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

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

Area	Maryland Recommended Nonattainment Counties	EPA's Designated Nonattainment Counties
Baltimore	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 *Montgomery County* (final in April 2009)* *Prince George's County* (final in April 2009)*
* EPA intends to modify the Baltimore nonattainment area to add Montgomery and Prince George's Counties as nonattainment for the 2006 $PM_{2.5}$ standard and that they be included in the Baltimore nonattainment area listed in the table above. Maryland recommended these two counties be included a Washington, DC-MD-VA nonattainment area, based upon 2004-2006 air quality data, but did not recommend their inclusion in the Baltimore area.		

EPA has designated the remaining counties in the state 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).

Environmental Protection Agency Technical Analysis for the Baltimore Area

Introduction

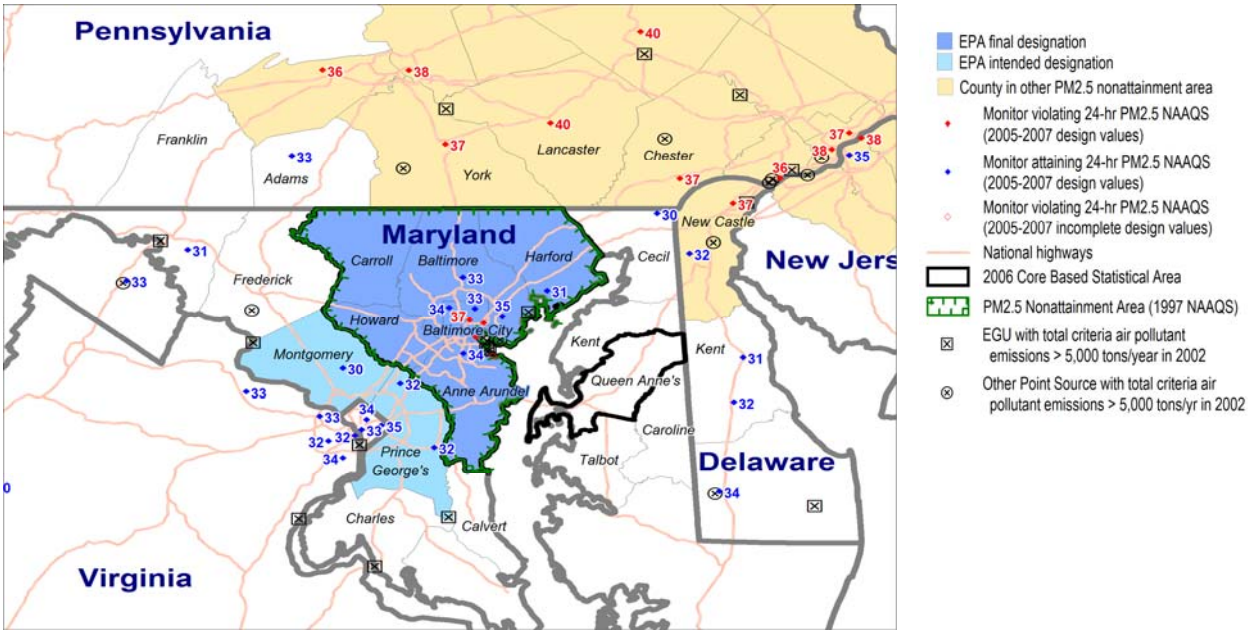
Pursuant to section 107(d) of the Clean Air Act, Environmental Protection Agency **(**EPA) must designate as nonattainment those areas that violate the national ambient air quality standards (NAAQS) and those areas that contribute to violations. This technical analysis for the Baltimore area identifies 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

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

Figure 1 is a map which identifies the counties in the Baltimore nonattainment area, based on EPA's August 18, 2008 intended designation. The map provides relevant information such as the locations and design values of air quality monitors, and the metropolitan area boundary. Also identified on this map are Montgomery and Prince George's Counties, which EPA is now proposing to add to the Baltimore nonattainment area for the 2006 24-hour $PM_{2.5}$ standard.

Figure 1. The Baltimore Area



For the Baltimore area, EPA established $PM_{2.5}$ 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. For the 2006 $PM_{2.5}$ NAAQS, EPA began its analysis with those areas (that violate the 2006 24-hr $PM_{2.5}$ standard) that were designated nonattainment for the 1997 $PM_{2.5}$ NAAQS, and then evaluated counties nearby to the prior nonattainment area. This was appropriate because EPA anticipated that the same sources of emissions will likely be contributing to the 2006 24-hour $PM_{2.5}$ NAAQS as well, and that this was therefore an appropriate starting point for our analysis.

In December 2007, Governor O'Malley provided EPA with recommendations as to which Maryland counties in the Baltimore area and the Washington, DC-MD-VA area should be designated as nonattainment for the 2006 $PM_{2.5}$ NAAQS. For the Baltimore area, Governor O'Malley recommended that EPA retain the same $PM_{2.5}$ nonattainment area boundaries established for the 1997 $PM_{2.5}$ NAAQS, including Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, and the City of Baltimore. For the Maryland counties located within the Washington, DC-MD-VA area, Governor O'Malley recommended that the four neighboring Maryland counties (Charles, Frederick, Montgomery, and Prince George's) that were part of the Washington, DC-MD-VA 1997 $PM_{2.5}$ nonattainment area continue to be designated as nonattainment for the 2006 24-hour $PM_{2.5}$ standard as part of the Washington, DC-MD-VA area. These recommendations were based on the air quality data are from Federal Reference Method (FRM) monitors located in the State. See the December 17, 2007 letter from Governor O'Malley to EPA. Maryland's recommendations were consistent with EPA guidance, which stated that it would be appropriate to use the same boundaries for the 2006 $PM_{2.5}$ NAAQS as were established for the 1997 $PM_{2.5}$ NAAQS. However, subsequent air quality data for the period from 2005-2007 indicated that the Washington, DC-MD-VA metropolitan area was attaining the 2006 24-hour $PM_{2.5}$ standard.

On August 18, 2008, EPA issued a letter to Governor O'Malley proposing Maryland nonattainment areas for the 2006 24-hour $PM_{2.5}$ NAAQS. For the Baltimore area, EPA proposed retaining the same $PM_{2.5}$ nonattainment area boundaries established for the 1997 $PM_{2.5}$ NAAQS. With respect to the Washington, DC-MD-VA nonattainment area, EPA recognized that monitoring data for the 2005-2007 period shows that the existing Washington, DC-MD-VA $PM_{2.5}$ nonattainment area is meeting the 2006 $PM_{2.5}$ NAAQS. EPA proposed that the four counties that had previously been included as part of the Washington, DC-MD-VA nonattainment area for the 1997 $PM_{2.5}$ NAAQS to be excluded from the Baltimore 2006 24-hour $PM_{2.5}$ nonattainment area. The basis for EPA's August 18, 2008 recommendation was that these counties are jurisdictionally separate from the Baltimore area, and have historically been part of the Washington, DC-MD-VA area for planning purposes. EPA's recommendation was based upon the belief that these historically separate Baltimore and Washington nonattainment areas have separate regional planning organizations comprised of separate local political jurisdictions that have conducted separate planning for air quality (and other) purposes for the Baltimore and Washington areas. Moreover, the commuting data for the Baltimore area demonstrated that the majority of commuters in these counties travel to the Washington rather than the Baltimore area. In this letter, EPA also requested that if Maryland wished to provide comments on EPA's intended designation, it should do so by October 20, 2008. EPA stated that it would consider any additional information (e.g., on power plants or partial county areas) provided by the state in making final decisions on the designations.

On September 2, 2008, EPA published a notice in the Federal Register to solicit public comments on our intended area designations for the 2006 24-hour $PM_{2.5}$ standard. Based upon public comment received, EPA determined that it was appropriate to further analyze the technical information used to support EPA's August 2008 recommendations for the Baltimore area. As a result of the Agency's additional technical analysis, EPA is now proposing to add Prince George's and Montgomery Counties, Maryland to the Baltimore nonattainment area for the 2006 24-hour $PM_{2.5}$ standard based on contribution of emissions from those areas to violations in the Baltimore area described below. Should Maryland have additional information to be considered by EPA regarding these counties, EPA requests that it be provided to EPA Region III by February 2, 2009. EPA will evaluate this additional information before issuing a final designation for Montgomery and Prince George's Counties.

Based on EPA's technical analysis and in response to comments, EPA is designating the same counties as previously designated for as nonattainment for the 1997 $PM_{2.5}$ NAAQS as nonattainment for the 2006 24-hour $PM_{2.5}$ NAAQS as part of the Baltimore nonattainment area. However, EPA has also concluded that its initial analysis of the Baltimore area did not adequately consider the contribution from adjacent counties following the determination that the Washington, DC-MD-VA area was attaining the 24-hour $PM_{2.5}$ standard. EPA now finds that the contribution to the Baltimore area from the two adjacent Maryland counties (Montgomery and Prince George's) warrants their inclusion in the Baltimore $PM_{2.5}$ nonattainment area. After reviewing any additional comments, EPA intends to supplement its December 2008 final action with the designation of Montgomery and Prince George's Counties in April 2009.

As a result of our technical analysis, EPA is designating as nonattainment the counties listed in the table below, and intends to designate Montgomery and Prince George's Counties as nonattainment as part of the Baltimore area. EPA's designation for the Baltimore area, and our intended modification to add Montgomery and Prince George's Counties to the nonattainment area are listed in the table below:

Baltimore Area	State-Recommended Nonattainment Counties/Cities	EPA Final 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 *Montgomery County* (final in April 2009)* *Prince George's County* (final in April 2009)*
* EPA intends to modify the Baltimore nonattainment area to add Montgomery and Prince George's Counties as nonattainment for the 2006 $PM_{2.5}$ standard and that they be included in the Baltimore nonattainment area listed in the table above. Maryland recommended these two counties be included a Washington, DC-MD-VA nonattainment area, based upon 2004-2006 air quality data, but did not recommend their inclusion in the Baltimore area.		

Technical Analysis

The following is a technical analysis for the Baltimore nonattainment area. This analysis addresses both the reasons for EPA's promulgation of designations for the Baltimore area in December 2008, and the reasons EPA believes that Montgomery and Prince George's Counties should be designated nonattainment as part of the Baltimore area.

As of the latest available (December 2006) update of statistical areas definitions from the Office of Management and Budget (OMB), the Baltimore-Towson, MD metropolitan statistical area (MSA) is a part of the larger Washington-Baltimore-Northern Virginia combined statistical area:

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

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

Due to the large number of counties involved in the analysis, the different states and jurisdictions involved, and because a number of the counties have been recommended by their respective states for inclusion in separate $PM_{2.5}$ nonattainment areas, EPA has parsed its analysis for the Baltimore area by the different metropolitan areas involved.

Factor 1: Emissions data

For this factor, EPA evaluated county level emission data for the following $PM_{2.5}$ components and precursor pollutants: "$PM_{2.5}$ emissions total," "$PM_{2.5}$ emissions carbon," "$PM_{2.5}$ emissions other," "sulfur dioxide (SO_2)," "nitrogen oxides (NO_x)," "volatile organic compounds (VOCs)," and "ammonia (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 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 and NH_3 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.

Table 1 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 OMB-defined Washington-Baltimore-Northern Virginia, DC-MD-VA-WV CSA. For each metropolitan area in Table 1, the counties are listed in order, from highest CES value to lowest.

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

County, State	State Recommended Nonattainment	CES	$PM_{2.5}$ emissions - total (tpy)	$PM_{2.5}$ emissions - carbon (tpy)	$PM_{2.5}$ emissions - other (tpy)	SO_2 (tpy)	NO_x (tpy)	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

With respect to the Baltimore-Towson metropolitan area, $PM_{2.5}$ precursor emissions are highest in Baltimore and Anne Arundel Counties. SO_2 emissions are highest in Anne Arundel County, followed by Baltimore County and Baltimore City. NO_x emissions are highest in Anne Arundel and Baltimore County, followed by Baltimore City. VOC emissions are highest in Baltimore County, followed by Baltimore City and Baltimore County. NH_3 emissions are comparatively low in the Baltimore-Towson

metropolitan area. Of particular note is 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 three Maryland counties that are adjacent to the Baltimore area and are also part of the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA, emissions of $PM_{2.5}$, NO_x, and VOC are highest in Montgomery and Prince George's Counties. SO_2 emissions are highest in Charles County, followed by Prince George's and Montgomery Counties Based upon emissions of SOx, NOx, and VOC, these counties rank very high compared with those of the highest ranking counties in the Baltimore metropolitan area. For this area, NH_3 emissions are highest in Frederick County, followed by Prince George's and Montgomery Counties. Frederick County's NH_3 emissions are higher ranking than any county in the Baltimore-Towson MSA, and Prince George's and Montgomery are also comparatively high ranking.

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 were recommended for nonattainment by Pennsylvania and Delaware as part of other neighboring nonattainment areas, and separate 9-factor analyses were prepared by EPA for those areas. Because these areas are part of separate nonattainment areas, EPA has determined that it is not necessary to include them in the Baltimore nonattainment area.

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 candidates based upon this factor. None of these counties were recommended for nonattainment by its respective state, nor did any of these counties have a violating monitor.

EPA also considered the Contributing Emissions Score for each county. The CES is a metric that takes into consideration emissions data, meteorological data, and air quality monitoring information to provide a relative ranking of counties in and near an area. Note that this metric is not the exclusive 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.

Based on emissions levels and CES scores, Anne Arundel (CES=43), Baltimore (CES=100), Harford (CES=20), and Howard (CES=20) Counties, along with the City of Baltimore (CES=100), are candidates for nonattainment designation as part of the Baltimore area under the 2006 24-hour $PM_{2.5}$ NAAQS. The adjacent counties of Prince George's (CES=30) and Montgomery (CES=27) are high ranking candidates, relative to counties in the Baltimore area, in terms of both their emissions levels and their CES scores. Charles County is high ranking on the basis of its high PM and PM precursor emissions, but it has a very low CES of 6, most likely due to the distance of this county from the violating monitor in the City of Baltimore and meteorological conditions. Frederick County has somewhat high levels of SO_2, NOx, and VOC emissions, but has somewhat high NH_3 emissions levels. Frederick County's low CES score of 7, coupled with its relatively low emissions make it lower ranking for this factor than other counties in the area of analysis. Carroll County (CES=13) and Calvert County (CES=2) are lower ranking under this factor, relative to other counties, but may deserve further analysis for other factors under this analysis.

Factor 2: Air quality data

This factor considers the 2006 24-hour $PM_{2.5}$ design values in micrograms per cubic meter ($\mu g/m^3$) 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. The structure of Table 2 distinguishes 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.

Baltimore County has one monitor which, based on 2005-2007 FRM 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 $\mu g/m^3$ also appears to trend downward. However, the absence of a violating monitor alone is not a sufficient reason to eliminate counties as candidates for nonattainment status, as they may be contributing to the violations in the Baltimore area. Each county has been evaluated based on the weight of evidence of the nine factors and other relevant information.

York, Lancaster, and Chester Counties, PA and New Castle County, DE all show violations of the 2006 24-hour $PM_{2.5}$ standard. 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.

Table 2. Air Quality Data

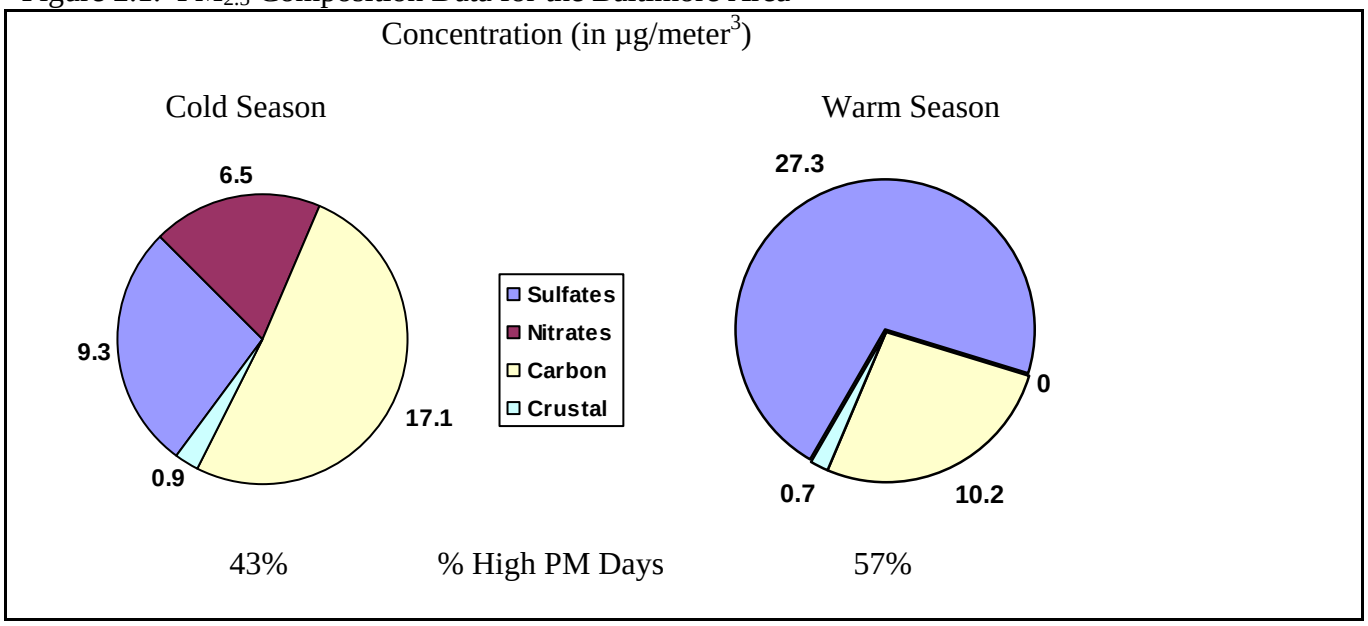
County, State	State Recommended Nonattainment?	24-hr $PM_{2.5}$ Design Values, 2003-2005 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2004-2006 ($\mu g/m^3$)	24-hr $PM_{2.5}$ Design Values, 2005-2007 ($\mu g/m^3$)
Baltimore-Towson, MD Metropolitan Area Counties (as defined by OMB on 12/18/2006)				
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: 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 sitting 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.

Under this factor, we also consider fine particle composition monitoring data. Air quality monitoring data on the composition of fine particle mass are available from the EPA Chemical Speciation Network and the IMPROVE monitoring network. Analysis of 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 (51% of total) in the

cold season, and high levels of sulfates (80% of total) in the warm season (See Figure 2.1). This data confirms the importance of SO_2, NOx, and direct PM emissions to the Baltimore area and justifies inclusions of these counties because the source of these emissions activities.

Figure 2.1. $PM_{2.5}$ Composition Data for the Baltimore Area



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

Table 3 shows the 2005 population for each county in the area being evaluated, as well as the population density for each county in that area. Population data gives an indication of whether it is likely that population-based emissions might contribute to violations of the 2006 24-hour $PM_{2.5}$ standard.

Table 3. Population

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq 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

County, State	State Recommended Nonattainment?	2005 Population	2005 Population Density (people/sq mile)
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 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. By comparison, 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 border each other along the boundary of three counties from each metropolitan area. Of the Washington area counties adjacent to Baltimore, Montgomery and Prince George's Counties in Maryland have the largest populations (coupled with very high population density) in the entire Washington-Baltimore-Northern Virginia CSA. Frederick County to the west and Charles County to the south of the Baltimore area also have relatively smaller, albeit significant, populations. Calvert County to the south has a much smaller population.

A number of the remaining counties listed in Table 3 that are outside the Washington-Baltimore-Northern Virginia CSA have fairly large populations, but have been recommended for nonattainment as part of other nonattainment areas (e.g., York, Lancaster, Chester, and New Castle Counties). The remaining counties have very small populations.

On the basis of this factor, Anne Arundel and Baltimore Counties, and the City of Baltimore are high ranking. Harford, Howard, and Carroll Counties are lower ranking. Montgomery and Prince George's Counties are very high ranking, in that they have the largest, densest populations in the area of analysis – having larger populations than any of the counties in the Baltimore-Towson metropolitan area.

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 millions of miles (see Table 4). A county with numerous commuters is generally an integral part of an urban area and is likely contributing to fine particle concentrations in the area.

The listing of counties on Table 4 reflects a ranking based on the number of people commuting to other counties. The counties that are in the Baltimore nonattainment area for the 1997 $PM_{2.5}$ NAAQS are shown in boldface.

Table 4. Traffic and Commuting Patterns

County, State	State Recommended Nonattainment?	2005 Vehicle Miles Traveled (millions of 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**
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 and 5 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 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 Counties 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.

For those Washington area counties adjacent to the 1997 Baltimore $PM_{2.5}$ nonattainment area, Montgomery and Prince George's Counties have very high 2005 VMT levels relative to counties in the Washington area. Although these two counties contribute a modest level of commuter traffic into the Baltimore nonattainment area and counties with a violating monitor, they do contribute significant commuter traffic to one another. Their high VMT levels also indicate that they generate significant amounts of mobile source emissions, including NOx, VOCs, and $PM_{2.5}$.

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. While Prince George's and Montgomery Counties are high ranking in terms of overall 2005 VMT levels and the resultant mobile source emissions, their commuting pattern trends to indicate that they contribute relatively little commuter VMT to the Baltimore area, and to the violating county, in particular. So, Montgomery and Prince George's are determined to be split with regard to this factor, high ranking in part for total VMT, and lower ranking for commuter patterns.

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. 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 of miles)	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)
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
New Castle, DE	522,094	1077	4	5,674	25
Cecil, MD	97,474	257	13	1,193	10
Lancaster, PA	489,936	499	4	4,392	21
Adams, PA	99,746	191	9	742	9
Kent, MD	19,908	240	3	219	42
Chester, PA	473,723	624	9	4,414	54
Kent, DE	143,462	240	13	1,435	5
Franklin, PA	137,273	178	6	1,535	18
Caroline, MD	31,805	98	7	329	20
Talbot, MD	35,630	114	5	614	105

Table 5 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-MD-VA-WV metropolitan area, the data in Table 5 indicates that Prince Georges and Montgomery County have the highest VMT levels, and are high ranking relative to their neighboring Baltimore area counties. Both Montgomery and Prince George's counties also have very high VMT growth rates, when compared to the counties in the Baltimore 1997 $PM_{2.5}$ area with the highest growth rates.

Of the counties that neighbor the Baltimore metropolitan area and 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 counties have been recommended for inclusion in other nonattainment areas bordering the Baltimore area. Cecil County, Maryland has moderate levels of VMT and moderate VMT growth.

With respect to the counties that do not border the Baltimore metropolitan area, Talbot County, Maryland has experienced triple digit VMT growth since 2000; however, this county is not a high ranking candidate for a nonattainment designation based upon other factors. Franklin County, Pennsylvania, and, Kent County, Delaware have moderate levels of VMT and moderate VMT growth. Of the remaining counties listed in Table 5, most do not have comparatively high levels of VMT. Their low levels of VMT do not warrant nonattainment designation on the basis of this factor.

Anne Arundel County and Baltimore Counties are high ranking candidates for nonattainment based on this factor, due to their large VMT and populations, and also due to expected growth of both. Howard County is relatively high ranking due to its high population coupled with significant population growth rate. Carroll County is relatively high ranking, because although its population is lower than some of the other counties, its population growth rate is relatively high. Montgomery and Prince George's Counties are also high ranking on the basis of this factor, as they have relatively moderate population growth rates, but very large populations resulting in large population projections, and they also have very large VMT (coupled with high VMT growth, in the case of Prince George's). Frederick and Charles Counties are relatively lower ranking for this factor, due to their smaller populations and moderate expected population growth and lower VMT levels (in spite of large projected VMT growth rates). Calvert and Charles Counties have lower populations and VMT, which in spite of projected growth, still make them lower ranking for this factor.

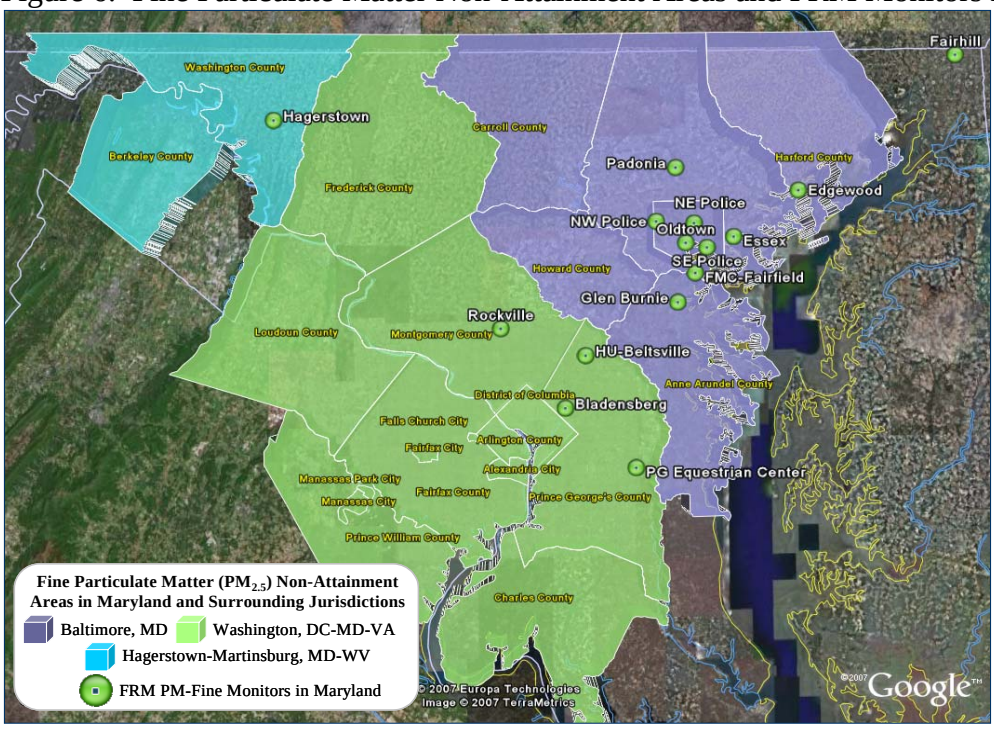
Factor 6: Meteorology (weather/transport patterns)

For this factor, EPA considered data from the National Weather Service instruments in the area. Wind direction and wind speed data for 2005-2007 were analyzed, with an emphasis on "high $PM_{2.5}$ days" for each of two seasons (an October-April "cold" season and a May-September "warm" season). These high $PM_{2.5}$ 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 location of each air quality monitoring site is depicted in Figure 6. The Figures 6.1-6.14 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. 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)

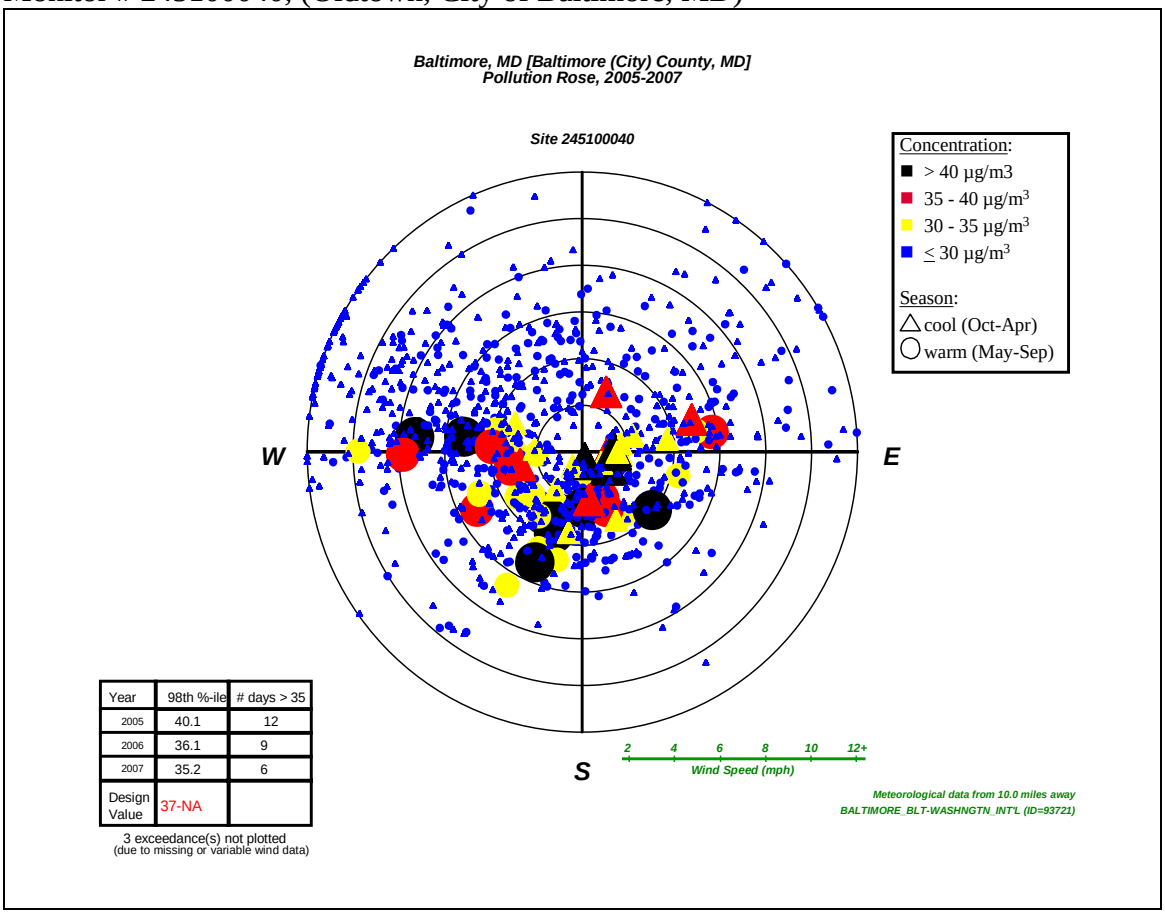
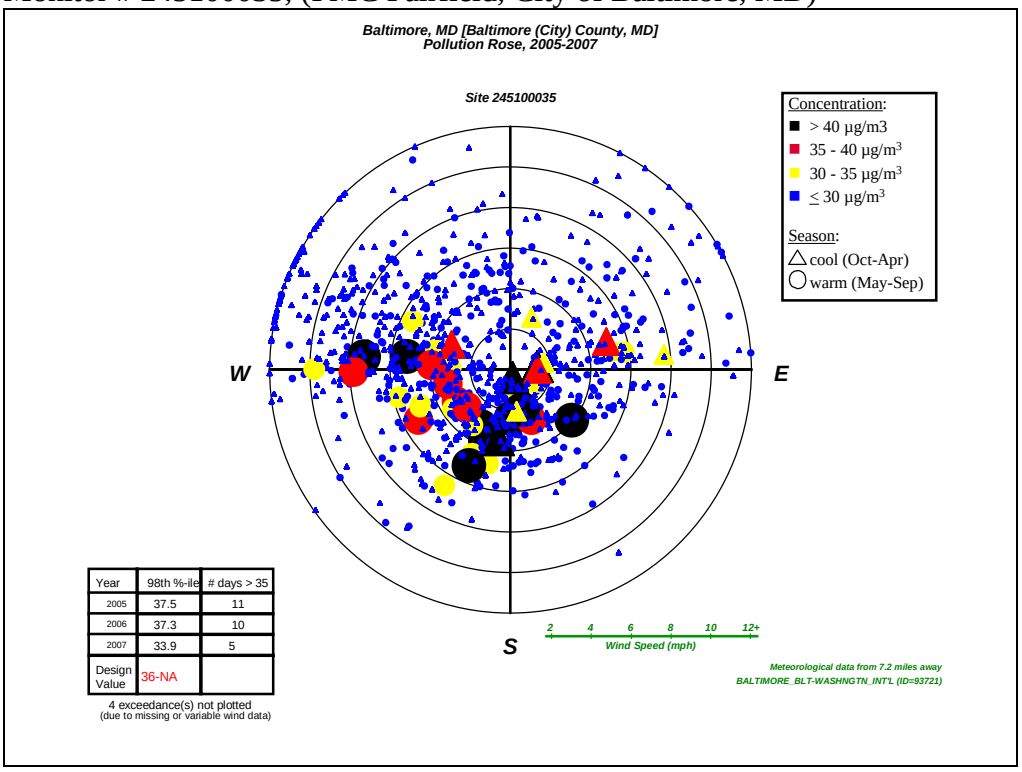


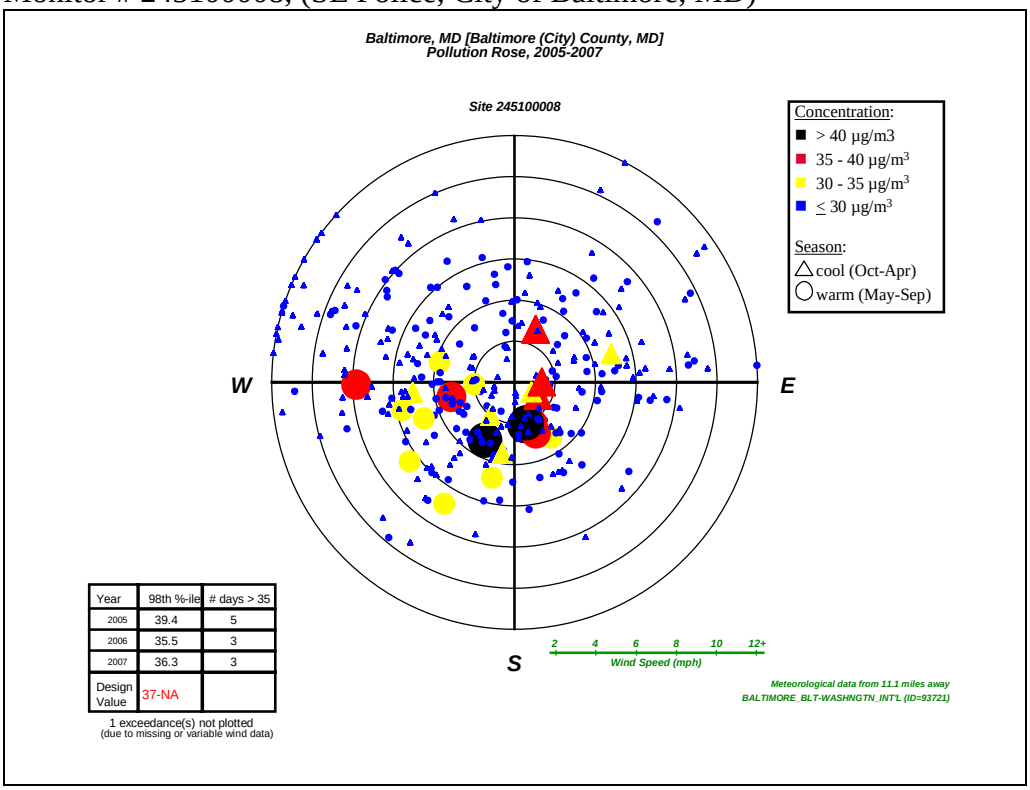
Figure 6.2. Pollution Rose for the City of Baltimore
Monitor # 245100035, (FMC Fairfield, City of Baltimore, MD)



Year	98th %-ile	# days > 35
2005	37.5	11
2006	37.3	10
2007	33.9	5
Design Value	36-NA	

4 exceedance(s) not plotted
(due to missing or variable wind data)

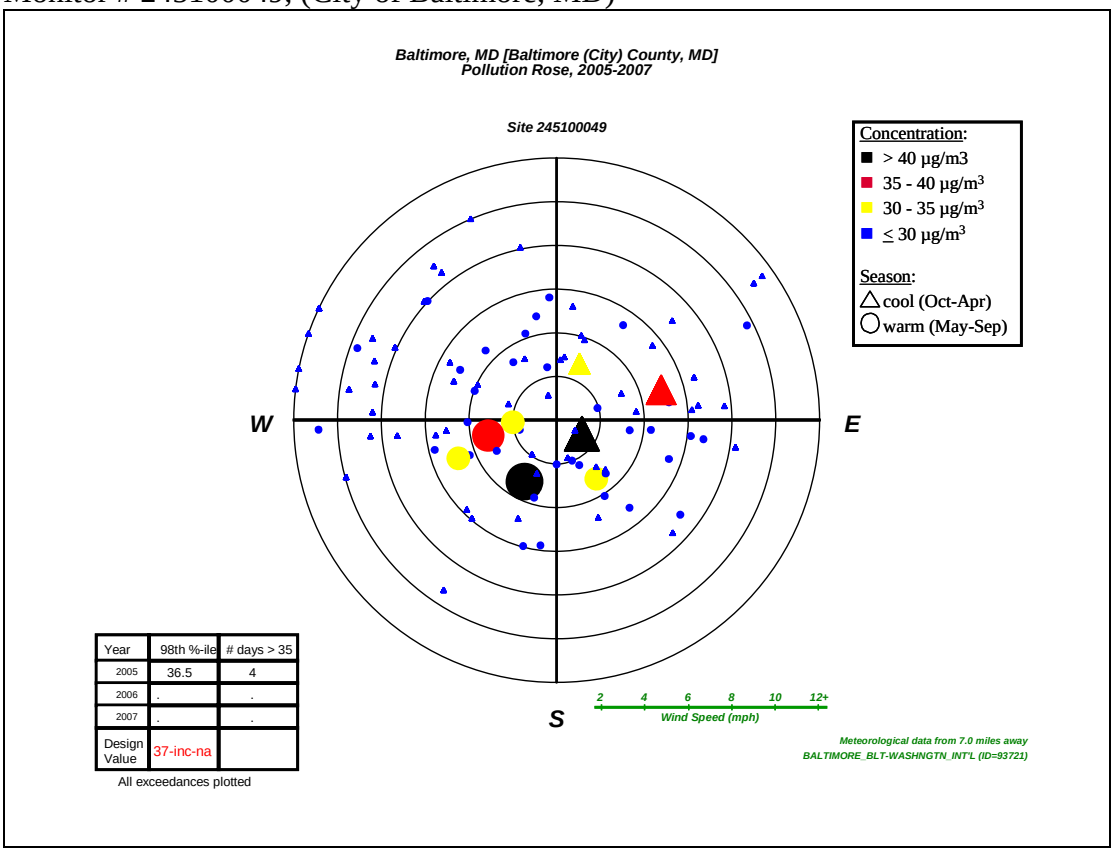
Figure 6.3. Pollution Rose for the City of Baltimore
Monitor # 245100008, (SE Police, City of Baltimore, MD)



Year	98th %-ile	# days > 35
2005	39.4	5
2006	35.5	3
2007	36.3	3
Design Value	37-NA	

1 exceedance(s) not plotted
(due to missing or variable wind data)

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 denser at the Essex monitor.

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

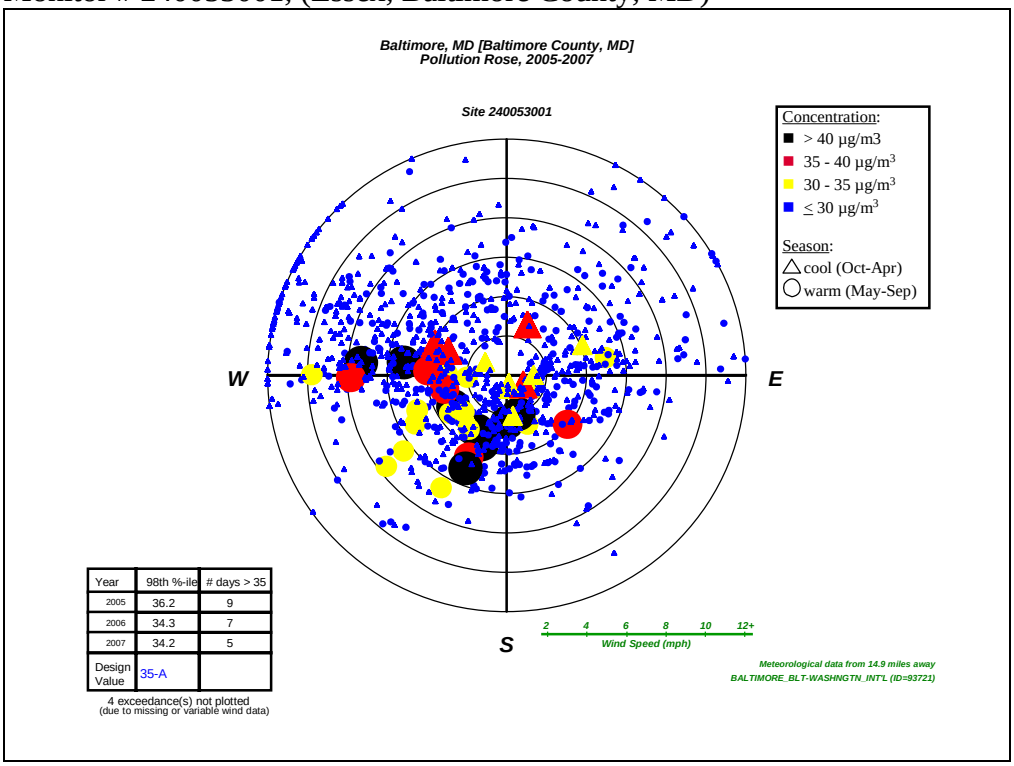
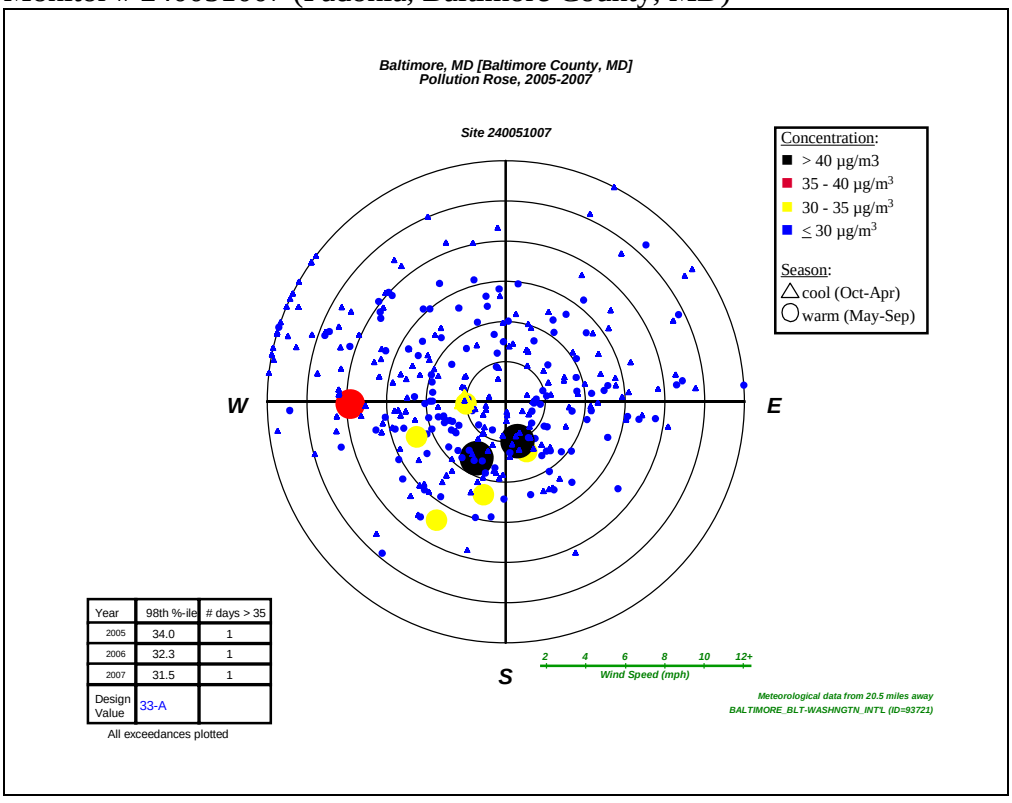
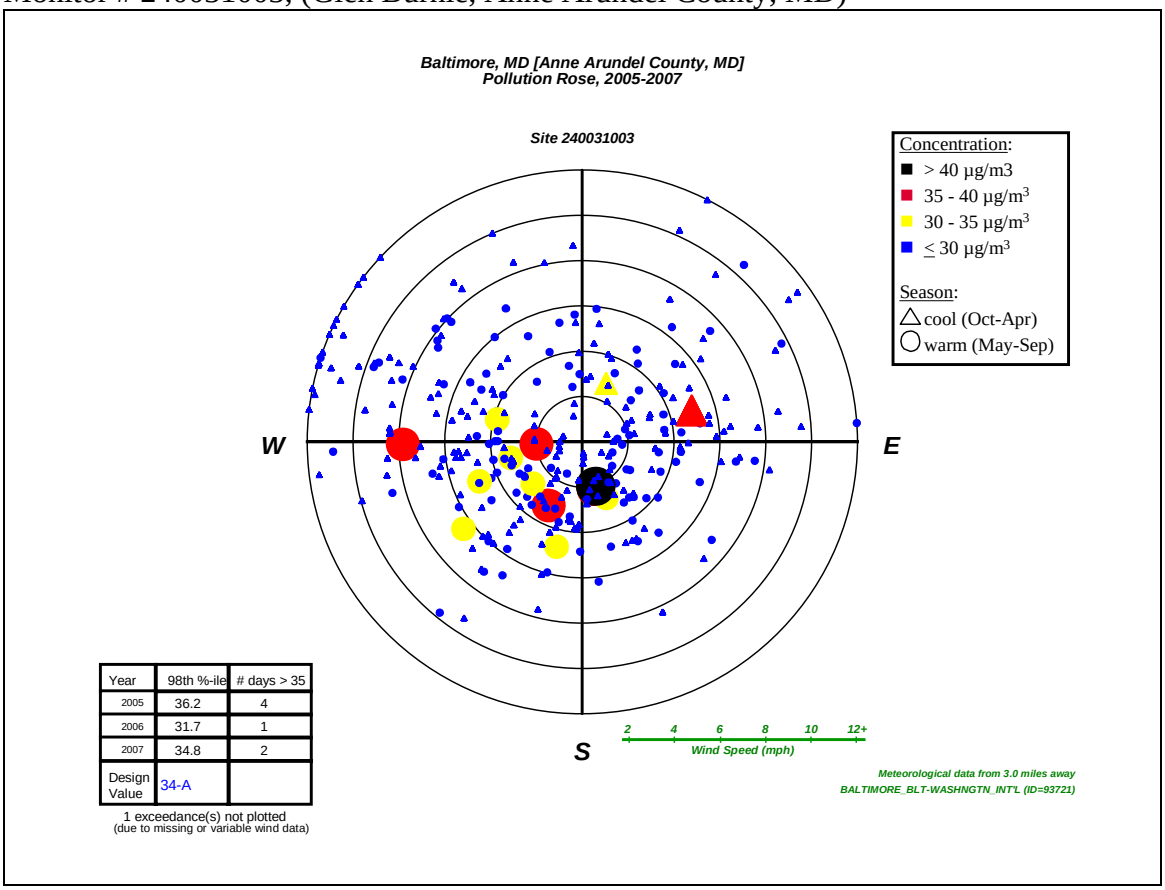


Figure 6.6. Pollution Rose for the Baltimore County Monitor # 240051007 (Padonia, Baltimore County, MD)



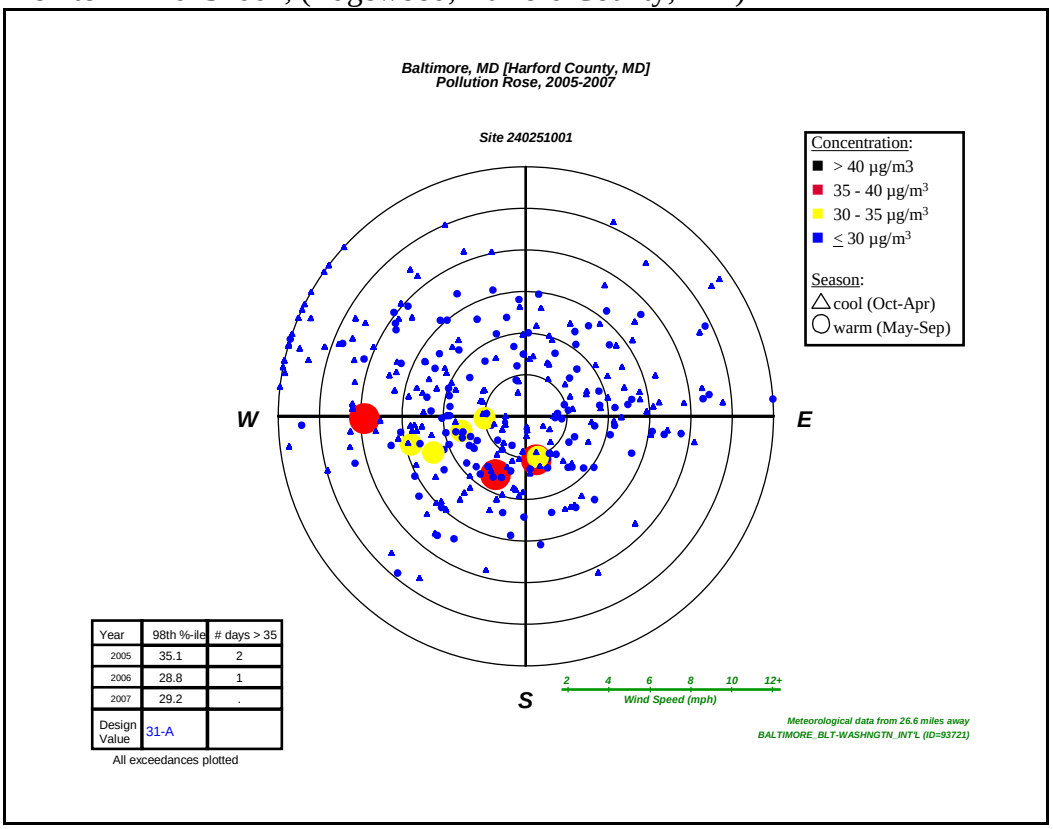
The Glen Burnie monitor in Anne Arundel County (Figure 6.7) lies in the northern tip of the county, just south of the City of Baltimore. The pollution rose for this monitor shows a similar pattern. For the warm season, on days with the highest measured $PM_{2.5}$ (>30 µg/m^3) concentration values, winds 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)



Pollution Rose Data For Washington Metro Area Counties Adjacent to the Baltimore Metro Area

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 µg/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)

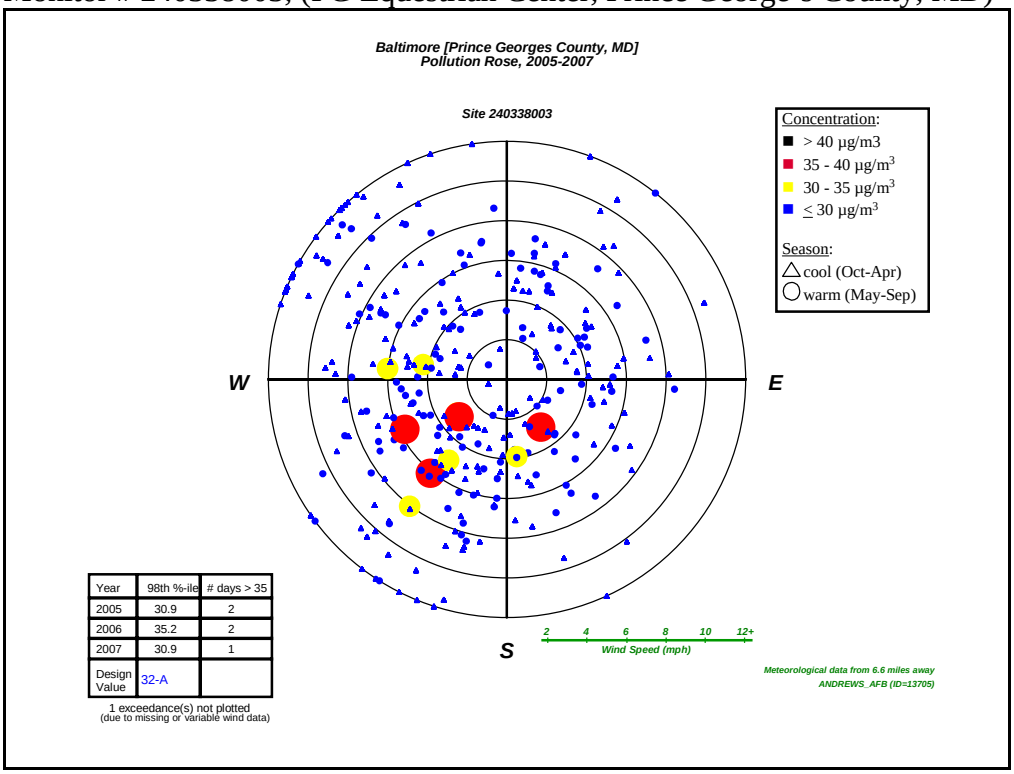
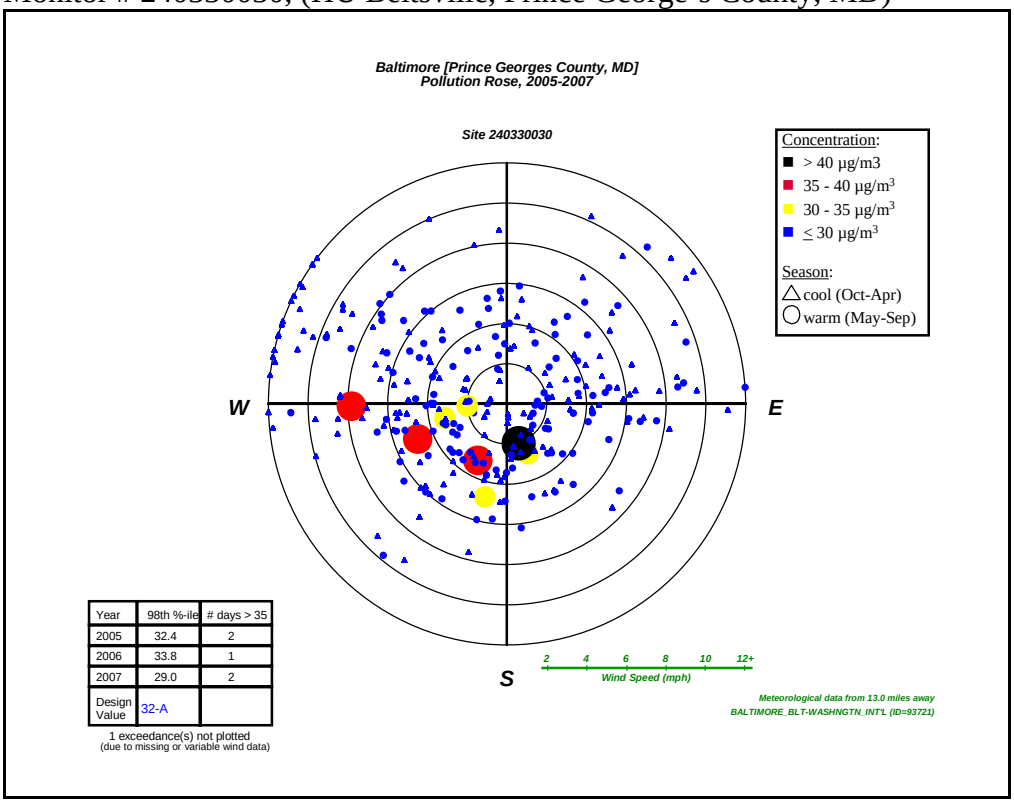
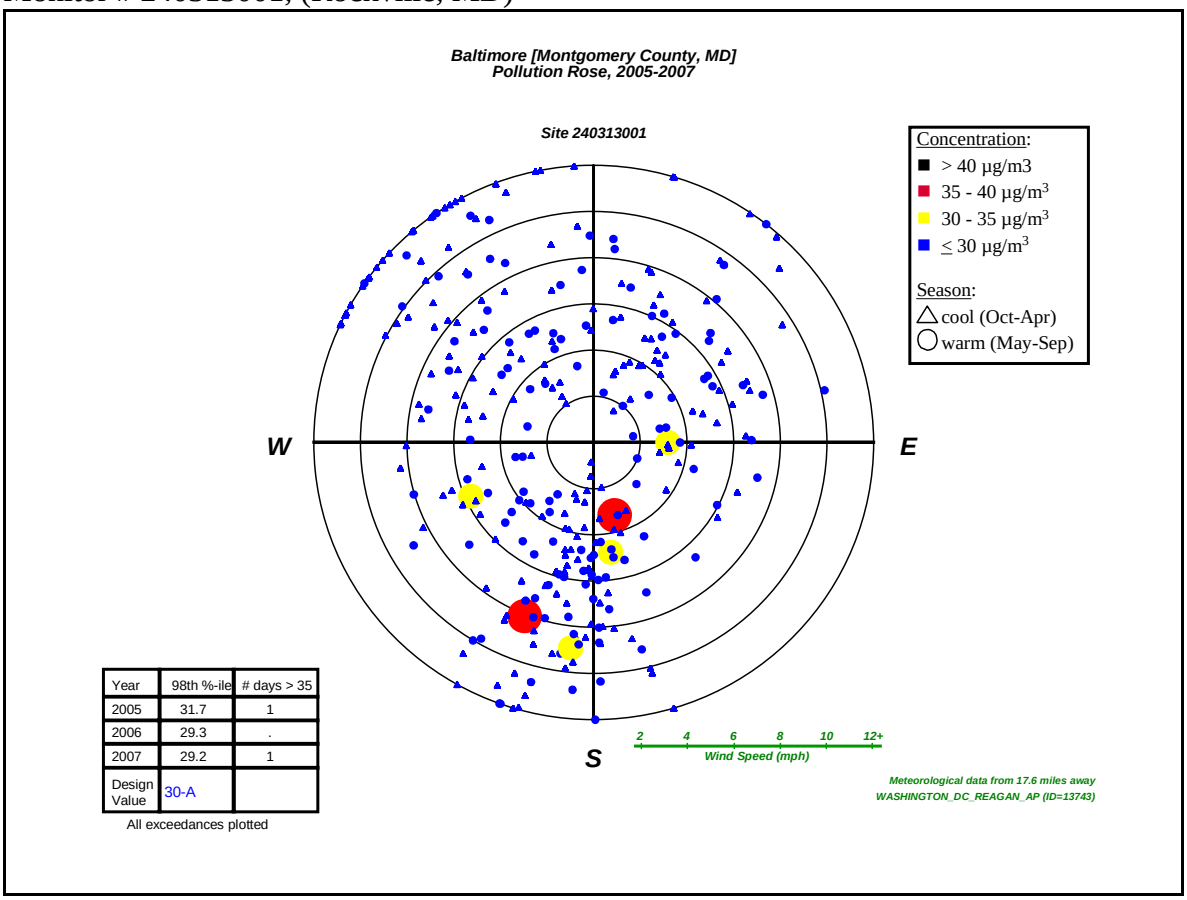


Figure 6.10. Pollution Rose for Prince George's County Monitor # 240330030, (HU Beltsville, Prince George's County, MD)



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

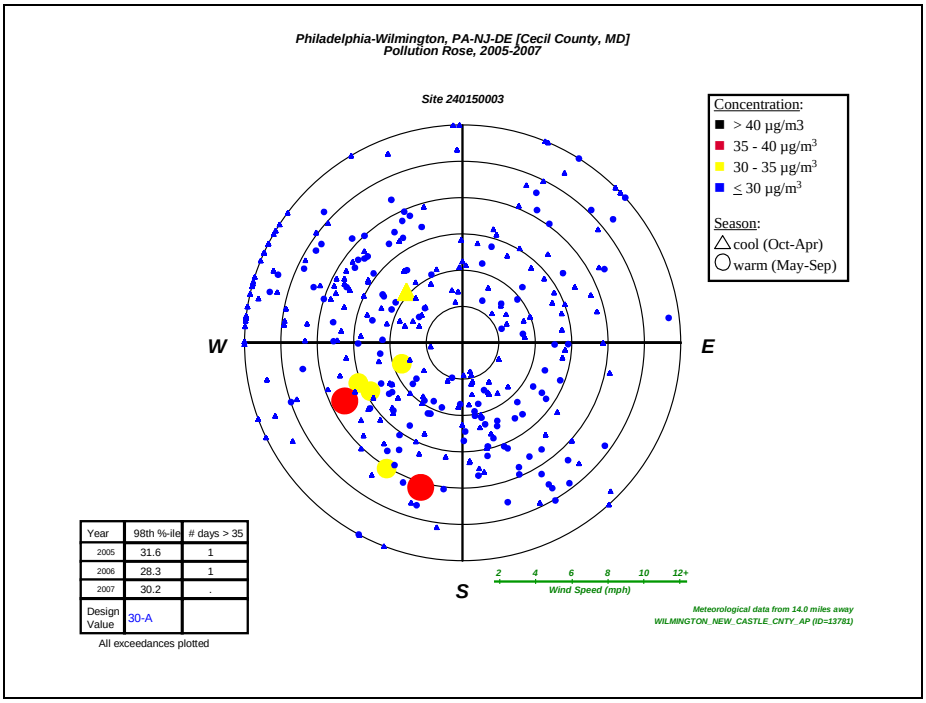
Figure 6.11. Pollution Rose for Montgomery County
Monitor # 240313001, (Rockville, MD)



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



Only when we examine the areas to the north of Baltimore, along the border between Pennsylvania and Maryland, do we see a different trajectory pattern. Below are examples from the Lancaster and York County, Pennsylvania monitors (Figures 6.13 to 6.14).

Figure 6.13 Pollution Rose for Lancaster County, PA
Monitor # 420710007

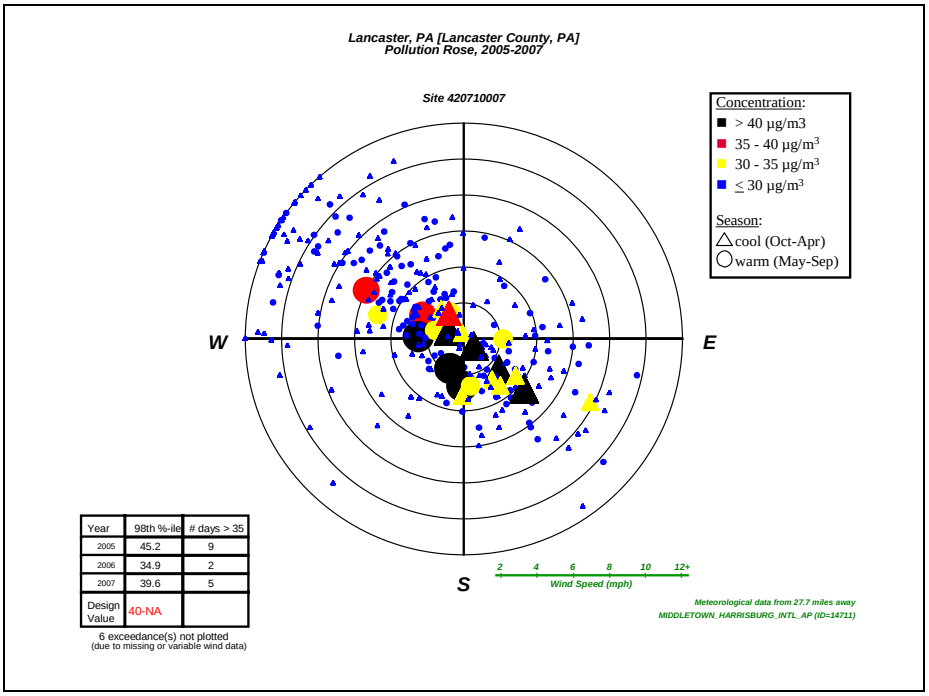
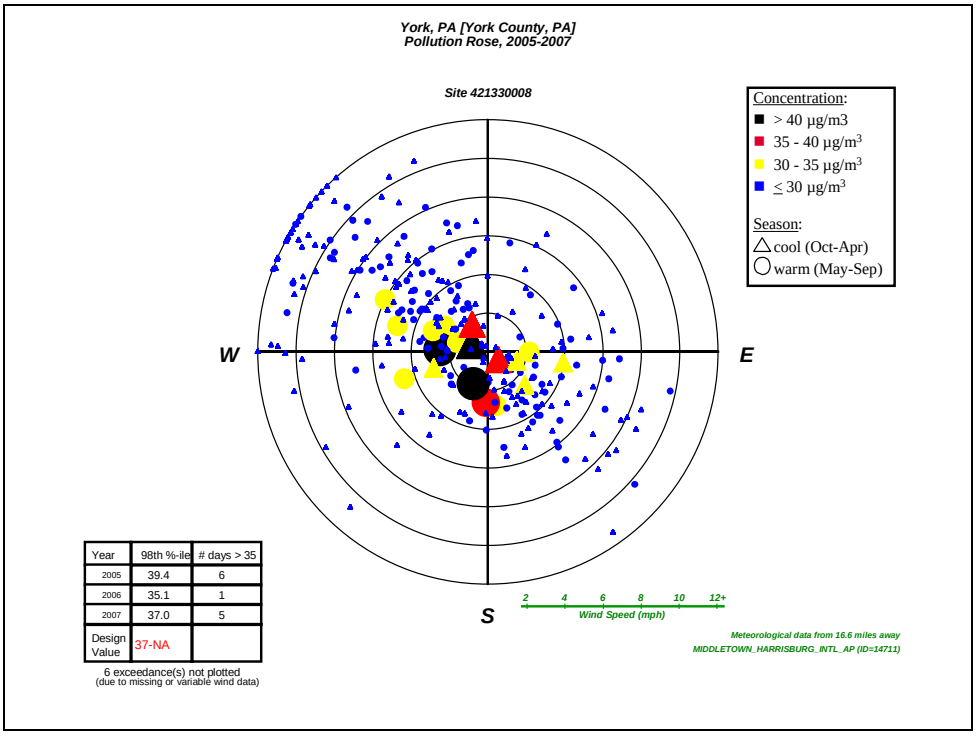


Figure 6.14. Pollution Rose for York County, PA
Monitor # 421330008



Based on the above 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. The absence of topographic features is consistent with our conclusion that emissions from each of these counties contribute to nonattainment of the Baltimore area.

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

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

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

The analysis of jurisdictional boundaries considered the planning and organizational structure of the 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, which would further complicate coordination, if 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 2006 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. 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.

As part of this analysis EPA is considering the planning and organizational structure of the entire proposed Baltimore nonattainment area. EPA recognizes that certain counties within Maryland are part of different metropolitan air quality and transportation planning organizations. For example, Prince George's and Montgomery Counties are part of the Metropolitan Washington Council of Government (MWCOG). However, based upon this analysis, EPA believes that inclusion of Prince George's and Montgomery Counties within the Baltimore nonattainment area for the 2006 $PM_{2.5}$ standard is appropriate in accordance with the Clean Air Act because the data supports a finding that these counties are contributing to the ambient air quality in the Baltimore area. The existence of this contribution from Montgomery and Prince George's Counties to a violation of the standard in the Baltimore area overrides the fact that the Baltimore and Washington areas have historically been separate areas for other NAAQS. As with other nonattainment areas which include overlapping air quality and transportation planning organizations, EPA believes that the proposed inclusion of Prince George's and Montgomery Counties within the Baltimore nonattainment area for the 2006 $PM_{2.5}$ standard will promote cooperation between the respective planning organizations in achieving sound regional responses to air quality and transportation improvements.

Factor 9: Level of control of emission sources

Under this factor, the existing level of control of emission sources is taken into consideration. The emissions data used by EPA in this technical analysis and provided in Table 1 (under Factor 1) represent emissions levels taking into account any control strategies implemented in the Baltimore area before 2005 on stationary, mobile, and area sources. Data are presented for $PM_{2.5}$ components that are directly emitted (carbonaceous $PM_{2.5}$ and crustal $PM_{2.5}$) and for pollutants which react in the atmosphere to form fine particles (e.g. SO_2, NOx, VOC, and ammonia).

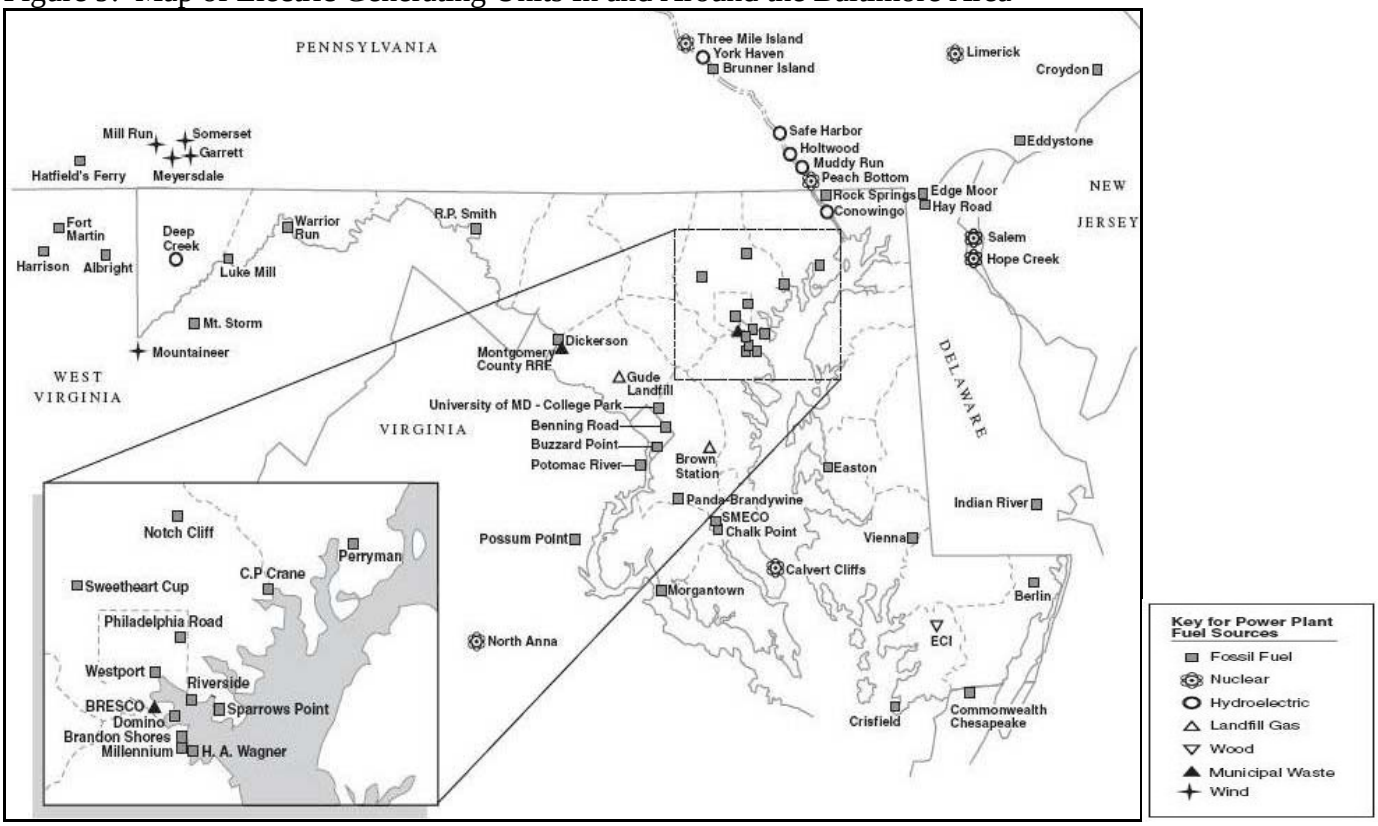
In considering county-level emissions, EPA used data from the 2005 National Emissions Inventory, which was the most up to date version of the national inventory available at the beginning of the designations process in late 2007. However, EPA recognized that for certain counties, emissions may have changed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

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

The emission estimates in Table 1 (under Factor 1) reflect implementation of control strategies implemented by the 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, NOx, and crustal $PM_{2.5}$).

Figure 9 is a map of Electric Generating Units (EGUs) in and around the Baltimore metropolitan area.

Figure 9. Map of Electric Generating Units In and Around the Baltimore Area



Source: Maryland Power Plant Research Program

Table 9. 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	

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 Reported	SO_2 Tons	NO_x Tons	CO_2 Tons	Heat Input (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

Table 9 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.

Some EGUs in Baltimore and the surrounding area are expected to have controls in place in the near future (see Table 9). 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.

EPA recognizes that certain power plants, or other large sources of emissions, located in Montgomery and Prince George's Counties may have installed emission controls, or otherwise significantly reduced emissions, since 2005. EPA recognizes that this information may not be reflected in this analysis. For these two counties, EPA will consider additional information on emission controls prior to 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).

Conclusion

For the counties that EPA is designating as nonattainment for the 2006 $PM_{2.5}$ NAAQS in December of 2008 (Anne Arundel County, Baltimore County, Carroll County, Harford County, Howard County, and the City of Baltimore), these counties are high ranking candidates for such designation on the basis of the analysis set forth above. The City of Baltimore is violating the NAAQS and is therefore designated nonattainment. Anne Arundel and Baltimore Counties are high-ranking candidates based on emissions, population and population density, traffic and commuting patterns, meteorological, and growth rate data, as well as level of control of emissions sources. Harford, Howard, and Carroll Counties are relatively high-ranking candidates based on emissions, population and population density data, and based on traffic and commuting pattern data. Howard and Carroll Counties are high ranking candidates based on meteorological data.

The additional counties that EPA now intends to designate nonattainment as part of the Baltimore nonattainment area (Montgomery and Prince George's Counties) are high ranking candidates for designation as nonattainment for the 2006 $PM_{2.5}$ NAAQS on the basis of the analysis set forth above. In particular, Montgomery and Prince George's Counties are high ranking candidates based upon emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors, population and population density, VMT, meteorological, and growth rate data.