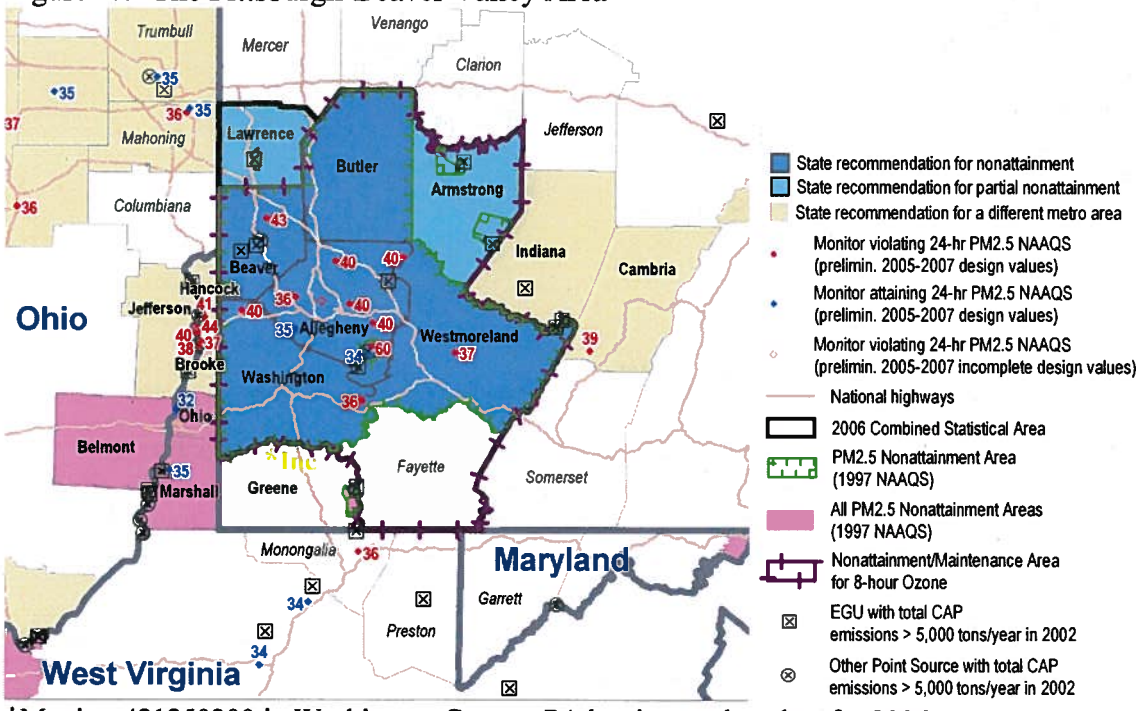
EPA Technical Analysis for Pittsburgh-Beaver Valley Area

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

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

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

Figure 1.0 The Pittsburgh-Beaver Valley Area



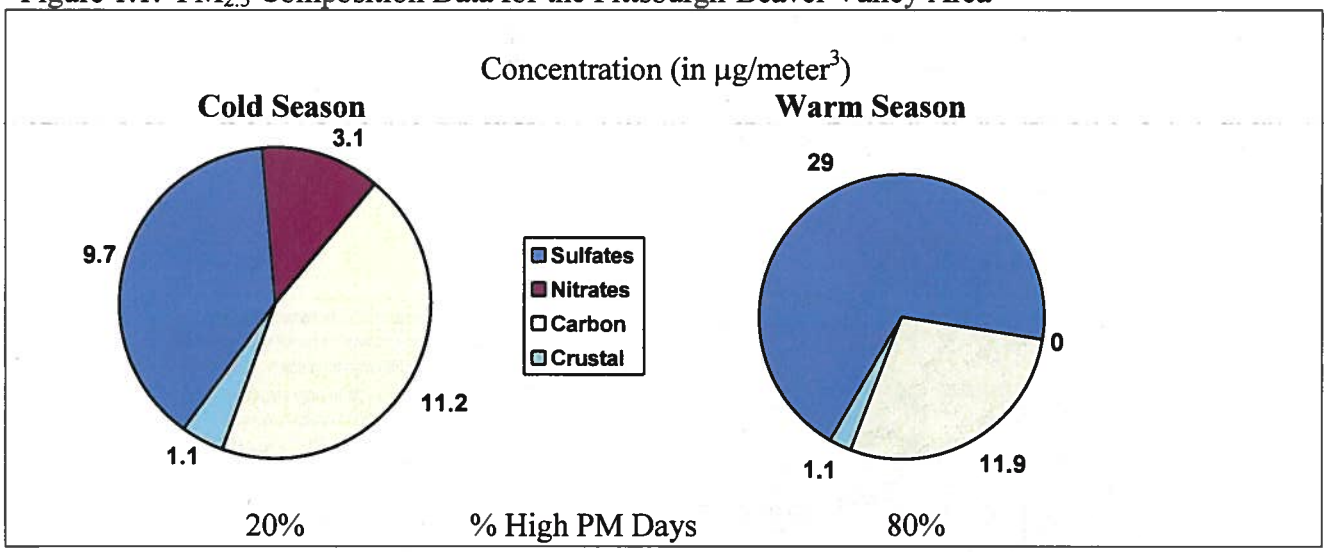
*Monitor 421250200 in Washington County, PA has incomplete data for 2006. No design value was calculated.

For this area, EPA previously established $PM_{2.5}$ nonattainment boundaries for the 1997 $PM_{2.5}$ NAAQS that included 4 full and 4 partial counties, with all being located in Pennsylvania.

In December 2007, the Commonwealth of Pennsylvania recommended that Allegheny County (except the Liberty-Clairton area), Beaver, Butler, Washington, and Westmoreland Counties, and portions of Armstrong and Lawrence Counties be designated "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard, based on air quality data from 2004-2006. Pennsylvania specifically recommended the exclusion of all of Greene County from this nonattainment area. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the state. (See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA, received on January 3, 2008)

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations in the Pittsburgh-Beaver Valley area occur predominantly in the summer. The average chemical composition of the highest days is illustrated in Figure 1.1, below.

Figure 1.1. $PM_{2.5}$ Composition Data for the Pittsburgh-Beaver Valley Area



Based on EPA's 9-factor analysis described below, EPA believes that the same counties as previously designated for the 1997 $PM_{2.5}$ NAAQS should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ air quality standard as part of the Pittsburgh-Beaver Valley nonattainment area, based upon currently available information. These counties are listed in the table below.

Pittsburgh-Beaver Valley Area	State-Recommended Nonattainment Counties	EPA-Recommended Nonattainment Counties
Pennsylvania	Allegheny County (partial) Beaver County Butler County Washington County Westmoreland County Armstrong County (partial)	Allegheny County (except Liberty-Clairton) Beaver County Butler County Greene County (partial) Washington County

	Lawrence County (partial)	Westmoreland County Armstrong County (partial) Lawrence County (partial)

The following is a summary of the 9-factor analysis for the Pittsburgh-Beaver Valley area.

The Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS was defined as Allegheny County (except the Liberty-Clairton area), Beaver, Butler, Washington, Westmoreland Counties, and portions of Green, Armstrong, and Lawrence Counties. EPA has determined that the same boundary is appropriate for the Pittsburgh-Beaver Valley nonattainment area under the 2006 $PM_{2.5}$ NAAQS. The Pittsburgh-Beaver Valley area is affected by long-range transport generally from the direction of the southwest, but from other directions as well. Sulfate emissions from large power plants located nearby in Greene, Armstrong, and Lawrence Counties also contribute to the area's nonattainment problem. In addition, population-based local emissions such as those from vehicles and other smaller area sources in Allegheny, Beaver, Butler, Washington, and Westmoreland Counties contribute to the nonattainment problem in the Pittsburgh-Beaver Valley area.

This 9-factor analysis will focus on the existing Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS and also the ring of nearby counties surrounding that area. Therefore, counties that are beyond that ring of counties surrounding the Pittsburgh-Beaver Valley area will be excluded from further analysis. In addition, if a county is part of another existing nonattainment area for the 1997 $PM_{2.5}$ NAAQS, the state has recommended including it in that other nonattainment area for the 2006 $PM_{2.5}$ NAAQS, and EPA agrees that the county is more properly included in another nonattainment area based upon consideration of the facts and circumstances in the area, that county will not be included in this analysis. Accordingly, the following counties will be excluded from further consideration for inclusion in the Pittsburgh-Beaver Valley nonattainment area because they are more closely integrated into other metropolitan areas and it is appropriate to treat them as part of those separate areas instead.

Counties	Reasons for Exclusion from Further Analysis
Brooke, WV Hancock, WV Jefferson, OH	All three counties are part of the Steubenville-Weirton nonattainment area for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in the Steubenville-Weirton nonattainment area for the 2006 $PM_{2.5}$ NAAQS. In addition, Jefferson County is not part of the contiguous ring of counties surrounding the existing Pittsburgh-Beaver Valley nonattainment area.
Belmont, OH	Belmont County is not part of the contiguous ring of counties surrounding the existing Pittsburgh-Beaver Valley nonattainment area.
Trumbull, OH Mahoning, OH	These counties are part of the Youngstown nonattainment area for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in the Youngstown nonattainment area for the 2006 $PM_{2.5}$ NAAQS.
Cambria, PA Indiana, PA	These counties are part of the Johnstown nonattainment area for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in the Johnstown nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

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

Factor 1: Emissions Data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO2 and NOx, are part of "$PM_{2.5}$ emissions total," they are not shown in Table 1.0 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 SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) 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 (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

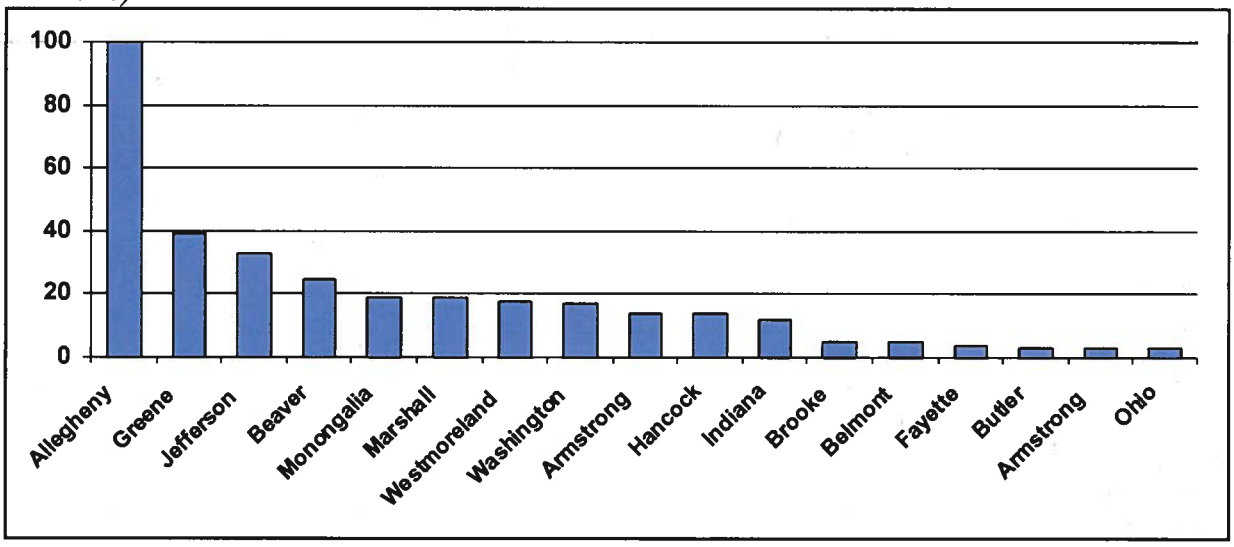
Table 1.0 shows emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the Pittsburgh-Beaver Valley. Counties that are part of the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface. Counties are listed in descending order by CES. Figure 1.2 is a graphical representation of the higher CES values set forth in Table 1.0.

Table 1.0. $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	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)
Allegheny, PA	**Yes - partial**	**100**	**5,221**	**2,245**	**2,975**	**51,471**	**63,290**	**46,690**	**2,249**
Greene, PA	**No**	**39**	**8,873**	**592**	**8,280**	**146,554**	**20,374**	**2,642**	**350**
Beaver, PA	**Yes**	**25**	**2,909**	**451**	**2,457**	**45,452**	**33,400**	**7,424**	**450**
Washington, PA	**Yes**	**17**	**1,683**	**514**	**1,170**	**6,318**	**16,311**	**9,297**	**919**
Westmoreland, PA	**Yes**	**18**	**1,779**	**798**	**981**	**3,506**	**16,655**	**15,073**	**1,175**
Armstrong, PA	**Yes - partial**	**14**	**11,962**	**780**	**11,182**	**209,910**	**20,352**	**3,417**	**844**
Butler, PA	**Yes**	**3**	**1,232**	**441**	**791**	**3,359**	**7,549**	**8,805**	**771**
Lawrence, PA	**Yes - partial**	**3**	**2,046**	**313**	**1,733**	**22,900**	**9,001**	**4,234**	**692**
Jefferson, OH	Yes - other area	33	11,409	722	10,686	224,025	46,158	3,693	297
Monongalia, WV	No*	19	5,105	469	4,636	84,301	12,953	5,081	211
Marshall, WV	No	19	4,604	309	4,295	118,021	39,932	3,230	146

Hancock, WV	Yes - other area	14	3,781	704	3,077	2,039	4,404	2,298	830
Indiana, PA	Yes - other area	12	12,409	851	11,558	147,536	42,777	4,693	706
Brooke, WV	Yes - other area	5	579	192	388	1,349	2,131	3,436	210
Belmont, OH	No	5	2,976	392	2,583	38,026	9,991	4,762	668
Fayette, PA	No	4	657	298	360	1,291	4,064	5,377	521
Ohio, WV	No	3	303	147	157	541	3,326	2,633	108
Columbiana, OH	No	2	805	366	441	525	4,377	4,933	1,956
Preston, WV	No	2	1,219	162	1,057	17,171	3,968	1,610	260
Somerset, PA	No	2	903	425	479	1,844	4,654	5,591	1,596
Cambria, PA	Yes - other area	1	844	324	520	7,752	6,177	5,363	494
Garrett, MD	No	1	552	288	264	858	2,499	3,527	556
Mahoning, OH	Yes - other area	1	722	338	384	1,927	10,086	10,416	1,415
Trumbull, OH	Yes - other area	1	1,730	625	1,105	18,501	13,373	12,098	881
Clarion, PA	No	0	535	233	303	1,542	3,203	3,272	417
Jefferson, PA	No	0	526	245	281	943	2,999	2,694	339
Mercer, PA	No	0	793	290	503	1,042	6,010	7,028	1,210
Venango, PA	No	0	522	235	287	1,919	2,757	3,476	286
Note: *Newly violating area, considering 2005 to 2007 data.									

Figure 1.2. CES Values for the Pittsburgh-Beaver Valley Area (Including Non-Contiguous Counties)



Based upon the data set forth in Table 1.0, Armstrong and Greene Counties have the highest emissions of all counties in this area. Allegheny County has the highest CES for this area, reflecting that it is the location of the design monitor in an area with many contributing counties. Emissions from Armstrong and Greene Counties have further to travel to reach the design monitor than emissions from Allegheny County, but nevertheless contribute markedly to violations in Allegheny based upon their emissions, their locations, and the meteorology in this area. All counties in the Pittsburgh-Beaver Valley area, even the counties with CESs of three, have $PM_{2.5}$ emissions greater than 1000 tons per year (tpy), SO_2 emissions greater than 3000 (tpy), and NOx emissions greater than 7000 tpy.

Most other counties with CES values over ten are located in other designated nonattainment areas. Jefferson, OH and Hancock, WV, along with Brooke, WV, are part of the Steubenville-Weirton

nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Ohio and West Virginia have recommended that these counties be included in the Steubenville-Weirton nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Marshall, WV is part of the Wheeling nonattainment area for the 1997 $PM_{2.5}$ NAAQS. However, Wheeling area is not violating the 2006 $PM_{2.5}$ NAAQS. Monongalia, WV is a newly violating county considering 2005-2007 data. EPA recommends that this county be included in the Morgantown nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

Factor 2: Air Quality Data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Pittsburgh-Beaver Valley 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 $\mu g/m^3$ 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 Pittsburgh-Beaver Valley area are shown in Table 2.0.

Table 2.0. Air Quality Data

County	State Recommended Nonattainment?	24-hr PM2.5 Design Values, 2003-2005 (µg/m3)	24-hr PM2.5 Design Values, 2004-2006 (µg/m3)	24-hr PM2.5 Design Values, 2004-2006 (µg/m3)
	Yes - partial +	**52**	**45**	**40**
Allegheny, PA	Yes - other area partial*	68*	65*	60*
Greene, PA	**No**	No Monitor		
Beaver, PA	**Yes**	**43**	**45**	**43**
Washington, PA	**Yes**	**36**	**38**	**40**
Westmoreland, PA	**Yes**	**38**	**37**	**37**
Armstrong, PA	**Yes - partial**	No Monitor		
Butler, PA	**Yes**	No Monitor		
Lawrence, PA	**Yes - partial**	No Monitor		
Jefferson, OH	Yes - other area	46	43	40
Monongalia, WV	No**	36	34	36
Marshall, WV	No	33	34	35
Hancock, WV	Yes - other area	45		41
Indiana, PA	Yes - other area	No Monitor		
Brooke, WV	Yes - other area	42	40	44
Belmont, OH	No			
Fayette, PA	No	No Monitor		
Ohio, WV	No			32
Columbiana, OH	No	No Monitor		
Preston, WV	No	No Monitor		
Somerset, PA	No	No Monitor		
Cambria, PA	Yes - other area	39	39	39
Garrett, MD	No	No Monitor		
Mahoning, OH	Yes - other area	38	37	36

Trumbull, OH	Yes - other area	38	36	35
Clarion, PA	No	No Monitor		
Jefferson, PA	No	No Monitor		
Mercer, PA	No	36	Inc	Inc
Venango, PA	No	No Monitor		

Notes:
1. *Design values for the Liberty-Clairton area, located within Allegheny County
2. **Newly violating area, considering 2005 to 2007 data.
3. Inc..- Incomplete data for 2006, design value cannot be confidently calculated.
4. Design values shown in red represent violations of the standard.

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

Allegheny, Beaver, Cambria, Washington, and Westmoreland Counties in Pennsylvania and Brooke, Hancock, and Monongalia Counties in West Virginia show violations of the 2006 24-hour $PM_{2.5}$ standard. Therefore, these counties are potential candidates for inclusion in the Pittsburgh-Beaver Valley nonattainment area. However, Cambria County, PA is part of the Johnstown nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that Cambria County be included in the Johnstown nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Also, Brooke and Hancock Counties are part of the Steubenville-Weirton nonattainment area for the 1997 $PM_{2.5}$ NAAQS. West Virginia has recommended that these counties be included in the Steubenville-Weirton nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

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

The Pennsylvania Department of Environmental Protection (PADEP) has recommended that the portion of Greene County, PA (Monongahela Township) which was included in the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS not be included in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. PADEP's recommendation is based in monitoring data from two sites, Charleroi and Washington, both in Washington County, north of Greene County. PADEP's December 28, 2007 designation recommendation letter stated that these two monitors meet the 2006 24-hour $PM_{2.5}$ standard. Pennsylvania's letter states that, "Emissions from this portion of Greene County are not believed to be significantly affecting monitors to the north; if they were, the Charleroi and Washington monitors, like other monitors farther north, would also be exceeding the 24-hour $PM_{2.5}$ standard."

Using 2004-2006 data, the Charleroi, PA monitor, #421250005, did meet the standard, with a design value of 34.4 $\mu g/m^3$. However, considering 2005-2007 data, this monitor's design value is violating the standard, at 36.6 $\mu g/m^3$.

The monitor in Washington County, PA (AQS ID 42-125-0200) does not have complete data capture for the second quarter of 2006. Data capture was 60%, well below the required 75%. According to 40 CFR Part 50, Appendix N, Section 4.2, "The 24-hour $PM_{2.5}$ NAAQS is met when the 24-hour standard design value at each monitoring site is less than or equal to 35 $\mu g/m^3$. This comparison shall be based on 3 consecutive, complete years of air quality data. A year meets data completeness requirements when at least 75 percent of the scheduled sampling days for each quarter have valid data. However, years shall be considered valid, notwithstanding quarters with less than complete data (even quarters with less than 11 samples), if the resulting annual 98th percentile value or resulting 24-hour design value (rounded according to the conventions of section 4.3 of this appendix) is greater than the level of the standard."

Using the incomplete data, the 98^{th} percentile value for 2006 the resulting design value for 2005 - 2007 is 34.6 $\mu g/m^3$. Using the criteria dictated by 40 CFR Part 50, Appendix N, a design value for the 24-hour $PM_{2.5}$ NAAQS for this specific monitor cannot be calculated.

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

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

Table 3.0. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Allegheny, PA	**Yes**	**1,233,036**	**1658**
Greene, PA	**No**	**40,408**	**70**
Beaver, PA	**Yes**	**176,825**	**399**
Washington, PA	**Yes**	**206,418**	**240**
Westmoreland, PA	**Yes**	**367,133**	**355**
Armstrong, PA	**Yes - partial**	**70,527**	**106**
Butler, PA	**Yes**	**181,526**	**229**
Lawrence, PA	**Yes - partial**	**92,412**	**255**
Jefferson, OH	Yes - other area	70,631	172
Monongalia, WV	No	84,592	231
Marshall, WV	No	34,250	110
Hancock, WV	Yes - other area	31,191	354
Indiana, PA	Yes - other area	88,481	106
Brooke, WV	Yes - other area	24,474	265
Belmont, OH	No	69,089	128
Fayette, PA	No	146,206	183
Ohio, WV	No	44,958	414
Columbiana, OH	No	110,636	207
Preston, WV	No	30,052	46
Somerset, PA	No	78,796	73

Cambria, PA	Yes - other area	147,804	214
Garrett, MD	No	29,863	46
Mahoning, OH	Yes - other area	253,181	599
Trumbull, OH	Yes - other area	218,672	345
Clarion, PA	No	40,388	66
Jefferson, PA	No	45,716	70
Mercer, PA	No	119,115	175
Venango, PA	No	55,938	82

Allegheny County has the highest population and population density, by far, due to the City of Pittsburgh. Considering counties that are not recommended for inclusion in other nonattainment areas for the 2006 standard, Ohio County, WV has the next highest population density. However, Ohio County's population is much lower, less than 50,000. Furthermore, it has low emissions and a very low CES of three. Other counties with population densities over 200 are Beaver, PA, Westmoreland, PA, Lawrence, PA, Washington, PA, Monongalia, WV, Butler, PA, and Columbiana, OH. Beaver, Westmoreland, Lawrence, Washington, and Butler Counties are part of the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Monongalia County is a newly violating area, and is part of the Morgantown MSA. EPA is proposing that this county be included in a newly established Morgantown nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Columbiana County has low emissions and a very low CES of two.

Factor 4: Traffic and Commuting Patterns

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

The listing of counties on Table 4.0 reflects 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 4.0. Traffic and Commuting Patterns

County	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting to any violating counties	Percent Commuting to any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
Allegheny, PA	**Yes**	**10,003**	**564,260**	**97**	**573,120**	**99**
Greene, PA	**No**	**367**	**4,240**	**29**	**3,610**	**25**
Beaver, PA	**Yes**	**1,522**	**72,520**	**90**	**78,710**	**97**
Washington, PA	**Yes**	**2,399**	**85,250**	**96**	**85,970**	**96**
Westmoreland, PA	**Yes**	**3,583**	**154,650**	**94**	**159,570**	**97**
Armstrong, PA	**Yes – partial**	**565**	**7,590**	**26**	**26,420**	**89**
Butler, PA	**Yes**	**1,669**	**25,780**	**32**	**77,510**	**96**
Lawrence, PA	**Yes – partial**	**769**	**9,520**	**24**	**34,860**	**87**
Jefferson, OH	Yes - other area	684	24,420	85	1,430	5

Monongalia, WV	No	727	32,470	89	600	2
Marshall, WV	No	217	830	6	480	4
Hancock, WV	Yes - other area	187	12,960	92	2,290	16
Indiana, PA	Yes - other area	696	5,610	15	4,830	13
Brooke, WV	Yes - other area	210	9,340	89	1,280	12
Belmont, OH	No	1,111	1,700	6	380	1
Fayette, PA	No	927	18,890	33	53,460	93
Ohio, WV	No	514	1,710	8	850	4
Columbiana, OH	No	872	13,900	28	2,740	6
Preston, WV	No	293	3,240	28	170	2
Somerset, PA	No	997	6,320	19	1,670	5
Cambria, PA	Yes - other area	1,029	49,080	82	1,010	2
Garrett, MD	No	487	140	1	130	1
Mahoning, OH	Yes - other area	2,666	97,290	89	1,550	1
Trumbull, OH	Yes - other area	2,153	85,780	88	490	1
Clarion, PA	No	579	490	3	1,420	8
Jefferson, PA	No	550	5,610	15	4,830	13
Mercer, PA	No	1,302	45,040	89	3,840	8
Venango, PA	No	596	1,130	5	1,100	5

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

As shown in Table 4.0, above, Allegheny County has the highest VMT, the largest number of commuters into violating counties, and the largest number of commuters into and within the Pittsburgh MSA. Of the counties that are not recommended for inclusion in other nonattainment areas for the 2006 standard, Westmoreland, PA, Washington, PA, Butler, PA, Beaver, PA, Mercer PA, and Belmont, OH have VMT over 1000. Westmoreland, PA, Washington, PA, Butler, PA, Beaver, PA are part of the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Compared with most other counties in the Pittsburgh-Beaver Valley nonattainment area, Mercer, PA has a low number of commuters into the MSA and low emissions. Furthermore, Mercer County's CES is zero. Belmont, OH is not in the ring of contiguous counties surrounding the existing Pittsburgh-Beaver Valley nonattainment area. In addition, Belmont County has less than 400 commuters into the Pittsburgh MSA and a CES of two.

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 Pittsburgh-Beaver Valley area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

Table 5.0 below shows population, population growth, VMT, and VMT growth for counties that are included in the Pittsburgh-Beaver Valley area.

Table 5.0. Population and VMT Values and Percent Change.

Location	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT (millions)	VMT % change (1996 to 2005)
Allegheny, PA	**1,233,036**	**1658**	**(4)**	**10,003**	**(3)**
Greene, PA	**40,408**	**70**	**(1)**	**367**	**(26)**
Beaver, PA	**176,825**	**399**	**(2)**	**1,522**	**0**
Washington, PA	**206,418**	**240**	**2**	**2,399**	**25**
Westmoreland, PA	**367,133**	**355**	**(1)**	**3,583**	**17**
Armstrong, PA	**70,527**	**106**	**(2)**	**565**	**(2)**
Butler, PA	**181,526**	**229**	**4**	**1,669**	**10**
Lawrence, PA	**92,412**	**255**	**(2)**	**769**	**(1)**
Jefferson, OH	70,631	172	(4)	684	(6)
Monongalia, WV	84,592	231	3	727	(18)
Marshall, WV	34,250	110	(3)	217	(11)
Hancock, WV	31,191	354	(4)	187	(32)
Indiana, PA	88,481	106	(1)	696	2
Brooke, WV	24,474	265	(4)	210	0
Belmont, OH	69,089	128	(1)	1,111	13
Fayette, PA	146,206	183	(2)	927	(14)
Ohio, WV	44,958	414	(5)	514	5
Columbiana, OH	110,636	207	(1)	872	(2)
Preston, WV	30,052	46	3	293	(19)
Somerset, PA	78,796	73	(2)	997	19
Cambria, PA	147,804	214	(3)	1,029	(8)
Garrett, MD	29,863	46	0.2	487	(35)
Mahoning, OH	253,181	599	(2)	2,666	9
Trumbull, OH	218,672	345	(3)	2,153	8
Clarion, PA	40,388	66	(3)	579	5
Jefferson, PA	45,716	70	(1)	550	4
Mercer, PA	119,115	175	(1)	1,302	(0)
Venango, PA	55,938	82	(3)	596	15

Most counties in the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS have lost population from 2000 to 2005. Only Washington and Butler and Washington Counties increased in population during that same period. From 1996 to 2005, VMT decreased in half the counties in the current Pittsburgh-Beaver Valley nonattainment, while VMT increased or remained unchanged in the other half.

Factor 6: Meteorology (Weather/Transport Patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ 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 or FEM air quality monitors had 24-hour $PM_{2.5}$ concentrations above 95% on a frequency distribution curve of $PM_{2.5}$ 24-hour values

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

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figures 6.1 – 6.11 identify 24-hour $PM_{2.5}$ values by color, and days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the 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.

Table 6.0. Trajectory and Distance Factors

County. State	Trajectory Factors Cold Season	Trajectory Factors Warm Season	Distance Factors
Allegheny, PA	87	96	14.9
Greene, PA	100	87	40.7
Beaver, PA	32	46	23.5
Washington, PA	90	100	19.5
Westmoreland, PA	67	75	33.1
Armstrong, PA	36	32	40.7
Butler, PA	32	30	33.9
Lawrence, PA	14	20	41.8
Jefferson, OH	28	43	38.9
Monongalia, WV	88	62	59.3
Marshall, WV	66	72	51.6
Hancock, WV	31	48	30.2
Indiana, PA	22	29	49.9
Brooke, WV	47	66	31.5
Belmont, OH	36	45	59.5
Fayette, PA	80	72	39.4
Ohio, WV	58	72	39.5
Columbiana, OH	12	22	47.4
Preston, WV	50	33	69.6
Somerset, PA	18	29	59
Cambria, PA	7	20	66.9
Garrett, MD	21	22	77.1
Mahoning, OH	7	17	56.5
Trumbull, OH	5	14	72.7
Clarion, PA	15	10	60.9
Jefferson, PA	12	15	71.6
Mercer, PA	7	11	60
Venango, PA	8	7	68.1

Based on the data in Table 6.0, Washington, Greene, and Allegheny Counties have the highest warm and cold season trajectory factors. These counties are part of the Pittsburgh-Beaver Valley

nonattainment for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania recommended that Washington and Allegheny Counties, but not Greene County, be included in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. EPA recommends that Greene County be included in the nonattainment area. This factor, which shows that air masses (carrying emissions) are very likely to pass over Greene County on their way to Allegheny County, supports Greene County's inclusion in the Pittsburgh-Beaver Valley nonattainment area.

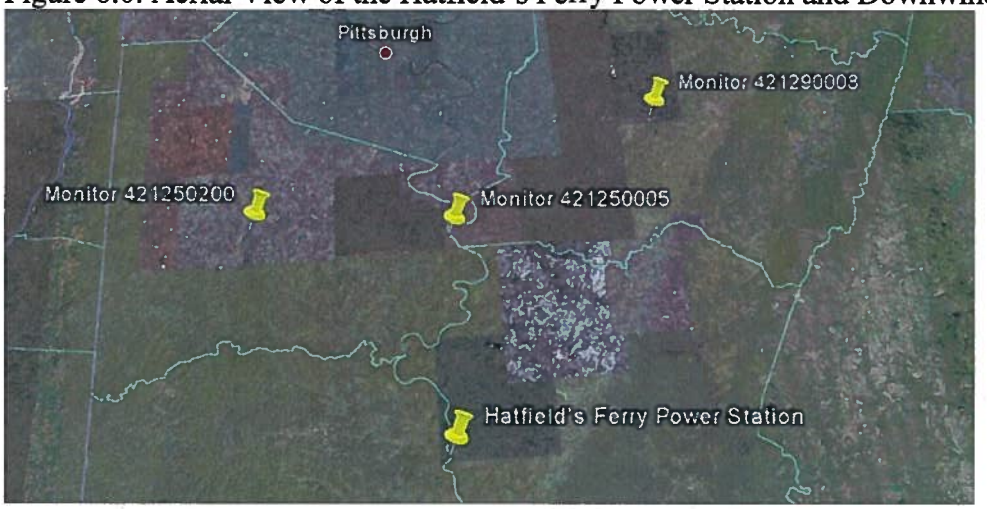
Monongalia County has a high cold season trajectory factor, 88. However, this is a newly violating county, considering 2005-2007 data. Monongalia County is part of the Morgantown MSA, and EPA recommends that it be included in a new Morgantown nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

Fayette County also has high trajectory factors, 80 for cold season and 72 for warm season. However, Fayette County has low emissions and a very low CES of four. Ohio and Marshall Counties both have warm season trajectory factors of 72. Ohio County has low emissions and a very low CES of three. Marshall County has a CES of nineteen. However, as shown in Factor 9, below, controls on a large point source have reduced emissions since 2005. Therefore, its contribution may be less than reflected in that CES.

As stated above, Pennsylvania has recommended that the portion of Greene County, PA (Monongahela Township) which was included in the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS not be included in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Pennsylvania's recommendation is based in monitoring data from two sites, Charleroi and Washington, both in Washington County, north of Greene County. PADEP's December 28, 2007 designation recommendation letter stated that, "Emissions from this portion of Greene County are not believed to be significantly affecting monitors to the north; if they were, the Charleroi and Washington monitors, like other monitors farther north, would also be exceeding the 2006 24-hour $PM_{2.5}$ standard."

As explained above, the Charleroi monitor (# 421250005) no longer meets the 2006 24-hour $PM_{2.5}$ standard. The Washington monitor (# 421250200) has incomplete data, so attainment or nonattainment cannot be determined. Even if both monitors had data indicating attainment at those locations, it would not necessarily establish that emissions from Greene County sources were not contributing to the violations at the monitors farther to the north in Allegheny County; those emissions could still be a portion of the cumulative emissions that contribute to violations in Allegheny. More importantly, the pollution roses show that the predominant winds in this part of Pennsylvania are from the southwest. Therefore, it is more likely that the emissions from the Hatfield's Ferry power plant in Monongahela Township, Greene County are affecting the monitor in Westmoreland County (# 421290008) and the Charleroi monitor (# 421250005). See Figures 6.1 -6.3. The emissions from the Hatfield's Ferry power plant are likely also impacting the Washington monitor (# 421250200), but to a lesser extent. Please see Figure 6.0, which is an aerial view of the Hatfield's Ferry Power Station and its downwind monitors, and the pollution roses for monitors 421250200, 421250005, and 421290008.

Figure 6.0. Aerial View of the Hatfield's Ferry Power Station and Downwind Monitors



Monitor # 421250200, Washington, PA, Washington County, incomplete data
Monitor # 421250005, Charleroi, PA, Washington County, 36 µg/m^3 2005-07 design value
Monitor # 421290008, Greensburg, PA, Westmoreland County, 37 µg/m^3 2005-07 design value

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

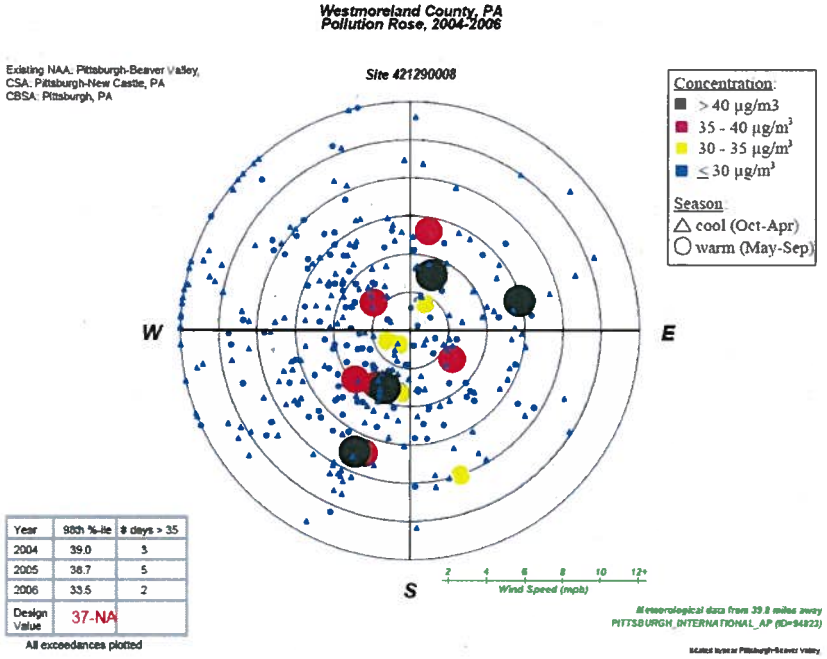


Figure 6.2. Pollution Trajectory Plot for Washington County, PA (Site 42-125-0005)

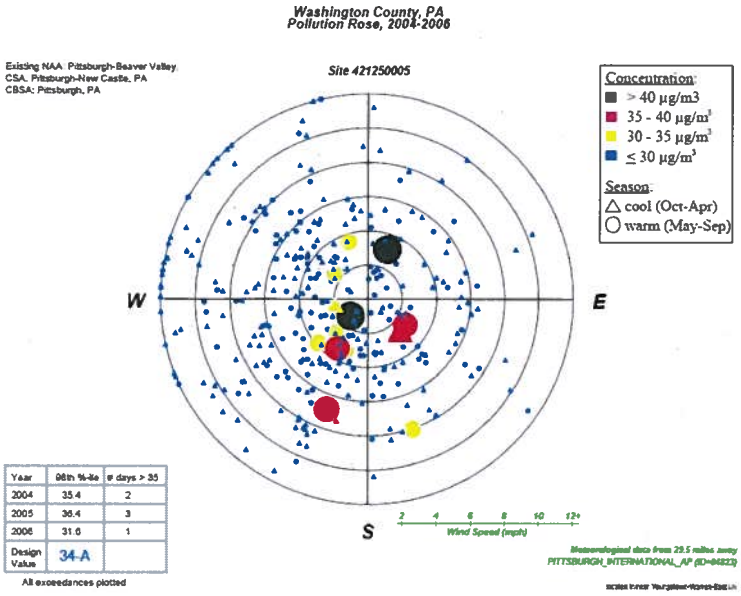
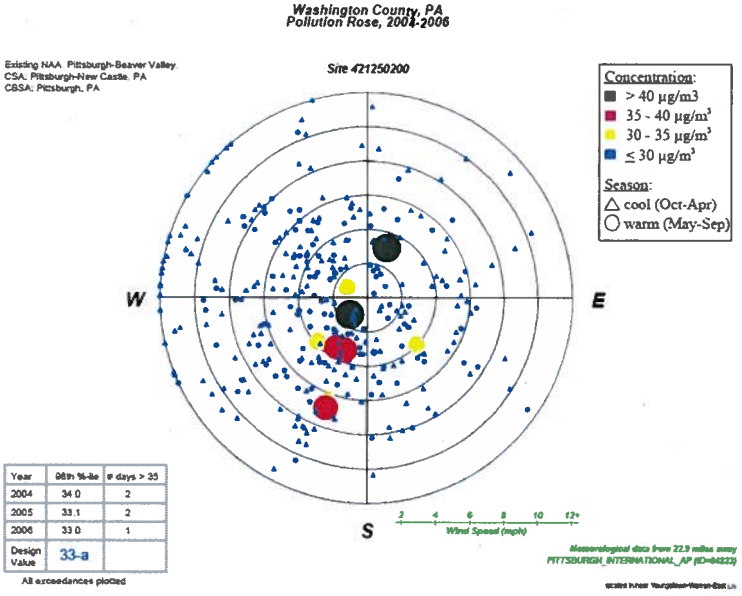
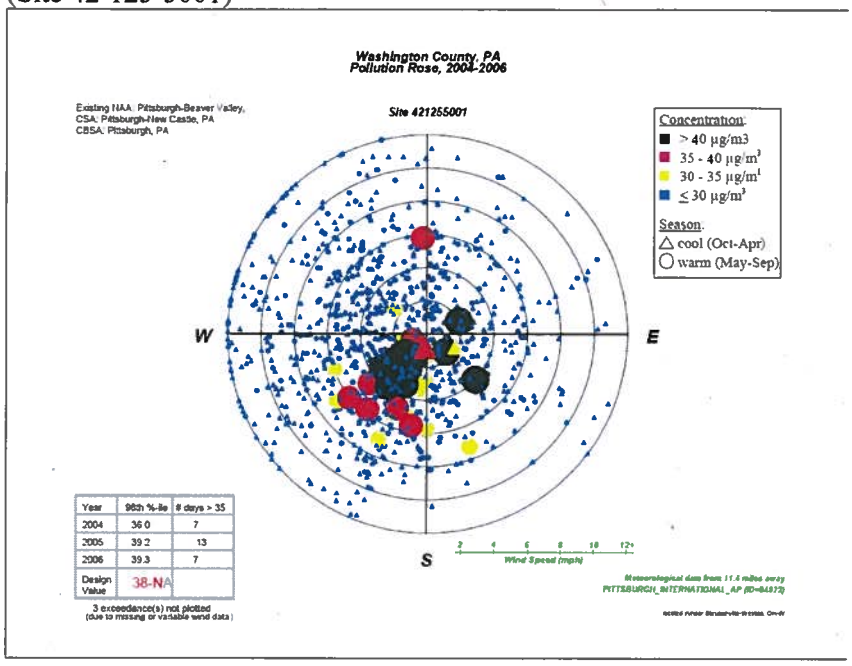


Figure 6.3. Pollution Trajectory Plot for Washington County, PA (Site 42-125-0200)



The pollution rose for the remaining monitor in Washington County, which is in the northwest corner of the county, shows that on high $PM_{2.5}$ days, which are days with monitored $PM_{2.5}$ values greater than 35 $\mu g/m^3$, winds are predominantly from the southwest. However, some very high $PM_{2.5}$ days (>40 $\mu g/m^3$) show winds from the east or southeast. See Figure 6.4.

Figure 6.4. Pollution Trajectory Plot for Washington County, PA (Site 42-125-5001)



Pollution roses for Allegheny County show that on high $PM_{2.5}$ days (>35 µg/m^3), winds are predominantly from the southwest. However, some very high $PM_{2.5}$ days (>40 µg/m^3) show winds from the north or southeast or west. In other words, Allegheny County monitors are influenced by all that surround it. See Figure 6.5 – 6.10.

Figure 6.5. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-0008)

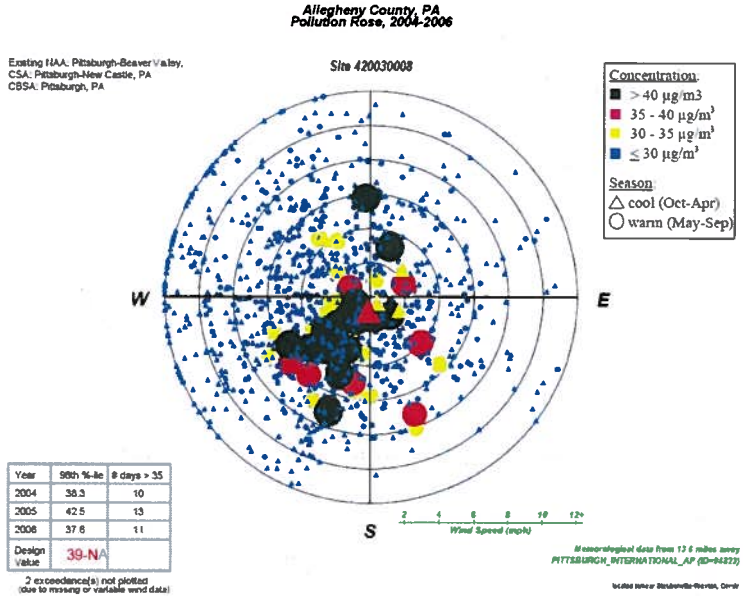


Figure 6.6. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-0093)

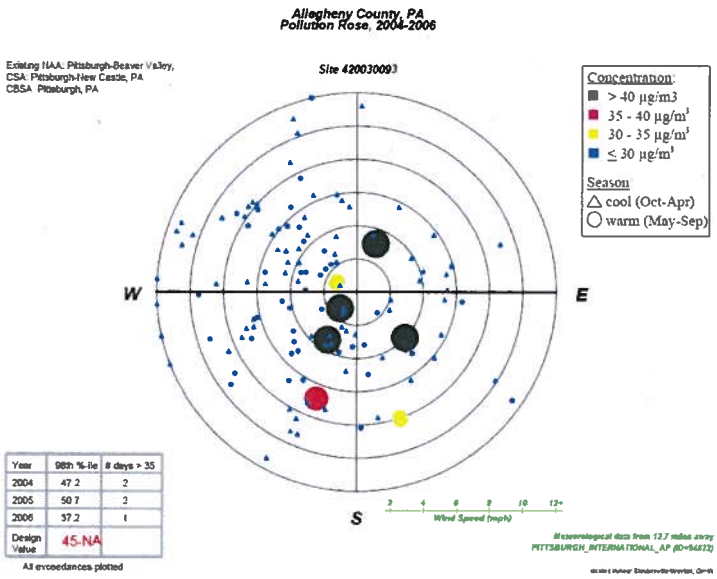


Figure 6.7. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-0095)

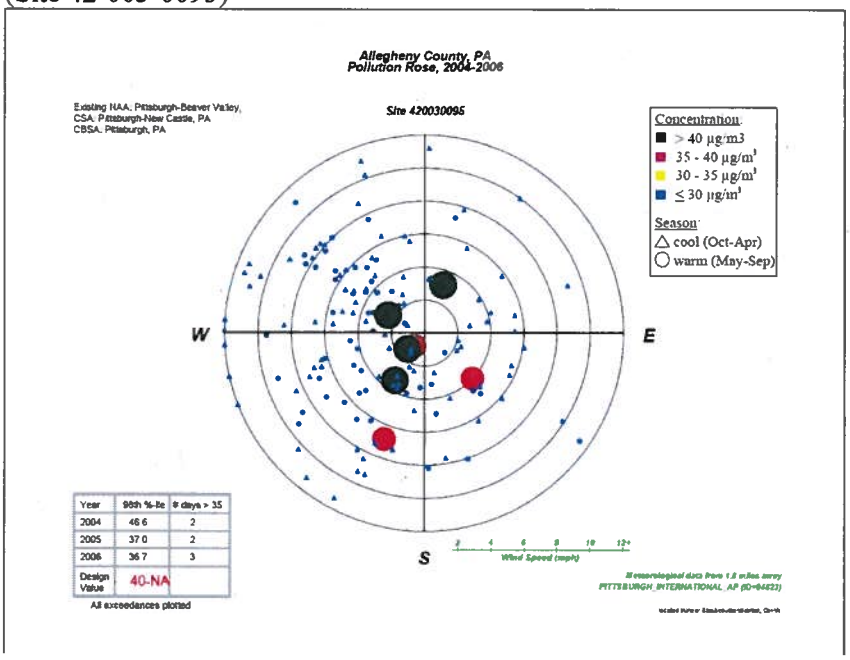


Figure 6.8. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-1008)

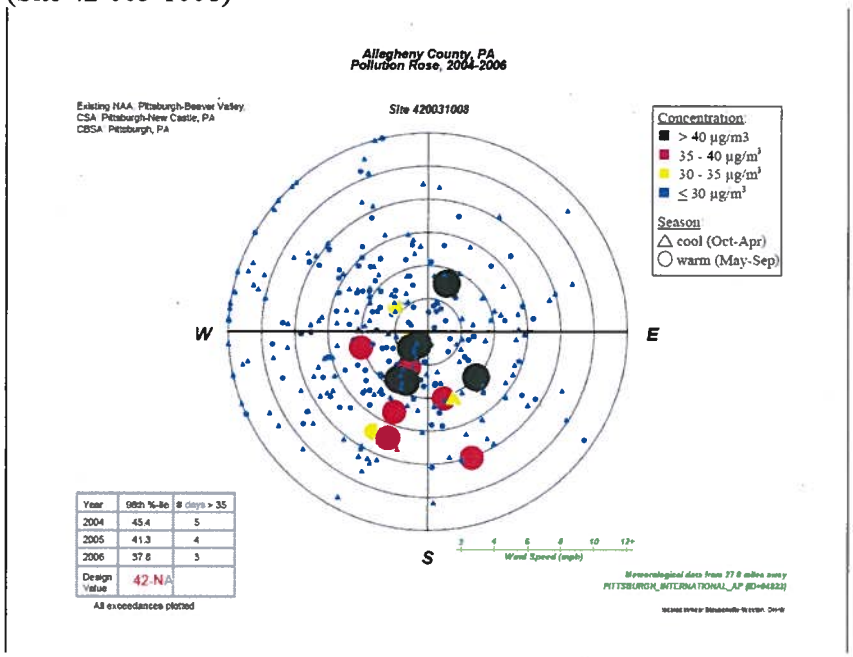


Figure 6.9. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-1301)

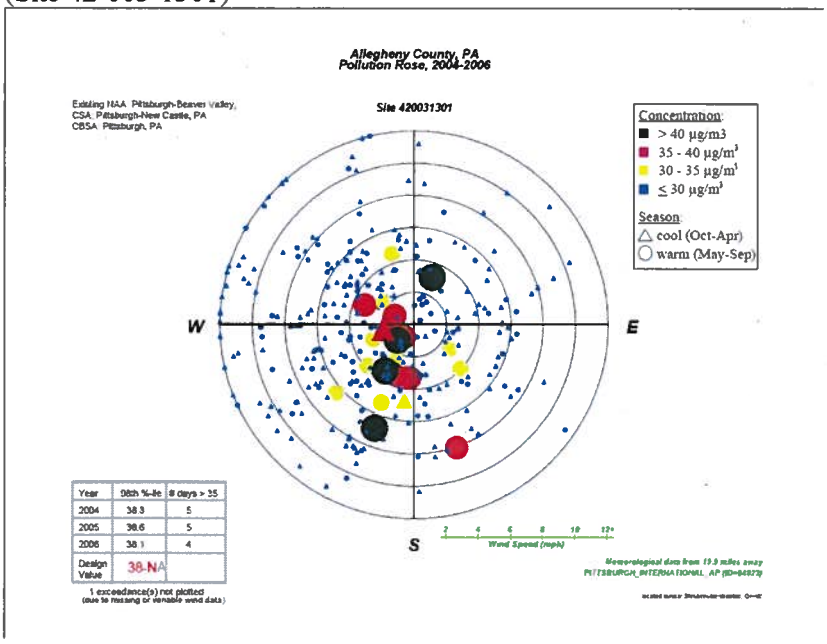
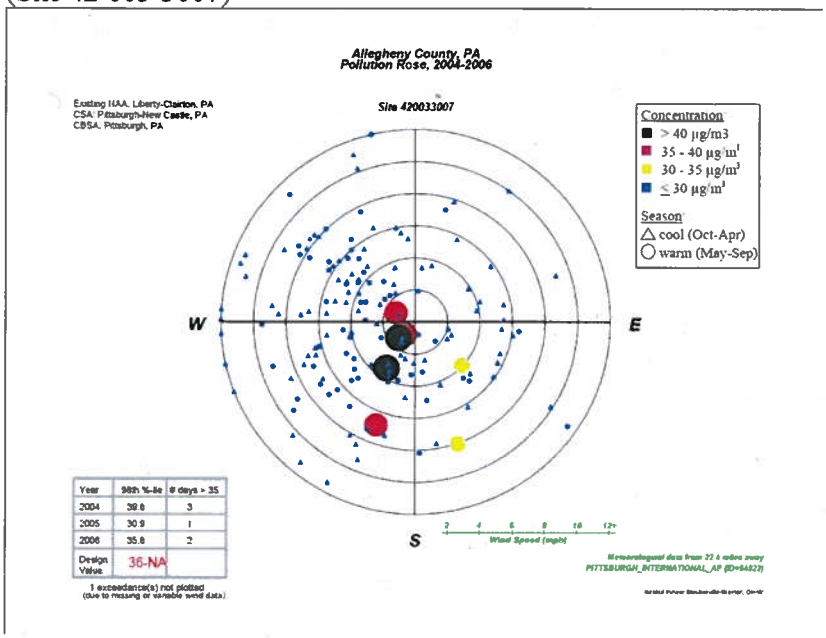
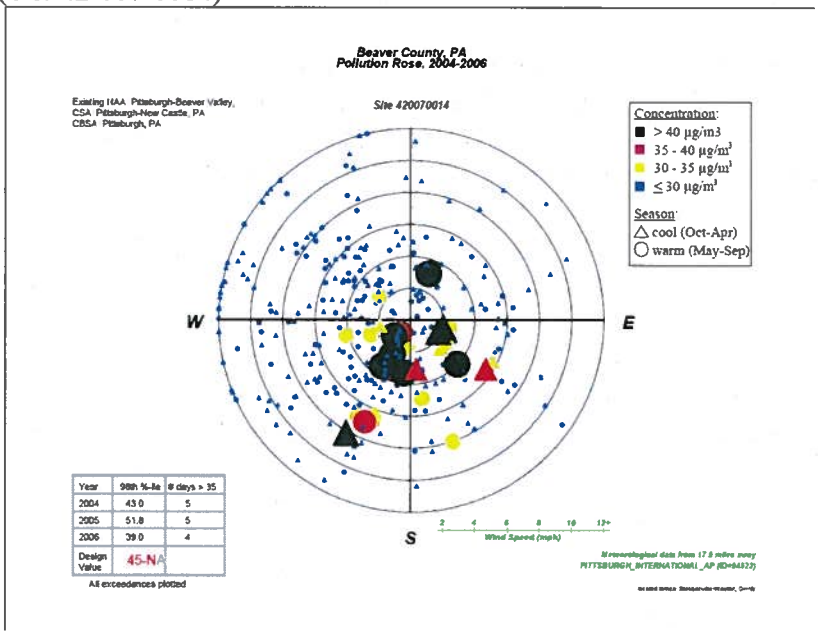


Figure 6.10. Pollution Trajectory Plot for Allegheny County, PA (Site 42-003-3007)



The pollution rose for Beaver County shows a similar pattern to Allegheny County. Winds on high $PM_{2.5}$ (>35 µg/m^3) days are predominantly from the southwest, with occasional very high $PM_{2.5}$ days (>40 µg/m^3) with winds from the north or the southeast. See Figure 6.11.

Figure 6.11. Pollution Trajectory Plot for Beaver County, PA (Site 42-007-0014)



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 Pittsburgh-Beaver Valley area.

The Pittsburgh-Beaver Valley area does not have any geographical or topographical barriers significantly limiting air pollution transport within its airshed. Therefore, this factor did not play a significant role in the decision-making process.

In Pennsylvania's December 28, 2007 designation recommendation letter, in order to justify inclusion of Allegheny County (except Liberty-Clairton), Beaver, Butler, Washington, and Westmoreland Counties and parts of Armstrong and Lawrence Counties, Pennsylvania used a topography argument. Pennsylvania stated that:

> "This region of Pennsylvania is dominated by relatively high terrain cut by numerous river valleys. While these features tend to trap local emissions overall, the monitors within this proposed nonattainment area tend to correlate well with one another.[2] This suggests that while the proposed nonattainment area is quite extensive, it can be grouped together as one nonattainment area."
>
> [2] Summary of Pennsylvania's $PM_{2.5}$ Nonattainment Analysis, Appendix C, Department of Environmental Protection"

EPA believes that since the same topography exists in Greene County, which is just south of Washington County, this argument could also be used to further justify the inclusion of part of Greene County in the Pittsburgh-Beaver Valley nonattainment area.

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

In evaluating the jurisdictional boundary factor, consideration should be given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

There are no jurisdiction issues in the Pittsburgh-Beaver Valley area. PADEP does the $PM_{2.5}$ planning for the entire Pittsburgh-Beaver Valley nonattainment area. PADEP works in cooperation with the Allegheny County Health Department (ACHD), which does the air quality planning for the Liberty-Clairton area. These two agencies have a long history of cooperation. Furthermore, one metropolitan planning organization (MPO), the Southwestern Pennsylvania Commission, does transportation planning for the entire area (Allegheny, Beaver, Butler, Washington, Westmoreland Armstrong County, Lawrence, and Greene Counties). This MPO also covers Indiana and Fayette Counties.

Factor 9: Level of Control of Emission Sources

This factor considers emission controls currently implemented for major sources in the Pittsburgh-Beaver Valley area.

The emission estimates on Table 1.0 (under Factor 1) include any control strategies implemented by the states in the Pittsburgh-Beaver Valley area before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NOx, and crustal $PM_{2.5}$).

The Pittsburgh-Beaver Valley area and the surrounding areas, there may be some emission reductions of SO_2 and NOx subsequent to 2005 that are not accounted for elsewhere in this analysis, due to new controls at large electric generating units (EGUs).

Table 9.0 shows emissions and controls (current and projected) for EGUs with SO_2 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 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.

As can be seen from Tables 9.0 and 9.1, since 2005, these new controls have resulted in significant reductions at the Mitchell power plant in Marshall County, WV. In 2005, the Mitchell plant emitted 53,765 tons of SO_2 and 20,026 tons of NOx, when the annual heat input was 64,325,953 million British Thermal Units (mmBTUs). In 2007, the Mitchell plant emitted 6,084 tons of SO_2 and 14,682 tons of NOx when the annual heat input was higher, 88,045,916 mmBTUs. This reduction of 47,681 tons of SO_2 and 5,344 tons of NOx from 2005 to 2007 is significant, compared to the county's total emissions in 2005, 118,021 tons of SO_2 and 39,932 tons of NOx.

New controls also resulted in modest emission reductions at the Fort Martin Power Station in Monongalia County, WV and the Bruce Mansfield facility in Beaver County, PA. However, these reductions are not nearly as substantial as those described above for the Mitchell plant.

Some EGUs are expected to put controls in place in the future. The Hatfield's Ferry Power Station in Greene County, PA, the Cheswick plant in Allegheny County, PA and the Keystone facility in Armstrong County, PA are expected to install scrubbers in 2009. As stated above, Pennsylvania recommended that the portion of Greene County, PA (Monongahela Township) that was included in the Pittsburgh-Beaver Valley nonattainment area for the 1997 $PM_{2.5}$ NAAQS not be included in the Pittsburgh-Beaver Valley nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Pennsylvania's argument to exclude Greene County from the Pittsburgh area was based, in part, on future control of the emissions from the Hatfield's Ferry plant. Pennsylvania's December 28, 2007 designation recommendation letter states that PADEP approved the installation of flue-gas desulfurization (FGD) units "within the next few years." In a press release, the facility's owner, Allegheny Energy, stated that plans to spend $650 million to install the FGD system at its Hatfield's Ferry Power, and that:

> "When completed in 2009, the "scrubbers" will remove approximately 95 percent of the sulfur dioxide (SO2) emissions and significantly reduce mercury emissions from the station." (See http://www.alleghenyenergy.com/Newsroom/Scrubber.Hat.2page.pdf.)

However, based upon current information, these emissions reductions have not yet occurred at the Hatfield's Ferry plant, and thus the emissions from this source remain high and continue to contribute to violations in the Pittsburgh area.

Table 9.0 EGUs with SO_2 plus NO_x emissions > 5000 tons, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO2	2006 NOx	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW
Allegheny, PA	Cheswick	Coal Steam	8226_B_1	32,373	4,221	2009	95.0	2003	580.0
Greene, PA	Hatfield's Ferry Power Station	Coal Steam	3179_B_1	55,558	8,901	2009	95.0		530.0
			3179_B_2	45,405	6,701	2009	95.0		530.0
			3179_B_3	34,119	4,453	2009	95.0		530.0
Beaver, PA	AES Beaver Valley Partners Beaver Valley	Coal Steam	10676_B_4	0	277	1980	92.0		43.0
			10676_B_2	0	261	1980	92.0		43.0
			10676_B_3	0	250	1980	92.0		43.0
	Bruce Mansfield	Coal Steam	6094_B_3	13,307	9,055	1977	98.0	2004	850.0
			6094_B_2	6,984	7,349	1973	98.0	2003	830.0
			6094_B_1	3,140	9,321	1973	98.0	2003	830.0
	G F Weaton Power Station	Coal Steam	50130_B_BLR1				28.6		56.0
			50130_B_BLR2				28.6		56.0
Washington, PA	Elrama	Oil/Gas Steam	3098_B_4	2,096	2,730	1975	89.0		173.5
			3098_B_3	922	1,218	1975	89.0		103.0
			3098_B_1	906	1,179	1975	89.0		94.0
			3098_B_2	896	1,169	1975	89.0		94.0
	Mitchell Power Station Elrama	Oil/Gas Steam	3181_B_33	923	2,735	1980	96.9		277.0
			3181_B_3	5	3				27.3
			3181_B_1	2	1				27.3
			3181_B_2	1	0				27.3
	Beech Hollow Power Project - new plant on line 2011	Coal Steam	82704_B_1			2011	95.0	2011	272.0
Armstrong, PA	Armstrong Power Station	Coal Steam	3178_B_1	12,955	1,507				172.0
			3178_B_2	14,155	1,589				171.0
	Keystone	Coal Steam	3136_B_2	86,809	7,349	2009	95.0	2003	850.0
			3136_B_1	77,544	5,434	2009	95.0	2003	850.0
Lawrence, PA	New Castle	Coal Steam	3138_B_5	6,116	1,116				134.0
			3138_B_4	3,870	566				98.0
			3138_B_3	3,586	539				94.0
Jefferson, OH	Cardinal	Coal Steam	2828_B_3	25,320	6,715	2010	95.0	2003	630.0
			2828_B_1	37,115	4,190	2007	95.0	2003	600.0
			2828_B_2	24,445	6,243	2007	95.0	2003	600.0
	W H Sammis	Coal Steam	2866_B_7	25,739	6,714	2011	95.0		630.0
			2866_B_6	26,028	6,292	2011	95.0		630.0

			2866_B_5	10,021	2,453		50.0		300.0
			2866_B_1	6,679	1,478		50.0		180.0
			2866_B_2	6,339	1,391		50.0		180.0
			2866_B_3	5,956	1,166		50.0		180.0
			2866_B_4	5,629	1,098		50.0		180.0
Monongalia, WV	Fort Martin Power Station	Coal Steam	3943_B_2	42,296	4,771	2006	95.0		555.0
			3943_B_1	45,269	5,319	2006	95.0		552.0
	Longview Power - new plant on line 2011	Coal Steam	82702_B_1			2011	95.0	2011	695.0
	Morgantown Energy Facility	Coal Steam	10743_B_CFB2	0	157		91.6		25.0
			10743_B_CFB1	0	154		91.6		25.0
Marshall, WV	Mitchell	Coal Steam	3948_B_1	26,240	8,798	2007	95.0	1993	800.0
			3948_B_2	25,766	7,596	2006	95.0	1994	800.0
	Kammer	Coal Steam	3947_B_1	14,251	3,858				210.0
			3947_B_3	14,002	3,748				210.0
			3947_B_2	12,497	3,193				210.0
Indiana, PA	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
Belmont, OH	R E Burger	Coal Steam	2864_B_7	8,730	1,720	2010	95.0		156.0
			2864_B_8	8,565	1,685	2010	95.0		156.0
			2864_B_5	0	0				47.0
			2864_B_6	0	0				47.0
Preston, WV	Albright	Coal Steam	3942_B_3	8,469	979				137.0
			3942_B_2	3,660	608				73.0
			3942_B_1	3,100	663				73.0
Cambria, PA	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
Clarion, PA	Piney Creek Project	Coal Steam	54144_B_BRBR1	0	236		91.1		32.5
Venango, PA	Scrubgrass Generating	Coal Steam	50974_B_UNIT2	0	332		91.6		42.5
			50974_B_UNIT1	0	294		91.6		42.5

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

Cheswick, Allegheny County, PA, Facility ID: 8226

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	42,017.9	5,761.2	3,376,491.2	32,977,678
2003	12	45,432.8	4,704.7	3,727,784.1	36,352,654
2004	12	40,982.1	4,926.8	3,198,899.6	31,220,642
2005	12	37,320.1	3,913.6	2,921,151.9	28,510,285
2006	12	32,372.6	4,220.7	2,818,930.7	27,498,505
2007	12	34,088.9	4,455.0	2,903,425.1	28,314,056

Hatfield's Ferry Power Station , Greene County, PA, Facility ID: 3179

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	158,712.6	23,064.7	10,043,621.5	97,891,124
2003	12	139,423.9	17,642.8	8,566,912.0	83,503,429
2004	12	148,458.6	19,198.8	9,130,158.0	88,987,877
2005	12	145,621.2	17,449.6	8,768,387.5	85,461,894
2006	12	135,082.2	20,055.6	9,139,990.4	89,083,716
2007	12	144,929.7	23,671.5	10,173,087.9	99,152,896

AES Beaver Valley Partners, Beaver County, PA, Facility ID: 10676

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	No Data	No Data	No Data	No Data	No Data
2003	6		964.7		4,966,487
2004	6		940.4		5,151,622
2005	6		885.5		4,703,946
2006	6		933.3		4,802,489
2007	6		1,098.8		5,363,531

Bruce Mansfield, Beaver County, PA, Facility ID: 6094

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	30,312.6	29,868.7	15,411,598.8	150,210,585
2003	12	31,923.0	23,500.8	15,265,479.0	148,786,383
2004	12	37,987.8	24,077.3	17,654,260.5	172,068,960
2005	12	33,122.6	23,453.0	17,290,117.2	168,519,577
2006	12	23,431.0	25,724.6	17,375,622.9	169,353,166
2007	12	20,546.2	24,859.0	17,387,361.0	169,467,508

GF Weaton, Beaver County, PA, Facility ID: 50130

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	No Data	No Data	No Data	No Data	No Data
2003	12		1,395.6		7,092,743
2004	9		914.0		5,043,710
2005	6		546.9		3,301,642
2006	6		521.8		3,742,986
2007	6		567.7		3,813,510

Elrama, Washington County, PA, Facility ID: 3098

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	5,395.2	8,078.7	3,469,030.9	33,811,222
2003	12	3,563.2	5,874.7	2,687,750.0	26,196,355
2004	12	3,645.0	5,520.9	2,500,488.4	24,371,235
2005	12	3,216.0	4,686.0	2,009,719.2	19,587,977
2006	12	4,821.1	6,295.9	2,671,698.0	26,039,969
2007	12	4,267.4	6,027.7	2,343,388.4	22,840,062

Mitchell Power Station, Washington County, PA, Facility ID: 3181

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	1,164.3	2,275.2	1,288,266.5	12,598,036
2003	12	1,442.9	2,269.3	1,675,735.1	16,377,269
2004	12	1,268.2	1,859.1	1,520,854.4	14,830,174
2005	12	1,519.8	2,439.9	1,772,999.4	17,290,962
2006	12	930.3	2,739.7	1,734,947.8	16,921,756
2007	12	633.6	1,491.6	908,844.8	8,869,946

Armstrong Power Station, Armstrong County, PA, Facility ID: 3178

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	32,499.9	4,128.0	2,198,944.0	21,432,172
2003	12	34,141.1	3,976.2	2,260,344.4	22,030,631
2004	12	32,945.2	3,931.2	2,143,760.5	20,894,414
2005	12	30,655.9	3,521.2	2,064,813.7	20,124,906
2006	12	27,110.0	3,096.4	1,855,594.1	18,085,696
2007	12	31,562.1	3,763.9	2,200,730.6	21,449,670

Keystone, Armstrong County, PA, Facility ID: 3136

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	150,619.5	18,203.0	11,522,016.1	112,300,339
2003	12	163,493.5	11,425.3	11,916,373.8	116,144,099
2004	12	171,309.1	13,575.7	11,756,542.8	114,586,217
2005	12	178,767.2	13,998.3	12,950,676.6	126,224,864
2006	12	164,353.5	12,783.6	12,271,116.4	119,601,524
2007	12	171,081.1	12,267.2	11,898,614.3	115,970,886

New Castle, Lawrence County, PA, Facility ID: 3138

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	25,551.2	3,503.9	1,949,030.2	18,996,021
2003	12	20,851.2	3,106.6	1,618,414.3	15,774,068
2004	12	22,590.6	3,246.0	1,704,761.0	16,615,571
2005	12	18,954.7	2,531.6	1,497,798.9	14,598,390
2006	12	13,571.6	2,220.7	1,286,902.3	12,542,940
2007	12	18,510.9	3,046.9	1,570,506.9	15,307,090

Cardinal, Jefferson County, OH, Facility ID: 2828

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	74,750.6	23,378.8	8,409,740.2	81,967,531

2003	12	96,928.5	20,742.0	9,961,957.8	97,095,065
2004	12	100,134.6	17,494.5	10,258,034.7	99,980,929
2005	12	115,847.6	15,849.9	10,874,807.3	105,992,276
2006	12	86,879.5	17,148.1	10,985,695.2	107,073,045
2007	12	81,288.3	15,595.6	10,598,681.6	103,301,042

WH Sammis, Jefferson County, OH, Facility ID: 2866

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	145,113.8	38,623.2	15,854,575.9	154,533,809
2003	12	164,397.8	40,369.2	16,694,526.2	162,714,725
2004	12	127,113.9	29,626.0	14,196,168.4	138,364,289
2005	12	106,566.1	25,155.7	15,401,305.9	150,110,208
2006	12	86,391.7	20,591.8	15,761,761.9	153,623,312
2007	12	101,788.8	19,957.9	15,677,290.8	152,800,149

Fort Martin Power Station, Monongalia County, WV, Facility ID: 3943

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	91,119.3	11,235.7	7,551,652.1	73,602,855
2003	12	102,522.3	11,582.1	7,693,243.9	74,982,901
2004	12	99,869.0	10,889.8	7,461,624.9	72,725,403
2005	12	82,820.5	9,089.0	6,729,296.8	65,587,709
2006	12	87,565.1	10,090.0	7,726,961.8	75,311,502
2007	12	88,031.6	8,995.3	6,726,766.8	65,563,012

Morgantown Energy Facility, Monongalia County, WV, Facility ID: 10743

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	No data	No data	No data	No data	No data
2003					
2004	6		370.5		2,916,246
2005	6		336.5		2,719,561
2006	6		310.7		2,710,964
2007	6		299.9		2,540,377

Mitchell, Marshall County, WV, Facility ID: 3948

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	56,009.2	29,593.1	8,641,347.9	84,222,423
2003	12	59,330.9	29,660.9	8,991,537.2	87,636,839
2004	12	62,617.0	23,575.2	8,627,594.8	84,089,902
2005	12	53,765.1	20,026.4	6,599,845.3	64,325,953
2006	12	52,005.5	16,394.6	7,076,633.7	68,972,995
2007	12	6,084.4	14,682.4	9,033,512.4	88,045,916

Kammer, Marshall County, WV, Facility ID: 3947

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	39,096.2	13,173.9	3,694,205.5	36,005,906
2003	12	42,216.1	11,968.5	3,562,163.2	34,718,914
2004	12	40,016.3	10,883.3	3,320,586.7	32,364,383
2005	12	42,574.0	11,516.3	3,722,892.7	36,285,498

2006	12	40,750.2	10,798.1	3,464,587.1	33,767,863
2007	12	43,126.6	11,100.7	3,991,447.0	38,902,989

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

R E Burger, Belmont County, OH, Facility ID: 2864

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	35,453.7	6,757.9	2,175,988.7	21,208,479
2003	12	29,929.8	3,603.4	1,783,723.4	17,385,166
2004	12	26,774.5	3,178.5	1,677,688.8	16,351,747
2005	12	37,598.3	5,358.6	2,465,490.1	24,031,261
2006	12	17,295.4	3,405.5	1,950,259.7	19,008,416
2007	12	22,508.5	3,403.3	2,038,237.3	19,865,844

Albright Power Station, Preston County, WV, Facility ID: 3942

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	20,560.1	4,672.3	1,702,180.5	16,590,381
2003	12	25,424.6	5,599.6	2,138,410.0	20,842,162
2004	12	15,984.9	2,725.0	1,230,785.0	11,995,936
2005	12	16,922.8	2,495.6	1,290,853.3	12,581,428
2006	12	15,228.9	2,249.7	1,168,370.4	11,387,612
2007	12	20,792.9	3,185.7	1,610,136.3	15,693,371

Cambria Cogen, Cambria County, PA, Facility ID: 10641					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	No data	No data	No data	No data
2003	12		779.9		7,265,580
2004	12		1,016.2		9,485,877
2005	12		945.9		9,315,832
2006	12		1,027.9		9,729,467
2007	12		1,026.0		9,585,889
Colver Power Project, Cambria County, PA, Facility ID: 10143					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	No data	No data	No data	No data
2003	12		746.9		9,172,828
2004	12		799.8		9,254,990
2005	12		745.5		9,494,657
2006	12		677.9		9,093,178
2007	12		817.2		10,256,283
Ebensburg Power, Cambria County, PA, Facility ID: 10603					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	No data	No data	No data	No data
2003	12		234.6		6,037,721
2004	12		285.1		6,097,638
2005	12		256.2		5,750,605
2006	12		260.0		6,044,791
2007	12		290.5		6,347,609
Piney Creek Project, Clarion County, PA, Facility ID: 54144					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	No data	No data	No data	No data
2003	12		229.6		3,374,392
2004	12		213.4		3,099,551
2005	12		227.0		3,243,152
2006	12		235.8		3,410,731
2007	12		261.9		3,557,966
Scrubgrass Generating, Venango County, PA, Facility ID: 50974					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	No data	No data	No data	No data
2003	12		625.3		9,877,959
2004	12		594.0		10,757,492
2005	12		514.8		9,360,405
2006	12		626.1		9,781,159
2007	12		736.7		10,384,742

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of emissions in this potential nonattainment area may have installed emission controls or otherwise significantly

reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants already have installed emission controls or plan to install such controls in the near future, EPA requests additional information on:

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

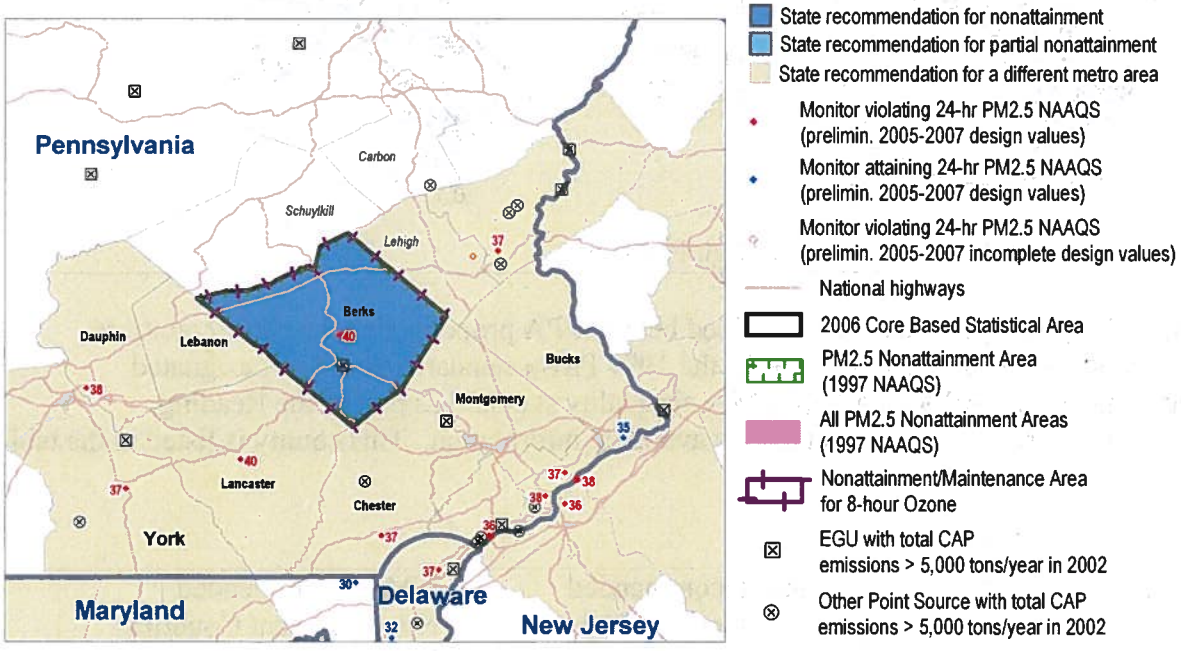
EPA Technical Analysis for the Reading Area

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

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

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

Figure 1.0. The Reading Area

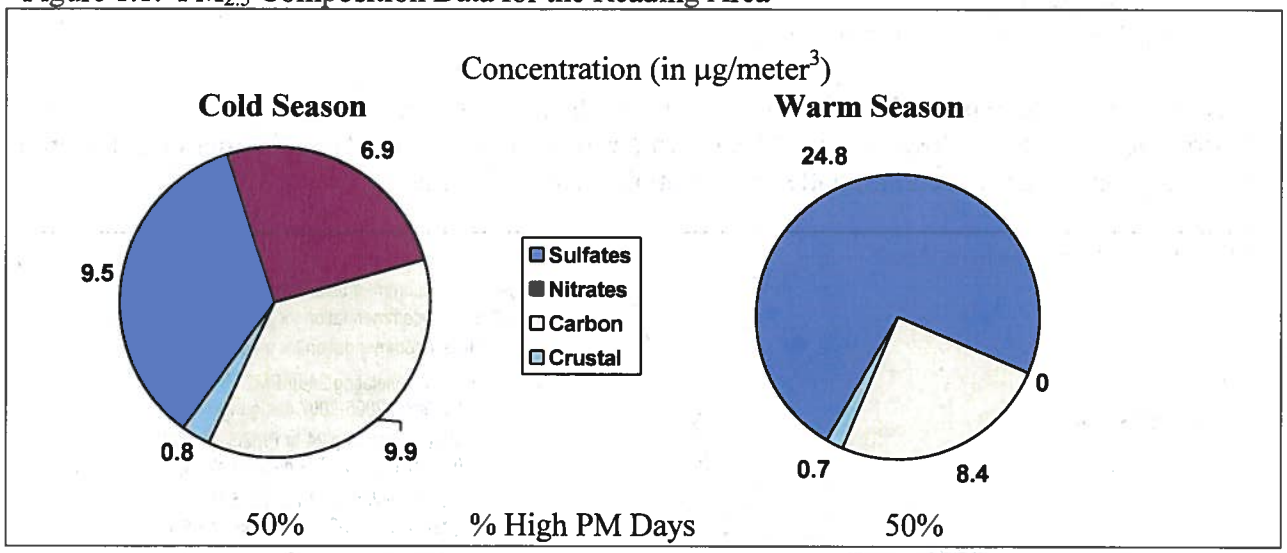


For this area, EPA previously established nonattainment boundaries for the 1997 $PM_{2.5}$ NAAQS that included one full county, Berks County, located in Pennsylvania.

In December 2007, the Commonwealth of Pennsylvania recommended that the same 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) and Federal Equivalent Method (FEM) monitors located in the state. (See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA, received on January 3, 2008).

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of these data indicates that the days with the highest fine particle concentrations in the Reading area occur in both cool and warm seasons. The average chemical composition of the highest days in the cold season and warm seasons is illustrated in Figure 1.1.

Figure 1.1. $PM_{2.5}$ Composition Data for the Reading Area



Based on EPA's 9-factor analysis described below, EPA proposes that the same county as previously designated nonattainment for the 1997 $PM_{2.5}$ standard should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ air quality standard as part of the Reading nonattainment area, based upon currently available information. This county is listed in the table below.

Reading Area	State-Recommended Nonattainment Counties	EPA-Recommended Nonattainment Counties
Pennsylvania	Berks County	Berks County

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

The Reading nonattainment area for the 1997 $PM_{2.5}$ NAAQS was defined as Berks County, PA. EPA has determined that the same boundary is appropriate for the Reading nonattainment area under the 2006 $PM_{2.5}$ NAAQS. The Reading area is affected by long-range transport from the southwest. Numerous nonattainment areas are upwind from Berks County, including the Lancaster, York, and Baltimore nonattainment areas. In addition, local emissions such as those from vehicles and other small area sources, and emissions from one large local source, Reliant Energy Inc.'s Titus Power Plant just southeast of the City of Reading, also contribute to the nonattainment problem. Furthermore, while the Reading area is surrounded by other metropolitan areas, this 9-factor analysis will show that it is a separate and distinct area, and should not be included in the nonattainment areas associated with those surrounding metropolitan areas. The Berks County is in a separate metropolitan statistical area (MSA), and there is limited commuting between Berks County and the other surrounding MSAs.

This technical analysis will focus on the Reading area (i.e., Berks County) and a ring of nearby counties surrounding that area that could reasonably be contributing to nonattainment in Reading. Therefore, counties that are beyond that ring of counties surrounding Berks County will be excluded from further analysis. In addition, if a county is part of another existing nonattainment area for the 1997 $PM_{2.5}$ NAAQS and the state has recommended including it in that other nonattainment area for the 2006 $PM_{2.5}$ NAAQS, that county will not be included in this analysis. Accordingly, the following counties will be excluded from further consideration for inclusion within the Reading nonattainment area.

Table 1.2. Counties Not Being Considered for Inclusion in the Reading Nonattainment Area

Counties, States	Reasons for Exclusion from Further Analysis
York, PA	York County is a separate nonattainment area for the 1997 $PM_{2.5}$ NAAQS and has been recommended as that same separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. In addition, York County is not part of the contiguous ring of counties surrounding the Reading area.
Lancaster, PA	Lancaster County is a separate nonattainment area for the 1997 $PM_{2.5}$ NAAQS and has been recommended as that same separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS.
Chester, PA Montgomery, PA Delaware, PA New Castle, DE Philadelphia, PA Bucks, PA Gloucester, NJ	These counties are all part of the Philadelphia nonattainment area for the 1997 $PM_{2.5}$ NAAQS. For the 2006 $PM_{2.5}$ NAAQS, Pennsylvania recommended that Chester, Montgomery, Delaware, Philadelphia, and Bucks Counties be included in the Philadelphia nonattainment area, and New Jersey recommended that Gloucester County be included in the Philadelphia area. Delaware recommended that New Castle County be its own nonattainment area for the 2006 $PM_{2.5}$ NAAQS. In addition, Philadelphia, Bucks, Delaware, New Castle, and Gloucester Counties are not part of the contiguous ring of counties surrounding the Reading area.
Baltimore, MD Harford, MD Anne Arundel, MD	These counties are all part of the Baltimore nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Maryland has recommended including them in the Baltimore nonattainment area for the 2006 $PM_{2.5}$ NAAQS. In addition, these counties are not part of the contiguous ring of counties surrounding the Reading area. In fact, the Baltimore area is separated from the Reading area by

	the York and Lancaster areas.
Northampton, PA	Northampton County is not part of the contiguous ring of counties surrounding the Reading area.
Lebanon, PA Dauphin, PA	Lebanon and Dauphin Counties are part of the Harrisburg nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Pennsylvania has recommended including them in the Harrisburg nonattainment area for the 2006 $PM_{2.5}$ NAAQS. In addition, Dauphin County is not part of the contiguous ring of counties surrounding the Reading area.
Montour, PA	Montour County is not part of the contiguous ring of counties surrounding the Reading area.
Montgomery, MD	Montgomery County is not part of the contiguous ring of counties surrounding the Reading area. It is separated from the Reading area by the Lancaster, York, and Baltimore areas. In addition, Montgomery County is part of the Washington nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Maryland has recommended including it in the Washington nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

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

The 9-factor analysis below will demonstrate that the Reading area is a separate and distinct area, not associated economically or jurisdictionally with the other counties in Table 1.2 or the York, Lancaster, Philadelphia, Baltimore, Allentown, Harrisburg-Lebanon-Carlisle, and Washington, DC area. Historically, these areas have been separate nonattainment areas for both particulate matter and ozone.

York, Lancaster, Chester, Montgomery (PA), Delaware, New Castle, Philadelphia, Bucks, Gloucester, Baltimore, Harford, Anne Arundel, Lebanon, Dauphin, and Montgomery (MD) Counties are in separate nonattainment areas for the 1997 $PM_{2.5}$ NAAQS, the York, Lancaster, Philadelphia-Wilmington, Baltimore, Harrisburg-Lebanon-Carlisle, and Washington, D.C. nonattainment areas, respectively. Very few commuters from these separate nonattainment areas travel into the Reading area compared to the commuters from Berks County who travel within the Reading MSA. Furthermore, as explained in detail in Factor 8, below, the counties in Table 1.2 are in separate MSAs and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Pennsylvania counties surrounding Berks County. Therefore, EPA has determined that it is appropriate to include only Berks County in the Reading nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS, and include the counties in Table 1.2 in separate nonattainment areas. To the extent that emissions from these other counties contribute to the reading nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

Factor 1: Emissions Data

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

other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_x, are part of "$PM_{2.5}$ emissions total," they are not shown in Table 1.0 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 SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) 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 (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html. Table 1.0 lists all the counties evaluated for the Reading area, and their calculated CES. Only counties with CESs greater than one are listed.

Table 1.0. Contributing Emissions Scores for the Reading Area

State	County	CES
PA	Berks	100
PA	York	76
PA	Lancaster	57
PA	Chester	43
PA	Montgomery	40
PA	Delaware	38
DE	New Castle	35
MD	Baltimore	29
PA	Philadelphia	28
PA	Northampton	23
PA	Schuylkill	22
PA	Lehigh	21
PA	Lebanon	19
PA	Montour	19
PA	Bucks	15
PA	Dauphin	14
MD	Harford	13
MD	Anne Arundel	12
MD	Montgomery	12
NJ	Gloucester	11
PA	Cumberland	9
MD	Baltimore (City)	8
MD	Prince George's	8
NJ	Camden	7
PA	Snyder	6
NJ	Salem	6
NJ	Mercer	6
MD	Frederick	6
MD	Carroll	5
MD	Howard	4
DE	Kent	4
DE	Sussex	4
PA	Luzerne	4
NJ	Atlantic	4
NJ	Cumberland	4
PA	Adams	4
VA	Fairfax	4
PA	Northumberland	4
MD	Washington	3
NJ	Ocean	3
NJ	Cape May	3
NJ	Hunterdon	3
NJ	Middlesex	3
PA	Carbon	3
DC	Washington	2
MD	Queen Anne's	2
PA	Clearfield	2
NJ	Monmouth	2
PA	Franklin	2
PA	Monroe	2
PA	Perry	2
MD	Calvert	1
MD	Caroline	1
PA	Union	1
MD	Kent	1
MD	Talbot	1
MD	Wicomico	1
MD	Worcester	1
NJ	Essex	1
NJ	Morris	1
NJ	Union	1
PA	Bedford	1
PA	Mifflin	1
PA	Blair	1
PA	Centre	1
PA	Columbia	1
PA	Huntingdon	1
PA	Juniata	1
VA	Arlington	1

MD	Cecil	8
NJ	Burlington	7

NJ	Warren	2
NJ	Somerset	2

VA	Loudoun	1

Table 1.1 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 Reading area. The county that is part of the Reading nonattainment area for the 1997 $PM_{2.5}$ NAAQS is shown in boldface. Counties are listed in descending order by CES. Only counties with CES values of ten or higher are included in this table.

Table 1.1. $PM_{2.5}$ 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)
Berks, PA	**Yes**	**100**	**3,378**	**922**	**2,456**	**18,874**	**18,086**	**19,117**	**4,653**
York, PA	Yes- other area	76	7,614	1,217	6,396	118,621	32,214	18,478	3,913
Lancaster, PA	Yes - other area	57	3,258	1,159	2,099	4,017	16,396	26,407	16,486
Chester, PA	Yes - other area	43	2,124	799	1,325	7,990	16,507	19,666	2,563
Montgomery, PA	Yes - other area	40	2,597	1,118	1,477	5,411	23,306	37,216	1,535
Delaware, PA	Yes - other area	38	2,454	865	1,589	20,356	32,904	20,250	956
New Castle, DE	Yes - other area	35	2,394	891	1,504	50,955	28,291	19,269	1,699
Baltimore, MD	Yes - other area	29	6,437	1,892	4,547	44,626	34,467	31,163	1,266
Philadelphia, PA	Yes - other area	28	2,506	1,248	1,258	11,293	38,733	35,230	1,299
Northampton, PA	Yes - other area	23	5,222	665	4,556	60,396	24,620	10,960	807
Schuylkill, PA	No	22	1,247	547	700	7,239	6,219	6,873	1,137
Lehigh, PA	Yes - other area	21	1,328	501	828	3,749	11,503	13,369	904
Lebanon, PA	Yes - other area	19	855	338	516	1,778	5,876	5,924	4,445
Montour, PA	No	19	2,022	876	1,146	3,951	16,792	26,241	1,834
Bucks, PA	Yes - other area	15	1,074	528	546	2,443	12,548	12,569	1,664
Dauphin, PA	Yes - other area	14	1,247	547	700	7,239	6,219	6,873	1,137
Harford, MD	Yes - other area	13	1,769	879	890	2,307	7,310	10,512	967
Anne Arundel, MD	Yes - other area	12	4,874	1,311	3,563	70,568	33,573	20,421	979
Montgomery, MD	Yes - other area	12	7,031	2,095	4,937	41,801	26,763	28,692	1,090
Gloucester, NJ	Yes - other area	11	1,607	677	930	7,116	12,711	14,140	813

Berks County has a CES of one-hundred, indicating that of all the counties in the analysis, it has the greatest influence its own nonattainment. However, a number of counties in this analysis have higher emissions than Berks County. York County has the next highest CES, seventy-six. York County is separated from the Reading area by Lancaster County. York County has, by far, the highest SO_2 emissions of all the counties in the analysis. York County also has the highest $PM_{2.5\text{-total}}$ emissions and the third highest NOx emissions. York County is its own nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that York County be a separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Lancaster County has the third highest CES, fifty-seven. Like York County, Lancaster County is its own nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that Lancaster County be a separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Lancaster County has total $PM_{2.5}$ and NOx emissions comparable to Berks County, but much lower SO_2 emissions.

As explained in detail in Factor 8, below, the York and Lancaster areas are distinct from the Reading area. They are in separate MSAs 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 and Lancaster Counties contribute to the Reading nonattainment area, that contribution it will be lessened by emission controls put in place in those separate nonattainment areas.

The four counties with the next highest CESs, forty-three to thirty-five, are Chester, Montgomery, Delaware, and New Castle Counties. These counties are part of the Philadelphia-Wilmington nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that Chester, Montgomery, Delaware Counties be included in the Philadelphia nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Delaware has recommended that New Castle County be its own separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Of these four counties, Delaware, and New Castle Counties have the highest SO_2 and NOx emissions. All four have comparable $PM_{2.5}$ emissions.

Five counties have CESs between thirty and twenty. Of these five, Baltimore and Northampton Counties have the highest $PM_{2.5}$ and SO_2 emissions. Philadelphia County has the highest NOx emissions. For the 1997 $PM_{2.5}$ NAAQS, Baltimore and Philadelphia Counties are part of the Baltimore and Philadelphia-Wilmington nonattainment areas, respectively. Maryland and Pennsylvania have recommended that these counties be included in those same nonattainment areas for the 2006 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that Northampton and Lehigh Counties be included in the Allentown nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

Of the remaining counties, with CESs between twenty and ten, Ann Arundel and Montgomery Counties in Maryland have the highest $PM_{2.5}$, SO_2, and NOx emissions. Ann Arundel County is part of the Baltimore nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Maryland has recommended including it in the Baltimore nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Montgomery County is part of the Washington nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Maryland has recommended including it in the Washington nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

Factor 2: Air Quality Data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Reading 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 $PM_{2.5}$ standards are met when the 3-year average of a monitor's 98^{th} percentile values are 35 $\mu g/m^3$ 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 Reading area are shown in Table 2.0.

Table 2.0. Air Quality Data

County, State	State	24-hr $PM_{2.5}$	24-hr PM2.5	24-hr $PM_{2.5}$

	Recommended Nonattainment?	Design Values, 2003-2005 ($\mu g/m^3$)	Design Values, 2004-2006 ($\mu g/m^3$)	Design Values, 2005-2007 ($\mu g/m^3$)
Berks, PA	**Yes**	39	37	38
York, PA	Yes - other area	41	37	37
Lancaster, PA	Yes - other area	44	39	40
Chester, PA	Yes - other area			37
Montgomery, PA	Yes - other area		Inc	Inc
Delaware, PA	Yes - other area	35	35	36
New Castle, DE	Yes - other area	37	37	37
Baltimore, MD	Yes - other area	37	36	35
Philadelphia, PA	Yes - other area	38	36	38
Northampton, PA	Yes - other area	36	37	37
Schuylkill, PA	No	No Monitior		
Lehigh, PA	Yes - other area	36		
Lebanon, PA	Yes - other area	No Monitor		
Montour, PA	No	No Monitor		
Bucks, PA	Yes - other area		33	35
Dauphin, PA	Yes - other area	39	38	38
Harford, MD	Yes - other area	34	31	31
Anne Arundel, MD	Yes - other area	37	35	34
Montgomery, MD	Yes - other area	32	31	30
Gloucester, NJ	Yes - other area	32		
Note: Design values shown in red represent violations of the standard.				

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with a FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM, FEM, or Alternative Reference Method (ARM) which has operated for more than 24 months is eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to the 2006 24-hour PM2.5 NAAQS for designation purposes.

Berks, York, Lancaster, Chester, Delaware, Philadelphia, Northampton, and Dauphin Counties in Pennsylvania and New Castle, DE show violations of the 2006 24-hour $PM_{2.5}$ standard. Therefore, these counties are candidates for inclusion in the Reading nonattainment area. However, York, Lancaster, Chester, Delaware, Philadelphia, and Dauphin Counties are in 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. New Castle County is part of the Philadelphia-Wilmington nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Delaware has recommended that it be a separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that Northampton County, along with Lehigh County, be designated nonattainment for the 2006 $PM_{2.5}$ NAAQS as the Allentown nonattainment 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. 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.

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

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

Table 3.0. Population

County	State Recommended Nonattainment?	2005 Population	2005 Population Density (pop/sq mi)
Berks, PA	**Yes**	**396,236**	**458**
York, PA	Yes - other area	408,182	449
Lancaster, PA	Yes - other area	489,936	499
Chester, PA	Yes - other area	473,723	624
Montgomery, PA	Yes - other area	774,666	1591
Delaware, PA	Yes - other area	554,393	2910
New Castle, DE	Yes - other area	522,094	1077
Baltimore, MD	Yes - other area	783,405	1255
Philadelphia, PA	Yes - other area	1,456,350	10220
Northampton, PA	Yes - other area	287,334	762
Schuylkill, PA	No	146,996	188
Lehigh, PA	Yes - other area	330,168	948
Lebanon, PA	Yes - other area	125,429	346
Montour, PA	No	18,032	138
Bucks, PA	Yes - other area	619,772	998
Dauphin, PA	Yes - other area	252,949	454
Harford, MD	Yes - other area	238,850	519
Anne Arundel, MD	Yes - other area	509,397	1127
Montgomery, MD	Yes - other area	927,405	1834
Gloucester, NJ	Yes - other area	277,037	823

In general, counties that are part of nonattainment areas other than the Reading area for the 1997 $PM_{2.5}$ NAAQS and/or are beyond the contiguous ring of counties around the Reading area have the highest populations and population densities. Of the remaining counties, Berks County has the highest 2005 population. However, Lehigh County's population density is twice that of Berks County.

The data in Table 3.0 indicates a number of counties which are in separate nonattainment areas for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in those areas for the 2006 $PM_{2.5}$ NAAQS rank high for this factor. However, as explained in detail in Factor 8, below, these counties are in areas that are distinct from the Reading area. They are in separate MSAs and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Pennsylvania counties surrounding the Reading area. Therefore, EPA has determined that it is appropriate to include these counties in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To

the extent that population-based emissions from these counties impact to the Reading nonattainment area, that contribution it will be lessened by controls put in place in those separate nonattainment areas.

Factor 4: Traffic and Commuting Patterns

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

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number Commuting to Any Violating Counties	Percent Commuting to Any Violating Counties	Number Commuting into & within Statistical Area*	Percent Commuting into & within Statistical Area*
Berks, PA	**Yes**	**3,320**	**157,470**	**89**	**140,820**	**79**
York, PA	Yes - other area	3,333	177,150	92	240	0
Lancaster, PA	Yes - other area	4,392	218,910	95	4,070	2
Chester, PA	Yes - other area	4,414	142,950	66	1,920	1
Montgomery, PA	Yes - other area	7,527	31,840	8	4,230	1
Delaware, PA	Yes - other area	4,011	216,560	85	187	0
New Castle, DE	Yes - other area	5,674	228,630	93	4	0
Baltimore, MD	Yes - other area	8,032	307,530	82	8	0
Philadelphia, PA	Yes - other area	6,499	469,300	82	243	0
Northampton, PA	Yes - other area	2,399	99,230	79	605	1
Schuylkill, PA	No	1,353	9,890	16	5,790	9
Lehigh, PA	Yes - other area	3,374	114,320	77	3,270	2
Lebanon, PA	Yes - other area	1,133	19,610	33	2,800	5
Montour, PA	No				20	0
Bucks, PA	Yes - other area	5,250	6,310	2	410	0
Dauphin, PA	Yes - other area	3,413	96,850	80	180	0
Harford, MD	Yes - other area	2,068	44,070	40	33	0
Anne Arundel, MD	Yes - other area	5,572	36,370	14	37	0
Montgomery, MD	Yes - other area	7,606	4,800	1	8	0
Gloucester, NJ	Yes - other area	2,621	42,160	35	16	0

*Note: The statistical area considered in this table is the Reading metropolitan statistical area (MSA), which consists of Berks county. In November 2007, the Office of Management and Budget (OMB) included Berks County in the Philadelphia Combined Statistical Area.

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

The listing of counties on Table 4.0 reflects the number of people commuting to other counties. The county in the Reading nonattainment area for the 1997 $PM_{2.5}$ NAAQS is shown in boldface.

In general, counties that are part of nonattainment areas other than the Reading area for the 1997 $PM_{2.5}$ NAAQS and/or that are beyond the contiguous ring of counties around the Reading area have the highest VMT. Of the remaining counties, Lehigh and Berks Counties have the highest 2005 VMT. However, Berks County has far more commuters (140,820) into and within the Reading Metropolitan Statistical Area (MSA) than any other county in this analysis. Schuylkill County has the next highest number of commuters into the Reading area, only 5,790.

The data in Table 4.0 indicates a number of counties which in separate nonattainment areas for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in those areas for the 2006 $PM_{2.5}$ NAAQS rank high for this factor as far as VMT. However, there is very little commuting between those counties and the Reading area. Furthermore, those counties are in separate MSAs and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Pennsylvania counties surrounding the Reading area. Therefore, EPA has determined that it is appropriate to include these counties in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that vehicle-based emissions from these counties impact to the Reading nonattainment area, that contribution it will be lessened by 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 Reading 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 5.0 below shows population, population growth, VMT, and VMT growth for counties that are included in the Reading area.

Table 5.0. Population and VMT Values and Percent Change.

Location	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT (millions)	VMT % change (1996 - 2005)
Berks, PA	**396,236**	**458**	**6**	**3,320**	**11**
York, PA	408,182	449	7	3,333	6
Lancaster, PA	489,936	499	4	4,392	21
Chester, PA	473,723	624	9	4,414	54
Montgomery, PA	774,666	1591	3	7,527	73
Delaware, PA	554,393	2910	0	4,011	24
New Castle, DE	522,094	1077	4	5,674	25
Baltimore, MD	783,405	1255	4	8,032	32
Philadelphia, PA	1,456,350	10220	(4)	6,499	(31)
Northampton, PA	287,334	762	7	2,399	21
Schuylkill, PA	146,996	188	(2)	1,353	(1)
Lehigh, PA	330,168	948	6	3,374	34

Lebanon, PA	125,429	346	4	1,133	7
Montour, PA	18,032	138	(1)		
Bucks, PA	619,772	998	3	5,250	49
Dauphin, PA	252,949	454	0	3,413	27
Harford, MD	238,850	519	9	2,068	0
Anne Arundel, MD	509,397	1127	4	5,572	45
Montgomery, MD	927,405	1834	6	7,606	16
Gloucester, NJ	277,037	823	8	2,621	26

Berks County has experienced a modest increase in population from 2000 to 2005, six percent. Most other counties in the analysis have experience similar moderate increases. However, Schuylkill County has seen a small decrease in population during the same time period.

VMT in Berks County has increased moderately from 1996 to 2005, eleven percent. VMT in Lebanon County increased to a lesser extent, while VMT in Lehigh County increased by thirty-four percent. Schuylkill County experienced a small decrease in VMT during the same time period. Berks, Lebanon, Lehigh, and Schuylkill Counties are in separate MSAs. As shown in factor 4, above, there is little commuting from Lebanon, Lehigh, and Schuylkill Counties into the Reading area. Therefore, EPA has determined that it is appropriate to include these counties in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that vehicle and population-based emissions from these counties impact to the Reading nonattainment area, that contribution it will be lessened by controls put in place in those separate nonattainment areas.

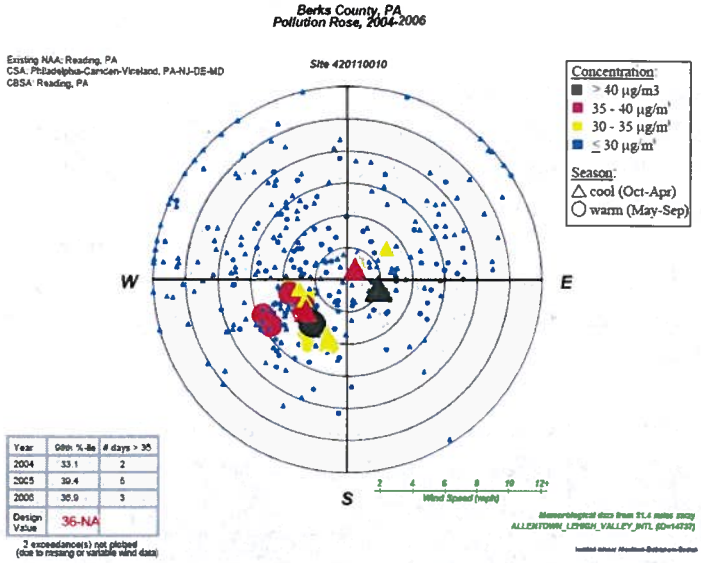
Factor 6: Meteorology (Weather/Transport Patterns)

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

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

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. Figure 6.0 identifies 24-hour $PM_{2.5}$ values by color and days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the 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 6.0. Pollution Trajectory Plot for Berks County, PA
(Site 42-011-0010)



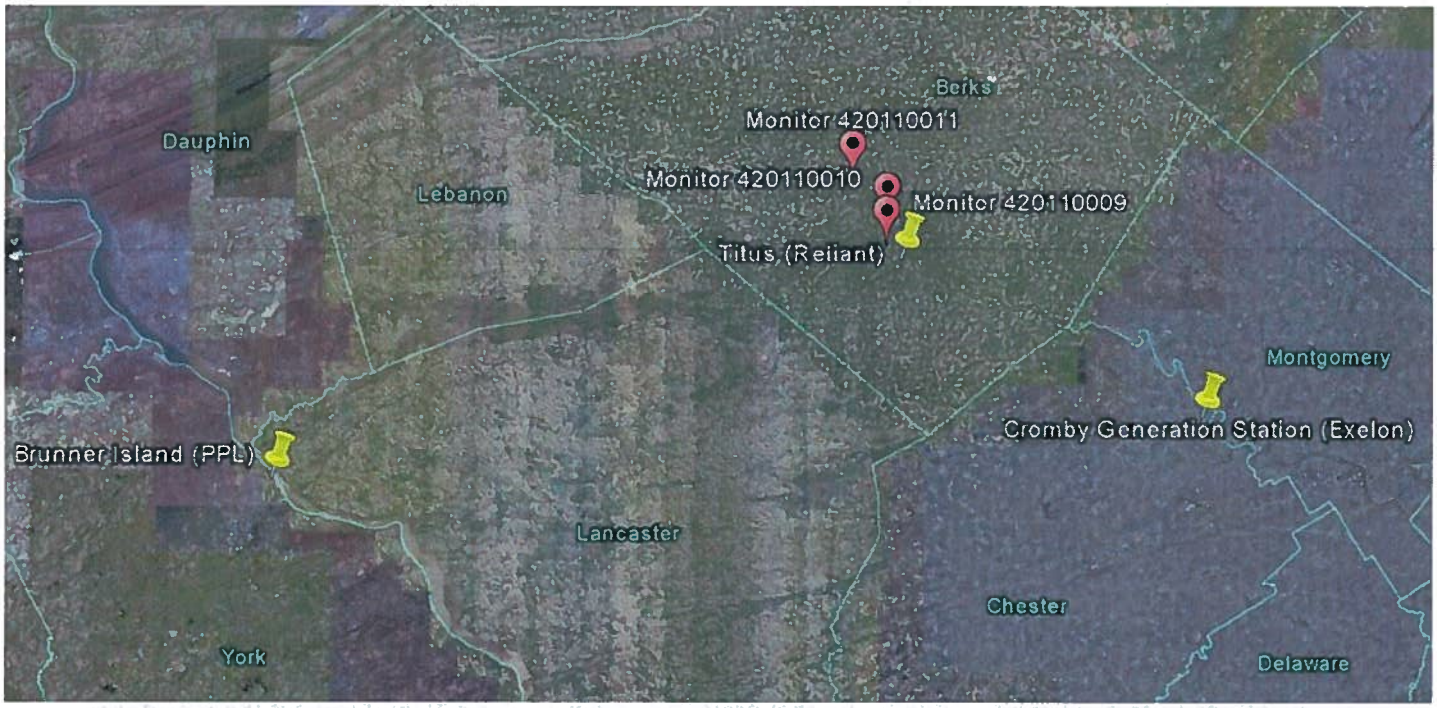
As can be seen from the pollution rose for Berks County, Figure 6.0, the average prevailing surface wind direction for high $PM_{2.5}$ days in Berks County is from the southwest and west-southwest. The pollution rose shows that 24-hour $PM_{2.5}$ concentrations are influenced by emissions from nearly any direction at various times, but these data also suggest that emissions from some directions are more likely to contribute to the violation than emissions from other directions. In this case, emissions from the southwest, west-southwest, and to a lesser extent from the east and east-southeast, are more likely to contribute to a violation at the Berks County monitor than emissions from most other directions. Long-range transport from the southwest is likely one component of the nonattainment problem in the Reading area. Numerous nonattainment areas are upwind from Berks County, including the Lancaster, York, and Baltimore nonattainment areas.

As can be seen in Figure 6.1, the Brunner Island facility, a large electric generating unit (EGU) in York County, on the border with Lancaster County, is west-southwest of the monitoring locations in Berks County. It is likely that emissions from Brunner Island impact the monitor in Berks County. York County's high emissions and location upwind of Berks County explain its high CES value, seventy-six. (See Table 1.0 in Factor 1.) However, York County is in separate nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Pennsylvania recommended that it be included in that same separate nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. Furthermore, as explained in detail in Factor 8, below, the York area is distinct from the Reading area. Lancaster and York Counties are in separate MSAs 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 County in separate nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that there is any contribution of transported pollution from York County to the Reading nonattainment area, that contribution it will be lessened by emission controls put in place in that separate nonattainment area.

The pollution rose show two high $PM_{2.5}$ days with low-speed winds from the east and east-southeast. This indicates that the Titus facility in Berks likely also impacts the monitor in Berks County.

Please note that the Pennsylvania department of Environmental Protection (PADEP) moved the Berks County monitor twice between 2005 and 2007. The first location, (AQS monitor # 420110009) was located at Morgantown Road and Prospect Street in Reading. PADEP lost the lease for that location, and in 2006 moved the monitor to a temporary location, 503 North 6th Street in Reading (AQS monitor # 420110010). Finally, in 2007, the monitor was moved to its new permanent location, 1059 Arnold Road, also in Reading (AQS monitor # 420110011). For calculating design values, EPA considers these monitoring locations to be one and the same. Figure 6.1 shows the monitor's locations.

Figure 6.1. Berks County Air Quality Monitor Locations and Nearby Large EGUs



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

The geography/topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the distribution of $PM_{2.5}$ over the Reading area.

The Reading area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, this factor did not play a significant role in the decision-making process.

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

In evaluating the jurisdictional boundary factor, consideration should be given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning. Berks County was initially the Reading Subpart 1 ("Basic") nonattainment area for the 1997 8-hour ozone NAAQS, and is now the Reading 8-hour ozone maintenance area. Berks County was also previously a maintenance areas for the 1-hour ozone NAAQS, but is no longer subject to that standard. Berks County also makes up the Reading nonattainment area for the 1997 $PM_{2.5}$ NAAQS.

Counties around the Reading area were designated as separate nonattainment areas for the 1997 $PM_{2.5}$ standard and the 1997 8-hour ozone standard. York, Lancaster, Chester, Montgomery (PA), Delaware, New Castle, Philadelphia, Bucks, Gloucester, Baltimore, Harford, Anne Arundel, Lebanon, Dauphin, and Montgomery (MD) Counties are in separate nonattainment areas for the 1997 $PM_{2.5}$ NAAQS, the York, Lancaster, Philadelphia-Wilmington, Baltimore, Harrisburg-Lebanon-Carlisle, and Washington, DC nonattainment areas, respectively. York County was part of the York Subpart 1 ("Basic") 8-hour ozone nonattainment area. Lancaster County was designated as the Lancaster marginal 8-hour ozone nonattainment area. Lebanon and Dauphin Counties were part of the Harrisburg-Lebanon-Carlisle Subpart 1 ("Basic") 8-hour ozone nonattainment area. Northampton County was part of the Allentown 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, Montgomery (PA), Delaware, New Castle, Philadelphia, Bucks, Gloucester Counties are part of the Philadelphia-Wilmington-Atlantic City moderate 8-hour ozone nonattainment area. Baltimore, Harford, Anne Arundel Counties are part of the Baltimore moderate 8-hour ozone nonattainment area, and Montgomery County, MD is part of the Washington, DC moderate 8-hour ozone nonattainment area.

The Berks County Planning Commission is the metropolitan planning organization (MPO) for Berks County. The counties surrounding Berks County are members of other MPOs, including the Lehigh Valley Planning Commission, the Delaware Valley Regional Planning Commission, the Lancaster County Transportation Coordinating Committee, the Northeastern Pennsylvania Alliance Rural Planning Organization, and the Lebanon County MPO.

From an EPA Region III perspective, there are no major jurisdictional boundary issues in the Reading area. EPA Region III is recommending that Berks County make up the nonattainment area. The air quality planning for the area will be conducted by the PADEP. Transportation planning is covered by one MPO, the Berks County Planning Commission. Furthermore, PADEP's Reading Air Basin covers portions of Berks County, and no other county. The Air Basin is defined in 25 Pa Code § 121.1. Controls on sulfur compounds for the Reading Air Basin are listed in 25 Pa Code § 123.22.

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

> *Air basin*—A geographic area of this Commonwealth as delimited in this section.
>
> *Allentown, Bethlehem, Easton air basin*—The following political subdivisions in Lehigh County: City of Allentown, City of Bethlehem, Catasauqua Borough, Coplay Borough, Emmaus Borough, Fountain Hill Borough, Hanover Township, Salisbury Township, South Whitehall Township, and Whitehall Township, and the following political subdivisions in Northampton County: Allen Township, Bath Borough, City of Bethlehem, Bethlehem Township, East Allen Township, City of Easton, Freemansburg Borough, Glendon Borough, Hanover Township, Hellertown Borough, Lower Nazareth Township, Lower Saucon Township, Nazareth Borough, North Catasauqua Borough, Northampton Borough, Palmer Township, Stockertown Borough, Tatamy Borough, Upper Nazareth Township, West Easton Borough, and Wilson Borough.
>
> *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.
>
> *Southeast Pennsylvania air basin*— The counties of Bucks, Chester, Delaware, Montgomery and Philadelphia.
>
> *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.

Berks County was added to the Philadelphia Combined Statistical Area in November 2007. However, as stated by PADEP in its December 28, 2007 designation recommendation letter, Berks County . . .

> ". . . traditionally has its own planning functions and should not be included in the Philadelphia area."

EPA aggress that this factor therefore supports a separate nonattainment area for Berks County.

Factor 9: Level of Control of Emission Sources

This factor considers emission controls currently implemented for major sources in the Reading area.

The emission estimates on Table 1.1 (under Factor 1) include any control strategies implemented by the states in the Reading area before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NOx, and crustal $PM_{2.5}$).

Table 9.0. EGUs with SO_2 plus NO_x emissions > 5000 tons, from the 2006 NEEDS EGU database

County, State	Plant Name	Unique ID Final	2006 SO_2	2006 NOx	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW
Berks, PA	Titus	3115_B_3	4,718	708				81.0
		3115_B_1	4,666	699				81.0
		3115_B_2	3,954	589				81.0
York, PA	P H Glatfelter	50397_B_5PB036				91.6		36.1
	PPL Brunner Island	3140_B_3	45,447	6,288	2008	95.0		749.0
		3140_B_2	26,606	3,600	2009	95.0		378.0
		3140_B_1	21,492	2,866	2009	95.0		321.0
Chester, PA	Cromby Generating Station	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
Delaware, PA	Chester Operations	50410_B_10						
	Eddystone Generating Station	3161_B_2	2,811	2,519		91.6		36.0
		3161_B_1	3,240	2,701	1983	93.2		309.0
		3161_B_3	217	101	1982	93.2		279.0
		3161_B_4	186	88				380.0
New Castle, DE	Edge Moor	593_B_4	5,671	1,485				174.0
		593_B_3	2,072	600				86.0
		593_B_5	239	179				445.0
Baltimore, MD	C P Crane	1552_B_1	14,770	2,898				200.0
		1552_B_2	13,111	2,410				200.0
	Riverside	1559_B_4	0	40				78.0
Philadelphia, PA	Schuylkill Generating Station	3169_B_1	95	43				166.0
Northampton, PA	Northampton Generating Company	50888_B_BLR1	0	422		91.6		112.0
	Portland	3113_B_2	18,187	2,207				243.0

County, State	Plant Name	Unique ID Final	2006 SO_2	2006 NOx	Scrubber Online Year	Scrubber Efficiency	SCR Online Year	Capacity MW
		3113_B_1	12,497	1,144				157.0
	PPL Martins Creek	3148_B_3	502	434				850.0
		3148_B_4	351	261				820.0
	Foster Wheeler Mt Carmel Cogen	10343_B_SG-101	492	246	1990	88.0		43.0
Schuylkill, PA	Gilberton Power Co, John B. Rich Memorial Power Station	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	50039_B_1	0	161		91.6		50.0
	St Nicholas Cogen Project	54634_B_1	0	241		91.6		88.0
	Wheelabrator Frackville Energy	50879_B_BLR1	0	316		91.6		44.5
	WPS Westwood Generation LLC	50611_B_031	300	289		91.6		30.0
Montour, PA	PPL Montour	3149_B_1	62,315	6,532	2008	95.0	2001	774.0
		3149_B_2	67,041	7,126	2008	95.0	2000	766.0
Anne Arundel, MD	Brandon Shores	602_B_1	20,498	5,867	2010	95.0	2000	643.0
		602_B_2	19,969	6,097	2010	95.0	2000	643.0
	Herbert A Wagner	1554_B_3	12,860	2,075			2002	324.0
		1554_B_2	6,492	2,015				135.0
		1554_B_4	340	158				400.0
		1554_B_1	76	51				131.0
Montgomery, MD	Dickerson	1572_B_3	13,763	1,926	2010	95.0		182.0
		1572_B_1	11,888	1,649	2010	95.0		182.0
		1572_B_2	10,301	1,401	2010	95.0		182.0
Gloucester, NJ	Logan Generating Plant	10043_B_B01	0	1,169	1994	93.0	2000	219.0

Table 9.0 shows emissions and controls (current and projected) for EGUs with SO_2 plus NO_x emissions greater than 5000 tons. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) database. As seen in Table 9.0, two EGUs in this analysis are scheduled to install controls between 2005 and 2008, PPL Brunner Island in York County, and PPL Montour in Montour County. York County is a separate MSA as well as nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and Pennsylvania recommended that it be a separate nonattainment area for the 2006 $PM_{2.5}$ NAAQS. Furthermore, only one of the three units at the Brunner Island facility is scheduled to be controlled by 2008. The other two units are not projected to be controlled until 2009. The Montour facility is scheduled to control both its units by 2008. However, as shown above in Factor 6, the Reading area is predominantly affected by emissions from the southwest and west-southwest and occasionally from the east and east-southeast. Montour County is north of the Reading area. Therefore, emissions from Montour County have a relatively small impact on the Reading area's nonattainment.

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

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

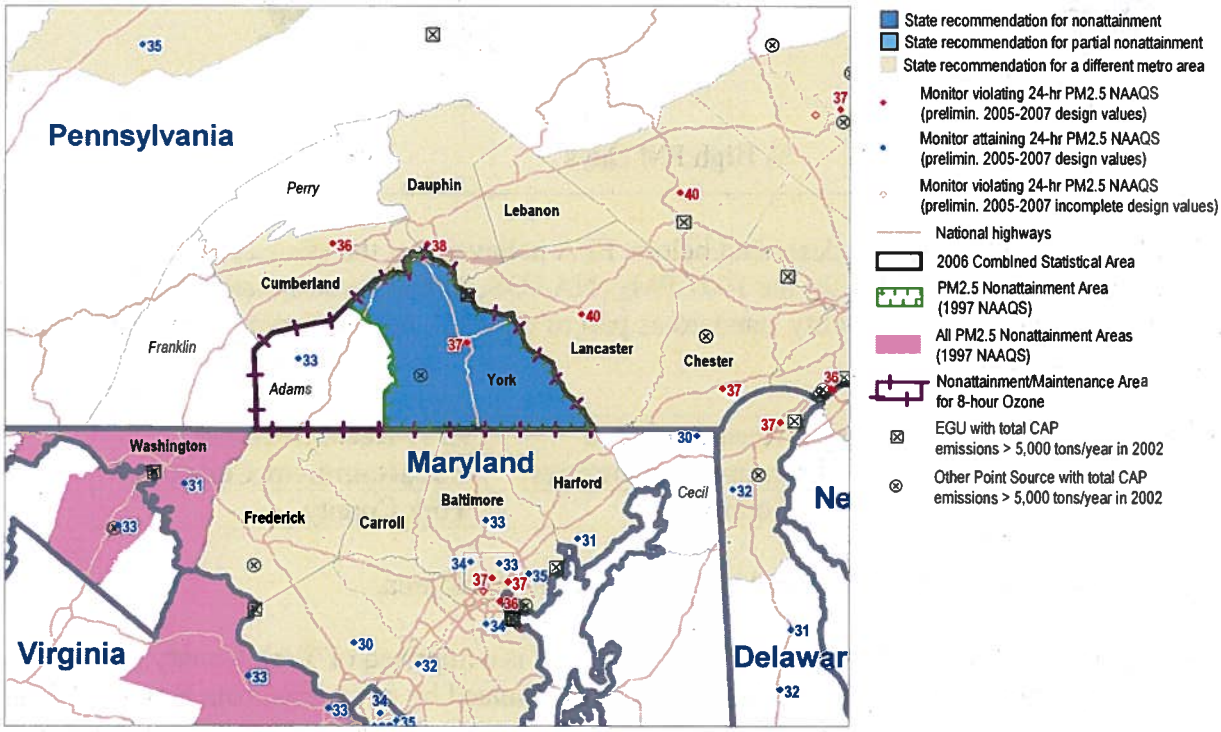
EPA Technical Analysis for York Area

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

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

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

Figure 1.0. The York Area

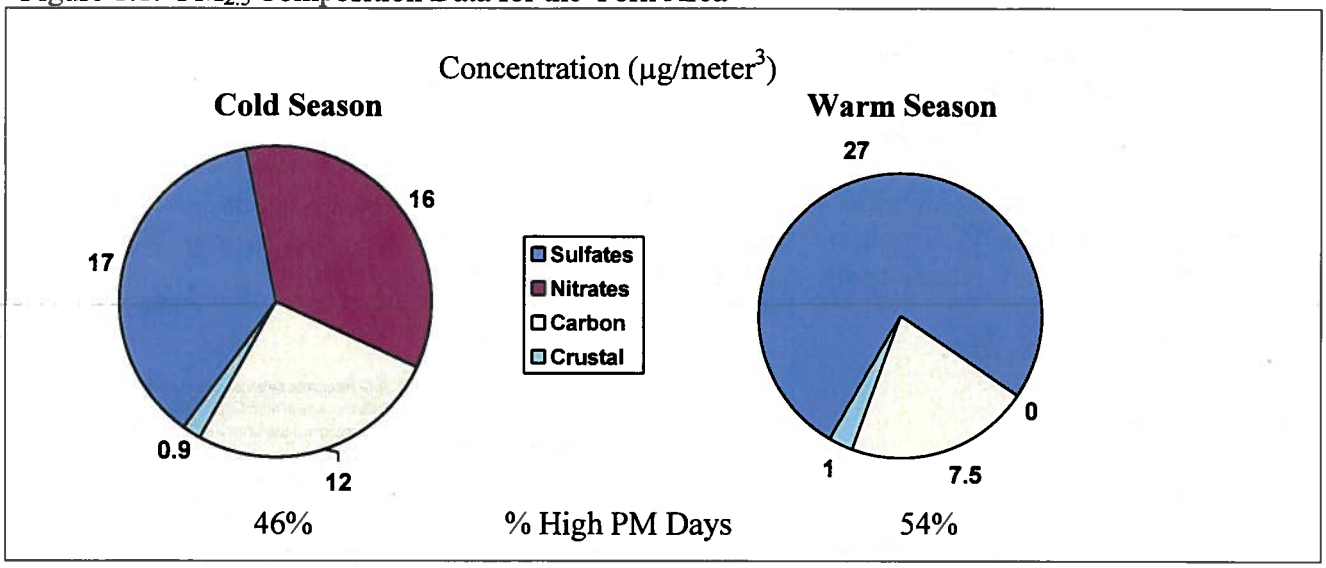


For this area, EPA previously established $PM_{2.5}$ nonattainment boundaries for the 1997 $PM_{2.5}$ NAAQS that included York County located in Pennsylvania.

In December 2007, Pennsylvania recommended that York 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) and Federal Equivalent Method (FEM) monitors located in the state. (See the December 28, 2008 letter from the Pennsylvania Department of Environmental Protection to EPA.)

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

Figure 1.1. $PM_{2.5}$ Composition Data for the York Area



Based on EPA's 9-factor analysis described below, EPA believes that the same county, York County, as previously designated for the 1997 $PM_{2.5}$ NAAQS, should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ air quality standard as part of the York nonattainment area. The county is listed in the table below.

York Area	State-Recommended Nonattainment Counties	EPA-Recommended Nonattainment Counties
Pennsylvania	York County	York County

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

The York nonattainment area for the 1997 $PM_{2.5}$ NAAQS is comprised of York County, PA. Particulate matter concentrations in the York area are dominated by emissions from Brunner Island, a large electric generating unit in York County. In 2005, Brunner Island emitted over 104,000 tons of sulfates. York County is surrounded by the Lancaster, Baltimore, and Harrisburg-Lebanon-Carlisle nonattainment areas. However, EPA's analysis of meteorological data shows that during high $PM_{2.5}$ days, emissions from the counties surrounding York County do not affect the York area.

Furthermore, the York area is in a separate and distinct area from the surrounding nonattainment areas, and is not economically or jurisdictionally associated with them. There is little commuting between the York area and the surrounding counties. York County is in a separate metropolitan statistical area, and is served by a separate metropolitan planning organization. For these reasons, EPA has determined that it is appropriate to include only York County in the York nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS.

This technical analysis focuses on the existing York nonattainment area for the 1997 $PM_{2.5}$ NAAQS and a ring of nearby counties surrounding that area that could reasonably be contributing to nonattainment in York. Therefore, counties that are beyond that ring of counties surrounding the York area will be excluded from further analysis. Certain counties identified in Figure 1.0, are part of another existing nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and either Pennsylvania or Maryland has recommended including these counties in another nonattainment area for the 2006 $PM_{2.5}$ NAAQS. These counties are listed below. For each of the listed counties, EPA agrees with Pennsylvania's and Maryland's recommendation.

Counties	**Reasons for Exclusion from Further Analysis**
Lancaster, PA	Lancaster County constitutes a separate nonattainment area under the1997 $PM_{2.5}$ NAAQS, and Pennsylvania recommended Lancaster County be designated as a separate nonattainment area under the 2006 $PM_{2.5}$ NAAQS. Lancaster County is referred to herein as either Lancaster County or the "Lancaster area."
Dauphin, PA Lebanon, PA Cumberland, PA	These three counties constitute a separate nonattainment area (the Harrisburg-Lebanon-Carlisle nonattainment area") under the 1997 $PM_{2.5}$ NAAQS, and Pennsylvania has recommended these counties be designated as a separate nonattainment area under the 2006 $PM_{2.5}$ NAAQS. These counties are referred to herein as the "Harrisburg area."
Baltimore, MD Carroll, MD Harford, MD	Baltimore, Carroll and Harford counties are part of a separate nonattainment area under the 1997 $PM_{2.5}$ NAAQS and Maryland recommended these counties be designated as a separate nonattainment area under the 2006 $PM_{2.5}$ NAAQS. These counties are referred to herein as the "Baltimore area."

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

EPA believes that the data set forth below supports a finding that York and Adams counties are distinct areas, and are not associated economically or jurisdictionally with the above described Lancaster, Harrisburg-Lebanon-Carlisle, and Baltimore areas. As discussed in greater detail below, meteorological data indicates that emissions from these areas do not impact the air quality monitored in York County. As also discussed below, it appears that, in comparison to the number of people who commute within York County, very few people commute from the Lancaster, Harrisburg or Baltimore areas into York County. Furthermore, as explained in detail in Factor 8, below, York County and Adams County may be distinguished from the counties that comprise the Lancaster, Harrisburg or Baltimore areas, because York and Adams 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 York,

Lancaster, and Harrisburg-Lebanon-Carlisle areas. Therefore, EPA has determined that it is appropriate to distinguish York County and Adams County from Lancaster, Dauphin, Lebanon, Cumberland, Baltimore, Carroll, and Harford Counties for purposes of this nonattainment designation analysis and to propose to include York County and Adams County, in a separate nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that emissions from Lancaster, Dauphin, Lebanon, Cumberland, Baltimore, Carroll and Harford Counties contribute to the York nonattainment area, that contribution will be lessened by emission controls put in place in those separate nonattainment areas.

Factor 1: Emissions Data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_x, are part of "$PM_{2.5}$ emissions total," they are not shown in Table 1.0 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 SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) 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 (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

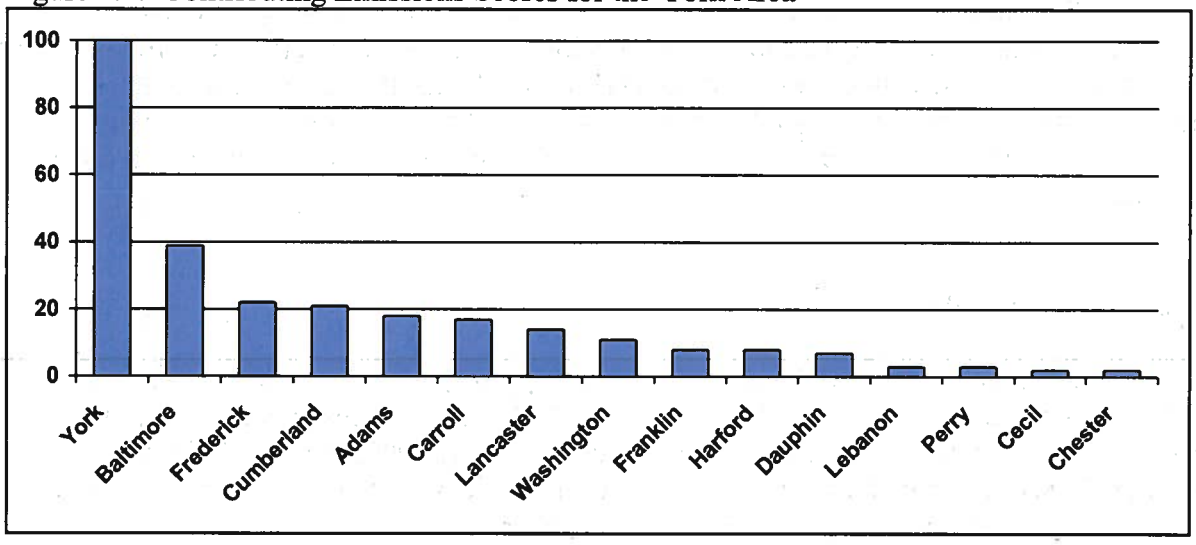
Table 1.0 and Figure 1.2 show emissions of $PM_{2.5}$ and precursor pollutants components (given in tons per year) and the CES for violating and potentially contributing counties in the York area. Counties that are part of the York nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface. Counties are listed in descending order by CES.

Table 1.0. $PM_{2.5}$ Related Emissions and Contributing Emissions Score

County	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**	**100**	**7,614**	**1,217**	**6,396**	**118,621**	**32,214**	**18,478**	**3,913**
Baltimore, MD	Yes – other area	39	6,437	1,892	4,547	44,626	34,467	31,163	1,266
Frederick, MD	Yes – other area	22	2,478	1,051	1,427	9,275	11,315	11,927	2,741

Cumberland, PA	Yes – other area	21	1,677	698	979	1,976	14,454	9,939	2,105
Adams, PA	No	18	1,142	444	697	581	2,825	4,660	3,353
Carroll, MD	Yes – other area	17	1,562	653	909	1,476	6,410	6,860	1,836
Lancaster, PA	Yes – other area	14	3,258	1,159	2,099	4,017	16,396	26,407	16,486
Washington, MD	No	11	1,470	610	860	6,514	10,081	9,134	1,747
Franklin, PA	No	8	1,083	385	699	851	5,470	6,972	5,092
Harford, MD	Yes – other area	8	1,769	879	890	2,307	7,310	10,512	967
Dauphin, PA	Yes – other area	7	1,074	528	546	2,443	12,548	12,569	1,664
Lebanon, PA	Yes – other area	3	855	338	516	1,778	5,876	5,924	4,445
Perry, PA	No	3	486	233	253	444	2,515	2,278	1,541
Cecil, MD	No	2	870	446	425	1,298	3,962	5,853	749
Chester, PA	Yes – other area	2	2,124	799	1,325	7,990	16,507	19,666	2,563

Figure 1.2. Contributing Emissions Scores for the York Area



Based upon the data set forth in Table 1.0, York County has the highest level of sulfur dioxide (SO_2) emissions, and the highest $PM_{2.5}$ emissions. York County also has high levels of nitrogen oxides (NOx) and to a lesser degree, volatile organic compounds (VOCs). In fact, SO_2 emissions in York County are more than double the next highest county (Baltimore County). This is primarily due to the emissions from the Brunner Island power station, which itself emitted over 104,000 tons of SO_2 and nearly 14,000 tons of NOx in 2005. Lancaster County leads the area of analysis in emissions of ammonia (NH_3) and Baltimore County has the highest level of VOC and NOx 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). SO_2 emissions from York are more than twice those of the next highest county, Baltimore, and twelve times larger than the next largest SO_2 contributor, Frederick County.

Baltimore County has the next highest CES score to York, as a result of its high emissions and likely due to meteorology that results in the York monitor being downwind from Baltimore. The CES scores for the area (Figure 1.2) are consistent with what one would expect, given in particular the emissions levels and distance of those emissions from the violating monitor.

Based on emissions levels and CES values, York and Baltimore Counties are the highest ranking candidates for 2006 24-hour $PM_{2.5}$ nonattainment designation in this area. Frederick, Cumberland, and Lancaster Counties are next highest ranking with respect to emissions, but have much lower CES scores of 22, 21, and 14, respectively. These will require further analysis under the other factors to determine their contribution to the York area. However, as shown below in Factor 6, meteorological data indicates that emissions from these areas do not impact the York area.

It should be noted that nine of the counties adjacent to York County have violating monitors and, as discussed above, these counties have been recommended by their respective states for a nonattainment designation as part of other nonattainment areas. With the exception of Baltimore, Frederick, and Cumberland counties, these counties have CES scores below 20. Their emissions data and CES do not provide significant justification for including them within the proposed York 2006 24-hour $PM_{2.5}$ nonattainment area. Based upon the above emissions data, the counties with CES scores lower than 10 are low ranking candidates for consideration as part of the proposed York nonattainment area. These counties have low emissions and do not appear to contribute significantly to the violations of the 2006 24-hour $PM_{2.5}$ NAAQS monitored in York County. Of these counties, all but Franklin, Perry, and Cecil have been recommended for inclusion in a separate nonattainment area.

Factor 2: Air Quality Data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the York 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 98^{th} percentile values is 35 $\mu g/m^3$ 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 York area are shown in Table 2.0.

Table 2.0. Air Quality Data

County	State Recommended Nonattainment?	Design Values 2003-05 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2004-2006 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2005-2007 ($\mu g/m^3$)
York, PA	**Yes**	**41**	**37**	**37**
Baltimore, MD	Yes – other area	37	36	35
Frederick, MD	Yes – other area	No monitor		
Cumberland, PA	Yes – other area	40	38	36
Adams, PA	No	36	35	33
Carroll, MD	Yes – other area	No monitor		
Lancaster, PA	Yes – other area	44	39	40
Washington, MD	No	36	34	31
Franklin, PA	No	No monitor		
Harford, MD	Yes – other area	34	31	31
Dauphin, PA	Yes – other area	39	38	38
Lebanon, PA	Yes – other area	No monitor		
Perry, PA	No	No monitor		
Cecil, MD	No	33	30	30
Chester, PA	Yes – other area			37

Note: Design values shown in red represent a violation of the standard, for the selected period.

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

In the York metropolitan area and adjacent counties, York, Chester, Cumberland, Dauphin, and Lancaster Counties show violations of the 2006 24-hour $PM_{2.5}$ standard (for the 2005-07 period). Therefore, these counties are candidates for inclusion in the York nonattainment area, or a neighboring nonattainment area.

As discussed above, EPA has considered each county's CES as part of this analysis. York County is the highest ranking candidate for a nonattainment designation based on the CES and on Factor 1 – Emissions Data. Lancaster County is the next highest ranking candidate for a nonattainment designation based on air quality data and Factor 1 – Emissions Data. As the above data indicates, monitors located in Dauphin, Cumberland, and Chester Counties indicate violations of the 2006 24-hr $PM_{2.5}$ NAAQS. As discussed above, Pennsylvania has recommended that these counties be designated nonattainment as part of other nonattainment areas. As discussed below, meteorological data indicates that emissions from these counties do not impact the air quality monitored in York County. Also, as discussed below, Dauphin, Cumberland, and Chester Counties are in metropolitan statistical areas (MSAs) separate from the York MSA, and these counties are served by separate metropolitan planning organizations. Furthermore, based upon the data provided below, it appears that there is little commuting between these counties and York County. Therefore, EPA has determined that it is appropriate to segregate these counties from the proposed York nonattainment area for the 2006 24-hr $PM_{2.5}$ NAAQS and that it is also appropriate to consider including these counties in separate nonattainment areas for the 2006 24-hr $PM_{2.5}$ NAAQS.

While this factor alone is insufficient to eliminate nearby counties that are not violating the standard (i.e., the Maryland counties of Cecil, Harford, and Washington) as candidates for nonattainment status, it bolsters the conclusion in Factor 1 – Emissions Data that these areas do not have sufficiently high emissions or CES scores to warrant inclusion in the York nonattainment area.

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

Table 3.0 shows the 2005 population for each county in the area being evaluated, as well as the population density. 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 3.0. Population

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq mi)
York, PA	**Yes**	**408,182**	**449**

Baltimore, MD	Yes – other area	783,405	1255
Frederick, MD	Yes – other area	220,409	331
Cumberland, PA	Yes – other area	223,017	405
Adams, PA	No	99,746	191
Carroll, MD	Yes – other area	168,397	371
Lancaster, PA	Yes – other area	489,936	499
Washington, MD	No	141,563	303
Franklin, PA	No	137,273	178
Harford, MD	Yes – other area	238,850	519
Dauphin, PA	Yes – other area	252,949	454
Lebanon, PA	Yes – other area	125,429	346
Perry, PA	No	44,724	81
Cecil, MD	No	97,474	257
Chester, PA	Yes – other area	473,723	624

The above data indicates that the area around York varies from sparsely to densely populated, with county level population densities ranging from a low of 81 to a high of 1255 persons per square mile. The average population density for Pennsylvania on the whole was 274 people per square mile, per the 2000 US Census. Most of these counties are characterized by their relatively distributed populations, relatively small urban centers, and in predominately rural/suburban development pattern. Baltimore County is the exception, with a fairly dense urban/suburban development pattern, followed distantly by Chester County. For example, the City of York had a 2005 population of 40,862, while the City of Lancaster had a 2005 population of 55, 551, each having around 10% of their respective total county populations. Baltimore County has the largest, densest population of this area, and is therefore the highest ranking for this factor. Chester, York, and Lancaster Counties have smaller, but still relatively large populations. These counties are the next highest ranking counties for determination of nonattainment based upon this factor.

The data in Table 3.0 indicates that counties within the Lancaster, Harrisburg or Baltimore areas are high ranking candidates for a nonattainment designation based upon this factor. However, as explained in detail in Factor 8, below, these counties are distinguishable from York County and Adams County, because they are in separate MSAs and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Pennsylvania counties surrounding the York area. Moreover, as shown below in Factor 6, meteorological data indicates that emissions from these areas do not impact the air quality monitored in York County. Therefore, EPA has determined that it is appropriate to propose that these counties be included in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that population-based emissions from these counties impact to the proposed York nonattainment area, that contribution will be lessened by controls put in place in those separate nonattainment areas.

Factor 4: Traffic and Commuting Patterns

This factor considers the number of commuters in each county who drive to another county within and surrounding the York area and the percent of total commuters in each county who commute to other counties within the York and surrounding counties. This factor also takes into consideration

the total Vehicle Miles Traveled (VMT) for each county in millions of miles (See Table 4.0). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number commuting into any violating counties	Percent commuting into any violating counties	Number Commuting into & within statistical area	Percent Commuting into & within statistical area
Lancaster, PA	Yes – other area	4,392	219,960	95	4,090	2
Baltimore, MD	Yes – other area	8,032	198,060	53	960	0
York, PA	**Yes**	**3,333**	**177,150**	**92**	**147,030**	**76**
Chester, PA	Yes – other area	4,414	141,030	65	200	0
Dauphin, PA	Yes – other area	3,413	115,320	95	2,530	2
Cumberland, PA	Yes – other area	2,996	100,130	95	4,490	4
Harford, MD	Yes – other area	2,068	27,440	25	530	1
Lebanon, PA	Yes – other area	1,133	18,320	31	280	1
Carroll, MD	Yes – other area	1,294	16,110	21	1,140	2
Adams, PA	No	742	14,560	32	35,650	79
Perry, PA	No	424	13,840	65	390	2
Franklin, PA	No	1,535	4,390	7	1,350	2
Cecil, MD	No	1,193	2,150	5	110	0
Frederick, MD	Yes – other area	3,024	1,080	1	340	0
Washington, MD	No	2,019	320	1	40	0

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

The listing of counties on Table 4.0 reflects a ranking based on the number of people commuting to other counties. The county that is in the nonattainment area for the 1997 $PM_{2.5}$ NAAQS is shown in boldface.

Table 4.1 shows that the bulk of commuter movement within and between the counties in the York 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, 142,104 commuter trips per day originate and end in York County).

As can be seen in Table 4.1, each of the neighboring counties contributes commuters most to itself, with relatively few commuters crossing county lines. In York County, over 78% of commuter trips originate and end within the county, with fewer than 10% travelling to York from other contiguous counties.

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

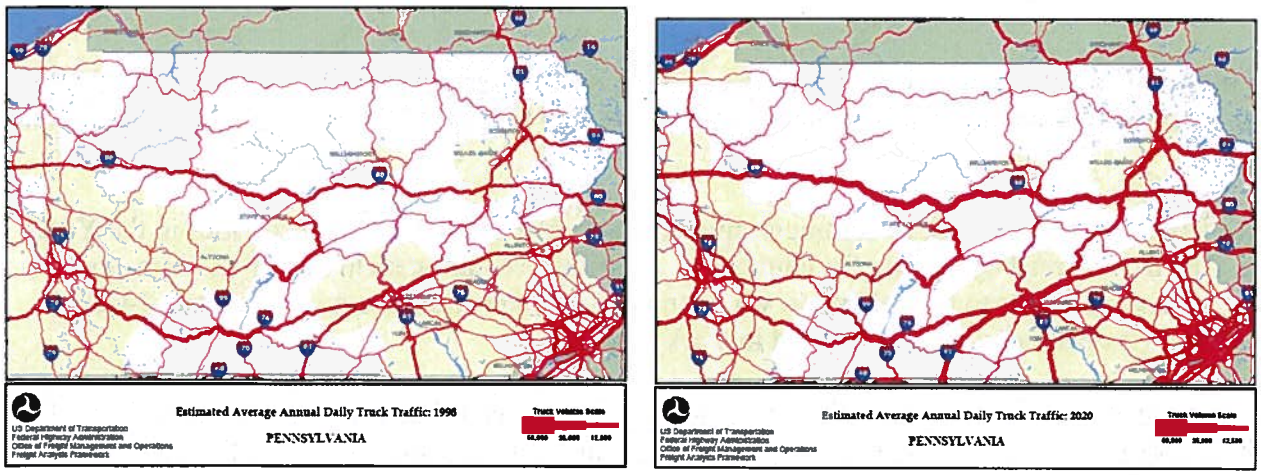
Commuting From:	Consolidated Statistical Area (CSA)	Core Based Statistical Area (CBSA)	Commuting To:					
			Baltimore	Cumberland	Dauphin	Lancaster	York	Adams
Baltimore, MD		Baltimore-Towson, MD	196,917	56	73	39	925	36
Cumberland, PA	Harrisburg-Carlisle-Lebanon, PA	Harrisburg-Carlisle, PA	39	73,081	22,448	705	3,807	683
Dauphin, PA	Harrisburg-Carlisle-Lebanon, PA	Harrisburg-Carlisle, PA	46	16,310	93,958	2,585	2,365	165
Lancaster, PA		Lancaster, PA	74	1,197	6,927	201,608	4,018	71
York, PA	**York-Hanover-Gettysburg, PA**	**York-Hanover, PA**	**7,970**	**11,626**	**9,848**	**5,485**	**142,104**	**4,923**
Adams, PA	York-Hanover-Gettysburg, PA	York-Hanover, PA	572	1,793	922	109	11,152	24,495

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

Overall, the counties being evaluated here had annual average VMT levels of over 40 million miles per day, making emissions contribution from motor vehicles an important consideration in designating this area. However, while the number of commuters is fairly large, most do not cross county lines and commute only within their own county.

Although York's contribution to traffic levels in the York area is significant, Table 4.1 shows that there is relatively small contribution from commuter traffic into York County. However, this data may not adequately address heavy-duty diesel truck traffic from surrounding counties to the York area. The entire region is expected to see strong growth in truck traffic over the next several decades (see Figure 4.0).

Figure 4.0. Estimated Pennsylvania Average Annual Daily Truck Traffic (1998 vs. 2020)



Lancaster County is the highest ranking county for a nonattainment designation based on VMT. Baltimore County and York County are also high ranking candidates for a nonattainment designation based on VMT. These three counties are also high ranking candidates based on other factors and their CES value. However, as shown below in Factor 6, meteorological data indicates that emissions from Lancaster and Baltimore Counties do not impact the air quality monitored in York County. Furthermore, as shown in Table 4.1, the majority of commuters from York County, commute within York County. Relatively few people commute between York County and Baltimore County, or between York County and Lancaster County. Moreover, Lancaster and Baltimore Counties are in separate nonattainment areas for the 1997 $PM_{2.5}$ NAAQS and have been recommended for inclusion in those same areas for the 2006 $PM_{2.5}$ NAAQS. York County is also distinguishable from Lancaster County and Baltimore County because those counties are in separate MSAs and are served by separate metropolitan planning organizations. In addition, for air quality planning purposes, Pennsylvania defined separate air basins for the Pennsylvania counties surrounding the York area. Therefore, EPA has determined that it is appropriate to propose that Lancaster County and Baltimore County be included in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that vehicle-based emissions from these counties impact the York nonattainment area, that contribution will be lessened by 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 within the York area and surrounding counties, 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 5.0 below shows population, population growth, VMT, and VMT growth for counties that are included in the York area.

Table 5.0. Population and VMT Values and Percent Change

Location	Population (2005)	Population Density (2005)	Population % change (2000 - 2005)	2005 VMT (millions)	VMT % change (1996 to 2005)
York, PA	**408,182**	**449**	**7**	**3,333**	**6**
Baltimore, MD	783,405	1255	4	8,032	32
Frederick, MD	220,409	331	12	3,024	38
Cumberland, PA	223,017	405	4	2,996	25
Adams, PA	99,746	191	9	742	9
Carroll, MD	168,397	371	11	1,294	(6)
Lancaster, PA	489,936	499	4	4,392	21
Washington, MD	141,563	303	7	2,019	14
Franklin, PA	137,273	178	6	1,535	18
Harford, MD	238,850	519	9	2,068	0
Dauphin, PA	252,949	454		3,413	27
Lebanon, PA	125,429	346	4	1,133	7
Perry, PA	44,724	81	3	424	17
Cecil, MD	97,474	257	13	1,193	10
Chester, PA	473,723	624	9	4,414	54
Note: Higher population and VMT levels and growth are denoted in red, lower levels in green.					

Baltimore County had the highest 2005 VMT, and the highest rate of VMT growth between 2000 and 2005 of any county in the area of analysis, followed distantly by Lancaster, Chester, and York Counties, which had similar levels of VMT -- but each had varying levels of VMT growth. Lancaster and Baltimore Counties both had relatively low population growth between 2000 and 2005, while Cecil, Frederick, and Carroll Counties in Maryland experienced high rates of population growth.

Cecil and Frederick Counties led the way in population growth rates, but Baltimore, York, and Chester added more in terms of absolute population increase, albeit at a slower rate of growth. For this reason, Baltimore, York, and Chester are highest ranking under this factor in terms of population growth. In terms of VMT growth, York County and Lancaster County are relatively low ranking. Chester County had the highest rate of VMT growth and total VMT, but Baltimore again had large increases in total 2005 VMT.

Baltimore and Chester Counties are in areas that are distinct from York and Adams counties because they are in separate MSAs and are served by separate metropolitan planning organizations. In addition, relatively few people commute between these counties and York and Adams counties area. Therefore, EPA has determined that it is appropriate to include these Baltimore County and Chester County in separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. To the extent that vehicle-based, or population-based, emissions from these counties impact the air quality monitored within the proposed York nonattainment area, that contribution will be lessened by controls put in place in those separate nonattainment areas. However, as shown below in Factor 6, meteorological data indicates that emissions from these counties do not impact the air quality monitored within York County.

Factor 6: Meteorology (Weather/Transport Patterns)

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

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

For each air quality monitoring site, EPA developed a "pollution rose" to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The following figures (See Figures 6.0 – 6.7) identify 24-hour $PM_{2.5}$ values by color, and days exceeding $35\mu g/m^3$ 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 each 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.

Lancaster and York Areas

The pollution roses, illustrated in Figures 6.0 and 6.1, for the adjacent counties of York and Lancaster show a similar pattern, for both warm and cool seasons on days with the highest measured $PM_{2.5}$ (>30 $\mu g/m^3$) concentration values, winds are mild and predominately from the northwest and the southeast. The wind directions shown on Figure 6.0 for the Lancaster monitor, which is west of York County, show that pollutants from Lancaster County are not transported to York County. The low wind speeds (especially from the west) shown on Figure 6.1 for York County indicate that on high PM days, local emissions dominate. This points to Brunner Island's impact on the York air quality monitor.

Figure 6.0. Pollution Trajectory Plot for York County, PA (Site 42-133-0008)

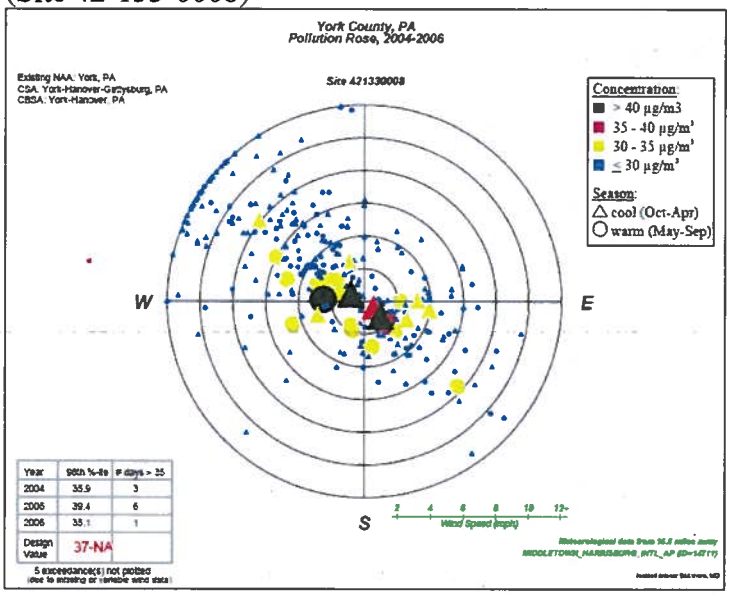
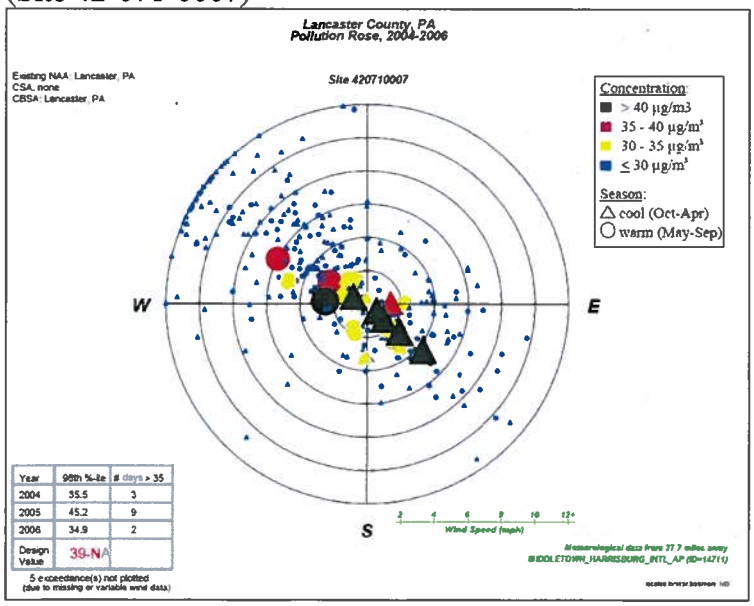


Figure 6.1. Pollution Trajectory Plot for Lancaster County, PA (Site 42-071-0007)



Harrisburg Area

The pollution roses below for Dauphin County and Cumberland County, illustrated in Figures 6.2 and 6.3, are similar to those of Lancaster and York. They show a similar northwest-southeast prevailing wind direction on high concentration days in both the cold and warm season, but show more cool high concentration days in the northwest quadrant and more cool weather days in the southwest quadrant. As shown on Figure 1.0, these monitors are north (and in the case of Cumberland County, northwest) of York County, indicating that they likely do not impact pollution transported to York County.

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

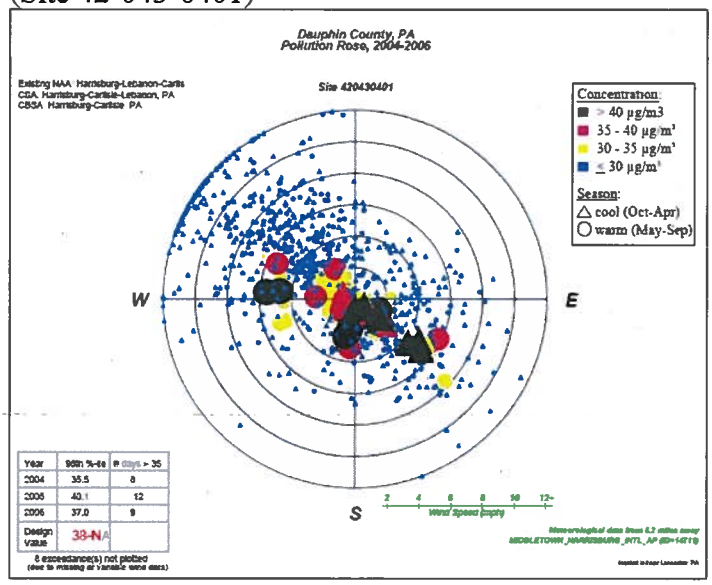
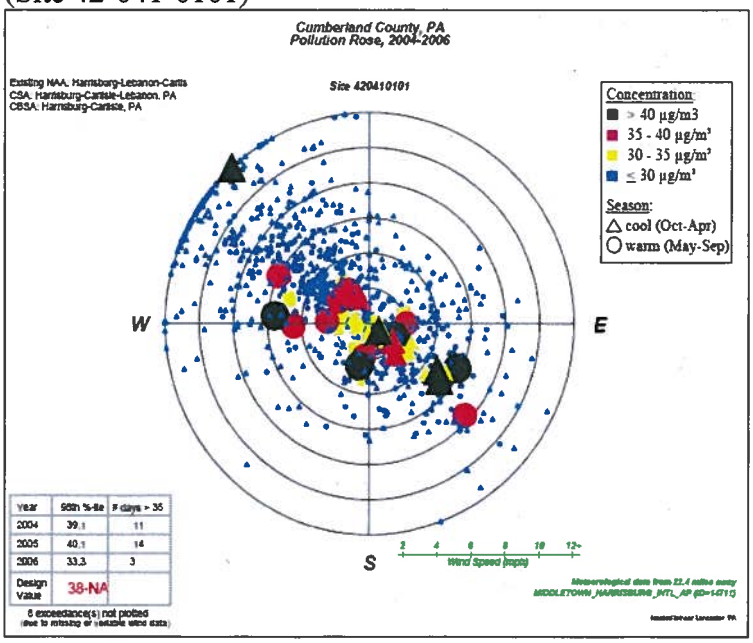


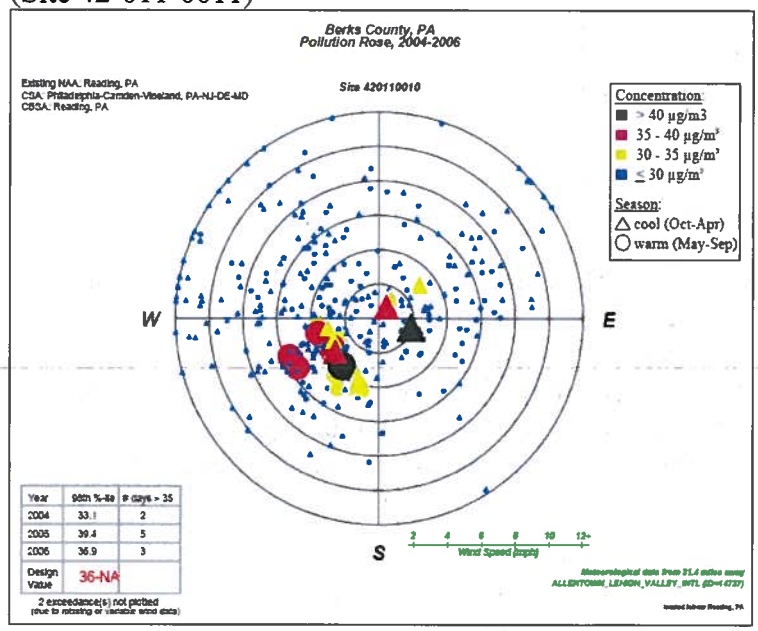
Figure 6.3 - Pollution Trajectory Plot for Cumberland County, PA
(Site 42-041-0101)



Reading Area

The Reading area monitor lies fairly distant to the north and east of the violating monitor in Lancaster County. For high days in the cool season, it shows a prevalence of light winds in the northeast or southwest direction (See Figure 6.4). The trend for warm days is for light winds from the southwest. It appears from this information that the wind magnitude and direction on high days in Berks County does not contribute significantly to the violations of the 2006 24-hour $PM_{2.5}$ NAAQS monitored within York County.

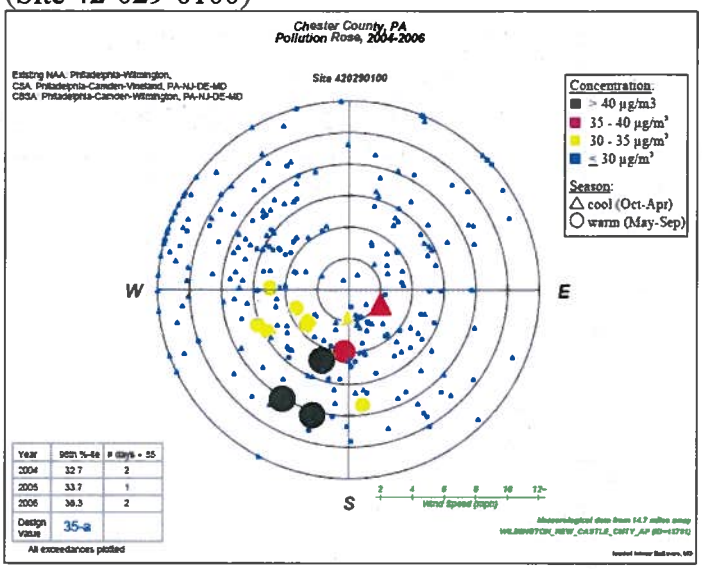
Figure 6.4. Pollution Trajectory Plot for Berks County, PA (Site 42-011-0011)



Chester County

The New Garden monitor lies to the distant east of the violating monitor in York (see Figure 6.5). 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 violations of the 2006 24-hour $PM_{2.5}$ NAAQS monitored within York County.

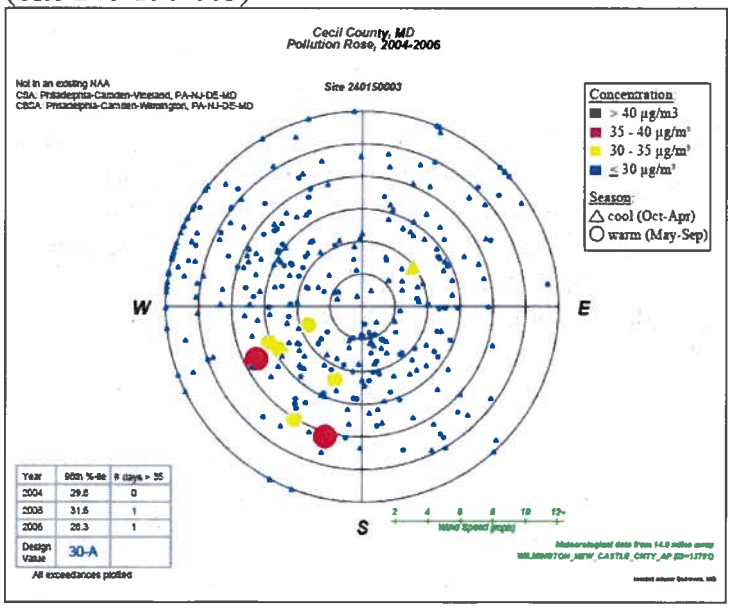
Figure 6.5. Pollution Trajectory Plot for Chester County, PA (Site 42-029-0100)



Cecil County, Maryland

The Fairhill monitor in Cecil County (See Figure 6.6) lies fairly distant to the southeast of the violating monitor in York, south even of the New Garden monitor in Chester County (See Figure 6.5). 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 York. It appears from this information that the wind magnitude and direction on high days in Cecil County do not contribute significantly to the violations of the 2006 24-hour $PM_{2.5}$ NAAQS monitored within York County.

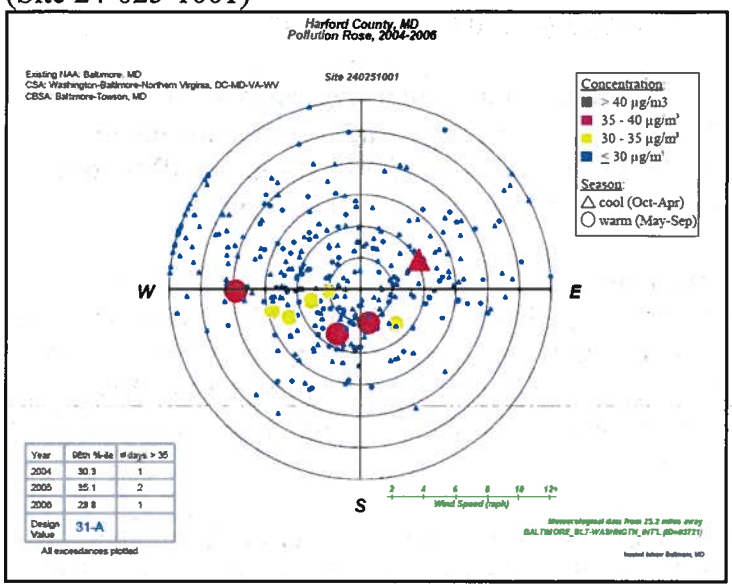
Figure 6.6. Pollution Trajectory Plot for Cecil County, MD (Site 240-150-003)



Harford County, Maryland

The Edgewood monitor in Harford County lays to the distant southeast to the violating monitor in York (See Figure 6.7). 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 York area. Figure 6.7 does show an occasional high day with winds from the south or southwest. High winds speeds from due south through Harford County may impact York County. However, the southerly winds are at low speeds. It appears from this information that Harford County does not contribute significantly to the violations of the 2006 24-hour $PM_{2.5}$ NAAQS monitored within York County.

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



EPA's analysis of this meteorological data shows that during high $PM_{2.5}$ days in 2004-2006, $PM_{2.5}$ emissions from the counties surrounding York County do not affect the air quality monitored in York County. Low wind speeds from the west at the York monitor point indicate that emissions from the Brunner Island Facility impact the air quality monitored in York County.

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 York 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 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 South Central Region, although these terrain features are smaller than the mountains to the north. Statistical analysis by Pennsylvania 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 York 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. 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 propose these as separate nonattainment areas for the 2006 24-hour $PM_{2.5}$ standard.

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

In evaluating the jurisdictional boundary factor, consideration should be given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

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 both the 1997 $PM_{2.5}$ standard and the 8-hour ozone standard, York County (i.e., the one-county York metropolitan area) was designated as a separate nonattainment area from the other areas surrounding it. The York metropolitan area is served by its own metropolitan planning organization (MPO) based on economic, political, and commuting patterns.

Other counties included in this 9-factor analysis are also designated as 8-hour ozone nonattainment areas, separate from the York area. A goal in designating $PM_{2.5}$ nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas. Comparison of ozone areas with potential $PM_{2.5}$ nonattainment areas, therefore, gives added weight to designation of York County as a separate $PM_{2.5}$ nonattainment area under the 2006 standard.

Pennsylvania has defined four air basins that roughly correspond to the 1997 and the 2006 proposed $PM_{2.5}$ nonattainment areas in South Central 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. 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:

> *Air basin*—A geographic area of this Commonwealth as delimited in this section.
>
> *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.

Factor 9: Level of Control of Emission Sources

This factor considers emission controls currently implemented for major sources in York County and surrounding areas.

The emission estimates on Table 1.0 (under Factor 1) include any control strategies implemented by the state in York County and surrounding counties before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NOx, and crustal $PM_{2.5}$).

Figure 9.0. Map of the York Area, with nearby EGUs over 5,000 tons/year SO_2 and NO_x

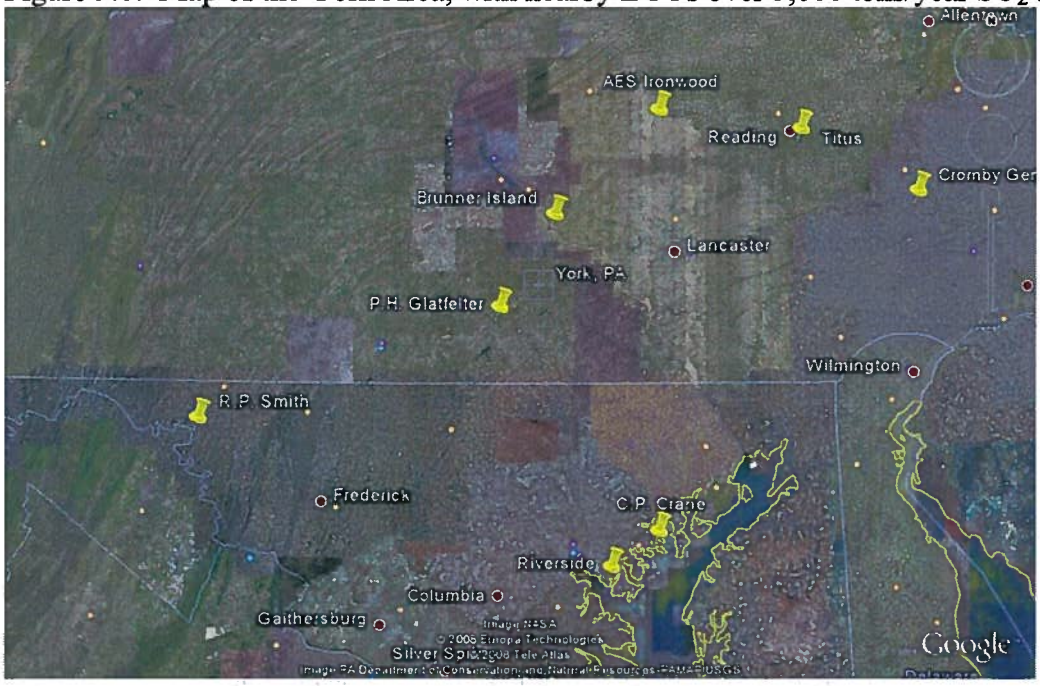


Table 9.0. EGUs with SO_2 and NO_x emissions > 5000 tons, from the 2006 NEEDS EGU database

County	Plant Name	Plant Type	Unique ID Final	2006 SO2	2006 NOx	Scrubber Online Year	Scrubber Efficiency	Capacity MW
Chester, PA	Cromby Generating Station	O/G 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
York, PA	P H Glatfelter	Coal Steam	50397_B_5PB 036				91.6	36.1
York, PA	PPL Brunner Island	Coal Steam	3140_B_3	45,447	6,288	2008	95.0	749.0
			3140_B_2	26,606	3,600	2009	95.0	378.0
			3140_B_1	21,492	2,866	2009	95.0	321.0
Baltimore, MD	C P Crane	Coal Steam	1552_B_1	14,770	2,898			200.0
			1552_B_2	13,111	2,410			200.0
Baltimore, MD	Riverside	O/G Steam	1559_B_4	0	40			78.0
Washington, MD	R Paul Smith	Coal	1570_B_11	3,462	867			87.0
			1570_B-9	926	279			28.0

The York area and its adjacent counties contain several large stationary point sources (see Figure 9.0) that emit high levels of SO_2 and NOx (defined as greater those emitting 5,000 tons per year). Most notable of these in terms of emissions levels is the PPL Brunner Island power station in York Haven, York County. This facility emitted over 106,000 tons of SO_2 in 2007 (see Table 9.1). Under a consent agreement, two scrubbers are in the process of being constructed at Brunner Island, which will handle exhaust from the plants three coal fired boilers. The first of these scrubbers is to be completed in 2008 (See Table 9.0), and the second scrubber for the remaining boiler units will be completed in 2009. These scrubbers are projected to remove about 100,000 tons of SO_2 per year, which will have a significant impact on air quality in and around the York area. Another large facility in the region is the CP Crane in Baltimore County, which has fairly large heat input and no post control scrubbers or SCR. However, this facility lies within the Baltimore metropolitan statistical area, a fairly large distance from York County.

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

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	no data				
2003	12	Not Reported	2,142.1	8,773,248.7	10,960,507
2004	12		2,068.6	7,870,160.3	10,423,119
2005	12		1,765.0	9,317,167.7	10,408,417
2006	12		1,735.7	9,020,665.8	10,495,477
2007	12		1,691.2	8,173,709.4	10,009,067

Cromby Generating Station, Chester County, PA, Facility ID: 3140					
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

C.P. Crane, Baltimore County, MD, Facility ID: 1552					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	32,386.3	10,742.1	2,446,255.7	23,715,373
2003	12	32,260.8	10,849.4	2,601,391.3	25,353,113
2004	12	29,042.1	7,703.5	2,196,962.3	21,412,831
2005	12	33,031.0	8,205.5	2,385,667.4	23,252,164
2006	12	27,881.1	5,307.8	2,087,302.3	20,344,135
2007	12	30,630.7	5,775.6	2,240,018.6	21,832,479

Riverside, Baltimore County, MD, Facility ID: 1559					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	0.2	78.3	32,412.1	545,379
2003	12	0.0	20.1	8,304.8	139,748
2004	12	0.0	7.6	2,872.7	48,340
2005	12	0.1	45.8	13,167.0	221,567
2006	12	0.1	39.6	10,540.3	177,348
2007	12	0.1	76.5	19,762.8	332,513

R. Paul Smith Power Station, Washington County, MD, Facility ID: 1570					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	4,588.0	1,258.9	618,454.8	6,027,713
2003	12	3,749.3	988.8	544,712.8	5,309,100
2004	12	2,800.7	752.7	410,146.3	3,997,496
2005	12	3,359.3	921.4	488,778.3	4,763,912
2006	12	4,388.0	1,146.6	615,251.1	5,996,636
2007	12	5,535.8	1,398.4	754,853.7	7,357,237

In considering county-level emissions, EPA considered 2005 emissions data from the National Emissions Inventory. EPA recognizes that certain power plants or large sources of

emissions in this potential nonattainment area may have installed emission controls or otherwise significantly reduced emissions since 2005 and that this information may not be reflected in this analysis. EPA will consider additional information on emission controls in making final designation decisions. In cases where specific plants have installed emission controls subsequent to 2005, or plan to install such controls in the near future, EPA requests additional information on:

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

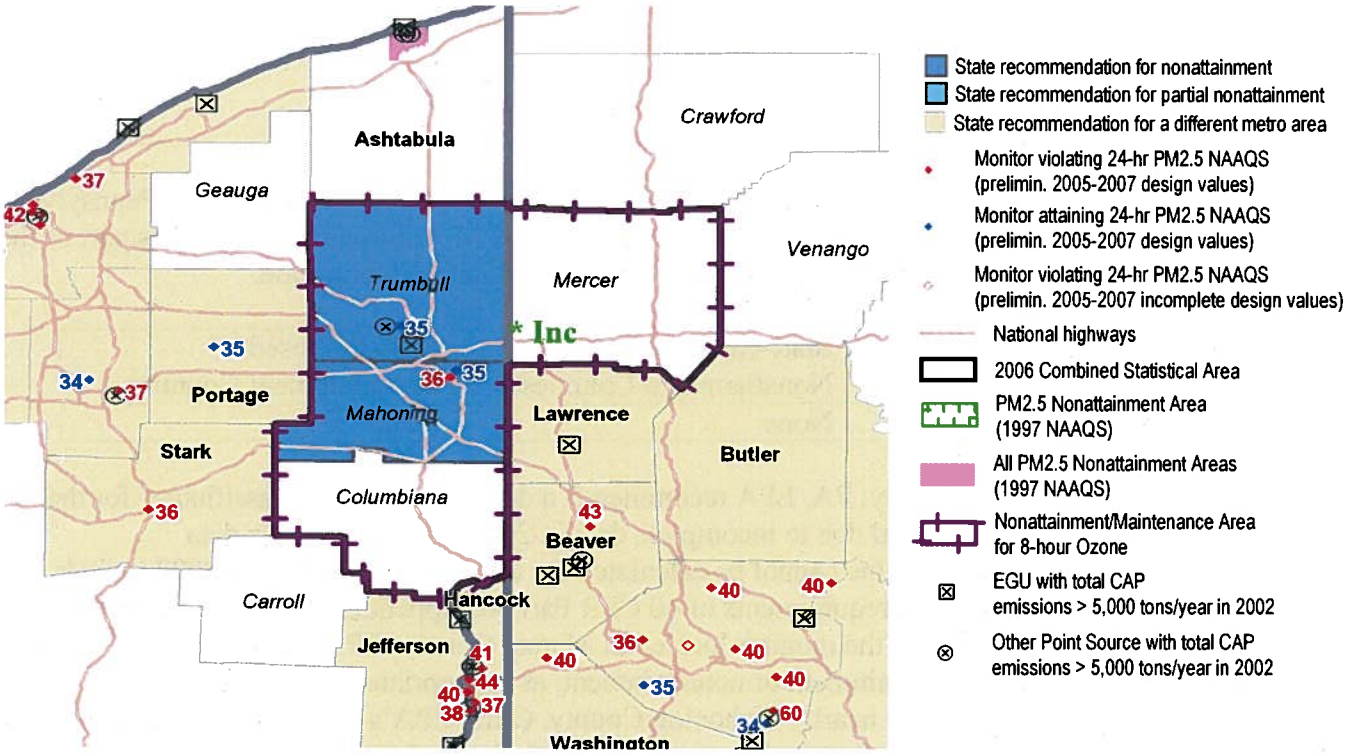
EPA Technical Analyses for the EPA Region III Portion of the Youngstown Area, Mercer County

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 EPA Region III portion of the Youngstown Area identifies the counties with monitors that violate the 2006 24-hour PM2.5 standard and evaluates the counties that potentially contribute to fine particle concentrations in the area. EPA has evaluated these counties based on the weight of evidence of the following nine factors recommended in EPA guidance and any other relevant information:

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

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

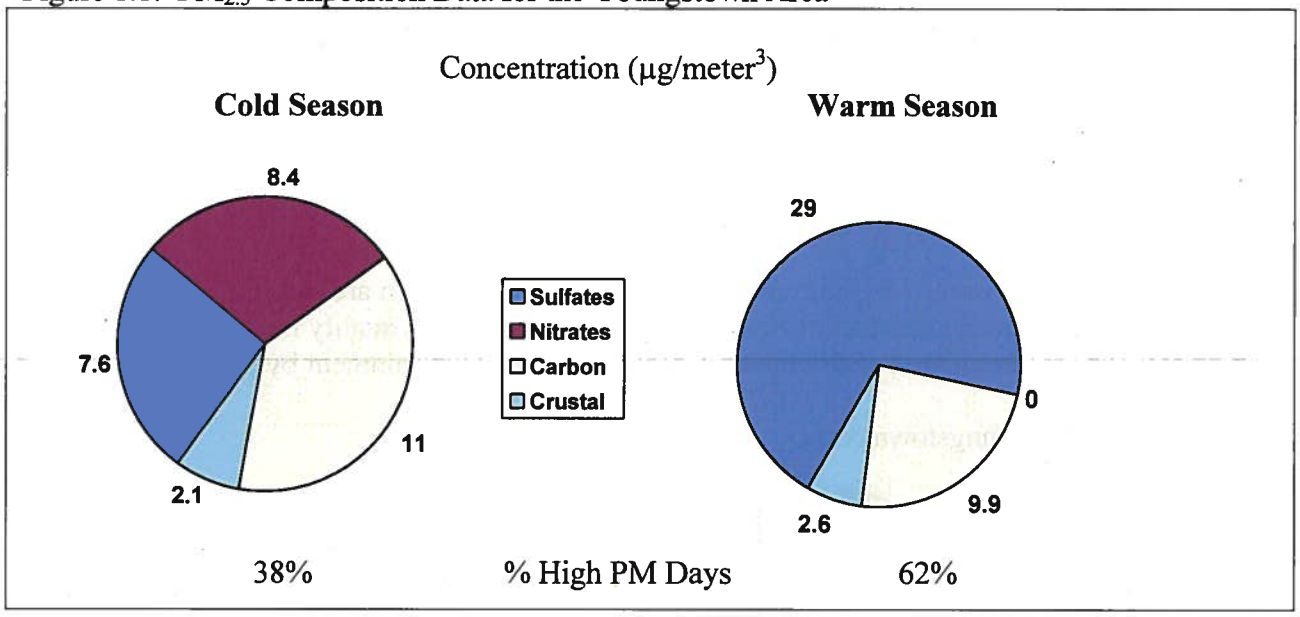
Figure 1.0. The Youngstown Area



In December 2007, the Commonwealth of Pennsylvania recommended that Mercer County, PA be designated as "attainment" 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) and Federal Equivalent Method (FEM) monitors located in the state. (See the December 28, 2007 letter from the Pennsylvania Department of Environmental Protection to EPA.)

Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. In the Youngstown area, analysis of these data indicates that the days with the highest fine particle concentrations occur predominantly in the summer. The average chemical composition of the highest days is in the warm season is illustrated in Figure 1.1.

Figure 1.1. $PM_{2.5}$ Composition Data for the Youngstown Area



Based on EPA's 9-factor analysis described below, EPA believes that no counties in Pennsylvania should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ air quality standard as part of the Youngstown nonattainment area, based upon currently available information.

Youngstown	State-Recommended Nonattainment Counties	EPA-Proposed Nonattainment Counties
Pennsylvania	None	None

However, for Mercer County, PA, EPA recommends a designation of "unclassifiable" for the 2006 24-hour $PM_{2.5}$ standard due to incomplete data in 2006. Because of this data incompleteness, a design value cannot be calculated for the 2004-2006 or 2005-2007 periods. When, pursuant to the data requirements of 40 CFR Part 50, Appendix N, EPA can confidently calculate a design value for the monitor located in Mercer County, EPA will revisit this designation and propose attainment or nonattainment, as appropriate. With respect to contribution to violations in nearby Mahoning County, Ohio, EPA's analysis suggests that Mercer does not contribute and therefore it also should not be designated nonattainment as part of this area at this time.

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

Mercer County, PA is part of the Youngstown-Warren-Sharon 8-hour ozone maintenance area, along with of Trumbull, Mahoning, and Columbiana Counties in Ohio. However, compared to Trumbull and Mahoning Counties, emissions from Mercer County are quite low. In addition, population, population density, and vehicle miles traveled (VMT) in Mercer County are all roughly half that of both Trumbull and Mahoning Counties. Furthermore, while 44,270 commuters travel into and within the Youngstown-Warren-Boardman metropolitan statistical area, 40,319 of those commuters are traveling within Mercer County. Therefore, less than 4000 commuters are traveling from Mercer County into Trumbull and Mahoning Counties. Meteorological data show that the prevailing winds in the area are primarily from the southeast and southwest, and occasionally from the south on days with high ambient levels of $PM_{2.5}$ relevant to the 2006 $PM_{2.5}$ NAAQS. The violating monitor in the Youngstown area is in northern Mahoning County, Ohio. Mercer County is northeast of the violating monitor. For that reason, emissions from Mercer County do not appear to impact the violating monitor on high PM days. Considering all 9 factors, EPA has concluded that Mercer County does not contribute to the nonattainment problem in the Youngstown area, and therefore should not be included in the Youngstown nonattainment 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," "SO_2," "NO_x," "VOCs," and "NH_3." "$PM_{2.5}$ emissions total" represents direct emissions of $PM_{2.5}$ and includes: "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," primary sulfate (SO_4), and primary nitrate. (Although primary sulfate and primary nitrate, which are emitted directly from stacks rather than forming in atmospheric reactions with SO_2 and NO_x, are part of "$PM_{2.5}$ emissions total," they are not shown in Table 1.0 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 SO_2 and NO_x, which are precursors of the secondary $PM_{2.5}$ components sulfate and nitrate, are also considered. VOCs (volatile organic compounds) and NH_3 (ammonia) 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 (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive way for consideration of data for these factors. A summary of the CES is included in Enclosure 2, and a more detailed description can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html.

Table 1.0 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 Youngstown area. Counties

are listed in descending order by CES, with the exception of Trumbull, Mahoning, Columbiana, and Mercer Counties. These counties are listed first because they make up the Youngstown-Warren-Sharon maintenance area for the 1997 8-hour ozone NAAQS.

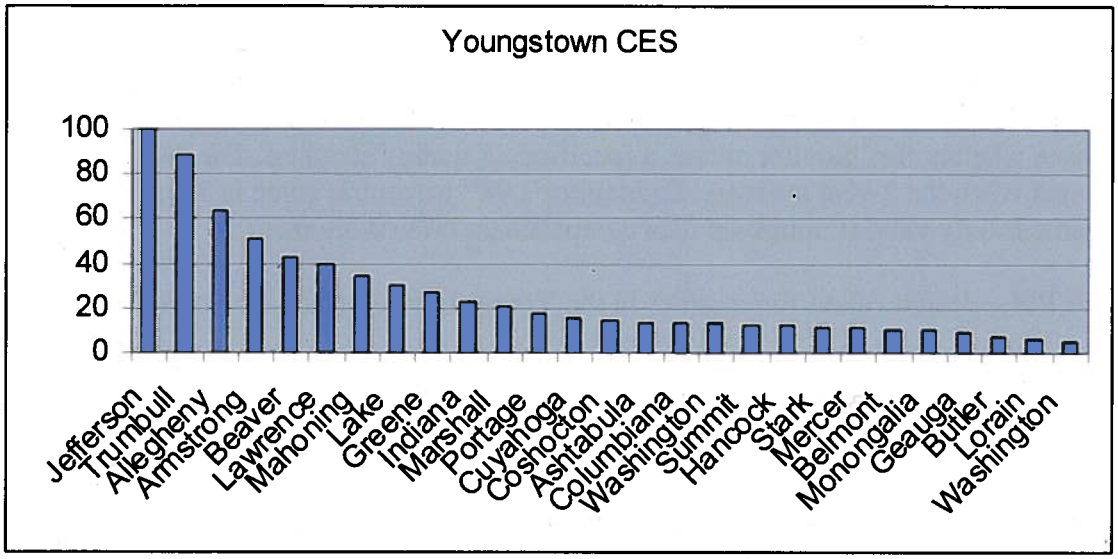
Table 1.0. $PM_{2.5}$ 24-Hour Component Emissions and CES

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)
Trumbull*, OH	Yes	89	1,730	625	1,105	18,501	13,373	12,098	881
Mahoning*, OH	Yes	34	722	338	384	1,927	10,086	10,416	1,415
Columbiana*, OH	No	14	805	366	441	525	4,377	4,933	1,956
Mercer*, PA	No	11	793	290	503	1,042	6,010	7,028	1,210
Jefferson, OH	Yes - other area	100	11,409	722	10,686	224,025	46,158	3,693	297
Allegheny, PA	Yes - other area	64	5,221	2,245	2,975	51,471	63,290	46,690	2,249
Beaver, PA	Yes - other area	43	2,909	451	2,457	45,452	33,400	7,424	450
Lawrence, PA	Yes - other area	40	2,046	313	1,733	22,900	9,001	4,234	692
Portage, OH	Yes - other area	18	1,011	496	514	548	7,269	8,365	564
Ashtabula, OH	No	14	1,407	648	758	5,713	14,555	10,988	860
Hancock, WV	Yes - other area	12	3,781	704	3,077	2,039	4,404	2,298	830
Stark, OH	Yes - other area	11	1,488	574	915	2,334	13,046	19,011	1,902
Geauga, OH	No	9	951	461	491	458	3,101	7,162	490
Butler, PA	Yes - other area	7	1,232	441	791	3,359	7,549	8,805	771
Washington, PA	Yes - other area	5	1,683	514	1,170	6,318	16,311	9,297	919
Crawford, PA	No	3	1,020	418	602	1,111	6,015	5,829	1,106
Carroll, OH	No	2	338	141	196	123	1,627	1,482	409
Venango, PA	No	2	522	235	287	1,919	2,757	3,476	286

*Notes:

1. Trumbull, Mahoning, and Columbiana Counties made up the 1999 Youngstown-Warren, OH MSA
2. Trumbull, Mahoning, and Mercer Counties make up the December 2006 Youngstown-Warren-Boardman, OH-PA MSA.

Figure 1.2. CES Values for the Youngstown Area (Including Non-Contiguous Counties)



Based upon the data set forth in Table 1.0, the emissions from Jefferson County, OH are much higher than any other county under consideration, and this county has the highest CES. However, Jefferson County is part of the Steubenville-Weirton nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Ohio has recommended that Jefferson County be included in the Steubenville-Weirton nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA agrees that these counties should be evaluated and included as part of that separate nonattainment area, rather than as part of the Youngstown area, because they are more integrated with that metropolitan area.

Trumbull County, OH has the next highest CES, while the next highest emissions are from Allegheny, Beaver, and Lawrence Counties in Pennsylvania. Trumbull County's CES is likely higher than Allegheny, Beaver, and Lawrence Counties' CESs because of its proximity to the violating monitor, which is in northern Mahoning County, close to the Mahoning-Trumbull County line. Allegheny, Beaver, and Lawrence Counties are in the Pittsburgh nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that these three counties be included in the Pittsburgh nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA agrees that these counties should be evaluated and included as part of that separate nonattainment area, rather than as part of the Youngstown area, because they are more integrated with that metropolitan area.

Mercer County, PA has a low CES of eleven. However, because it is part of the Youngstown-Warren-Sharon ozone maintenance area, further analysis is warranted to determine if it should be included in the Youngstown nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS.

Butler, Washington, Crawford, and Venango Counties in Pennsylvania all have CESs below ten. Butler and Washington Counties are in the Pittsburgh nonattainment area for the 1997 $PM_{2.5}$ NAAQS. Pennsylvania has recommended that these three counties be included in the Pittsburgh nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS. EPA agrees that these counties should be evaluated and included as part of that separate nonattainment area, rather than as part of the Youngstown area, because they are more integrated with that metropolitan area.

Factor 2: Air Quality Data

This factor considers the 24-hour $PM_{2.5}$ design values (in $\mu g/m^3$) for air quality monitors in counties in the Youngstown 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 value is 35 $\mu g/m^3$ 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 Youngstown area are shown in Table 2.0.

Table 2.0. Air Quality Data

County, State	State Recommended Nonattainment	Daily Design Values 2003-05 (µg/m³)	Daily Design Values 2004-06 (µg/m³)	Daily Design Values 2005-07 (µg/m³)
Trumbull, OH	Yes	38	36	35
Mahoning, OH	Yes	38	37	36
Columbiana, OH	No	No monitor		
Mercer, PA	No	36	Inc	Inc
Jefferson, OH	Yes - other area	46	43	40
Allegheny, PA [Liberty-Clairton]*	Yes - other area [Yes - other area]*	52 [68]	45 [65]	40 [60]
Beaver, PA	Yes - other area	43	45	43
Lawrence, PA	Yes - other area	No monitor		
Portage, OH	Yes - other area	34	34	35
Ashtabula, OH	No	No monitor		
Hancock, WV	Yes - other area	45	40	41
Stark, OH	Yes - other area	38	37	36
Geauga, OH	No	No monitor		
Butler, PA	Yes - other area	No monitor		
Washington, PA	Yes - other area	36	38	40
Crawford, PA	No	No monitor		
Carroll, OH	No	No monitor		
Venango, PA	No	No monitor		

Notes:
1. *Allegheny County, except for the Liberty-Clairton area, is in the Pittsburgh-Beaver Valley $PM_{2.5}$ nonattainment area. The Liberty-Clairton area is a separate $PM_{2.5}$ nonattainment area.
2. Inc: Incomplete data for 2006, design value cannot be confidently calculated.
3. Design values shown in red represent violations of the standard.

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

Allegheny, Beaver, and Washington Counties in Pennsylvania and Hancock County in West Virginia show violations of the 2006 24-hour $PM_{2.5}$ standard. However, Pennsylvania has recommended that Allegheny, Beaver, and Washington Counties be included in the Pittsburgh nonattainment area and West Virginia has recommended that Hancock County be included in the Steubenville nonattainment area.

The monitor in Mercer County, PA (AQS # 420850100) does not have complete data capture for the second quarter of 2006. Data capture was 58%, well below the required 75%. According to 40 CFR Part 50, Appendix N, Section 4.2:

> "The 24-hour $PM_{2.5}$ NAAQS is met when the 24-hour standard design value at each monitoring site is less than or equal to 35 $\mu g/m^3$. This comparison shall be based on 3 consecutive, complete years of air quality data. A year meets data completeness requirements when at least 75 percent of the scheduled sampling days for each quarter have valid data. However, years shall be considered valid, notwithstanding quarters with less than complete data (even quarters with less than 11 samples), if the resulting annual 98th percentile value or resulting 24-hour standard design value (rounded according to the conventions of section 4.3 of this appendix) is greater than the level of the standard."

Using the incomplete data, the 98^{th} percentile value for 2006 is 30.7 $\mu g/m^3$. The 98^{th} percentile values for 2005 and 2007 were 39.0 $\mu g/m^3$ and 34.9 $\mu g/m^3$, respectively. The resulting design value for 2005 – 2007 is 34.89 $\mu g/m^3$. Using the criteria dictated by 40 CFR Part 50, Appendix N, the data cannot be considered valid. Therefore, a design value for the 2006 24-hour $PM_{2.5}$ NAAQS cannot be calculated at this time.

This factor alone is not sufficient to eliminate the other counties in the Youngstown area as candidates for nonattainment status based upon potential contribution. EPA considered each county's CES as well as the eight other factors (plus other relevant factors or circumstances) when determining which counties to include in the Youngstown nonattainment area. As stated above, in the discussion of Factor 1, Mercer County, PA is part of the Youngstown-Warren-Sharon ozone maintenance area. Therefore, further analysis is warranted to determine if it should be included in the Youngstown nonattainment area for the 2006 24-hour $PM_{2.5}$ NAAQS because of the potential for contribution to violations in Youngstown. The analysis of Factors 3 through 9 will focus on Mercer County, PA.

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

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

Table 3.0. Population

County, State	State Recommended Nonattainment	2005 Population	2005 Population Density (people/sq mi)
Trumbull, OH	Yes	218,672	345
Mahoning, OH	Yes	253,181	599
Columbiana, OH	No	110,636	207
Mercer, PA	No	119,115	175
Jefferson, OH	Yes - other area	70,631	172
Allegheny, PA	Yes - other area	1,233,036	1658
Beaver, PA	Yes - other area	176,825	399
Lawrence, PA	Yes - other area	92,412	255
Portage, OH	Yes - other area	155,150	307
Ashtabula, OH	No	103,044	145
Hancock, WV	Yes - other area	31,191	354
Stark, OH	Yes - other area	380,275	655
Geauga, OH	No	95,060	233
Butler, PA	Yes - other area	181,526	229
Washington, PA	Yes - other area	206,418	240
Crawford, PA	No	89,484	87
Carroll, OH	No	29,252	73
Venango, PA	No	55,938	82

In 2005, Mercer County's population was roughly half that of either Trumbull or Mahoning Counties. Furthermore, its population density is roughly half that of Trumbull County and less than one-third that of Mahoning County.

Factor 4: Traffic and Commuting Patterns

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

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 VMT (millions)	Number commuting into any violating counties	Percent commuting into any violating counties	Number commuting into & within statistical area	Percent commuting into & within statistical area
Trumbull, OH	Yes	2,153	85,820	88	85,870	88
Mahoning, OH	Yes	2,666	99,310	91	100,200	92
Columbiana, OH	No	872	16,360	33	39,050	79
Mercer, PA	No	1,302	44,370	87	44,270	87
Jefferson, OH	Yes - other area	684	21,140	74	730	3

Allegheny, PA	Yes - other area	10,003	564,260	97	474	0
Beaver, PA	Yes - other area	1,522	48,250	60	970	1
Lawrence, PA	Yes - other area	769	7,390	18	4,730	12
Portage, OH	Yes - other area	1,788	3,650	5	2,250	3
Ashtabula, OH	No	1,182	720	2	670	2
Hancock, WV	Yes - other area	187	8,480	60	940	7
Stark, OH	Yes - other area	3,049	3,650	5	2,250	3
Geauga, OH	No	834	530	1	440	1
Butler, PA	Yes - other area	1,669	3,510	4	1,880	2
Washington, PA	Yes - other area	2,399	54,270	61	60	0
Crawford, PA	No	795	1,590	4	1,560	4
Carroll, OH	No	173	5,380	42	370	3
Venango, PA	No	596	850	4	830	4

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

VMT in Mercer County, PA is roughly half that of VMT in Trumbull and Mahoning Counties, Ohio. Furthermore, the numbers commuting into any violating counties or into the statistical area from Mercer County are less than half that of Trumbull and Mahoning Counties. More importantly, while 44,270 commute into the statistical area, 40,370 of those commuters are traveling within Mercer County. Therefore, less than 4000 commuters are traveling from Mercer County into Trumbull and Mahoning Counties. Finally, the VMT and commuting figures for Mercer County are, in comparison to more populated areas where vehicle emissions are more relevant, very low. As demonstrated in the following table, vehicle emissions from Mercer County are minimal when compared to a more populated area, in this case, Allegheny County, PA.

Table 4.1. Highway Vehicle Emissions for the Youngtown Area and Selected Nearby Counties

Highway Vehicle Emissions (Tier 11) 2005 NEI, Version 1			Total County Emissions
County, State	Pollutant	Tons	tons
Trumbull, OH	NOx	4,987	13,373
Mahoning , OH		6,713	10,086
Columbiana, OH		2,025	4,377
Mercer, PA		3,521	6,010
Jefferson, OH		1,528	46,158
Allegheny, PA		18,403	63,290
Trumbull, OH	PM25-PRI	86	1,730
Mahoning , OH		117	722

Columbiana, OH		34	805
Mercer, PA		73	793
Jefferson, OH		25	11,409
Allegheny, PA		311	5,221
Trumbull, OH	SO_2	110	18,501
Mahoning , OH		145	1,927
Columbiana, OH		44	525
Mercer, PA		84	1,042
Jefferson, OH		33	224,025
Allegheny, PA		392	51,471
Trumbull, OH	VOC	3,773	12,098
Mahoning , OH		4,719	10,416
Columbiana, OH		1,596	4,933
Mercer, PA		1,838	7,028
Jefferson, OH		1,216	3,693
Allegheny, PA		14,938	46,690
Trumbull, OH	NH3	223	881
Mahoning , OH		274	1,415
Columbiana, OH		90	1,956
Mercer, PA		128	1,210
Jefferson, OH		71	297
Allegheny, PA		1,052	2,249

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 Youngstown area, as well as patterns of population and VMT growth. A county with rapid population or VMT growth is generally an integral part of an urban area and is likely to be contributing to fine particle concentrations in the area.

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

Table 5.0. Population and VMT Values and Percent Change

County, State	State Recommended Nonattainment?	2005 Population	Percent Population Change (2000-2005)	2005 VMT (millions)	Percent VMT Growth (1996-2005)
Trumbull, OH	Yes	218,672	(3)	2,153	8
Mahoning, OH	Yes	253,181	(2)	2,666	9
Columbiana, OH	No	110,636	(1)	872	(2)
Mercer, PA	No	119,115	(1)	1,302	(0)

Jefferson, OH	Yes - other area	70,631	(4)	684	(6)
Allegheny, PA	Yes - other area	1,233,036	(4)	10,003	(3)
Beaver, PA	Yes - other area	176,825	(2)	1,522	0
Lawrence, PA	Yes - other area	92,412	(2)	769	(1)
Portage, OH	Yes - other area	155,150	2	1,788	6
Ashtabula, OH	No	103,044	0.5	1,182	13
Hancock, WV	Yes - other area	31,191	(4)	187	(32)
Stark, OH	Yes - other area	380,275	1	3,049	(1)
Geauga, OH	No	95,060	4	834	(2)
Butler, PA	Yes - other area	181,526	4	1,669	10
Washington, PA	Yes - other area	206,418	2	2,399	25
Crawford, PA	No	89,484	(1)	795	(11)
Carroll, OH	No	29,252	1	173	(7)
Venango, PA	No	55,938	(3)	596	15

Most counties with CES values above ten had population decreases between 2000 and 2005, with the exception of Portage (CES = 18), Ashtabula (CES= 14), and Stark (CES = 11). (See Table 1.0 under Factor 1 – Emissions Data.) Portage and Ashtabula Counties also had increased VMT between 2000 and 2005, as did Trumbull and Mahoning Counties. Mercer County, PA had no change in VMT, while all other counties with CESs above ten experienced a drop in VMT.

Factor 6: Meteorology (Weather/Transport Patterns)

For this factor, EPA considered data from National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ 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 or FEM 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. Figures 6.0, 6.1, 6.2, and 6.4 identify 24-hour $PM_{2.5}$ values by color and days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figures indicate the location of the air quality monitoring site, and the location of the icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

The following pollution roses show that, during high $PM_{2.5}$ days in 2004-2006 in Trumbull and Mahoning Counties, the wind generally came from the south, including southwestern and southeastern components on days with high ambient levels relevant to the 2006 24-hour $PM_{2.5}$ NAAQS. In addition, some days with high levels show impacts from winds from the east. However, the high days showing winds from the east have monitored ambient levels in the 30 to 35 $\mu g/m^3$ range. The highest days, with monitored values greater than 35 $\mu g/m^3$ $PM_{2.5}$, are generally from the southeast and southwest, and occasionally from the south, suggesting that

contribution to violations of the 2006 24-hour $PM_{2.5}$ NAAQS is more likely from that direction, rather than from the direction of Mercer County.

Figure 6.0. Pollution Trajectory Plot for Mahoning County, OH (Site 39-099-0014)

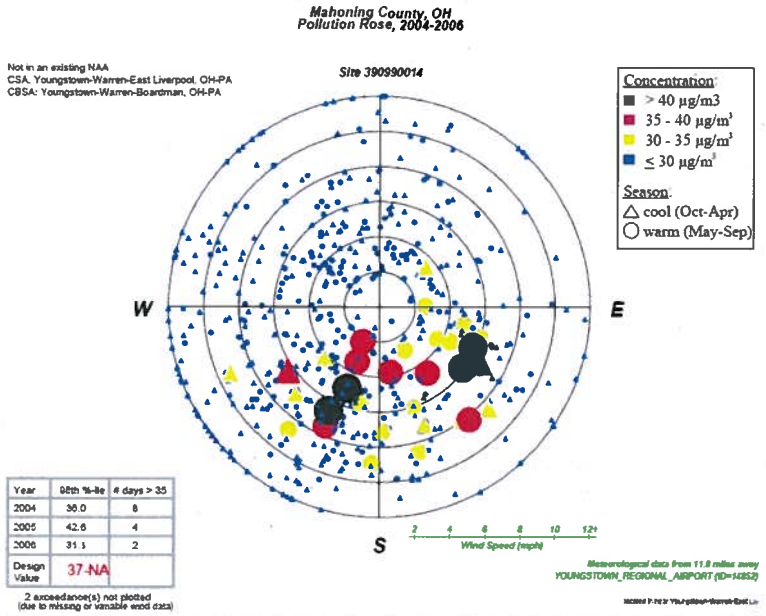


Figure 6.1. Pollution Trajectory Plot for Mahoning County, OH (Site 39-099-0054)

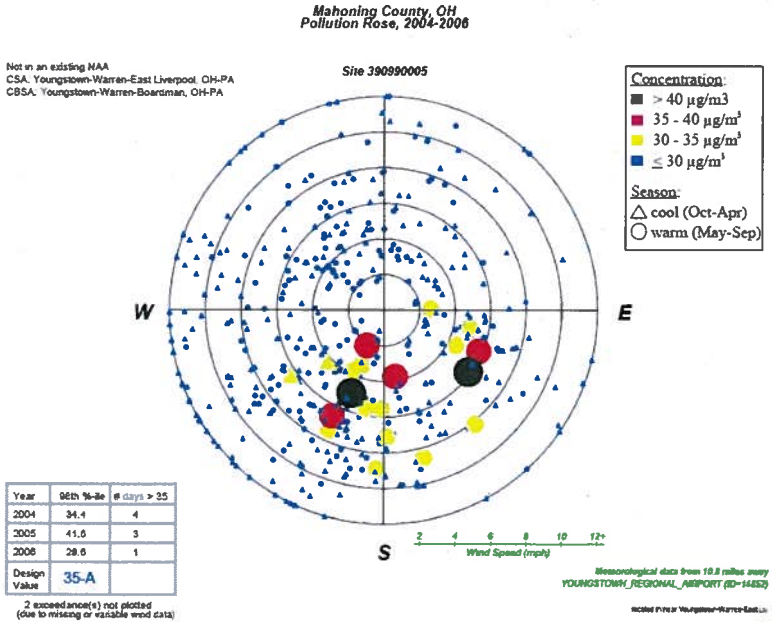
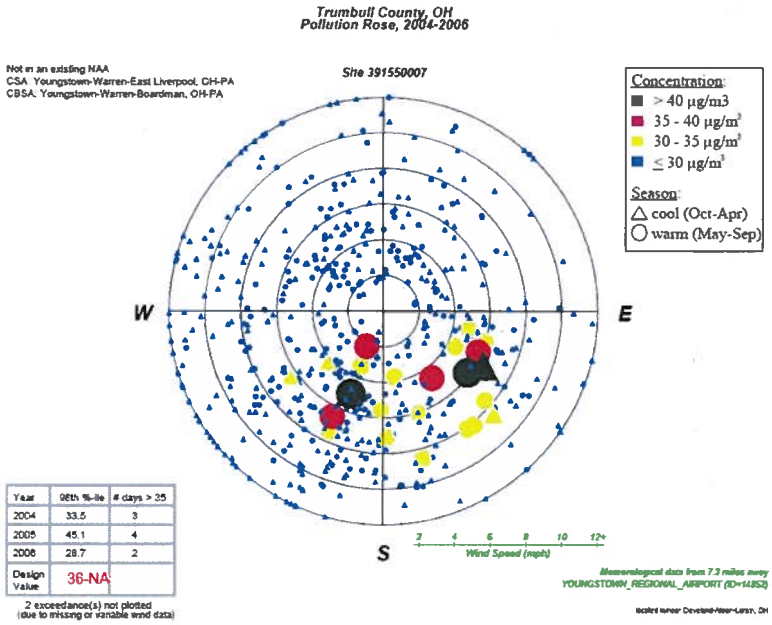
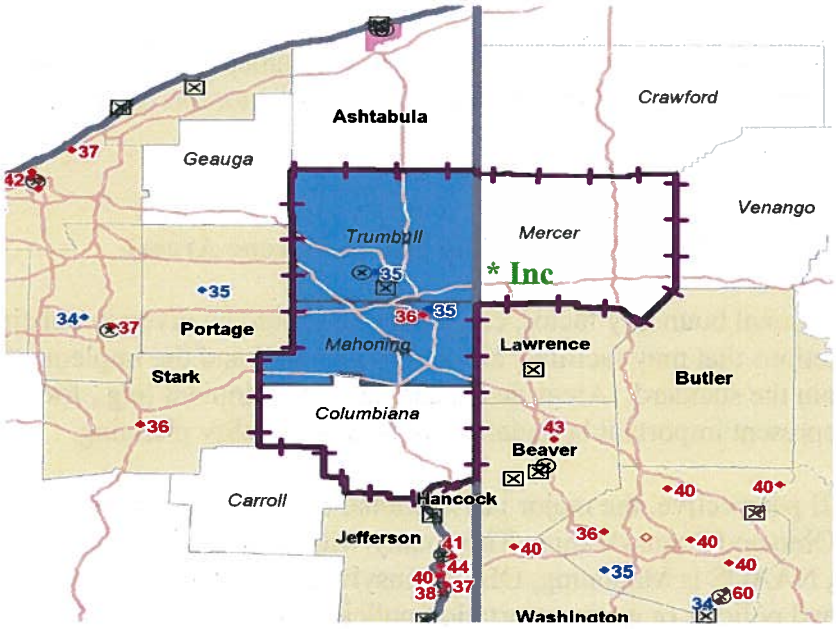


Figure 6.2. Pollution Trajectory Plot for Trumbull County, OH
(Site 39-155-0007)



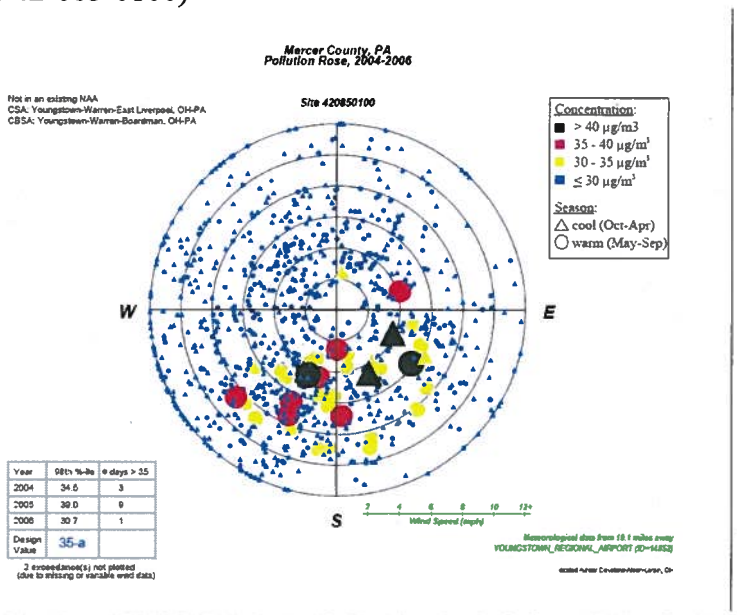
As shown in Figure 6.3, the violating monitor in the Youngstown area is in northern Mahoning County. Mercer County is northeast of the violating monitor. Therefore, emissions from Mercer County do not appear to contribute to the violating monitor on high $PM_{2.5}$ days (with monitored values greater than 35 µg/m^3.)

Figure 6.3. The Youngstown Area



The following pollution rose shows that on high $PM_{2.5}$ days at the Mercer County monitor, winds are generally from the south, southwest, and southeast, with occasional days dominated by winds from the east. (See Figure 6.4)

Figure 6.4. Pollution Trajectory Plot for Mercer County, PA (Site 42-085-0100)



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 Youngstown area.

The Youngstown area does not have any geographical or topographical barriers significantly limiting air pollution transport within its airshed. Therefore, this factor did not play a significant role in the decision-making process.

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

In evaluating the jurisdictional boundary factor, consideration should be given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

From an EPA Region III perspective, the major jurisdictional boundary in the Youngstown area is the State line between Ohio and Pennsylvania. The county with an air quality monitor that violates the 2006 $PM_{2.5}$ NAAQS is Mahoning, OH. Pennsylvania has no jurisdictional say in the air quality regulations and policies (e.g., transportation policies) developed by either Ohio to address $PM_{2.5}$ emissions in the areas with the violating monitor.

On the other hand, areas designated as 8-hour ozone nonattainment areas are also important boundaries for State air-quality planning. Mercer County, PA was included in the ozone nonattainment area associated with the Youngstown area. Mahoning, Trumbull, Columbiana, and Mercer Counties are part of the Youngstown-Warren-Sharon maintenance area for the 8-hour ozone NAAQS. Other counties included in this 9-factor analysis are also designated as 8-hour ozone nonattainment areas, but are not associated with the Youngstown area. A goal in designating $PM_{2.5}$ nonattainment areas is to achieve a degree of consistency with ozone nonattainment areas. Comparison of ozone areas with potential $PM_{2.5}$ nonattainment areas, therefore, gives added weight to designation of Mercer County, PA. However, this is the only factor which supports a nonattainment designation for Mercer County.

Factor 9: Level of Control of Emission Sources

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

The emission estimates on Table 1.0 (under Factor 1) include any control strategies implemented by the states in the Youngstown area before 2005 that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NOx, and crustal $PM_{2.5}$).

As explained in Factor 6, emissions from Mercer County, PA do not impact the violating monitor in Mahoning County on most high days. Furthermore, there are no large electric generating units or other large sources with emissions greater than 5000 tons per year in Mercer County. Therefore, an analysis of any additional emission reductions which may have occurred in Mercer County since 2005 is not being performed.