DRAFT - ENCLOSURE

PENNSYLVANIA'S RESPONSE TO EPA'S INTENDED PM2.5 DESIGNATIONS

In February 2004, Pennsylvania submitted recommendations to the U.S. Environmental Protection Agency (EPA) to designate attainment and nonattainment areas for the fine particulate matter ($PM_{2.5}$) national ambient air quality standard. At that time, Pennsylvania recommended 16 counties for nonattainment based on air quality monitoring data and other available information, including emissions, meteorology and demographics. Those counties included Philadelphia, Delaware, Chester, Bucks, Montgomery, Berks, Lancaster, York, Dauphin, Cumberland, Lebanon, Cambria, Westmoreland, Washington, Allegheny and Beaver. In June 2004, Pennsylvania revised the recommendations to exclude Bucks, Montgomery and Lebanon from that list based on further analysis and EPA guidance and data concerning the designation process.

As required by the federal Clean Air Act, EPA notified Pennsylvania, in a letter dated June 29, 2004, of its intention to modify Pennsylvania's recommendations for some counties. The June 29th letter to Governor Rendell identified 22 counties as proposed $PM_{2.5}$ nonattainment in Pennsylvania. In addition to the 13 counties identified in Pennsylvania's revised recommendations, EPA proposed Lebanon, Indiana, Montgomery, Bucks, Butler, Armstrong, Greene, Lawrence and Mercer as nonattainment areas.

Pennsylvania's recommendations were developed with consideration given to EPA guidance. The first guidance memo (dated April 1, 2003) from EPA Assistant Administrator Jeffrey R. Holmstead outlined EPA's intention to apply a presumption that the boundaries for urban nonattainment areas should be based on Metropolitan Area boundaries, as defined by the Office of Management and Budget (OMB) and published on June 30, 1999. The guidance memo listed factors that EPA will consider if states request nonattainment area boundaries that are different from OMB's metropolitan area definitions. These factors are:

- Emissions in areas potentially included versus excluded from the nonattainment area
- Air quality in potentially included versus excluded areas
- Population density and degree of urbanization including commercial development in included versus excluded areas
- Traffic and commuting patterns
- Expected growth (including extent, pattern and rate of growth)
- Meteorology (weather/transport patterns)
- Geography/topography (mountain ranges or other air basin boundaries)
- Jurisdictional boundaries (e.g., counties, air districts, Reservations, etc.)
- Level of control of emission sources

EPA issued additional guidance on February 12, 2004 on the $PM_{2.5}$ designation process, in the form of a memo from Lydia N. Wegman. The additional guidance indicated that

OMB's revised Metropolitan Area boundaries, issued June 10, 2003, should also be considered in States' recommendations and in EPA's review and determination of $PM_{2.5}$ designation boundaries.

Pennsylvania remains convinced that the 13 counties identified by both EPA and Pennsylvania as nonattainment are the only counties in Pennsylvania that should be designated nonattainment with regard to the $PM_{2.5}$ standard. Pennsylvania's analysis and recommendations were completed in accordance with EPA issued guidance. EPA's newly developed "weighted emissions" scoring process is arbitrary and appears to expand nonattainment areas to include counties monitoring attainment solely because of the relative emission levels without any demonstration of air quality impact. This process was never published for review and comment. It has long been Pennsylvania's position that it is imperative that emissions from large point sources, such as power plants, be addressed through a consistent national or regional control program. EPA's recently proposed Clean Air Interstate Rule (CAIR) would be an appropriate mechanism for addressing these emissions provided more stringent emission caps and timely compliance schedules are promulgated.

The following discussion provides relevant analysis and our comments on EPA's intended designations for each area:

HARRISBURG AREA

In the June 29, 2004 "120-day letter", EPA gave notice of its intention to expand the Harrisburg nonattainment area to include Cumberland, Dauphin and Lebanon counties. Pennsylvania recommends that only Cumberland and Dauphin counties be included in the Harrisburg nonattainment area. Table 1 summarizes 2001-03 annual $PM_{2.5}$ concentrations in the Harrisburg region.

Table 1.

Harrisburg Region 2001-03 $PM_{2.5}$ Annual Design Value

Site	County	2001-03 design Value (μg/m3)	Annual Standard (μg/m3)
Carlisle	Cumberland	15.1**	15.0
Harrisburg	Dauphin	15.7	15.0
Little Buffalo SP	Perry	13.0	15.0

****Combined data from two monitors**

There is a discrepancy between Cumberland County's design value cited in EPA's June 29, 2004 letter and what's listed in Table 1. EPA listed Cumberland County's design value as 17.6 $\mu g/m^3$, but noted that the data for the county was incomplete. The Carlisle monitor was moved at the end of the first quarter of 2001. It appears EPA used the old monitoring site's 1st quarter 2001 $PM_{2.5}$ concentration as the county's annual design

value. Pennsylvania combined data from both sites to calculate the 2001-03 annual $PM_{2.5}$ design value for Cumberland County. Both sites are within 3 miles of each other (see Appendix II).

EPA Analysis and Support for an Expanded Nonattainment Area

In its June 29, 2004 letter to Pennsylvania, EPA outlined its intentions for the Harrisburg nonattainment area. EPA cited lack of emissions and the county's low annual design value as supporting factors for this decision. Lebanon County, however, was added to the nonattainment area; Pennsylvania had requested that only Dauphin and Cumberland counties be included in the Harrisburg nonattainment area. EPA cited Lebanon County's location adjacent to several other nonattainment counties as supporting evidence for its position. Including Lebanon County "…completes a contiguous nonattainment boundary."

Pennsylvania's Comments Regarding EPA's Analysis

Pennsylvania concurs with EPA's intended designation of attainment for Perry County.

Pennsylvania does not believe Lebanon County should be included in the Harrisburg nonattainment area. Emissions from Lebanon County are roughly two thirds (2/3) of emissions from either Cumberland or Dauphin counties. Any emission controls imposed on Lebanon County will have little or no effect on design values in the nonattainment area since Lebanon County is generally downwind of Cumberland and Dauphin counties. The inclusion of Lebanon County purely to establish a contiguous nonattainment area seems more of an aesthetic exercise than one based on helping the nonattainment area comply with the annual $PM_{2.5}$ standard.

JOHNSTOWN AREA

In the June 29, 2004 letter, EPA gave notice of its intention to expand the Johnstown nonattainment area to include Cambria and Indiana. Pennsylvania recommends that the nonattainment area include only Cambria.

There is a discrepancy in the Johnstown $PM_{2.5}$ annual design value. EPA's analysis indicates the 2001-03-design value is 15.8 $\mu g/m^3$. Our analysis indicates Johnstown's design value is slightly lower, 15.6 $\mu g/m^3$.

Pennsylvania's Comments Regarding EPA's Analysis

Indiana is a rural, non-industrial county that is not associated with any MSA. Indiana has relatively high emissions, but these are mainly attributable to the county's three power stations – accounting for 99.4% of the SO_2 and 91.5% of the NOx emissions. These are Seward Station, Conemaugh Station and Homer City Station. The Seward Station was recently shut down and replaced with modern well-controlled fluidized bed units, representing state of the art controls. The Conemaugh Station is equipped with sulfur

dioxide scrubbers and ESPs on both units. The Homer City Station has one of its three units equipped with sulfur dioxide scrubbers and all three units are equipped with SCR, low NOx burners and ESPs. The remainder of emissions from Indiana would have a negligible impact on either the nonattainment area. Subjecting the entire county to nonattainment status due to speculation that these sources for which additional controls will be required under the Clean Air Act regional haze rule and proposed interstate air quality rules is inappropriate.

LANCASTER AREA

Pennsylvania concurs with EPA's intended designation of nonattainment for Lancaster County.

NEW YORK AREA

Pennsylvania concurs with EPA's intended designation of attainment for Pike County.

PHILADELPHIA AREA

In the June 29, 2004 letter to Pennsylvania, EPA gave notice of its intention to expand the Philadelphia nonattainment area to include five counties: Bucks, Chester, Delaware, Montgomery and Philadelphia. Pennsylvania's proposed Philadelphia $PM_{2.5}$ nonattainment area did not include Bucks or Montgomery counties (June 1, 2004 Revised $PM_{2.5}$ Designation Recommendations). Both of these counties have 2001-2003 design values below the annual $PM_{2.5}$ standard (15.0 $\mu g/m^3$). Table 2 lists the annual design

Table 2.

2001-03 $PM_{2.5}$ Design Values in the Five-County Philadelphia Region

Site	**County**	**2001-03 design Value** (μg/m3)	**Annual Standard** (μg/m3)
Bristol	Bucks	14.4	15.0
New Garden	Chester	15.2**	15.0
Chester	Delaware	15.5	15.0
Norristown	Montgomery	14.3	15.0
AMS Lab	Philadelphia	15.2	15.0
Belmont	Philadelphia	14.3	15.0
N/E Airport	Philadelphia	13.8	15.0
Broad Street	Philadelphia	"Middle-scale" monitor	Compare to 24-hr standard
Elmwood	Philadelphia	14.9	15.0
MLK	*New Castle, DE*	*16.2*	15.0
Camden	*Camden, NJ*	*14.6*	15.0
Gibbstown	*Gloucester, NJ*	*13.8*	15.0

From EPA letters to Delaware and New Jersey, ***** Incomplete data set (2002-03)***

values for the counties in Pennsylvania included in EPA's proposed Philadelphia nonattainment area.

The five-county Philadelphia region's 2001-03 $PM_{2.5}$ design value is 15.5 $\mu g/m^3$, slightly above the annual standard of 15.0 $\mu g/m^3$. Both Bucks and Montgomery counties have design values less than the annual standard. Additionally, these counties are thought to be generally downwind and/or not significantly contributing to monitors exceeding the annual standard.

EPA Analysis and Support for an Expanded Nonattainment Area

Technical justifications for expanding the Philadelphia $PM_{2.5}$ nonattainment area were included in Enclosure B of EPA's June 29, 2004 letter sent to Pennsylvania. EPA used nine criteria to determine which counties should be included in the Philadelphia nonattainment area. These criteria included emissions, air quality, population, traffic and commuting patterns, expected growth, meteorology, geography/topography, jurisdictional boundaries, and level of emission controls.

EPA placed a high emphasis on weighted countywide emissions in its supporting document. EPA concluded its weighted emissions analysis showed Montgomery County and Bucks County significantly contributed to the region's nonattainment problem. Additional analysis factors including population density, growth and commuting, were also cited in support for expanding the Philadelphia nonattainment area to include Bucks and Montgomery counties.

Pennsylvania's Comments Regarding EPA's Analysis

Philadelphia Annual $PM_{2.5}$ Design Value: $PM_{2.5}$ design values listed in EPA's June 29, 2004 designation letter are different than those complied by Pennsylvania and listed in Table 2. The five-county Philadelphia region's design value is less than the value listed in EPA's designation letter (16.4 $\mu g/m^3$). Less than half of the monitors in the five-county Philadelphia region exceed the annual $PM_{2.5}$ standard. Expanding the nonattainment area would place counties measuring attainment into a nonattainment area.

EPA's Weighted Emissions Analysis: EPA's use of weighted emission scores is problematic. This recently developed method cannot gauge how emissions are affecting a particular monitor's design value. EPA's method does not differentiate between different emission sources. A modeling analysis would be more helpful in determining if emissions from a particular county or a particular source type are significantly contributing to a monitor's design value.

EPA's Sector Wind Frequency/Weighted Emissions Analysis: EPA's attempt to use sector wind frequency and distance to the design monitor to determine emission transport

is over simplified. The methodology uses 10 years of wind direction data to gauge were emissions may be transported. This method does not take into account other meteorological factors such as wind speed and atmospheric stability, which influence atmospheric dispersion. This method also ignores source characteristics that affect emission dispersion such as release height, plume temperature, plume velocity and does not account for chemical transformation processes. The analysis does not make a determination if the meteorological data used in the analysis is representative over the entire nonattainment area in accordance with Section 3 of EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications (EPA-454/R-99-005). Distance to the design monitor may be incorrect since there is a discrepancy between EPA's regional design value and what is listed in Table 1.

EPA's VMT Analysis: EPA considered VMT in its analysis but did not establish a clear relationship between VMT and monitored $PM_{2.5}$ design values. VMT in the Philadelphia region is much higher than any other region in Pennsylvania yet its design value is only slightly above the annual $PM_{2.5}$ standard. Furthermore, monitors in Bucks and Montgomery counties are located near major highways yet both monitors' 2001-03 $PM_{2.5}$ design values are less than the annual standard. If a definitive link exists between VMT and $PM_{2.5}$ design values, one would expect higher values for monitors in the Philadelphia region than portions of central and western Pennsylvania.

Table 3 summarizes VMT-$PM_{2.5}$ coefficients for all Pennsylvania counties. VMT and design monitor concentrations are weakly correlated with one another. If an average value is substituted for a county's design value (counties with multiple monitoring sites) the VMT-$PM_{2.5}$ correlation becomes nonexistant.

Table 3.

VMT-$PM_{2.5}$ Correlation Coefficients for the Commonwealth of Pennsylvania

	2001-03 Annual PM2.5 Design Value *	2001-03 Average PM2.5 Design Value **
VMT	0.6557	0.3119

* County Design Value (Max)
** Average Design Value for counties with multiple monitors

Stringent Emission Control Programs/Population Growth/Density: EPA's analysis failed to account for stringent emission control programs implemented in the five-county Philadelphia region. Southeast Pennsylvania and most of the metropolitan regions along the I-95 corridor have some of the most stringent emission controls in the nation. These controls were enacted to bring the Ozone Transport Region (OTR) into attainment of the one-hour ozone standard. Controls on NO_x and VOC-emitting sources have undoubtedly helped reduce $PM_{2.5}$ concentrations. The Department estimates NO_x and VOC emissions will be reduced by 35% between 1990 and 2005 in the five-county Philadelphia region. These emission reductions have occurred even though the region's population has increased by 10.4% (half a million people) between 1980 and 2000.

Table 4 summarizes population density-$PM_{2.5}$ correlation coefficients for all Pennsylvania monitors. The results show there is no correlation between a county's population density and it's design value.

Table 4.

Population Density-$PM_{2.5}$ Correlation Coefficients
for the Commonwealth of Pennsylvania

	2001-03 Annual PM2.5 Design Value *	2001-03 Average PM2.5 Design Value **
Population Density	0.2373	0.0860

* County Design Value (Max)
** Average Design Value for counties with multiple monitors

Design Value Contribution Analysis

Overview

The Department has completed a design value contribution analysis for all of the $PM_{2.5}$ monitors in the five-county Philadelphia region. Our analysis attempts to determine a monitor sample's contribution to its annual $PM_{2.5}$ design value. Samples are grouped into different $PM_{2.5}$ concentration ranges. An analysis of each range's contribution can then be examined to determine which samples are contributing to the monitor's design value. Sample dates can then be further analyzed to determine if there are specific meteorological conditions or sources that are adversely affecting the monitor's design value. Results from our design value analysis for southeast Pennsylvania are summarized in Table 5.

Our design value contribution analysis indicates the two monitors in the five-county Philadelphia region that exceeded the annual standard, Chester and PHL-Lab, have relatively few "clean" days (0-7.5 $\mu g/m^3$). Their design value contributions from this range are less than the statewide average and less than other monitors in the Philadelphia region. Graph 1 confirms Chester has fewer "clean" days, $PM_{2.5}$ concentrations in the 0 to 7.5 $\mu g/m^3$ range.

Table 5.

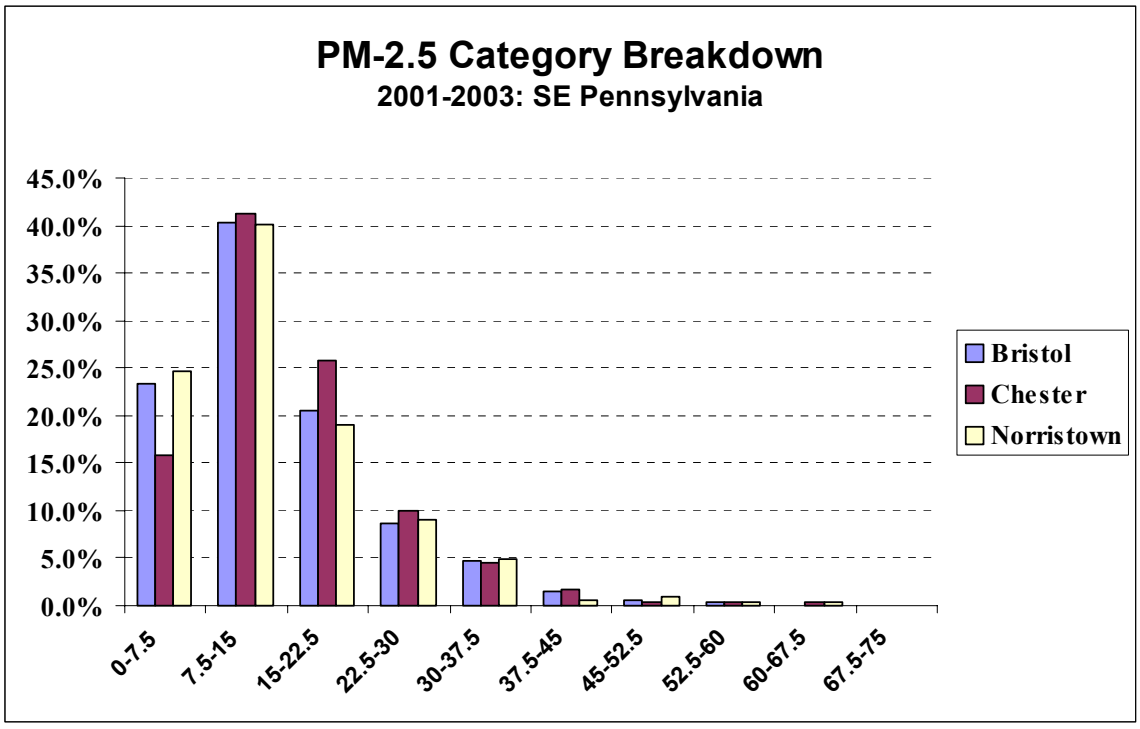
Southeast Pennsylvania
PM-2.5 Annual Design Value Contribution Analysis

Site Name	0-7.5	7.5-15	15-22.5	22.5-30	30-37.5	37.5-45	45-52.5	52.5-60	60-67.5	67.5-75	Sum
Bristol	-2.1945	-1.6299	0.7112	0.9525	0.8442	0.3879	0.2026	0.1363	0.0000	0.0000	**-0.59**
Chester	-1.4321	-1.6780	0.8684	1.0791	0.8254	0.4275	0.0894	0.1239	0.1470	0.0000	**0.45**
Norristown	-2.2976	-1.7091	0.6782	0.9489	0.8432	0.1636	0.3095	0.1467	0.1775	0.0000	**-0.74**
PHL-Belmont	-2.1229	-1.6089	0.8339	0.9816	0.6281	0.2920	0.1906	0.1157	0.0000	0.0000	**-0.69**
PHL-Elmwood	-1.8026	-1.6580	0.8068	0.9680	0.8544	0.3010	0.2685	0.1737	0.0000	0.0000	**-0.09**
PHL-LAB	-1.7461	-1.6521	0.7268	1.1130	0.9363	0.5302	0.2413	0.0890	0.0000	0.0000	**0.24**
PHL-Northeast Airport	-2.4223	-1.6391	0.6829	0.8288	0.7105	0.3262	0.1097	0.2540	0.0000	0.0000	**-1.15**
New Garden (incomplete)	-1.9109	-1.4315	0.7571	0.9206	1.0716	0.3139	0.0000	0.1918	0.0000	0.2421	**0.15**
Five-County Phila Avg	**-1.9911**	**-1.6258**	**0.7582**	**0.9741**	**0.8392**	**0.3428**	**0.1765**	**0.1539**	**0.0406**	**0.0303**	**-0.30**
State Average	**-1.8539**	**-1.6112**	**0.7704**	**0.9833**	**0.7858**	**0.4223**	**0.2478**	**0.2103**	**0.0464**	**0.0527**	**0.05**

Add "Sum" to 15.0 to get monitor's annual design value.

Additional analyses were done to try and determine what was contributing to the lack of "clean" days at Chester. To do this we identified days when Chester's $PM_{2.5}$ concentrations were relatively high but regional monitoring concentrations were low. Between 2001 and 2003 we identified 72 days where Chester's $PM_{2.5}$ concentrations were 25% or greater than the regional average. The most extreme events were examined further to determine why Chester's concentrations were high when regional concentrations were low.

Graph 1.



Analysis of Speciated Data

Speciated data for Chester and New Garden, a monitoring site ~21 miles west of Chester, were examined to determine if there were any significant differences on days when regional concentrations were low but Chester's were high. A total of eleven (11) days were examined. Data was missing for most of the more extreme events. Table 6 lists standard deviations, correlation coefficients and correlations of divergence for these eleven days. These analyses indicate major differences in sulfate and crustal components between the two sites.

Table 6.

Statistical Analysis Chester/New Garden Speciated Data

	Nitrate	Sulfate	Ammonium	Organic Carbon	Elemental Carbon	Crustal	Other
Standard Deviation	1.2748	1.6022	0.7094	1.4553	0.3444	0.9071	2.7151
Correlation Coefficient	0.9725	-0.3467	0.8875	0.8247	0.6032	0.4838	0.1228
Coefficients of Divergence	0.0684	0.5048	0.3261	0.1237	0.2325	1.2103	1.4793

Criteria Pollutant/Meteorological Data Analysis

Twenty-four hour averaged wind direction, wind speed, PM_{10} and sulfur dioxide concentrations for Chester, Norristown and Bristol were compared for nineteen days when $PM_{2.5}$ concentrations at Chester were significantly higher than regional averages. On a majority of these days, sixteen, Chester's surface winds had strong easterly components. Chester's PM_{10} and sulfur dioxide levels were also significantly higher than Norristown and Bristol on these days. These values are summarized in Table 7.

Quarterly $PM_{2.5}$ Concentration Analysis

Regional 2001-03 annual design values were influenced by unusually high $PM_{2.5}$ concentrations during the first quarter of 2001 (Table 8). Quarterly averages were well above normal across the Commonwealth. . The cause of this anomaly is not known but is probably not due to sources solely within the five-county Philadelphia region.

Table 7.

Nineteen-Day Summary Chester/Bristol/Norristown

	PM-10			SO2			VWD			SWS		
Date	Chester	Bristol	Norristown	Chester	Bristol	Norristown	Chester	Bristol	Norristown	Chester	Bristol	Norristown
9/12/03	53	22	18	10	4	0	81	45	104	8.5	7.3	4.4
12/14/03	58	7	5	8	11	1	119	102	107	8.8	5.5	2.7
4/18/03	49	23	23	1	0	1	87	313	111	9.5	9.0	5.0
3/19/03	33	23	26	2	5	0	103	274	126	11.6	9.0	7.5
2/26/03	36	13	15	7	9	11	74	34	93	6.6	4.3	3.2
1/3/03	19	7	5	9	17	9	75	62		7.2	7.5	
10/29/02	27	12	10	5	15	1	81	46	146	6.0	2.8	1.8
4/9/03	26	10	9	6	6	2	32	326	64	6.9	5.4	3.1
11/16/02	26	13	11	10	8	3	55	51	93	5.9	6.3	4.3
9/18/03	44	21	19	13	3	1	72	67	94	11.4	11.3	6.4
11/5/03	23	13	10	3	8	2	113	82	145	4.4	2.8	1.3
1/19/01	23	11	8	11	12	3	91	57	175	4.1	0.6	1.7
3/5/01	18	6	5	7	6	4	225	208	232	8.2	0.7	4.3
4/16/01	24	11	10	6		1	195	195	209	5.7	4.6	4.3
9/9/03	27	16	14	3	1	0	82	54	103	9.2	5.7	3.9
9/26/02	35	13	11	4	8	0	52	41	78	5.9	4.3	2.4
9/3/03	22	11	11	3	2	0	93	77	123	4.9	3.1	2.8
10/11/02	20	5	5	2	11	0	94	58	100	7.2	4.6	3.8
7/17/03	22	21	16	4	5	2	293	281	322	5.4	2.5	3.7

Table 8.

Statewide/SE PA Quarterly $PM_{2.5}$ Statistics

	Avg	StDev	Max	Min	>15.0	Sites	Bris	Ches	BEL-F	ELM-FD	LAB-FD	NEA-F	ROX-F	SOA-F	VET-F	Norr	NewG
1st Q 2001	15.6	2.328	21.3	11.9	22	41	15.18	17.40	16.93	19.11	18.70	16.48				15.60	
2nd Q 2001	16.5	2.278	25.6	13.0	32	41	15.28	17.63	15.57	16.85	16.05	14.53				15.17	
3rd Q 2001	17.2	2.155	25.6	13.5	36	41	13.87	16.37	16.41	16.29	16.18	15.34				16.94	
4th Q 2001	13.2	1.949	21.4	10.4	5	41	13.99	12.47	12.57	14.67	15.12	12.31				12.70	
1st Q 2002	12.6	1.813	18.3	9.2	4	43	14.29	13.23	12.67	13.81	14.21	12.71		13.44		12.87	13.83
2nd Q 2002	14.5	1.931	22.1	11.4	17	44	12.23	14.16	13.44	13.61	12.81	12.73		13.63	14.73	12.85	13.32
3rd Q 2002	18.5	2.457	25.2	13.5	41	44	15.20	16.00	15.30	15.90	17.00	14.90		14.30	22.00	15.40	17.20
4th Q 2002	12.7	2.097	18.2	8.6	6	44	14.84	15.15	13.81	12.74	13.51	14.47	14.58	11.32		13.83	14.60
1st Q 2003	14.8	2.042	20.7	10.0	21	43	15.13	16.61	13.79	16.13	16.70	13.05	11.95			14.84	16.98
2nd Q 2003	14.6	1.592	19.5	11.8	12	42	14.28	16.18	13.61	13.27	13.64	12.36	14.52			13.60	15.41
3rd Q 2003	17.8	2.303	23.0	14.5	40	42	15.47	17.19	16.06	14.52	15.60	16.36	15.08			15.58	16.48
4th Q 2003	12.3	2.198	21.3	9.0	3	42	13.13	12.99	11.58	12.05	13.33	10.98	11.55			11.75	13.41

Summary

EPA intends to expand the Philadelphia nonattainment area to include Bucks and Montgomery counties. EPA supported this expansion with an analysis of 2001-03 regional $PM_{2.5}$ annual design values, a weighted emissions analysis, an analysis of population density, an analysis of population growth and an analysis of commuting patterns.

The Pennsylvania DEP disagrees with EPA's recommendation to expand the Philadelphia nonattainment area. EPA's expansion will include a number of counties that are attaining the annual $PM_{2.5}$ standard. A number flaws with EPA's analysis supporting expansion of the Philadelphia nonattainment area have been identified. EPA's methodology does not establish a definitive relationship between countywide emissions and the region's design value monitor. In addition, it appears that EPA did not take into account the level of controls in the five-county Philadelphia region that have reduced NO_x and VOC emissions by 35% even as the regions population has increased by half a million people since 1980.

A review of monitoring data in the five-county Philadelphia region indicates the region's peak monitor, Chester, is being adversely affected by local sources. Unusually high quarterly $PM_{2.5}$ concentrations in the 1st Quarter of 2001 have also affected regional design values. This anomaly was observed across the Commonwealth making it unlikely that sources in the five-county Philadelphia region were solely responsible. Both of these observations indicate the Philadelphia regions $PM_{2.5}$ nonattainment problem is more local in scope and expanding the nonattainment area to include Bucks and Montgomery counties will not help the region attain the annual $PM_{2.5}$ standard.

PITTSBURGH AREA

In the June 29, 2004 letter, EPA proposed to expand the Pittsburgh-Beaver Valley nonattainment area to include eight counties: Allegheny, Beaver, Butler, Westmoreland, Washington, Armstrong, Greene and Lawrence. Pennsylvania recommends that this area be limited to Allegheny, Beaver, Westmoreland and Washington counties. In addition, Pennsylvania recommends the creation of two nonattainment areas within the Pittsburgh Area based on strong evidence of a localized problem affecting each of these monitors. These two locations are the area surrounding the Liberty monitor and the area surrounding the North Braddock monitor. An analysis of the monitoring data shows that these two monitors correlate poorly with the other monitors sited in the region.

EPA Analysis and Support for an Expanded Nonattainment Area

Technical justifications for expanding the Pittsburgh $PM_{2.5}$ nonattainment area were included in Enclosure B of EPA's June 29, 2004 letter sent to Pennsylvania. EPA used nine criteria to determine which counties should be included in the Pittsburgh nonattainment area. These criteria included emissions, air quality, population, traffic and commuting patterns, expected growth, meteorology, geography/topography, jurisdictional boundaries, and level of emission controls.

EPA placed a high emphasis on the weighted emissions score in its supporting document. EPA concluded its weighted emissions analysis showed Butler County and three adjacent counties, Armstrong, Greene and Lawrence, significantly contribute to the region's nonattainment problem. Additional analysis factors including population density, growth

and commuting, were also cited in support for expanding the Pittsburgh nonattainment area to include these counties.

The Feasibility in Creating Two Separate Smaller Nonattainment Areas within the Larger Proposed Pittsburgh Nonattainment Area

Figure 8 shows a display of the $PM_{2.5}$ monitor location in EPA's proposed Pittsburgh Nonattainment area. Take note of the three monitor names with the blue background. The three monitors in question are the Clairton, Liberty and North Braddock. These three monitors have the highest $PM_{2.5}$ design values in the proposed area, as can be seen on Figure 9. The Liberty monitor has the highest design value in the entire Northeastern US at 21.2 $\mu g/m^3$. The Clairton monitor at 17.3 $\mu g/m^3$ and the North Braddock monitor at 16.9 $\mu g/m^3$ are the next highest design values in the region and have values at least 1 $\mu g/m^3$ higher than the next highest in the proposed Nonattainment area (Harrison at 15.9 $\mu g/m^3$). $PM_{2.5}$ concentrations of monitors surrounding the three listed above show only levels at or slightly above the 15.0 $\mu g/m^3$ standard. After further evaluation of the data, we have concluded that the resulting design values at each of the three high monitors indicated above are due to local influences. Consequently, Pennsylvania is recommending that two additional, smaller Nonattainment areas inside of the bigger Pittsburgh Nonattainment area be established. These areas will consist of the five municipalities in the Liberty and the two municipalities in the North Braddock area, as shown in Figure 10.

Liberty

The proposed Liberty Nonattainment area consists of five municipalities (City of Clairton, Borough of Glassport, Liberty Borough, Borough of Lincoln, and Port Vue Borough). This area consists of the same five municipalities designated by the US EPA and thus codified in 40 CFR Part 81 on November 6, 1991 for being in Nonattainment of the PM_{10} 24 hour and annual standards.

The Liberty area will also consist of both the Clairton (in the City of Clairton) and Liberty (in Liberty Borough) $PM_{2.5}$ monitors. Discounting the North Braddock monitor at the moment, we have to ask ourselves why this area is so much higher than the surrounding area. The analysis that we completed will help to demonstrate that local influences are having an effect on the $PM_{2.5}$ concentrations measured at each one of the monitors. Pennsylvania completed a contribution assessment analysis to try to characterize in what concentration range most of the contribution to the design value is occurring.

An analysis of the data for the Liberty area revealed the following contribution assessment (expressed in $PM_{2.5}$ in $\mu g/m^3$).

Site Name	0-7.5	7.5-15	15-22.5	22.5-30	30-37.5	37.5-45	45-52.5	52.5-60	60-67.5	67.5-75	Sum
Liberty	-1.2230	-1.2147	0.6456	1.4657	1.6840	1.1766	1.4001	0.8007	0.6910	0.7319	**6.16**

The design value for each day was placed in one of the categories above. For example, on January 1, 2003, the $PM_{2.5}$ measured at Liberty was 5.6 $\mu g/m^3$. Since this value falls in between 0-7.5 in the above chart, the type of contribution this daily value had on the 3-year design value (by comparing this value to 15 $\mu g/m^3$, the current annual standard for $PM_{2.5}$) was determined. Since there were 86 measurements recorded at Liberty between January 1 and March 31, 2003 and knowing there are 12 quarters (12 3-month periods) in order to calculate the 3-year design value, the Department determined that the January 1, 2003 contribution assessment to the 2003 design value was –0.00911 $\mu g/m^3$. If this type of analysis is completed for every day of measurements from January 1, 2001 through December 31, 2003, the values set forth in the above table will be derived. The sum of all values in the above table equals 6.16 $\mu g/m^3$, which shows that the design value should be 6.16 $\mu g/m^3$ above 15 $\mu g/m^3$. See Figure 9 for verification.

Subsequently, this contribution assessment analysis was completed for every site in the proposed Pittsburgh Nonattainment area. The contribution assessment average for all sites, not including the Liberty, Clairton, and North Braddock monitors is set forth below:

Site Name	**0-7.5**	**7.5-15**	**15-22.5**	**22.5-30**	**30-37.5**	**37.5-45**	**45-52.5**	**52.5-60**	**60-67.5**	**67.5-75**	**Sum**
All Sites	-1.6630	-1.6763	0.7806	0.8994	0.7594	0.3327	0.2024	0.2752	0.0174	0.0000	**-0.07**

For comparison, the results from Liberty analysis are shown again as follows:

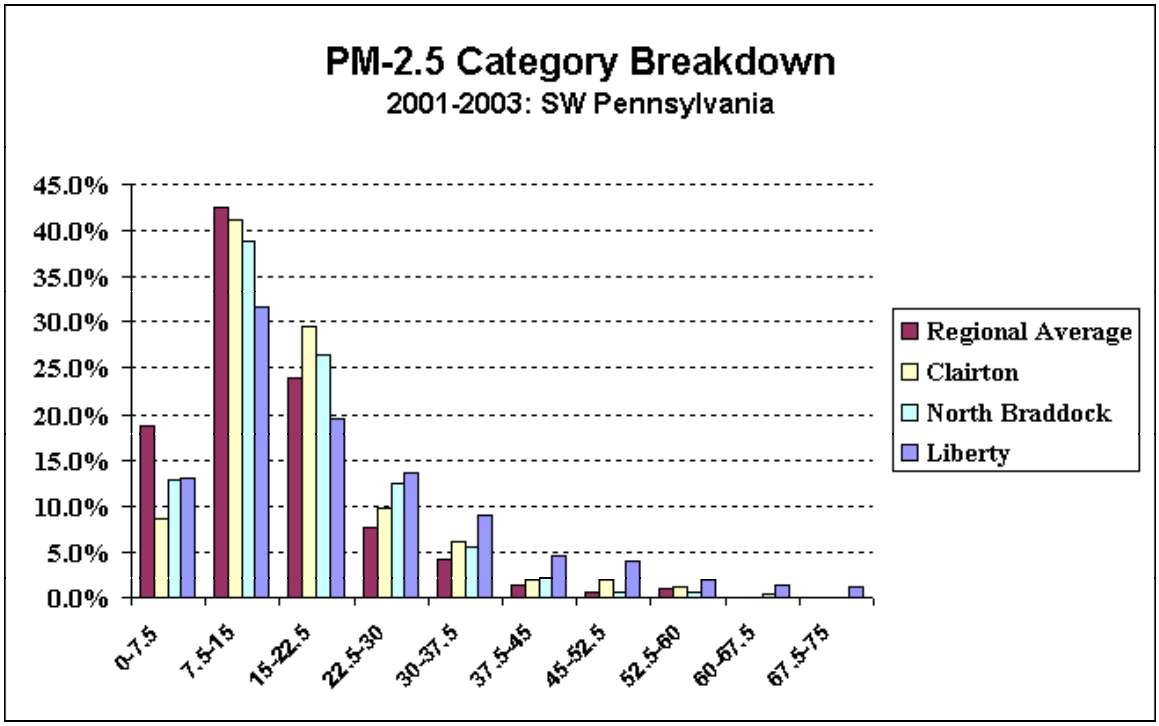
Site Name	**0-7.5**	**7.5-15**	**15-22.5**	**22.5-30**	**30-37.5**	**37.5-45**	**45-52.5**	**52.5-60**	**60-67.5**	**67.5-75**	**Sum**
Liberty	-1.2230	-1.2147	0.6456	1.4657	1.6840	1.1766	1.4001	0.8007	0.6910	0.7319	**6.16**

These data show the following:

1. The heavy contribution of Liberty's design value from 22.5 $\mu g/m^3$ and up as is significantly larger than the regional average.
2. There are a lot more days when the regional concentration is at 15 $\mu g/m^3$ as compared with the Liberty monitor.
3. The regional average sum shows that the regional values have a negative impact on the design value, which, in turn, would allow the monitor to be below the 15 $\mu g/m^3$ annual threshold.

The main question remains: Why is the Liberty monitor so much higher than the regional average? Graph 2 below shows Liberty's categorical breakdown, compared with Clairton, North Braddock and the regional average. As can be seen from the above analysis and Graph 2, the answers should lie in the range of 22.5 $\mu g/m^3$ and higher range of concentrations. The remainder of the contribution assessment analysis will focus on the higher range of concentrations.

Graph 2



The Department also completed a day-to-day comparison of actual measured $PM_{2.5}$ concentrations at Liberty to the regional average. This range was selected to focus on the Liberty's values that were considerably higher than the regional average to in order to determine what was contributing to Liberty's high values. The day-to-day variance in standard deviation was determined and the daily difference in the Liberty value to that of the region was also calculated. The analysis also evaluated a certain number of days set to the criteria above (days where Liberty was at least one standard deviation greater than the regional average) and days when the regional levels were above 15 $\mu g/m^3$ and the Liberty values were above 22.5 $\mu g/m^3$.

In addition, the meteorology that was occurring at the monitor was also examined. The Liberty monitor measures meteorological parameters, including wind speed and wind direction. In fact, Figure 11 shows a wind rose at the Liberty monitor from January 1, 2001 through December 31, 2003. The daily average wind direction over the three-year period was compared to those values with the daily $PM_{2.5}$ concentrations at the Liberty monitor. Subsequently, this wind data was linked to the corresponding high days for Liberty as compared with the regional average. Based on the Department's analysis, there were over 200 days during the three- year period where the Liberty concentrations were at least one standard deviation over the regional average. It is important to note that samples are taken at Liberty every day (1 in 1 monitor). However, the wind analysis on the top 50 days (top 25% of the 200 days) with regards to the days being ranked from highest to lowest with respect to the difference of Liberty's concentration to the rest of the region. Figure 12 shows the wind directions for these top 50 days plotted in a GIS application. On more than 80% of the days, the wind flow from the southwest, flowing

right over top an industrial source is observed. This source is a possible contributor to the $PM_{2.5}$ problem being experienced in Liberty, with the following emissions (direct PM emissions from filterable and condensable measurements and SO2 and NO2 emissions to help formulate sulfates and nitrates, constituents in secondary $PM_{2.5}$ formation):

Source Name	Inventory Year	NO2	PM2.5	PM10	PT	PM Cond	SO2
Liberty Area Industrial Source	2002	5764.22	319.04	740.52	2461.20	109.06	1251.56

Therefore, we strongly recommend that the proposed Liberty area be designated as a separate $PM_{2.5}$ Nonattainment area. Local influences, such as those from the industrial source labeled above, are contributing to the additional $PM_{2.5}$ being measured at the Liberty monitor.

North Braddock

The proposed North Braddock Nonattainment area consists of two municipalities (Braddock Borough and North Braddock Borough).

The North Braddock area will also consist of the North Braddock (in North Braddock Borough) $PM_{2.5}$ monitor. Discounting the Liberty and Clairton monitors at this time, questions raised as to why this area is so much higher than the surrounding area must be addressed. The analysis that the Department has completed will help to demonstrate that local influences are having an effect on the $PM_{2.5}$ concentrations measured at each one of the monitors. Pennsylvania completed a contribution assessment analysis to try to characterize in what concentration range most of the contribution to the design value is occurring.

The Department initially evaluated data for the North Braddock area and observed the following contribution assessment expressed in $PM_{2.5}$ in $\mu g/m^3$).

Site Name	0-7.5	7.5-15	15-22.5	22.5-30	30-37.5	37.5-45	45-52.5	52.5-60	60-67.5	67.5-75	Sum
North Braddock	-1.2247	-1.3675	1.0383	1.2770	0.9955	0.5594	0.2116	0.2683	0.1497	0.0000	**1.91**

The design value for each day is included in one of the above categories. For example, on January 4, 2003, the $PM_{2.5}$ measured at North Braddock was 11.7 $\mu g/m^3$. Since this value falls in between 0-7.5 in the above chart, the type of contribution this daily value had on the 3-year design value (by comparing this value to 15 $\mu g/m^3$, the current annual standard for $PM_{2.5}$) was calculated. Since there were 20 measurements recorded at North Braddock between January 1 and March 31, 2003 and knowing there are 12 quarters (12 3-month periods) in order to calculate the 3-year design value, the Department determined that the January 4, 2003 contribution assessment to the 2001-2003 design value was –0.01375 $\mu g/m^3$. If this type of analysis is completed for every day of measurements from January 1, 2001 through December 31, 2003, the values set forth in the above table will be achieved. The sum of all values in the above table equals 1.91

$\mu g/m^3$, which shows that the design value should be 1.91 $\mu g/m^3$ above 15 $\mu g/m^3$. See Figure 9 for verification.

The Department also completed this contribution assessment analysis for every site in the proposed Pittsburgh Nonattainment area. The contribution assessment average for all sites, not including the Liberty, Clairton, and North Braddock monitors is set forth below:

Site Name	0-7.5	7.5-15	15-22.5	22.5-30	30-37.5	37.5-45	45-52.5	52.5-60	60-67.5	67.5-75	Sum
All Sites	-1.6630	-1.6763	0.7806	0.8994	0.7594	0.3327	0.2024	0.2752	0.0174	0.0000	**-0.07**

The following results from North Braddock analysis are provided below for comparison purposes.

Site Name	0-7.5	7.5-15	15-22.5	22.5-30	30-37.5	37.5-45	45-52.5	52.5-60	60-67.5	67.5-75	Sum
North Braddock	-1.2247	-1.3675	1.0383	1.2770	0.9955	0.5594	0.2116	0.2683	0.1497	0.0000	**1.91**

Based on the data in these two tables the following should be noted:

1. The heavy contribution of North Braddock's design value from 15 $\mu g/m^3$ through to 45 $\mu g/m^3$ as compared to regional average.
2. There are a lot more days when the regional concentration is at 15 $\mu g/m^3$ as compared with the Liberty monitor.
3. The regional average sum shows that the regional values have a negative impact on the design value, which, in turn, would allow the monitor to be below the 15 $\mu g/m^3$ annual threshold.

The main question remains: Why is the North Braddock monitor so much higher than the regional average? Graph 2 (in the Liberty section) shows North Braddock's categorical breakdown, compared with Clairton, Liberty and the regional average. As can be seen from the above analysis and Graph 2, the answers should lie in the range of 15 and 45 $\mu g/m^3$ concentrations. The remainder of the contribution assessment analysis will focus in the 15 – 45 $\mu g/m^3$ range.

The Department also completed a day-to-day comparison of actual measured $PM_{2.5}$ concentrations at North Braddock to the regional average. The range of North Braddock's values that were considerably higher than the regional average were evaluated to determine, if possible, the factors contributing to North Braddock's high values. During this analysis the day-to-day variance in standard deviation and the daily difference in the North Braddock value to that of the region were determined. Subsequently, an analysis on a certain number of days set to the criteria above (days where North Braddock was at least one standard deviation greater than the regional average) was considered as well as the days when the regional levels were above 15 $\mu g/m^3$ and the Liberty values ranged from 15 to 45 $\mu g/m^3$.

The Department also evaluated the meteorological conditions occurring at the monitor. The North Braddock monitor used to measure meteorological parameters, including wind

speed and wind direction, between 1990 and 2000. For this portion of the analysis, the Department considered two of the years: 1999 and 2000 since both of these years have measured PM 2.5 and meteorological parameters. Figure 13 shows a wind rose at the North Braddock monitor from January 1, 1999 through December 31, 2000. The general wind flow through the river valley should be noted. There is a substantial amount of wind flow from the northwest and again out of the southeast. The Department calculated the daily average wind direction over the three-year period and compare those values with the daily $PM_{2.5}$ concentrations at the Liberty. This wind data was linked to corresponding high days for Liberty as compared with the regional average. Based on the analysis, there were 45 days during the two-year period where the Liberty concentrations were at least one standard deviation over the regional average. It is important to note that samples are taken at Liberty every third day (1 in 3 monitor). Therefore, the wind analysis is based on the top 12 days (top 25% of the 45 days) with regards to the days being ranked from highest to lowest with respect to the difference of Liberty's concentration to the rest of the region. Figure 14 shows the wind directions for these top 12 days plotted in a GIS application. On more than 80% of the days, the wind flow from the southeast, flowing right over top an industrial source is observed. This source is a possible contributor to the $PM_{2.5}$ problem being experienced in North Braddock, with the following emissions (direct PM emissions from filterable and condensable measurements and SO2 and NO2 emissions to help formulate sulfates and nitrates, constituents in secondary $PM_{2.5}$ formation):

Source Name	Inventory Year	NO2	PM2.5	PM10	PT	PMCond	SO2
North Braddock Industrial Source	2002	298.17	291.23	359.47	494.71	671.03	1356.49

Based on this analysis, the proposed North Braddock area should be designated as a separate $PM_{2.5}$ Nonattainment area. Local influences, such as those from the industrial source labeled above, are contributing to the additional $PM_{2.5}$ being measured at the North Braddock monitor.

Pennsylvania's Additional Comments Regarding EPA's Analysis

Greene County. Greene County is adjacent to the Pittsburgh MSA. Greene County is a rural, non-industrial county with very low population data and VMT. Emissions from Greene County are dominated by a single power plant, Allegheny Energy Supply's Hatfield's Ferry Power Station that is equipped with low NOx cell burners and ESPs. One of the units has rotating over-fire air and SNCR. Emissions from this single facility account for 99.5% of the county's SO_2 emissions and 86.1% of the NOx emissions. This plant will also be subject to the Best Available Retrofit Technology (BART) requirement under the regional haze program. As discussed previously, Pennsylvania believes that a national or regional multi-pollutant rule is the appropriate mechanism to address emissions from large point sources. Adding Greene County to the Pittsburgh nonattainment area is not a logical or efficient way to address the emissions from the county's power plant. Pennsylvania recommends that EPA designate Greene County as attainment.

Butler County. Butler County contains no significant sources of emissions. Therefore, it does not contribute to the $PM_{2.5}$ nonattainment levels monitored elsewhere in the Pittsburgh Consolidated Metropolitan Statistical Area (CMSA). Based on monitored $PM_{2.5}$ levels in similar non-urban, non-industrial counties, there is no reasonable basis to conclude that this county should be nonattainment. After reviewing EPA's weighted emissions scoring data for the Pittsburgh Area, it is apparent that Butler County scores very low in EPA's own emission weighting scheme. Additionally, the county has low population density and VMT. Based on all of these factors, DEP remains convinced that it is inappropriate to designate Butler as nonattainment for the $PM_{2.5}$ standard.

Armstrong County. Armstrong County was not included in the Pittsburgh MSA as defined by OMB in the June 30, 1999 definitions. It was added to the Pittsburgh CSA in the June 2003 OMB report. Armstrong County has very low population density and VMT. County population is projected to decline substantially over the next decade. In addition, DEP has collected monitoring data from a TEOM monitor in the Kittanning area. This monitor averaged 14.3 ug/m^3 (2001 – 2003 data) demonstrating that the county has $PM_{2.5}$ levels that achieve the standard. Armstrong County does have substantial emissions of sulfur dioxide (SO_2) and nitrogen oxides (NOx). However, virtually all (99.8 % of the SO_2 and 86.4% of the NOx) of these emissions can be attributed to the county's two large power plants, Armstrong and Keystone. The Armstrong plant is equipped with rotating over-fire air, electrostatic precipitators (ESPs) and low NOx burners. The larger of these two plants, Keystone, is located on Armstrong County's eastern border and is equipped with SCR on both units to reduce emissions of nitrogen oxides. An examination of the wind rose from Pittsburgh supports the conclusion that these emission sources would have virtually no impact on the monitors in the Pittsburgh area that are monitoring nonattainment of the $PM_{2.5}$ standard. In addition, it has long been Pennsylvania's position that it is imperative that emissions from large point sources, such as power plants, be addressed through a consistent national or regional control program. EPA's recently proposed Clean Air Interstate Rule (CAIR) would be an appropriate mechanism for addressing these emissions provided more stringent emission caps and timely compliance schedules are promulgated.

Examining EPA's weighted emissions scoring process for Armstrong and Washington demonstrates that absurd conclusions can be drawn from EPA's ranking process. Washington County rates a weighted emissions score of 10.6. Depending on the "cut point" chosen, this would normally indicate that based on emissions this county could be excluded from the nonattainment area. Armstrong County had a weighted emissions score of 60.6 making it higher than Allegheny County, where the major nonattainment values exist. The problem is, interestingly, that Armstrong County monitors attainment while Washington County, with a five-fold lower weighted emissions score, monitors nonattainment. Clearly the rating process must be employed with extreme caution or merely disregarded.

Lawrence County. Lawrence County was not included in the Pittsburgh MSA in the June 30, 1999 OMB definitions. OMB's June 10, 2003 report added Lawrence County to the Pittsburgh MSA. For ozone, Lawrence County has historically been a stand-alone

planning area not included in the Pittsburgh nonattainment area. Lawrence County has relatively low and declining population density. Lawrence County also has relatively low emissions and the bulk of the SO_2 emission (81%) would be addressed by EPA's proposed CAIR provided more stringent emission caps and timely compliance schedules are promulgated. These emissions are from the older New Castle power plant located in the county and covered by BART. All three of the units at the plant are controlled by selective non-catalytic reduction (SNCR) and ESPs. Based on a review of the available data, DEP believes that attainment is the correct designation for Lawrence County.

READING AREA

Pennsylvania concurs with EPA's intended designation of nonattainment for Berks County.

YORK AREA

There is a discrepancy in the York $PM_{2.5}$ annual design value. EPA's analysis indicates the 2001-03-design value is 17.3 $\mu g/m^3$. Our analysis indicates York's design value is slightly lower, 17.1 $\mu g/m^3$.

Pennsylvania concurs with EPA's intended nonattainment designation for York County.

YOUNGSTOWN AREA

On June 29, 2004 EPA released their intended $PM_{2.5}$ designations for Pennsylvania. EPA expanded the Youngstown, Ohio nonattainment to include Mercer County. Three (3) other Ohio counties, Columbiana, Mahoning and Trumbull, were included in the Youngstown nonattainment area. The design monitor for the Youngstown nonattainment area is in Mahoning County and has an annual $PM_{2.5}$ design value of 15.2 $\mu g/m^3$. EPA's report lists Mercer County's design value as 14.3 $\mu g/m^3$. Pennsylvania's records indicate Mercer County's design value is slightly lower at 14.2 $\mu g/m^3$.

EPA Analysis and Support for an Expanded Nonattainment Area

EPA noted a couple of factors supporting the addition of Mercer County into the Youngstown nonattainment area. The first was the inclusion of Mercer County in the 2003 Metropolitan Statistical Area (MSA). Additional factors include moderate contributions from population and commuting.

Pennsylvania's Comments Regarding EPA's Analysis

Mercer County should not be included in the Youngstown nonattainment area. The following comments to EPA's analysis:

Youngstown MSA: EPA's primary reason for including Mercer County in the Youngstown nonattainment area was its inclusion in the Youngstown MSA. MSA and

CMSA boundaries were not restricting factors in other nonattainment areas in Pennsylvania. This application appears inconsistent.

Monitored Values: The Mercer County monitor is well below the annual $PM_{2.5}$ standard. Placing a county that's monitoring attainment into a nonattainment area will cause difficulties in communication and emission control program implementation. Local officials and citizens will question the legitimacy of imposing control measures on an area that is attaining the standard and has not been shown definitely to be contributing to a nonattainment problem.

Mercer County Emissions: Emissions from Mercer County are significantly less than the emissions of either Trumball or Mahoning counties. The same is true for Columbiana County in Ohio. In fact, the combined emissions of Mercer and Columbiana counties are well below the emissions of either Trumball or Mahoning counties. Emissions from Mercer County will have little or no effect on the design monitor since predominant winds place the county downwind of the Youngstown region.

Mercer County's Population: Mercer County's population trends do not support adding this Pennsylvania county to the Youngstown nonattainment area. Census figures indicate the county's population has decreased over the last 20 years, though numbers seem to have stabilized in the 1990s.

Mercer County VMT: Mercer County's VMT is approximately half of either Mahoning or Trumbull counties. Demographics show Mercer County's work-age population (15-64 year olds) has decreased by 1.5% between 1990 and 2000. This should place a ceiling on future VMT, if it is directly related.