UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

AUG 18 2008

Honorable Martin O'Malley
Governor of Maryland
100 State Circle
Annapolis, Maryland 21401

Dear Governor O'Malley:

Thank you for your recommendations on the status of fine particle pollution ($PM_{2.5}$) throughout Maryland. Fine particle pollution represents one of the most significant barriers to clean air facing our nation today. Health studies link these tiny particles – about $1/30^{th}$ the diameter of a human hair – to serious human health problems including aggravated asthma, increased respiratory symptoms like coughing and difficult or painful breathing, chronic bronchitis, decreased lung function, and even premature death in people with heart and lung disease. Fine particle pollution can remain suspended in the air for long periods of time and create public health problems far away from emission sources. Reducing levels of fine particle pollution is an important part of our nation's commitment to clean, healthy air.

The U.S. Environmental Protection Agency (EPA) has reviewed the December 17, 2007 letter from Governor Martin O'Malley, submitting Maryland's recommendations on air quality designations for the 2006 24-hour $PM_{2.5}$ standard. EPA has also reviewed the technical information submitted to support the recommendations. EPA appreciates the effort Maryland has made to develop this supporting information.

Consistent with the Clean Air Act, this letter is to inform you that the EPA supports most of Maryland's recommended nonattainment designations and boundaries, except for the Washington, District of Columbia (D.C.) area. Based upon 2005 to 2007 air quality monitoring data, the Washington, D.C. area is now in attainment. This is truly good news for the residents of Maryland.

EPA has enclosed a detailed analysis of relevant areas that serves as the basis for EPA's preliminary concurrence with Maryland's recommendations, as well as a detailed description of areas where EPA intends to modify Maryland's recommendations, and the basis for such modification. Your Department of the Environment Secretary, the Honorable Shari T. Wilson and the Air and Radiation Management Administration Director, Mr. George S. Aburn, will also receive a copy of this letter and the enclosures. Should you have additional information that you wish to be considered by EPA in this process, please provide it to EPA Region III by October 20, 2008.

EPA has taken steps to reduce fine particle pollution across the country, such as the Clean Diesel Program, to dramatically reduce emissions from highway, nonroad, and stationary diesel engines. In addition, State programs implemented to attain the 1997 $PM_{2.5}$ standards, will also help to reduce unhealthy levels of fine particle pollution.

EPA intends to make final designation decisions for the 2006 24-hour $PM_{2.5}$ standard by December 18, 2008. If you have any questions, please do not hesitate to contact me. Please also be aware that in the near future, EPA is planning to publish a notice in the Federal Register to solicit public comments on our intended designation decisions. EPA looks forward to a continued dialogue with you as we work together to implement the $PM_{2.5}$ standards.

Sincerely,

Donald S. Welsh

Donald S. Welsh
Regional Administrator

Enclosures

cc: Honorable Shari T. Wilson, Secretary
Maryland Department of the Environment

Mr. George S. Aburn, Director
Air and Radiation Management Administration

Enclosure 1

Maryland
Area Designations for the 2006 24-Hour
Fine Particle National Ambient Air Quality Standard

The table below identifies the counties in Maryland that EPA intends to designate as not attaining the 2006 24-hour fine particle standard.[1] A county will be designated as nonattainment if it has an air quality monitor that is violating the standard or if the county is determined to be contributing to the violation of the standard.

Area	Maryland Recommended Nonattainment Counties	EPA's Intended Nonattainment Counties
Baltimore	Anne Arundel County Baltimore County Baltimore City Carroll County Harford County Howard County	Anne Arundel County Baltimore County Baltimore City Carroll County Harford County Howard County
Washington, DC	Charles County Frederick County Montgomery County Prince George's County	None: demonstrating attainment based on 2005-2007 monitoring data

EPA intends to designate the remaining counties as "attainment/unclassifiable."

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

Enclosure 2

Description of the Contributing Emissions Score

The Contributing Emissions Score (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. Using this methodology, scores were developed for each county in and around the relevant metro area. The county with the highest contribution potential was assigned a score of 100, and other county scores were adjusted in relation to the highest county. The CES represents the relative maximum influence that emissions in that county have on a violating county. The CES, which reflects consideration of multiple factors, should be considered in evaluating the weight of evidence supporting designation decisions for each area.

The CES for each county was derived by incorporating the following significant information and variables that impact fine particle ($PM_{2.5}$) transport:

- Major $PM_{2.5}$ components: total carbon (organic carbon (OC) and elemental carbon (EC)), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and inorganic particles (crustal).
- $PM_{2.5}$ emissions for the highest (generally top 5%) $PM_{2.5}$ emission days (herein called "high days" or "high $PM_{2.5}$ days") for each of two seasons, cold (October-April) and warm (May-September).
- Meteorology on high days using the NOAA HYSPLIT model for determining trajectories of air masses for specified days.
- The "urban increment" of a violating monitor, which is the urban $PM_{2.5}$ concentration that is in addition to a regional background $PM_{2.5}$ concentration, determined for each $PM_{2.5}$ component.
- Distance from each potentially contributing county to a violating county or counties.

A more detailed description of the CES can be found at http://www.epa.gov/ttn/naaqs/pm/pm25_2006_techinfo.html#C.

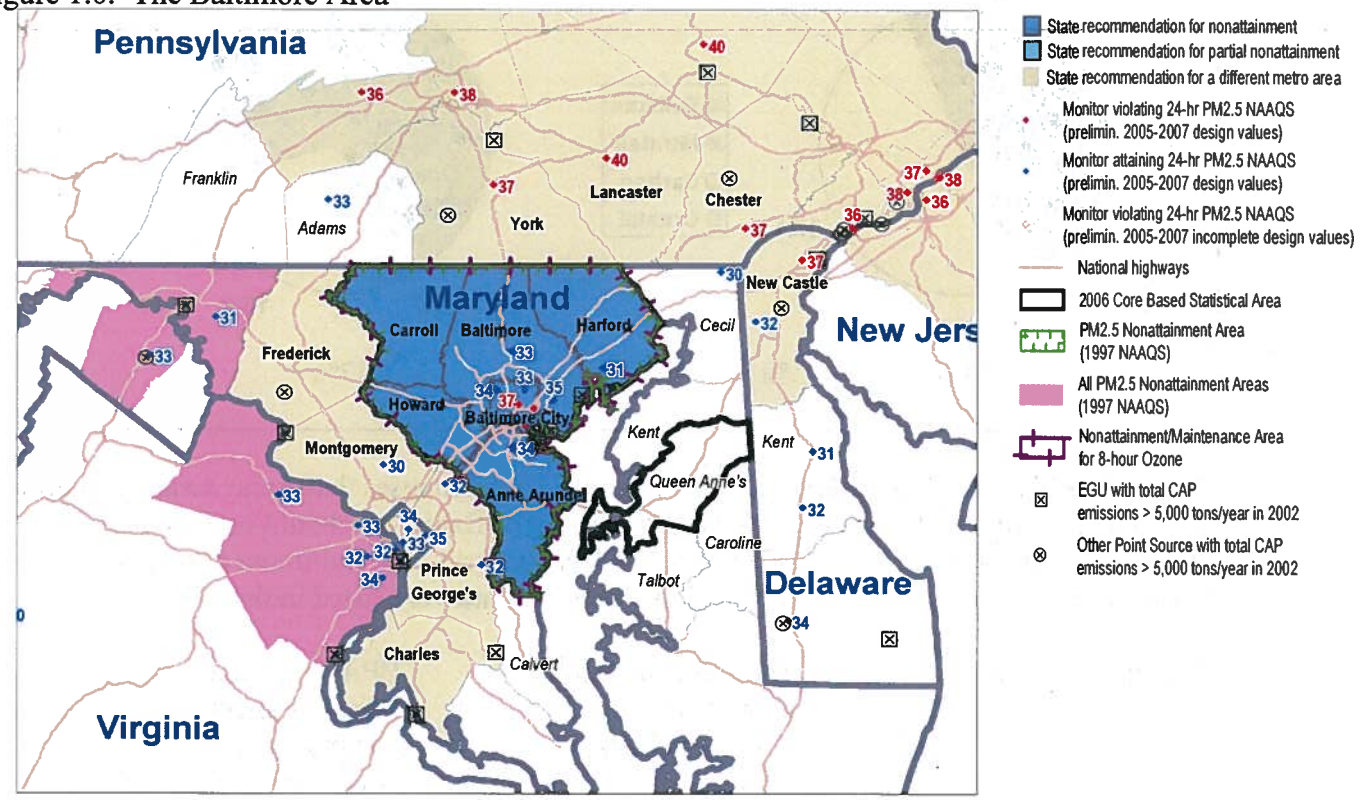
EPA Technical Analysis for the Baltimore Area

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 Baltimore 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 Baltimore area and provides 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 Baltimore Area

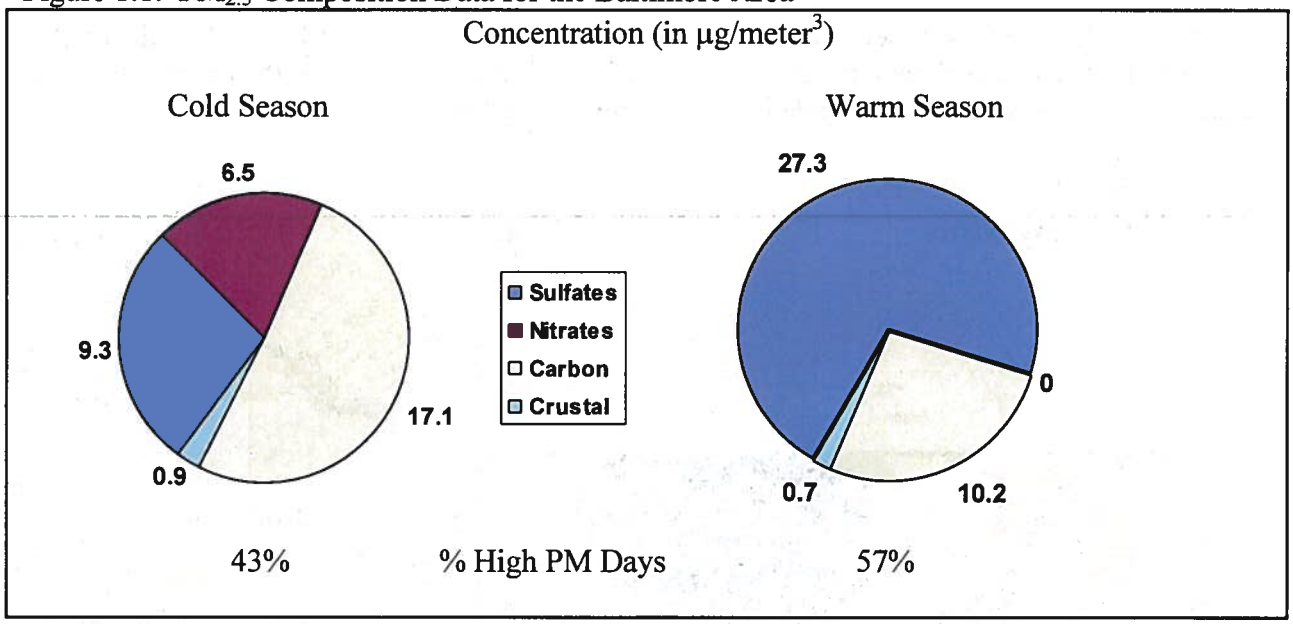


For this area, EPA established nonattainment area boundaries for the 1997 $PM_{2.5}$ NAAQS that included Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, and the City of Baltimore, all within the State of Maryland.

In December 2007, Maryland recommended that the same counties be designated as "nonattainment" for the 2006 24-hour $PM_{2.5}$ standard based on air quality data from 2004-2006. These data are from Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors located in the State. (See the December 17, 2007 letter from Governor O'Malley 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 this data indicates that the days with the highest fine particle concentrations occur in both cool and warm seasons, and the average chemical composition of the highest days is typically characterized by high levels of carbon in the cold season, and high levels of sulfates in the warm season (See Figure 1.1).

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



Based on EPA's 9-factor analysis described below, EPA proposes that Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, and the City of Baltimore should be designated nonattainment for the 2006 24-hour $PM_{2.5}$ NAAQS as part of the Baltimore nonattainment area, based upon currently available information. These counties are listed in the table below.

Baltimore Area	State-Recommended Nonattainment Counties/Cities	EPA-Proposed Nonattainment Counties/Cities
Maryland	Anne Arundel County Baltimore County Carroll County Harford County Howard County City of Baltimore	Anne Arundel County Baltimore County Carroll County Harford County Howard County City of Baltimore

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

The Baltimore area is bounded by a large number of counties, several of which have been part of other nonattainment areas in the past. For this 9-factor analysis, we have taken the approach of parsing the analysis geographically, in order to evaluate the smaller census-defined geographic areas that comprise the larger Washington-Baltimore-Northern Virginia combined statistical area (CSA) of which Baltimore is part. Under the 1997 $PM_{2.5}$ air quality standard, EPA designated the Washington, DC-MD-VA and Baltimore-MD metropolitan areas as separate nonattainment areas. The Hagerstown-Martinsburg, MD-WV metropolitan statistical area (MSA) was also designated as a separate nonattainment area.

The 2006 census includes the Baltimore-Towson, MD MSA as a part of the larger Washington-Baltimore-Northern Virginia combined statistical area:

Washington-Baltimore-Northern Virginia, DC-MD-VA-WV Combined Statistical Area

Baltimore-Towson, MD Metropolitan Area
Culpeper, VA Micropolitan Area
Lexington Park, MD Micropolitan Area
Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area
Winchester, VA-WV Metropolitan Statistical Area

For the 1997 $PM_{2.5}$ NAAQS nonattainment designations, EPA used the MSA boundary as a presumptive boundary in determining nonattainment areas. For the 2006 $PM_{2.5}$ NAAQS, EPA is starting with areas already designated nonattainment for the 1997 $PM_{2.5}$ NAAQS and evaluating counties within and contiguous to the area.

Because the violations in this large metropolitan area are in Baltimore, this technical analysis examines the existing Baltimore nonattainment area for the 1997 $PM_{2.5}$ NAAQS, and a ring of counties surrounding and contiguous to that area. Counties beyond that ring will be excluded from further analysis. If a county was evaluated here that was part of a separate nonattainment area under the 1997 $PM_{2.5}$ NAAQS and that state has recommended inclusion of that county in another nonattainment area for the 2006 $PM_{2.5}$ NAAQS, that county will not be included in this analysis for the Baltimore area if EPA agrees that it is appropriate to consider that county as part of the other area instead, based upon economic integration, location in an air shed, or other relevant reasons. Accordingly, the following counties will be excluded from further consideration for inclusion within the Baltimore nonattainment area.

Counties	Reasons for Exclusion from Further Analysis
Montgomery, MD Prince George's, MD Frederick, MD Charles, MD Calvert, MD	These counties are part of the larger 2006 Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA, and were part of the Washington, DC nonattainment area for the 1997 $PM_{2.5}$ NAAQS. While Maryland recommended these counties be nonattainment for the 2006 $PM_{2.5}$ NAAQS, they indicated that they should be part of a Washington nonattainment area, separate from the Baltimore area. The 1997 Washington $PM_{2.5}$ area is now demonstrating attainment based on 2005-2007 monitoring data.
Chester, PA	These counties are part of the Philadelphia nonattainment area for the 1997

Counties	Reasons for Exclusion from Further Analysis
New Castle, DE	$PM_{2.5}$ NAAQS and have been recommended by Pennsylvania and Delaware for inclusion in other nonattainment areas for the 2006 $PM_{2.5}$ NAAQS.
Lancaster, PA	This county is part of the Lancaster, PA nonattainment area for the 1997 $PM_{2.5}$ NAAQS and has been recommended for inclusion in the Lancaster nonattainment area for the 2006 $PM_{2.5}$ NAAQS.
York, PA	This county is part of the York nonattainment area for the 1997 $PM_{2.5}$ NAAQS and has been recommended for inclusion in the York nonattainment area for the 2006 $PM_{2.5}$ NAAQS.

Note: Data for these areas/counties will be included in the tables for the remaining factors, for reference.

The Baltimore area has monitors that based on 2005-2007 FRM and FEM data in the EPA Air Quality System (AQS) violate the 2006 24-hour $PM_{2.5}$ NAAQS. There are large populations, emissions sources, and vehicle traffic in the Baltimore area that warrant its designation as nonattainment. Based on the overall 9-factor analysis below, the counties that are part of 1997 $PM_{2.5}$ standard Washington, DC-MD-VA nonattainment area, are being recommended for attainment of the 2006 24-hour $PM_{2.5}$ NAAQS.

The Washington, DC-MD-VA area that borders the Baltimore area was classified as nonattainment under the 1997 $PM_{2.5}$ standard, however monitoring data shows that the Washington area is meeting the 2006 $PM_{2.5}$ standard for the period from 2005-2007. In its December 2007 recommendation letter to EPA, Maryland recommended that four counties in the Maryland portion of the Washington, DC-MD-VA metropolitan area (Frederick, Montgomery, Prince George's, and Charles) be designated nonattainment under the 2006 $PM_{2.5}$ NAAQS, based upon 2004-2006 monitoring data for the Washington, DC area. Monitoring data for the 2005-2007 period now shows that the entire 1997 Washington, DC-MD-VA nonattainment area is meeting the 2006 $PM_{2.5}$ NAAQS.

The counties that comprise the 1997 Baltimore $PM_{2.5}$ nonattainment area and the counties that comprise the 1997 Washington, DC-MD-VA nonattainment area have a long history, including separate regional planning organizations made up of separate local political jurisdictions that have historically focused on separate planning for air quality in the Baltimore and Washington areas. EPA believes these well-developed jurisdictional boundaries reflect that Baltimore and Washington are appropriately treated as separate areas for air pollution control purposes. Moreover, the commuting data for the Baltimore area shown below in Factor 4, below demonstrate that there is very little commuting between the Baltimore and Washington metropolitan areas. Because mobile source emissions are a major source of $PM_{2.5}$ precursor emissions in both areas, there is a strong argument for separating the Maryland portion of the Washington area from the Baltimore 2006 24-hour $PM_{2.5}$ area. Although several of the Maryland counties in the Washington area that border the Baltimore area to the south and east appear to contribute to Baltimore, EPA believes these counties are not impacting the Baltimore area as much as the core counties in the Baltimore area. Thus, EPA believes that these adjacent Maryland counties do not need to be included within the Baltimore area designated nonattainment for the 2006 $PM_{2.5}$ NAAQS. Maryland may wish to reconsider its recommendation for these four counties based upon the more recent monitoring data for the Washington area. EPA will continue to assess the potential impact of these counties on air quality in the Baltimore area.

Therefore, EPA proposes to maintain the same boundaries set under the 1997 $PM_{2.5}$ NAAQS in designating the Baltimore area nonattainment under the 2006 24-hour $PM_{2.5}$ NAAQS.

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.

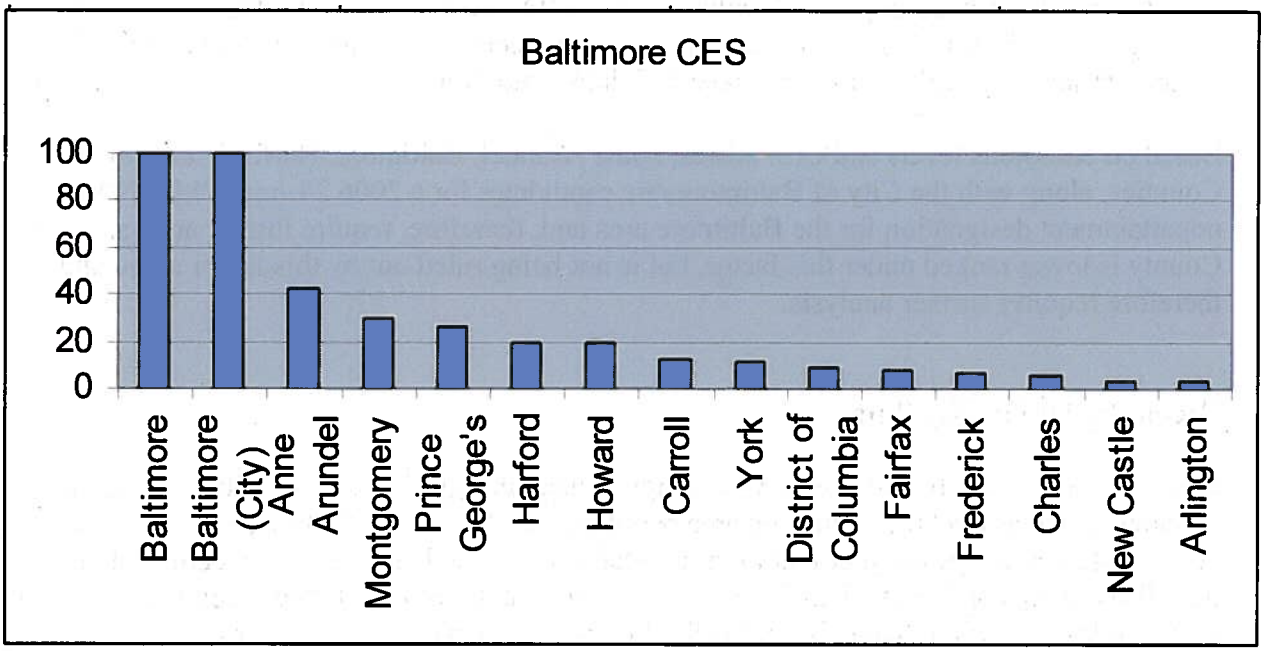
EPA also considered the Contributing Emissions Score (CES) for each county. EPA also considered the Contributing Emissions Score (CES) for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive means of 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 $PM_{2.5}$ components (given in tons per year) and the CES for violating and potentially contributing counties in and around the Baltimore area. Counties that are part of the Baltimore nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface. Counties are listed in descending order by CES, by metropolitan area within the 2006 Office of Management and Budget (OMB) defined Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA. For each metropolitan area in Table 1.0, the counties are listed in order, from highest CES value to lowest.

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

County, State	State Recommended Nonattainment	CES	$PM_{2.5}$ emissions - total (tpy)	$PM_{2.5}$ emissions - carbon (tpy)	$PM_{2.5}$ emissions - other (tpy)	SO_2 (tpy)	NO_x (tpy)	VOC (tpy)	NH_3 (tpy)
Baltimore-Towson, MD Metropolitan Area (as defined by OMB on 12/18/2006) Counties									
Baltimore, MD	**Yes**	**100**	**6,437**	**1,892**	**4,547**	**44,626**	**34,467**	**31,163**	**1,266**
Baltimore City, MD	**Yes**	**100**	**2,175**	**777**	**1,397**	**11,407**	**19,061**	**20,312**	**628**
Anne Arundel, MD	**Yes**	**43**	**4,874**	**1,311**	**3,563**	**70,568**	**33,573**	**20,421**	**979**
Harford, MD	**Yes**	**20**	**1,769**	**879**	**890**	**2,307**	**7,310**	**10,512**	**967**
Howard, MD	**Yes**	**20**	**1,075**	**599**	**475**	**2,404**	**9,892**	**10,980**	**528**
Carroll, MD	**Yes**	**13**	**1,562**	**653**	**909**	**1,476**	**6,410**	**6,860**	**1,836**
Queen Anne's, MD	No	3	659	261	398	479	2,076	3,290	1,365
Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Counties (as defined by OMB on 12/18/2006)									
Montgomery, MD	Yes – other	30	7,031	2,095	4,937	41,801	26,763	28,692	1,090
Prince George's, MD	Yes – other	27	6,737	1,531	5,206	63,981	34,959	27,826	1,193
Frederick, MD	Yes – other	7	2,478	1,051	1,427	9,275	11,315	11,927	2,741
Charles, MD	Yes – other	6	3,484	612	2,871	81,281	17,058	6,433	277
Calvert, MD	No	2	645	335	309	425	1,868	4,357	146
Counties outside, but contiguous to the 2006 Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA)									
York, PA	Yes – other	12	7,614	1,217	6,396	118,621	32,214	18,478	3,913
New Castle, DE	Yes – other	4	2,394	891	1,504	50,955	28,291	19,269	1,699
Cecil, MD	No	3	870	446	425	1,298	3,962	5,853	749
Lancaster, PA	Yes- other	3	3,258	1,159	2,099	4,017	16,396	26,407	16,486
Adams, PA	No	2	1,142	444	697	581	2,825	4,660	3,353
Kent, MD	No	2	443	162	282	471	1,002	2,225	1,050
Chester, PA	Yes – other	1	2,124	799	1,325	7,990	16,507	19,666	2,563
Kent, DE	No	1	1,014	435	580	4,478	9,088	6,301	1,803
Franklin, PA	No	0	1,083	385	699	851	5,470	6,972	5,092
Caroline, MD	No	0	343	119	223	566	1,111	2,710	2,608
Talbot, MD	No	0	601	271	330	799	2,632	4,169	844

Figure 1.2. Baltimore Area and Surrounding Counties CES Scores



With respect to the Baltimore-Towson metropolitan area, $PM_{2.5}$ precursor emissions are highest in Baltimore and Anne Arundel Counties. Sulfur dioxide (SO_2) emissions are highest in Anne Arundel County, followed by Baltimore County and Baltimore City. Nitrogen oxide (NO_x) emissions are highest in Anne Arundel and Baltimore County, followed by Baltimore City. Volatile organic compound (VOC) emissions are highest in Baltimore County, followed by Baltimore City and Baltimore County. Ammonia (NH_3) emissions are comparatively low in the Baltimore-Towson metropolitan area. Of particular note are that all $PM_{2.5}$ precursor emissions types are much lower in Queen Anne's County than in any other county in the Baltimore-Towson metropolitan area.

For the counties neighboring the Baltimore area that are part of the Washington-Arlington-Alexandria, DC-VA-MD-WV area, emissions of $PM_{2.5}$, NO_x, and VOC are highest in Montgomery and Prince Georges Counties. In this area, SO_2 emissions are highest in Charles County, followed by Prince Georges and Montgomery Counties. In this area, NH_3 emissions are highest in Frederick County. Emissions in Calvert County are much lower in comparison to the other counties in this area.

For the remaining counties that neighbor the Baltimore area, but lie outside the Washington-Baltimore-Northern Virginia CSA, emissions are highest in York, Lancaster, and Chester Counties in Pennsylvania and in New Castle County, Delaware. These four counties have been recommended for nonattainment by Pennsylvania and Delaware as part of other neighboring nonattainment areas. Separate 9-factor analyses have been prepared by EPA for those areas.

Figure 1.2 shows the CES scores in a bar graph in descending order, with no breakout by metropolitan area. Baltimore County and Baltimore City have the highest CES (normalized to 100), which coupled with their large contribution of emissions form a strong argument for their designation as nonattainment. Anne Arundel, Montgomery, Prince Georges, Harford, and Howard all have comparatively high CES values, coupled with relatively high emissions levels that support nonattainment designation. Carroll County has a relatively low CES value of 13.

Based on the low $PM_{2.5}$ precursor emissions levels, Cecil, Calvert, Caroline, Kent, and Talbot Counties in Maryland, along with Franklin County, PA and Kent, County, DE are very low ranking for this factor. None of these counties were recommended for nonattainment by its respective state, nor did any of them have a violating monitor.

Based on emissions levels and CES scores, Anne Arundel, Baltimore, Harford, and Howard Counties, along with the City of Baltimore, are candidates for a 2006 24-hour $PM_{2.5}$ NAAQS nonattainment designation for the Baltimore area and, therefore, require further analysis. Carroll County is lower ranked under this factor, but is not being ruled out by this factor alone and therefore requires further analysis.

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 and around the Baltimore 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 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 and around the Baltimore area are shown in Table 2.0. The location of the Table 2.0 is delineated to show those counties in the Baltimore-Towson MSA, those in the Washington MSA, and those outside the larger Washington-Baltimore-Northern Virginia, DC-MD-VA-WV combined statistical area.

Table 2.0. Air Quality Data

County, State	State Recommended Nonattainment?	24-hr $PM_{2.5}$ Design Values, 2004-2006 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2004-2006 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2005-2007 ($\mu g/m^3$)
Baltimore-Towson, MD Metropolitan Area Counties (as defined by OMB on 12/18/2006)				
Baltimore, MD	**Yes**	**37**	**36**	**35**
Baltimore City, MD	**Yes**	**41**	**39**	**37**
Anne Arundel, MD	**Yes**	**37**	**35**	**34**
Harford, MD	**Yes**	**34**	**31**	**31**
Howard, MD	**Yes**	**No monitor**		
Carroll, MD	**Yes**	**No monitor**		
Queen Anne's, MD	No	No monitor		
Neighboring Counties in the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area (as defined by OMB on 12/18/2006)				
Montgomery, MD	Yes - other	32	31	30
Prince George's, MD	Yes - other		35	32
Frederick, MD	Yes - other	No monitor		
Charles, MD	Yes - other	No monitor		
Calvert, MD	No	No monitor		

Neighboring Counties Outside the Washington-Baltimore-Northern Virginia, DC-MD-VA-WV Metropolitan Area (as defined by OMB on 12/18/2006)				
York, PA	Yes - other	41	37	37
New Castle, DE	Yes - other	37	37	37
Cecil, MD	No	33	30	30
Lancaster, PA	Yes - other	44	39	40
Adams, PA	No	36	35	33
Kent, MD	No	No monitor		
Chester, PA	Yes - other			37
Kent, DE	No	32	32	32
Franklin, PA	No	No monitor		
Caroline, MD	No	No monitor		
Talbot, MD	No	No monitor		
Note: Design values shown in red represent violations of the standard				

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

The Baltimore-Towson metropolitan area has one monitor (in Baltimore County) that, based on 2005-2007 FRM and FEM data in the EPA Air Quality System (AQS), shows a violation of the 2006 24-hour $PM_{2.5}$ standard. Therefore this county is included in the Baltimore nonattainment area.
The City of Baltimore's 2005-07 design value is 37 $\mu g/m^3$, although the design value appears to be trending downward over time. Anne Arundel County's most recent design value of 34 also appears to trend downward.

York, Lancaster, and Chester, PA and New Castle, DE all show violations of the 2006 24-hour $PM_{2.5}$ standard. As noted earlier, these counties have been recommended for nonattainment as part of other areas, and for jurisdictional and geographic reasons it makes sense to do so.

Monitoring data for the neighboring Washington-Arlington-Alexandria metropolitan area (which was classified as nonattainment under the 1997 $PM_{2.5}$ standard) shows that the area is meeting the 2006 $PM_{2.5}$ standards for the period from 2005-2007. Therefore, EPA is considering herein whether the same boundaries that were established for implementing the 1997 $PM_{2.5}$ NAAQS may also be appropriate for implementing the 2006 24-hour $PM_{2.5}$ NAAQS.

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

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

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

Table 3.0. Population

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq mile)
Baltimore-Towson Metropolitan Area (as defined by OMB on 12/18/2006)			
Baltimore, MD	**Yes**	**783,405**	**1,255**
Baltimore City, MD	**Yes**	**636,377**	**7,315**
Anne Arundel, MD	**Yes**	**509,397**	**1,127**
Harford, MD	**Yes**	**238,850**	**519**
Howard, MD	**Yes**	**269,174**	**1,063**
Carroll, MD	**Yes**	**168,397**	**371**
Queen Anne's, MD	No	45,469	115
Contiguous counties in the Washington-Arlington-Alexandria, DC-VA-MD-WV metropolitan area (as defined by OMB on 12/18/2006)			
Montgomery, MD	Yes - other	927,405	1,834
Prince George's, MD	Yes - other	842,764	1,711
Frederick, MD	Yes - other	220,409	331
Charles, MD	Yes - other	138,106	292
Calvert, MD	No	87,622	369
Counties outside (but contiguous to) the 2006 Washington-Baltimore-Northern Virginia, DC-MD-VA-WV metropolitan area			
York, PA	Yes - other	408,182	449
New Castle, DE	Yes - other	522,094	1,077
Cecil, MD	No	97,474	257
Lancaster, PA	Yes - other	489,936	499
Adams, PA	No	99,746	191
Kent, MD	No	19,908	67
Chester, PA	Yes - other	473,723	624
Kent, DE	No	143,462	240
Franklin, PA	No	137,273	178
Caroline, MD	No	31,805	98
Talbot, MD	No	35,630	114

The Baltimore area is comprised of several highly dense populations, with densely populated inner suburbs that adjoin with suburbs in the Washington area. The data in Table 3.0 indicates that the highest population levels and densities are in the City of Baltimore and Baltimore

County, as well as Anne Arundel County. Harford, Howard, and Carroll Counties have slightly lower populations. Queen Anne's County has much smaller population and population density.

The Baltimore-Towson and the Washington-Arlington-Alexandria metropolitan statistical areas have fairly dense populations that merge together at the two area's boundary. The neighbouring Washington area counties also have high populations (and in some cases high population density). Of these, Montgomery and Prince Georges Counties in Maryland have the largest populations (coupled with high population density) in the entire area of analysis. Frederick County to the west and Charles County to the south of the Baltimore area also have high, albeit smaller, populations. Calvert County to the south has a much smaller population.

Of the counties in and around the Baltimore area that lay outside the Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA, the Maryland counties of Cecil, Caroline, Kent, and Talbot have relatively tiny populations and population densities. Franklin and Adams Counties Pennsylvania also have tiny populations, as does Kent County Delaware.

The remaining counties listed in Table 3.0 that are outside the CSA have fairly large populations, but have been recommended for nonattainment as part of other 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 Baltimore area, the percentage of total commuters in each county who commute to other counties within the area, as well as the total Vehicle Miles Traveled (VMT) for each county in thousands of miles (see Table 4.0). A county with numerous commuters is generally an integral part of an urban area is likely contributing to fine particle concentrations in the area.

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

Table 4.0. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 Vehicle Miles Traveled (1000s miles)	Number Commuting into any Violating Counties	Percent Commuting into any Violating Counties	Number Commuting into Statistical Area	Percent Commuting into Statistical Area
Baltimore-Towson, MD Metropolitan Area (as defined by OMB on 12/18/2006)						
Baltimore, MD	**Yes**	**8,032**	**307,530**	**82**	**355,270**	**95**
Baltimore City, MD	**Yes**	**3,940**	**213,680**	**86**	**238,530**	**96**
Anne Arundel, MD	**Yes**	**5,572**	**36,370**	**14**	**196,300**	**77**
Harford, MD	**Yes**	**2,068**	**44,070**	**40**	**105,120**	**94**
Howard, MD	**Yes**	**3,481**	**25,920**	**19**	**92,380**	**69**

County, State	State Recommended Nonattainment?	2005 Vehicle Miles Traveled (1000s miles)	Number Commuting into any Violating Counties	Percent Commuting into any Violating Counties	Number Commuting into Statistical Area	Percent Commuting into Statistical Area
Carroll, MD	**Yes**	**1,294**	**22,560**	**29**	**66,950**	**87**
Queen Anne's, MD	No	758	1,300	6	14,450	70
Contiguous counties in the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area (as defined by OMB on 12/18/2006)						
Montgomery, MD	Yes – other area	7,606	4,800	1	13,590	3
Prince George's, MD	Yes – other area	8,680	5,570	1	21,970	6
Frederick, MD	Yes – other area	3,024	1,960	2	6,480	6
Charles, MD	Yes – other area	1,266	290	0	940	2
Calvert, MD	No	673	310	1	2,280	6
Counties outside (but contiguous to) the 2006 Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA						
York, PA	Yes – other area	3,333	158,530	82	15,820	8
New Castle, DE	Yes – other area	5,674	214,930	88	870	0
Cecil, MD	No	1,193	16,690	40	6,090	15
Lancaster, PA	Yes – other area	4,392	212,400	92	360	0
Adams, PA	No	742	12,110	27	3,090	7
Kent, MD	No	219	630	7	900	10
Chester, PA	Yes – other area	4,414	153,810	71	320	0
Kent, DE	No	1,435	6,140	10	280	1
Franklin, PA	No	1,535	510	1	160	0
Caroline, MD	No	329	310	2	1,980	14
Talbot, MD	No	614	200	1	1,540	10

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 data from Table 4.0 indicates that the City of Baltimore and Baltimore County have the highest levels of commuters and the highest percentage of commuters traveling into the Baltimore metropolitan area (and into the violating county). Anne Arundel, Harford, Howard, and Carroll also have relatively high commuter levels and percentages of commuters travelling into the Baltimore area. These counties represent the largest share of commuter miles into the Baltimore area.

The Maryland portion of the Washington-Arlington-Alexandria area (Montgomery, Prince Georges, Charles, and Calvert Counties) have very high 2005 VMT levels, but low contribution of commuter traffic into the Baltimore area, and in particular, into a county in the Baltimore area with a violating monitor.

Baltimore and Anne Arundel Counties, along with the City of Baltimore, are high-ranking counties based on this factor, and are also counties that are nonattainment candidates based on other factors.

Factor 5: Growth Rates and Patterns

This factor considers population growth for 2000-2005 and growth in vehicle miles traveled for 1996-2005 for counties in and around the Baltimore 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. Population and VMT Values and Percent Change

County, State	Population (2005)	Population Density (people/ square mile) (2005)	Percent Population Change (2000-2005)	2005 Vehicle Miles Travelled (millions)	VMT % Change (1996-2005)
Baltimore-Towson, MD Metropolitan Area (as defined by OMB on 12/18/2006)					
Baltimore, MD	**783,405**	**1255**	**4**	**8,032**	**32**
Anne Arundel, MD	**509,397**	**1127**	**4**	**5,572**	**45**
Baltimore City, MD	**636,377**	**7315**	**(2)**	**3,940**	**(34)**
Howard, MD	**269,174**	**1063**	**8**	**3,481**	**86**
Harford, MD	**238,850**	**519**	**9**	**2,068**	**0**
Carroll, MD	**168,397**	**371**	**11**	**1,294**	**(6)**
Queen Anne's, MD	45,469	115	11	758	81
Contiguous counties that are part of the Washington-Arlington-Alexandria, DC-VA-MD-WV Metropolitan Area(as defined by OMB on 12/18/2006)					
Prince George's, MD	842,764	1711	5	8,680	37
Montgomery, MD	927,405	1834	6	7,606	16
Frederick, MD	220,409	331	12	3,024	38
Charles, MD	138,106	292	14	1,266	38
Calvert, MD	87,622	369	17	673	(4)
New Castle, DE	522,094	1077	4	5,674	25
Chester, PA	473,723	624	9	4,414	54
Lancaster, PA	489,936	499	4	4,392	21

Counties outside (but contiguous to) the 2006 Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA					
York, PA	408,182	449	7	3,333	6
Cecil, MD	97,474	257	13	1,193	10
Franklin, PA	137,273	178	6	1,535	18
Kent, DE	143,462	240	13	1,435	5
Adams, PA	99,746	191	9	742	9
Talbot, MD	35,630	114	5	614	105
Caroline, MD	31,805	98	7	329	20
Kent, MD	19,908	240	3	219	42

Table 5.0 shows population, population growth, VMT, and VMT growth for counties that are in and around the Baltimore area, by metropolitan statistical area. Counties that lie outside the Washington-Baltimore-Northern Virginia, DC-MD-VA-WV consolidated statistical area are listed in the bottom section the table.

Based upon this data, in the Baltimore metropolitan area, Baltimore and Anne Arundel Counties have the highest overall VMT. Howard and Queen Anne's have the highest VMT growth rates, by percentage, but their overall VMT levels are much lower. Baltimore County and the City of Baltimore have the highest populations in the Baltimore metropolitan area, and the City of Baltimore has the area's highest population density. Carroll and Queen Anne's Counties have the highest population growth rate, although their populations remain much smaller.

In the counties around Baltimore that are part of the Washington DC metropolitan area, the data in Table 5.0 indicates that Prince Georges and Montgomery County have the highest VMT levels. These are coupled with very significant VMT growth rates over the entire portion of the Washington area begin evaluated, particularly for Prince George's, Frederick, and Charles Counties.

In the counties that neighbor the Baltimore metropolitan area that are not part of the Washington-Baltimore-Northern Virginia CSA, there are several counties having high populations and several that are experiencing significant VMT growth rates. However, as stated earlier, many of these areas have been recommended for inclusion in other nonattainment areas bordering the Baltimore area. Cecil County, Maryland; Franklin County, Pennsylvania; and Kent County, Delaware all have moderate levels of VMT and moderate VMT growth. Of the remaining counties listed in this section of Table 5.0, most do not have comparatively high levels of VMT, although VMT is growing rapidly in some of these counties (e.g., Talbot County, Maryland has experienced triple digit VMT growth since 2000). Their low levels of VMT do not warrant nonattainment designation on the basis of this factor.

Baltimore County and City, and Anne Arundel County are high ranking candidates for nonattainment based on this factor, and based on other factors and their CES scores. Prince George's and Montgomery Counties are high ranking on the basis of this factor, but Factor 4 indicates that their commuting patterns are heavily weighted towards the Washington metropolitan area and away from the Baltimore metro area.

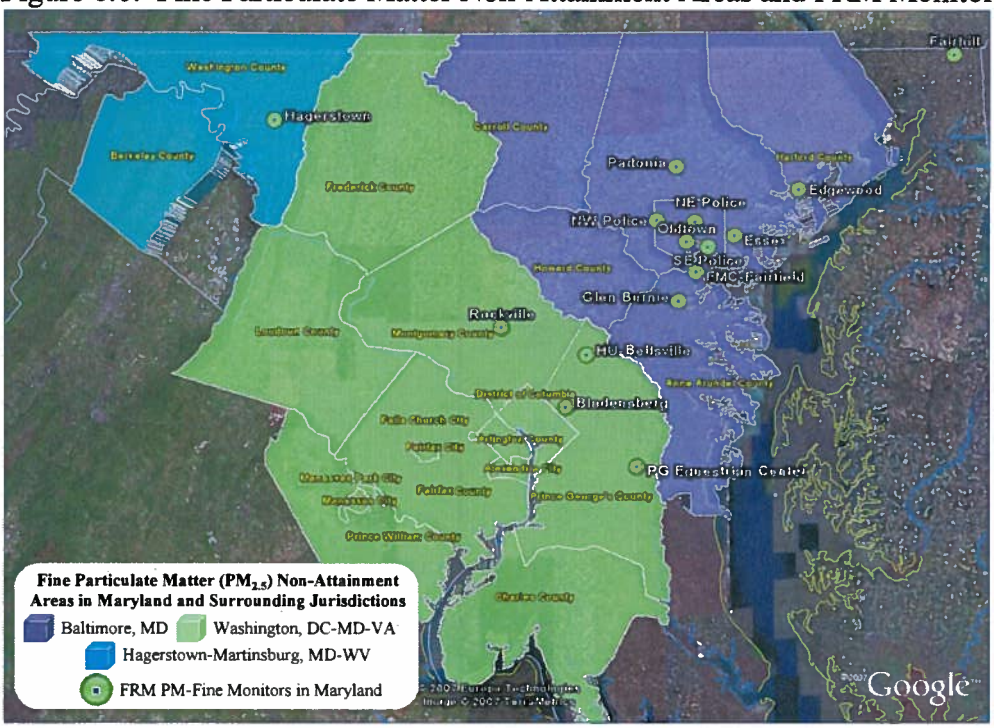
Factor 6: Meteorology (Weather/Transport Patterns)

For this factor, EPA considered data from the National Weather Service instruments in the area. Wind direction and wind speed data for 2004-2006 were analyzed, with an emphasis on "high $PM_{2.5}$ 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 trajectory plot (or "pollution rose") to understand the prevailing wind direction and wind speed on the days with highest fine particle concentrations. The Figures 6.1-6.17 identify 24-hour $PM_{2.5}$ values by colored icons and days exceeding 35 $\mu g/m^3$ are denoted with a red or black icon. These icons are either dots or triangles. A dot indicates the day occurred in the warm season and a triangle indicates the day occurred in the cool season. The center of the figures indicate the location of the air quality monitoring site, and the location of each icon in relation to the center indicates the direction from which the wind was blowing on that day. An icon that is close to the center indicates a low average wind speed on that day. Higher wind speeds are indicated when the icon is further away from the center.

Figure 6.0. Fine Particulate Matter Non-Attainment Areas and FRM Monitors in Maryland



Baltimore Metropolitan Area Pollution Rose Data

Pollution roses for the Baltimore area (Figures 6.1 to 6.4) show a trend in pollution trajectories and winds in the warm season of high concentration days from the southwest to the northeast. It is likely that some component of elevated $PM_{2.5}$ measured at the monitors in this region may

originate from the southeast and move northeastward. The roses also show the need to consider the contribution of the Washington area to the violating monitors in the Washington suburbs of Maryland and the Baltimore area.

Figure 6.1. Pollution Rose for the City of Baltimore
Monitor # 245100040, (Oldtown, City of Baltimore, MD)

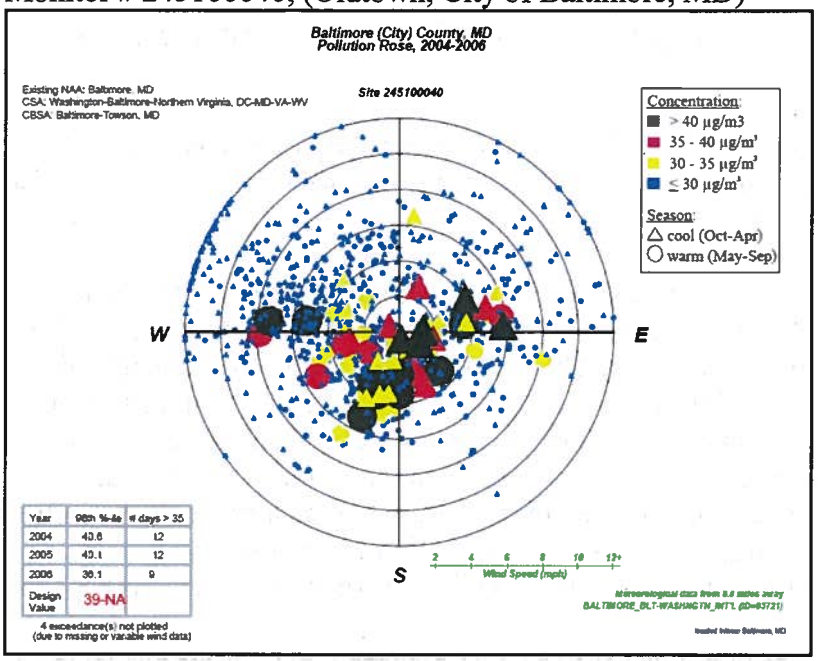


Figure 6.2. Pollution Rose for the City of Baltimore
Monitor # 245100035, (FMC Fairfield, City of Baltimore, MD)

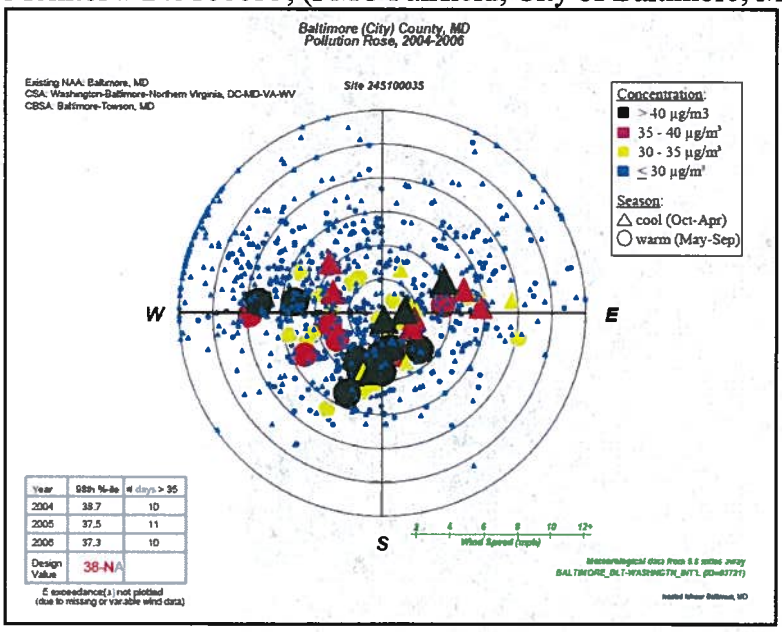


Figure 6.3. Pollution Rose for the City of Baltimore
Monitor # 245100008, (SE Police, City of Baltimore, MD)

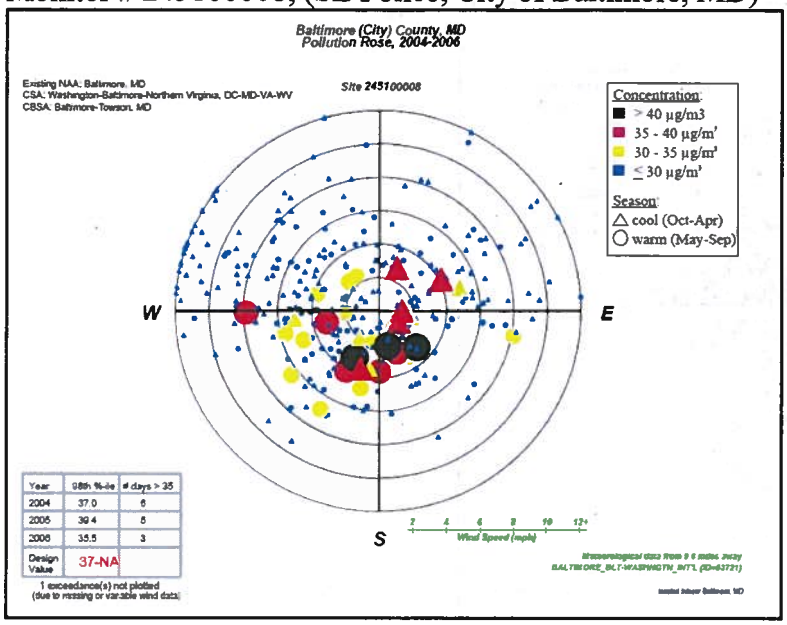
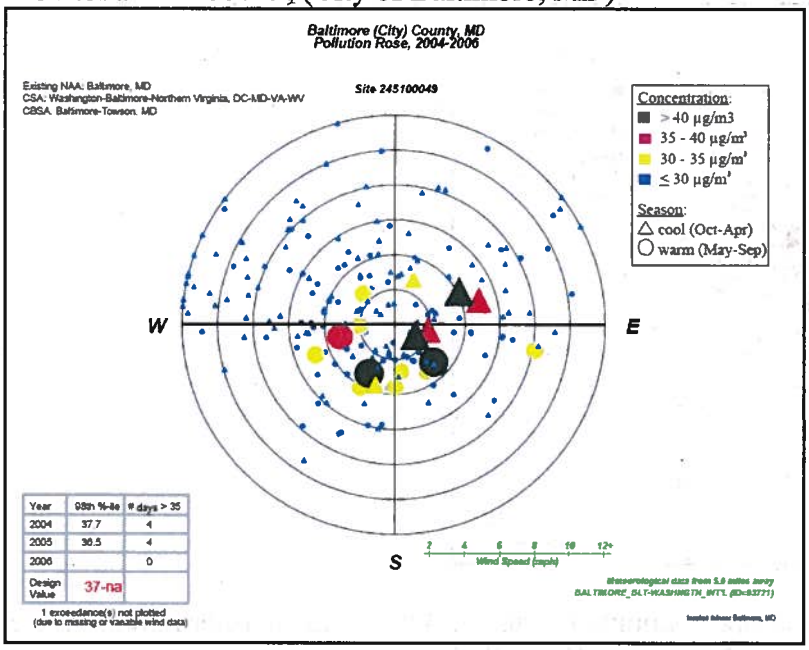


Figure 6.4. Pollution Rose for the City of Baltimore
Monitor # 245100049, (City of Baltimore, MD)



In Baltimore County (which surrounds the City of Baltimore), the Essex monitor lies to the east of and the Padonia monitor to the north of the City of Baltimore. The pollution roses for both monitors (Figures 6.5 and 6.6) show a similar pattern. For the warm season, on days with the highest measured $PM_{2.5}$ (>30 µg/m^3) concentration values, winds are predominately from the southwest (and occasionally from the west). Cold and warm season pollution trajectories are similar in pattern, although the concentration plots are much more dense at the Essex monitor.

Figure 6.5. Pollution Rose for the Baltimore County Monitor # 240053001, (Essex, Baltimore County, MD)

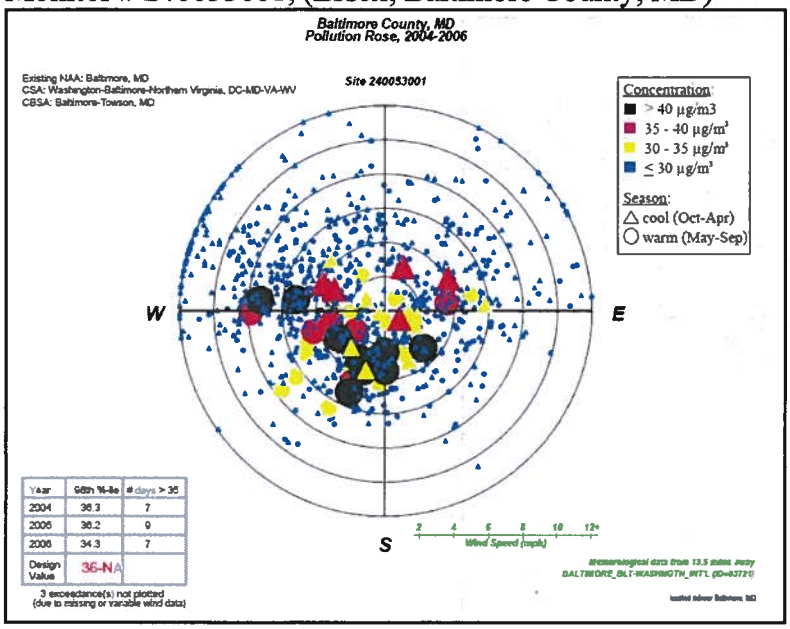
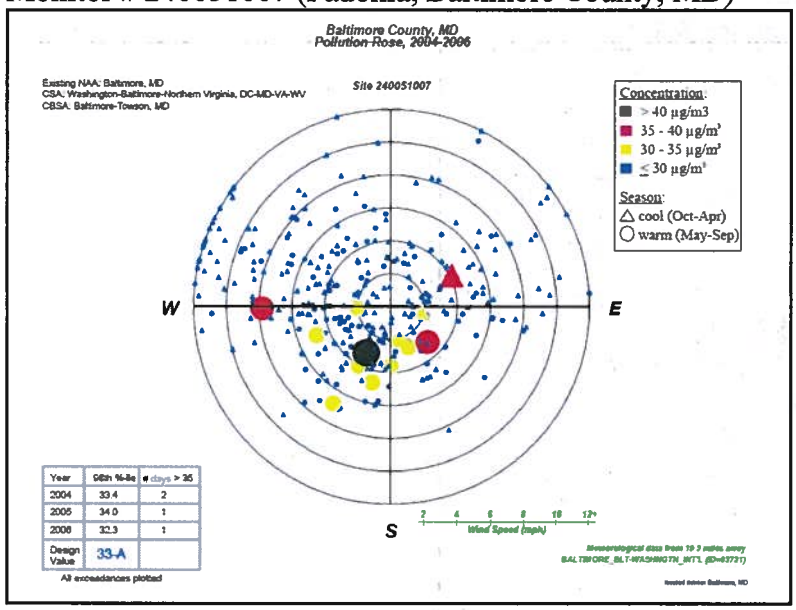
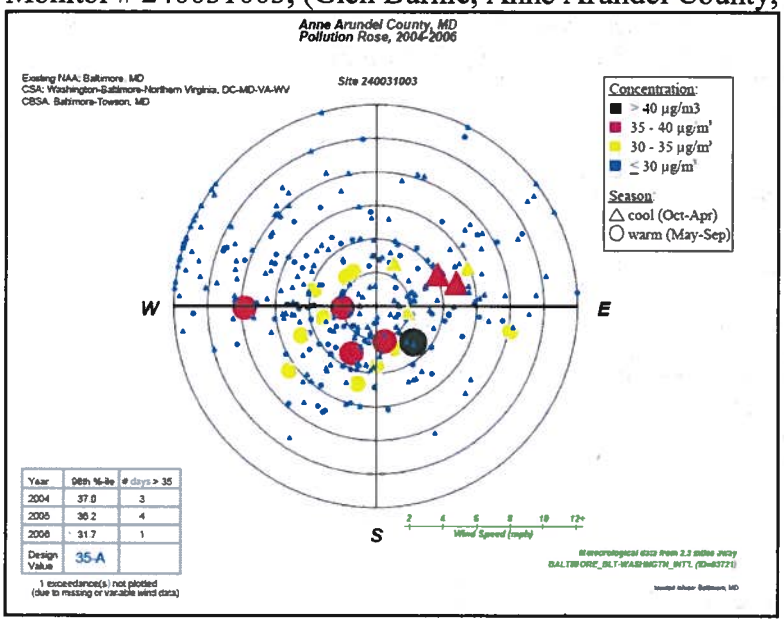


Figure 6.6. Pollution Rose for the Baltimore County Monitor # 240051007 (Padonia, Baltimore County, MD)



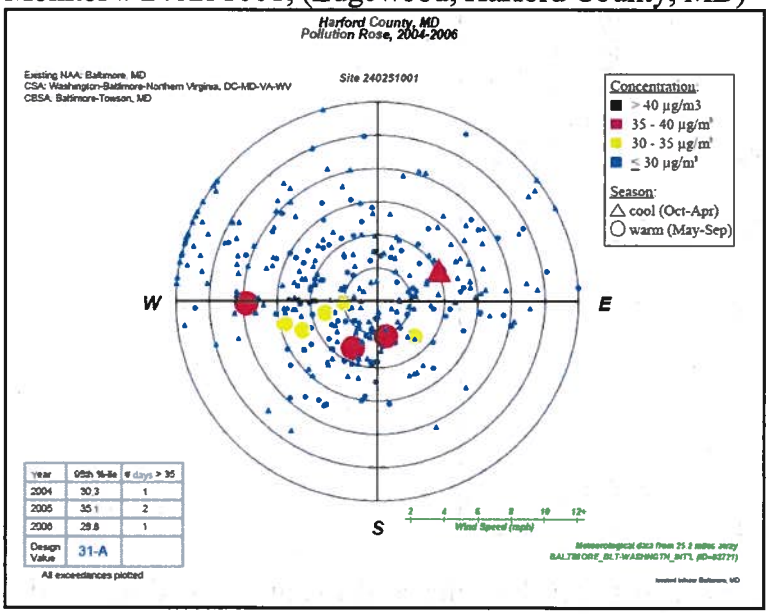
The Glen Burnie monitor in Anne Arundel County (Figure 6.7) lies in the northern tip of Prince George's County, south of the City of Baltimore. The pollution rose for this monitor shows a similar pattern. For the warm season, on days with the highest measured $PM_{2.5}$ (>30 $\mu g/m^3$) concentration values, winds predominate from the southwest (and occasionally from the west).

Figure 6.7. Pollution Rose for Anne Arundel County
Monitor # 240031003, (Glen Burnie, Anne Arundel County, MD)



The Edgewood monitor in Harford County lies northeast of the City of Baltimore. For this monitor, high concentration days are predominately during the warm season. The pollution rose (Figure 6.8) shows that winds predominate from the southwest (and occasionally from the east and west).

Figure 6.8. Pollution Rose for Harford County
Monitor # 240251001, (Edgewood, Harford County, MD)



<u>Pollution Rose Data For Washington Metro Area Counties Adjacent to the Baltimore Metro Area</u>
Next we examine the monitors that lie adjacent to the Baltimore metropolitan area that are part of the Washington metro area, beginning to the south, with Prince George's County (Figures 6.9 and 6.10). Here we continue to see a trend in winds coming from the southwest during the warm season, on days with the highest measured $PM_{2.5}$ (>30 $\mu g/m^3$) concentration values.

Figure 6.9. Pollution Rose for the Prince George's County Monitor # 240338003, (PG Equestrian Center, Prince George's County, MD)

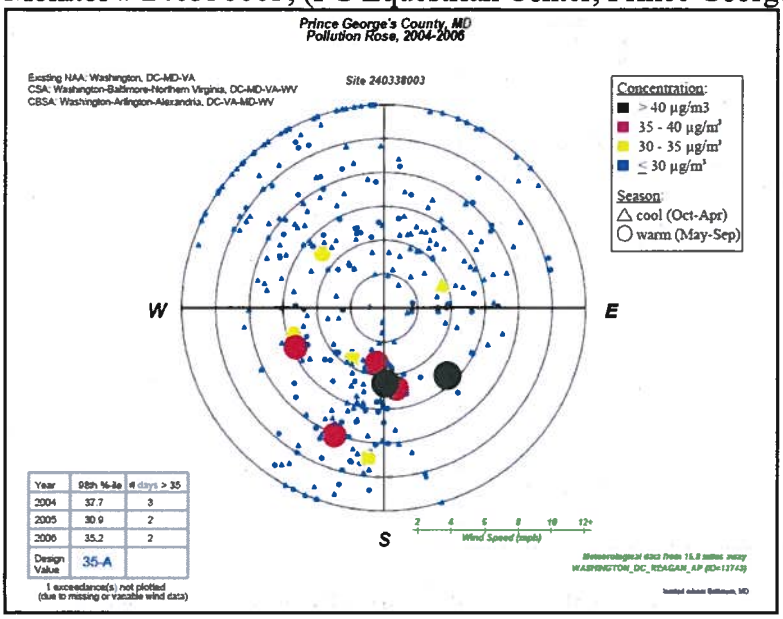
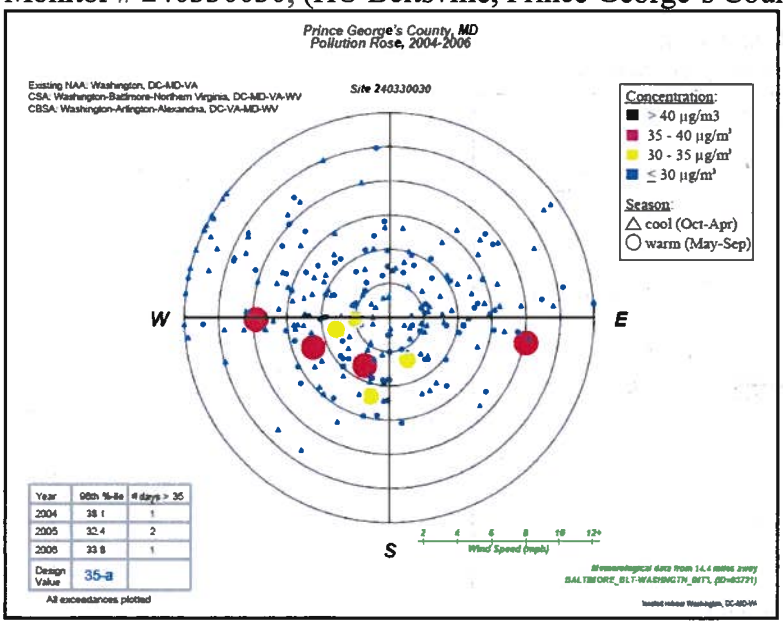
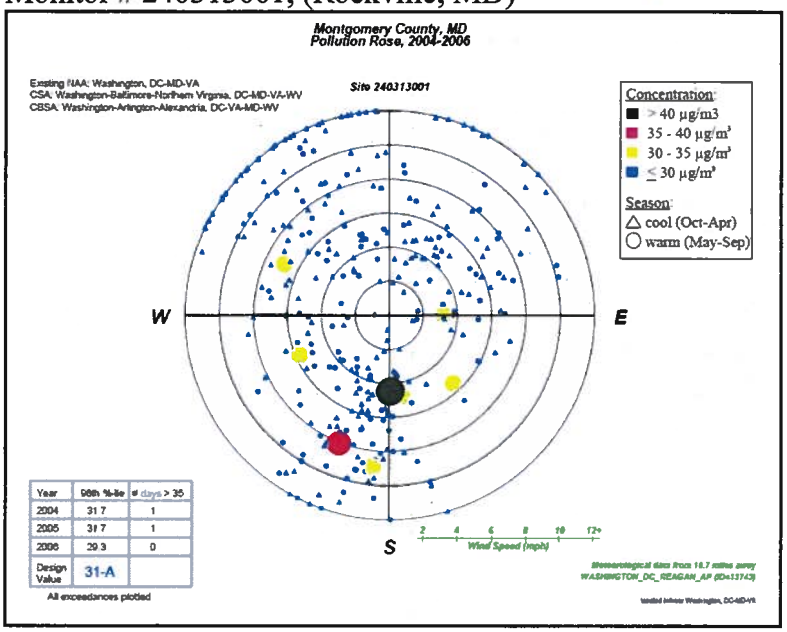


Figure 6.10. Pollution Rose for Prince George's County Monitor # 240330030, (HU Beltsville, Prince George's County, MD)



In Rockville, Montgomery County (one county north along the border between Baltimore and the District), we see a similar pattern (see Figure 6.11).

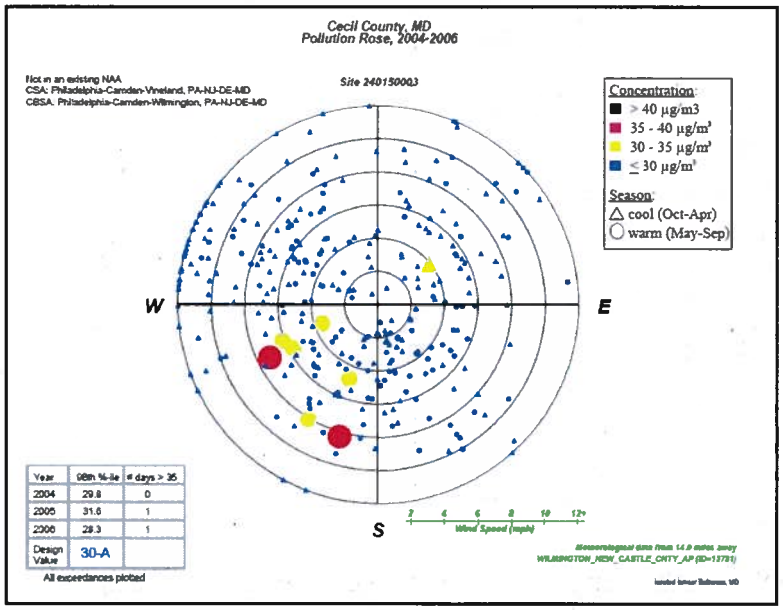
Figure 6.11. Pollution Rose for Montgomery County
Monitor # 240313001, (Rockville, MD)



Pollution Rose Data for Counties Adjacent to Baltimore, but outside the Baltimore-Washington-Northern Virginia CSA

In Cecil County, which is located between the Baltimore and Philadelphia urban areas, we again see a similar pattern (Figure 6.12) of warm season wind and pollution trajectories.

Figure 6.12. Pollution Rose for Cecil County
Monitor # 240150003



And again, we see a similar scatter pattern for Chester County, Philadelphia and New Castle County, Delaware (Figures 6.13 and 6.14) which are part of the 1997 Philadelphia $PM_{2.5}$ nonattainment area.

Figure 6.13. Pollution Rose for Chester County, PA
Monitor # 420290100

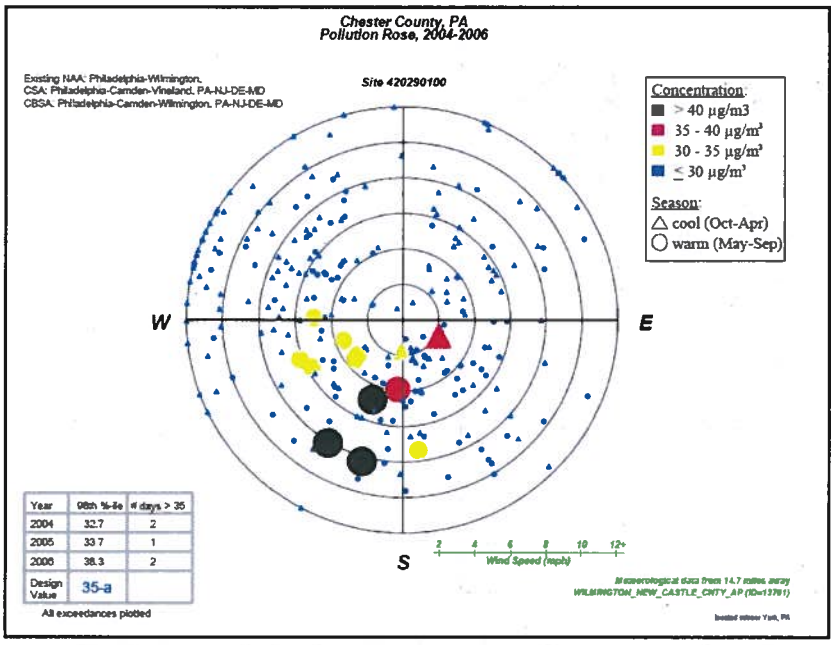
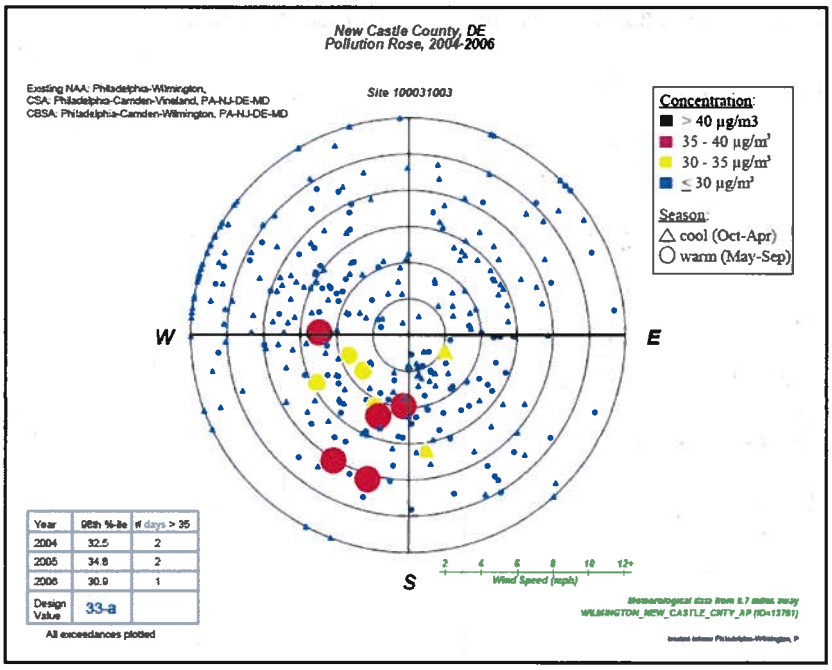


Figure 6.14. Pollution Rose for New Castle County, DE
Monitor # 100031003



Only when we examine the areas to the north, along the border between Pennsylvania and Maryland, do we see a different trajectory pattern. Here are examples from the Lancaster, York and Adams County, Pennsylvania monitors (Figures 6.15 to 6.17).

Figure 6.15 Pollution Rose for Lancaster County, PA
Monitor # 420710007

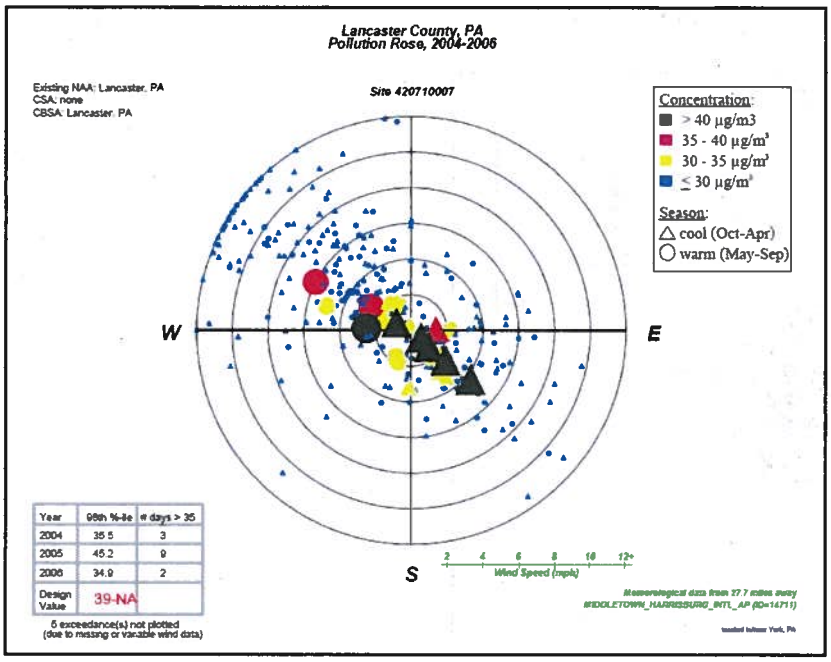


Figure 6.16. Pollution Rose for York County, PA
Monitor # 421330008

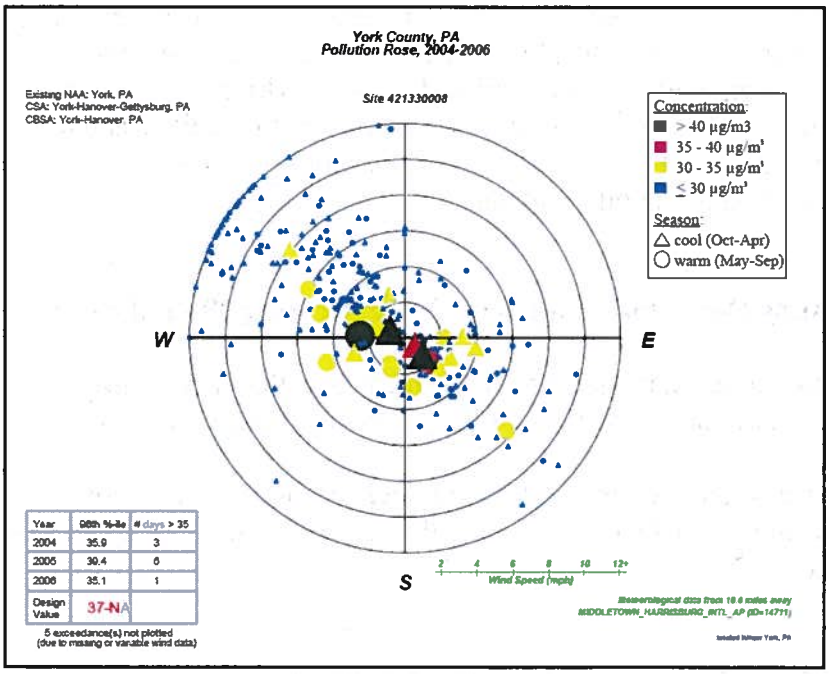
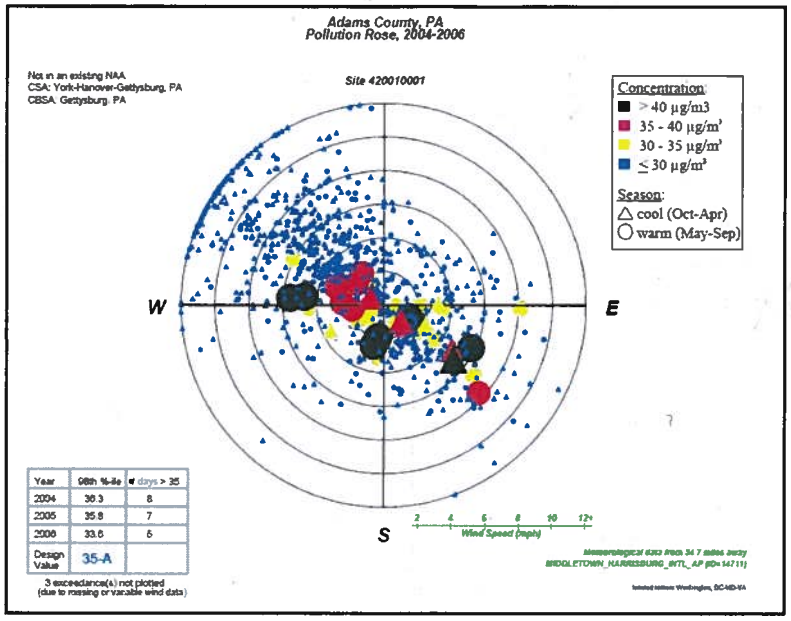


Figure 6.17. Pollution Rose for Adams County, PA
Monitor # 420010001



Based on analysis of the pollution trajectory plots, EPA concludes that the counties that have violating monitors in the Baltimore area are high ranking for this factor. The average prevailing surface wind direction for high $PM_{2.5}$ days is from the southwest to northeast. Therefore, the counties adjacent to the Baltimore area that are part of the Washington metro area are more likely to contribute to the violation than emissions from other directions. The counties to the north of Baltimore, along the border in Pennsylvania, appear to be meteorologically removed from the Baltimore metropolitan area, and are low ranked candidates for nonattainment as part of a Baltimore nonattainment area under this and other factors.

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 Baltimore area.

The Baltimore 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 is being given to existing boundaries and organizations that may facilitate air quality planning and the implementation of control measures to attain the standard. Areas designated as nonattainment (e.g., for $PM_{2.5}$ or 8-hour ozone standard) represent important boundaries for state air quality planning.

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

The major jurisdictional boundary in the Baltimore area is the boundary between the Baltimore-Towson, MD and Washington-Arlington-Alexandria, DC-VA-MD-WV metropolitan statistical areas. While both areas are part of a larger consolidated statistical area, as defined by OMB (December 18, 2006), the Washington and Baltimore areas comprise distinct metropolitan statistical areas in three states (Maryland, Virginia, West Virginia) and the District of Columbia. Different state governments develop and implement their various regulatory emission control strategies and enforcement programs. In addition, the Baltimore, Washington, and Philadelphia metropolitan areas all have separate, distinct metropolitan planning organizations to address air quality and transportation and other planning. This would further complicate coordination, in the event they were combined for purposes of nonattainment designation.

As mentioned in Factor 2 – Air Quality, for the period from 2005-2007, no monitors in the 1997 $PM_{2.5}$ NAAQS Washington nonattainment area show a violation of the 24-hour $PM_{2.5}$ NAAQS. Violations of the standard were measured over the same period in the Baltimore nonattainment area, as well as in the York, Lancaster, and Philadelphia areas. EPA believes that the violations in York, Lancaster, and Philadelphia areas are best addressed by designating separate nonattainment areas for those locations because they are not as integrated with the Baltimore area.

In addition to the 1997 $PM_{2.5}$ standard, the Washington and Baltimore $PM_{2.5}$ nonattainment areas and the Philadelphia, Lancaster, and York $PM_{2.5}$ nonattainment areas have historically been separate under the 1-hour and the 8-hour ozone standards. The ozone nonattainment boundaries for these areas are similar to those of the $PM_{2.5}$ standard, and areas designated as 8-hour ozone nonattainment areas are also important boundaries for State air quality planning. The inclusion of Washington area counties in the Baltimore area, or the merging of Baltimore with either the Philadelphia, York, or Lancaster areas would greatly complicate this planning process. 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 Baltimore as a separate nonattainment area, exclusive of counties in the Washington or Philadelphia, Lancaster, or York $PM_{2.5}$ nonattainment areas.

Factor 9: Level of Control of Emission Sources

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

The emission estimates in Table 1.0 (under Factor 1) reflect implementation of control strategies implemented by the States in and around the Baltimore area that may influence emissions of any component of $PM_{2.5}$ emissions (i.e., total carbon, SO_2, NO_x, and crustal $PM_{2.5}$).

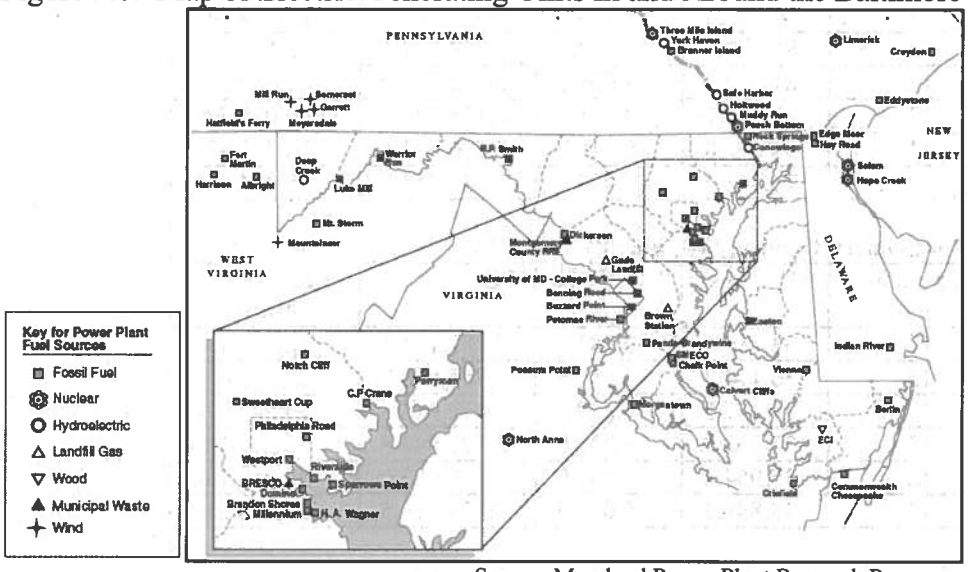
Figure 9.0 is a map of Electric Generating Units (EGUs) in and around the Baltimore metropolitan area. Table 9.0 lists emissions and controls (current and projected) for EGUs with SO_2 plus NO_x emissions greater than 5000 tons. Data was obtained from the 2006 National Electric Energy Data System (NEEDS) 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.

Table 9.0. EGUs with Total SO_2 and NO_x Emissions >5,000 tons per year, From the 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	1997 $PM_{2.5}$ Nonattainment Area
Anne Arundel, MD	Brandon Shores	Coal Steam	602-B-1	20,498	5,867	2010	95.0	2000	643.0	Baltimore
			602-B-2	19,969	6,097	2010	95.0	2000	643.0	
Anne Arundel, MD	Herbert A Wagner	Coal Steam	1554-B-3	12,860	2,075	-	-	2002	324.0	Baltimore
			1554-B-2	6,492	2,015	-	-	-	135.0	
		O/G Steam	1554-B-4	340	158	-	-	-	400.0	
			1554-B-1	76	51	-	-	-	131.0	
Baltimore, MD	C.P. Crane	Coal Steam	1552-B-1	14,770	2,898	-	-	-	200.0	Baltimore
			1552-B-2	13,111	2,410	-	-	-	200.0	
Charles, MD	Morgantown Generating Station	Coal Steam	1573-B-1	50,019	8,030	2009	95.0	2007	624.0	Washington
			1573-B-2	48,054	7,415	2009	95.0	2008	620.0	
Montgomery, MD	Dickerson	Coal Steam	1572-B-3	13,763	1,926	2010	95.0	-	182.0	Washington
			1572-B-1	11,888	1,649	2010	95.0	-	182.0	
			1572-B-2	10,301	1,401	2010	95.0	-	182.0	
Prince George's, MD	Chalk Point LLC	Coal Steam	1571-B-2	25,196	5,029	2010	95.0	2009	342.0	Washington
			1571-B-1	23,358	4,590	2010	95.0	2009	341.0	
		O/G Steam	1571-B-3	640	310	-	-	-	612.0	
			1571-B-4	391	358	-	-	-	612.0	
York, PA	Brunner Island	Coal Steam	3140-B-3	45,447	6,288	2008	95.0	-	749.0	York
			3140-B-2	26,606	3,600	2009	95.0	-	378.0	
			3140-B-1	21,492	2,866	2009	95.0	-	321.0	
New Castle, DE	Edge Moor	Coal Steam	593-B-4	5,671	1,485	-	-	-	174.0	Philadelphia
			593-B-3	2,072	600	-	-	-	86.0	
		O/G Steam	593-B-5	239	179	-	-	-	445.0	
Chester, PA	Cromby Generating Station	O/G Steam	3159-B-1	3,435	1,581	1982	93.8	-	48.0	Philadelphia
			3159-B-2	178	112	-	-	-	201.0	
			3159-B-FB1	3,435	1,581	-	89.0	-	48.0	
			3159-B-FB2	3,435	1,581	-	89.0	-	48.0	

Figure 9.0. Map of Electric Generating Units In and Around the Baltimore Area



Source: Maryland Power Plant Research Program

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

Brandon Shores, Anne Arundel County, MD, Facility ID: 602					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	39,974.2	11,669.0	7,573,936.9	73,820,084
2003	12	40,766.7	13,042.9	8,148,886.8	79,423,891
2004	12	41,291.1	11,893.2	7,875,005.4	76,754,347
2005	12	41,698.6	11,724.9	8,134,939.2	79,287,924
2006	12	40,467.1	11,964.3	8,094,442.0	78,893,123
2007	12	42,041.1	12,851.6	8,105,261.9	78,998,624
Herbert A. Wagner, Anne Arundel County, MD, Facility ID: 1554					
Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	18,793.5	5,707.3	3,220,517.8	32,521,811
2003	12	23,153.9	6,297.0	3,612,517.4	36,291,469
2004	12	23,287.4	6,038.2	3,720,789.0	37,564,105
2005	12	24,634.5	5,868.1	3,853,521.8	38,783,286
2006	12	19,768.7	4,299.3	2,888,357.0	28,528,356
2007	12	20,982.6	4,639.5	3,340,874.1	33,316,661
C.P. Crane / Constellation Power, 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
Morgantown Generating Station, Charles County, MD, Facility ID: 1573					
Year	# of Months	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input

	Reported				(mmBtu)
2002	12	70,343.4	18,619.2	7,435,744.7	72,494,145
2003	12	85,340.6	17,792.8	7,759,622.1	75,653,455
2004	12	81,000.1	13,703.7	6,318,751.3	61,617,262
2005	12	79,481.7	13,435.7	6,156,779.2	60,039,789
2006	12	98,072.8	15,444.7	7,226,692.4	70,467,422
2007	12	70,343.4	18,619.2	7,435,744.7	72,494,145

Dickerson, Montgomery County, MD, Facility ID: 1572

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	33,911.1	7,381.3	3,182,191.1	32,046,131
2003	12	30,174.7	5,181.9	2,761,808.9	27,778,452
2004	12	39,037.5	5,828.5	3,472,924.8	34,577,570
2005	12	37,767.9	5,821.0	3,527,948.5	35,074,600
2006	12	35,954.4	5,039.9	3,249,702.0	32,012,158
2007	12	33,843.7	5,012.4	3,133,016.5	30,978,219

Chalk Point, Prince George's County, MD, Facility ID: 1571

Year	# of Months Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (mmBtu)
2002	12	52,525.8	15,227.5	6,387,632.3	70,242,143
2003	12	52,278.8	13,448.5	6,249,666.9	67,615,956
2004	12	64,646.6	14,043.1	6,814,162.8	72,313,469
2005	12	60,536.7	13,794.5	6,952,253.9	75,667,269
2006	12	49,590.9	10,322.8	4,818,939.9	50,616,123
2007	12	46,373.3	10,749.7	5,292,021.5	56,267,488

Some EGUs in Baltimore and the surrounding area are expected to put controls in place in the near future (see Table 9.0). Morgantown Generating Station, in Charles County, Maryland is expected to have scrubbers installed on its two units in 2009, and will have SCR in place by 2008 on both units by 2008. Brandon Shores in Anne Arundel County, Maryland will have scrubbers installed on its two units in 2010. Chalk Point in Prince George's County, Maryland is expected to have (on Units 1 & 2) SCR in place by 2009 and scrubbers by 2010. Dickerson in Montgomery County, Maryland is expected to have scrubbers in place on all three of its units by 2010, as well. Brunner Island in York County, Pennsylvania is expected to have scrubbers on one unit by 2008 and on the remaining two units by 2009.

Maryland's Healthy Air Act imposes NO_x and SO_2 emissions caps on 15 electric generating units at the seven largest power plants in the State, including Brandon Shores, H.A. Wagner, and C. P. Crane in the Baltimore Area. The plants are required to comply with the first phase of NOx caps starting in January 2009, with the second phase starting in 2012. The SO_2 caps apply starting in January 2010 and ramp down in 2013. In the Baltimore area, the caps will cut NOx emissions by about 75% and SO2 emissions by about 70% from 2002 levels.

It is important to note that this area has a large component of emissions from highway and nonroad mobile sources, for which many new categories of Federal emission standards are in the process of being implemented. Reductions from these measures occur over a phased-in timeline, dependent upon the stringency of the standard and the turnover rate for new equipment and vehicle purchases. These mobile source controls are expected to provide substantial reductions in areas where mobile source emissions of PM, NO_x, and VOCs are a significant factor.

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

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