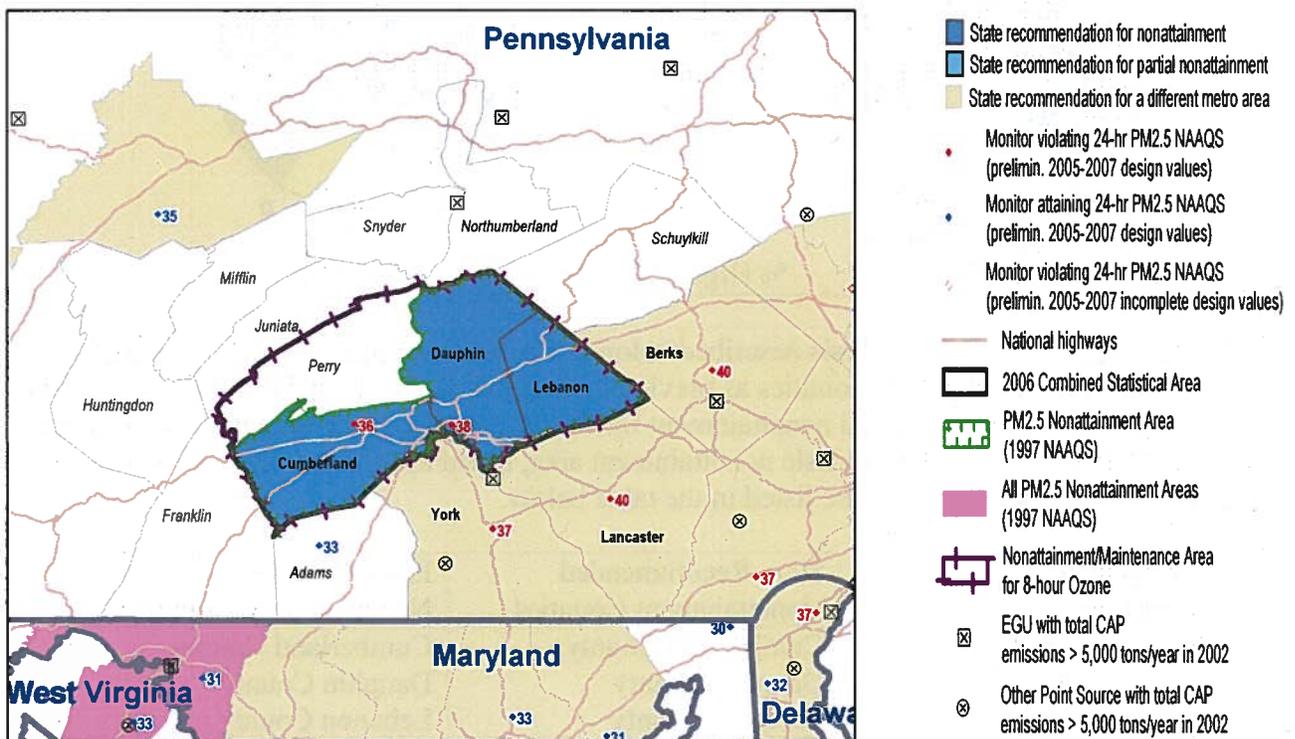
## EPA Technical Analysis for the Harrisburg-Lebanon-Carlisle Area

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Harrisburg-Lebanon-Carlisle area identifies the counties with monitors that violate the 2006 24-hour PM<sub>2.5</sub> standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1.0 is a map which identifies the counties in the Harrisburg-Lebanon-Carlisle area and provides other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary and counties recommended as nonattainment by the State.

Figure 1.0. The Harrisburg-Lebanon-Carlisle Area

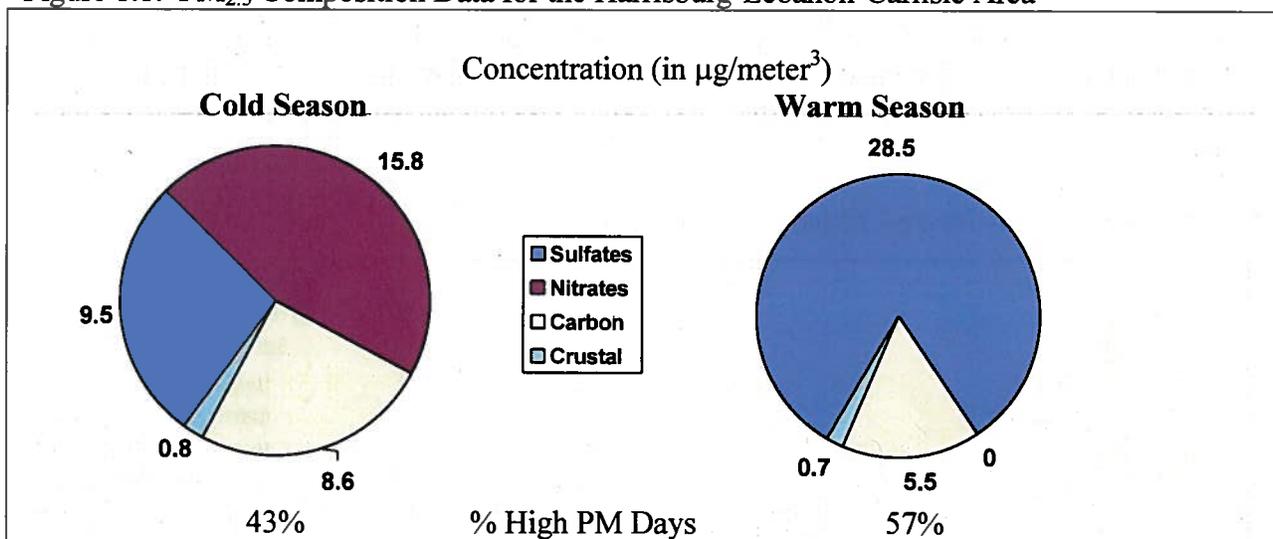


For this area, EPA previously established PM<sub>2.5</sub> nonattainment boundaries for the 1997 PM<sub>2.5</sub> NAAQS that included three full counties, Cumberland, Dauphin and Lebanon, all in the Commonwealth of Pennsylvania.

In December 2007, the Commonwealth of Pennsylvania recommended that the same counties, be designated as “nonattainment” for the 2006 24-hour PM<sub>2.5</sub> standard based on air quality data from 2004-2006. See the December 28, 2007 letter from the Pennsylvania Department of Environmental Protection to EPA. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state.

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations occur in both cool and warm seasons, and the average chemical composition of the highest days are typically characterized by high levels of nitrates in the cold season, and high levels of sulfates in the warm season. See Figure 1.1.

Figure 1.1. PM<sub>2.5</sub> Composition Data for the Harrisburg-Lebanon-Carlisle Area



Based on EPA's 9-factor analysis described below, EPA believes that Cumberland, Dauphin, and Lebanon Counties, the same counties as previously designated nonattainment for the 1997 PM<sub>2.5</sub> NAAQS, should be designated nonattainment for the 24-hour PM<sub>2.5</sub> air-quality standard as part of the Harrisburg-Lebanon-Carlisle nonattainment area, based upon currently available information. These counties are listed in the table below.

Harrisburg-Lebanon-Carlisle Area	State-Recommended Nonattainment Counties	EPA-Proposed Nonattainment Counties
Pennsylvania	Cumberland County Dauphin County Lebanon County	Cumberland County Dauphin County Lebanon County

The following is a summary of the 9-factor analysis for the Harrisburg-Lebanon-Carlisle area.

Cumberland, Dauphin, and Lebanon Counties in Pennsylvania were designated nonattainment for the 1997 PM<sub>2.5</sub> NAAQS as the Harrisburg-Lebanon-Carlisle nonattainment area. Those three counties, plus Perry County, were initially designated as a “basic” (Subpart 1) area for the 1997 8-hour ozone NAAQS and now comprise the Harrisburg-Lebanon-Carlisle maintenance area for the 1997 8-hour ozone standard. Cumberland and Dauphin Counties have monitors showing violations of 2006 24-hour PM<sub>2.5</sub> NAAQS. Lebanon County has no monitors, but is economically linked to Cumberland and Dauphin Counties, with over 14,000 Lebanon residences commuting to Cumberland and Dauphin Counties. In addition, based on emission levels, economic linkages, traffic, and commuting, emissions from Cumberland, Dauphin, and Lebanon Counties, such as those from vehicles and other small area sources, contribute to the nonattainment problem in the Harrisburg area. Therefore, EPA has determined that it is appropriate to include Cumberland, Dauphin, and Lebanon Counties in the Harrisburg-Lebanon-Carlisle nonattainment area for the 2006 24-hour PM<sub>2.5</sub> NAAQS.

This technical analysis focuses on the existing Harrisburg-Carlisle-Lebanon nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the other nearby counties illustrated in Figure 1.0. Therefore, counties that are not identified in Figure 1.0 are not addressed within this analysis. In addition, if a county is part of another existing nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the state has recommended including it in a separate nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS, that county will be considered for inclusion in a separate nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS. Accordingly, the following counties will be excluded from further consideration for inclusion within the Harrisburg-Carlisle-Lebanon nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS for the reasons provided below.

Counties	Reasons for Exclusion From Further Consideration
Lancaster, PA	Lancaster County is a separate nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania recommended Lancaster again be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.
Berks, PA	Reading is a separate nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania has recommended it again be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.
York, PA	York County is a separate nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania recommended Reading be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.

Data for these counties will be included in the tables for the remaining factors for informational purposes. However, no analysis will be conducted regarding that data.

The 9-factor analysis below will demonstrate that the Harrisburg-Lebanon-Carlisle area is a separate and distinct area, not associated economically or jurisdictionally with the Lancaster, Berks, and York areas. Historically, these areas have been separate nonattainment areas for both particulate matter and ozone. Lancaster, Berks, and York Counties are in separate nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, the Lancaster, Reading, and York nonattainment areas, respectively. Very few commuters from York, Lancaster, and Berks Counties travel into the Harrisburg-Carlisle-Lebanon Combined Statistical Area (CSA) compared to the commuters from Dauphin, Cumberland, and Lebanon Counties who travel within that CSA. Furthermore, as explained in detail in Factor 8, below, the York, Lancaster, and Berks areas are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In

addition, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Lancaster, and Berks Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that emissions from the York, Lancaster, and Berks Counties contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

### **Factor 1: Emissions Data**

For this factor, EPA evaluated county level emission data for the following PM<sub>2.5</sub> components and precursor pollutants: "PM<sub>2.5</sub> emissions total," "PM<sub>2.5</sub> emissions carbon," "PM<sub>2.5</sub> emissions other," "SO<sub>2</sub>," "NO<sub>x</sub>," "VOCs," and "NH<sub>3</sub>." "PM<sub>2.5</sub> emissions total" represents direct emissions of PM<sub>2.5</sub> and includes: "PM<sub>2.5</sub> emissions carbon," "PM<sub>2.5</sub> emissions other," primary sulfate (SO<sub>4</sub>), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO<sub>2</sub> and NO<sub>x</sub>, are part of "PM<sub>2.5</sub> emissions total," they are not shown in Table 1.0 separate items). "PM<sub>2.5</sub> emissions carbon" represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and "PM<sub>2.5</sub> emissions other" represents other inorganic particles (crustal). Emissions of SO<sub>2</sub> and NO<sub>x</sub>, which are precursors of the secondary PM<sub>2.5</sub> components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH<sub>3</sub> (ammonia) are also potential PM<sub>2.5</sub> precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html#C](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C).

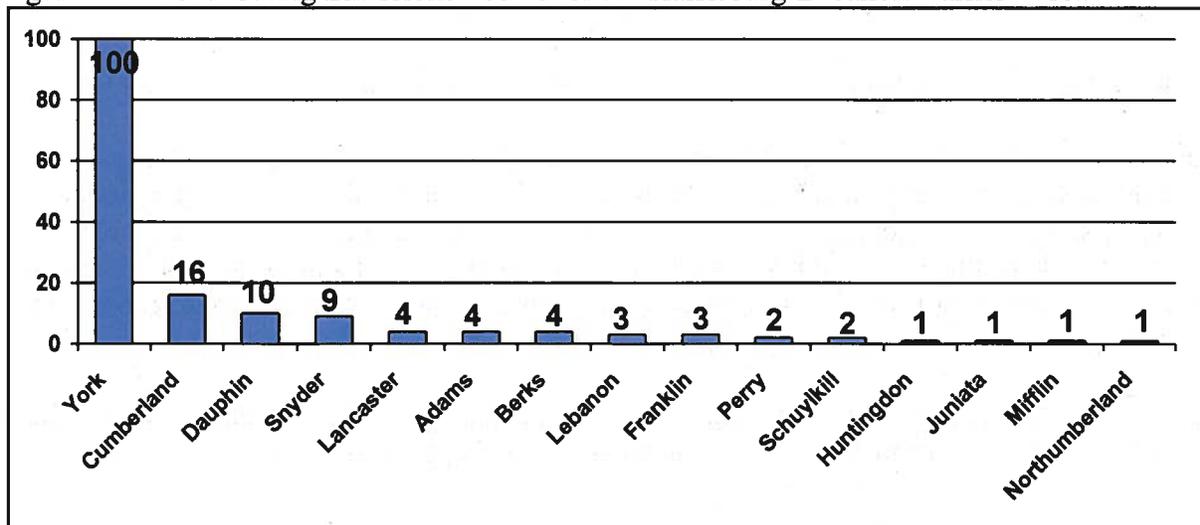
Table 1.0 shows emissions of PM<sub>2.5</sub> and precursor pollutants components (given in tons per year) and the CES values for violating and potentially contributing counties in the Harrisburg-Lebanon-Carlisle area. Counties that are part of the Harrisburg-Lebanon-Carlisle nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS are shown in boldface. Counties are listed in descending order by CES. Figure 1.2 is a graphical representation of the higher CES values set forth in Table 1.0. See Table 1.0 and Figure 1.2, below.

Table 1.0. PM<sub>2.5</sub> Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment?	CES	PM <sub>2.5</sub> emissions total (tpy)	PM <sub>2.5</sub> emissions carbon (tpy)	PM <sub>2.5</sub> emissions other (tpy)	SO <sub>2</sub> (tpy)	NOx (tpy)	VOCs (tpy)	NH <sub>3</sub> (tpy)
York, PA	Yes – other area	100	7,614	1,217	6,396	118,621	32,214	18,478	3,913
Cumberland, PA	Yes	16	1,677	698	979	1,976	14,454	9,939	2,105
Dauphin, PA	Yes	10	1,074	528	546	2,443	12,548	12,569	1,664
Snyder, PA	No	9	1,183	208	976	28,199	4,434	2,856	1,762
Adams, PA	No	4	1,142	444	697	581	2,825	4,660	3,353
Berks, PA	Yes – other area	4	3,378	922	2,456	18,874	18,086	19,117	4,653
Lancaster, PA	Yes – other area	4	3,258	1,159	2,099	4,017	16,396	26,407	16,486
Lebanon, PA	Yes	3	855	338	516	1,778	5,876	5,924	4,445
Franklin, PA	No	3	1,083	385	699	851	5,470	6,972	5,092
Perry, PA	No	2	486	233	253	444	2,515	2,278	1,541
Schuylkill, PA	No	2	1,247	547	700	7,239	6,219	6,873	1,137
Huntingdon, PA	No	1	565	257	307	791	2,526	3,247	870
Juniata, PA	No	1	291	125	167	252	1,807	1,499	1,577
Mifflin, PA	No	1	553	244	309	490	2,695	2,333	1,282
Northumberland, PA	No	1	728	308	420	1,505	3,442	5,275	1,722

Based upon the above data, York County has by far the highest level of sulfur dioxide (SO<sub>2</sub>), nitrogen oxide (NOx) and PM<sub>2.5</sub> emissions. In fact, SO<sub>2</sub> emissions in York County are more than the total SO<sub>2</sub> emissions in all the counties in and adjacent to the nonattainment area. This is primarily due to the emissions from the Brunner Island power station, which itself emitted over 104,000 tons of SO<sub>2</sub> and nearly 14,000 tons of NOx in 2005. Lancaster County leads the area of analysis in emissions of ammonia (NH<sub>3</sub>) and volatile organic compound (VOC) emissions. Composition data for the Harrisburg-Lebanon-Carlisle area (See Figure 1.1) shows very high levels of sulfates during the warm season and high levels of nitrates in the cold season. This data demonstrates the contribution of the SO<sub>2</sub> emissions from York County, which result in high sulfate composition, as well as the local contribution of nitrates by Lancaster County, most likely due to the higher ammonia levels there.

Figure 1.2. Contributing Emissions Scores for the Harrisburg-Lebanon-Carlisle Area



The overwhelming emissions contribution of York County has a great deal to do with why it is assigned the highest CES in the area of analysis (normalized to 100). Cumberland and Dauphin Counties have the next highest CES scores after York, although their emissions contributions for all pollutants are relatively low, with the exception of VOCs. The CES values for these counties are likely skewed due to their contribution from and proximity to York. Lebanon County has lower emissions and is further from the dominant emissions of York, and has a commensurately lower CES value. The CES scores for the area (Figure 1.2) are consistent with what one would expect, given in particular the emissions levels and distance of those emissions from the violating monitor.

Based on emissions levels and CES values, York County, followed distantly by Cumberland and Dauphin Counties, is the highest ranking candidate for a 2006 24-hour PM<sub>2.5</sub> nonattainment designation within the area which is the subject of this analysis.

It should be noted that three of the counties adjacent to the Harrisburg-Lebanon-Carlisle area have violating monitors (i.e., York, Lancaster, and Berks) and have been recommended by Pennsylvania for nonattainment as part of separate nonattainment areas. York, Lancaster, and Berks Counties are in separate nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS. Furthermore, as explained in detail in Factor 8, below, the York, Lancaster, and Berks areas are distinct from the Harrisburg-Lebanon-Carlisle area. They are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. Furthermore, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Lancaster, and Berks Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that emissions from the York, Lancaster, and Berks Counties contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

Those counties with CES scores lower than 3 have comparatively low emissions and do not appear to contribute significantly to the violating monitors in Cumberland and Dauphin Counties. Of these counties with CES lower than three, none have violating monitors and none have been recommended for nonattainment designation by Pennsylvania.

## **Factor 2: Air Quality Data**

This factor considers the 24-hour PM<sub>2.5</sub> design values (in  $\mu\text{g}/\text{m}^3$ ) for air-quality monitors in counties in the Harrisburg-Lebanon-Carlisle area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air-quality standard. The 2006 24-hour PM<sub>2.5</sub> standard is met when the 3-year average of a monitor's 98<sup>th</sup> percentile values are 35  $\mu\text{g}/\text{m}^3$  or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM<sub>2.5</sub> design values for counties in the Harrisburg-Lebanon-Carlisle area are shown in Table 2, with the current 1997 PM<sub>2.5</sub> nonattainment area appearing in bold.

Table 2.0. Air Quality Data

County	State Recommended Nonattainment?	Design Values 2003-05 ( $\mu\text{g}/\text{m}^3$ )	Design Values 2004-06 ( $\mu\text{g}/\text{m}^3$ )	Design Values 2005-07 ( $\mu\text{g}/\text{m}^3$ )
Cumberland, PA	Yes	40	38	36
Dauphin, PA	Yes	39	38	38
Lebanon, PA	Yes	No monitor		
York, PA	Yes – other area	41	37	37
Snyder, PA	No	No monitor		
Adams, PA	No	36	35	33
Berks, PA	Yes – other area	39	36	40
Lancaster, PA	Yes – other area	44	39	40
Franklin, PA	No	No monitor		
Perry, PA	No	No monitor		
Schuylkill, PA	No	No monitor		
Huntingdon, PA	No	No monitor		
Juniata, PA	No	No monitor		
Mifflin, PA	No	No monitor		
Northumberland, PA	No	No monitor		

Note: Design values shown in red represent violations of the standard.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 2006 24-hr  $\text{PM}_{2.5}$  NAAQS for designation purposes.

The data set forth in Table 2.0, above, indicates that, in the Harrisburg-Lebanon-Carlisle area, Cumberland and Dauphin Counties violate the 2006 24-hour  $\text{PM}_{2.5}$  standard. The adjacent counties of York, Adams, Berks, and Lancaster also violate the 2006 24-hour  $\text{PM}_{2.5}$  standard, over the same period. Therefore, these counties are candidates for inclusion in the Harrisburg-Lebanon-Carlisle nonattainment area, or as part of a neighboring nonattainment area.

However, the absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status. Each county has been evaluated based on the weight of evidence of the nine factors and other relevant information. Based upon the above data, Adams County does not have a violating monitor and has low emissions compared to the other counties in this analysis and low CES values.

Based upon 2005-07 design values, Berks and Lancaster Counties have the highest design values, followed by Dauphin, York, and Cumberland Counties, which all continue to monitor violations of the standard. However, as stated above, Berks, Lancaster and York Counties are in separate nonattainment areas for the 1997  $\text{PM}_{2.5}$  NAAQS, and Pennsylvania recommended them for inclusion in those same nonattainment areas for the 2006  $\text{PM}_{2.5}$  NAAQS.

### Factor 3: Population Density and Degree of Urbanization

Table 3.0, below, shows the 2005 population for each county in the Harrisburg-Lebanon-Carlisle area, as well as the population density for each county in that area. Population data provides an indication of whether it is likely that population-based emissions might contribute to violations of the 2006 24-hour PM<sub>2.5</sub> standard.

Table 3.0. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
<b>Cumberland, PA</b>	<b>Yes</b>	<b>223,017</b>	<b>405</b>
<b>Dauphin, PA</b>	<b>Yes</b>	<b>252,949</b>	<b>454</b>
<b>Lebanon, PA</b>	<b>Yes</b>	<b>125,429</b>	<b>346</b>
York, PA	Yes— other area	408,182	449
Snyder, PA	No	37,949	114
Adams, PA	No	99,746	191
Berks, PA	Yes – other area	396,236	458
Lancaster, PA	Yes – other area	489,936	499
Franklin, PA	No	137,273	178
Perry, PA	No	44,724	81
Schuylkill, PA	No	146,996	188
Huntingdon, PA	No	45,772	51
Juniata, PA	No	23,412	60
Mifflin, PA	No	46,085	112
Northumberland, PA	No	92,280	194

Based upon the above data and other relevant data, this area varies from sparsely to densely populated, with county level population densities ranging from a low of 51 to a high of 499 persons per square mile. The average population density for Pennsylvania on the whole was 274 per the 2000 US Census. Most of these counties are characterized by their relatively distributed populations, relatively small urban centers, and in predominately rural/suburban development pattern. For example, the City of York had a 2003 population of 40,862, while the City of Lancaster had a 2003 population of 55,551 – each having around 10% of their respective total county populations.

The above data indicates that York, Lancaster, and Berks Counties have the highest populations in the Harrisburg-Lebanon-Carlisle area. Of the remaining listed counties, Dauphin and Cumberland have the highest populations. Lancaster and Berks counties have the highest population density. Dauphin, York, Cumberland and Lebanon counties also have significantly greater population density than the remaining counties within the Harrisburg-Lebanon-Carlisle area. Lebanon County has a relatively high population density, but only about half the total population of Cumberland and Dauphin, each. The counties shown in Factor 1 to have low CES values and relatively low emissions are shown here to have comparatively low populations and population densities. Of the counties not otherwise recommended by Pennsylvania for inclusion as part of a separate nonattainment area, Cumberland, Dauphin, and Lebanon are highest ranking for this factor.

#### Factor 4: Traffic and Commuting Patterns

This factor considers the number of commuters in each county who drive to another county within and surrounding the Harrisburg-Lebanon-Carlisle area, the percent of total commuters in each county who commute to other counties within the area and to surrounding counties. This factor also takes into consideration the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4.0). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

The listing of counties in Table 4.0 reflects a ranking based on the number of people commuting to other counties. The counties that comprise the Harrisburg-Lebanon-Carlisle nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS are shown in boldface.

Table 4.0. Traffic and Commuting Patterns

County	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
<b>Cumberland, PA</b>	<b>Yes</b>	<b>2,996</b>	<b>100,130</b>	<b>95</b>	<b>96,320</b>	<b>91</b>
<b>Dauphin, PA</b>	<b>Yes</b>	<b>3,413</b>	<b>115,390</b>	<b>95</b>	<b>113,240</b>	<b>94</b>
<b>Lebanon, PA</b>	<b>Yes</b>	<b>1,133</b>	<b>21,020</b>	<b>36</b>	<b>50,890</b>	<b>87</b>
York, PA	Yes – other area	3,333	169,300	88	21,840	11
Snyder, PA	No	419	660	4	820	5
Adams, PA	No	742	14,000	31	2,730	6
Berks, PA	No	3,320	145,730	82	2,940	2
Lancaster, PA	Yes – other area	4,392	217,820	94	10,110	4
Franklin, PA	Yes – other area	1,535	4,360	7	3,970	6
Perry, PA	No	424	13,840	65	20,190	95
Schuylkill, PA	No	1,353	8,480	14	3,960	6
Huntingdon, PA	No	465	430	2	290	2
Juniata, PA	No	226	2,200	21	2,670	26
Mifflin, PA	No	403	480	2	510	3
Northumberland, PA	No	797	1,880	5	1,800	4

Note: The 2005 VMT data used for Tables 4.0 and 4.1 of this analysis has been derived using methodology similar to that described in “Documentation for the final 2002 Mobile National Emissions Inventory, Version 3, September 2007, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at: [ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002\\_mobile\\_nei\\_version\\_3\\_report\\_092807.pdf](ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002_mobile_nei_version_3_report_092807.pdf). The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008. The United States 2000 Census County-to-County Worker Flow Files can be found at: <http://www.census.gov/population/www/cen2000/commuting/index.html>.

The data set forth in Table 4.1, below, relates to predominant commuting patterns for the Harrisburg-Lebanon-Carlisle area. Based upon this data, it appears that the bulk of commuter movement is within and between the counties in the Harrisburg-Lebanon-Carlisle area that have monitors that violate the 2006 PM<sub>2.5</sub> 24-hour standard. The table is read by finding the county that contributes commuters in the left column, and reading across the table to the column to

where those commuters travel (e.g., on average, 142,104 commuter trips per day originate and end in York County).

Table 4.2. Predominant Commuting Patterns for the Harrisburg-Lebanon-Carlisle Area

Commuting From:	CSA	CBSA	Number commuting into any violating counties	Number commuting into statistical area	Commuting To:						
					Berks	Cumberland	Dauphin	Lancaster	York	Lebanon	Perry
Berks	Philadelphia-Camden-Vineland, PA-NJ-DE-MD	Reading, PA	145,730	2,940	140,819	238	651	3,870	152	2,053	6
Cumberland	Harrisburg-Carlisle-Lebanon, PA	Harrisburg-Carlisle, PA	100,130	96,320	84	73,081	22,448	705	3,807	419	370
Dauphin	Harrisburg-Carlisle-Lebanon, PA	Harrisburg-Carlisle, PA	115,390	113,240	175	16,310	93,958	2,585	2,365	2,508	460
Lancaster		Lancaster, PA	217,820	10,110	4,074	1,197	6,927	201,608	4,018	1,952	320
York	York-Hanover-Gettysburg, PA	York-Hanover, PA	169,300	21,840	240	11,626	9,848	5,485	142,104	332	320
Lebanon	Harrisburg-Carlisle-Lebanon, PA	Lebanon, PA	21,020	50,890	2,799	1,335	12,853	3,770	266	36,677	210
Adams	York-Hanover-Gettysburg, PA	Gettysburg, PA	14,000	2,730							
Perry	Harrisburg-Carlisle-Lebanon, PA	Harrisburg-Carlisle, PA	13,840	20,190							
Schuylkill		Pottsville, PA	8,480	3,960							
Franklin		Chambersburg, PA	4,360	3,970							
Juniata			2,200	2,670							
Northumberland	Sunbury-Lewisburg-Selinsgrove, PA	Sunbury, PA	1,880	1,800							
Snyder	Sunbury-Lewisburg-Selinsgrove, PA	Selinsgrove, PA	660	820							
Mifflin		Lewistown, PA	480	510							
Huntingdon		Huntingdon, PA	430	290							

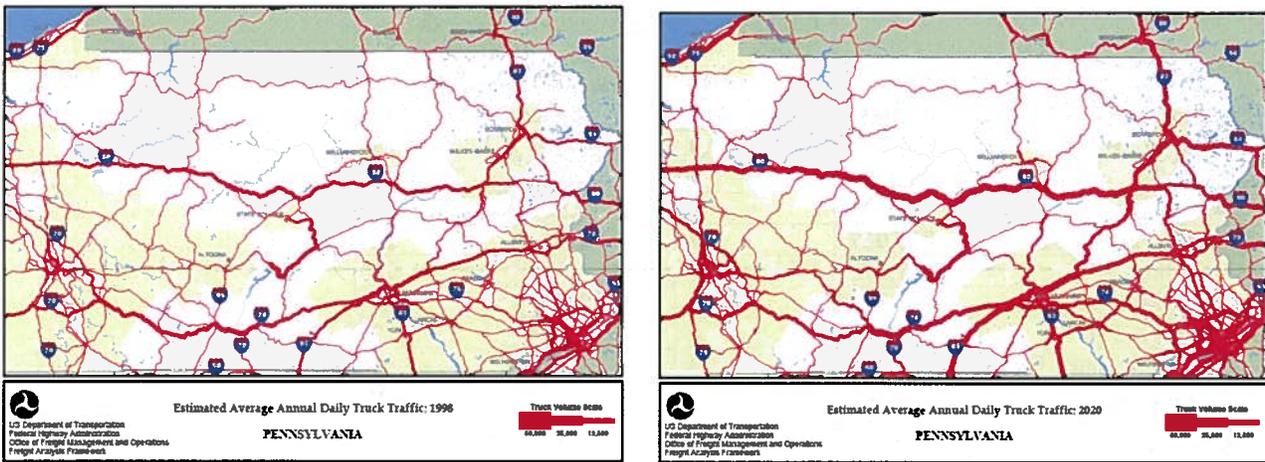
Source: United States 2000 Census County-To-County Worker Flow Files  
<http://www.census.gov/population/www/cen2000/commuting/index.html>

Based upon the above data, it appears that, for each of the counties with a violating monitor, the great majority of commuters travel within the confines of their own county and the number of commuters crossing into other counties with a violating monitor is relatively low. For example, in York County over 78% of commuter trips originate and end within the county, with fewer than 10% travelling to the violating counties of Cumberland and Dauphin.

Although York and Berks have the highest overall number of commuters, most do not cross into the other counties with violating monitors. Also, Cumberland and Dauphin have relatively high number of commuters, but most travel within the Harrisburg area. Lebanon County's VMT is only roughly one-third that of Cumberland and Dauphin Counties, and it has far fewer commuters. However, 87% of Lebanon County's commuters commute into and within the statistical area, with over 14,000 commuters into Cumberland and Dauphin Counties.

Tables 4.0 and 4.1 only address commuter traffic, and do not track non-commuter travel patterns. These tables do not directly address heavy-duty diesel truck traffic from surrounding counties to the Harrisburg-Lebanon-Carlisle area. The entire region is expected to see strong growth in truck traffic over the next several decades (see Figure 4.0).

Figure 4.0. U.S. Department of Transportation Estimated Pennsylvania Average Annual Daily Truck Traffic (1998 vs. 2020)



While York, Berks, and Lancaster Counties all rank high for VMT under this factor, Pennsylvania has recommended them for nonattainment designation as separate areas. Based upon the data set forth in Table 4.1, above, it appears that very few commuters from York, Lancaster, and Berks Counties travel into the Harrisburg-Carlisle-Lebanon Combined Statistical Area (CSA) compared to the commuters from Dauphin, Cumberland, and Lebanon Counties who travel within that CSA. As explained in greater detail in Factor 8, below, the Harrisburg-Carlisle-Lebanon, York, Berks, and Lancaster areas are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Lancaster, and Berks Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that vehicle emissions from the York, Lancaster, and Berks Counties contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

Of the remaining counties, Dauphin, Cumberland, and Lebanon rank highest for nonattainment designation based on this factor. These three counties are also high ranking candidates based on several other factors.

## Factor 5: Growth Rates and Patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in the Harrisburg-Lebanon-Carlisle area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

Table 5.0 below shows population, population growth, VMT and VMT growth for counties in the Harrisburg-Lebanon-Carlisle area. Counties are listed in descending order based on VMT growth between 1996 and 2005.

Table 5.0. Population and VMT Growth and Percent Change

Location	Population (2005)	Population % change (2000 - 2005)	Vehicle Miles Traveled in 2005 (millions)	Percentage VMT Growth (1996 to 2005)
Lancaster, PA	489,936	4	4,392	21
<b>Dauphin, PA</b>	<b>252,949</b>	<b>0</b>	<b>3,413</b>	<b>27</b>
York, PA	408,182	7	3,333	6
Berks, PA	396,236	6	3,320	11
<b>Cumberland, PA</b>	<b>223,017</b>	<b>4</b>	<b>2,996</b>	<b>25</b>
Franklin, PA	137,273	6	1,535	18
Schuylkill, PA	146,996	(2)	1,353	(1)
<b>Lebanon, PA</b>	<b>125,429</b>	<b>4</b>	<b>1,133</b>	<b>7</b>
Northumberland, PA	92,280	(2)	797	5
Adams, PA	99,746	9	742	9
Huntingdon, PA	45,772	0	465	30
Perry, PA	44,724	3	424	17
Snyder, PA	37,949	1	419	40
Mifflin, PA	46,085	(1)	403	11
Juniata, PA	23,412	2	226	22

Based upon the above data, Lancaster County had the highest 2005 VMT levels. Although Snyder and Huntingdon had the largest percentage gains in VMT growth, their 2005 VMT levels were compared to Lancaster, Dauphin, Cumberland, and Lebanon Counties, and other counties in this analysis. Dauphin and Cumberland Counties had larger VMT levels and had high VMT growth between 2000 to 2005, 27 and 25 percent respectively.

Population growth was highest in absolute terms in York County. Lebanon, Dauphin, and Cumberland Counties all had population growth rates for the period from 2000 to 2005 of between four to seven percent. Of the counties being analyzed here, York County appears to be the highest ranking county in terms of population growth.

Due to the relatively modest population of all of these counties, and the relatively low populations, population growth is not a high ranking factor in this analysis. The large VMT growth rates make VMT growth a larger concern. However, VMT levels in most of the Harrisburg-Lancaster-Lebanon area and surrounding counties continues to be relatively small. High rates of VMT growth in combination with high baseline VMT levels make VMT growth a higher ranking factor for Dauphin, Cumberland and Lancaster Counties.

While York, Berks, and Lancaster Counties all rank high for VMT under this factor, Pennsylvania has recommended them for nonattainment designation as separate areas. As explained in greater detail in Factor 8, below, the Harrisburg-Carlisle-Lebanon, York, Berks, and Lancaster areas are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Lancaster, and Berks Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that VMT and population-based emissions from the York, Lancaster, and Berks Counties impact the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution it will be lessened by controls put in place in those separate nonattainment areas.

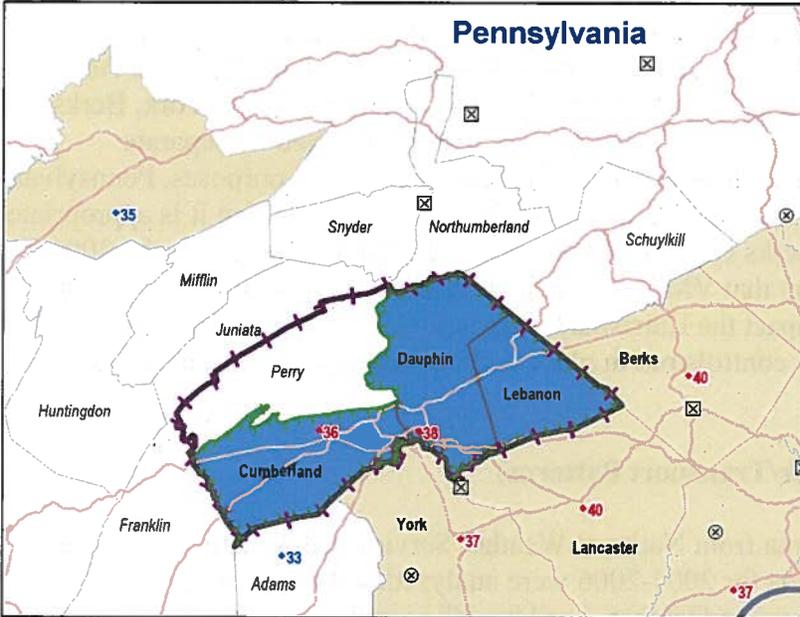
#### **Factor 6: Meteorology (Weather/Transport Patterns)**

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on “high PM<sub>2.5</sub> days” for each of two seasons (an October-April “cold” season and a May-September “warm” season). These high PM<sub>2.5</sub> days are defined as days where any FRM or FEM air quality monitors had 24-hour PM<sub>2.5</sub> concentrations above 95% on a frequency distribution curve of PM<sub>2.5</sub> 24-hour values.

Meteorology data is also considered in each county’s Contributing Emissions Score (CES) because the method for deriving the CES included an analysis of trajectories of air masses for high PM<sub>2.5</sub> days. See Factor 1 (Emissions data), above.

For each air quality monitoring site identified in Figure 6.1, below, EPA developed a pollution trajectory plot (or “pollution rose”) to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. See Figures 6.2-6.7, below. Each pollution rose figure identifies 24-hour PM<sub>2.5</sub> values by colored icons; days exceeding 35 µg/m<sup>3</sup> are denoted with a red or black icon. These icons are either dots or triangles. A dot indicates the day occurred in the warm season; a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of each icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 6.1. Harrisburg-Lebanon-Carlisle Area



Harrisburg and Carlisle Areas

The pollution roses for Dauphin County (Harrisburg area) and Cumberland County (Carlisle area) are similar. See figures 6.2 and 6.3, below. These figures show a similar northwest-southeast prevailing wind direction on high PM<sub>2.5</sub> days in both the cold and warm season, but show more warm high PM<sub>2.5</sub> days in the northwest quadrant and more cool weather days in the southwest quadrant. These patterns indicate influences from Lebanon, York, Lancaster and Cumberland Counties on Dauphin County. For Cumberland County, the pollution rose indicates particulate contribution from York County (from the southeast), plus westerly and northwesterly components.

Figure 6.2. Pollution Trajectory Plot for Dauphin County, PA (Site 42-043-0401)

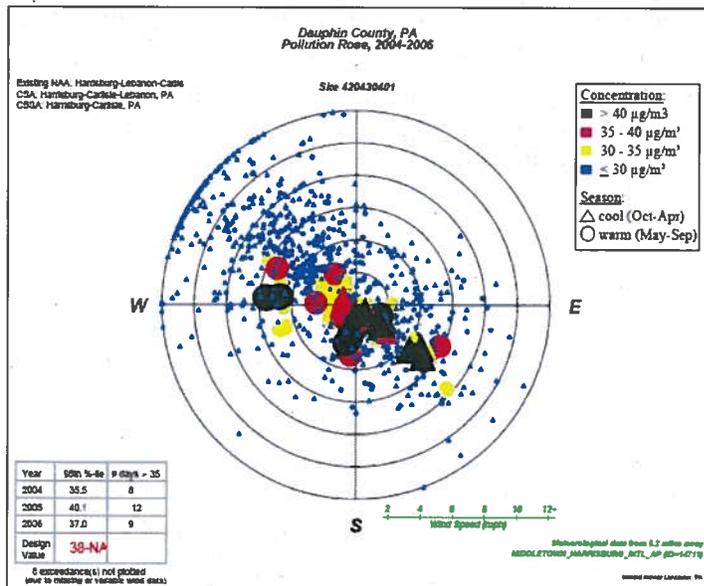
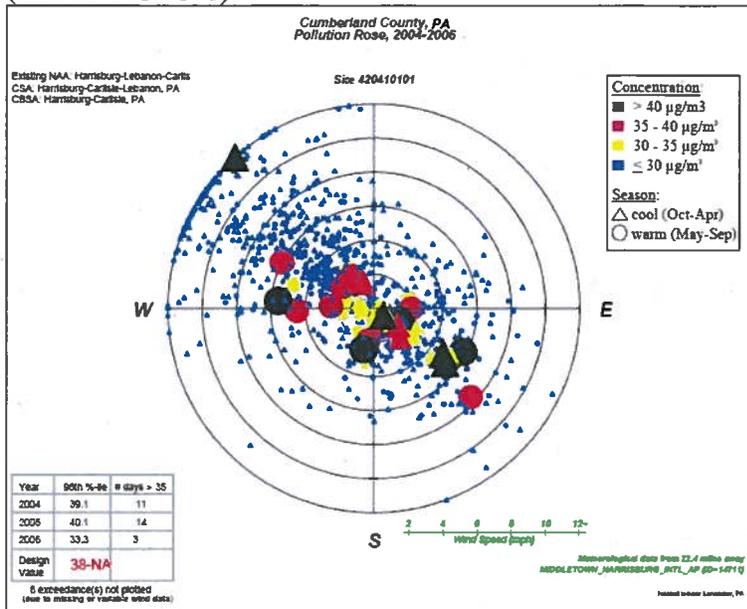


Figure 6.3. Pollution Trajectory Plot for Cumberland County, PA (Site 42-041-0101)



Lancaster and York Areas

The pollution roses for the adjacent counties of York and Lancaster monitors show a similar pattern to those of Harrisburg and Carlisle. See Figures 6.4 and 6.5, below. For both warm and cool seasons on days with the highest measured PM<sub>2.5</sub> (>30 µg/m<sup>3</sup>) concentration values, winds are mild and predominately from the northwest and the southeast.

Figure 6.4. Pollution Trajectory Plot for York County, PA (Site 42-133-0008)

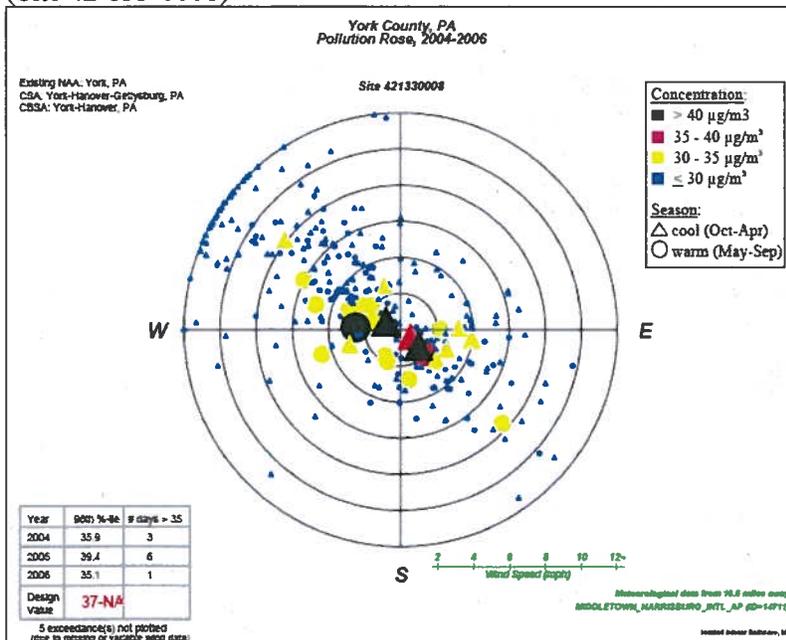
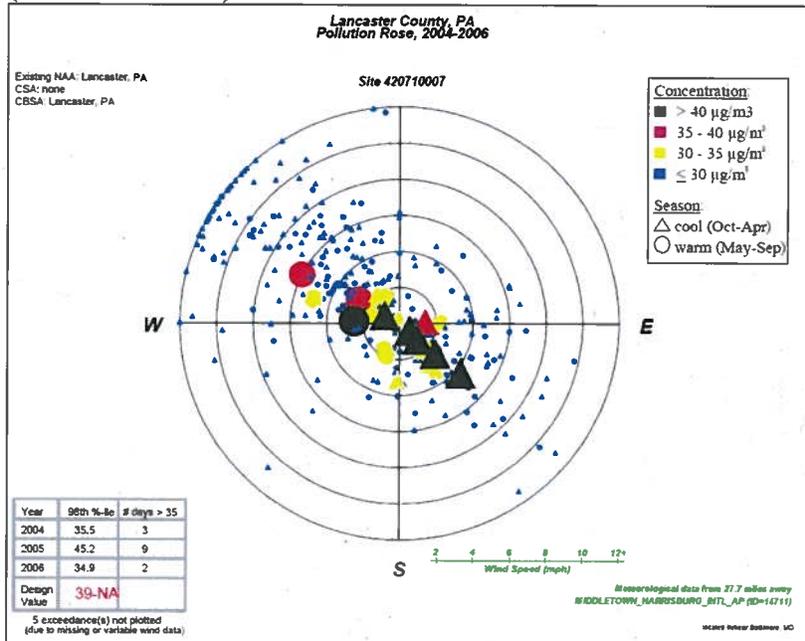


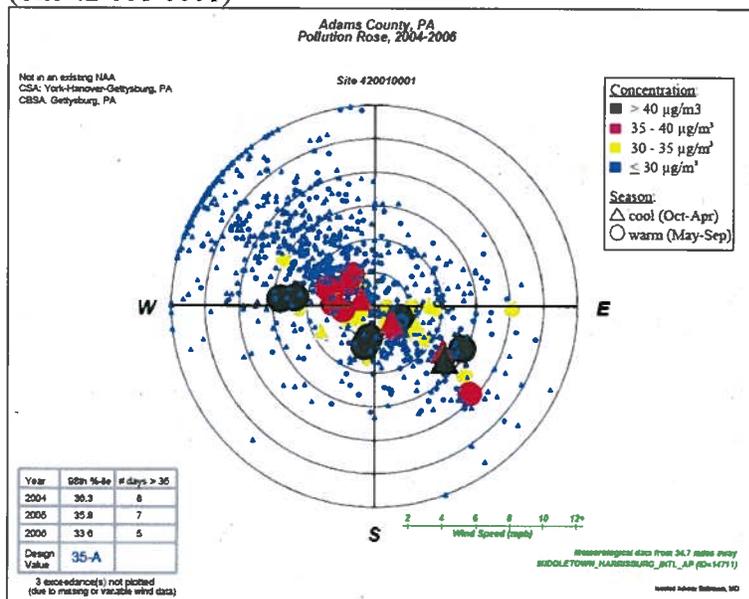
Figure 6.5. Pollution Trajectory Plot for Lancaster County, PA (Site 42-071-0007)



Adams County

The Adams County monitor is located due south of Cumberland County in the Harrisburg area. The pollution rose for the Adams County monitor is very similar in appearance to that of Cumberland County. It also shows a northwest-southeast prevailing wind direction on high concentration days in both the cold and warm season, but show more cool high PM<sub>2.5</sub> days in the southeast quadrant.

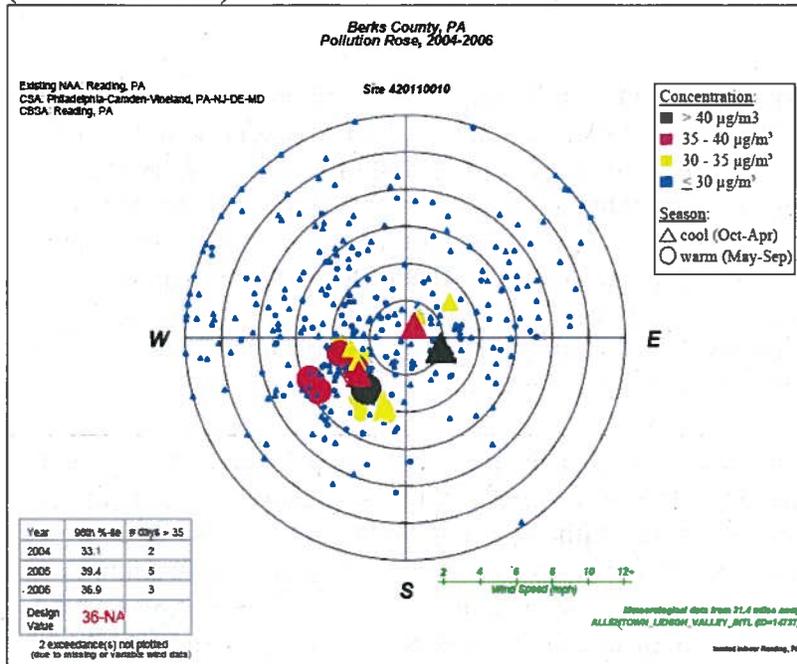
Figure 6.6. Pollution Trajectory Plot for Adams County, PA (Site 42-001-0001)



### Reading Area

The Reading monitor is located fairly distant due east of the violating monitors in Dauphin and Cumberland Counties. For high days in the cool season, the pollution rose for Berks County shows a prevalence of light winds in the northeast or southwest direction. The trend for warm days appears to be for light winds from the southwest. See Figure 6.7, below. It appears from this information that the wind magnitude and direction on high days in Berks County does not contribute significantly to the violating monitors in Dauphin and Cumberland Counties.

Figure 6.7. Pollution Trajectory Plot for Berks County, PA  
(Site 42-011-0011)



The wind patterns and pollution trajectories show that emissions from Dauphin and Cumberland Counties impact each other. Based on the above analysis of this factor, EPA concludes that Cumberland and Dauphin Counties are high ranking candidates for a 24-hour PM<sub>2.5</sub> nonattainment designation.

Lancaster and York Counties have meteorology patterns that likely result in some contribution of transported pollution to the violating monitors in the 1997 Harrisburg-Lebanon-Carlisle PM<sub>2.5</sub> nonattainment area. However, York and Lancaster Counties are in separate nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and Pennsylvania recommended that they be included in those same separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. Furthermore, as explained in detail in Factor 8, below, the York and Lancaster areas are distinct from the Harrisburg-Lebanon-Carlisle area. They are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. Furthermore, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include Lancaster and York Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that there is any contribution of transported pollution from the Lancaster and York nonattainment areas to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

The pollution rose data does not show a clear contribution from Berks County to the violating monitors in Dauphin and Cumberland Counties. Therefore, Berks County is a lower ranking candidate for a 24-hour PM<sub>2.5</sub> nonattainment designation in the Harrisburg area.

#### **Factor 7: Geography/Topography**

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM<sub>2.5</sub> over the Harrisburg-Lebanon-Carlisle area.

The Southcentral Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM<sub>2.5</sub> NAAQS, including the Harrisburg-Lebanon-Carlisle, Lancaster, York and Reading nonattainment areas. These areas generally lie to the south and east of the southern boundary of the Allegheny Mountains, which influence regional wind patterns and serves as a barrier to low maritime air masses originating from the Atlantic Ocean. Several broad valleys stretch across this Southcentral Region, although these terrain features are smaller than the mountains to the north. Statistical analysis by Pennsylvania DEP indicate monitors within the area generally correlate well with each other, but less well with monitors located in eastern Pennsylvania, or in Adams County (to the west) or Perry County (to the north).

The Harrisburg-Lebanon-Carlisle area does not have geographical or topographical barriers that significantly limit air-pollution transport within its air shed. Therefore, geography did not play a significant role in the decision-making process. Although the general Harrisburg-Lebanon-Carlisle area and the general York, Lancaster and Reading areas are geographically contiguous and to some degree may contribute particulate emissions to one another, EPA has, previously, analyzed the Harrisburg-Lebanon-Carlisle area separately from the York, Lancaster and Reading areas for purposes of designation determinations based upon both PM and ozone standards. For reasons discussed above, EPA is analyzing the Harrisburg-Lebanon-Carlisle area separately from the York, Lancaster and Reading areas for purposes of the 24-hour PM<sub>2.5</sub> nonattainment designation determination.

#### **Factor 8: Jurisdictional Boundaries (e.g., Existing PM and Ozone areas)**

In evaluating the jurisdictional boundary factor, consideration is being given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for PM<sub>2.5</sub> or 8-hour ozone standard) represent important boundaries for state air quality planning.

As mentioned above, the Southcentral Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM<sub>2.5</sub> NAAQS, including the Harrisburg-Lebanon-Carlisle, York, Lancaster, and Reading nonattainment areas. These nonattainment areas are in separate metropolitan statistical areas (MSAs):

- The Harrisburg-Carlisle MSA includes Cumberland, Dauphin, and Perry Counties. The Harrisburg-Carlisle-Lebanon Combined Statistical Area (CSA) includes the Harrisburg-Carlisle MSA along with the Lebanon MSA (Lebanon County).

- The York-Hanover MSA is comprised of a single county, York. The York-Hanover-Gettysburg, CSA includes the York-Hanover MSA plus the Gettysburg, PA Micropolitan Statistical Area of Adams County.
- The Lancaster MSA is comprised of Lancaster County.
- The Reading MSA consists of Berks County. The Reading MSA is part of the Philadelphia-Camden-Vineland CSA.

These areas are served by separate metropolitan planning organizations (MPOs): the Tri-County Regional Planning Commission (RPC), the Lebanon County Planning Department, the York County Planning Commission, the Lancaster County Planning Commission and the Berks County Planning Commission.

Pennsylvania has defined four air basins that roughly correspond to the 1997 Harrisburg-Lebanon-Carlisle PM<sub>2.5</sub> nonattainment area and the recommended 2006 PM<sub>2.5</sub> nonattainment areas in Southcentral Pennsylvania: 1) Lancaster Air Basin in Lancaster County; 2) Reading Air Basin in Berks County; 3) Harrisburg Air Basin in Cumberland and Dauphin Counties; and, 4) the York Air Basin in York County. These air basins are defined in 25 *Pa Code* § 121.1, and designate sulfur compound controls outlined in 25 *Pa Code* § 123.22.

The definitions of these four air basins, as they appear in 25 *Pa Code* § 121.1 appear below:

*Lancaster air basin*—The political subdivisions in Lancaster County of East Petersburg Borough, City of Lancaster, Lancaster Township, Manheim Township and Millersville Borough.

*Reading air basin*—The political subdivisions in Berks County of Bern Township, Cumru Township, Kenhorst Borough, Laureldale Borough, Leesport Borough, Lower Alsace Township, Mohnton Borough, Mt. Penn Borough, Muhlenberg Township, City of Reading, Shillington Borough, Sinking Spring Borough, Spring Township, St. Lawrence Borough, Temple Borough, West Lawn Borough, West Reading Borough, Wyomissing Borough and Wyomissing Hills Borough.

*Harrisburg air basin*—The following political subdivisions in Cumberland County: Camp Hill Borough, East Pennsboro Township, Lemoyne Borough, New Cumberland Borough, West Fairview Borough, Wormleysburg Borough, and the political subdivisions in Dauphin County of the City of Harrisburg, Highspire Borough, Lower Swatara Township, Middletown Borough, Paxtang Borough, Royalton Borough, Steelton Borough, Susquehanna Township and Swatara Township.

*York air basin*—The political subdivisions in York County of Manchester Township, North York Borough, Spring Garden Township, Springettsbury Township, West Manchester Township, West York Borough and City of York.

Areas designated as 8-hour ozone nonattainment areas, and prior PM<sub>2.5</sub> nonattainment areas, are also important boundaries for State air-quality planning. For the 1997 PM<sub>2.5</sub> standard and the 1997 8-hour ozone standard, the Harrisburg-Lebanon-Carlisle metropolitan area (as defined by OMB in 1999) was designated as a separate nonattainment area from the other nearby metropolitan areas surrounding it. York and Adams Counties were designated as the York

Subpart 1 (“Basic”) 8-hour ozone nonattainment area. Berks County was designated as the Reading Subpart 1 (“Basic”) 8-hour ozone nonattainment area, Lancaster County designated as the Lancaster marginal 8-hour ozone nonattainment area. The Harrisburg-Lebanon-Carlisle, York, Reading, and Lancaster 8-hour ozone nonattainment areas have all been re-designated to attainment for the 1997 8-hour ozone standard.

The Harrisburg-Carlisle metropolitan area is served by one MPO, the Tri-County RPC, which has planning responsibilities for Dauphin, Cumberland, and Perry Counties. A separate MPO is responsible for Lebanon County.

Perry County was not included in the 1997 PM<sub>2.5</sub> Harrisburg-Lebanon-Carlisle nonattainment area, due to its generally low ranking in the 9-factor analysis performed by EPA under that standard. Perry County was, however, included in the 8-hour ozone nonattainment area, and is now a part of that 8-hr ozone maintenance area.

A goal in designating PM<sub>2.5</sub> nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas. A comparison of ozone areas with potential PM<sub>2.5</sub> nonattainment areas gives support to: 1) designating portions of the Harrisburg-Lebanon-Carlisle area as separate PM<sub>2.5</sub> nonattainment area from the other surrounding PM<sub>2.5</sub> nonattainment areas and 2) including Lebanon County within the Harrisburg-Lebanon-Carlisle 2006 PM<sub>2.5</sub> nonattainment areas. Furthermore these proposals are supported by Pennsylvania’s December 2007 recommendation for designation within the Harrisburg-Lebanon-Carlisle area under the 2006 PM<sub>2.5</sub> standard.

### **Factor 9: Level of Control of Emission Sources**

This factor considers emission controls currently implemented, and those to be implemented in the near future, in the Harrisburg-Lebanon-Carlisle area.

The emission estimates on Table 1.0 (under Factor 1) reflect implementation of control strategies implemented by the Commonwealth of Pennsylvania in the Harrisburg-Lebanon-Carlisle area before or during 2005 that may influence emissions of any component of PM<sub>2.5</sub> emissions (i.e., total carbon, SO<sub>2</sub>, NO<sub>x</sub>, and crustal PM<sub>2.5</sub>).

Figure 9.1, below, depicts the location of the four electrical generating units (EGUs) within the Harrisburg-Lebanon-Carlisle area and nearby vicinity which have combined SO<sub>2</sub> and NO<sub>x</sub> emissions of greater than 5,000 tons annually. Table 9.0 shows emissions and controls (current and projected) for EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions greater than 5000 tons. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) database. Table 9.1 shows emissions for the same EGUs for the years 2002 through 2008. The data was obtained from the emissions section of EPA’s Clean Air Markets Division (CAMD) website <http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>.

Figure 9.1 The Harrisburg-Lebanon-Carlisle Area showing nearby EGUs over 5,000 tons/year SO<sub>2</sub> and NO<sub>x</sub> (Google Earth 2008)

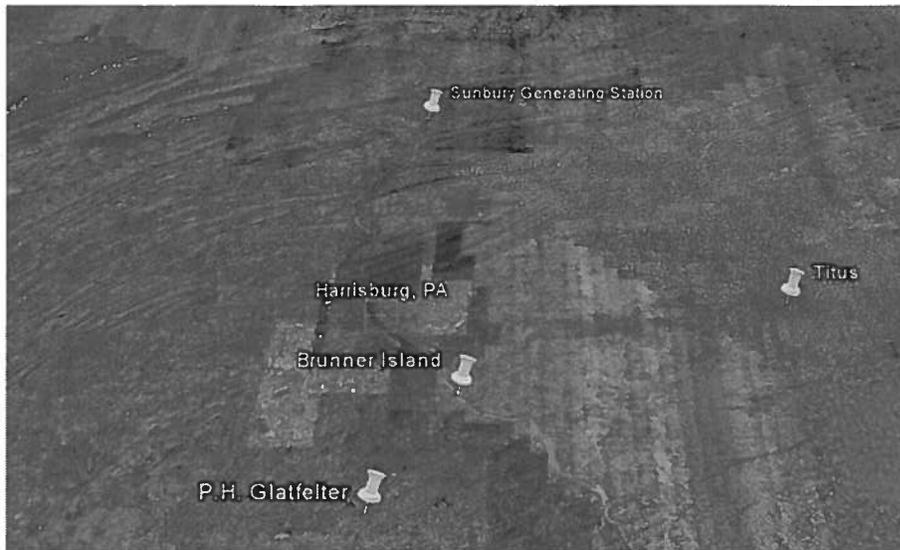


Table 9.0. EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions > 5000 tons, from the 2006 NEEDS EGU Database

County	Plant Name	Plant Type	UniqueID Final	2006 SO <sub>2</sub>	2006 NO <sub>x</sub>	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW	1997 PM <sub>2.5</sub> Nonattainment Area
Berks	Titus	Coal Steam	3115_B_3	4,718	708				81.0	Reading
			3115_B_1	4,666	699				81.0	
			3115_B_2	3,954	589				81.0	
Snyder	Sunbury Generating Station	Coal Steam	3152_B_4	6,668	704				128.0	Attainment
			3152_B_3	7,039	819				82.7	
			3152_B_2B	2,712	330				37.6	
			3152_B_1A	2,556	277		91.6		37.6	
			3152_B_1B	2,496	275		91.6		37.6	
			3152_B_2A	2,404	297				37.6	
York	P H Glatfelter	Coal Steam	50397_B_5PB036				91.6		36.1	York
	PPL Brunner Island	Coal Steam	3140_B_3	45,447	6,288	2008	95.0		749.0	York
			3140_B_2	26,606	3,600	2009	95.0		378.0	
			3140_B_1	21,492	2,866	2009	95.0		321.0	

The Harrisburg-Lebanon-Carlisle area contains no large stationary point sources (defined here as those emitting levels of SO<sub>2</sub> plus NO<sub>x</sub> greater those 5,000 tons per year). However, several large sources are present in the counties adjacent to the Harrisburg-Lebanon-Carlisle area (see Figure 9.1).

Of these sources, the most notable in terms of emissions levels is the PPL Brunner Island power station in York Haven, York County. This facility emitted over 106,000 tons of SO<sub>2</sub> in 2007 (see Table 9.0). Under a consent agreement, two scrubbers are in the process of being constructed at Brunner Island. EPA believes that these scrubbers will handle exhaust from the plants three coal fired boilers. The first of these scrubbers is to be completed during 2008, and the second scrubber for the remaining boiler units is projected to be completed in 2009. These scrubbers are

projected to remove about 100,000 tons of SO<sub>2</sub> per year, which will have a significant impact on air quality in the surrounding area.

Table 9.1. Selected EGU Emissions (2002-2007) from EPA's Clean Air Markets Division

<b>Brunner Island, York County, PA, Facility ID: 3140</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	68,931.9	16,190.7	8,773,248.7	85,510,980
2003	12	73,731.0	13,507.7	7,870,160.3	76,709,689
2004	12	92,073.5	16,249.1	9,317,167.7	90,810,610
2005	12	104,601.6	13,929.5	9,020,665.8	87,923,213
2006	12	93,545.0	12,753.7	8,173,709.4	79,665,649
2007	12	106,148.2	15,730.2	9,380,958.3	91,432,329
<b>Sunbury Generating Station, Snyder County, PA, Facility ID: 3152</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	25,216.2	5,398.3	2,505,104.3	23,347,084
2003	12	28,065.8	3,552.9	2,261,858.1	21,185,122
2004	12	27,734.5	2,913.2	2,144,078.4	19,981,770
2005	12	27,738.3	2,897.3	2,299,850.0	21,310,739
2006	12	23,874.9	2,701.8	2,233,097.1	21,384,758
2007	12	29,807.2	3,776.8	2,724,661.0	26,556,171
<b>Titus, Berks County, PA, Facility ID: 3115</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	13,840.5	1,790.6	1,239,473.3	12,080,730
2003	12	15,892.3	2,088.3	1,344,585.4	13,105,065
2004	12	13,577.7	1,996.2	1,245,216.7	12,136,589
2005	12	14,926.4	2,269.9	1,404,778.6	13,691,829
2006	12	13,338.6	1,997.2	1,258,790.7	12,268,916
2007	12	14,488.7	2,474.4	1,481,640.1	14,440,906
<b>PH Glatfelter, York County, PA, Facility ID: 50397</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	No Data			
2003	12	Not Reported	Not Reported	2,142.1	10,960,507
2004	12			2,068.6	10,423,119
2005	12			1,765.0	10,408,417
2006	12			1,735.7	10,495,477
2007	12			1,691.2	10,009,067

Based upon this factor, significant reductions in emissions are expected in the area after the time of designation but prior to the date by when the attainment demonstration for the area would be due. York County is the dominant county in the area from an SO<sub>2</sub> emissions perspective, and the area in general will benefit greatly in the 2008-2009 timeframe from reduction in emission from the Brunner Island power station. York is a high-ranking candidate for nonattainment based upon this factor, and for the other factors that are based on CESs. However, York has been recommended by Pennsylvania as a separate nonattainment area from Harrisburg-Lebanon-

Carlisle. Further, this facility is located in a separate jurisdictional area for both economic and air quality planning purposes.

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of emissions in this potential nonattainment area may have installed emission controls or otherwise significantly reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants installed emission controls subsequent to 2005, or plan to install such controls in the near future, EPA requests additional information on:

- the plant name, city, county, and township/tax district,
- identification of emission units at the plant, fuel use, and megawatt capacity,
- identification of emission units on which controls will be installed, and units on which controls will not be installed,
- identification of the type of emission control that has been or will be installed on each unit, the date on which the control device became / will become operational, and the emission reduction efficiency of the control device,
- the estimated pollutant emissions for each unit before and after implementation of emission controls, and
- whether the requirement to operate the emission control device will be federally enforceable by December 2008, and the instrument by which federal enforceability will be ensured (e.g. through source-specific SIP revision, operating permit requirement, consent decree).

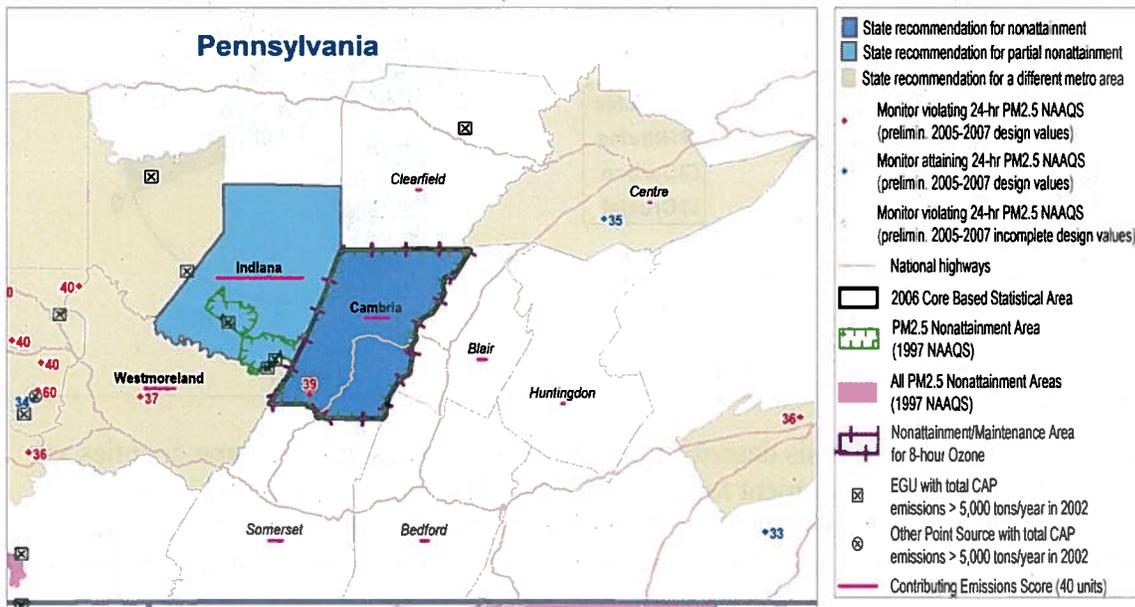
## EPA Technical Analysis for the Johnstown Area

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Johnstown area identifies the counties with monitors that violate the 2006 24-hour PM<sub>2.5</sub> standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1.0 is a map which identifies the counties in the Johnstown area and provides other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State.

Figure 1.0. Map of the Johnstown Area

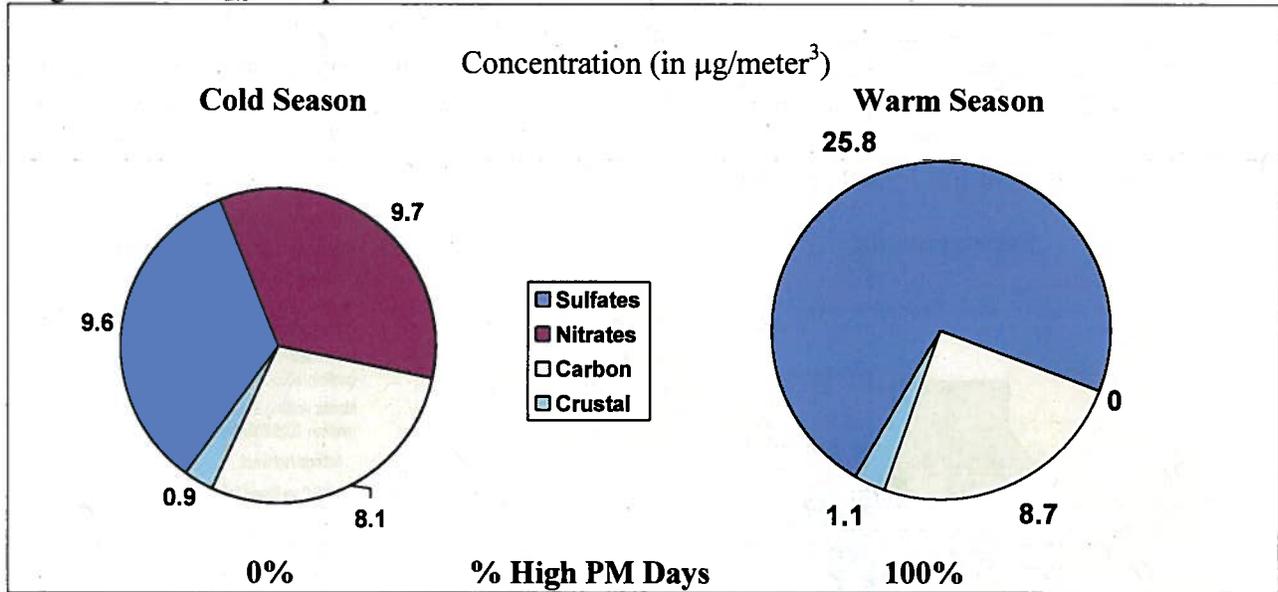


For this area, EPA previously established PM<sub>2.5</sub> nonattainment boundaries for the 1997 PM<sub>2.5</sub> NAAQS that included the one full county (Cambria County) and one partial county (portions of Indiana County), with all being located in Pennsylvania.

In December 2007, Pennsylvania recommended that the same counties be designated as “nonattainment” for the 2006 24-hour PM<sub>2.5</sub> standard based on air quality data from 2004-2006. See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state.

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of this data indicates that the days with the highest total fine particle concentrations in the Johnstown area occur exclusively in the warm season. During the warm season, the average chemical composition of the highest days appears to be predominated by sulfates. The average chemical composition is illustrated in Figure 1.1, below.

Figure 1.1. PM<sub>2.5</sub> Composition Data for the Johnstown Area



Based on EPA's 9-factor analysis described below, EPA proposes that the same counties as previously designated nonattainment for the 1997 PM<sub>2.5</sub> NAAQS should be designated nonattainment for the 2006 24-hour PM<sub>2.5</sub> air quality standard as part of the Johnstown nonattainment area, based upon currently available information. These counties are listed in the table below.

<b>Johnstown</b>	State-Recommended Nonattainment Counties	EPA-Proposed Nonattainment Counties
Pennsylvania	Cambria County Indiana County (partial)	Cambria County Indiana County (partial)

The following is a summary of the 9-factor analysis for the Johnstown area.

The Johnstown and surrounding area, which EPA is using as the area for this technical analysis, has monitors in Cambria and Westmoreland Counties that violate the 2006 24-hour PM<sub>2.5</sub> NAAQS based on 2005-2007 FRM and FEM data in the EPA Air Quality System (AQS). The largest source of direct PM<sub>2.5</sub> and PM<sub>2.5</sub> precursor emissions in this analysis area come from three large electric generating units (EGUs) in Indiana County (and another in Clearfield County). The western edge of this analysis area overlaps the Pittsburgh 1997 PM<sub>2.5</sub> nonattainment area (in Westmoreland County – which EPA is proposing for inclusion in the Pittsburgh nonattainment area). The area has generally small, low-density population centers with relatively low levels of vehicle miles of travel. Commuting patterns show low levels of inter-county commuting. Population, VMT and commercial growth are thus generally not significant factors in this area. Topography is an important factor, as the Johnstown area is part of a river valley almost entirely surrounded by low mountains; these mountains limit transport of low-level emissions and impact meteorology and PM<sub>2.5</sub> formation. Pollution roses indicate that wind patterns in Westmoreland and Centre Counties appear not to have a major impact on Cambria County's violating monitor. As discussed in greater detail below, Centre County, which is further removed geographically and meteorologically from the violating monitor in Cambria County, is a low-ranked candidate for a 2006 24-hour PM<sub>2.5</sub> nonattainment designation. Jurisdictional boundaries for existing ozone and PM<sub>2.5</sub> nonattainment areas, as well as existing state-defined air basins, support maintaining the existing 1997 PM<sub>2.5</sub> area boundaries.

This technical analysis focuses on the existing Johnstown, PA nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and a ring of counties surrounding that area. Therefore, counties that are beyond that ring of counties surrounding this area will be excluded from further analysis. In addition, if a county is part of another existing nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the state has recommended including it in that other nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS, that county will not be included in this analysis. The Johnstown area, as identified in Figure 1.0, above, includes Westmoreland County, PA. The Commonwealth of Pennsylvania has recommended including this county in the Pittsburgh nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS. Westmoreland County is much more economically integrated with the Pittsburgh area, and already subject to air planning with the rest of that area, and thus EPA is proposing that this county be considered for designation as nonattainment as part of the Pittsburgh nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS. See the "EPA Technical Analysis for the Pittsburgh, Pennsylvania Area." Therefore, this county will be excluded from further consideration for inclusion within the Johnstown, Pennsylvania 2006 PM<sub>2.5</sub> NAAQS nonattainment area. Based upon consideration of the information discussed below, EPA is also proposing that Bedford, Blair, Centre, Clearfield, and Somerset Counties do not contribute to violations in this area, and thus do not need to be included within the Johnstown nonattainment area.

Therefore, EPA proposes to maintain the same boundaries set under the 1997 PM<sub>2.5</sub> NAAQS in designating the Johnstown nonattainment area for the 2006 24-hour PM<sub>2.5</sub> NAAQS, i.e., Cambria County and portions of Indiana County previously identified in the 1997 PM<sub>2.5</sub> NAAQS designations.

### **Factor 1: Emissions Data**

For this factor, EPA evaluated county level emission data for the following PM<sub>2.5</sub> components and precursor pollutants: "PM<sub>2.5</sub> emissions total," "PM<sub>2.5</sub> emissions carbon," "PM<sub>2.5</sub> emissions other," "SO<sub>2</sub>," "NO<sub>x</sub>," "VOCs," and "NH<sub>3</sub>." "PM<sub>2.5</sub> emissions total" represents direct emissions  
Johnstown Area

of PM<sub>2.5</sub> and includes: “PM<sub>2.5</sub> emissions carbon,” “PM<sub>2.5</sub> emissions other,” primary sulfate (SO<sub>4</sub>), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO<sub>2</sub> and nitrogen oxides (NO<sub>x</sub>), are part of “PM<sub>2.5</sub> emissions total,” they are not shown in Table 1.0 as separate items.) “PM<sub>2.5</sub> emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM<sub>2.5</sub> emissions other” represents other inorganic particles (crustal). Emissions of SO<sub>2</sub> and NO<sub>x</sub>, which are precursors of the secondary PM<sub>2.5</sub> components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH<sub>3</sub> (ammonia) are also potential PM<sub>2.5</sub> precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

Table 1.0 shows emissions of PM<sub>2.5</sub> and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in and around the Johnstown area. Counties that are part of the Johnstown nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1.0. PM<sub>2.5</sub> Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment?	CES	PM <sub>2.5</sub> emissions total (tpy)	PM <sub>2.5</sub> emissions carbon (tpy)	PM <sub>2.5</sub> emissions other (tpy)	SO <sub>2</sub> emissions (tpy)	NO <sub>x</sub> emissions (tpy)	VOC emissions (tpy)	NH <sub>3</sub> emissions (tpy)
<b>Indiana, PA</b>	<b>Yes-Partial County</b>	<b>100</b>	<b>12,409</b>	<b>851</b>	<b>11,558</b>	<b>147,536</b>	<b>42,777</b>	<b>4,693</b>	<b>706</b>
<b>Cambria, PA</b>	<b>Yes</b>	<b>29</b>	<b>844</b>	<b>324</b>	<b>520</b>	<b>7,752</b>	<b>6,177</b>	<b>5,363</b>	<b>494</b>
Westmoreland, PA	Yes – other area	35	1,779	798	981	3,506	16,655	15,073	1,175
Somerset, PA	No	16	903	425	479	1,844	4,654	5,591	1,596
Blair, PA	No	10	772	315	458	2,374	5,016	5,222	1,211
Bedford, PA	No	9	599	291	308	779	4,534	4,092	1,377
Clearfield, PA	No	5	3,248	503	2,745	48,498	11,279	4,636	360
Huntingdon, PA	No	3	565	257	307	791	2,526	3,247	870
Centre, PA	Yes – other area	2	1,192	465	726	5,708	6,651	6,017	1,097

Based on the data set forth in Table 1.0, emissions of total PM<sub>2.5</sub> are highest in Indiana County, as are the “other” species of PM<sub>2.5</sub>. Sulfur dioxide emissions are dramatically higher in Indiana County; these emissions are more than twice the combined total of the remainder of the area of analysis. Emissions of NO<sub>x</sub> are also highest by far in Indiana County as compared to elsewhere

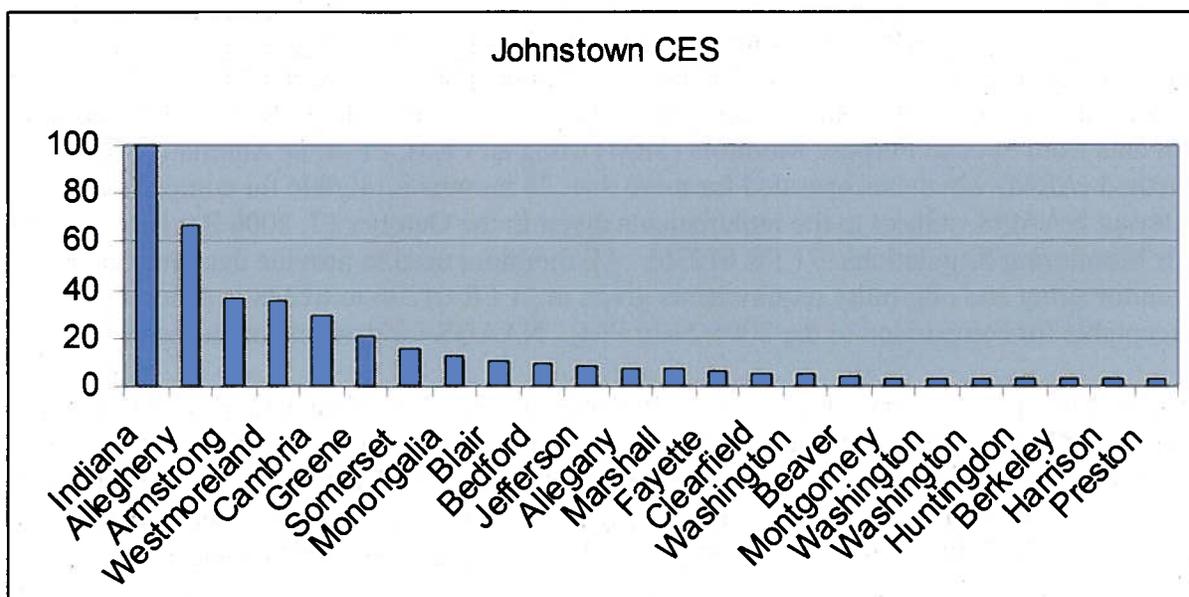
in the area. Volatile organic compound (VOC) emissions are highest in Westmoreland County. Ammonia emissions levels are fairly consistent across the area subject to this technical analysis.

Indiana County is immediately adjacent to the Johnstown metropolitan area and has a very large emissions contribution to the area, primarily stemming from three large coal-fired electric generating units (EGUs) located: the Homer City Station Plant, Conemaugh Plant, and Seward Plant. As a result of the disproportionately large emissions contribution from these sources and the low relative contribution from the remainder of Indiana County, the 1997 PM<sub>2.5</sub> nonattainment area includes the Indiana County townships and boroughs in which these EGUs are located. The disproportionate amount of emissions from these sources also supports inclusion of these portions of Indiana County within the Johnstown nonattainment area for 2006 PM<sub>2.5</sub> NAAQS.

With the exception of VOC emissions, emissions from Cambria County are much lower than those of Indiana County. The emission data does not support a nonattainment designation based upon this factor alone. The emission contribution from Clearfield County is worth noting in that emissions of SO<sub>2</sub> and NO<sub>x</sub> are comparatively higher than the remaining counties in the area of analysis. However, its low CES value and its low ranking under the remaining factors here, does not support designation of Clearfield County as nonattainment.

With respect to CES scores, Indiana has the highest CES score of 100, followed distantly by Westmoreland, Cambria, and Somerset Counties (see Figure 2.0). Indiana's CES score of 100 reflects the highest contribution (normalized to a value of 100), with all other scores relative to that value. Westmoreland County has a comparatively high CES scores; however, as discussed above EPA is proposing this county for inclusion in the Pittsburgh nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS.

Figure 2.0. CES Values for Johnstown (Including Non-Contiguous Counties)



Based on emissions levels and CES values, Cambria and Indiana Counties are high ranking candidates for the 2006 PM<sub>2.5</sub> NAAQS nonattainment designation for this area. Based upon their

low emissions and CES scores and lack of a violating monitor, we believe that the other counties in this area rank low for consideration of contribution based on this factor.

## Factor 2: Air Quality Data

This factor considers the 24-hour PM<sub>2.5</sub> design values (in µg/m<sup>3</sup>) for air quality monitors in counties in the Johnstown area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 2006 24-hour PM<sub>2.5</sub> standard is met when the 3-year average of a monitor's 98<sup>th</sup> percentile values is 35 µg/m<sup>3</sup> or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM<sub>2.5</sub> design values for counties in the Johnstown area are shown in Table 2.0.

Table 2.0. Air Quality Data

County, State	State Recommended Nonattainment?	24-hr PM <sub>2.5</sub> Design Values 2003-05 (µg/m <sup>3</sup> )	24-hr PM <sub>2.5</sub> Design Values 2004-06 (µg/m <sup>3</sup> )	24-hr PM <sub>2.5</sub> Design Values 2005-07 (µg/m <sup>3</sup> )
<b>Indiana, PA</b>	<b>Yes - Partial</b>	No Monitor		
<b>Cambria, PA</b>	<b>Yes</b>	<b>39</b>	<b>39</b>	<b>39</b>
Westmoreland, PA	Yes – Other NAA	38	37	37
Somerset, PA	No	No Monitor		
Blair, PA	No	No Monitor		
Bedford, PA	No	No Monitor		
Clearfield, PA	No	No Monitor		
Huntingdon, PA	No	No Monitor		
Centre, PA	Yes – Other NAA	38	36	35
Note: Design values shown in red represent violations of the standard				

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 2006 24-hr PM<sub>2.5</sub> NAAQS for designation purposes.

As the data above indicates, Cambria and Westmoreland Counties have monitored violations of the 2006 24-hour PM<sub>2.5</sub> standard. Therefore, it is appropriate to include these counties within a nonattainment area for that standard. However, EPA has proposed to include Westmoreland County as part of the Pittsburgh nonattainment area, and it is addressed in a separate technical analysis for the Pittsburgh area. See the "EPA Technical Analysis for Pittsburgh, Pennsylvania."

Centre County previously had monitored violations of the 2006 24-hour PM<sub>2.5</sub> standard based upon 2003-05 and 2003-06 data, but 2005-07 data indicate that the monitor at issue is now meeting the standard. Although Centre County is now attaining the standard, EPA has also

evaluated that county for contribution to the Johnstown area on the basis of emissions and CES score, as detailed in Factor 1 of this analysis.

Note that the absence of a violating monitor is not a sufficient reason to eliminate counties as candidates for nonattainment status based upon contribution to violations in other nearby areas. Each county has been evaluated based on the weight of evidence of all nine factors and other relevant information.

**Factor 3: Population Density and Degree of Urbanization (Including Commercial Development)**

Table 3.0, below, shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 2006 24-hour PM<sub>2.5</sub> standard.

Table 3.0. Population

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq mi)
<b>Indiana, PA</b>	<b>Yes – partial</b>	<b>88,481</b>	<b>106</b>
<b>Cambria, PA</b>	<b>Yes</b>	<b>147,804</b>	<b>214</b>
Westmoreland, PA	Yes – other area	367,133	355
Somerset, PA	No	78,796	73
Blair, PA	No	126,572	240
Bedford, PA	No	49,862	49
Clearfield, PA	No	82,634	72
Huntingdon, PA	No	45,772	51
Centre, PA	Yes – other area	140,313	126

The above data indicates that most of the counties in this area are relatively sparsely populated (with population densities of about 200 persons per square mile or less) and are characterized by small, sub-county sized metropolitan areas. Populations for all of the counties are relatively low, with Westmoreland County having the highest population in this area of analysis.

None of these counties are high-ranking candidates for designation as nonattainment based solely upon this factor. Westmoreland has a fairly large population, but will be addressed in the Pittsburgh nonattainment area.

#### Factor 4: Traffic and Commuting Patterns

This factor considers the number of commuters in each county who drive to another county within the Johnstown area, the percent of total commuters in each county who commute to other counties within the area, as well as the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4.0). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

The listing of counties on Table 4.0 reflects a ranking based on the number of people commuting to other counties. The counties that are in the Johnstown nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS are shown in boldface.

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting into any Violating Counties	Percent Commuting into any Violating Counties	Number Commuting into Statistical Area	Percent Commuting into Statistical Area
<b>Indiana, PA</b>	<b>Yes – Partial</b>	<b>696</b>	<b>4,520</b>	<b>12</b>	<b>1,720</b>	<b>5</b>
<b>Cambria, PA</b>	<b>Yes</b>	<b>1,029</b>	<b>48,990</b>	<b>82</b>	<b>48,150</b>	<b>80</b>
Westmoreland, PA	Yes – Other NAA	3,583	106,910	65	860	1
Somerset, PA	No	997	5,820	17	5,170	15
Blair, PA	No	1,066	2,770	5	1,140	2
Bedford, PA	No	1,011	400	2	320	2
Clearfield, PA	No	1,081	5,300	15	510	2
Huntingdon, PA	No	465	2,000	11	30	0
Centre, PA	Other	1,441	57,920	92	60	0

Note: The 2005 VMT data used for Tables 4.0 and 5.0 of the technical analysis has been derived using methodology similar to that described in “Documentation for the final 2002 Mobile National Emissions Inventory, Version 3,” September 2007, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:

[ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002\\_mobile\\_nei\\_version\\_3\\_report\\_092807.pdf](ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002_mobile_nei_version_3_report_092807.pdf). The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008. The United States 2000 Census County-to-County Worker Flow Files can be found at: <http://www.census.gov/population/www/cen2000/commuting/index.html>.

The data set forth in Table 4.1, below, relates to predominant commuting patterns for the Johnstown area.

Table 4.1. Predominant Commuting Patterns for the Johnstown Area

Commuting From:	CBSA	Commuting To:				
		Cambria	Centre	Westmoreland	Violating	CBSA
Cambria, PA	Johnstown, PA	48,154	259	574	833	48,154
Centre, PA	State College, PA	63	57,815	39	102	63
Westmoreland, PA	Pittsburgh, PA	858	34	106,015	892	858
Somerset, PA	Somerset, PA					
Clearfield, PA	DuBois, PA					
Indiana, PA	Indiana, PA					
Huntingdon, PA	Huntingdon, PA					
Bedford, PA						
Blair, PA	Altoona, PA					

The above data indicates that the VMT and number of commuters within and between the counties in this area are low compared to other areas. Of the counties in and around Johnstown, Westmoreland County has the highest VMT (more than twice the next highest county in the area) and the largest number of commuters commuting into a violating county. See Figure 4.1. Centre County has the next highest level of commuters to a violating county, but they also commute predominantly to Centre County. As noted above, Centre County was a violating county in 2005, but is now monitoring attainment based on 2005-2007 data.

Of all the counties in and around Johnstown, Cambria stands out because over 98% of its commuters travelling within the county boundaries and 80% commuting within the statistical area.

In general, it appears that this factor is not critical for purposes of nonattainment designation. However, of these counties, Cambria County is the highest ranked for this factor, due to its large number of commuters travelling within the statistical area.

**Factor 5: Growth Rates and Patterns**

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in the Johnstown area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

Table 5.0 below shows population, population growth, VMT and VMT growth for counties that are included in the Johnstown area.

Table 5.0. Population and VMT Values and Percent Change

County, State	Population (2005)	Population Density (2005) (persons/square mile)	Percent Population Change (2000-05)	2005 VMT (millions)	Percent VMT Growth (1996-2005)
Indiana, PA	88,481	106	(1)	696	2
Cambria, PA	147,804	214	(3)	1,029	(8)
Westmoreland, PA	367,133	355	(1)	3,583	17
Somerset, PA	78,796	73	(2)	997	19
Blair, PA	126,572	240	(2)	1,066	(5)
Bedford, PA	49,862	49	-	1,011	23
Clearfield, PA	82,634	72	(1)	1,081	14
Huntingdon, PA	45,772	51	-	465	30
Centre, PA	140,313	126	3	1,441	25

As the data above indicates, all the counties in the area of analysis for Johnstown have relatively low populations and low population densities, in the range of 200 persons per mile or less (except for Westmoreland County). All of these counties (except Centre County) have had population declines since 2000. Therefore, population and population growth are not critical factors for the nonattainment designation in the Johnstown area.

With the exception of Westmoreland County, Vehicle Miles Traveled (VMT) levels are low for all these counties relative to other areas in Pennsylvania. VMT growth between 1996 and 2005 was negative in Cambria and Blair Counties, and flat in Indiana County. Huntingdon, Centre, Bedford, Somerset and Clearfield Counties experienced double digit growth in VMT between 1996 and 2005. However, these percentage-based growth levels are less relevant considering the relatively low absolute VMT levels. Overall, VMT levels remain relatively low throughout the area, with the exception of Westmoreland County, which has somewhat higher levels.

Note that commuting statistics in Factor 4 show that for the most part commuting miles for Cambria County are far and above the largest source of commuting into the county with the violating monitor. Of the other nearby counties (including Westmoreland County and the other counties with double digit VMT growth), none have large numbers of commuters travelling into the statistical area, including to Cambria County where the statistical area's violating monitor is located.

With the exception of Westmoreland County, those counties that have experienced double digit VMT growth are not high ranking candidates for nonattainment designation on the basis of Factors 1 through 4.

#### **Factor 6: Meteorology (Weather/Transport Patterns)**

For this factor, EPA considered data from the National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high PM<sub>2.5</sub> days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high PM<sub>2.5</sub> days are defined as days where any FRM or FEM air quality

monitors had 24-hour PM<sub>2.5</sub> concentrations above 95% on a frequency distribution curve of PM<sub>2.5</sub> 24-hour values.

Meteorology data is also considered in each county's Contributing Emissions Score (CES) because the method for deriving the CES included an analysis of trajectories of air masses for high PM<sub>2.5</sub> days. See Factor 1 (Emissions Data), above.

For each air quality monitoring site identified in Figure 6.0, below, EPA developed a pollution trajectory plot (or "pollution rose") to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. See Figures 6.0-6.3, below. Each figure identifies 24-hour PM<sub>2.5</sub> values by colored icons and days exceeding 35 µg/m<sup>3</sup> are denoted with a red or black icon. These icons are either dots or triangles. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of each icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 6.0. Map Showing Violating PM<sub>2.5</sub> Monitors During 2005-2007 for the Johnstown Area

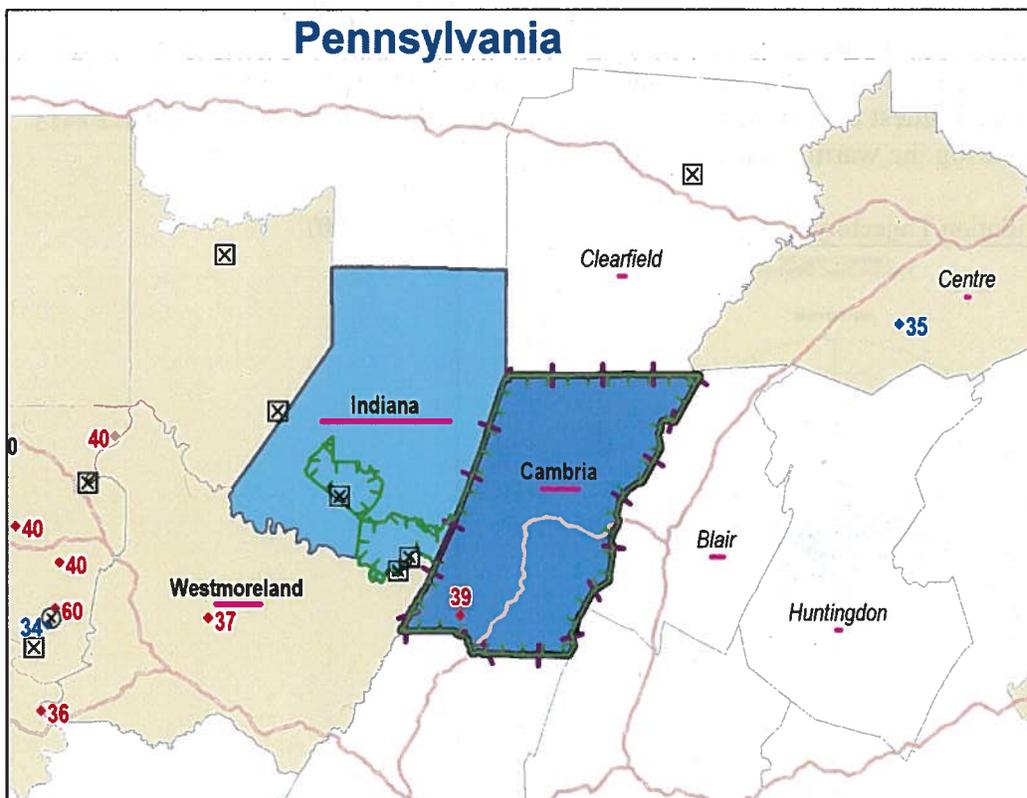
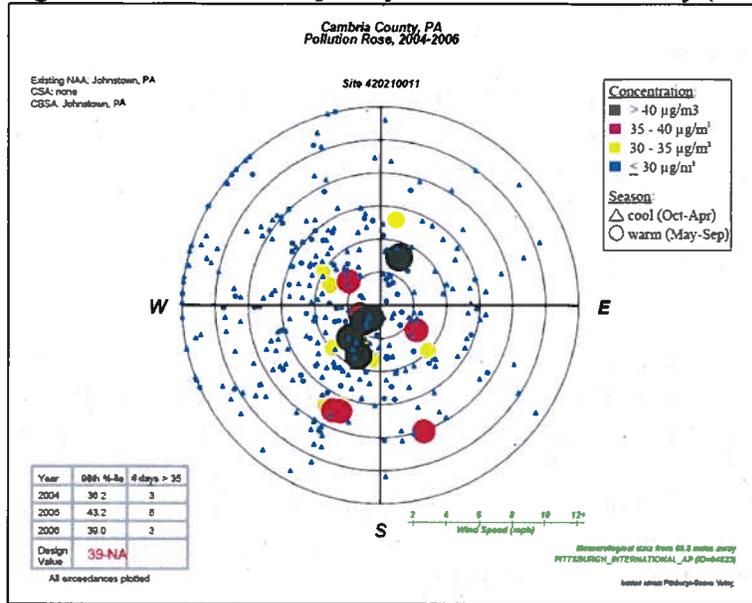
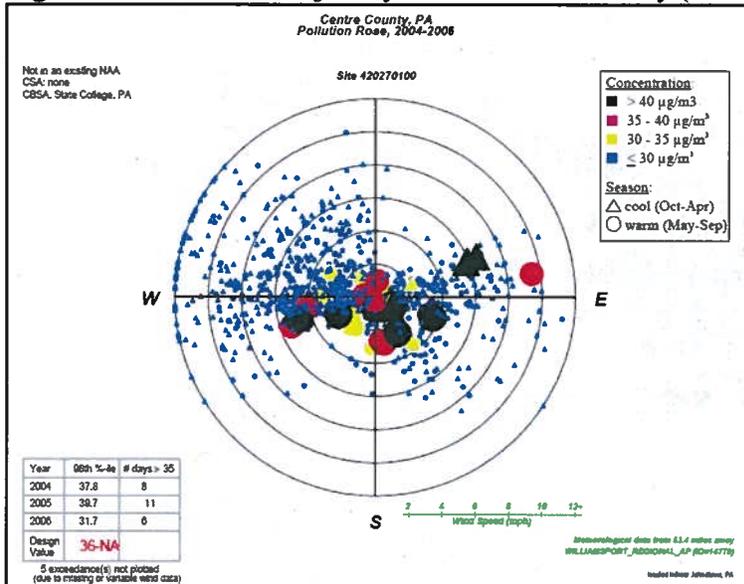


Figure 6.1. Pollution Trajectory Plot for Cambria County (Site 42-021-0011)



As shown in the pollution rose in Figure 6.1, the surface wind directions for high PM<sub>2.5</sub> days in Cambria County are erratic, covering all points of the compass. The pollution roses show that 24-hour PM<sub>2.5</sub> concentrations are influenced by emissions from any direction at various times. However, the data also suggests that emissions from the south relative to the violation are slightly more likely to contribute to the violation than emissions from other directions, particularly on the highest concentration days. It is important to note that all the high PM<sub>2.5</sub> days occurred during the warm season at this monitor.

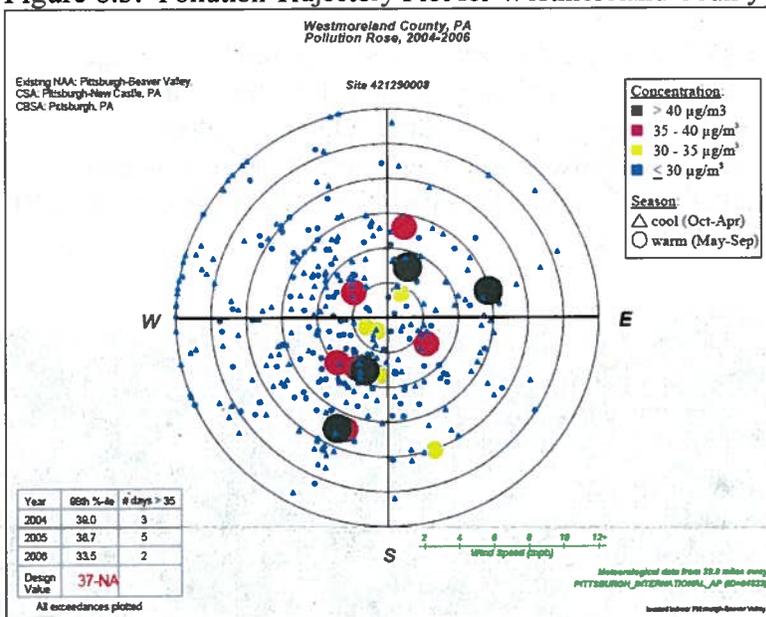
Figure 6.2. Pollution Trajectory Plot for Centre County (Site 42-027-0100)



As shown in the pollution rose in Figure 6.2, the surface wind directions for high PM<sub>2.5</sub> days in Centre County are predominantly from the south, and the wind speeds on high concentration days are typically low. The data also suggests that emissions from the south relative to the violation are slightly more likely to contribute to the violation than emissions from other

directions, particularly on the highest concentration days. The high PM<sub>2.5</sub> days are more evenly split between the warm and cold season than they were at the Cambria monitor (Figure 6.1). While the pollution trajectories from this monitor indicate that at least on some high PM<sub>2.5</sub> days, pollution could impact Cambria County, however, the wind directions to the southwest that would do so occur primarily in the cold season – while the Cambria monitor violations occur all in the warm season (see the speciation split in Figure 1.1 in Factor 1).

Figure 6.3. Pollution Trajectory Plot for Westmoreland County (Site 42-129-0008)



As shown in Figure 6.3, the average prevailing surface wind direction for high PM<sub>2.5</sub> days in Westmoreland County are from the southwest and the northeast. Wind speeds occur over a broader range at this monitor and the highest concentrations occur during the warm season. Wind directions on some of the high PM<sub>2.5</sub> days that occur during the high season show that particulate matter could sometimes pass over Indiana or Cambria County, but in most instances this is not the wind direction on high PM<sub>2.5</sub> days at this monitor.

Pollution roses for the Johnstown area show that some component of elevated PM<sub>2.5</sub> measured at the Cambria monitor may originate from all wind directions.

Based on analysis of this factor, EPA concludes that Centre County, which is further removed geographically and meteorologically from the violating monitor in Cambria County, is a low-ranked candidate for a 2006 24-hour PM<sub>2.5</sub> nonattainment designation. Based on this, plus the absence of a violating PM<sub>2.5</sub> monitor in Centre County during the 2005-2007 period, EPA concludes that Centre County is a low-ranking candidate for a nonattainment designation based upon the 2006 PM<sub>2.5</sub> NAAQS.

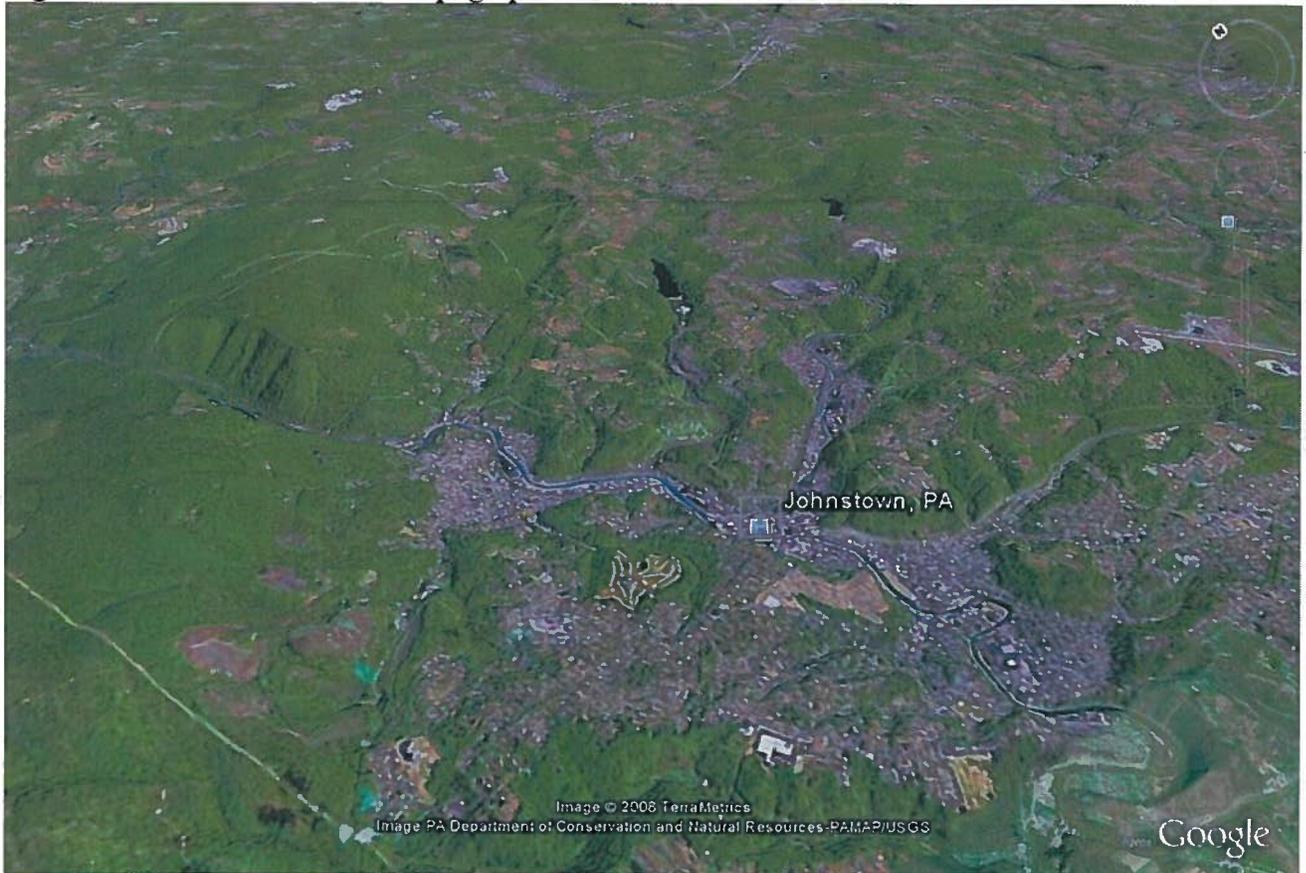
### Factor 7: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM<sub>2.5</sub> over the Johnstown analysis area.

The topography of the Johnstown air basin area isolates the city from inter-urban transport of low-level emissions, but not from transport of high-level emissions. Some of the highest terrain in Pennsylvania brackets the Johnstown area to the east and west. Over 34 square miles of mountain upland drains down into the city and then out the deepest river gap in the eastern United States. The city of Johnstown itself lies in the approximately two-mile wide flood plane formed by the junction of the Stonycreek and Little Conemaugh Rivers, and the narrow Conemaugh River Gap where water flows out of the City.

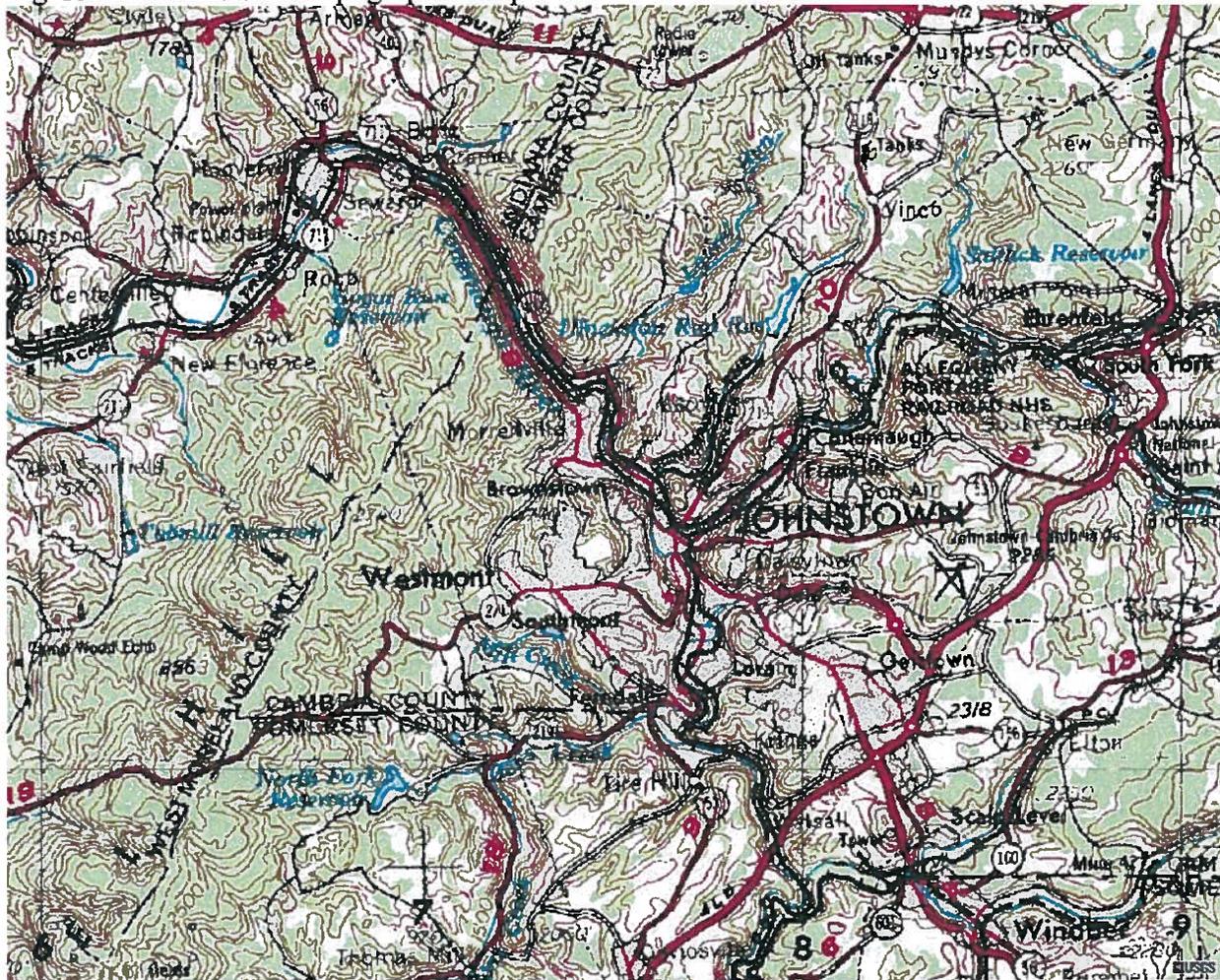
The Conemaugh River Gap is over 1600 feet deep, when measured from the top of Rager Mountain to the river level at its outfall from the Conemaugh Gap in Indiana County. The basin within which the city lies is about 300 feet below the surrounding ridgelines. These topographical features diminish the transport of low level emissions from surrounding areas. Figures 7.0 and 7.1 show the topographic relief of the Johnstown area, and the Conemaugh River Valley is depicted on the left side of both Figures.

Figure 7.0. Johnstown Aerial Topographic Photo



Source: Google Earth – August 2008

Figure 7.1. Johnstown Topographic Map



Source: US Geologic Survey – TerraServer USA website

### Factor 8: Jurisdictional Boundaries (e.g., Existing PM<sub>2.5</sub> and Ozone Areas)

In evaluating the jurisdictional boundary factor, consideration is being given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for PM<sub>2.5</sub> or 8-hour ozone standard) represent important boundaries for state air quality planning.

A goal in designating PM<sub>2.5</sub> nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas. Comparison of ozone areas with potential PM<sub>2.5</sub> nonattainment areas, therefore, gives added weight to designation of these counties.

Of the counties considered in this 9-factor analysis for Johnstown, only Cambria, Westmoreland and portions of Indiana were designated nonattainment under the 1997 PM<sub>2.5</sub> NAAQS. Cambria and Indiana Counties comprised the Johnstown 1997 PM<sub>2.5</sub> nonattainment area. Westmoreland County was part of the Pittsburgh-Beaver Valley 1997 PM<sub>2.5</sub> nonattainment area.

Areas designated as 8-hour ozone nonattainment areas are also important boundaries for state air-quality planning. Cambria County was the sole county in the Johnstown technical analysis

area that comprised the Johnstown 8-hour ozone nonattainment area. Most of the remaining counties were also designated nonattainment under the 8-hour ozone standard, but were part of separate nonattainment areas. State College (Centre County) and Altoona (Blair County) were designated by EPA as separate, one-county Subpart 1 nonattainment areas. Indiana and Clearfield Counties were designated as a Subpart 1 nonattainment area. Westmoreland County was designated Subpart 1 nonattainment as part of the Pittsburgh-Beaver Valley 8-hour ozone nonattainment area. Bedford, Huntingdon, and Somerset Counties were designated unclassifiable/attainment under the 8-hour ozone standard. Since then, with the exception of Pittsburgh-Beaver Valley, EPA has redesignated these counties as 8-hour nonattainment ozone maintenance areas.

Pennsylvania's regional transportation planning organizations (which often also serve as economic planning organizations) fall along county lines. In the case of the counties considered as part of this 9-factor analysis, there is one MPO that includes Cambria, Bedford, Blair, Huntingdon and Somerset Counties. Westmoreland and Indiana County are part of another MPO covering a larger, Southwestern Pennsylvania region. Centre County has its own MPO.

The 1997 PM<sub>2.5</sub> nonattainment area also contains the Johnstown air basin, defined by the Pennsylvania and which is subject to a common set of state regulatory requirements relating to sulfur compound (See 25 Pa Code § 121.1 and 123.22). It is important to note that sulfur compounds are an important PM<sub>2.5</sub> precursor.

Based upon the above discussion and supporting data, EPA believes that the same boundaries established for the 1997 PM<sub>2.5</sub> nonattainment area are appropriate for the 2006 24-hour PM<sub>2.5</sub> area for the Johnstown area.

### **Factor 9: Level of Control of Emission Sources**

This factor considers emission controls currently implemented in the Johnstown area.

The emission estimates on Table 1.0 (under Factor 1) reflect implementation of control strategies implemented by the Commonwealth in the Johnstown area before and during 2005 that may influence emissions of any component of PM<sub>2.5</sub> emissions (i.e., total carbon, SO<sub>2</sub>, NO<sub>x</sub>, and crustal PM<sub>2.5</sub>).

In Johnstown and the surrounding area, there may be some emission reductions of SO<sub>2</sub> and NO<sub>x</sub> subsequent to 2005 that are not accounted for elsewhere in this analysis, due to new controls at large electric generating units (EGUs).

Table 9.0 shows emissions and controls (current and projected) for EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions greater than 5000 tons per year. Table 9.1 shows several EGUs in Cambria County with emissions much lower than 5000 tons per year. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) database. Table 9.2 shows emissions for the same EGUs for the years 2002 through 2007. The data was obtained from the emissions section of EPA's Clean Air Markets Division (CAMD) website:

<http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>.

Table 9.0 EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions > 5000 tpy, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO <sub>2</sub>	2006 NO <sub>x</sub>	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW
Indiana	Conemaugh	Coal Steam	3118-B-1	4,201	12,710	1994	96.9		850.0
			3118-B-2	3,836	10,660	1995	98.0		850.0
	Homer City Station	Coal Steam	3122-B-3	2,598	4,533	2001	97.7	2001	650.0
			3122-B-1	53,168	4,929			2001	620.0
			3122-B-2	51,006	5,559			2000	614.0
	Seward	Coal Steam	3130_B_2	3,735	874	2004	95.0		260.5
3130_B_1			3,623	846	2004	95.0		260.5	
Clearfield	Shawville	Coal Steam	3131_B_4	13,670	1,980				175.0
			3131_B_3	13,387	1,929				175.0
			3131_B_2	10,976	1,870				127.5
			3131_B_1	9,253	1,633				122.0

Table 9.1 EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions <5000 tpy, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO <sub>2</sub>	2006 NO <sub>x</sub>	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW
Cambria	Cambria Cogen	Coal Steam	10641-B-B2	0	530		91.6		44.0
			10641-B-B1	0	498		91.6		44.0
	Colver Power Project	Coal Steam	10143-B-ABB01	0	678		91.6		110.0
	Ebensburg Power	Coal Steam	10603_B_031	0	260		91.6		49.5

Table 9.2. Selected EGU Emissions (2002-2007) from EPA's Clean Air Markets Division

<b>Conemaugh, Indiana County, PA, Facility ID: 3118</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	5,936.4	19,460.9	11,603,127.7	113,132,105
2003	12	7,373.3	21,508.4	12,871,213.1	125,449,777
2004	12	7,204.2	19,741.3	12,336,450.1	120,259,118
2005	12	7,177.1	19,663.3	12,609,081.9	122,906,774
2006	12	8,036.9	23,369.4	13,991,064.0	136,378,534
2007	12	6,783.3	20,124.6	12,124,918.8	118,215,814
<b>Homer City, Indiana County, PA, Facility ID: 3122</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	105,784.4	25,164.6	11,709,766.6	114,082,529
2003	12	151,677.6	21,330.1	13,993,063.1	136,384,703
2004	12	149,956.9	20,123.9	13,052,616.6	127,218,463
2005	12	132,022.8	18,256.1	13,408,986.7	130,691,897
2006	12	106,772.1	15,021.1	11,970,802.0	116,674,489
2007	12	120,767.8	17,444.1	13,576,987.3	132,329,347
<b>Seward, Indiana County, PA, Facility ID: 3130</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	10,737.5	1,751.6	903,787.8	8,808,855
2003	12	9,192.2	1,462.4	757,575.7	7,383,784
2004	12	2,801.0	1,971.9	1,274,765.8	24,896,699
2005	12	7,618.9	1,446.0	3,128,927.5	30,496,421
2006	12	7,358.0	1,720.6	3,446,385.4	33,631,632
2007	12	8,096.0	1,739.2	3,731,173.7	36,400,512
<b>Shawville, Clearfield County, PA, Facility ID: 3131</b>					
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	38,225.9	6,533.6	3,051,848.1	29,745,503
2003	12	43,392.4	7,188.6	3,402,211.6	33,159,915
2004	12	44,320.0	6,864.3	3,181,911.9	31,012,783
2005	12	46,976.3	6,884.6	3,403,901.5	33,176,494
2006	12	47,287.1	7,412.9	3,634,960.0	35,428,521
2007	12	49,064.9	7,356.6	3,577,584.7	34,869,260

Based upon the above data, it appears that some EGUs in this area have made efficiency improvements that have resulted in somewhat lowered emissions or emission rates. For example, the 80-year old 200-megawatt Seward coal steam plant was converted to a 521-megawatt waste coal-fired plant in 2004 with a circulating fluidized bed combustor coupled with a scrubber. It appears that in spite of an increase in heat input levels, 2007 SO<sub>2</sub> emissions are lower than the 2003 SO<sub>2</sub> levels and NO<sub>x</sub> emissions are only 20% higher.

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of emissions in this potential nonattainment area may have installed emission controls or otherwise significantly reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants installed emission controls subsequent to 2005, or plan to install such controls in the near future, EPA requests additional information on:

- the plant name, city, county, and township/tax district,
- identification of emission units at the plant, fuel use, and megawatt capacity,
- identification of emission units on which controls will be installed, and units on which controls will not be installed,
- identification of the type of emission control that has been or will be installed on each unit, the date on which the control device became / will become operational, and the emission reduction efficiency of the control device,
- the estimated pollutant emissions for each unit before and after implementation of emission controls, and
- whether the requirement to operate the emission control device will be federally enforceable by December 2008, and the instrument by which federal enforceability will be ensured (e.g. through source-specific SIP revision, operating permit requirement, consent decree).

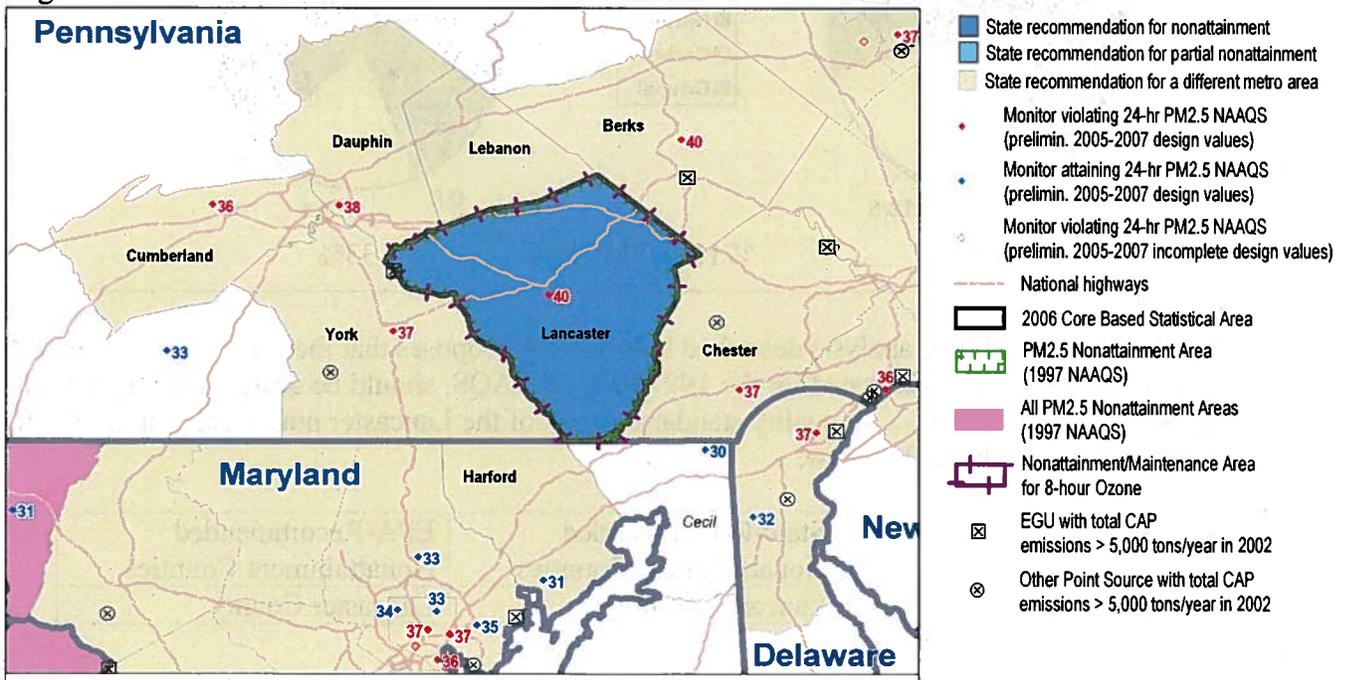
## EPA Technical Analysis for the Lancaster Area

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Lancaster area identifies the counties with monitors that violate the 2006 24-hour PM<sub>2.5</sub> standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

- pollutant emissions
- air quality data
- population density and degree of urbanization
- traffic and commuting patterns
- growth
- meteorology
- geography and topography
- jurisdictional boundaries
- level of control of emissions sources

Figure 1.0 is a map which identifies the counties in the Lancaster area and provides other relevant information such as the locations and design values of air quality monitors, the metropolitan area boundary, and counties recommended as nonattainment by the State.

Figure 1.0. The Lancaster Area

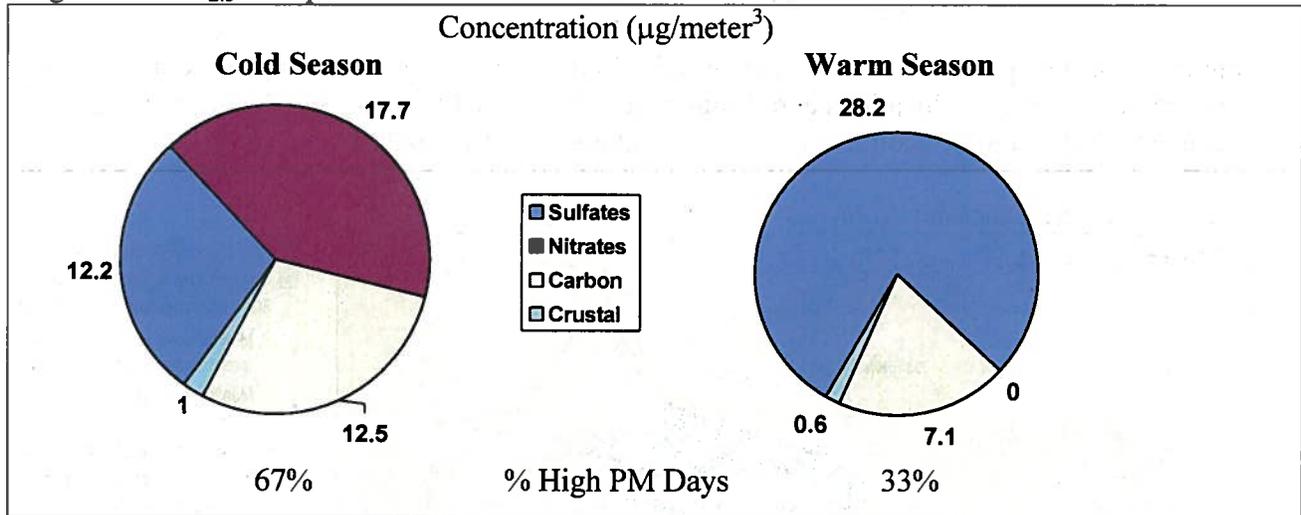


For this area, EPA previously established PM<sub>2.5</sub> nonattainment boundaries for the 1997 PM<sub>2.5</sub> NAAQS that included one full county, Lancaster County, Pennsylvania.

In December 2007, Pennsylvania recommended that Lancaster County, be designated as “nonattainment” for the 2006 24-hour PM<sub>2.5</sub> standard based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state. (See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA.)

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations occur in both cool and warm seasons, but with twice as many of the highest days in the cold season. The average chemical composition of the highest days is typically characterized by high levels of sulfates in the warm season and high levels of nitrates in the cold season as illustrated in Figure 1.1.

Figure 1.1 PM<sub>2.5</sub> Composition Data for the Lancaster Area



Based on EPA's 9-factor analysis described below, EPA proposes that the same county, Lancaster County, as previously designated for the 1997 PM<sub>2.5</sub> NAAQS, should be designated nonattainment for the 2006 24-hour PM<sub>2.5</sub> air quality standard as part of the Lancaster nonattainment area. The county is listed in the table below.

Lancaster	State-Recommended Nonattainment Counties	EPA-Recommended Nonattainment Counties
Pennsylvania	Lancaster County	Lancaster County

The following is a summary of the 9-factor analysis for the Lancaster Area.

The Lancaster area and surrounding counties, which EPA is using as the area of consideration for this technical analysis, has monitors in Lancaster, York, Berks, Chester, Dauphin, and Cumberland Counties that violate the 2006 24-hour PM<sub>2.5</sub> NAAQS based on 2005-2007 FRM and FEM data in the EPA Air Quality System (AQS). The largest source of direct PM<sub>2.5</sub> and PM<sub>2.5</sub> precursor emissions in this analysis area comes from the Brunner Island power plant in York County and to a much lesser extent, several smaller electric generating units (EGUs) in Berks and Chester Counties. The Lancaster 1997 PM<sub>2.5</sub> nonattainment area is almost completely surrounded by the adjacent 1997 PM<sub>2.5</sub> nonattainment areas of Harrisburg (Cumberland, Dauphin, and Lebanon Counties), York (York County), Reading (Berks County), and part of Philadelphia (Chester County). EPA is recommending these areas as separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. The Lancaster area of analysis has a moderately populated count with sub-county and low-density population centers. VMT levels for the analysis area, in total, are fairly high, but commuting patterns show low levels of inter-county commuting, and commuting is generally limited to the statistical area in which each county lays. Population, VMT, and commercial growth vary in levels of importance by county/metropolitan area in the area of analysis. VMT growth is the most significant of these. Topography is not a significant factor, although there are several relatively distant mountains that likely affect wind patterns and meteorology in the area. The Commonwealth considers the existing air basins overlaying parts of the area to be an important consideration under the geography/topography. Pollution roses show impact from York on Lancaster. However, jurisdictional boundaries for existing ozone and PM<sub>2.5</sub> nonattainment areas, as well as existing state-defined air basins, support maintaining the existing 1997 PM<sub>2.5</sub> area boundaries.

Therefore, EPA proposes to maintain the same single-county boundary established for the 1997 PM<sub>2.5</sub> NAAQS in designating the Lancaster nonattainment area under the 2006 24-hour PM<sub>2.5</sub> NAAQS.

This 9-factor analysis focuses on the existing Lancaster nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the ring of nearby counties surrounding that area that could reasonably be contributing to nonattainment in Lancaster. If a county is part of another existing nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS and the state has recommended including it in that other nonattainment area for the 2006 PM<sub>2.5</sub> NAAQS, that county will not be included in this analysis. Accordingly, the following counties will be excluded from further consideration for inclusion in the Lancaster nonattainment area.

Counties	Reasons for Exclusion from Further Analysis
York, PA	York County is a separate nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania recommended that York again be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.
Dauphin, PA Lebanon, PA Cumberland, PA	These three counties constitute a separate nonattainment area (Harrisburg) under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania has recommended they again be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.
Berks, PA	Berks County comprises the separate, one-county Reading nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania recommended

	Reading again be designated as a separate nonattainment area under the 2006 PM <sub>2.5</sub> NAAQS.
Chester, PA	Chester County is part of the separate Philadelphia nonattainment area under the 1997 PM <sub>2.5</sub> NAAQS, and Pennsylvania recommended Chester again be designated nonattainment under the 2006 PM <sub>2.5</sub> NAAQS as part of the Philadelphia area.
Harford, MD	Harford County is in the Baltimore nonattainment area for the 1997 PM <sub>2.5</sub> NAAQS, and Maryland has recommended it for inclusion in the Baltimore nonattainment area for the 2006 24-hour PM <sub>2.5</sub> NAAQS.

Data for these counties will be included in the tables for the remaining factors for informational purposes. However, no analysis will be conducted regarding that data.

The 9-factor analysis below will demonstrate that the Lancaster area is a separate and distinct area, not associated economically or jurisdictionally with the York, Reading, Harrisburg-Lebanon-Carlisle, Philadelphia, and Baltimore areas. Historically, these areas have been separate nonattainment areas for both particulate matter and ozone. Lancaster, York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties are in separate nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, the Lancaster, York, Reading, Philadelphia-Wilmington, Harrisburg-Lebanon-Carlisle, and Baltimore nonattainment areas, respectively. Very few commuters from York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties travel into Lancaster County compared to the commuters from Lancaster County who travel within that county. Furthermore, as explained in detail in Factor 8, below, Lancaster, York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Lancaster, York, Reading, Philadelphia-Wilmington, and Harrisburg-Lebanon-Carlisle areas. Therefore, EPA has determined that it is appropriate to include York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that emissions from York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties contribute to the Lancaster nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

EPA considered the nine factors detailed below and other relevant factors when determining which counties to include in the Lancaster nonattainment area.

### **Factor 1: Emissions Data**

For this factor, EPA evaluated county level emission data for the following PM<sub>2.5</sub> components and precursor pollutants: "PM<sub>2.5</sub> emissions total," "PM<sub>2.5</sub> emissions carbon," "PM<sub>2.5</sub> emissions other," "SO<sub>2</sub>," "NO<sub>x</sub>," "VOCs," and "NH<sub>3</sub>." "PM<sub>2.5</sub> emissions total" represents direct emissions of PM<sub>2.5</sub> and includes: "PM<sub>2.5</sub> emissions carbon," "PM<sub>2.5</sub> emissions other," primary sulfate (SO<sub>4</sub>), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO<sub>2</sub> and NO<sub>x</sub>, are part of "PM<sub>2.5</sub> emissions total," they are not shown in Table 1.0 as separate items). "PM<sub>2.5</sub> emissions carbon"

represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM<sub>2.5</sub> emissions other” represents other inorganic particles (crustal). Emissions of SO<sub>2</sub> and NO<sub>x</sub>, which are precursors of the secondary PM<sub>2.5</sub> components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH<sub>3</sub> (ammonia) are also potential PM<sub>2.5</sub> precursors and are included for consideration.

Emissions data were derived from the 2005 National Emissions Inventory (NEI), version 1. See [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at [http://www.epa.gov/ttn/naaqs/pm/pm25\\_2006\\_techinfo.html](http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html).

Table 1.0 shows emissions of PM<sub>2.5</sub> and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Lancaster area. Counties are listed in descending order by CES, with the exception of Lancaster County, which is part of the Lancaster nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS. Data for Lancaster County is shown in boldface.

Table 1.0. PM<sub>2.5</sub> Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment	CES	PM <sub>2.5</sub> emissions total (tpy)	PM <sub>2.5</sub> emissions carbon (tpy)	PM <sub>2.5</sub> emissions other (tpy)	SO <sub>2</sub> (tpy)	NO <sub>x</sub> (tpy)	VOCs (tpy)	NH <sub>3</sub> (tpy)
<b>Lancaster, PA</b>	<b>Yes</b>	<b>12</b>	<b>3,258</b>	<b>1,159</b>	<b>2,099</b>	<b>4,017</b>	<b>16,396</b>	<b>26,407</b>	<b>16,486</b>
York, PA	Yes – other area	100	7,614	1,217	6,396	118,621	32,214	18,478	3,913
Berks, PA	Yes – other area	7	3,378	922	2,456	18,874	18,086	19,117	4,653
Chester, PA	Yes – other area	6	2,124	799	1,325	7,990	16,507	19,666	2,563
Harford, MD	Yes – other area	3	1,769	879	890	2,307	7,310	10,512	967
Dauphin, PA	Yes – other area	2	1,074	528	546	2,443	12,548	12,569	1,664
Lebanon, PA	Yes – other area	2	855	338	516	1,778	5,876	5,924	4,445
Cecil, MD	No	1	870	446	425	1,298	3,962	5,853	749
Cumberland, PA	Yes – other area	1	1,677	698	979	1,976	14,454	9,939	2,105

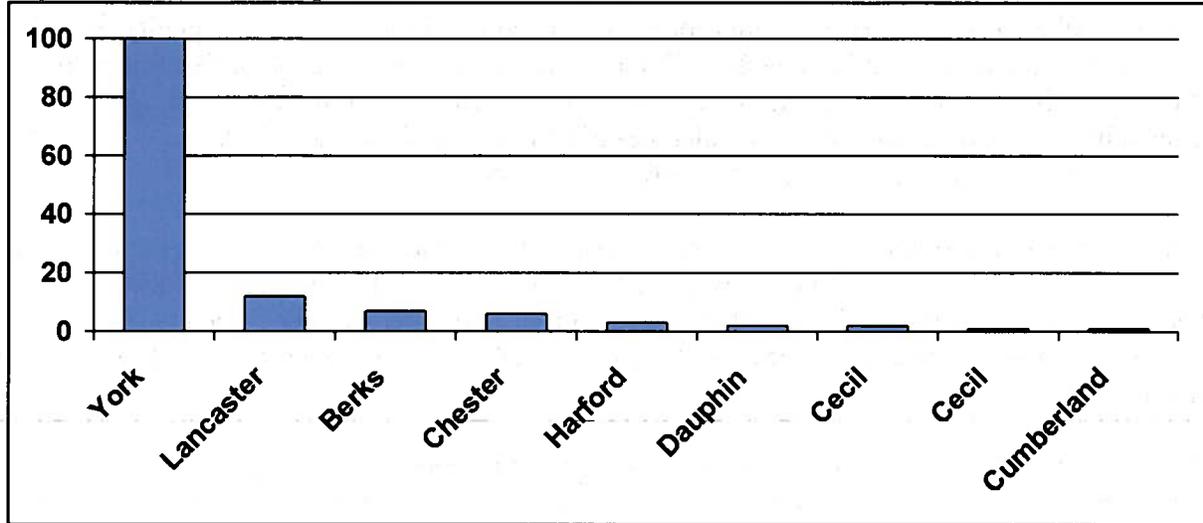
As shown above, York County has by far the highest emissions levels of PM<sub>2.5</sub>, nitrogen oxides (NO<sub>x</sub>), and (to an even greater degree) sulfur dioxide (SO<sub>2</sub>). In fact, SO<sub>2</sub> levels in York County are more than twice the combined emissions from all the other counties being analyzed here. This is primarily due to the emissions from the Brunner Island power station, which emitted over 104,000 tons of SO<sub>2</sub> and nearly 14,000 tons of NO<sub>x</sub> in 2005 (See Table 9.1). Lancaster County leads this analysis area in emissions of ammonia (NH<sub>3</sub>) and volatile organic compounds (VOCs). SO<sub>2</sub> emissions from York are nearly 30 times larger than those of Lancaster, and 10 times greater than those of the next largest SO<sub>2</sub> contributor, Berks County.

Composition data for the Lancaster Area show high levels of sulfates, particularly during the warm season, and high levels of nitrates in the cold season (see Figure 1.1.) This most likely is a result of the contribution of SO<sub>2</sub> emissions from York County leading to high sulfate formation. The Lancaster Area

nitrates likely result from the local contribution of ammonia emission from agricultural activity in Lancaster County.

Figure 1.2 is a graphical representation of the CES values listed in Table 1.0. York County's overwhelming emissions contribution and proximity to Lancaster lead to it have the highest CES score, followed by Lancaster County. The CES scores for all other counties being analyzed are much lower, likely the result of their low emissions of all precursor pollutants, coupled with their distance from Lancaster and the prevailing wind patterns and meteorology for the area.

Figure 1.2. Contributing Emissions Scores for the Lancaster Area



Based on this factor, York and Lancaster Counties are the highest ranking candidates for the 2006 24-hour  $PM_{2.5}$  nonattainment designation in the Lancaster nonattainment area. However, York County is part of the York nonattainment area under the 1997  $PM_{2.5}$  NAAQS, and was recommended for inclusion in the York nonattainment area for the 2006  $PM_{2.5}$  NAAQS by Pennsylvania. Berks and Chester Counties have emissions levels similar to that of Lancaster County (except for  $NH_3$ ). These counties are also part of separate nonattainment areas under the 1997  $PM_{2.5}$  NAAQS (Reading and Philadelphia-Wilmington, respectively), and have again been recommended by Pennsylvania for inclusion in those same nonattainment areas under the 2006  $PM_{2.5}$  NAAQS.

Lancaster, York, Chester, and Berks Counties are in separate nonattainment areas for the 1997  $PM_{2.5}$  NAAQS. Furthermore, as explained in detail in Factor 8, below, the York, Chester, and Berks are in areas that are distinct from the Lancaster area. They are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. Furthermore, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Chester, and Berks Counties in separate nonattainment areas for the 2006 24-hour  $PM_{2.5}$  NAAQS. To the extent that emissions from the York, Chester, and Berks Counties contribute to the Lancaster nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

## Factor 2: Air Quality Data

This factor considers the 24-hour PM<sub>2.5</sub> design values (in µg/m<sup>3</sup>) for air quality monitors in counties in the Lancaster area based on data for the 2005-2007 period. A monitor's design value indicates whether that monitor attains a specified air quality standard. The 2006 24-hour PM<sub>2.5</sub> standard is met when the 3-year average of a monitor's 98<sup>th</sup> percentile values is 35 µg/m<sup>3</sup> or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM<sub>2.5</sub> design values for counties in the Lancaster area are shown in Table 2.0.

Table 2.0. Air Quality Data

County	State Recommended Nonattainment?	Design Values 2003-05 (µg/m <sup>3</sup> )	Design Values 2004-06 (µg/m <sup>3</sup> )	Design Values 2005-07 (µg/m <sup>3</sup> )
Lancaster, PA	Yes	44	39	40
York, PA	Yes – other area	41	37	37
Berks, PA	Yes – other area	39	37	38
Chester, PA	Yes – other area			37
Harford, MD	Yes – other area	34	31	31
Dauphin, PA	Yes – other area	39	38	38
Lebanon, PA	Yes – other area	No monitor		
Cecil, MD	No	33	30	30
Cumberland, PA	Yes – other area	40	38	36

Note: Design values shown in red represent violations of the standard.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 2006 24-hr PM<sub>2.5</sub> NAAQS for designation purposes.

As shown in Table 2.0, Lancaster County and the adjacent counties of York, Berks, Chester, Cumberland, and Dauphin all show violations of the 2006 24-hour PM<sub>2.5</sub> standard during 2005-2007. Therefore, these counties are candidates for inclusion in the Lancaster nonattainment area, or in a neighboring nonattainment area. However, York, Berks, Chester, Cumberland, and Dauphin Counties are part of other nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS (York, Reading and Philadelphia-Wilmington, and Harrisburg, respectively). Each of these counties has been recommended for inclusion in those same nonattainment areas for the 2006 PM<sub>2.5</sub> NAAQS.

The absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status. Each county has been evaluated based on the weight of evidence of the nine factors and other relevant information.

### Factor 3: Population Density and Degree of Urbanization (Including Commercial Development)

Table 3.0 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 2006 24-hour PM<sub>2.5</sub> standard.

Table 3.0. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
<b>Lancaster, PA</b>	<b>Yes</b>	<b>489,936</b>	<b>499</b>
York, PA	Yes – other area	408,182	449
Berks, PA	Yes – other area	396,236	458
Chester, PA	Yes – other area	473,723	624
Harford, MD	Yes – other area	238,850	519
Dauphin, PA	Yes – other area	252,949	454
Lebanon, PA	Yes – other area	125,429	346
Cecil, MD	No	97,474	257
Cumberland, PA	Yes – other area	223,017	405

The area of analysis in and around the Lancaster area ranges from moderately to sparsely populated, with county level population densities ranging from a low of 257 to a high of 624. Most of these counties are characterized by relatively small metropolitan areas surrounded by less population dense rural settings. Urban areas in this region are generally small geographically, with most having single county metropolitan areas boundaries, as defined by the Office of Management and Budget (OMB). An example of one such area is Lancaster. According to the latest Census estimates for 2007, the City of Lancaster had a population of 54,672 and the county totaled 498,465; while the City of York had a population of 40,226 compared to a county total of 421,049. Each city has roughly 10% of their respective total county populations, with no other appreciable sized town in each county.

Lancaster County, followed closely by Chester and York Counties, are the highest ranking for this factor with respect to population. Chester County is highest ranking with respect to population density. However, this factor is not of critical importance with respect to the Lancaster area, due to the relatively sparse population density and lack of interaction between the cities in terms of economic linkages and commuting of the area of analysis.

### Factor 4: Traffic and Commuting Patterns

This factor considers the number of commuters in each county who drive to another county within the Lancaster area, the percent of total commuters in each county who commute to other counties within the Lancaster area, and the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4.0). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

The listing of counties on Table 4.0 reflects a ranking based on the number of people commuting to other counties. The counties that are in the nonattainment area for the 1997 PM<sub>2.5</sub> NAAQS are shown in boldface.

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
<b>Lancaster, PA</b>	<b>Yes</b>	<b>3,895</b>	<b>223,960</b>	<b>97</b>	<b>201,610</b>	<b>87</b>
York, PA	Yes – other area	3,088	169,420	88	5,490	3
Berks, PA	Yes – other area	3,178	151,330	85	3,870	2
Chester, PA	Yes – other area	4,255	142,910	66	2,830	1
Dauphin, PA	Yes – other area	3,001	115,450	95	2,590	2
Cumberland, PA	Yes – other area	2,743	100,180	95	710	1
Lebanon, PA	Yes – other area	1,158	21,120	36	3,770	6
Cecil, MD	No	1,211	1,270	3	160	0
Harford, MD	Yes – other area	2,233	820	1	110	0

Note: The 2005 VMT data used for Tables 4.0 and 5.0 of the 9-factor analysis has been derived using methodology similar to that described in “Documentation for the final 2002 Mobile National Emissions Inventory,” Version 3, September 2007, prepared for the Emission Inventory Group, U.S. EPA. The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008. This document may be found at: [ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002\\_mobile\\_nei\\_version\\_3\\_report\\_092807.pdf](ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/mobile/2002_mobile_nei_version_3_report_092807.pdf).

The 2005 VMT data were taken from documentation which is still draft, but which should be released in 2008.

Table 4.1. Predominant Commuting Patterns for the Lancaster Area (2005)

Commuting From:	Number commuting into any violating counties	Number commuting into statistical area	Commuting To:				
			Berks	Cumberland	Dauphin	Lancaster	York
Berks, PA	151,330	3,870	140,819	238	651	<b>3,870</b>	152
Chester, PA	142,910	2,828	1916	23	263	<b>2,828</b>	197
Cumberland, PA	100,180	710	84	73,081	22,448	<b>705</b>	3,807
Dauphin, PA	115,450	2,590	175	16,310	93,958	<b>2,585</b>	2,365
<b>Lancaster, PA</b>	<b>223,960</b>	<b>201,610</b>	<b>4,074</b>	<b>1,197</b>	<b>6,927</b>	<b>201,608</b>	<b>4,018</b>
Lebanon	21,120	3,770	2,799	1,335	12,853	<b>3,770</b>	266
York, PA	169,420	5,490	240	11,626	9,848	<b>5,485</b>	142,104

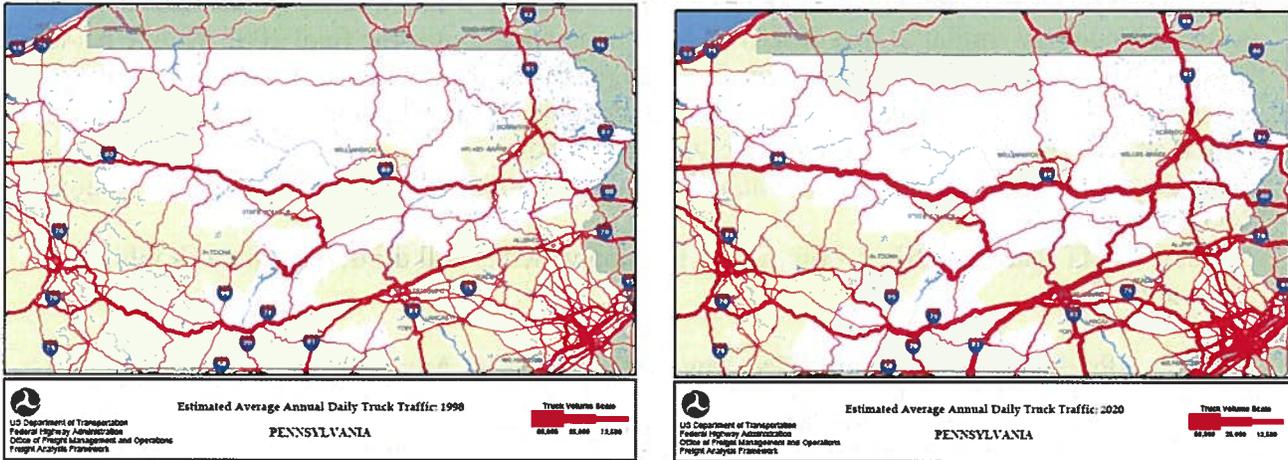
Source: United States 2000 Census County-to-County Worker Flow Files  
<http://www.census.gov/population/www/cen2000/commuting/index.html>

Table 4.1 shows that the bulk of commuter movement within and between the counties in the Lancaster area. The table is read by finding the county that contributes commuters in the left column, and reading across the table to the column to where those commuters travel (e.g., on average, 201,608 commuter trips per day originate and end in Lancaster County). Table 4.1 indicates that each of the neighboring counties contributes commuters most to itself, with relatively few commuters crossing county lines. For example, in Lancaster County over 90% of commuter trips originate and end within the county, with fewer than 10% travelling to Lancaster from adjacent counties.

The entire evaluation area for this technical analysis had combined annual average VMT levels of nearly 25 million miles per day, which is a significant amount of vehicle traffic. The number of commuters is comparatively small, and as a portion of that total, few commuters travel across county lines.

Although the Lancaster contribution to traffic levels in the Lancaster area is significant, there is little contribution to Lancaster from surrounding area commuter traffic. However, this data may not adequately take into account heavy-duty diesel truck traffic from surrounding counties to the Lancaster area. The entire region is expected to see growth in truck traffic over the next several decades (see Figure 4.1).

Figure 4.1. Estimated Pennsylvania Average Annual Daily Truck Traffic (1998 vs. 2020)



Lancaster County has the highest number of commuters in the area of evaluation. Lancaster County's commuters operate primarily in the statistical area where the Lancaster violating monitor is located. Chester County has the overall highest VMT levels, followed closely by Lancaster County. For this factor, Lancaster County is highest ranking for nonattainment designation, and is also high ranking for based on other Factors and its CES value. Of the remaining counties that have a high percentage of commuter traffic into a county with a violating monitor (York, Berks, Chester, Dauphin, and Cumberland), each has been recommended for inclusion as part of another nonattainment area by Pennsylvania, and each was also part of another nonattainment area under the 1997 PM<sub>2.5</sub> NAAQS.

As shown above in Table 4.1, above, very few commuters from York, Berks, Chester, Dauphin, and Cumberland Counties travel into the Lancaster metropolitan statistical area (MSA) compared to the commuters from Lancaster County who travel within the MSA. As explained in detail in Factor 8, below, Lancaster, York, Berks, Chester, Dauphin, and Cumberland Counties are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include York, Berks, Chester, Dauphin, and Cumberland Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that vehicle emissions from the York, Berks, Chester, Dauphin, and Cumberland contribute to the Lancaster nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

**Factor 5: Growth Rates and Patterns**

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in the Lancaster area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

Table 5.0 below shows population, population growth, VMT, and VMT growth for counties that are included in the Lancaster area.

Table 5.0. Population and VMT Values and Percent Change

Location	Population (2005)	Population Dens (2005)	Population % change (2000 - 2005)	2005 VMT (millions)	VMT % change (1996 to 2005)
Lancaster, PA	489,936	499	4	4,392	21
York, PA	408,182	449	7	3,333	6
Berks, PA	396,236	458	6	3,320	11
Chester, PA	473,723	624	9	4,414	54
Dauphin, PA	238,850	519	9	2,068	0
Cumberland, PA	252,949	454	0	3,413	27
Lebanon, PA	125,429	346	4	1,133	7
Cecil, MD	97,474	257	13	1,193	10
Harford, MD	223,017	405	4	2,996	25

Lancaster and Chester have the highest VMT levels in the area of analysis, followed closely by York, Berks, and Cumberland Counties. Those counties have similar levels of VMT, but very different levels of VMT growth. Lancaster County had low population growth between 2000 and 2005. However, Lancaster County had a sizable increase in VMT from 1996 and 2005, which was larger than all other counties in the analysis area (except for Chester County which experienced a 54% jump in VMT). Cumberland County and Harford County have a fairly large percentage increase in VMT, but their overall VMT levels are similar to that of the other counties in the area.

Lancaster, York and Chester Counties are the highest ranking counties in the area in terms of population. Lancaster and Chester Counties are highest ranking in terms of VMT. Both are high ranking for other factors as well.

While Chester and York Counties rank high for VMT under this factor, Pennsylvania has recommended them for inclusion in separate nonattainment areas. As explained in detail in Factor 8, below, Lancaster, Chester, and York Counties are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include Chester and York Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that VMT and population-based emissions from the Chester and York Counties impact the Lancaster nonattainment area, that contribution it will be lessened by controls put in place in those separate nonattainment areas.

#### **Factor 6: Meteorology (Weather/Transport Patterns)**

For this factor, EPA considered the most representative National Weather Service wind direction and speed data throughout the year, with an emphasis on “high PM<sub>2.5</sub> days” for each of two seasons (an October-April “cold” season and a May-September “warm” season). These high days are defined as days where any FRM or FEM air-quality monitors had 24-hour PM<sub>2.5</sub> concentrations above 95% on a frequency distribution curve of PM<sub>2.5</sub> 24-hour values.

Meteorology data is also considered in each county’s Contributing Emissions Score (CES) because the method for deriving the CES included an analysis of trajectories of air masses for high PM<sub>2.5</sub> days (See Factor 1- Emissions Data).

For each air quality monitoring site, EPA developed a pollution trajectory plot (or “pollution rose”) to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figures 6.0- 6.7 identify 24-hour PM<sub>2.5</sub> values by colored icons and days exceeding 35 µg/m<sup>3</sup> are denoted with a red or black icon. These icons are either dots or triangles. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figure indicates the location of the air quality monitoring site, and the location of each icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Pollution trajectories, or pollution roses, are available for a number of the counties in the Lancaster area that is being considered in this technical analysis. These pollution roses are listed below, by metropolitan area.

The pollution roses in Figures 6.0 and 6.1 for the neighboring counties of Lancaster and York show a similar pattern, for both warm and cool seasons on days with the highest measured PM<sub>2.5</sub> (>30 µg/m<sup>3</sup>) concentration values, winds are mild and predominately from the northwest and the southeast.

Figure 6.0. Pollution Trajectory Plot for Lancaster County, PA  
(Lancaster, Lincoln Junior High School Monitor, Site 42-071-0007)

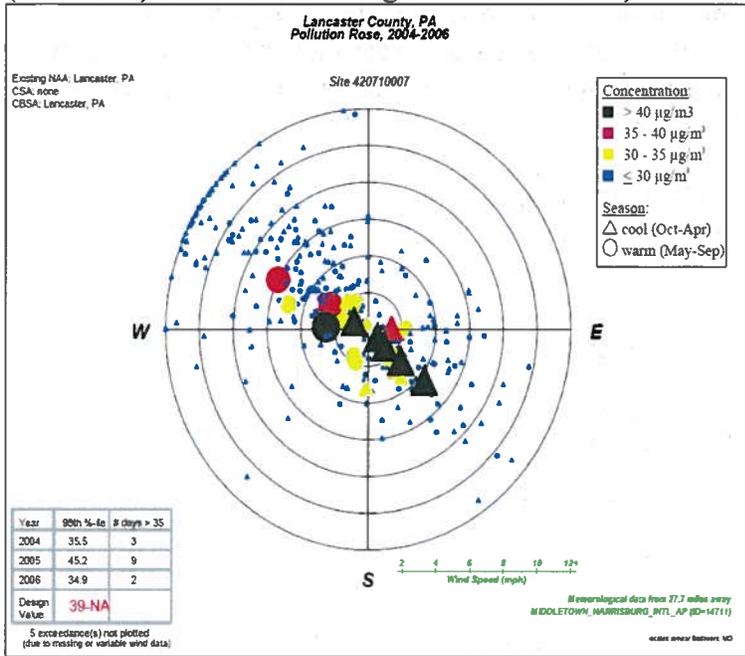
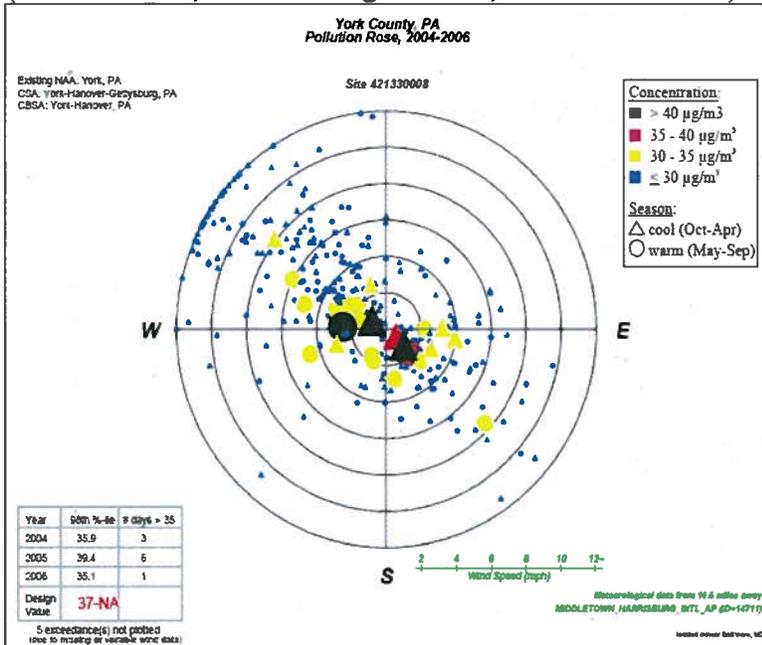


Figure 6.1. Pollution Trajectory Plot for York County, PA  
(York Monitor, Davis Jr. High School, Site 42-133-0008)



The pollution roses in Figures 6.2 and 6.3 for Dauphin County and Cumberland County are similar to those of Lancaster and York. They show a similar northwest-southeast prevailing wind directions on high concentration days in both the cold and warm season, but show more cool high concentration days in the northwest quadrant and more cool weather days in the southwest quadrant.

Figure 6.2. Pollution Trajectory Plot for Dauphin County, PA (Harrisburg Monitor, 1833 UPS Drive, Site 42-043-0401 )

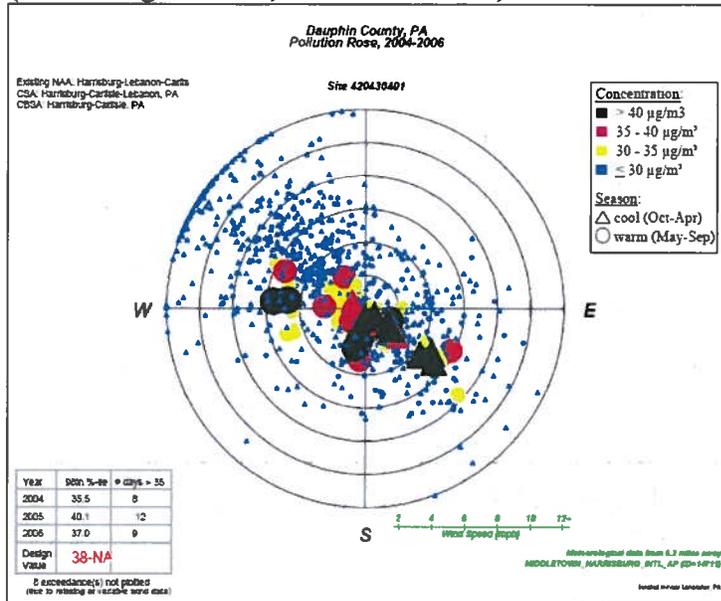
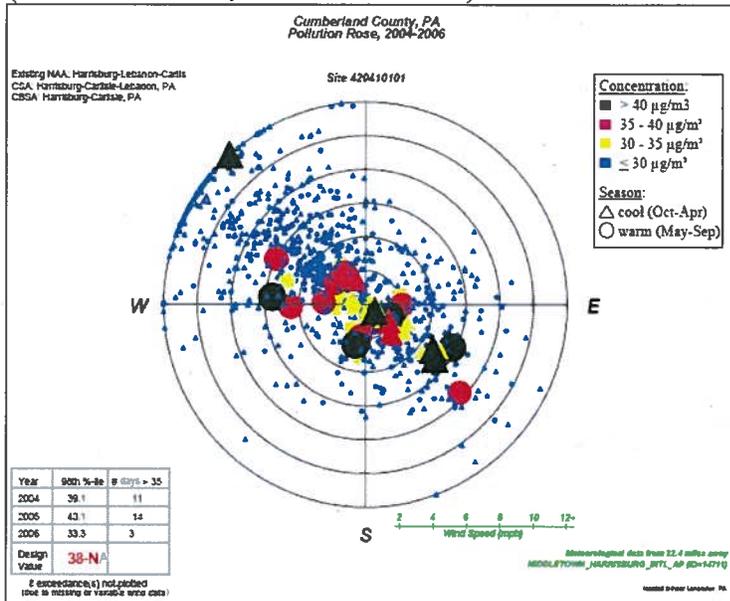
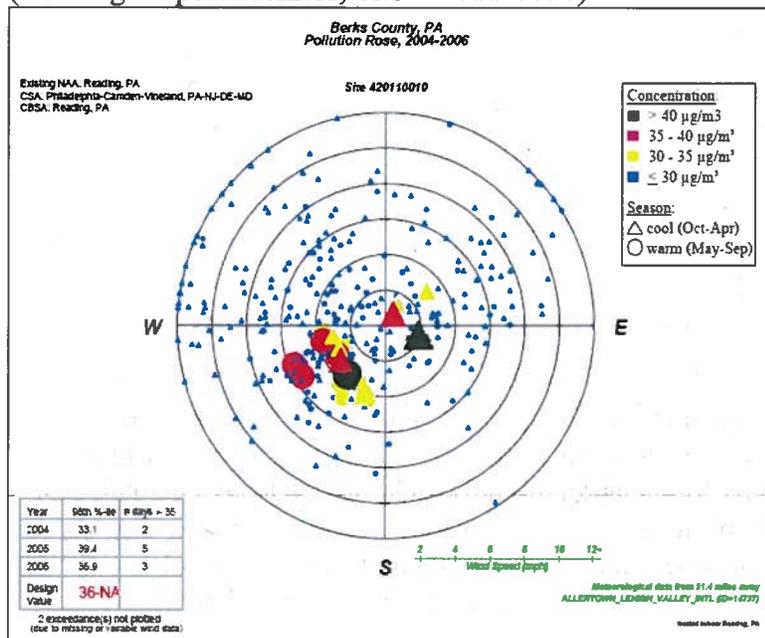


Figure 6.3. Pollution Trajectory Plot for Cumberland County, PA (Carlisle Monitor, Site 42-041-0101)



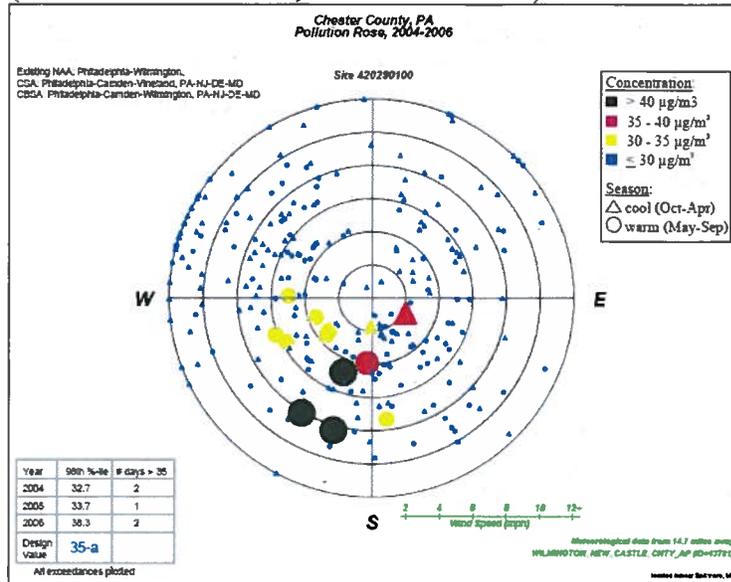
The Reading monitor in Berks County lies fairly distant to the north and east of the violating monitor in Lancaster. For high days in the cool season, it shows a prevalence of light winds in the northeast or southwest direction. (See Figure 6.4) The trend for warm days is for light winds from the southwest. It appears from this information that the wind magnitude and direction on high days in Berks County does not contribute significantly to the violating Lancaster monitor.

Figure 6.4. Pollution Trajectory Plot for Berks County, PA (Reading Airport Monitor, Site 42-011-0010)



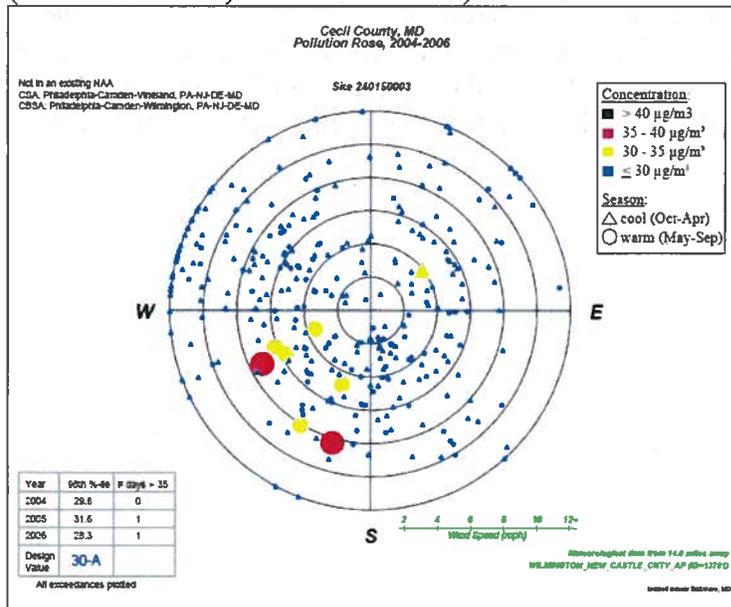
The New Garden monitor in Chester County lies to the distant south and east of the violating monitor in Lancaster. For high days in the warm season, it shows prevailing winds from the southwest, indicating transport from the direction of the Baltimore or Washington areas. The trend for cool days is for light winds from the east, from the direction of the Philadelphia-Wilmington, PA-DE area. From this, it appears that wind magnitude and direction on high days in Chester County does not contribute significantly to the violating Lancaster monitor. (See Figure 6.5)

Figure 6.5. Pollution Trajectory Plot for Chester County, PA  
(New Garden Monitor, Site 42-029-0100)



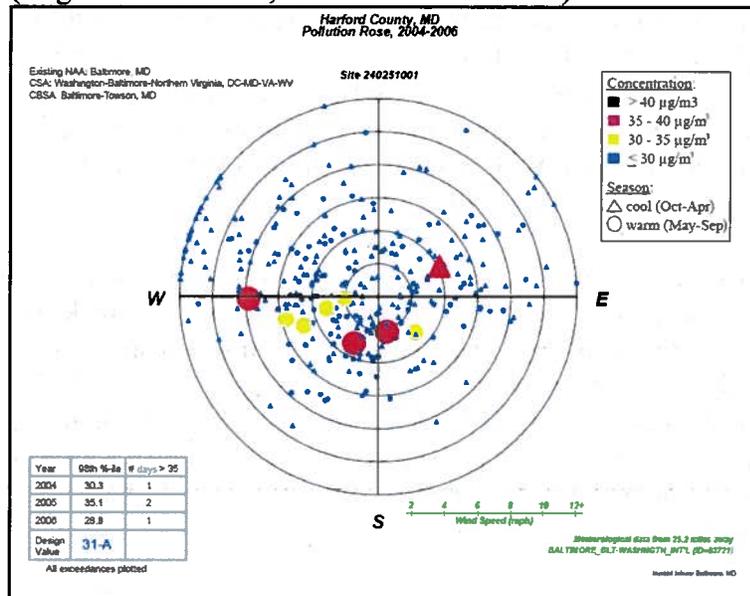
The Fairhill monitor in Cecil County lies fairly distant to the south and east of the violating monitor in Lancaster, south even of the New Garden monitor in Chester County. For high days in the warm season, it trends similar to the New Garden monitor, with winds from the southwest — indicating transport from the direction of the Baltimore or Washington areas, rather than the Lancaster area. It appears from this information that the wind magnitude and direction on high days in Cecil County do not contribute significantly to the violating Lancaster monitor. (See Figure 6.6)

Figure 6.6. Pollution Trajectory Plot for Cecil County, PA  
(Fairhill Monitor, Site 240-150-003)



The Edgewood monitor in Harford County lays distant, due south to the violating monitor in Lancaster. On high days in the warm season, winds prevail from the western direction, indicating impact from the direction of the Baltimore area rather than the Lancaster area. It appears from this information that Harford County does not contribute significantly to the violating Lancaster monitor. (See Figure 6.7)

Figure 6.7. Pollution Trajectory Plot for Harford County, MD (Edgewood Monitor, Monitor 24-025-1001)



EPA’s analysis of meteorology shows that PM<sub>2.5</sub> emissions during high PM<sub>2.5</sub> days in 2004-2006 from Dauphin, Cumberland, and York Counties likely impact the Lancaster area. York also ranks high for several other factors. However, Dauphin, Cumberland, and York Counties are in separate nonattainment areas for the 1997 PM<sub>2.5</sub> NAAQS, and Pennsylvania recommended that they be included in those same separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. Furthermore, as explained in detail in Factor 8, below, the Harrisburg-Lebanon-Carlisle and York areas are distinct from the Lancaster area. They are in separate metropolitan statistical areas and are served by separate metropolitan planning organizations. Furthermore, for air quality planning purposes, Pennsylvania defined separate air basins for these areas. Therefore, EPA has determined that it is appropriate to include Dauphin, Cumberland, and York Counties in separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> NAAQS. To the extent that there is any contribution of transported pollution from the Dauphin, Cumberland, and York Counties to the Lancaster nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

None of the remaining counties adjacent to Lancaster seem to have significant impact on Lancaster, on the basis of these pollution roses. Based on this analysis for this factor, EPA concludes that Chester and Berks Counties in Pennsylvania and Cecil and Harford Counties in Maryland (which are further removed geographically and meteorologically from the Lancaster area) are low-ranked candidates for a 2006 24-hour PM<sub>2.5</sub> nonattainment designation.

### **Factor 7: Geography/Topography (Mountain Ranges or Other Air Basin Boundaries)**

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM<sub>2.5</sub> over the Lancaster area.

The South Central Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM<sub>2.5</sub> NAAQS, including the Lancaster, York, Harrisburg-Lebanon-Carlisle, and Reading nonattainment areas. These areas lie to the south of Blue Mountain, which marks the southern boundary of the Allegheny Mountains, which influence regional wind patterns and serves as a barrier to low maritime air masses originating from the Atlantic Ocean. Several broad valleys stretch across this South Central Region, although these terrain features are smaller than the mountains to the north. Statistical analysis by Pennsylvania DEP indicate monitors within the area generally correlate well with each other, but less well with monitors in eastern Pennsylvania, or with Adams County (to the west) or Perry County (to the north).

The Lancaster area does not have significant topographical barriers limiting air pollution transport within its air shed. Therefore, geography did not play a significant role in the decision-making process. However, Pennsylvania and EPA feel that the air basins have served as a distinguishing characteristic. In the past, EPA has designated the Lancaster area separately from the York, Harrisburg-Lebanon-Carlisle, and Reading areas for both PM and ozone standards, although these areas are geographically contiguous and to some degree may contribute to one another. For the reasons explained above EPA believes it is appropriate to continue to treat these as separate nonattainment areas for the 2006 24-hour PM<sub>2.5</sub> standard.

### **Factor 8: Jurisdictional Boundaries (e.g., Existing PM and Ozone Areas)**

In evaluating the jurisdictional boundary factor, consideration is being given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for PM<sub>2.5</sub> or 8-hour ozone standard) represent important boundaries for state air quality planning.

The analysis of jurisdictional boundaries considered the planning and organizational structure of the Lancaster area to determine if the implementation of controls in a potential nonattainment area can be carried out in a cohesive manner.

As mentioned above, the Southcentral Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM<sub>2.5</sub> NAAQS, including the Harrisburg-Lebanon-Carlisle, York, Lancaster, and Reading nonattainment areas. These nonattainment areas are in separate metropolitan statistical areas (MSAs).

- The Harrisburg-Carlisle MSA includes Cumberland, Dauphin, and Perry Counties. The Harrisburg-Carlisle-Lebanon Combined Statistical Area (CSA) includes the Harrisburg-Carlisle MSA along with the Lebanon MSA (Lebanon County).
- The York-Hanover MSA is comprised of a single county, York. The York-Hanover-Gettysburg, CSA includes the York-Hanover MSA plus the Gettysburg, PA Micropolitan Statistical Area of Adams County.

- The Lancaster MSA is comprised of Lancaster County.
- The Reading MSA consists of Berks County. The Reading MSA is part of the Philadelphia-Camden-Vineland CSA.

These areas are served by separate metropolitan planning organizations (MPOs), the Tri-County Regional Planning Commission (RPC), the Lebanon County Planning Department, the York County Planning Commission, the Lancaster County Planning Commission, and the Berks County Planning Commission.

Chester and Harford Counties are in separate nonattainment areas under the 1997 PM<sub>2.5</sub> NAAQS, including the Philadelphia-Wilmington and Baltimore nonattainment areas. Chester and Harford Counties are also in separate MSAs, the Philadelphia-Camden-Wilmington MSA and the Baltimore-Towson MSA. Furthermore, these areas are served by separate MPOs, the Delaware Valley Regional Planning Commission and the Baltimore Metropolitan Council.

Areas designated as 8-hour ozone nonattainment areas, and prior PM<sub>2.5</sub> nonattainment areas, are also important boundaries for State air quality planning. For the 1997 PM<sub>2.5</sub> standard and the 8-hour ozone standard, Lancaster County (i.e., the one-county Lancaster metropolitan area) was designated as a separate nonattainment area from the other areas surrounding it. Lancaster County designated as the Lancaster marginal 8-hour ozone nonattainment area. This one-county Lancaster metropolitan area is served by its own transportation planning agency based on economic, political, and commuting patterns.

Other counties included in this 9-factor analysis are also designated as 8-hour ozone nonattainment areas, separate from the Lancaster area.. York and Adams Counties were designated as the York Subpart 1 (“Basic”) 8-hour ozone nonattainment area. Berks County was designated as the Reading Subpart 1 (“Basic”) 8-hour ozone nonattainment area. Dauphin, Lebanon, and Cumberland Counties were part of the Harrisburg-Lebanon-Carlisle Subpart 1 (“Basic”) 8-hour ozone nonattainment area. These areas have all been re-designated to attainment for the 1997 8-hour ozone standard.

Chester County is part of the Philadelphia-Wilmington-Atlantic City moderate 8-hour ozone nonattainment area. Harford County is part of the Baltimore moderate 8-hour ozone nonattainment area.

A goal in designating PM<sub>2.5</sub> nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas. Comparison of ozone areas with potential PM<sub>2.5</sub> nonattainment areas, therefore, gives added weight to designation of Lancaster County as a separate PM<sub>2.5</sub> nonattainment area under the 2006 standard

Pennsylvania has defined four air basins that roughly correspond to the 1997 and the 2006 proposed PM<sub>2.5</sub> nonattainment areas in Southcentral Pennsylvania. These include the Lancaster Air Basin in Lancaster County, the Reading Air Basin in Berks County, the Harrisburg Air Basin in Cumberland and Dauphin Counties, and the York Air Basin in York County. In addition, Pennsylvania has defined the Southeast Pennsylvania air basin that corresponds to the 5-county Philadelphia area. These air basins are defined in 25 *Pa Code* § 121.1, and designate sulfur compound controls outlined in 25 *Pa Code* § 123.22.

The definitions of these four air basins, as they appear in 25 Pa Code § 121.1 appear below:

*Lancaster air basin*—The political subdivisions in Lancaster County of East Petersburg Borough, City of Lancaster, Lancaster Township, Manheim Township and Millersville Borough.

*Reading air basin*—The political subdivisions in Berks County of Bern Township, Cumru Township, Kenhorst Borough, Laureldale Borough, Leesport Borough, Lower Alsace Township, Mohnton Borough, Mt. Penn Borough, Muhlenberg Township, City of Reading, Shillington Borough, Sinking Spring Borough, Spring Township, St. Lawrence Borough, Temple Borough, West Lawn Borough, West Reading Borough, Wyomissing Borough, and Wyomissing Hills Borough.

*Harrisburg air basin*—The following political subdivisions in Cumberland County: Camp Hill Borough, East Pennsboro Township, Lemoyne Borough, New Cumberland Borough, West Fairview Borough, Wormleysburg Borough, and the political subdivisions in Dauphin County of the City of Harrisburg, Highspire Borough, Lower Swatara Township, Middletown Borough, Paxtang Borough, Royaltown Borough, Steelton Borough, Susquehanna Township, and Swatara Township.

*York air basin*—The political subdivisions in York County of Manchester Township, North York Borough, Spring Garden Township, Springettsbury Township, West Manchester Township, West York Borough, and City of York.

*Southeast Pennsylvania air basin*—The counties of Bucks, Chester, Delaware, Montgomery and Philadelphia.

### **Factor 9: Level of Control of Emission Sources**

This factor considers emission controls currently implemented, and those soon to be implemented, for major sources in the Lancaster Area.

The emission estimates on Table 1.0 (under Factor 1) reflect implementation of control strategies implemented by the states in the Lancaster area before or during 2005 that may influence emissions of any component of PM<sub>2.5</sub> emissions (i.e., total carbon, SO<sub>2</sub>, NO<sub>x</sub>, and crustal PM<sub>2.5</sub>).

The area surrounding and including the Lancaster area has several large stationary, point sources (see Figure 9.0) that emit high levels of SO<sub>2</sub> plus NO<sub>x</sub> (defined as greater those emitting 5,000 tons per year). Most notable of these in terms of emissions levels is the PPL Brunner Island power station in York Haven, York County. This facility emitted over 106,000 tons of SO<sub>2</sub> in 2007 (see Table 9.1). Under a consent agreement, two scrubbers are in the process of being constructed at Brunner Island, which will handle exhaust from the plants three coal fired boilers. The first of

these scrubbers is to be completed in 2008 (see Table 9.0), and the second scrubber for the remaining boiler units will be completed in 2009. These scrubbers are projected to remove about 100,000 tons of SO<sub>2</sub> per year, which will have a significant impact on air quality in and around the York area.

Figure 9.0. Relief Map of the Lancaster Area with select Electric Generating Units (EGUs) Displayed

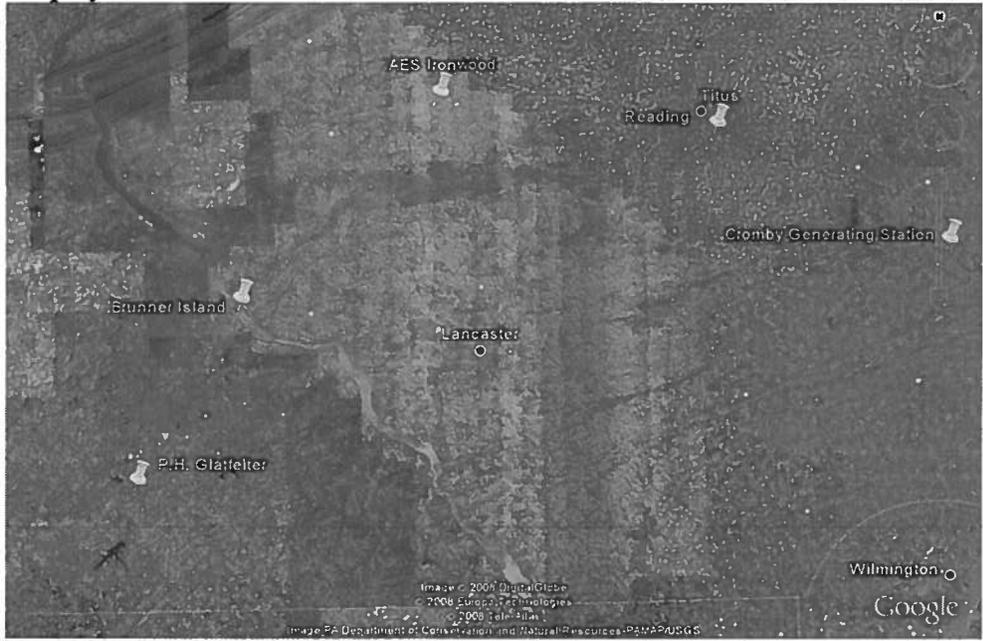


Table 9.0. EGUs with SO<sub>2</sub> plus NO<sub>x</sub> emissions > 5000 tons, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	UniqueID Final	2006 SO <sub>2</sub>	2006 NO <sub>x</sub>	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW	1997 PM <sub>2.5</sub> Nonattainment Area
York, PA	PPL Brunner Island	Coal Steam	3140-B-3	45,447	6,288	2008	95.0		749.0	York
			3140-B-2	26,606	3,600	2009	95.0		378.0	
			3140-B-1	21,492	2,866	2009	95.0		321.0	
Berks, PA	Titus	Coal Steam	3115-B-3	4,718	708				81.0	Reading
			3115-B-1	4,666	699				81.0	
			3115-B-2	3,954	589				81.0	
Chester, PA	Cromby Generating Station	O/G Steam	3159-B-1	3,435	1,581	1982	93.8		48.0	Philadelphia
			3159-B-2	178	112				201.0	
			3159-B-FB1	3,435	1,581		89.0		48.0	
			3159-B-FB2	3,435	1,581		89.0		48.0	

Table 9.1. Selected EGU Emissions (2002-2007) from EPA's Clean Air Markets Division

<b>Brunner Island, York County, PA</b>					
					<b>Facility ID: 3140</b>
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	68,931.9	16,190.7	8,773,248.7	85,510,980
2003	12	73,731.0	13,507.7	7,870,160.3	76,709,689
2004	12	92,073.5	16,249.1	9,317,167.7	90,810,610
2005	12	104,601.6	13,929.5	9,020,665.8	87,923,213
2006	12	93,545.0	12,753.7	8,173,709.4	79,665,649
2007	12	106,148.2	15,730.2	9,380,958.3	91,432,329
<b>Titus, Berks County, PA</b>					
					<b>Facility ID: 3115</b>
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	13,840.5	1,790.6	1,239,473.3	12,080,730
2003	12	15,892.3	2,088.3	1,344,585.4	13,105,065
2004	12	13,577.7	1,996.2	1,245,216.7	12,136,589
2005	12	14,926.4	2,269.9	1,404,778.6	13,691,829
2006	12	13,338.6	1,997.2	1,258,790.7	12,268,916
2007	12	14,488.7	2,474.4	1,481,640.1	14,440,906
<b>Cromby Generating Station, Chester County, PA</b>					
					<b>Facility ID: 3159</b>
Year	# of Months Reported	SO <sub>2</sub> Tons	NO <sub>x</sub> Tons	CO <sub>2</sub> Tons	Heat Input (mmBtu)
2002	12	3,666.6	1,416.5	888,337.4	9,365,376
2003	12	5,442.3	1,952.5	1,257,579.8	13,222,000
2004	12	6,864.9	2,053.2	1,247,551.4	12,790,103
2005	12	4,989.2	2,104.9	1,221,416.0	12,799,778
2006	12	3,613.5	1,692.7	970,952.9	9,881,506
2007	12	3,446.6	1,973.3	1,062,054.7	10,942,142

Based upon this factor, significant reductions in emissions are expected in York County area after the time of designation but prior to the date by when the attainment demonstration for the area would be due. York County is a high-ranking candidate for nonattainment based upon this factor, and for the other factors that are based on CESs. However, this facility is located in a separate jurisdictional area for both economic and air quality planning purposes.

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of emissions in this potential nonattainment area may have installed emission controls or otherwise significantly reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In

cases where specific plants already have installed emission controls or plan to install such controls in the near future, EPA requests additional information on:

- the plant name, city, county, and township/tax district,
- identification of emission units at the plant, fuel use, and megawatt capacity,
- identification of emission units on which controls will be installed, and units on which controls will not be installed,
- identification of the type of emission control that has been or will be installed on each unit, the date on which the control device became / will become operational, and the emission reduction efficiency of the control device,
- the estimated pollutant emissions for each unit before and after implementation of emission controls, and
- whether the requirement to operate the emission control device will be federally enforceable by December 2008, and the instrument by which federal enforceability will be ensured (e.g. through source-specific SIP revision, operating permit requirement, consent decree).