

4.0 Analyses of Individual Nonattainment Areas

4.3 Region 3 Nonattainment Areas

4.3.3 Pennsylvania

PENNSYLVANIA Area Designations For the 24-Hour Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in the Commonwealth of Pennsylvania that EPA has designated as not attaining the 2006 24-hour fine particle (PM_{2.5}) standard.¹ A county (or part thereof) is designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	Pennsylvania Recommended Nonattainment Counties	EPA's Designated Nonattainment Counties
Allentown-Bethlehem-Easton	Lehigh County Northampton County	Lehigh County Northampton County
Harrisburg-Lebanon-Carlisle	Cumberland County Dauphin County Lebanon County	Cumberland County Dauphin County Lebanon County
Johnstown	Cambria County Indiana County (partial)	Cambria County Indiana County (partial)
Lancaster	Lancaster County	Lancaster County
Liberty-Clairton	Allegheny County (partial)	Allegheny County (partial)
Philadelphia	Bucks County Chester County Delaware County Montgomery County Philadelphia County	Bucks County Chester County Delaware County Montgomery County Philadelphia County
Pittsburgh	Allegheny County (partial) Armstrong County (partial) Beaver County Butler County Lawrence County (partial) Washington County Westmoreland County	Allegheny County (partial) Armstrong County (partial) Beaver County Butler County Greene County Lawrence County (partial) Washington County Westmoreland County
Reading	Berks County	Berks County
State College	Centre County	None: demonstrating attainment based on 2005-2007 monitoring data
York	York County	York County

¹ EPA designated nonattainment areas for the 1997 fine particle standards in 2005. In 2006, the 24-hour PM_{2.5} standard was revised from 65 micrograms per cubic meter (average of 98th percentile values for 3 consecutive years) to 35 micrograms per cubic meter; the level of the annual standard for PM_{2.5} remained unchanged at 15 micrograms per cubic meter (average of annual averages for 3 consecutive years).

EPA has designated Mercer County as unclassifiable and the remaining counties in the state as “attainment/unclassifiable.” EPA designated a county as “unclassifiable” when: one or more of its monitors recorded a violation in 2004-2006; all monitors in the county with complete 2005-2007 data showed attainment; and one or more other monitors in the county had 2005-2007 monitoring data that was not complete and could not be used for determining compliance with the standard.

EPA Technical Analysis for the Allentown-Bethlehem-Easton Area

Introduction

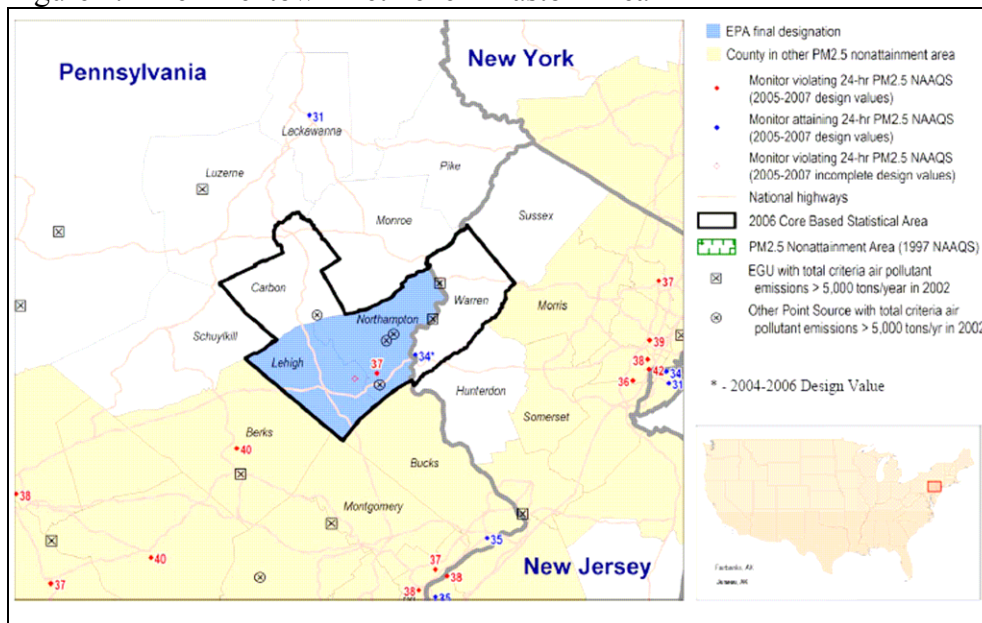
Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Allentown-Bethlehem-Easton area identifies the counties with monitors that violate the 2006 24-hour PM_{2.5} standard and evaluates nearby counties for contribution 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

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under Factor 1 below.)

Figure 1 is a map which identifies the counties in the Allentown-Bethlehem-Easton area and provides other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. 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 $PM_{2.5}$ standard in the Allentown-Bethlehem-Easton area, based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) 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.)

In August 2008, EPA notified the Commonwealth of Pennsylvania of its intended designations. In this letter, EPA also requested that if the Commonwealth of Pennsylvania wished to provide comments on EPA’s intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

Based on EPA's technical analysis described below, EPA has designated two counties in Pennsylvania as nonattainment for the 2006 24-hour $PM_{2.5}$ air quality standard as part of the Allentown-Bethlehem-Easton nonattainment area, based upon currently available information. These counties are listed in the table below.

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

The following is a technical analysis for the Allentown-Bethlehem-Easton area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: $PM_{2.5}$ emissions total, $PM_{2.5}$ emissions carbon, $PM_{2.5}$ emissions other, sulfur

dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and ammonia (NH₃). “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. VOCs and NH₃ are also potential PM_{2.5} 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.

EPA also considered the Contributing Emissions Score 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 manner for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of PM_{2.5} 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 descending order by CES.

Table 1. PM_{2.5} Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment ?	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ (tpy)	NO _x (tpy)	VOCs (tpy)	NH ₃ (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

Based upon the data set forth in Table 1, Northampton County has the highest PM_{2.5} total emissions and SO₂ emissions, and the second highest NO_x 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_{2.5} (see Figure 1).

Philadelphia (CES=13) has the highest NO_x emissions, while Berks county has the second highest SO₂ emissions. Berks, Montgomery, and Philadelphia Counties have the second, third, and fourth highest PM_{2.5} total emissions, respectively. These counties are in existing nonattainment areas for the 1997 PM_{2.5} NAAQS, and are included in those same nonattainment areas for the 2006 PM_{2.5} 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_{2.5} NAAQS, and is included in that nonattainment area for the 2006 PM_{2.5} 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_{2.5} and PM_{2.5} precursors in these counties are quite low. So, on the basis of this factor only, Northampton and Lehigh would be recommended for inclusion in the Allentown nonattainment area.

Factor 2: Air quality data

This factor considers the 24-hour PM_{2.5} design values in micrograms per cubic meter (µg/m³) 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_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values is 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the Allentown-Bethlehem-Easton area are shown in Table 2.

Table 2. Air Quality Data

County, State	State Recommended Nonattainment?	Design Values 2003-05 (µg/m ³)	Design Values 2004-06 (µg/m ³)	Design Values 2005-07 (µg/m ³)
Northampton, PA	Yes	36	37	37
Lehigh, PA	Yes	36	No monitor	
Berks, PA	Yes - other area	39	37	40
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	

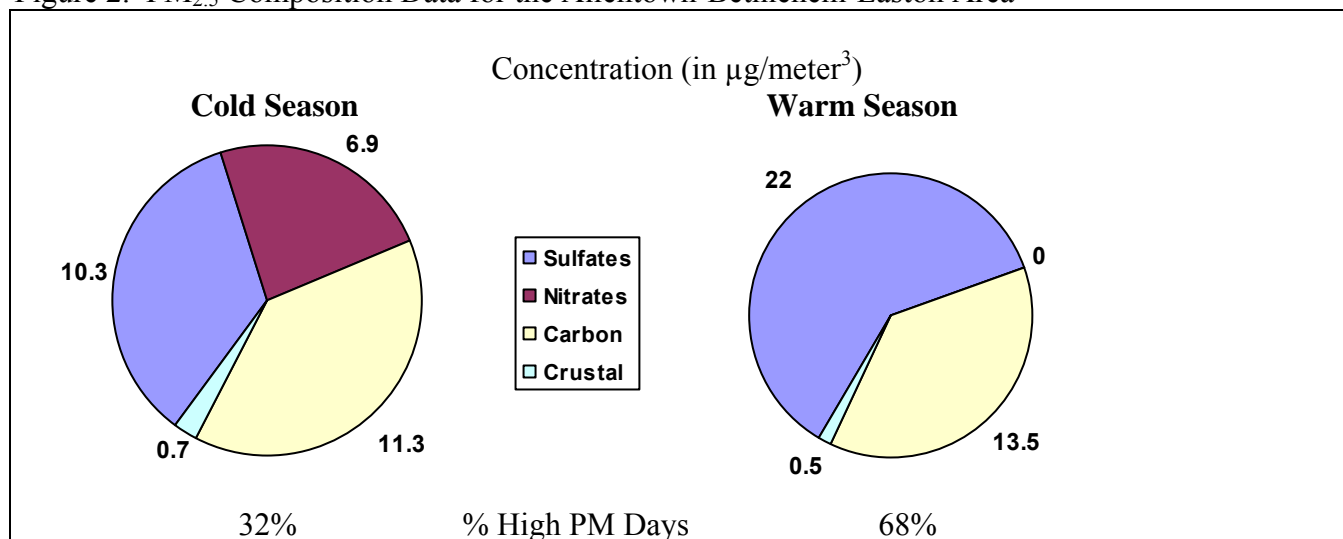
Northampton and Lehigh Counties in Pennsylvania show violations of the 2006 24-hour PM_{2.5} standard. Therefore, these counties are included in the Allentown-Bethlehem-Easton nonattainment area. Berks and Philadelphia Counties in Pennsylvania also show violations of the 2006 24-hour PM_{2.5} standard. However, as stated in Factor 1, above, Berks and Philadelphia Counties are in other nonattainment areas for the 1997 and 2006 PM_{2.5} NAAQS.

Although the other counties in this area of analysis did have a monitor, or had a monitor that did not show a violation of the PM_{2.5} 24-hour standard, 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 all nine factors and other relevant information.

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_{2.5} 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_{2.5} design values in 2005, the last year both monitors were operating, for Allentown and Freemansburg were 36.4 µg/m³ and 36.1 µg/m³ respectively.” These monitors are less than 5 miles apart, with the Freemansburg monitor east-northeast (i.e. downwind) of the Allentown monitor.

Under this factor, we also consider fine particle composition monitoring data. 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 2 illustrates average concentrations of PM_{2.5} components for both warm and cold season high PM_{2.5} days. This data indicates that sources of SO₂ and direct PM_{2.5} carbon emissions are key contributors to exceedances in the area.

Figure 2. PM_{2.5} Composition Data for the Allentown-Bethlehem-Easton Area



Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM 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_{2.5} NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 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_{2.5} standard.

Table 3. 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
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The above data indicates that the counties with the highest populations and population densities are in separate existing nonattainment areas for the 1997 PM_{2.5} NAAQS and are included in those same nonattainment areas for the 2006 PM_{2.5} 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 metropolitan statistical area (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.

Based on this factor, Northampton and Lehigh Counties are high ranking for inclusion in the Allentown-Bethlehem-Easton 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 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). 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. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions of miles)	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

The listing of counties in Table 4 reflects a ranking of the number of people commuting to other counties. As with population and population density in Factor 3, counties with the highest VMT are in

separate existing nonattainment areas for the 1997 PM_{2.5} NAAQS, and are included in those same nonattainment areas for the 2006 PM_{2.5} 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. Northampton and Lehigh Counties are high ranking candidates for nonattainment designation on the basis of this factor.

Note: The 2005 VMT data used for Tables 4 and 5 of the technical analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:
ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf

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 below shows population, population growth, VMT, and VMT growth for counties that are included in the Allentown-Bethlehem-Easton area. Counties are listed in descending order based on VMT growth between 1996 and 2005.

Table 5. Population and VMT Values and Percent Change

Location	Population (2005)	Population % change (2000 - 2005)	2005 VMT (millions of miles)	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 Counties, 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_{2.5} 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. Northampton and Lehigh Counties are high ranking candidates for nonattainment designation on the basis of this factor.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments and other meteorological monitoring sites in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on “high PM_{2.5} 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 air quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values.

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. The figure identifies 24-hour PM_{2.5} values by color; days exceeding 35 ug/m³ are denoted with a red or black icon. 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 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_{2.5} levels is from the southwest (See Figures 6 and 6.1). However, on some days where PM_{2.5} concentrations exceed 35 µg/m³, winds are from the north or north-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 County, PA and Warren County, NJ, influence violations in this area to a far lesser degree.

Figure 6. Pollution Trajectory Plot for Northampton County, PA

(Site 42-095-0025)

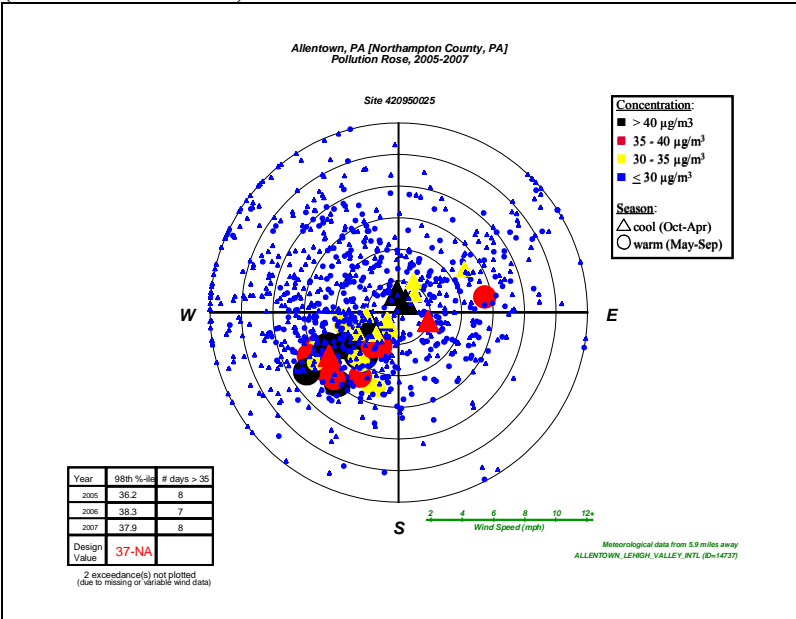
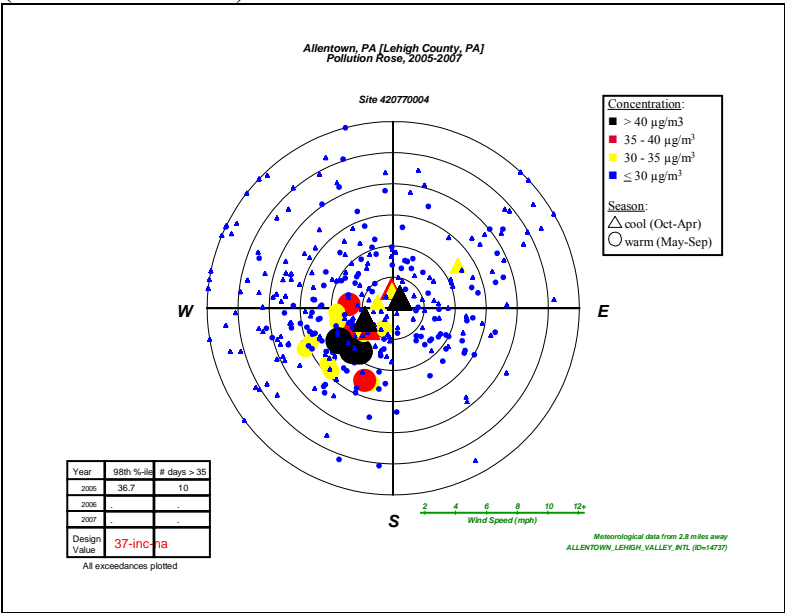


figure 6.1. Pollution Trajectory Plot Lehigh County, PA
(Site 42-077-0004)



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 County, NJ
(Site 44-041-0006)

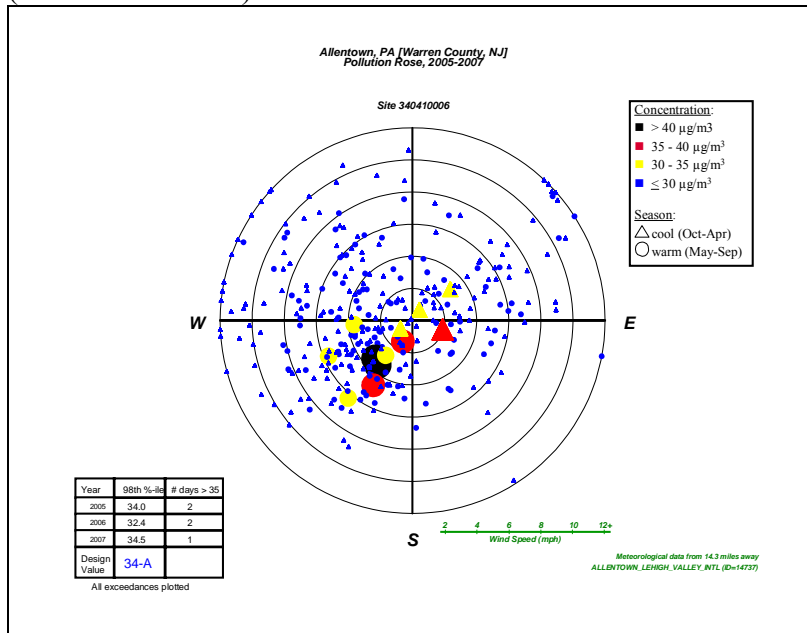
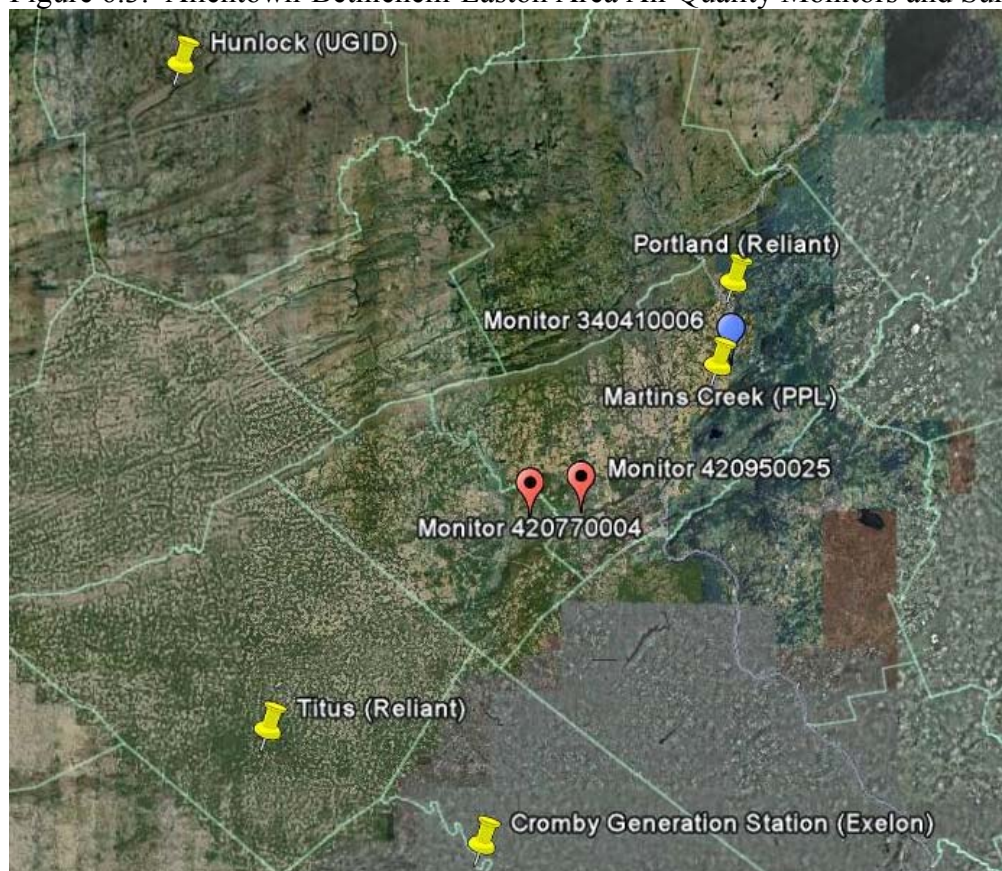


Figure 6.3, below, shows the Northampton, Lehigh, and Warren County monitors, monitors 420950025, 420770004, and 340410006, respectively. Figure 6.3 also includes the four largest electric generating units (EGUs) in the area. The Portland and Martins Creek facilities are in Northampton County, near its 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. Although on the basis of this factor it would appear that the facilities in Berks and Chester Counties to the south of the violating monitor warrant inclusion of those counties in this nonattainment area for this factor, the fact is that they are further away and are being included as part of other nonattainment areas on the basis of comprehensive technical analyses performed by EPA for those areas.

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



Note: 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_{2.5} days.

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_{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 transport of pollutants between Lehigh and Northampton Counties. However, the physical barrier between Carbon and Northampton Counties, i.e., Blue Mountain, means that Carbon County is less likely to contribute to violations in Northampton County.

The Delaware River separates Hunterdon and Warren counties in New Jersey from the Pennsylvania counties in the Allentown, PA-NJ area; however this is not a significant barrier that would influence

the air shed. Although the river valley does not constitute a barrier to transport of air pollutants, Warren County is not recommended for inclusion in the nonattainment area based on all other factors.

Factor 8: Jurisdictional boundaries (e.g., existing PM areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 2006 24-hour PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 2006 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, three also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment 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 Allentown-Bethlehem-Easton area did not violate the 1997 PM_{2.5} standards, and therefore was not designated nonattainment under that standard.

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. Therefore, for metropolitan planning purposes there is no justification to include or exclude counties outside the Allentown area, since the Lehigh Valley Planning Commission would undertake metropolitan planning for the entire nonattainment area.

There are no major jurisdictional boundary issues in the Allentown-Bethlehem-Easton area. EPA is designating Northampton and Lehigh Counties as 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.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Allentown-Bethlehem-Easton area before 2005 on stationary, mobile, and area sources. Data are presented for PM_{2.5} components that are directly emitted (carbonaceous PM_{2.5} and crustal PM_{2.5}) and for pollutants which react in the atmosphere to form fine particles (e.g. SO₂, NO_x, VOC, and ammonia).

In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a State regulation adopted in a State implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in federally enforceable permit upon termination of the consent decree. In making final decisions, EPA also considered whether a facility would continue to emit pollutants which contribute to PM_{2.5} exceedances even after emission controls are operational

The emission estimates on Table 1 (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_{2.5} emissions (i.e., total carbon, SO₂, NO_x, and crustal PM_{2.5}).

In the Allentown-Bethlehem-Easton Area and the surrounding counties, there may be some emission reductions of SO₂ and NO_x subsequent to 2005 that are not accounted for elsewhere in this analysis, due to new controls at large electric generating units (EGUs).

Table 9 shows emissions and controls (current and projected) for EGUs with SO₂ plus NO_x emissions greater than 5000 tons. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) database. Table 9 also lists one EGU that is not included in the NEEDS database, but which has comparable SO₂ and NO_x 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>.

Table 9. EGUs with SO₂ plus NO_x emissions > 5000 tons, from the 2006 NEEDS EGU database

County, State	Plant Name	Plant Type	UniqueID Final	2006 SO ₂	2006 NO _x	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
			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

Northampton Generating Company, Northampton County, PA, Facility ID: 50888					
Year	# Months Reported	SO ₂ Tons	NOx Tons	CO ₂ 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
Portland, Northampton County, PA, Facility ID: 3113					
Year	# Months Reported	SO ₂ Tons	NOx Tons	CO ₂ 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
PPL Martins Creek, Northampton County, PA, Facility ID: 3148					
Year	# Months Reported	SO ₂ Tons	NOx Tons	CO ₂ 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 ₂ Tons	NOx Tons	CO ₂ 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 ₂ Tons	NOx Tons	CO ₂ 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 ₂ Tons	NOx Tons	CO ₂ 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 ₂ Tons	NOx Tons	CO ₂ 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 ₂ Tons	NOx Tons	CO ₂ 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
WPS Westwood Generation LLC, Schuylkill County, PA, Facility ID: 50611					
Year	# Months Reported	SO ₂ Tons	NOx Tons	CO ₂ 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
Panther Creek Energy Facility, Carbon County, PA, Facility ID: 50776					
Year	# Months Reported	SO ₂ Tons	NOx Tons	CO ₂ 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

Hunlock Power Station, Luzerne County, PA, Facility ID: 3176					
Year	# Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Cromby Generation Station (Exelon), Chester County, PA, Facility ID: 3159					
Year	# Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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

As seen in Tables 9 and 9.1, none of the EGUs in the Allentown-Bethlehem-Easton area and surrounding counties put controls 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. (See "Martins Creek at a Glance": <http://www.pplweb.com/ppl+generation/coal+plants/ppl+martins+creek/>) Thus, emissions from Martins Creek may be significantly reduced by December 2008. However, Martin's Creek is located in Northampton County, which has a violating monitor and would be designated nonattainment regardless of the lower expected emissions from this particular facility.

Conclusion

EPA's technical analysis indicates that Northampton and Lehigh Counties contribute the most to the PM_{2.5} nonattainment problem in the Allentown-Bethlehem-Easton area. Compared to the other counties in the MSA, Northampton and Lehigh have high CES, high VMT growth, relatively high populations and population densities, and the most commuters into and within the MSA. Meteorological data and jurisdictional boundaries support their designation as nonattainment.

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 VMT and fewer commuters travelling 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, the Lehigh Valley Planning Commission. Carbon and Warren Counties are in different MPOs. Carbon County is also separated topographically from the Allentown area. In addition, meteorological data indicates that prevailing winds at the violating monitor in Northampton County on

days with elevated PM_{2.5} at or near the level of the 2006 24-hour PM_{2.5} 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.

The area is also affected by short and long-range transport primarily from the southwest. However, 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_{2.5} NAAQS, and have been recommended for inclusion in those same nonattainment areas for the 2006 PM_{2.5} NAAQS. They are similarly in separate MPOs. For all of 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_{2.5} NAAQS.

In December 2007, the State of New Jersey recommended that Knowlton Township in Warren County be designated as “nonattainment” for the 2006 24-hour PM_{2.5} as part of the Allentown-Bethlehem-Easton area. However, in August 2008, based on EPA’s technical analysis of the area, EPA recommended that Warren County, New Jersey, in its entirety, be designated attainment/unclassifiable. In response, the State of New Jersey provided additional technical data to EPA in letters dated September 17, 2008 and October 20, 2008. This additional information was submitted to support New Jersey’s recommendation that Knowlton Township in Warren County, NJ be included in the Allentown-Bethlehem-Easton nonattainment area. EPA evaluated this information and determined that the inclusion of any portion of Warren County in the Allentown-Bethlehem-Easton nonattainment area is not appropriate. For further information, refer to EPA’s technical analysis for the Allentown area. There is a monitor in Warren County, but that monitor does not show a violation of the 24-hour PM_{2.5} standard. Neither has Warren County been shown to contribute to nonattainment in the Allentown-Bethlehem-Easton area. EPA does not rely upon modeling (which New Jersey submitted to demonstrate a showing of nonattainment). Further, Warren County has not been demonstrated to contribute to a violation in counties that do show monitored violations of the standard (i.e., Northampton, Berks, etc.). Therefore, the Clean Air Act does not support designation of Warren County as nonattainment under the standard.

Additional information regarding responses to specific State comments can be found in EPA's Response to Comments document at <http://www.epa.gov/pmdesignations/2006standards/tech.htm>.

EPA Technical Analysis for the Harrisburg-Lebanon-Carlisle Area

Introduction

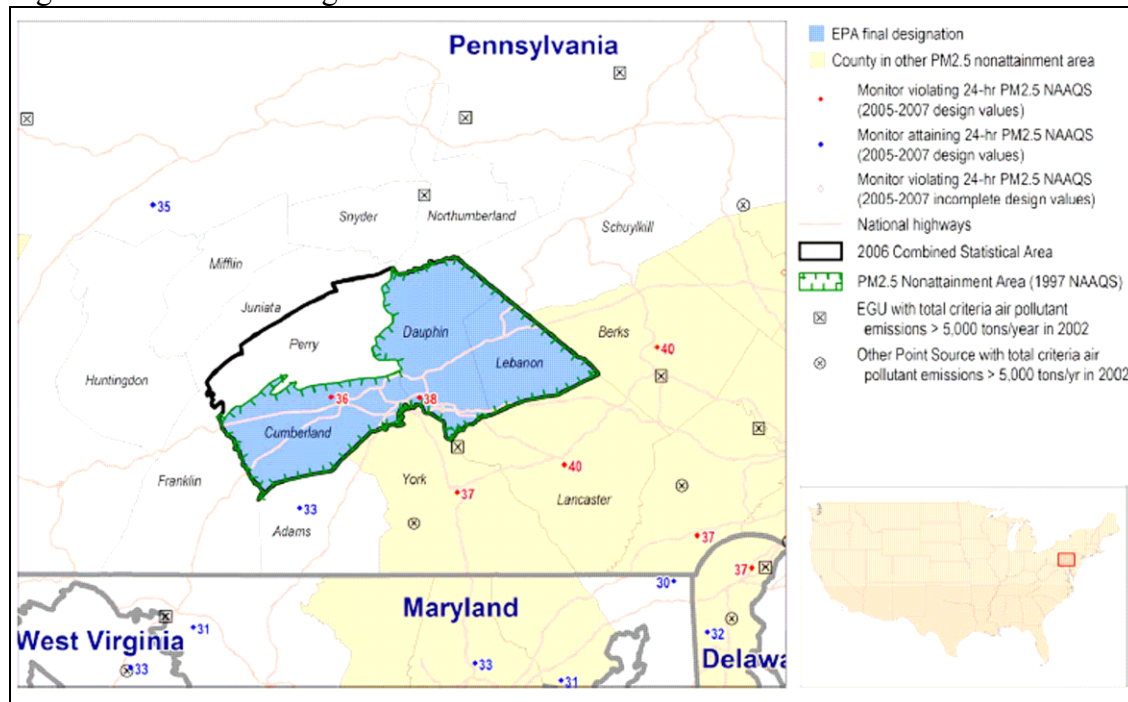
Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those nearby areas that contribute to violations. This technical analysis for the Harrisburg-Lebanon-Carlisle area identifies the counties with monitors that violate the 2006 24-hour PM_{2.5} standard and evaluates nearby counties for contributions 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

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under Factor 1 below.)

Figure 1 is a map of the counties in the nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. The Harrisburg-Lebanon-Carlisle Area



For this area, EPA previously established PM_{2.5} nonattainment boundaries for the 1997 PM_{2.5} NAAQS that included three full counties, Cumberland, Dauphin and Lebanon Counties 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_{2.5} 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) monitors located in the state.

In August 2008, EPA notified the Commonwealth of Pennsylvania of its intended designations. In this letter, EPA also requested that if the Commonwealth of Pennsylvania wished to provide comments on EPA’s intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

Based on EPA's technical analysis described below, EPA has designated Cumberland, Dauphin, and Lebanon Counties, the same counties as previously designated nonattainment for the 1997 PM_{2.5} NAAQS, as nonattainment for the 2006 24-hour PM_{2.5} 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 Final Designated Nonattainment Counties
Pennsylvania	Cumberland County Dauphin County Lebanon County	Cumberland County Dauphin County Lebanon County

The following is a technical analysis for the Harrisburg area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following PM_{2.5} components and precursor pollutants: PM_{2.5} emissions total, PM_{2.5} emissions carbon, PM_{2.5} emissions other, sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and ammonia (NH₃). “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. VOCs and NH₃ are also potential PM_{2.5} 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.

EPA also considered the Contributing Emissions Score 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 manner for consideration of data for these factors. A summary of the CES is included in attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of PM_{2.5} 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_{2.5} NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1. PM_{2.5} Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment?	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ (tpy)	NOx (tpy)	VOCs (tpy)	NH ₃ (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 SO₂, NOx and PM_{2.5} emissions. In fact, SO₂ emissions in York County are more than the total SO₂ 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 SO₂ and nearly 14,000 tons of NOx in 2005. Lancaster County leads the area of analysis in emissions of NH₃ and VOC emissions.

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 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_{2.5} nonattainment designation within the area which is the subject of this analysis.

It should be noted however that three of the counties adjacent to the Harrisburg-Lebanon-Carlisle area have violating monitors (i.e., York, Lancaster, and Berks Counties) and were 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_{2.5} 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_{2.5} NAAQS. To the extent that emissions from the York, Lancaster, and Berks Counties may contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution 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_{2.5} design values micrograms per cubic meter (µg/m³) 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 24-hour PM_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values is 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the Harrisburg-Lebanon-Carlisle area are shown in Table 2, with the current 1997 PM_{2.5} nonattainment area appearing in bold.

Table 2. Air Quality Data

County	State Recommended Nonattainment?	Design Values 2003-05 (µg/m ³)	Design Values 2004-06 (µg/m ³)	Design Values 2005-07 (µg/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

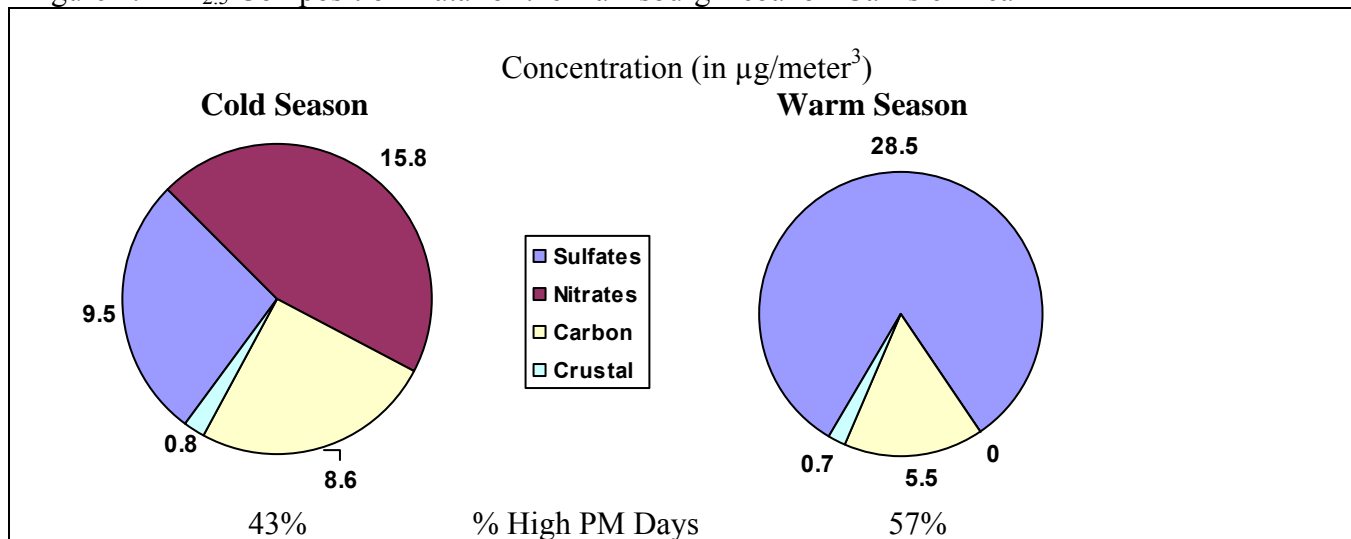
Cumberland and Dauphin Counties violate the 2006 24-hour PM_{2.5} standard. Therefore, these counties are included in the Harrisburg-Lebanon-Carlisle nonattainment area. The adjacent counties of York, Berks, and Lancaster Counties also violate the 2006 24-hour PM_{2.5} standard, over the same period. However, these counties are included as part of separate nonattainment areas for the 2006 24-hour PM_{2.5} NAAQS and are addressed in separate technical analyses.

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 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 PM_{2.5} NAAQS. EPA is designating these counties as part of those same nonattainment areas for the 2006 PM_{2.5} NAAQS. 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.

Under this factor, we also consider fine particle composition monitoring data. 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. This data demonstrates the contribution of the SO₂ 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. See Figure 2. This data indicates that sources of SO₂, NO_x, and direct PM_{2.5} carbon emissions are key contributors to exceedances in the area.

Figure 2. PM_{2.5} Composition Data for the Harrisburg-Lebanon-Carlisle Area



Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM 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_{2.5} NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization

Table 3, 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 gives an indication of whether it is likely that population-based emissions might contribute to violations of the 24-hour PM_{2.5} standard.

Table 3. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Cumberland, PA	Yes	223,017	405
Dauphin, PA	Yes	252,949	454
Lebanon, PA	Yes	125,429	346
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
Huntington, 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 persons per square mile in Huntington County, PA to a high of 499 in York, PA. Most of these counties are characterized by their relatively distributed populations, relatively small urban centers, and predominately rural/suburban development pattern.

The above data indicates that York, Lancaster, and Berks Counties have the highest populations in the Harrisburg-Lebanon-Carlisle area. However, as noted above these counties are being designated as part of separate nonattainment areas. 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 Counties, 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. Based on this factor, Dauphin, Cumberland and Lebanon counties could be considered for inclusion in the 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 Harrisburg-Lebanon-Carlisle area, the percent of total commuters in each county who commute to other counties within the Harrisburg-Lebanon-Carlisle area, as well as the total Vehicle Miles Traveled (VMT) for each county in millions of miles (see Table 4). 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 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_{2.5} NAAQS are shown in boldface.

Table 4. Traffic and Commuting Patterns

County	State Recommended Nonattainment?	2005 VMT (millions of miles)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
Cumberland, PA	Yes	2,996	100,130	95	96,320	91
Dauphin, PA	Yes	3,413	115,390	95	113,240	94
Lebanon, PA	Yes	1,133	21,020	36	50,890	87
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 and 5 of the technical analysis have been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:

http://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf

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_{2.5} 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 4.1. 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	466
Lancaster		Lancaster, PA	217,820	10,110	4,074	1,197	6,927	201,608	4,018	1,952	32
York	York-Hanover-Gettysburg, PA	York-Hanover, PA	169,300	21,840	240	11,626	9,848	5,485	142,104	332	32
Lebanon	Harrisburg-Carlisle-Lebanon, PA	Lebanon, PA	21,020	50,890	2,799	1,335	12,853	3,770	266	36,677	21
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							

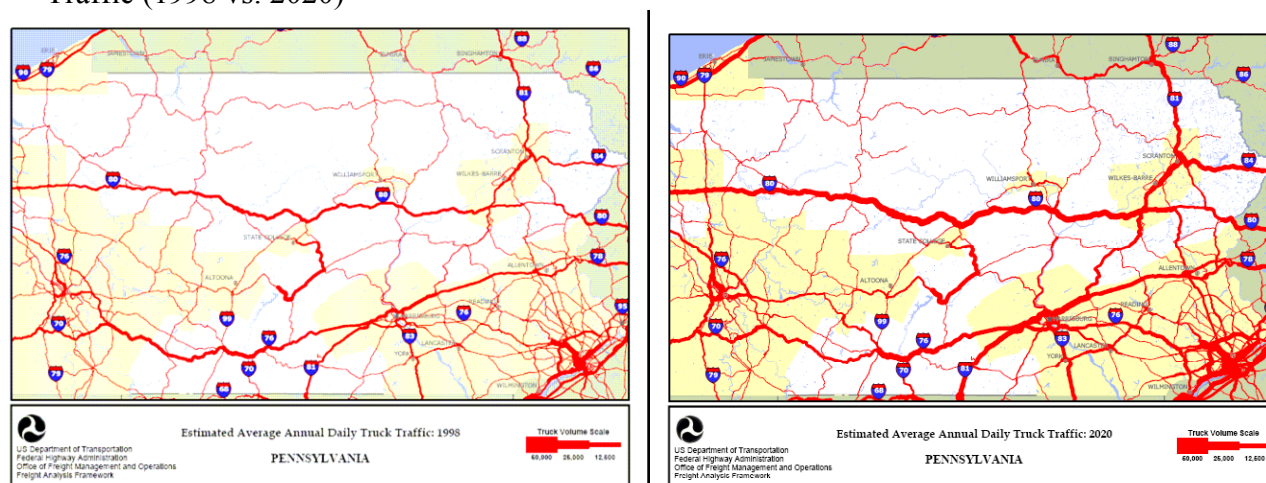
Based upon the above data, it appears that, for each of the counties with a violating monitor, the great majority of commuters travel within the confines of their own county and the number of commuters crossing into other counties with a violating monitor is relatively low. For example, in York County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

Although York and Berks Counties have the highest overall number of commuters, most do not cross into the other counties with violating monitors. Also, Cumberland and Dauphin Counties have relatively high numbers 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 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).

Figure 4. 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 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 $PM_{2.5}$ NAAQS. To the extent that vehicle emissions from the York, Lancaster, and Berks Counties may contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution will be lessened by emission controls put in place in those separate nonattainment areas.

Of the remaining counties, Dauphin, Cumberland, and Lebanon Counties rank highest for nonattainment designation based on this factor. The commuting numbers for these counties also indicate an economic linkage between the three counties. These three counties are also high ranking candidates for designation 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 likely to be contributing to fine particle concentrations in the area.

Table 5 below shows population, population growth, VMT, and VMT growth for counties in the Harrisburg-Lebanon-Carlisle area.

Table 5. Population and VMT Values and Percent Change

Location	Population (2005)	Population % change (2000 - 2005)	Vehicle Miles Traveled in 2005 (millions of miles)	Percentage VMT Growth (1996 to 2005)
Lancaster, PA	489,936	4	4,392	21
Dauphin, PA	252,949	0	3,413	27
York, PA	408,182	7	3,333	6
Berks, PA	396,236	6	3,320	11
Cumberland, PA	223,017	4	2,996	25
Franklin, PA	137,273	6	1,535	18
Schuylkill, PA	146,996	(2)	1,353	(1)
Lebanon, PA	125,429	4	1,133	7
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 Counties had the largest percentage gains in VMT growth, their 2005 VMT levels were quite low compared to Lancaster, Dauphin, Cumberland, and Lebanon Counties, and other counties in this analysis. Considering only VMT levels and VMT growth between 2000 to 2005, in comparison with all counties listed above, Dauphin and Cumberland Counties had larger VMT levels, 3,413 VMT and 2,996 VMT respectively, and had higher VMT growth, 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. York, Berks, and Lancaster Counties all rank high for VMT under this factor, however these counties are included as part of separate nonattainment areas for the 2006 24-hour PM_{2.5} NAAQS and are addressed in separate technical analyses for those areas. 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. However, VMT levels in most of the Harrisburg-Lancaster-Lebanon area and surrounding counties continues to be relatively small. Based on this factor, Dauphin, Cumberland and Lebanon could be considered for inclusion in the nonattainment area.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments and other meteorological monitoring sites in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on “high PM_{2.5} 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 air quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values

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. The figures identify 24-hour PM_{2.5} values by color; days exceeding 35 ug/m³ are denoted with a red or black icon. 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 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.

Harrisburg and Carlisle Areas

The pollution roses for Dauphin County (Harrisburg area) and Cumberland County (Carlisle area) are similar. See Figures 6 and 6.1, below. These figures show a similar northwest-southeast prevailing wind direction on high PM_{2.5} days in both the cold and warm season, and show more warm high PM_{2.5} days in the southwest quadrant and cool weather days in the southeast and northwest 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. Pollution Trajectory Plot for Dauphin County, PA
(Site 42-043-0401)

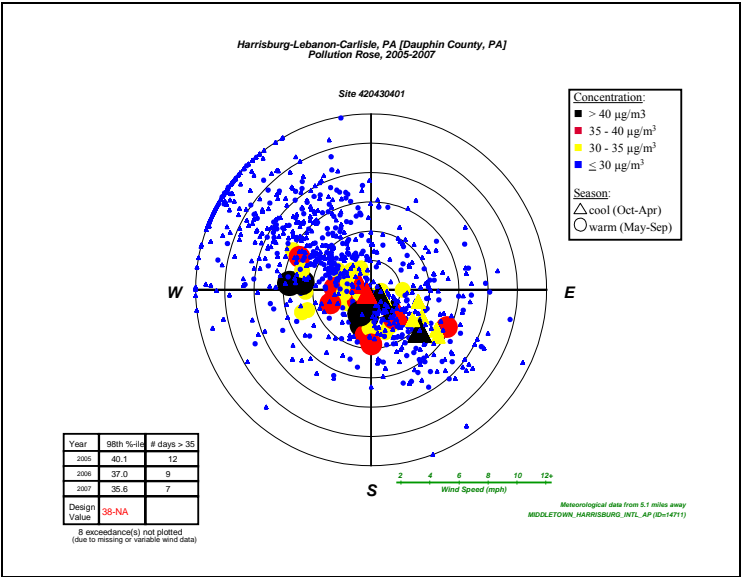
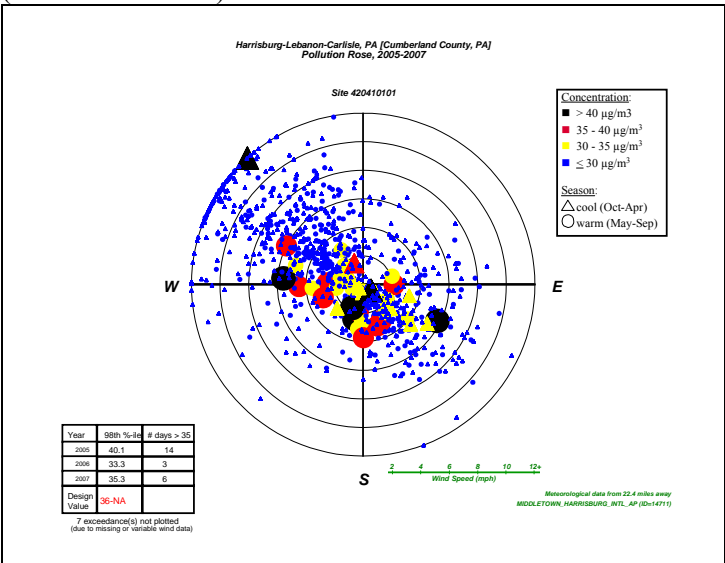


Figure 6.1. Pollution Trajectory Plot for Cumberland County, PA
(Site 42-041-0101)



Lancaster and York Areas

The pollution roses in Figures 6.2 and 6.3, below, for the adjacent counties of York and Lancaster monitors show that for both warm and cool seasons on days with the highest measured PM_{2.5} (>30 µg/m³) concentration values, winds are mild. Prevailing wind directions in the warm season for York

are from the south, and for Lancaster, from the northwest. In the cool season, winds are from the northwest in York and from the southeast in Lancaster.

Figure 6.2. Pollution Trajectory Plot for York County, PA
(Site 42-133-0008)

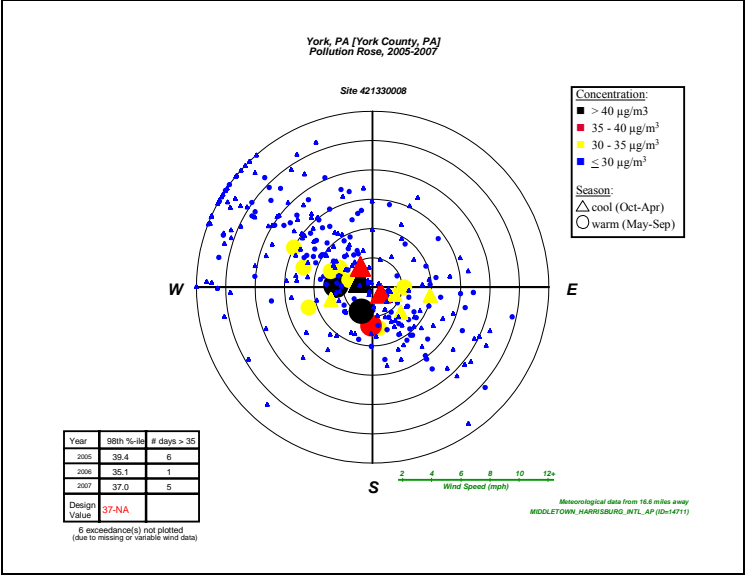
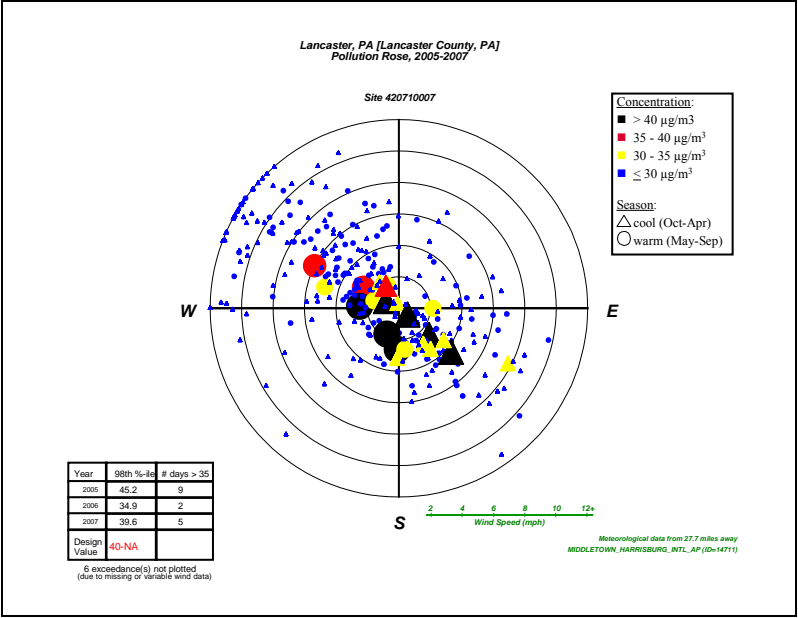


Figure 6.3. Pollution Trajectory Plot for Lancaster County, PA
(Site 42-071-0007)

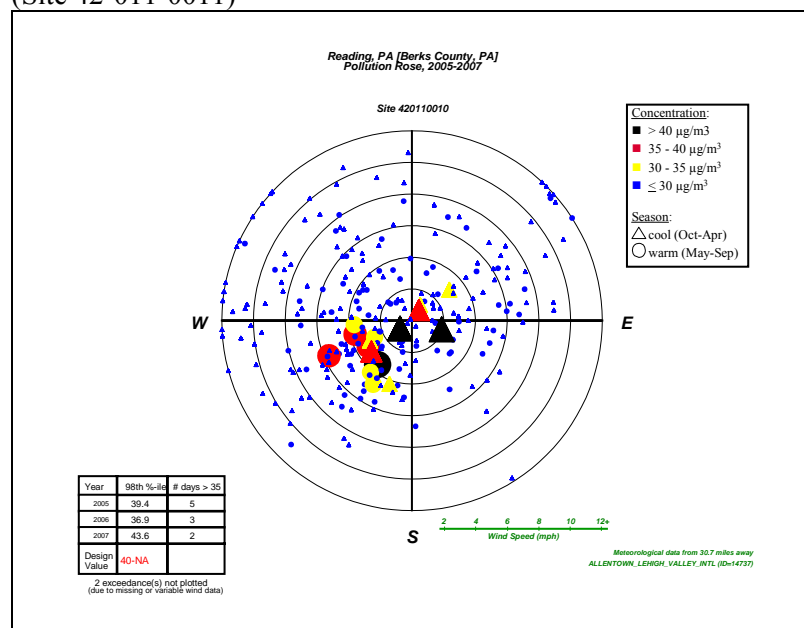


Reading Area

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 from the northeast or southwest direction. The trend for warm days appears to be for light winds from the southwest. See Figure 6.4, 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 6.4. 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. The pollution roses also indicate Lebanon County as contributing to Dauphin and Cumberland Counties. Based on the above analysis of this factor, EPA concludes that Cumberland and Dauphin Counties are high ranking candidates for a 2006 24-hour PM_{2.5} 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_{2.5} nonattainment area. However, those counties have been included in separate nonattainment areas based on historical jurisdictions and factors supporting separate economic 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 2006 24-hour PM_{2.5} nonattainment designation in the Harrisburg area.

Note: 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_{2.5} days.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM_{2.5} over the Harrisburg-Lebanon-Carlisle area.

The Southcentral Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM_{2.5} 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 Department of Environmental Protection 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 2006 24-hour PM_{2.5} nonattainment designation determination.

Factor 8: Jurisdictional boundaries (e.g., existing PM areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 2006 24-hour PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 2006 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, three also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment 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_{2.5} NAAQS, including the Harrisburg-Lebanon-Carlisle, York, Lancaster, and Reading nonattainment areas. These nonattainment areas are also 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_{2.5} nonattainment area and the 2006 PM_{2.5} 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_{2.5} nonattainment areas, are also important boundaries for State air-quality planning. To the degree appropriate, based upon violations and contributions to violations of the ozone and PM_{2.5} NAAQS in a particular area, EPA believes it may be helpful for air planning purposes and for attainment of both NAAQS, for there to be some consistency between ozone and PM_{2.5} nonattainment area boundaries. For the 1997 PM_{2.5} standard and the 1997 8-hour ozone standard, the Harrisburg-Lebanon-Carlisle metropolitan area (as defined by Office of Management and Budget 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. Perry County was not included in the 1997 PM_{2.5} Harrisburg-Lebanon-Carlisle nonattainment area, due to its generally low ranking in the technical 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.

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

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Harrisburg-Lebanon-Carlisle area before 2005 on stationary, mobile, and area sources. Data are presented for PM_{2.5} components that are directly emitted (carbonaceous PM_{2.5} and crustal PM_{2.5}) and for pollutants which react in the atmosphere to form fine particles (e.g. SO₂, NO_x, VOC, and ammonia).

In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a State regulation adopted in a State implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in federally enforceable permit upon termination of the consent decree. In making final decisions,

EPA also considered whether a facility would continue to emit pollutants which contribute to PM_{2.5} exceedances even after emission controls are operational.

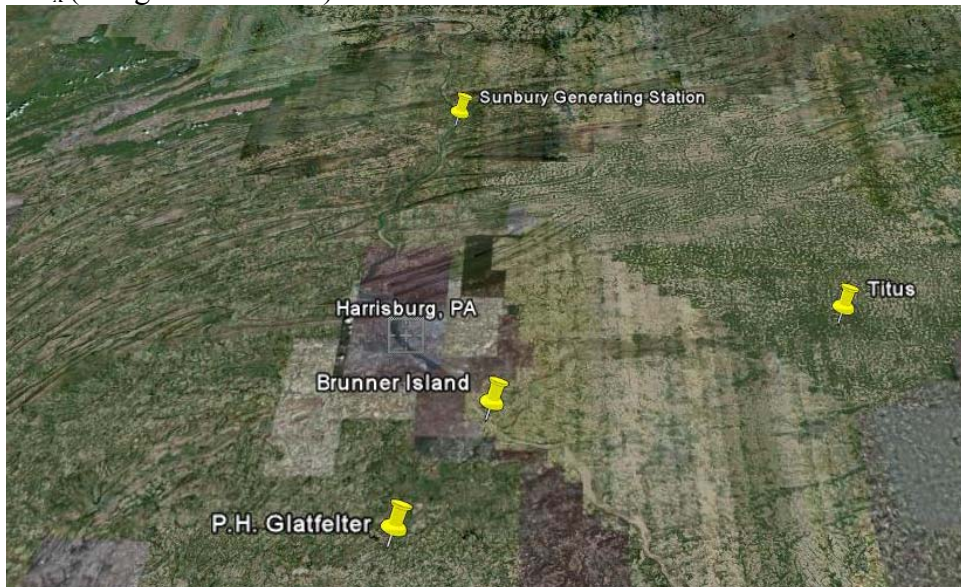
Figure 9, below, depicts the location of the four electrical generating units (EGUs) within the Harrisburg-Lebanon-Carlisle area and nearby vicinity which have combined SO₂ and NO_x emissions of greater than 5,000 tons annually. Table 9 shows emissions and controls (current and projected) for EGUs with SO₂ plus NO_x 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>.

Table 9. EGUs with SO₂ plus NO_x emissions > 5000 tons, from the 2006 NEEDS EGU Database

County	Plant Name	Plant Type	UniqueID Final	2006 SO ₂	2006 NO _x	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW	1997 PM _{2.5} 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	

Figure 9. The Harrisburg-Lebanon-Carlisle Area showing nearby EGUs over 5,000 tons/year SO₂ and NO_x (Google Earth 2008)



The Harrisburg-Lebanon-Carlisle area contains no large stationary point sources (defined here as those emitting levels of SO₂ plus NO_x greater than 5,000 tons per year). However, several large sources are present in the counties adjacent to the Harrisburg-Lebanon-Carlisle area (see Figure 9).

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 SO₂ in 2007 (see Table 9). 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 plant's 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 SO₂ 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

Brunner Island, York County, PA, Facility ID: 3140					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Sunbury Generating Station, Snyder County, PA, Facility ID: 3152					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Titus, Berks County, PA, Facility ID: 3115					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
PH Glatfelter, York County, PA, Facility ID: 50397					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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 SO₂ 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 is included as a separate nonattainment area for the 2006 24-hour PM_{2.5} NAAQS and is addressed in separate technical analysis for that area. Further, this facility is located in a separate jurisdictional area for both economic and air quality planning purposes.

Conclusion

EPA's technical analysis demonstrates that Cumberland, Dauphin, and Lebanon Counties contribute significantly to the PM_{2.5} nonattainment problem in the Harrisburg-Lebanon-Carlisle area.

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_{2.5} NAAQS, the Lancaster, Reading, and York nonattainment areas, respectively. Very few commuters from York, Lancaster, and Berks Counties travel into the Harrisburg-Carlisle-Lebanon CSA compared to the commuters from Dauphin, Cumberland, and Lebanon Counties who travel within that CSA. Furthermore, 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_{2.5} NAAQS. To the extent that emissions from the York, Lancaster, and Berks Counties may contribute to the Harrisburg-Lebanon-Carlisle nonattainment area, that contribution will be lessened by emission controls put in place in those separate nonattainment areas.

Cumberland, Dauphin, and Lebanon Counties in Pennsylvania were designated nonattainment for the 1997 annual PM_{2.5} NAAQS as the Harrisburg-Lebanon-Carlisle nonattainment area. Cumberland and Dauphin Counties have monitors showing violations of 2006 24-hour PM_{2.5} 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_{2.5} NAAQS.

EPA Technical Analysis for the Johnstown Area

Introduction

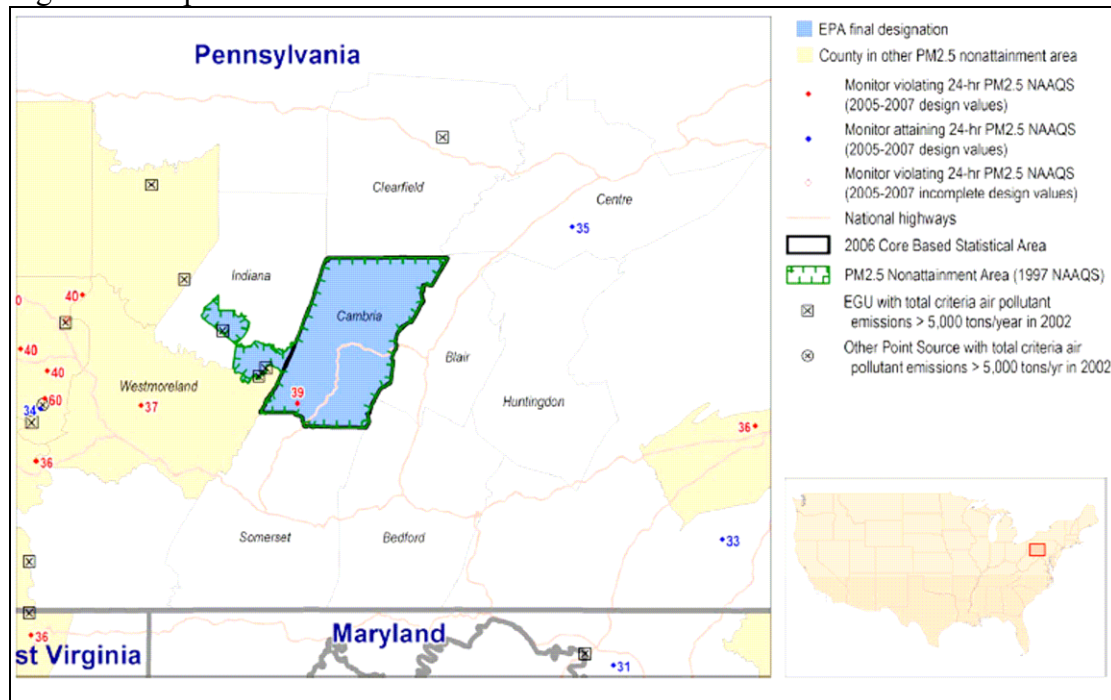
Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those nearby areas that contribute to violations. This technical analysis for the Johnstown area identifies the counties with monitors that violate the 2006 24-hour PM_{2.5} standard and evaluates nearby counties for contributions 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

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under Factor 1 below.)

Figure 1 is a map of the counties in the Johnstown nonattainment area and other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. Map of the Johnstown Area



For this area, EPA previously established PM_{2.5} nonattainment boundaries for the 1997 PM_{2.5} 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_{2.5} 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) monitors located in the state.

In August 2008, EPA notified the Commonwealth of Pennsylvania of its intended designations. In this letter, EPA also requested that if the Commonwealth of Pennsylvania wished to provide comments on EPA’s intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

Based on EPA's technical analysis described below, EPA has designated Cambria County and portions of Indiana County as nonattainment for the 2006 24-hour PM_{2.5} NAAQS as the Johnstown nonattainment area, based upon currently available information. These counties are listed in the table below.

Johnstown	State-Recommended Nonattainment Counties	EPA Final Designated Nonattainment Counties
Pennsylvania	Cambria County Indiana County (partial)	Cambria County Indiana County (partial)

The following is a technical analysis for the Johnstown area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following PM_{2.5} components and precursor pollutants: PM_{2.5} emissions total, PM_{2.5} emissions carbon, PM_{2.5} emissions other, sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and ammonia (NH₃). “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. VOCs and NH₃ are also potential PM_{2.5} 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.

EPA also considered the Contributing Emissions Score 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 manner for considering data for these factors. A summary of the CES is included in Attachment 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of PM_{2.5} and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Johnstown area. Counties that are part of the Johnstown nonattainment area for the 1997 PM_{2.5} NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1. PM_{2.5} Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment?	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ emissions (tpy)	NO _x emissions (tpy)	VOC emissions (tpy)	NH ₃ emissions (tpy)
Indiana, PA	Yes-Partial County	100	12,409	851	11,558	147,536	42,777	4,693	706
Cambria, PA	Yes	29	844	324	520	7,752	6,177	5,363	494
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, emissions of total PM_{2.5} are highest in Indiana County, as are the “other” species of PM_{2.5}. Sulfur dioxide emissions are dramatically higher in Indiana County; these emissions are more than twice the combined total of the remainder of the area EPA evaluated. Emissions of NO_x are also highest by far in Indiana County as compared to elsewhere in the area. 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. These emissions result primarily from three large coal-fired electric generating units (EGUs) located in Indiana County: the Homer City Station Plant, the Conemaugh Plant, and the Seward Plant. As a result of the disproportionately large emissions contribution from these individual sources and the low relative contribution from the remainder of Indiana County, EPA previously designated only the Indiana County townships and boroughs in which these EGUs are located for the 1997 PM_{2.5} NAAQS. EPA has concluded that the disproportionate amount of emissions from these sources also supports inclusion of only these portions of Indiana County within the Johnstown nonattainment area for 2006 PM_{2.5} NAAQS.

Cambria County has monitored violations of the 2006 PM_{2.5} NAAQS, and accordingly requires a designation of nonattainment. EPA has evaluated the emissions and other relevant information for other counties to determine whether other nearby areas contribute to those violations in Cambria. With the exception of VOC emissions, emissions from Cambria County are much lower than those of Indiana County supporting the conclusion that Indiana is contributing to violations adjacent Cambria County. The emission contribution from Clearfield County is worth noting in that emissions of SO₂ and NO_x 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. Indiana's CES score of 100 reflects the highest contribution to violations in Cambria County (normalized to a value of 100), with all other scores relative to that value. Westmoreland County has a comparatively high CES scores; however, EPA is including this county in the Pittsburgh nonattainment area for the 2006 PM_{2.5} NAAQS. Westmoreland County is much more economically integrated with the Pittsburgh area, and already subject to air quality planning with the rest of that area. See the "EPA Technical Analysis for the Pittsburgh-Beaver Valley Area." Based on emissions levels and CES values, Indiana County is the highest ranking candidate inclusion with Cambria County for the 2006 PM_{2.5} NAAQS nonattainment designation for the Johnstown area. Based upon their low emissions and CES scores and lack of a violating monitor, we believe that the other nearby 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_{2.5} design values in micrograms per cubic meter (µg/m³) 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_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values is 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the Johnstown area are shown in Table 2.

Table 2. Air Quality Data

County, State	State Recommended Nonattainment?	24-hr PM _{2.5} Design Values 2003-05 (µg/m ³)	24-hr PM _{2.5} Design Values 2004-06 (µg/m ³)	24-hr PM _{2.5} Design Values 2005-07 (µg/m ³)
Indiana, PA	Yes - Partial	No Monitor		
Cambria, PA	Yes	39	39	39
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

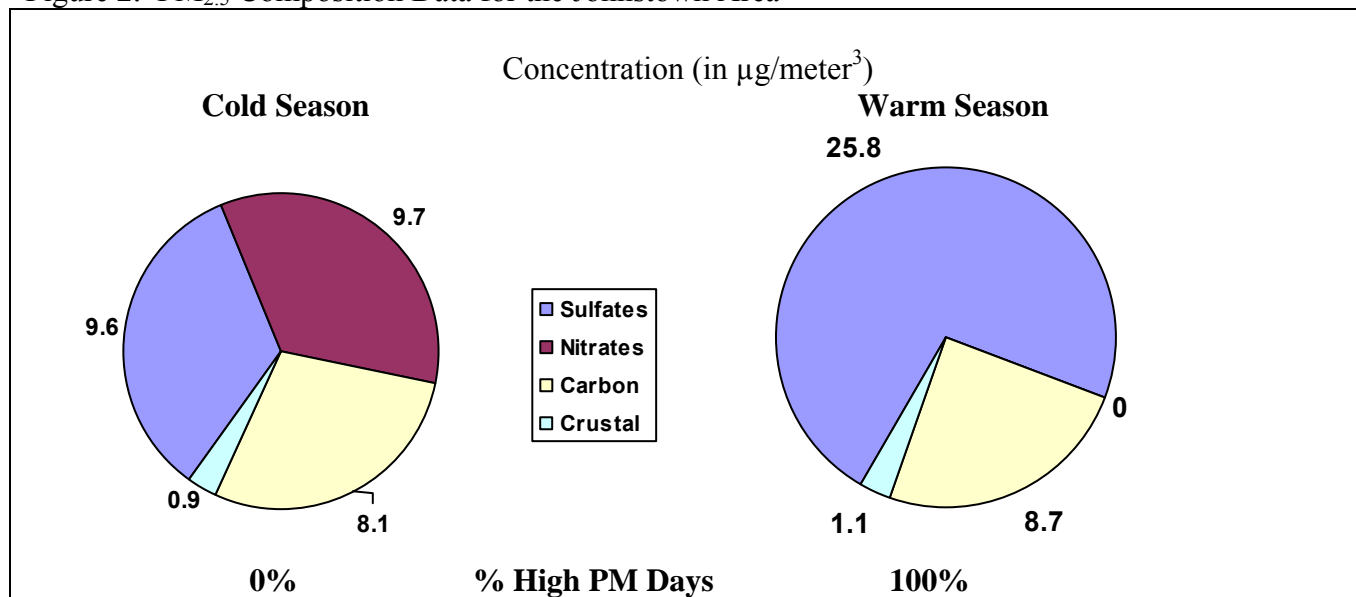
Cambria and Westmoreland Counties have monitored violations of the 2006 24-hour PM_{2.5} standard. Therefore, it is appropriate to include Cambria County within the Johnstown nonattainment area. However, EPA has included Westmoreland County as part of the 2006 24-hour PM_{2.5} standard Pittsburgh nonattainment area, and it is addressed in a separate technical analysis for the Pittsburgh area. See the “EPA Technical Analysis for Pittsburgh, Pennsylvania.”

Of the remaining counties, Centre County previously had monitored violations of the 2006 24-hour PM_{2.5} standard based upon 2003-05 and 2004-06 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.

Under this factor, we also considered fine particle composition monitoring data. 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 2, below. This data indicates that sources of SO₂ emissions are key contributors to exceedances in the area.

Figure 2. PM_{2.5} Composition Data for the Johnstown Area



Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM 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_{2.5} NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3, 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_{2.5} standard.

Table 3. Population

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq mi)
Indiana, PA	Yes – partial	88,481	106
Cambria, PA	Yes	147,804	214
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.

Blair and Centre Counties, which border Cambria County, have populations comparable to Cambria County. However, these counties are separated from Cambria County by a mountain range that runs north to south, separating Cambria and Clearfield Counties on the west from Centre and Blair Counties on the east.

None of these counties are high-ranking candidates for designation as nonattainment based solely upon this factor. Westmoreland County has a fairly large population, but is 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). 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 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_{2.5} NAAQS are shown in boldface.

Table 4. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions of miles)	Number Commuting into any Violating Counties	Percent Commuting into any Violating Counties	Number Commuting into and within Statistical Area	Percent Commuting into and within Statistical Area
Indiana, PA	Yes – Partial	696	4,520	12	1,720	5
Cambria, PA	Yes	1,029	48,990	82	48,150	80
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

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 within this area, and the bulk of the commuting is actually within Cambria County itself. 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.

Of the other counties near 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, but not to Cambria County. Centre County has the next highest level of commuters to a violating county, but they also commute predominantly within Centre County. This suggests that Center County is not contributing to violations in Cambria with respect to this factor.

In general, it appears that information related to this factor is not dispositive for purposes of this 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.

Note: The 2005 VMT data used for Tables 4 and 5 of the technical analysis has been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:

ftp://ftp.epa.gov/EmisInventory/2005_nei/mobile_sector/documentation/2005_mobile_nei_version_2_report.pdf

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 likely to be contributing to fine particle concentrations in the area.

Table 5 below shows population, population growth, VMT, and VMT growth for counties that are included in the Johnstown area.

Table 5. 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 of miles)	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 evaluated by EPA 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, 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. Huntington, 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.

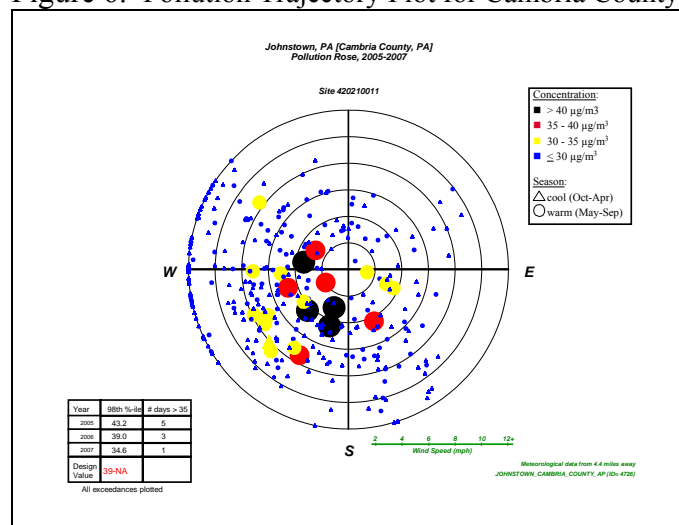
With the exception of Westmoreland County, those counties that have experienced double digit VMT growth are not high ranking candidates for nonattainment designation on the basis of Factors 1 through 4.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments and other meteorological monitoring sites in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on "high PM_{2.5} 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 air quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values.

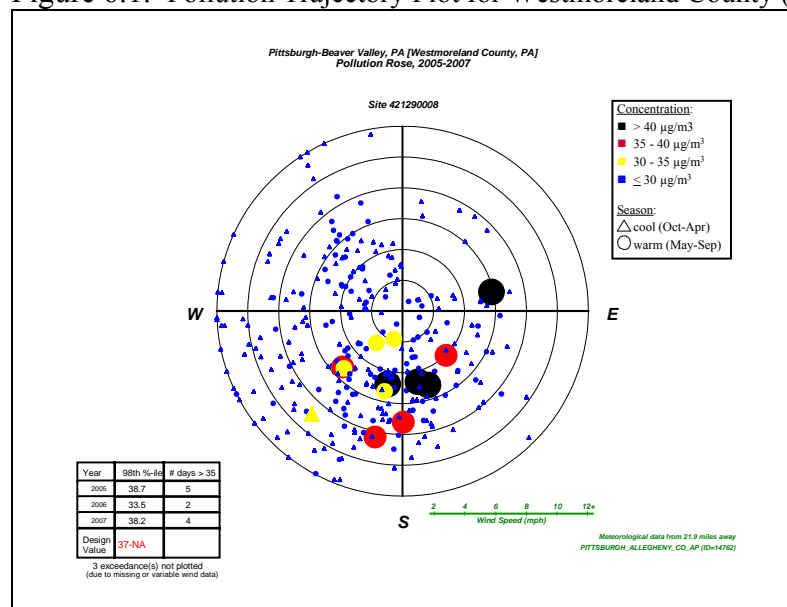
For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Each figure identifies 24-hour PM_{2.5} values by color and days exceeding 35 ug/m³ are denoted with a red or black icon. 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 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.

Figure 6. Pollution Trajectory Plot for Cambria County (Site 42-021-0011)



As shown in the pollution rose in Figure 6, the surface wind directions for high PM_{2.5} days in Cambria County are variable, covering most points of the compass. The pollution roses indicate that 24-hour PM_{2.5} 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_{2.5} days occurred during the warm season at this monitor. This pollution rose supports the conclusion that emissions in adjacent Indiana County are contributing to violations in Cambria County.

Figure 6.1. Pollution Trajectory Plot for Westmoreland County (Site 42-129-0008)



As shown in Figure 6.1, the average prevailing surface wind direction for high PM_{2.5} 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_{2.5} 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_{2.5} days at this monitor.

Pollution roses for the Johnstown area show that some component of elevated PM_{2.5} measured at the Cambria monitor may originate from all wind directions.

Note: 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_{2.5} days.

Factor 7: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might have an effect on the air shed and, therefore, on the distribution of PM_{2.5} over the Johnstown 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 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. Johnstown Aerial Topographic Photo

Source: Google Earth – August 2008

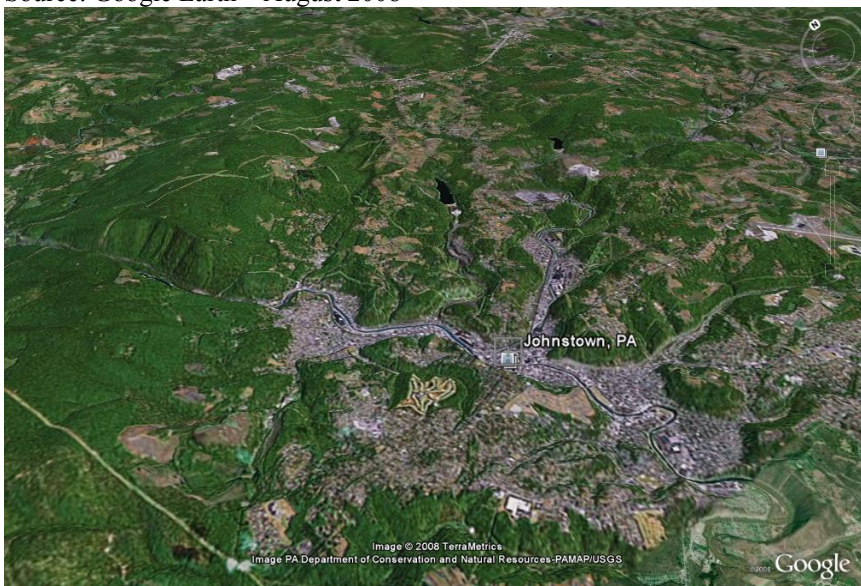


Figure 7.1. Johnstown Topographic Map



Source: US

Geologic Survey – TerraServer USA website

Factor 8: Jurisdictional boundaries (e.g., existing PM_{2.5} areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 2006 24-hour PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 2006 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, three also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may

facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment represent important boundaries for state air quality planning.

Of the counties considered in this technical analysis for Johnstown, only Cambria, Westmoreland and portions of Indiana Counties were designated nonattainment under the 1997 PM_{2.5} NAAQS. Cambria and Indiana Counties comprised the Johnstown 1997 PM_{2.5} nonattainment area. Westmoreland County was part of the Pittsburgh-Beaver Valley 1997 PM_{2.5} nonattainment area.

To the degree appropriate, based upon violations and contributions to violations of the ozone and PM_{2.5} NAAQS in a particular area, EPA believes it may be helpful for air planning purposes and for attainment of both NAAQS, for there to be some consistency between ozone and PM_{2.5} nonattainment area boundaries. 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 technical analysis, there is one Metropolitan Planning Organization 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_{2.5} 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_{2.5} precursor.

Based upon the above discussion and supporting data, EPA believes that the same boundaries established for the 1997 PM_{2.5} nonattainment area are appropriate for the 2006 24-hour PM_{2.5} area for the Johnstown area.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Johnstown area before 2005 on stationary, mobile, and area sources. Data are presented for PM_{2.5} components that are directly emitted (carbonaceous PM_{2.5} and crustal PM_{2.5}) and for pollutants which react in the atmosphere to form fine particles (e.g. SO₂, NO_x, VOC, and ammonia).

In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a State regulation adopted in a State implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in federally enforceable permit upon termination of the consent decree. In making final decisions, EPA also considered whether a facility would continue to emit pollutants which contribute to PM_{2.5} exceedances even after emission controls are operational.

The emission estimates in Table 1 (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_{2.5} emissions (i.e., total carbon, SO₂, NO_x, and crustal PM_{2.5}).

In Johnstown and the surrounding area, there may be some emission reductions of SO₂ and NO_x subsequent to 2005 that are not accounted for elsewhere in this analysis, due to new controls at large EGUs. However, as discussed below, while certain EGUs have installed scrubbers, these controls were in place before 2005, and therefore those emission reductions are reflected in Factor 1.

Table 9 shows emissions and controls (current and projected) for EGUs with SO₂ plus NO_x 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. EGUs with SO₂ plus NO_x emissions > 5000 tpy, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO ₂	2006 NO _x	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 SO₂ plus NO_x emissions <5000 tpy, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO ₂	2006 NO _x	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

Conemaugh, Indiana County, PA, Facility ID: 3118					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Homer City, Indiana County, PA, Facility ID: 3122					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Seward, Indiana County, PA, Facility ID: 3130					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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

Shawville, Clearfield County, PA, Facility ID: 3131					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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 SO₂ emissions are lower than the 2003 SO₂ levels and NO_x emissions are only 20% higher. However, the scrubbers at the Seaward plant were in place before 2005, and therefore those emission reductions are reflected in Factor 1.

Conclusion

The Johnstown and the surrounding nearby areas, which EPA evaluated for this technical analysis, has monitors in Cambria and Westmoreland Counties that violate the 2006 24-hour PM_{2.5} NAAQS based on 2005-2007 FRM data in the EPA Air Quality System (AQS). The largest sources of direct PM_{2.5} and PM_{2.5} precursor emissions in this area are three large EGUs in Indiana County (and another in Clearfield County). The western edge of this analysis area overlaps the Pittsburgh 1997 PM_{2.5} nonattainment area (in Westmoreland County – which EPA is designating as part of 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_{2.5} 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. Westmoreland County is a more natural fit to the Pittsburgh rather than the Johnstown nonattainment area, as it is part of the MSA and historically has been part of the Pittsburgh ozone and PM nonattainment areas. 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_{2.5} nonattainment designation. Jurisdictional boundaries for existing ozone and PM_{2.5} nonattainment areas, as well as existing state-defined air basins, support maintaining the existing 1997 PM_{2.5} area boundaries. Based upon consideration of the information in the technical analysis, Bedford, Blair, Centre, Clearfield, and Somerset Counties do not contribute to violations in this area, and thus are not included within the Johnstown nonattainment area. Therefore, EPA has determined that it is appropriate to include Cambria County and a portion of Indiana County as part of the Johnstown nonattainment area for the 2006 24-hour PM_{2.5} NAAQS.

EPA Technical Analysis for the Lancaster Area

Introduction

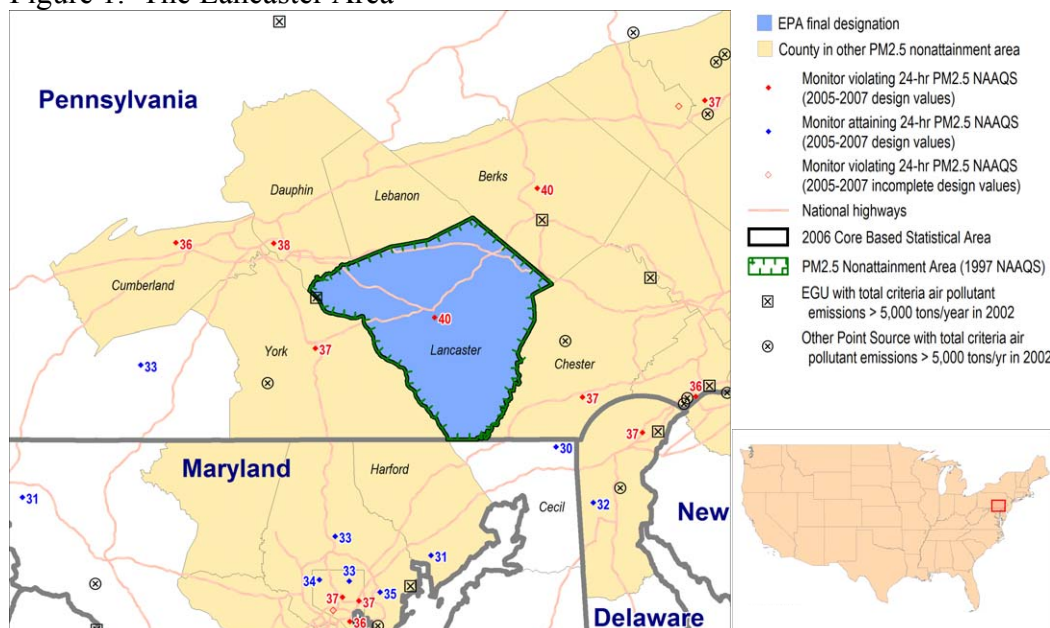
Pursuant to section 107(d) of the Clean Air Act, EPA must designate as nonattainment those areas that violate the NAAQS and those areas that contribute to violations. This technical analysis for the Lancaster area identifies the counties with monitors that violate the 2006 24-hour PM_{2.5} standard and evaluates nearby counties for contribution 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

We also used analytical tools and data such as pollution roses, fine particle composition monitoring data, back trajectory analyses, and the contributing emission score (CES) to evaluate these areas. (See additional discussion of the CES under Factor 1 below.)

Figure 1 is a map which identifies the counties in the Lancaster nonattainment area and provides other relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary.

Figure 1. The Lancaster Area



For this area, EPA previously established PM_{2.5} nonattainment boundaries for the 1997 PM_{2.5} 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_{2.5} standard based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) monitors located in the state. (See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA.)

In August 2008, EPA notified the Commonwealth of Pennsylvania of its intended designations. In this letter, EPA also requested that if the Commonwealth of Pennsylvania wished to provide comments on EPA’s intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

Based on EPA's technical analysis described below, EPA has designated the same county, Lancaster County, as previously designated for the 1997 PM_{2.5} NAAQS, as nonattainment for the 2006 24-hour PM_{2.5} air quality standard as part of the Lancaster nonattainment area. The county is listed in the table below.

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

The following is a technical analysis for the Lancaster Area.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following PM_{2.5} components and precursor pollutants: PM_{2.5} emissions total, PM_{2.5} emissions carbon, PM_{2.5} emissions other, sulfur dioxide (SO₂), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and ammonia (NH₃). “PM_{2.5} emissions total” represents direct emissions of PM_{2.5} and includes: “PM_{2.5} emissions carbon,” “PM_{2.5} emissions other,” primary sulfate (SO₄), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO₂ and NO_x, are part of “PM_{2.5} emissions total,” they are not shown in Table 1 as separate items). “PM_{2.5} emissions carbon” represents the sum of organic carbon (OC) and elemental carbon (EC) emissions, and “PM_{2.5} emissions other” represents other inorganic particles (crustal). Emissions of SO₂ and NO_x, which are precursors of the secondary PM_{2.5} components sulfate and nitrate, are also considered. VOCs and NH₃ are also potential PM_{2.5} 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.

EPA also considered the Contributing Emissions Score 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 manner for consideration of data for these factors. A summary of the CES is included in Attachment 2,

and a more detailed description can be found at
http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

Table 1 shows emissions of PM_{2.5} and precursor pollutant 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_{2.5} NAAQS. Data for Lancaster County is shown in boldface.

Table 1. PM_{2.5} Related Emissions and Contributing Emissions Score

County, State	State Recommended Nonattainment	CES	PM _{2.5} emissions total (tpy)	PM _{2.5} emissions carbon (tpy)	PM _{2.5} emissions other (tpy)	SO ₂ (tpy)	NO _x (tpy)	VOCs (tpy)	NH ₃ (tpy)
Lancaster, PA	Yes	12	3,258	1,159	2,099	4,017	16,396	26,407	16,486
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_{2.5}, NO_x, and (to an even greater degree) SO₂. In fact, SO₂ 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 SO₂ and nearly 14,000 tons of NO_x in 2005 (See Table 9.1). Lancaster County leads this analysis area in emissions of NH₃ and VOCs. SO₂ emissions from York are nearly 30 times larger than those of Lancaster, and 10 times greater than those of the next largest SO₂ contributor, Berks County.

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.

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 is a separate economic area, and based on all of the factors as detailed below EPA is designating York County as a separate nonattainment area for the 2006 PM_{2.5} NAAQS. (See the "EPA Technical Analysis for the York Area.") Berks and Chester Counties have emissions levels similar to that of Lancaster County (except for NH₃). These counties are also part of separate nonattainment areas under the 1997 PM_{2.5} NAAQS (Reading and Philadelphia-Wilmington, respectively) and are separate economic areas, and are also designated as separate nonattainment areas for the 2006 PM_{2.5} NAAQS. (See the "EPA Technical Analysis for the Reading Area" and the "EPA Technical Analysis for the Philadelphia-Wilmington Area.")

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

Counties 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 York, Chester, and Berks Counties may contribute to the Lancaster nonattainment area, that contribution 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_{2.5} design values in micrograms per cubic meter (µg/m³) 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_{2.5} standard is met when the 3-year average of a monitor's 98th percentile values is 35 µg/m³ or less. A design value is only valid if minimum data completeness criteria are met.

The 24-hour PM_{2.5} design values for counties in the Lancaster area are shown in Table 2.

Table 2. Air Quality Data

County	State Recommended Nonattainment?	Design Values 2003-05 (µg/m ³)	Design Values 2004-06 (µg/m ³)	Design Values 2005-07 (µg/m ³)
Lancaster, PA	Yes	44	39	40
York, PA	Yes – other area	41	37	37
Berks, PA	Yes – other area	39	37	40
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

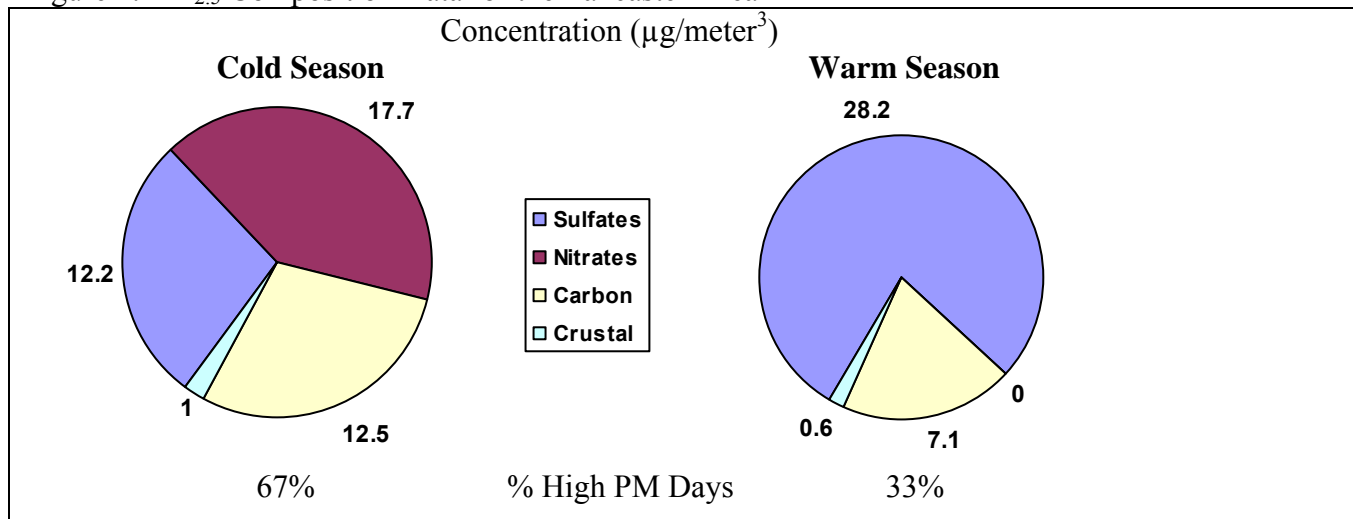
As shown in Table 2, Lancaster County shows violations of the 2006 24-hour PM_{2.5} standard during 2005-2007 and thus must be included in the nonattainment area based on this factor. In addition the adjacent counties of York, Berks, Chester, Cumberland, and Dauphin Counties all show violations of the 2006 24-hour PM_{2.5} standard during 2005-2007. However, York, Berks, Chester, Cumberland, and Dauphin Counties are part of other nonattainment areas for the 1997 PM_{2.5} NAAQS (York, Reading and Philadelphia-Wilmington, and Harrisburg, respectively) and are separate economic areas. Each of these counties has been included in those same nonattainment areas for the 2006 PM_{2.5} NAAQS, and each is addressed in separate technical analyses. See the “EPA Technical Analysis for York Area,” the “EPA Technical Analysis for the Reading Area,” the “EPA Technical Analysis for the Philadelphia-Wilmington Area,” and the “EPA Technical Analysis for the Harrisburg Area.”

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.

Under this factor, we also consider fine particle composition monitoring data. 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 2. This data indicates that sources of SO₂, NO_x, and direct PM_{2.5} carbon emissions are key contributors to exceedances in the area.

Figure 2. PM_{2.5} Composition Data for the Lancaster Area



Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM monitor. All data from Special Purpose Monitors (SPM) using an FRM 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_{2.5} NAAQS for designation purposes.

Factor 3: Population density and degree of urbanization (including commercial development)

Table 3 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_{2.5} standard.

Table 3. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Lancaster, PA	Yes	489,936	499
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).

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 as described further below

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). 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 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_{2.5} NAAQS are shown in boldface.

Table 4. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions of miles)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
Lancaster, PA	Yes	3,895	223,960	97	201,610	87
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 and 5 of the technical analysis has been derived using methodology such as that described in "Documentation for the 2005 Mobile National Emissions Inventory, Version 2," December 2008, prepared for the Emission Inventory Group, U.S. EPA. This document may be found at:

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

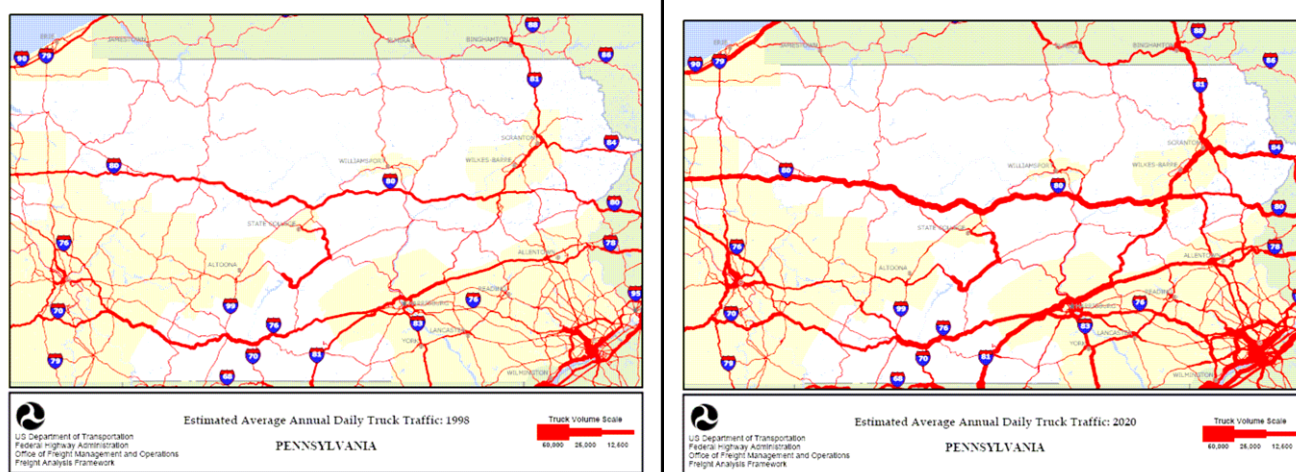
Commuting From:	Number commuting into any violating counties	Number commuting into statistical area	Commuting To:				
			Berks	Cumberland	Dauphin	Lancaster	York
Berks, PA	151,330	3,870	140,819	238	651	3,870	152
Chester, PA	142,910	2,828	1916	23	263	2,828	197
Cumberland, PA	100,180	710	84	73,081	22,448	705	3,807
Dauphin, PA	115,450	2,590	175	16,310	93,958	2,585	2,365
Lancaster, PA	223,960	201,610	4,074	1,197	6,927	201,608	4,018
Lebanon	21,120	3,770	2,799	1,335	12,853	3,770	266
York, PA	169,420	5,490	240	11,626	9,848	5,485	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 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, however, 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 County 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 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 Counties), each has been designated as part of another nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS, and each was also part of another nonattainment area under the 1997 $PM_{2.5}$ 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 $PM_{2.5}$ NAAQS. To the extent that vehicle emissions from York, Berks, Chester, Dauphin, and Cumberland Counties may contribute to the Lancaster nonattainment area, that contribution 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 below shows population, population growth, VMT, and VMT growth for counties that are included in the Lancaster area.

Table 5. Population and VMT Values and Percent Change

Location	Population (2005)	Population Dens (2005)	Population % change (2000 - 2005)	2005 VMT (millions of miles)	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 Counties 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. However, as noted York and Chester are included in separate nonattainment areas based on analysis of all the factors and analytic tools.

Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from National Weather Service instruments and other meteorological monitoring sites in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on “high PM_{2.5} 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 air quality monitors had 24-hour PM_{2.5} concentrations above 95% on a frequency distribution curve of PM_{2.5} 24-hour values.

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. The figure identifies 24-hour PM_{2.5} values by color; days exceeding 35 ug/m³ are denoted with a red or black icon. 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 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 pollution roses in Figures 6 and 6.1, below, for the adjacent counties of York and Lancaster monitors show that for both warm and cool seasons on days with the highest measured PM_{2.5} (>30

$\mu\text{g}/\text{m}^3$) concentration values, winds are mild. Prevailing wind directions in the warm season for York are from the south, and for Lancaster, from the northwest. In the cool season, winds are from the northwest in York and from the southeast in Lancaster.

Figure 6. Pollution Trajectory Plot for Lancaster County, PA
(Lancaster, Lincoln Junior High School Monitor, Site 42-071-0007)

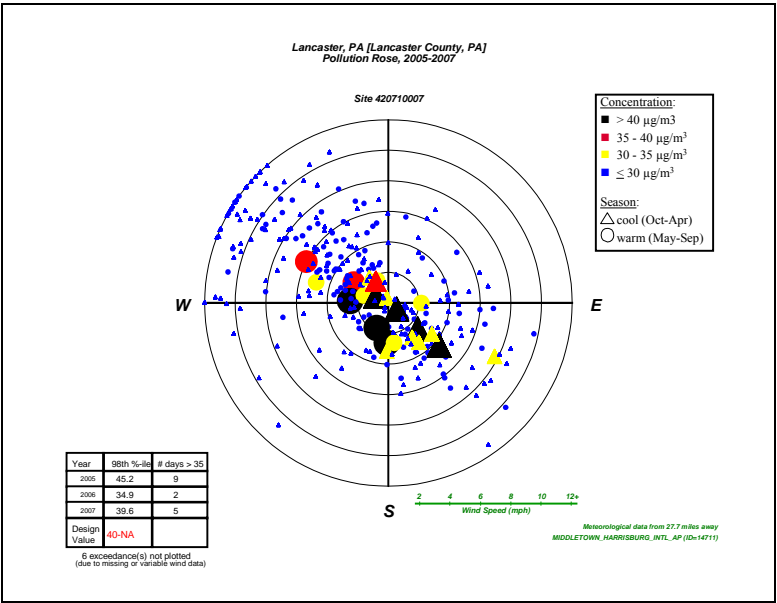
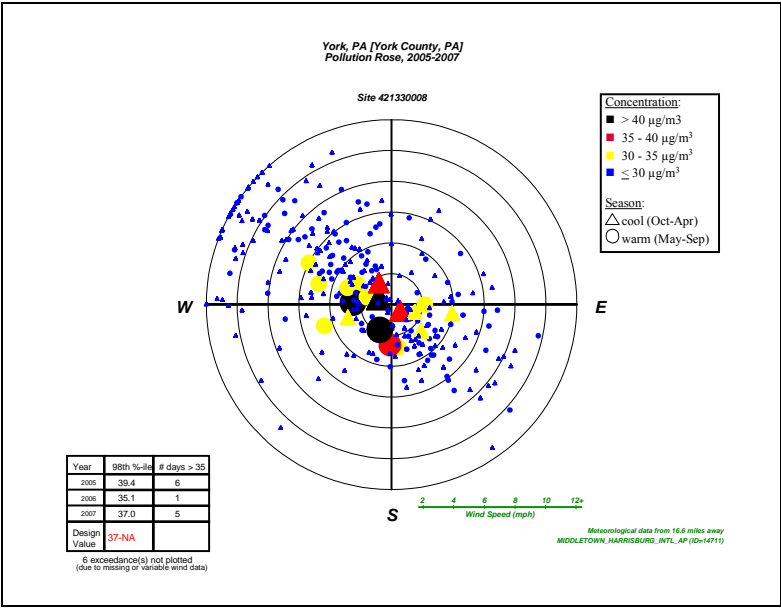


Figure 6.1. Pollution Trajectory Plot for York County, PA
(York Monitor, Davis Jr. High School, Site 42-133-0008)



The pollution roses for Dauphin County (Harrisburg area) and Cumberland County (Carlisle area) are similar. See Figures 6.2 and 6.3. They show a similar northwest-southeast prevailing wind directions on high concentration days in both the cold and warm season, and show more warm high PM_{2.5} days in the southwest quadrant and cool weather days in the southeast and northwest quadrant.

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

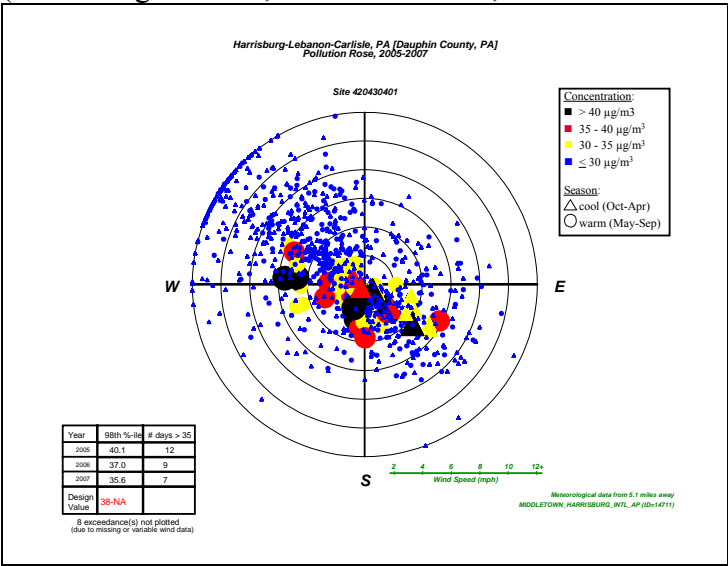
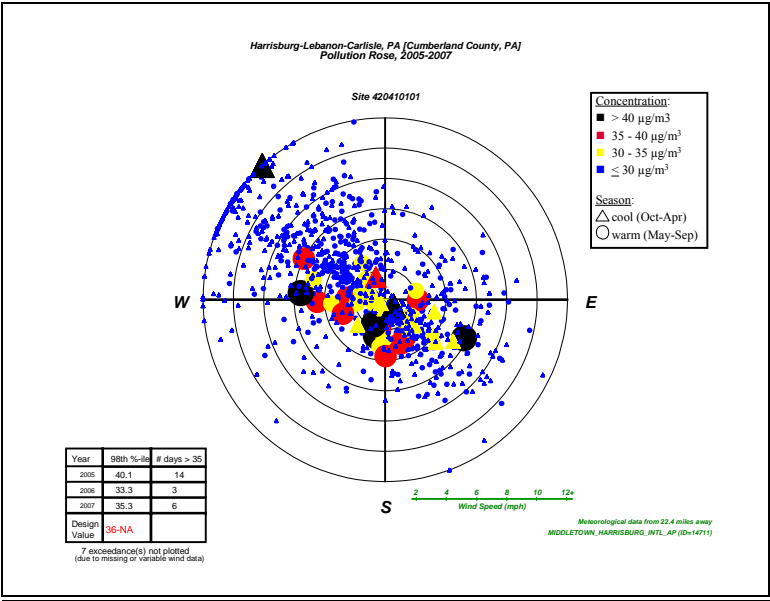
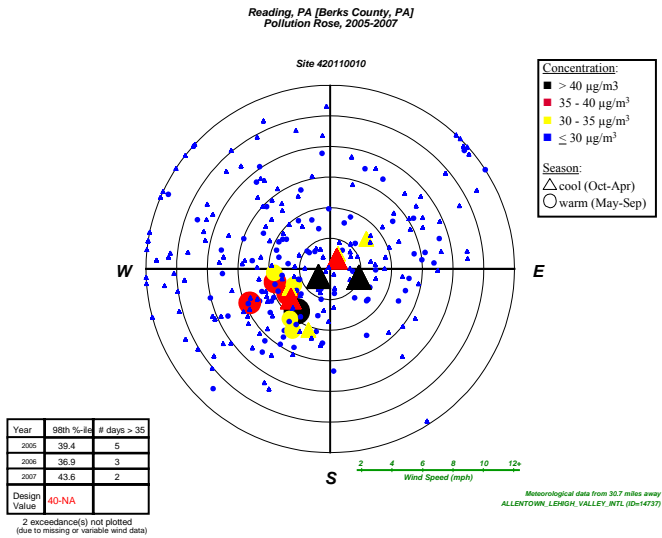


Figure 6.3. Pollution Trajectory Plot for Cumberland County, PA
(Carlisle Monitor, Site 42-041-0101)



The Reading monitor in Berks County lies fairly distant to the north and east of the violating monitor in Lancaster. For high days in both the warm and the cool season, it shows a prevalence of light winds from the southwest direction. (See Figure 6.4) 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.

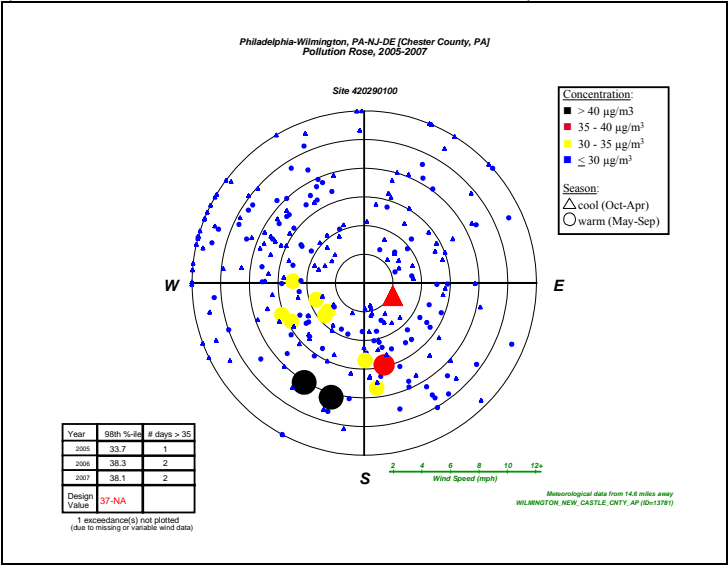
Figure 6.4. Pollution Trajectory Plot for Berks County, PA
(Reading Airport Monitor, Site 42-011-0010)



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,

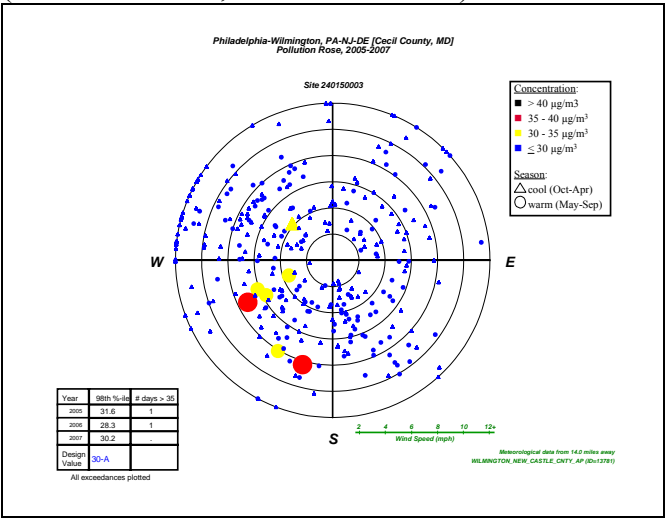
indicating transport from the direction of the Baltimore or Washington areas. The trend for cool days is for light winds from the east, from the direction of the Philadelphia-Wilmington, PA-DE area. From this, it appears that wind magnitude and direction on high days in Chester County does not contribute 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)



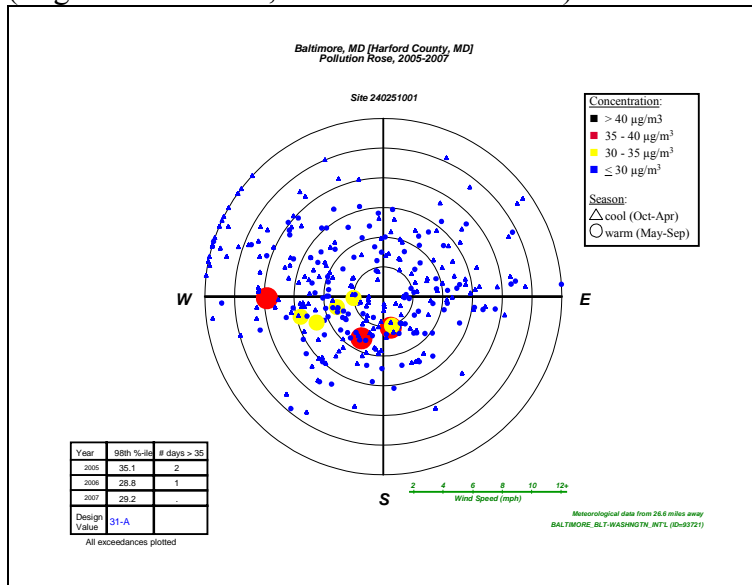
The Fairhill monitor in Cecil County lies fairly distant to the south and east of the violating monitor in Lancaster, south even of the New Garden monitor in Chester County. For high days in the warm season, it trends similar to the New Garden monitor, with winds from the southwest -- indicating transport 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_{2.5} emissions during high PM_{2.5} days in 2005-2007 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_{2.5} NAAQS and are separate economic areas. Therefore, based on analysis of all the factors and analytic tools, EPA has determined that it is appropriate to include Dauphin, Cumberland, and York Counties in separate nonattainment areas for the 2006 24-hour PM_{2.5} NAAQS and these counties are addressed in separate technical analyses. To the extent that there is any contribution of transported pollution from Dauphin, Cumberland, and York Counties to the Lancaster nonattainment area, that contribution will be lessened by emission controls put in place in those separate nonattainment areas.

None of the remaining counties adjacent to Lancaster County seem to have significant impact on Lancaster County, 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_{2.5} nonattainment designation.

Note: The meteorology factor is also considered in each county's Contributing Emissions Score (CES) because the method for deriving this metric included an analysis of trajectories of air masses for high PM_{2.5} days.

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_{2.5} over the Lancaster area.

The South Central Region of Pennsylvania is home to four separate nonattainment areas under the 1997 PM_{2.5} 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 Department of Environmental Protection 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_{2.5} standard.

Factor 8: Jurisdictional boundaries (e.g., existing PM areas)

In evaluating the jurisdictional boundary factor, EPA gave special consideration to areas that were already designated nonattainment in 2005 for violating the 1997 fine particle standards. Analysis of chemical composition data in these areas indicates that the same components that make up most of the PM_{2.5} mass in the area on an annual average basis (such as sulfate and direct PM_{2.5} carbon in many eastern areas) also are key contributors to the PM_{2.5} mass on days exceeding the 2006 24-hour 2006 PM_{2.5} standard. These data indicate that in many cities, the same source categories that contribute to violations of the annual standard also contribute to exceedances of the 2006 24-hour standard.

Most areas that were originally designated nonattainment for the PM_{2.5} standards still have not attained the standards. Thus, EPA has generally concluded that counties that were designated as having emissions sources contributing to fine particle concentrations which continue to exceed the 1997 standards (all areas violated the annual standard, three also violated the previous 24-hour standard) also contribute to fine particle concentrations on the highest days. For this reason, EPA believes that for most existing nonattainment areas, the nonattainment area for the 2006 24-hour standard should be the same. Consideration also should be given to existing boundaries and organizations as they may facilitate air quality planning and the implementation of control measures to attain the standard. Areas already designated as nonattainment 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_{2.5} 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_{2.5} 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.

Pennsylvania has defined four air basins that roughly correspond to the 1997 and the 2006 proposed PM_{2.5} 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, 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.

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

Areas designated as 8-hour ozone nonattainment areas, and prior PM_{2.5} nonattainment areas, are also important boundaries for State air quality planning. For the 1997 PM_{2.5} 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 is 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 technical 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.

To the degree appropriate, based upon violations and contributions to violations of the ozone and PM_{2.5} NAAQS in a particular area, EPA believes it may be helpful for air planning purposes and for attainment of both NAAQS, for there to be some consistency between ozone and PM_{2.5} nonattainment area boundaries. Comparison of ozone areas with potential PM_{2.5} nonattainment areas, therefore, gives added weight to designation of Lancaster County as a separate PM_{2.5} nonattainment area under the 2006 standard.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Lancaster area before 2005 on stationary, mobile, and area sources. Data are presented for PM_{2.5} components

that are directly emitted (carbonaceous PM_{2.5} and crustal PM_{2.5}) and for pollutants which react in the atmosphere to form fine particles (e.g. SO₂, NO_x, VOC, and ammonia).

In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, the most updated version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed since 2005. For example, certain power plants or large sources of emissions in or near this area may have installed emission controls or otherwise significantly reduced emissions since 2005. Some States provided updated information on emissions and emission controls in their comments to EPA. EPA considered such additional information in making final designation decisions.

With regard to nearby power plants, EPA considered information about whether a specific plant installed federally enforceable emission controls by December 2008 resulting in significant emissions reductions. A control requirement is considered to be federally-enforceable if it is required by a State regulation adopted in a State implementation plan, if it is included in a federally-enforceable Title V operating permit, or if it is required by a consent decree which also requires the controls to be included in federally enforceable permit upon termination of the consent decree. In making final decisions, EPA also considered whether a facility would continue to emit pollutants which contribute to PM_{2.5} exceedances even after emission controls are operational.

The area surrounding and including the Lancaster area has several large stationary, point sources (see Figure 9) that emit high levels of SO₂ plus NO_x (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 SO₂ 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), 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 SO₂ per year, which will have a significant impact on air quality in and around the York area.

Figure 9. Relief Map of the Lancaster Area with select Electric Generating Units (EGUs) Displayed

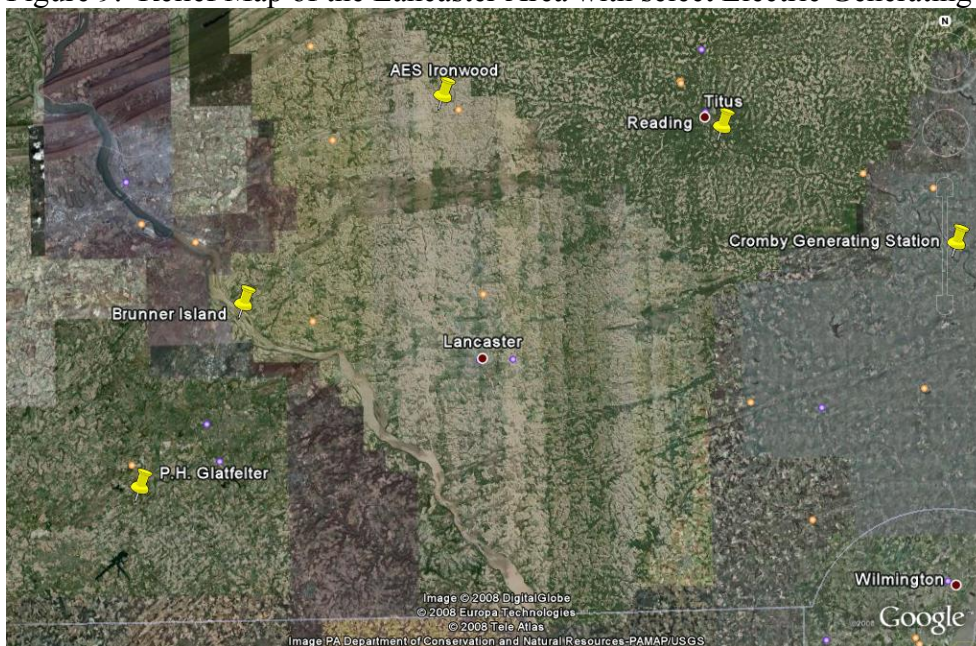


Table 9. EGUs with SO₂ plus NO_x emissions > 5000 tons, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	UniqueID Final	2006 SO ₂	2006 NO _x	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW	1997 PM _{2.5} 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

Brunner Island, York County, PA Facility ID: 3140					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Titus, Berks County, PA Facility ID: 3115					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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
Cromby Generating Station, Chester County, PA Facility ID: 3159					
Year	# of Months Reported	SO ₂ Tons	NO _x Tons	CO ₂ 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, and York County is being designated as nonattainment for the 2006 24-hour PM_{2.5} standard as a separate nonattainment area based upon analysis of all of the factors and analytic tools.

Conclusion

This technical analysis demonstrates 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_{2.5} 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, 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_{2.5} NAAQS. To the extent that emissions from York, Berks, Chester, Dauphin, Lebanon, Cumberland, and Harford Counties may contribute to the Lancaster nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

The Lancaster area and surrounding counties, which EPA used as the area of consideration for this technical analysis, has monitors in Lancaster, York, Berks, Chester, Dauphin, and Cumberland Counties that all violate the 2006 24-hour PM_{2.5} NAAQS based on 2005-2007 FRM data in the EPA Air Quality System. The largest source of direct PM_{2.5} and PM_{2.5} 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 in Berks and Chester Counties. The Lancaster 1997 PM_{2.5} nonattainment area is almost completely surrounded by the adjacent 1997 PM_{2.5} nonattainment areas of Harrisburg (Cumberland, Dauphin, and Lebanon Counties), York (York County), Reading (Berks County), and part of Philadelphia (Chester County). EPA is designating these areas as separate nonattainment areas for the 2006 24-hour PM_{2.5} NAAQS. The Lancaster area of analysis has a moderately populated county 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, with high VMT growth in Lancaster County. 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 factor. Pollution roses show impact from York County on the Lancaster area. However, jurisdictional boundaries for existing ozone and PM_{2.5} nonattainment areas, as well as existing state-defined air basins, coupled with economic and commuting patterns support maintaining the existing 1997 PM_{2.5} area boundaries.

Therefore, EPA is maintaining the same single-county boundary established for the 1997 PM_{2.5} NAAQS in designating the Lancaster nonattainment area under the 2006 24-hour PM_{2.5} NAAQS.