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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 17, 2013

The Honorable Judith A. Enck
Regional Administrator
United States Environmental Protection Agency – Region 2
290 Broadway – 26th Floor
New York, New York 10007-1866

Dear Administrator Enck:

The purpose of this letter is to submit New Jersey's recommendations for fine particulate matter ($PM_{2.5}$) designations for the revised annual 12μg/m^3 primary National Ambient Air Quality Standard (NAAQS).[1] Section 107(d)(1)(A) of the Clean Air Act provides that each state submit recommendations for areas to be designated attainment, nonattainment, or unclassifiable, no later than 1 year after the United States Environmental Protection Agency (USEPA) promulgates a new or revised NAAQS.

New Jersey recommends the entire State of New Jersey be designated attainment of the new annual NAAQS for $PM_{2.5}$. New Jersey makes this recommendation because all the monitors in New Jersey are in attainment of the revised annual $PM_{2.5}$ primary NAAQS of 12μg/m^3. Years of monitoring analyses, regulatory development and timely action to implement control measures for $PM_{2.5}$ and its precursors have resulted in a decreasing trend in $PM_{2.5}$ levels in New Jersey. Future reductions in the sulfur content of distillate and residual fuel oils, beginning in 2014, will continue to lower local and regional fine particulate levels even further.

An analysis, done in accordance with the April 2013 USEPA guidance, shows insignificant air quality contributions to New Jersey's neighboring States that have monitored violations of the 12 ug/m^3 annual standard. New Jersey intends to submit this analysis to you in a separate submittal.

[1] 78 FR 3086

If you have any questions regarding New Jersey's recommendations, please contact Chris Salmi, Assistant Director of the Division of Air Quality, at (609) 292 – 2710.

Sincerely,

Bob Martin
Commissioner

Attachments

c: Richard Ruvo, USEPA Region 2 (electronic copy)
John Renella, New Jersey DAG (electronic copy)
William O'Sullivan, NJDEP (electronic copy)
Chris Salmi, NJDEP (electronic copy)
Sharon Davis, NJDEP (electronic copy)

State of New Jersey
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CHRIS CHRISTIE
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KIM GUADAGNO
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BOB MARTIN
Commissioner

February 24, 2014

John Filippelli, Director
United States Environmental Protection Agency - Region 2
Clean Air & Sustainability Division
290 Broadway, 25th Floor
New York, NY 10007-1866

RE: Technical Analysis in Support of New Jersey's PM2.5 Attainment Designation

Dear Director Filippelli:

Enclosed is the technical analysis supporting New Jersey's recommendations for fine particulate matter ($PM_{2.5}$) designations for the annual 12μg/m^3 primary National Ambient Air Quality Standard (NAAQS), which was submitted to Regional Administrator Judith A. Enck on December 18, 2013.

This technical analysis supports New Jersey's recommendation that the entire State of New Jersey be designated attainment of the new annual NAAQS for $PM_{2.5}$. This analysis was done in accordance with the April 2013 USEPA guidance. The analysis demonstrates that (a) all air quality monitors in New Jersey record $PM_{2.5}$ levels below the standard of 12μg/m^3, and (b) violations of the 12μg/m^3 annual standard in Pennsylvania are attributable to local sources in Pennsylvania and not to sources in New Jersey.

If you have any questions regarding New Jersey's technical analysis, please contact Sharon Davis, Chief of the Bureau of Air Quality Planning, at 609-292-6722.

Sincerely,

William O'Sullivan
Director

Enclosure

c: Jane Kozinski, Assistant Commissioner, NJDEP (electronic copy)
Richard Ruvo, USEPA Region 2 (electronic copy)
John Renella, New Jersey DAG (electronic copy)
Chris Salmi, NJDEP (electronic copy)
Sharon Davis, NJDEP (electronic copy)

Technical Basis for Designating New Jersey Attainment for the Annual $PM_{2.5}$ National Ambient Air Quality Standard of $12 \mu g/m^3$

Prepared by the
New Jersey Department of
Environmental Protection

February 24, 2014

Table of Contents

Five Factor Analysis for the Designation of Areas in New Jersey for the Annual Fine Particulate ($PM_{2.5}$) National Ambient Air Quality Standard (NAAQS) of 12µg/m^3

Introduction

The United States Environmental Protection Agency (USEPA) promulgated a new annual $PM_{2.5}$[1] National Ambient Air Quality Standard (NAAQS) on December 14, 2012. This new annual standard for fine particulate matter was lowered from 15 micrograms per cubic meter (µg/m^3) to 12µg/m^3. According to Section 107(d)(l)(A) of the federal Clean Air Act, states have one year from the new standard's promulgation to submit a recommendation to the USEPA for designating areas as attainment or nonattainment. The USEPA then has one year to decide what the final nonattainment area size and designation should be.

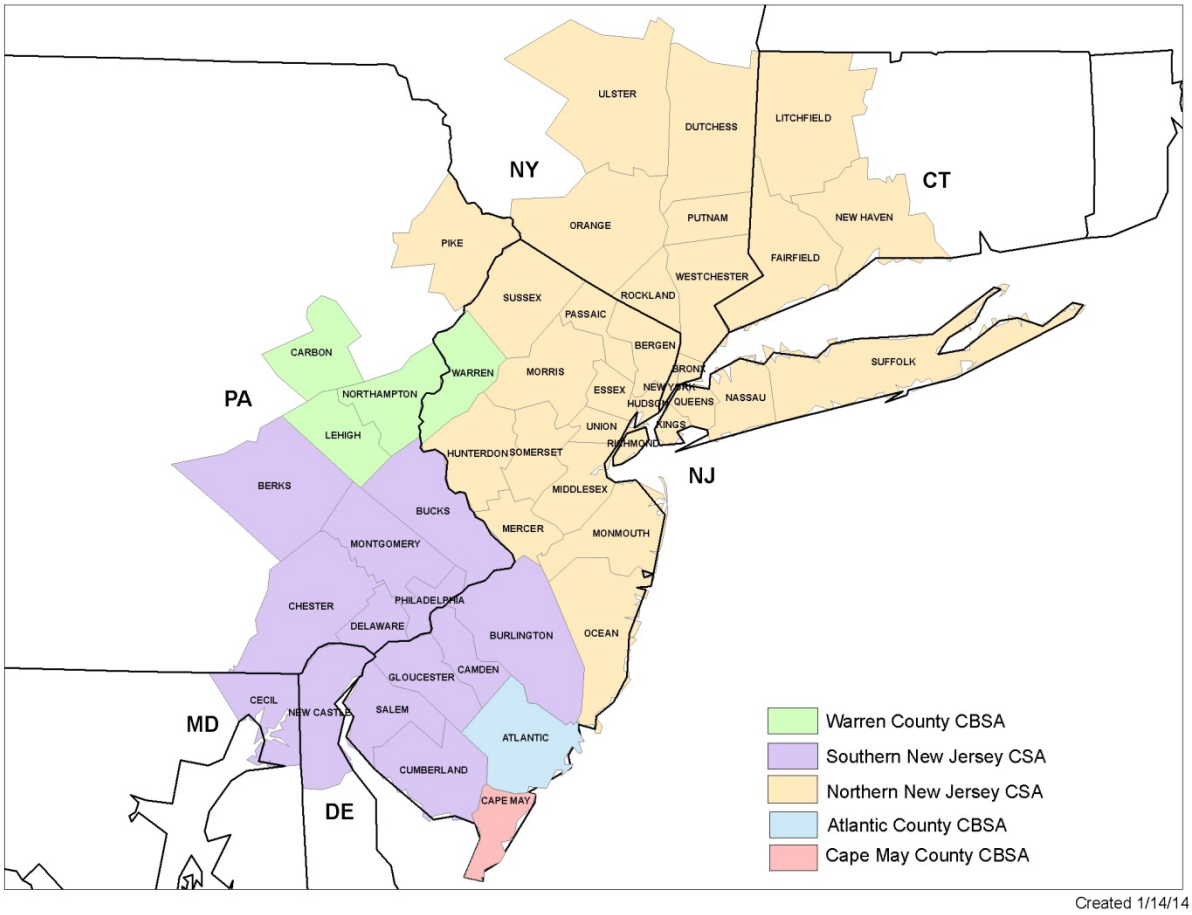
Under the old 15µg/m^3 $PM_{2.5}$ standard, New Jersey had 13 counties in northern and southern New Jersey designated as nonattainment. Due to improvements in air quality, the USEPA redesignated these counties as attaining the annual $PM_{2.5}$ standard of 15µg/m^3 in August 2013, thus making the entire State of New Jersey attainment of the old 15µg/m^3 $PM_{2.5}$ NAAQS and the 35µg/m^3 24-hour $PM_{2.5}$ NAAQS. New Jersey's recommendation that the entire State of New Jersey be designated attainment of the new annual NAAQS for $PM_{2.5}$ was submitted to the USEPA on December 18, 2013.

For the new, annual 12µg/m^3 standard, the USEPA issued guidance for determining nonattainment areas on April 17, 2013.[2] This guidance includes five factors to be used by states for determining the size of nonattainment areas. A five factor analysis is initiated if a monitor measures air quality above the standard. Under initial consideration for nonattainment, the size of a nonattainment area is the boundary of the Core Based Statistical Area (CBSA)[3] or the Combined Statistical Area (CSA)[4] , unless a state can demonstrate that a smaller size or attainment for its portion of the CBSA or CSA is warranted.

New Jersey is part of two Combined Statistical Areas (CSAs): the Northern New Jersey CSA which it shares with New York, Connecticut and Pennsylvania, and includes the New Jersey counties of Bergen, Essex, Hudson, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset and Union; and the Southern New Jersey CSA shared with Philadelphia, Delaware and Maryland, and includes the New Jersey counties of Burlington, Camden, Cumberland, Gloucester, and Salem. New Jersey also has three Core Based Statistical Areas (CBSAs): the Warren County CBSA, which it shares with the Pennsylvania counties of Carbon, Lehigh, and Northampton; the Atlantic County CBSA and the Cape May County CBSA. The Atlantic County and Cape May County CBSAs are not associated with any other areas. These two counties are existing attainment areas. A map of the current CBSAs and CSAs for New Jersey is shown in Figure 1.

[1] $PM_{2.5}$ is also referred to as fine or respirable particulate matter.
[2] USEPA Guidance on Area Designations, April 17, 2013 ("Area Designation Guidance")
[3] The United States Office of Management and Budget (OMB) defines a core based statistical area (CBSA) as one or more adjacent counties or county-equivalents having at least one urban cluster of at least 10,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.
[4] The United States Office of Management and Budget (OMB) defines a combined statistical area (CSA) as an aggregate of adjacent core based statistical areas that are linked by commuting ties.

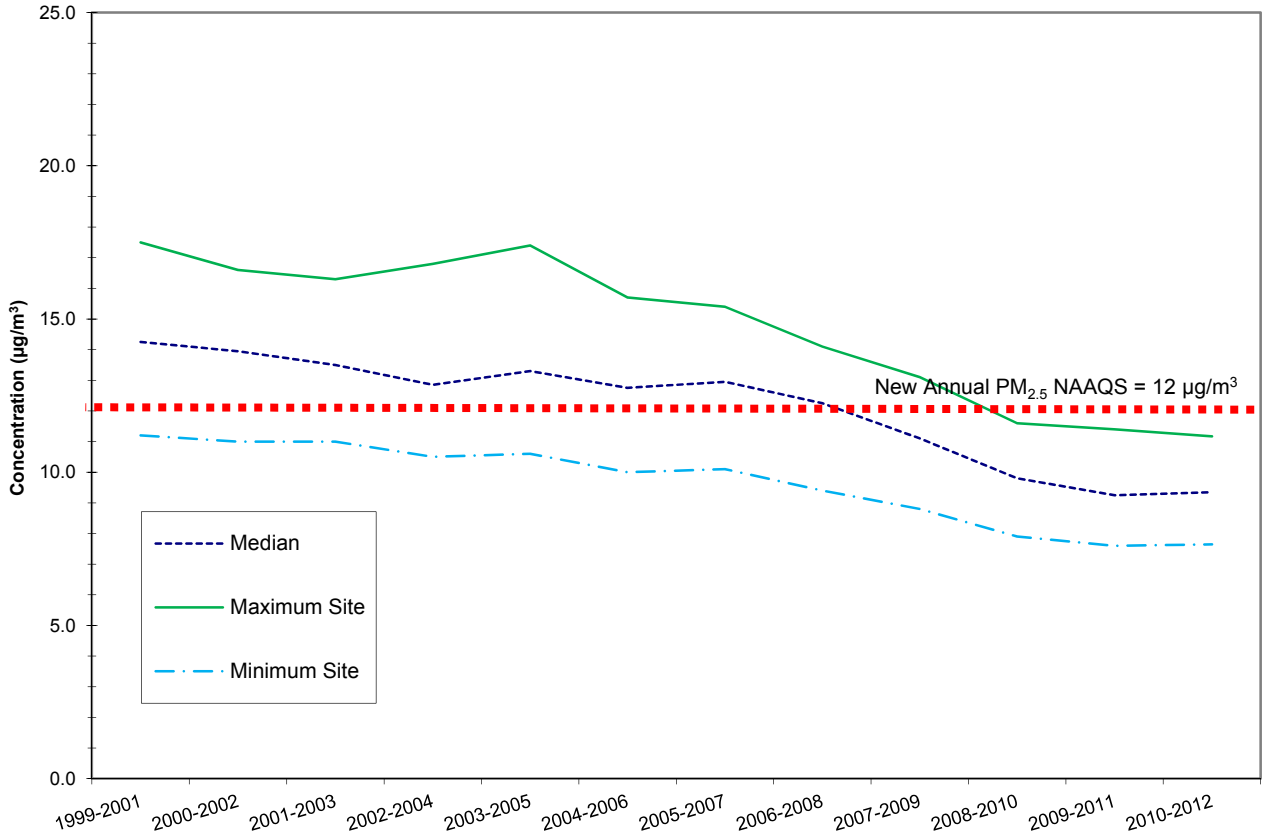
<u>Figure 1</u>: New Jersey Combined Statistical Areas and Core Based Statistical Area



All New Jersey monitors show attainment and a downward trend in measured $PM_{2.5}$ levels over the last 10 years. The downward trend is expected to continue due to new control measures and the continued effectiveness of existing control measures (See Figure 2). For example, New Jersey has adopted a low sulfur content standard for distillate and residual fuel oils of 500 parts per million (ppm) that will take effect in July, 2014, with the next lower sulfur-content phase (15 ppm) beginning in July 2016. The low sulfur fuel standard is expected to lower particulate levels even further in New Jersey and in all downwind areas. The historical trend of New Jersey's statewide annual design values is shown in Figure 2.

Based on its analysis pursuant to the USEPA's "Area Designation Guidance", all New Jersey counties should be designated attainment. No counties in New Jersey should be included within the nonattainment area outside of New Jersey, but within the same CSAs and CBSAs.

<u>Figure 2</u>: $PM_{2.5}$ Design Value Concentrations, Annual Design Values 1999 – 2012
New Jersey Statewide

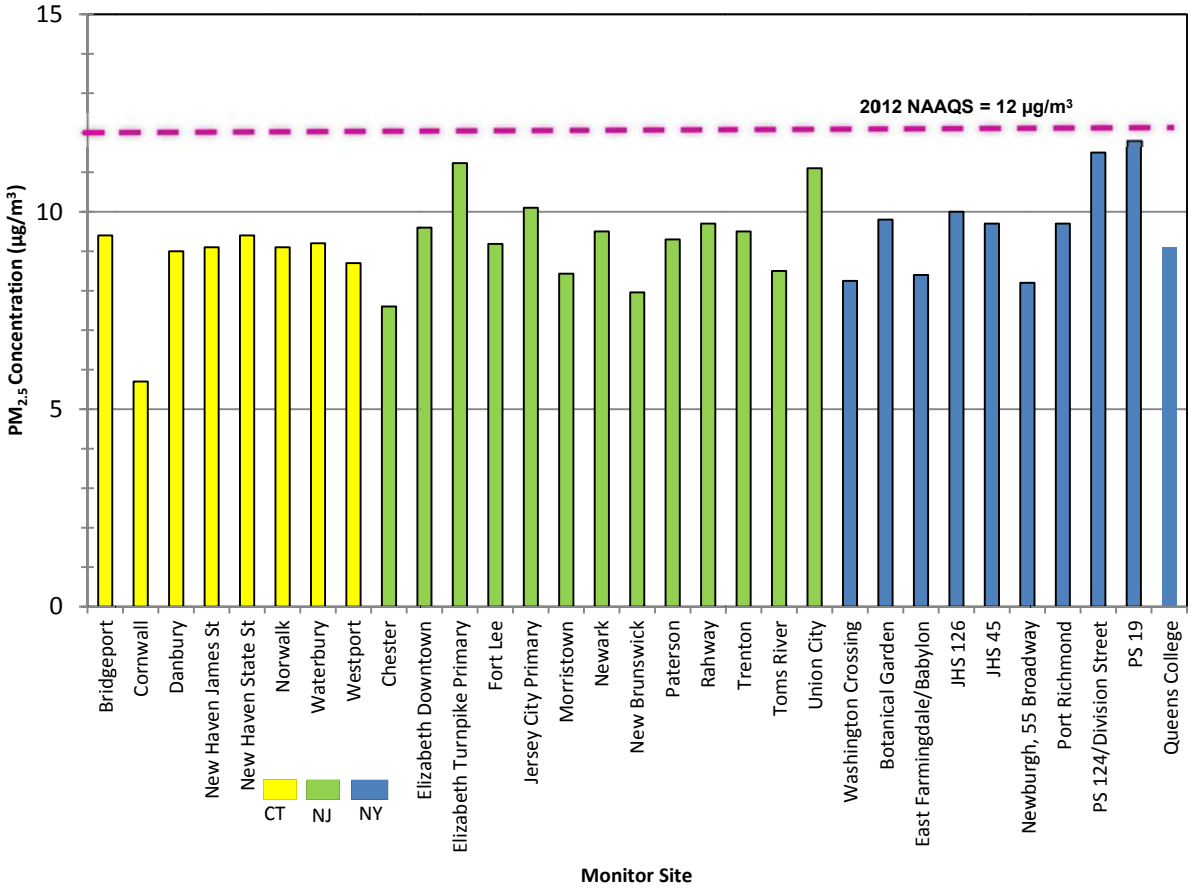


The Northern New Jersey Combined Statistical Area (CSA)

The entire area including parts of the CSA in New York and Connecticut attains the annual $PM_{2.5}$ NAAQS of 12µg/m^3. Therefore, a five-factor analysis for this area is not required.

A chart of the current monitored levels of $PM_{2.5}$ within the CSA is shown in the following Figure 3.

Figure 3: $PM_{2.5}$ 2010-2012 Annual Design Values Northern New Jersey CSA

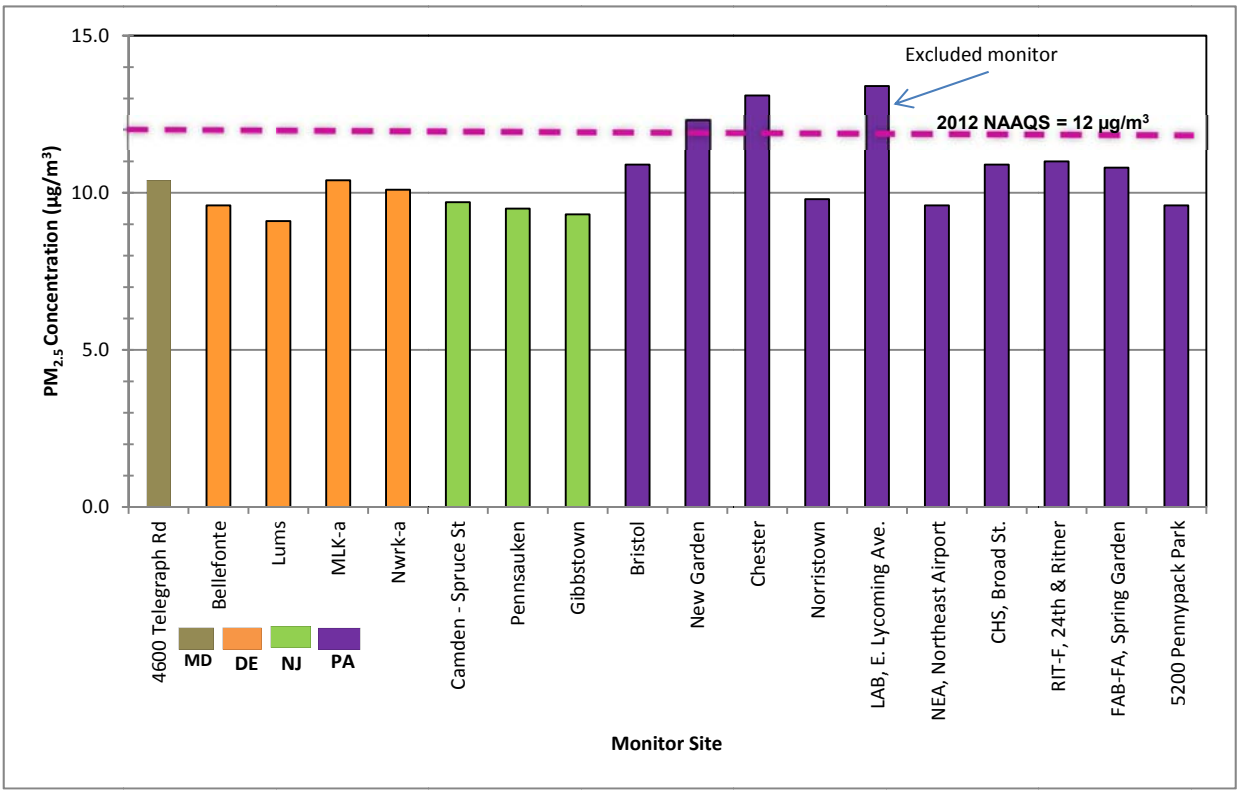


Five-Factor Analysis of the Southern New Jersey Combined Statistical Area (CSA)

Factor 1: Air Quality Data

$PM_{2.5}$ air quality monitoring data, including the annual design value are calculated for each area based on air quality data for the last, available, full 3-year period of monitoring data (i.e.; 2010, 2011, and 2012). No monitors in the New Jersey portion of the Southern New Jersey CSA record $PM_{2.5}$ levels in violation of the annual $PM_{2.5}$ 12µg/m^3 NAAQS. (See Figure 4). All 3 New Jersey monitors are well under the NAAQS by about 20 percent.

Figure 4: $PM_{2.5}$ 2010-2012 Annual Design Values Southern New Jersey Combined Statistical Area



a. Background on $PM_{2.5}$ Components at New Jersey Speciation Monitoring Sites

$PM_{2.5}$ is composed of many different chemical components. An evaluation of the components of $PM_{2.5}$ provides insight into the contributing pollution sources and the effect of existing control measures.

Speciation is the process of disaggregating pollutants into individual chemical species or components, or into groups of species. New Jersey collects data on the components of $PM_{2.5}$ at monitoring sites across the State. This is also referred to as "speciation" monitoring. The speciation monitors are different than those used to measure attainment (Federal Reference Method (FRM) monitors) and use a different sampling method. Speciation data is relevant for this analysis because it aids in defining the larger components that make up $PM_{2.5}$ at a particular site and, therefore, the potential sources that may be affecting the $PM_{2.5}$ levels at the monitor.

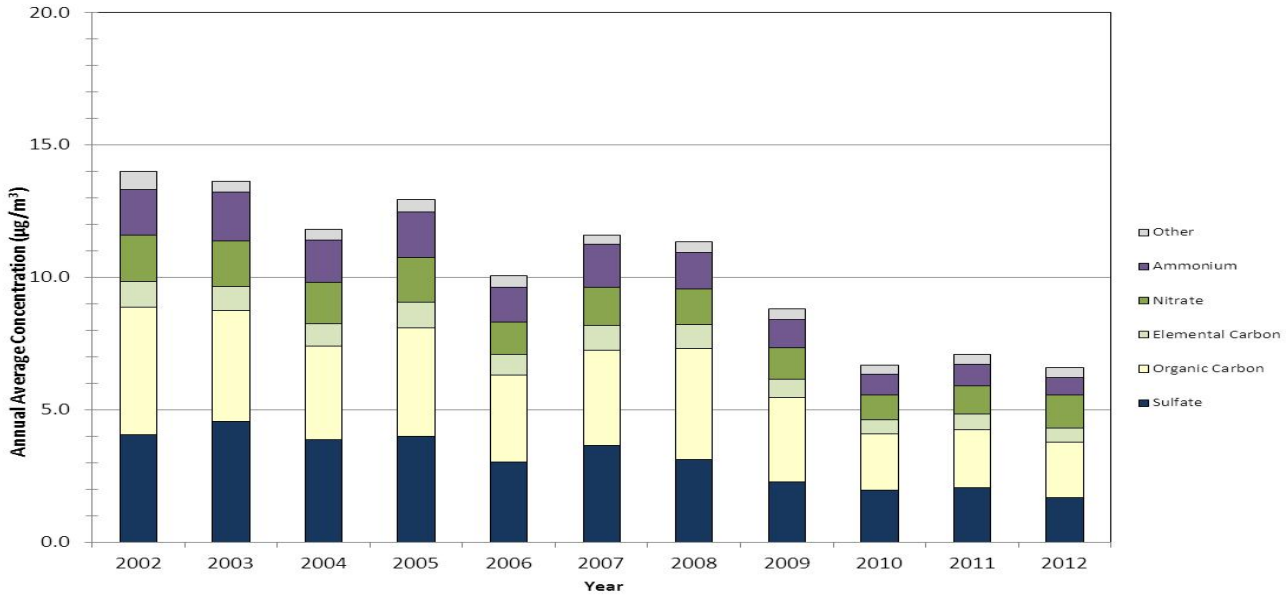
The New Jersey Speciation Network currently consists of five sites (Elizabeth, Newark, New Brunswick, Chester, and Camden) at which air filters are analyzed to determine the chemical characteristics of the particulate matter collected on the filter. Data from 2002 through 2012 was used in this speciation analysis. Since the Camden speciation monitoring site restarted operation in 2013, after being shut down since 2008, it was not included in the analysis due to incomplete data. The Newark monitor was also not included in the analysis, because the site began operation in 2010.

The annual statewide speciation data from the monitors at Elizabeth, New Brunswick, and Chester were averaged for each year from 2002-2012. The five most prevalent compounds in New Jersey's fine particles are sulfate, organic carbon, nitrate, ammonium, and elemental carbon. The "other" category includes all other trace elements for "crustal" calculations (aluminum, silicon, calcium, iron, titanium, etc.) that were measured.

Organic carbon and sulfate comprise approximately 63 percent of the total $PM_{2.5}$ mass. Studies[5] have shown that the primary sources of organic and elemental carbon are gasoline and diesel vehicles and local sources such as wood burning (depending on the area and season). The major contributors of sulfate are primarily from burning coal and secondarily from burning other fuels that contain sulfur, such as heating oil.

The speciation data at all New Jersey sites show a downward trend in sulfates, nitrates, ammonium, and organic carbon. A graph showing the downward trend in the components that make up fine particulate matter is shown in Figure 5. This downward trend is consistent with reductions in the emissions of fine particulate matter that New Jersey has made over the years (see in this document, Factor 2 – Emissions and Emissions-related Data).

Figure 5: New Jersey $PM_{2.5}$ Speciation Summary Statewide Annual Average Concentrations, 2002 – 2012



[5] For details on other $PM_{2.5}$ speciation data studies, including seasonal trends, for New Jersey and the region, refer to: NJDEP State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the Fine Particulate Matter ($PM_{2.5}$) National Ambient Air Quality Standard: $PM_{2.5}$ Attainment Demonstration, Final, Chapter 2, Appendices B11 and B12. New Jersey Department of Environmental Protection, March 26, 2009 (http://www.state.nj.us/dep/baqp/sip/siprevs.htm).

The total $PM_{2.5}$ mass measured at the speciation monitors decreased by 30 percent between 2002 and 2012, while the sum of the known species (as shown in Figure 5) decreased by about 50 percent. The reduction is due to significant decreases over the 10-year period in all five of the primary $PM_{2.5}$ components. Average reductions of each of these components from 2002-2012 in the statewide annual averages are as follows:

- Sulfate: - 58 percent
- Organic carbon: - 56 percent
- Elemental carbon: - 50 percent
- Ammonium: - 59 percent
- Nitrate: - 28 percent

In summary, organic carbon, sulfates and sulfur make up the majority of the $PM_{2.5}$ mass measured at New Jersey monitors. Significant decreases are noted in the annual average data in all of the five major species listed above from 2002-2012. Organic carbon and sulfate consistently remain the top two largest components on an individual basis.

b. Validity of Air Quality Data at Nonattainment Monitors

There are three Pennsylvania monitors that record $PM_{2.5}$ levels above the 12µg/m^3 health standard: Chester, PA (Delaware County), New Garden, PA (Chester County), and the East Lycoming Avenue (Philadelphia, PA) in the Southern New Jersey CSA (See Figures 4 and 6). The Philadelphia Department of Health determined that the East Lycoming Avenue monitor data was not appropriate for determining an area's attainment status[6]. Thus, the monitor was not included in New Jersey's analysis.

c. Trends Analysis for the Pennsylvania Nonattainment Monitors

The particulate matter levels measured at the Chester and New Garden monitors have dropped in recent years. The following table shows the number of days during the last three years when the measured levels of particulate matter were greater than 12µg/m^3. Daily monitoring data from the two monitors was used for this analysis.

[6] http://www.phila.gov/health/pdfs/2013_14AMNPFinalwAppendices__20130628.pdf

Figure 6: Pennsylvania Monitors with valid data measuring above 12µg/m3 in the Southern New Jersey CSA.

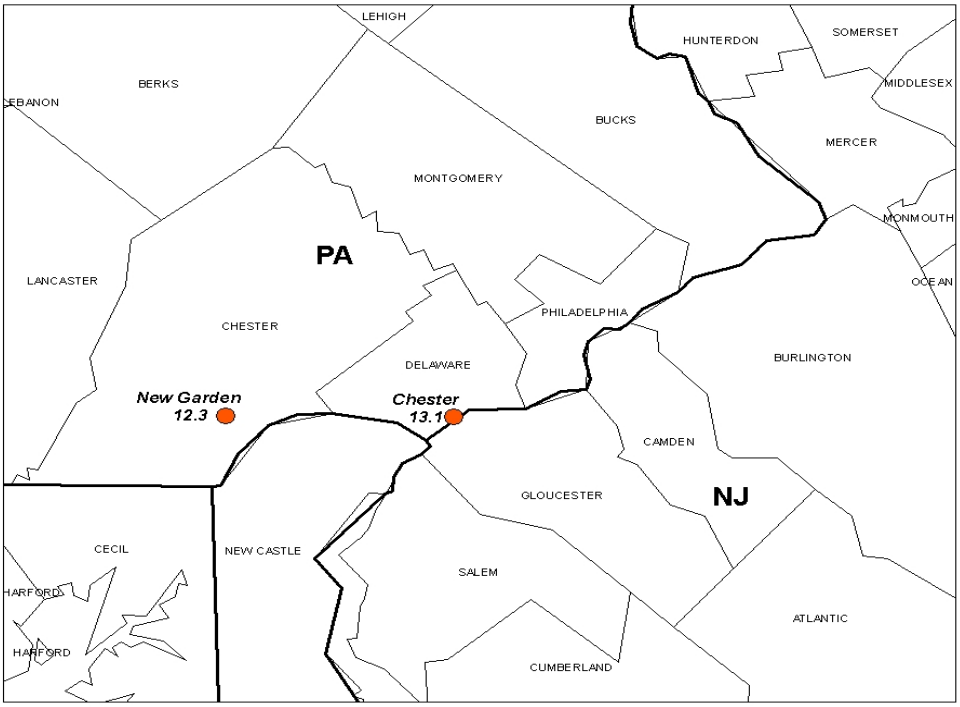


Table 1: Percent of Days (2010 - 2012) with monitored $PM_{2.5}$ levels greater than 12µg/m^3 at the Chester and New Garden, PA Sites.

Monitor	Year	# Days with Data	% of Days with Data	Days with $PM_{2.5}$ > 12µg/m^3	% of days with $PM_{2.5}$ > 12µg/m^3
Chester, PA	2010	349	96%	175	48%
	2011	341	93%	163	45%
	2012	299	82%	135	37%
New Garden, PA	2010	341	93%	178	49%
	2011	297	81%	142	39%
	2012	329	90%	94	26%

d. Urban Excess Analysis Using Speciation Data at New Garden and Arendtsville, PA

An urban excess analysis is conducted to determine the amount of particulate matter that is emitted locally in urban areas. Typical urban sources considered to be local in nature and that may impact $PM_{2.5}$ levels at an air monitor include nearby vehicular traffic, local industry, construction activity, pesticide use and wood burning.

New Jersey could not conduct a sufficient urban excess analysis due to lack of adequate speciation data in the area near the Chester and New Garden monitoring sites. The closest New Jersey speciation monitor with data to compare to the Pennsylvania speciated data collected at New Garden is located in Morris County, NJ. These two sites are located over 72 miles from each other. Because of this lack of sufficient data, New Jersey will rely upon the urban excess analysis performed by the State of

Pennsylvania.

New Jersey does not disagree with Pennsylvania's determination of the urban excess as contained in its report released in December 2013[7]. In that report, Pennsylvania concluded that the urban contribution at the New Garden, PA monitoring site is local in nature, and that there is excess nitrate, ammonium, and organic carbon at the New Garden monitor. The levels of these $PM_{2.5}$ components have decreased in New Jersey between 28 and 59 percent since 2002 (see in this document, Factor 1 – Air Quality Data).

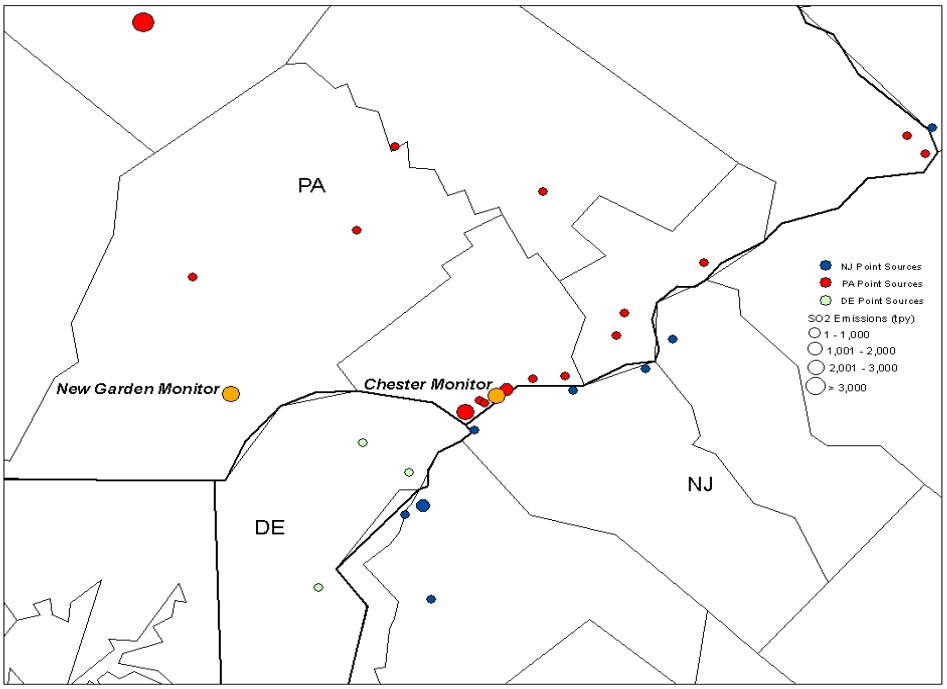
Factor 2: Emissions and Emissions-Related Data in the Southern New Jersey Combined Statistical Area (CSA)

Point, Mobile and Area Emissions

Point Source Emissions

Figure 7 shows the emission and locations of major point sources near the Chester, PA and New Garden monitors. The maps in Figure 8A, 8B, and 8C show the total emissions of fine particulates, sulfur dioxide, and oxides of nitrogen, respectively, in each county of the Southern New Jersey CSA between 2008 and 2011. Decreasing amounts of sulfur dioxide and particulate emissions are occurring in most counties. Sources in Pennsylvania counties continue to contribute the largest portion of emissions within and upwind of the Pennsylvania monitors that measure high $PM_{2.5}$ levels.

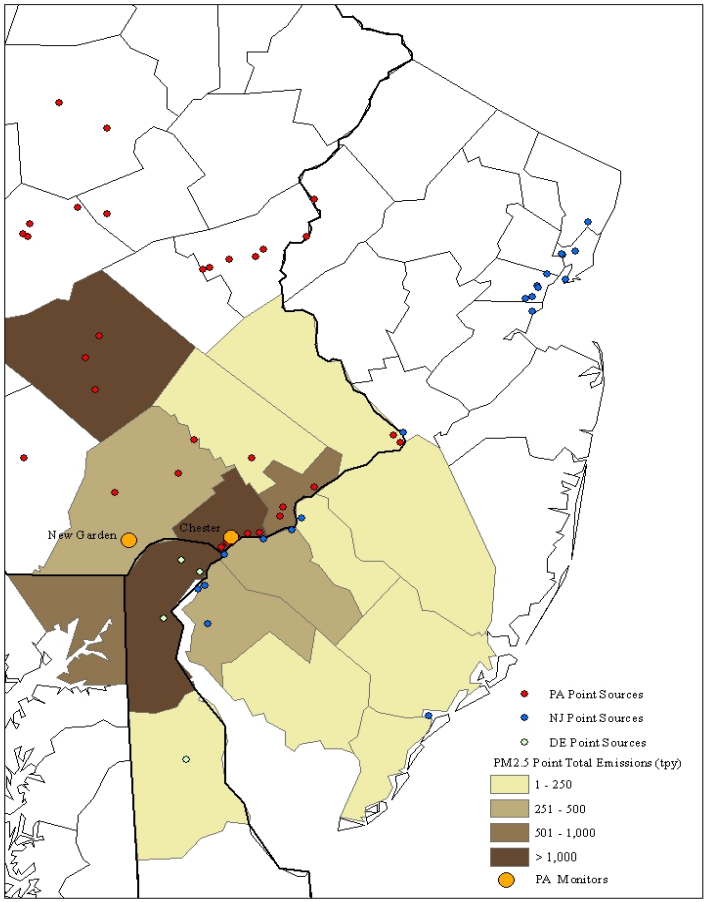
Figure 7: Emissions and Locations of Major Point Sources near the Chester and New Garden, PA monitors (Indicated with Orange Circles).



[7] http://www.dep.state.pa.us/dep/deputate/airwaste/aq/attain/pm25des/AppendixC-1-Greater_Philadelphia_Area.pdf

Figure 8A:

2008 $PM_{2.5}$ County Total Emissions from Point Sources in Southern New Jersey CSA



2011 $PM_{2.5}$ County Total Emissions from Point Sources in Southern New Jersey CSA

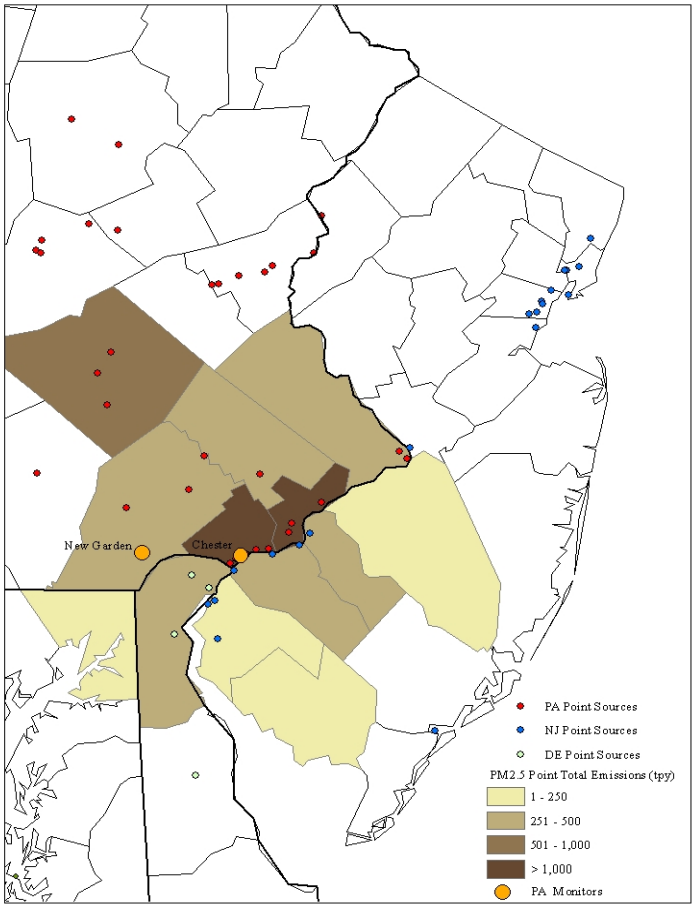
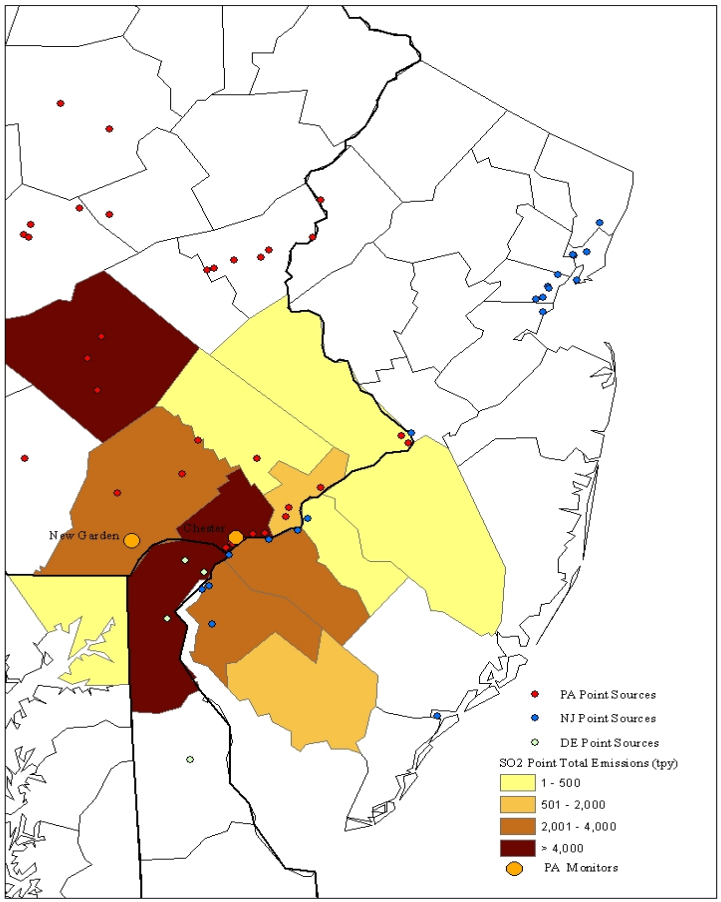


Figure 8B:

2008 SO_2 County Total Emissions from Point Sources in Southern New Jersey CSA



2011 SO_2 County Total Emissions from Point Sources in Southern New Jersey CSA

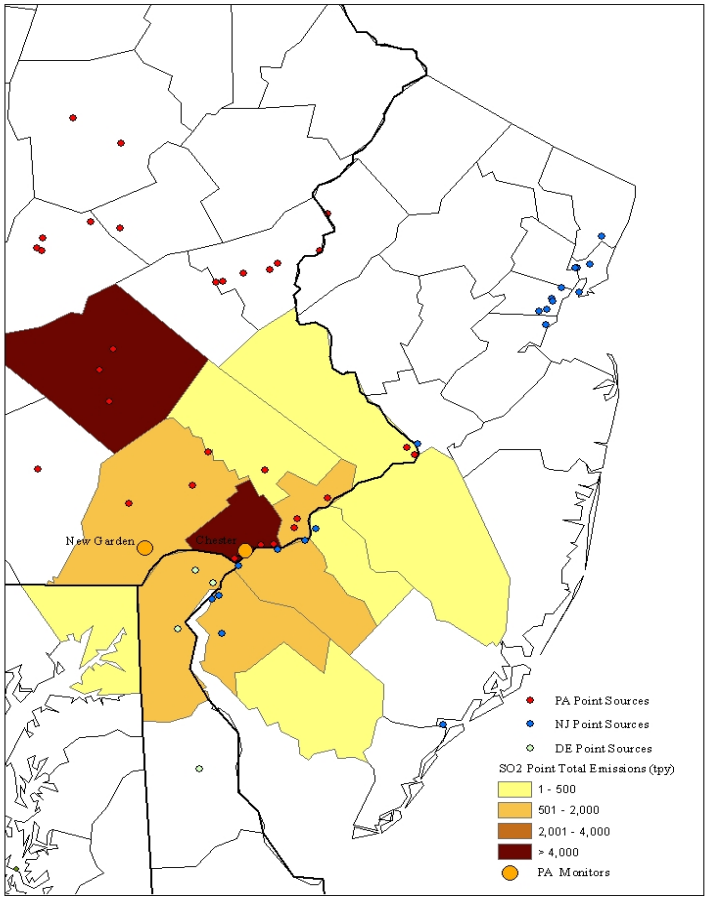
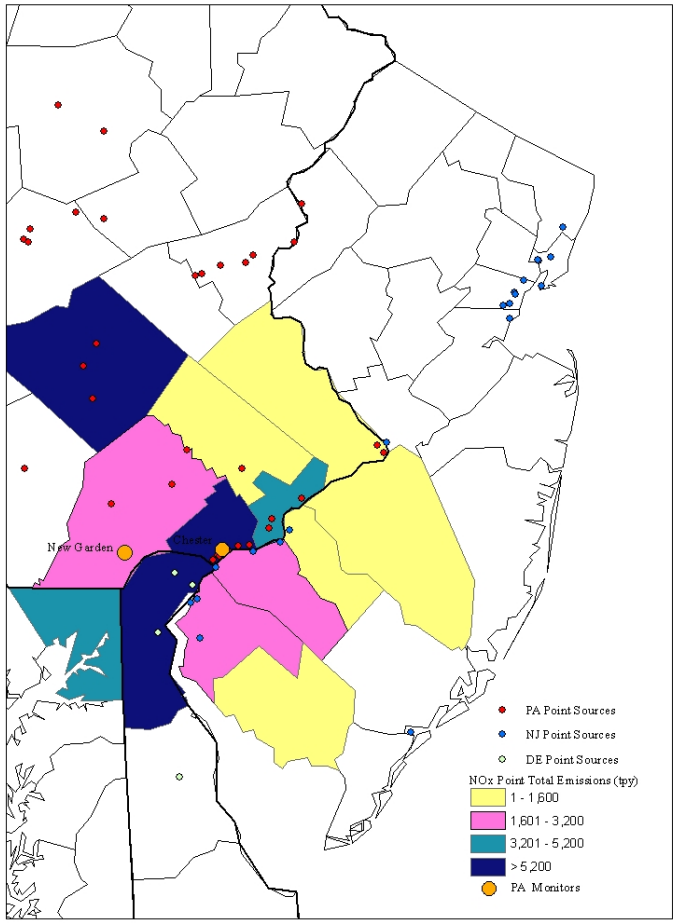


Figure 8C:

2008 NO_x County Total Emissions from Point Sources in Southern New Jersey CSA



2011 NO_x County Total Emissions from Point Sources in Southern New Jersey CSA

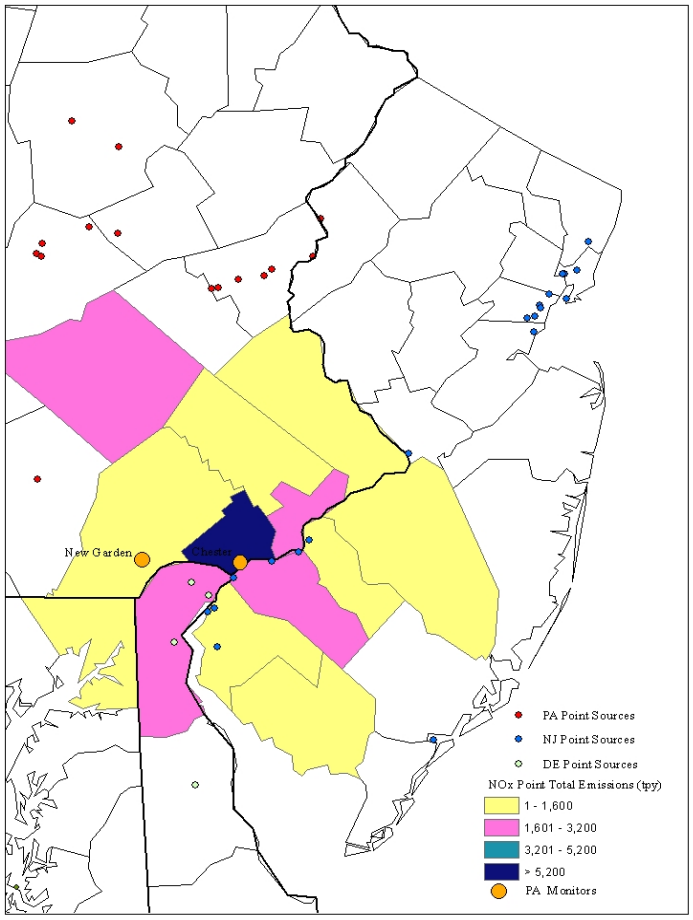


Figure 9 shows the location of the major point sources in New Jersey and Pennsylvania.

<u>Figure 9</u>: Emissions and Locations of Major $PM_{2.5}$ Point Sources for New Jersey and Pennsylvania

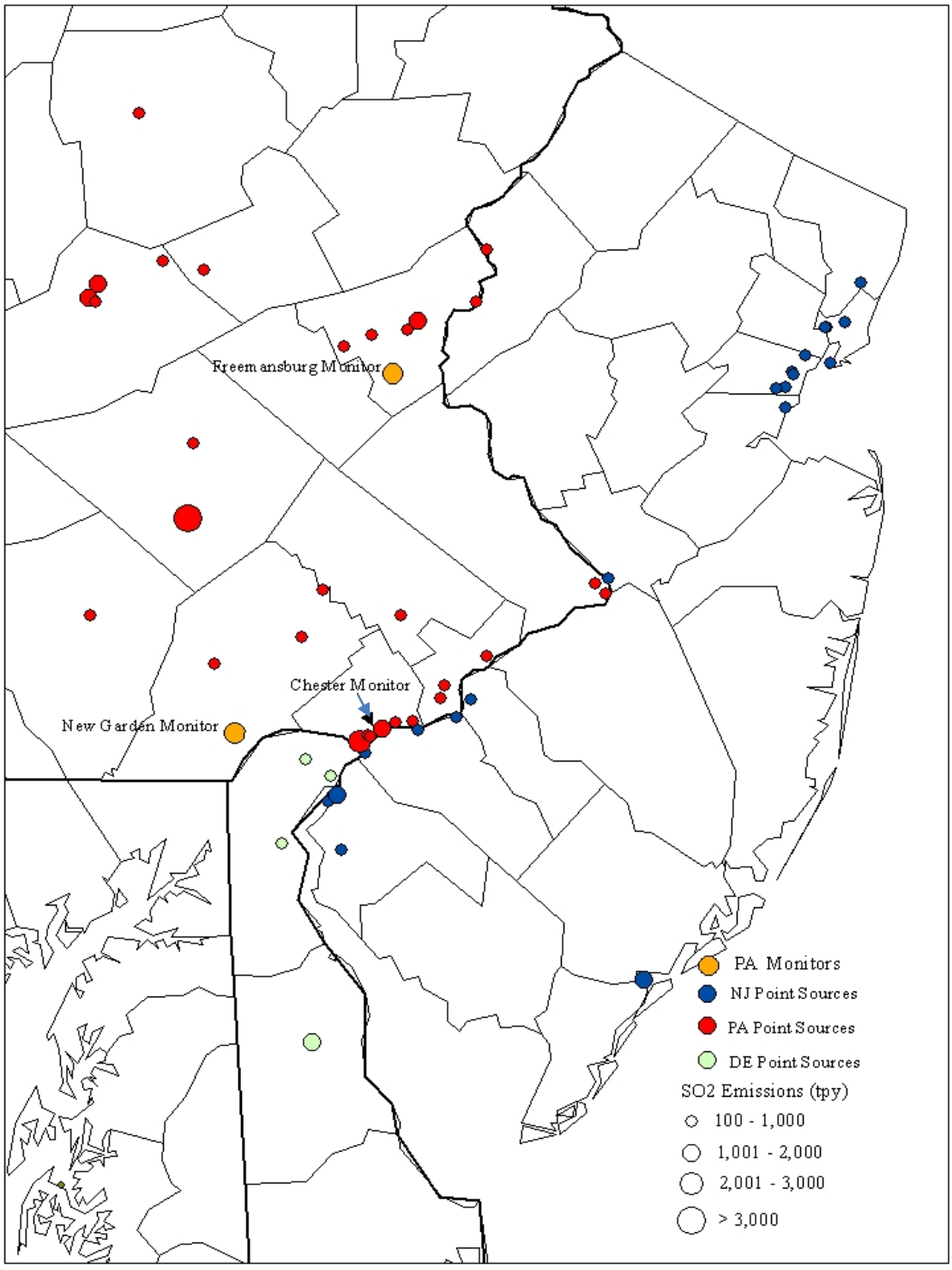


Table 2 shows 2011 total emissions (in tons per year) for point sources located in the counties included in the CSA. (Data Source: 2011 National Emissions Inventory at http://www.epa.gov/pmdesignations/2012standards/docs/nei2011v1pointnei2008v3county.xlsx). The pollutants analyzed include $PM_{2.5}$ and its precursors: oxides of nitrogen (NO_x) and sulfur dioxide (SO_2).

In 2011, New Jersey's total point source emissions only contribute approximately 18 percent of the overall emissions in the area: 22 percent of $PM_{2.5}$, 16 percent of SO_2 and 19 percent of NO_x. The Pennsylvania counties in the CSA contribute the majority of the emissions: 69 percent of the total $PM_{2.5}$ emissions, 78 percent of the total SO_2 emissions and 70 percent of the total NO_x emissions.

The highest point source emissions in the CSA for all three pollutants occur in Delaware County, PA, where the Chester monitor is located. Figure 9 shows the location and relative emissions of SO_2 for the point sources. These point sources are also large emitters of nitrogen oxides and particulate matter.

The high number of large point sources located in Pennsylvania is contributing to this urban excess at the New Garden and Chester monitors, given the predominant wind directions and wind trajectories on days of high monitored $PM_{2.5}$ levels at New Garden and Chester sites (see Factor 2 and 3 discussion).

Table 2: Total point source emissions (in tons per year) for Delaware, Pennsylvania, New Jersey, and Maryland counties included in the Southern New Jersey CSA

County	2011 $PM_{2.5}$ (tons per year)	2011 SO_2 (tons per year)	2011 NO_x (tons per year)
New Castle, DE	597	896	2,756
Total DE Portion	**597 (9.0%)**	**896 (6%)**	**2,756 (11%)**
Philadelphia, PA	1,034	730	2,568
Delaware, PA	1,497	4,976	7,642
Montgomery, PA	306	292	1,456
Chester, PA	513	1,007	1,530
Berks, PA	722	4,651	3,139
Bucks, PA	330	260	1,271
Total PA Portion	**4,402 (69.0%)**	**11,916 (78%)**	**17,606 (70%)**
Gloucester, NJ	332	742	1,758
Camden, NJ	562	48	433
Burlington, NJ	51	89	286
Cumberland, NJ	203	348	723
Salem, NJ	222	1,256	1,540
Total NJ Portion	**1,370 (22.0%)**	**2,483 (16%)**	**4,740 (19%)**
Cecil, MD	16	6	77
Total MD Portion	**16 (0.0%)**	**6 (0%)**	**77 (0%)**
Total Emissions in CSA	**6,385**	**15,301**	**25,179**

The lower emissions in the New Jersey counties are attributed to state regulatory efforts to reduce emissions that contribute to $PM_{2.5}$. All large coal burning sources in the New Jersey portion of the CSA are controlled using scrubbing technology to reduce sulfur dioxide emissions, baghouse filtration to reduce particulate emissions, and selective catalytic reduction (SCR) to reduce nitrogen oxides emissions.

The Pennsylvania counties within the Southern New Jersey CSA have multiple large point sources that are concentrated along the borders of Philadelphia and Delaware Counties and upwind of the Chester monitor as shown in Figure 9. This indicates that local influence from these point sources may be responsible for the elevated $PM_{2.5}$ levels measured at Chester, rather than emissions from New Jersey emission sources that are smaller and further away than the Pennsylvania sources.

The emissions of elemental and organic carbon, NO_x, and SO_2 are expected to continue to decrease in New Jersey because of the State of New Jersey and federal efforts to control air emissions, including lower sulfur Home Heating Oil and Reasonably Available Control Technology rules to address emissions of oxides of nitrogen and $PM_{2.5.}$
The location of the major point sources as shown in Figure 9 is also considered in the Factor 3 analysis of the predominant wind directions.

Mobile Emissions

a. Motor Vehicle Traffic Levels

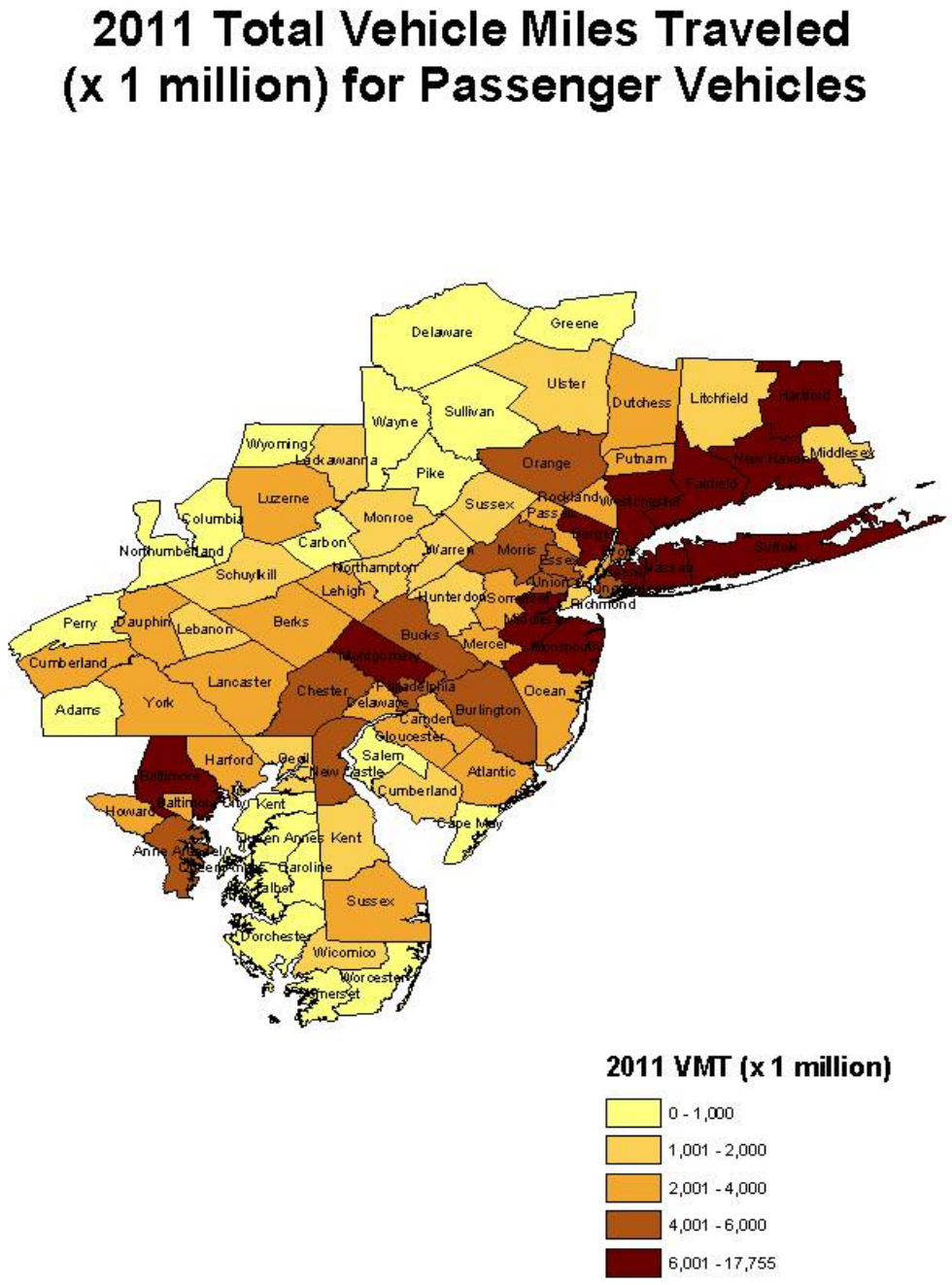
In 2011, motor vehicle emissions accounted for approximately 79 percent of the nitrogen oxides and 32 percent of the direct fine particulate emissions in New Jersey. The amount of emissions from passenger vehicles can be estimated by looking at the number of miles driven within all counties in the metropolitan area (i.e.; the total Vehicle Miles Traveled (VMT) for each county). The total VMT for 2011 is shown in Figure 10 for each county in the Southern New Jersey CSA[8] in millions of miles. The 2011 data is shown in Table 3, which indicates that a greater degree of commuting occurs within the upwind Pennsylvania counties surrounding the Chester and New Garden, PA monitors than in the downwind neighboring New Jersey counties of Burlington, Camden, Cumberland, Gloucester, and Salem. 95 percent more people are commuting within Pennsylvania to Delaware County than are commuting from New Jersey.

Table 3: Total Number and Percent of Commuters and Vehicle Miles Travelled (VMT) within Pennsylvania and from other States that travel to Delaware County, PA

Home County	VMT (Millions)	#Commuters to Delaware, PA
PA's Total Commuters within PA	27,573	192,677
NJ Total Commuters to PA	12,942	8,773
DE Total Commuters to PA	5,201	8,150
MD Total Commuters to PA	1,356	373
Grand Totals	**47,072**	**209,973**
PA % of Total	58.6	91.8
NJ % of Total	27.5	4.1
DE % of Total	11.0	3.9
MD % of Total	2.9	0.2

[8] http://www.epa.gov/pmdesignations/2012standards/docs/vmt2011.xlsx

<u>Figure 10</u>: Driving miles for Passenger Vehicles within each county in 2011



b. Commuting Patterns

Table 4 presents the total number of commuters from a specific home county in Pennsylvania and New Jersey to Delaware County, Pennsylvania[9]. Similarly, Table 3 summarizes the total number of commuters by State and presents the percentage of commuters to Delaware County from each state. New Jersey commuters comprise only about 4% of the commuters to Delaware County, PA. The majority of the commuters within Delaware County come from within Pennsylvania itself. This pattern of commuting indicates that Pennsylvania residents drive and commute to work by motor vehicle more than do New Jersey residents.

Table 4: 2011 Number of Commuters and Vehicle Miles Travelled (VMT) from specific residence counties in Pennsylvania and New Jersey to Delaware County, Pennsylvania

Home County	VMT (Millions)	#Commuters to Delaware County, PA
Philadelphia, PA	5,345	21,802
Delaware, PA	3,336	137,988
Montgomery, PA	6,505	11,758
Chester, PA	4,277	17,870
Bucks, PA	4,728	2,754
Berks, PA	3,382	505
PA residents. living within the CSA, commuting to Delaware County, PA	**27,573**	**192,677**
Gloucester, NJ	2,713	3,179
Camden, NJ	3,849	3,232
Burlington, NJ	4,478	1,771
Cumberland, NJ	1,122	105
Salem, NJ	780	486
NJ residents, living within the CSA, commuting to Delaware County, PA	**12,942**	**8,773**

[9] Ibid

Area Source Emissions

a. Existing Population and Expected Growth

The New Jersey counties have some of the lowest populations and population densities when compared to the Pennsylvania portion of the CSA (see Table 5). A little less than 1.5 million people in the CSA live in the five New Jersey counties. By comparison, over 4 million people live in the Pennsylvania counties of this CSA. Camden, Gloucester, Cumberland, Salem and Burlington Counties in New Jersey experienced low to negative growth in New Jersey (between -0.5% and 0.6%) between 2010 and 2012, which was less than the growth in the Pennsylvania counties of the CSA. Therefore, the contribution from New Jersey's emissions due to population-related emission sources (e.g.; home heating and consumer products) would be much less than the contribution from Pennsylvania's population related sources.

Table 5: 2010 Population and Population Change for the counties in the Southern New Jersey CBSA between 2010 and 2012[10]

County Name	Population Estimates		Change from 2010 to 2012	
	2010 Population	Estimated 2012 Population	Number	Percent Change
Pennsylvania Counties Total	**4,420,433**	**4,464,284**	**43,851**	**1.0**
Chester County, PA	498,878	506,575	7,697	1.5
Philadelphia County, PA	1,526,006	1,547,607	21,601	1.4
Montgomery County, PA	799,881	808,460	8,579	1.1
Berks County, PA	411,447	413,491	2,044	0.5
Delaware County, PA	558,972	561,098	2,126	0.4
Bucks County, PA	625,249	627,053	1,804	0.3
New Jersey Counties Total	**1,473,666**	**1,478,020**	**4,354**	**0.3**
Burlington County, NJ	448,731	451,336	2,605	0.6
Cumberland County, NJ	156,898	157,785	887	0.6
Gloucester County, NJ	288,288	289,586	1,298	0.5
Camden County, NJ	513,666	513,539	-127	0.0
Salem County, NJ	66,083	65,774	-309	-0.5

[10] 2010 population data from http://www.epa.gov/pmdesignations/2012standards/docs/population2010.xls and 2012 population data from http://www.census.gov/popest/data/historical/2010s/vintage_2012/index.html

Factor 3: Meteorology (including Wind Trajectories and Wind Roses)

Wind trajectory analysis demonstrates that New Jersey's point sources of $PM_{2.5}$ are not located in the predominant directions that the wind blows when elevated $PM_{2.5}$ levels are detected at the Chester and New Garden monitors. Figure 11 and Figure 12 show the wind trajectories on the top 10 percent of the days over the last three year period when elevated $PM_{2.5}$ levels were detected at the Chester and New Garden monitoring sites. These wind trajectories are represented as lines on these maps, showing the location of where the wind traveled over the preceding 24-hour period before reaching the monitoring location. The wind collects air pollutant emissions from upwind regions as it travels along the path of these wind trajectories. The wind blows on the largest majority of the days from Pennsylvania and other States (shown as red lines on the map) to the monitoring sites, rather than from New Jersey (shown in colors other than red) during days of elevated $PM_{2.5}$ levels in Pennsylvania.

Wind roses from the Philadelphia airport, located in close proximity to the Chester, PA, monitor is shown in each of the following maps. These wind roses also show that the predominant directions from which the wind is blowing are from the northwest and west. This means that the air over the New Garden and Chester monitoring sites travels over Pennsylvania during most times of the year. It is less likely, therefore, that emissions from New Jersey affect particulate level concentrations at the New Garden and Chester monitoring sites.

Figure 11:

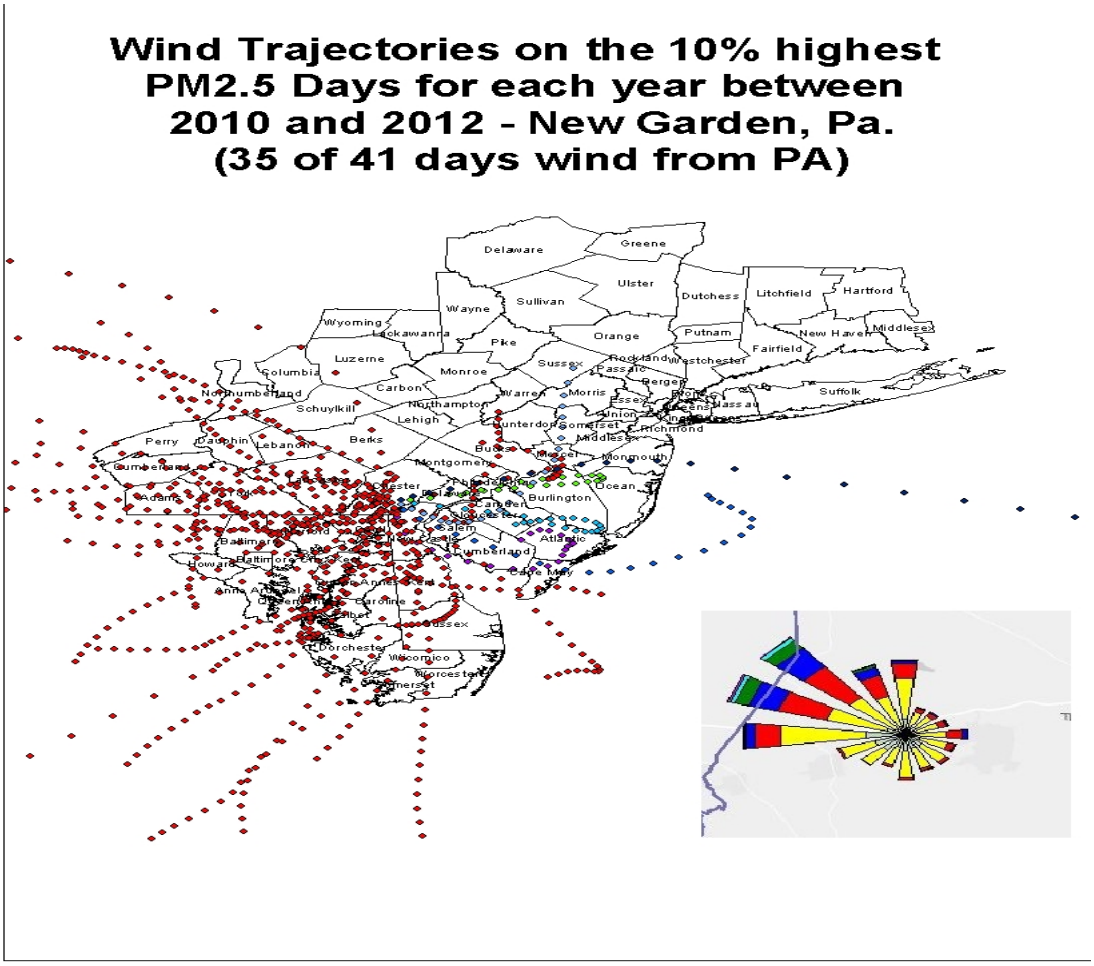
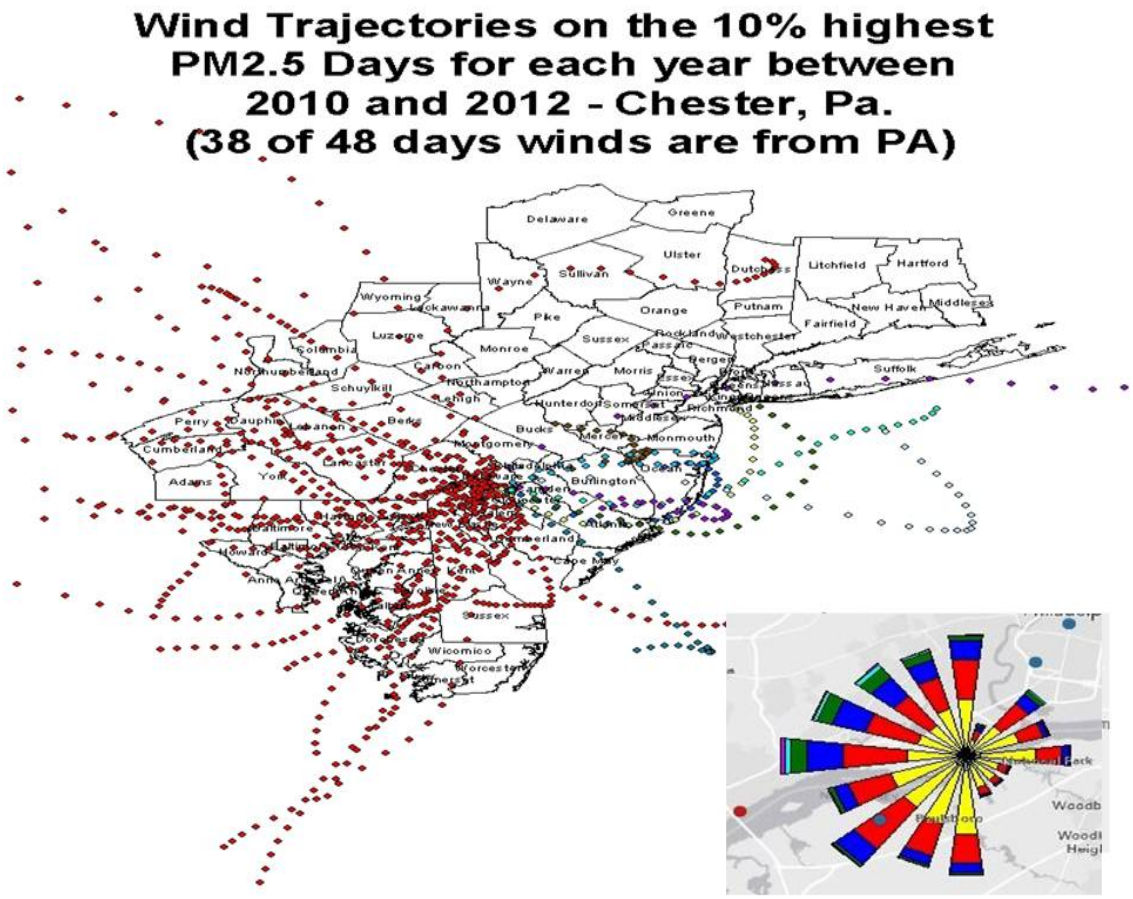


Figure 12:



Discussion of Pennsylvania Analysis of Wind Trajectories

On December 10, 2013, the Pennsylvania Department of Natural Resources recently released a report outlining recommendations for the non-attainment areas within Pennsylvania. This report (http://www.dep.state.pa.us/dep/deputate/airwaste/aq/attain/pm25des/AppendixC-1-Greater_Philadelphia_Area.pdf), included an analysis of the wind trajectories on the days of regionally low particulate level concentrations, but locally high particulate levels at the Chester, PA monitoring site. The analysis shows that the wind trajectories on these days are predominantly from three directions; southwesterly, easterly, and northeasterly. The analysis also concluded that there are multiple local, major sources of $PM_{2.5}$, SO_2, and NO_x located in close proximity of the Chester monitor. The wind direction analysis conducted by Pennsylvania shows that the predominant winds on the top 25% of high particulate days travel directly over these Pennsylvania sources. The Pennsylvania analysis indicates the local nature of the high particulate levels at the Chester monitor. There are no major point sources of emissions located in New Jersey that are located directly east of the Chester, PA monitoring site. Also, there are several large emission sources located in Pennsylvania to the southwest and northeast of this monitoring site. (See Figure 7D).

Figure 13 shows the Chester monitoring site to be located within the fence-line of a major point source of particulate emissions and next to an unpaved lot. These nearby emissions of fine

particulate matter are to the northeast of the monitoring site, where southwesterly winds will influence measured fine particulate levels. This and other local point source emissions in Pennsylvania are the likely cause of the higher levels of fine particulate measured at the Chester monitor compared to when low levels occur elsewhere in the region.

Figure 13:

Picture of Chester, PA Monitoring Site

Also, Pennsylvania's analysis looked at those days when the monitors near the Chester monitor were recording low levels of $PM_{2.5}$. If New Jersey's emissions contributed to the high recorded $PM_{2.5}$ levels at the Chester site, then other monitors located to the west of New Jersey should be noticing higher PM levels on these days too. However, the monitors in Gloucester county, NJ, New Castle county, DE, and Philadelphia county, PA, located to the west of New Jersey, are all measuring annual levels well below the $PM_{2.5}$ annual standard.

Factor 4: Geography/Topography

Geography or topography does not have a significant role in causing high levels of $PM_{2.5}$ at the Pennsylvania monitoring sites. The location of the Chester monitoring site in close proximity of the Delaware River could have some influence on fine particulate matter in Chester. The channeling of emissions along the Delaware River would be consistent with winds from the southwest and northeast, which is discussed as factor 3.

Factor 5: Jurisdictional Boundaries

The current jurisdictional boundaries for New Jersey should be considered since all New Jersey monitors are currently measuring $PM_{2.5}$ levels below the NAAQS. Also, New Jersey's air pollution control rules will continue to reduce sulfur and particulate emissions within New Jersey. For example, New Jersey will have more stringent sulfur in fuel oil standards than Pennsylvania beginning in July 2016. This will continue the decreasing trend in monitored levels of particulates in New Jersey and all downwind areas when fully implemented.

Summary of why New Jersey should not be associated with the Pennsylvania nonattainment area.

1. There are no violating monitors in the New Jersey in the Southern New Jersey Combined Statistical Area.
2. Pennsylvania determined that the Chester monitor in Delaware County, PA is influenced by local sources[11].
3. When daily $PM_{2.5}$ concentrations are high at Pennsylvania's nonattainment monitors, the winds are not from New Jersey.
4. New Jersey's contributions of $PM_{2.5}$ emissions and its precursors are small compared to Pennsylvania's contributions in the CSA.
5. The number of commuters from New Jersey to Delaware County, PA, where the Chester, PA monitor is located is small compared to the number of commuters from Pennsylvania to Delaware County.
6. The emission contributions from New Jersey's population-related emission sources are much less than the contributions from such sources in Pennsylvania.

[11] http://www.dep.state.pa.us/dep/deputate/airwaste/aq/attain/pm25des/AppendixC-1-Greater_Philadelphia_Area.pdf

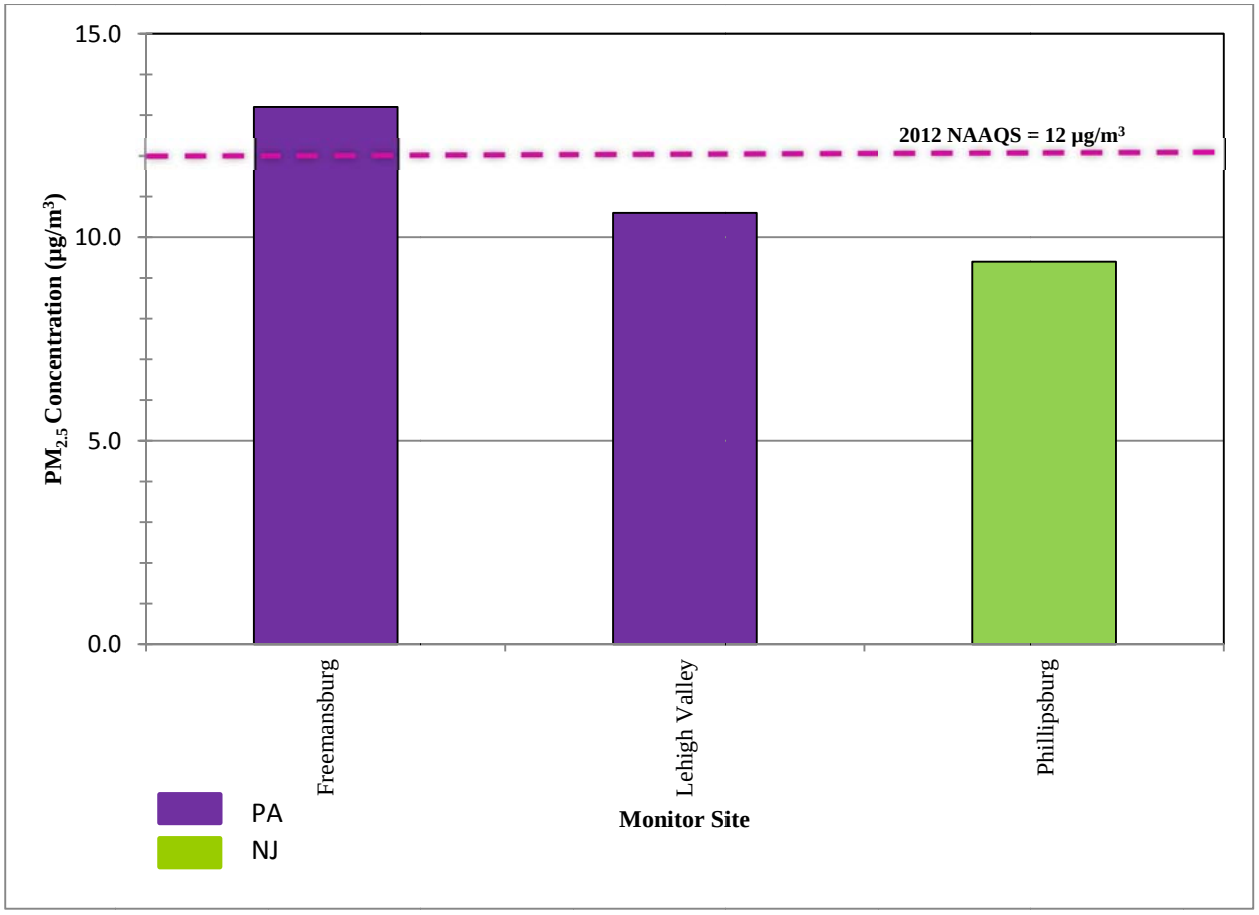
Five Factor Analysis of the Northampton/Warren County Core Based Statistical Area for the Annual $PM_{2.5}$ NAAQS

Warren County should be excluded as part of any nonattainment area in Pennsylvania. The following is the five-factor analysis for Warren and adjacent counties that support Warren County being designated attainment.

Factor 1: Air Quality Data

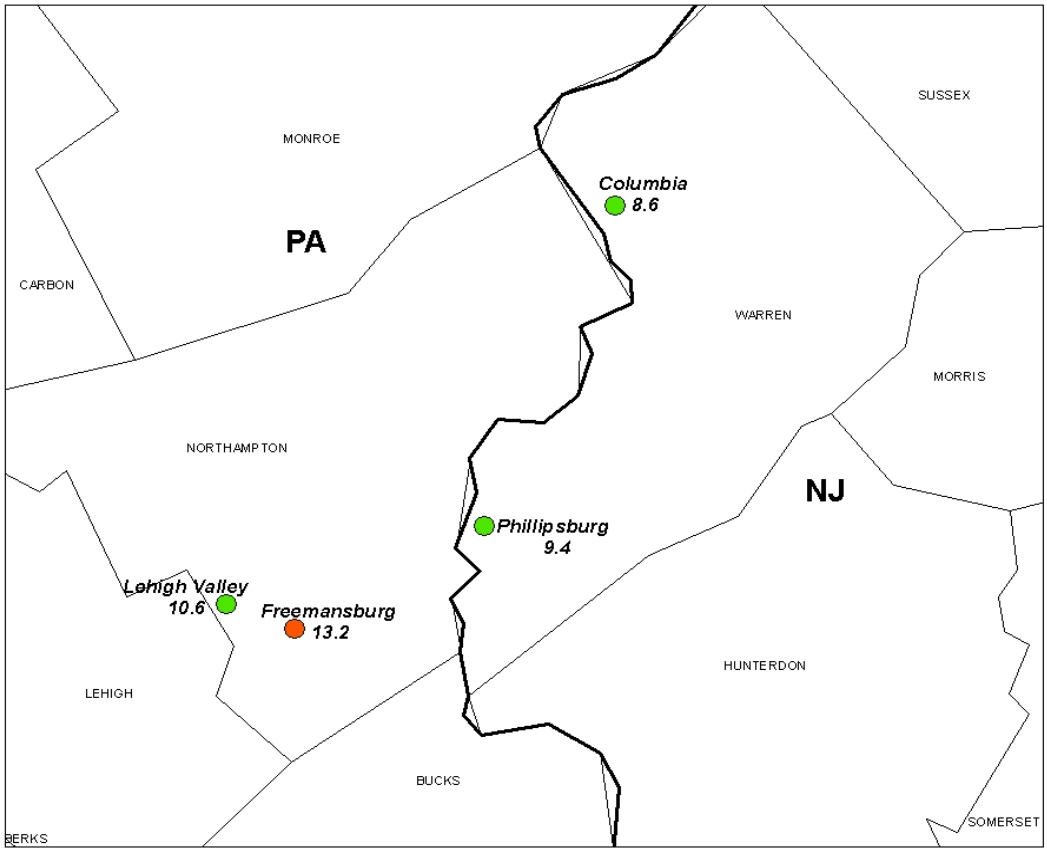
The annual design value for $PM_{2.5}$ based on air quality data in the area for a 3-year period (2010 – 2012) is shown in Figure 14.

Figure 14: $PM_{2.5}$ 2010-2012 Annual Design Values for the Northampton/Warren County Core Based Statistical Area



The Freemansburg monitoring site (Northampton County, Pennsylvania) is monitoring $PM_{2.5}$ levels above the NAAQS, whereas the Phillipsburg (Warren County) monitor in New Jersey is well below the annual standard (See Figure 15). Based on data from 2010 to 2012, the design value at the Phillipsburg, New Jersey (Warren County) monitor is 9.4 $\mu g/m^3$. The monitor located in Columbia Lake, NJ (Warren County) began operation in 2010 and does not have the requisite three years of data to determine a design value. The average annual concentration for the year 2012 at the Columbia Lake monitor was 8.7$\mu g/m^3$, also well below the levels recorded at the Freemansburg, PA monitoring site.

Figure 15: $PM_{2.5}$ Monitors in the Northampton/Warren County CBSA



Trends Analysis for the Freemansburg, PA Monitor

The levels of particulate matter measured at the Freemansburg, PA monitor dropped in 2012. Table 6 shows the percent of days measured over the last three years when the measured levels of particulate matter were greater than 12µg/m^3. Having more days greater than this level increases the likelihood that the annual average concentration (i.e., the measured value each day divided by the number of sampling days) will also be greater than 12µg/m^3.

Table 6: Percentage of days with monitored $PM_{2.5}$ levels greater than 12µg/m^3 at the Freemansburg, PA monitoring site during 2010 to 2012.

Monitor	Year	# Days with Data	Days with Value > 12µg/m^3	% of days with Values > 12µg/m^3
Freemansburg	2010	336	170	47%
	2011	340	177	48%
	2012	351	132	36%

Factor 2: Emissions in the Northampton/Warren County Core Based Statistical Area

Point Sources

Level of control of emission sources

There are no large point sources of emissions in Warren County, NJ, and the emissions of all air pollutants from Warren County are small. Located between the Freemansburg monitoring site and New Jersey is the Portland Generating Station and other large Pennsylvania sources of emissions. The Portland Generating Station coal units will be shut down in 2014, pursuant to an enforcement settlement agreement approved by the court. Emissions from within Northampton County, PA, where the monitor is located, are higher than all other counties in the area. These local emissions will be the greatest contributor to sulfur dioxide and fine particulate levels in the area.

Table 7 shows 2011 point source emissions (in ton per year) for Pennsylvania and New Jersey counties in the CBSA. (Data Source: 2011 National Emissions Inventory).

Warren County, NJ emissions contribute small amounts to the overall emissions in the CBSA with only 2.6 percent of the total $PM_{2.5}$ emissions, 0.2 percent of the total SO_2 emissions and 3.2 percent of the total NO_x emissions. Pennsylvania counties contribute most of the emissions in the CBSA with 97.4 percent of the total $PM_{2.5}$ emissions, 99.8 percent of the total SO_2 emissions and 96.8 percent of the total NO_x emissions.

Table 7: Total point source emissions (in tons per year) for Pennsylvania and New Jersey counties included in the CBSA

County	2011 $PM_{2.5}$ (tons per year)	2011 SO_2 (tons per year)	2011 NO_x (tons per year)
Lehigh, PA	245	374	628
Northampton, PA	1,306	19,222	8,117
Carbon, PA	50	799	730
Total PA Portion	**1,601 (97.4%)**	**20,395 (99.8%)**	**9,475 (96.8%)**
Warren, NJ	43	52	315
Total NJ Portion	**43 (2.6%)**	**52 (0.2%)**	**315 (3.2%)**
Total Emissions in CBSA	**1,644**	**20,447**	**9,790**

Area Sources

Population/Population Density

Warren County, NJ is a rural county and does not have a high population density. See Table 8.

Table 8: 2010 Population Density for the CBSA

County	2010 Population Density (population per sq. mile)
Northampton, PA	805
Lehigh, PA	1,012
Carbon, PA	171
Warren, NJ	304

Source: U.S. Census Bureau, 2010 Population

The total amount of population in Lehigh, Northampton, and Carbon County, PA are also much greater than the population of Warren County, NJ. Northampton and Lehigh counties have also experienced positive growth in the last several years, while Warren County has experienced negative growth, as shown in the Table 9. [12]

Table 9: Population Changes and Estimates in the Northampton/Warren County CBSA

County Name	Population Estimates		Change from 2010 to 2012	
	2010 Population	Estimated 2012 Population	Number	Percent Change
Pennsylvania Counties	**712,481**	**719,518**	**7,037**	**1.0**
Lehigh County, PA	349,497	355,245	5,748	1.6
Northampton County, PA	297,735	299,267	1,532	0.5
Carbon County, PA	65,249	65,006	-243	-0.4
New Jersey Counties	**108,692**	**107,653**	**-1,039**	**-1.0**
Warren County, NJ	108,692	107,653	-1,039	-1.0

Factor 3: Meteorology (including Wind Trajectories and Wind Roses)

New Jersey's point sources are not located in the predominant directions that the wind blows when elevated levels of $PM_{2.5}$ are detected at the Freemansburg monitors. Figure 16 shows the wind trajectories on the top 10 percent of the days over the last three year period when the highest $PM_{2.5}$ levels are monitored at the Freemansburg monitoring site. The Hysplit model was used to determine the wind trajectories for these highest $PM_{2.5}$ days by tracking back the direction of the wind for the preceding 24 hours. These wind trajectories are represented as lines on these maps,

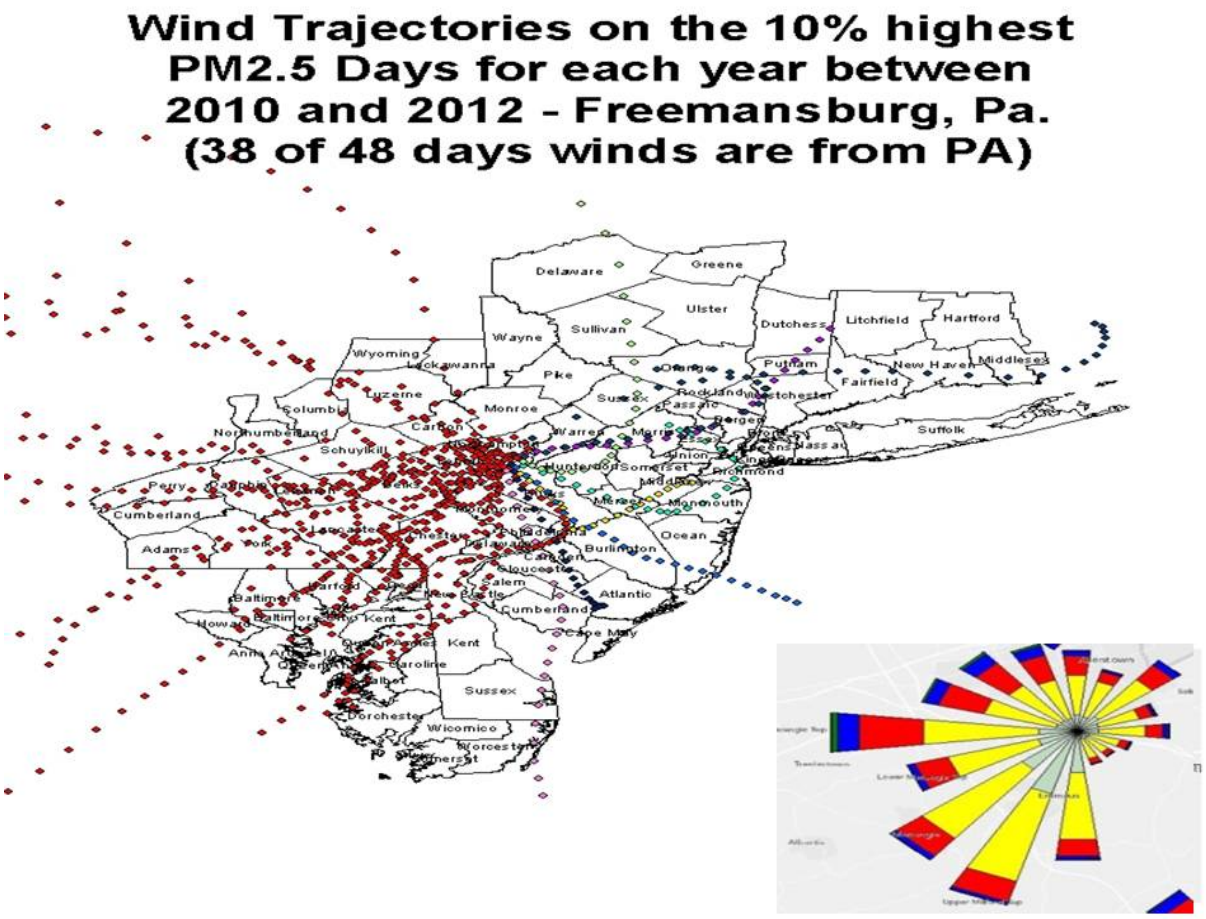
[12] http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

showing the location of the wind over the preceding 24-hour period before reaching the monitoring location. The wind collects air pollutant emissions from upwind regions as it travels along the path of these wind trajectories. The wind blows on most of the days from Pennsylvania and other States (shown as red lines on the map) to the Freemansburg monitoring site, rather than from New Jersey (shown in colors other than red) during days of elevated $PM_{2.5}$ levels in Pennsylvania.

The wind trajectory lines shown in Figure 16 are made up of 24 dots representing each hour of the day for the days when the back trajectories were run. Each dot also represents the location of the parcel of air at that particular hour of the day.

The wind rose from the Allentown, PA area, located in close proximity to the Freemansburg, PA monitor, is shown on the following map. This wind rose shows that the predominant direction from which the wind is blowing is from the northwest and west. This means that the air over the Freemansburg, PA monitoring site comes from over Pennsylvania during most of the time. It is more likely, therefore, for emissions coming from Pennsylvania affect particulate level concentrations at the New Garden and Chester monitoring sites than for emissions coming from New Jersey.

Figure 16:



Discussion of Pennsylvania's $PM_{2.5}$ Recommendations for Northampton County.

The Pennsylvania Department of Natural Resources released a report on December 10, 2013, outlining recommendations for the nonattainment areas within Pennsylvania. This report included an analysis of the meteorological conditions impacting high $PM_{2.5}$ days at the Freemansburg monitor. The analysis shows that the predominant winds on the top 25 percent days, as well as the highest $PM_{2.5}$ concentrations, are coming from the south. Pennsylvania's analysis of $PM_{2.5}$ speciated data during the 25% days with the highest $PM_{2.5}$ indicate high levels of crustal materials which could be associated with local construction activities at the former Bethlehem Steel corporation industrial site (which lies just south of Freemansburg). Pennsylvania is recommending that only Northampton County be listed as nonattainment due to this local construction activity and influence[13].

Factor 4: Geography/Topography

Higher concentrations of $PM_{2.5}$ at the Freemansburg, PA monitoring site do not appear to be occurring because of the geographical or topographical features in the area.

Factor 5: Jurisdictional boundaries

The entire State of New Jersey should be designated attainment based on all monitors within New Jersey's jurisdictional boundaries showing $PM_{2.5}$ levels less than the NAAQS, including two monitors in Warren County.

Summary of why New Jersey should not be associated with the Northampton nonattainment area.

1. There are no violating New Jersey monitors in the Warren County Core Based Statistical Area.
2. Pennsylvania determined that the Freemansburg monitor in Northampton County, PA is influenced by local sources in Pennsylvania.
3. New Jersey's direct $PM_{2.5}$ emissions and its precursors are small compared to Pennsylvania's contributions in the Core Based Statistical Area.
4. The emission contributions from New Jersey due to population-related emission sources are much less than the contributions from Pennsylvania.
5. When daily $PM_{2.5}$ concentrations are high at the Freemansburg monitor, the winds are not from New Jersey.

[13] http://www.dep.state.pa.us/dep/deputate/airwaste/aq/attain/pm25des/Appendix_C-2-Northampton_County_Area.pdf