Delaware
Area Designations for the
2008 Ozone National Ambient Air Quality Standards

In March 2009, the State of Delaware recommended a large, multi-state nonattainment area, covering the entire States of Delaware, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia, plus the District of Columbia. Alternatively, Delaware recommended that the entire State of Delaware be designated as a stand-alone nonattainment area. In October 2011, Delaware updated its recommendations. In that letter, Delaware expanded its recommended large multi-state nonattainment area to include the States of Kentucky, Indiana, Illinois, Missouri, Tennessee, and Wisconsin. In addition, in its October 2011 letter, the State of Delaware specified that if EPA did not accept either of its designation options, then Kent County should not be designated nonattainment. That recommendation was based on 2008-2010 data and preliminary 2009-2011 data. On February 29, 2012, Delaware submitted comments on EPA's preliminary nonattainment area boundary decisions. In that letter, Delaware commented on EPA's intended nonattainment area boundaries as well as EPA's methodology for determining those boundaries. Delaware also commented on EPA's rejection of the large multi-state nonattainment area.

EPA has addressed Delaware's comments in the *Responses to Significant Comments on the State and Tribal Designation Recommendations for the 2008 Ozone National Ambient Air Quality Standards* document in the docket for these designations. In section 3.1.2 of this document, EPA addresses the concept of a large, multi-state nonattainment area and states that we do not believe that creation of a super-regional nonattainment area to address pollution transport is the appropriate approach. As an initial matter, Clean Air Act (CAA) section 107(d)(1) provides that areas designated nonattainment should include any "nearby" area contributing to a violation of the NAAQS. We believe that broad super-regional areas go beyond this by including areas that are not necessarily "nearby" but contribute to nonattainment through long-range transport. The CAA has separate provisions to address this phenomenon. Section 110(a)(2)(D) requires states to address ozone transport that contributes to a violation of the NAAQS in another State. In addition, section 184, creates the northeast ozone transport region and also grants EPA authority to establish additional transport regions, as appropriate. Finally, we note that the approach taken by EPA is consistent with the approach Congress specified for serious and above areas for the 1-hour NAAQS, where in section 107(d)(4)A), Congress set the Consolidated Metropolitan Statistical Area (CMSA) boundaries as the presumptive boundaries of the nonattainment area. In *Catawba Co. v. EPA*[1], the Court upheld that "contribute" under §107(a)(1)(A) of the CAA does not necessarily mean "any contribution" to nonattainment but rather a *degree of contribution sufficient to deem an area nonattainment,* that is, sufficient enough to warrant designation as nonattainment. "Section 107(d) is ambiguous as to how EPA should measure contribution and *what degree of contribution is sufficient to deem an area nonattainment…" Catawba County v. EPA*, 571 F.3d 20, 39 (D.C. Cir. 2009) (Internal citation omitted but with emphasis added). "Thus, reasonably exercising the discretion that Congress delegated to it, EPA interpreted "contribute" to mean "sufficiently contribute," and then applied the CMSA presumption and nine-factor test precisely to identify those areas that meet that definition." *Id.*

[1] *Catawba County v. EPA*, 571 F.3d 20, (D.C. Cir. 2009)

For the reasons stated above, EPA does not intend to designate a large nonattainment area as suggested by Delaware.

The table below identifies the areas and associated counties or parts of counties in Delaware that EPA is designating as nonattainment for the 2008 ozone national ambient air quality standards (2008 ozone NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the individual nonattainment areas are provided below.

Nonattainment Areas in Delaware

Area	Delaware Recommended Nonattainment Counties	EPA's Designated Nonattainment Counties
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE	none	New Castle
Seaford, DE	none	Sussex

The Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Area is a multi-state nonattainment area. Table 1 in the Technical Analysis for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Area, below, identifies the counties in the other states that EPA is designating as part of the nonattainment area.

EPA is designating the remaining county in Delaware that is not listed in the table above, Kent County, as "unclassifiable/attainment" for the 2008 ozone NAAQS.

The analysis below provides the basis for the nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining ozone nonattainment area boundaries and recommended that states consider these factors in making their designation recommendations to EPA.[2]

1. Air quality data (including the design value calculated for each FRM or FEM monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);

[2] The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in 5 categories of factors.

5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

Ground-level ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) within which is located the violating monitor(s).[3] All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

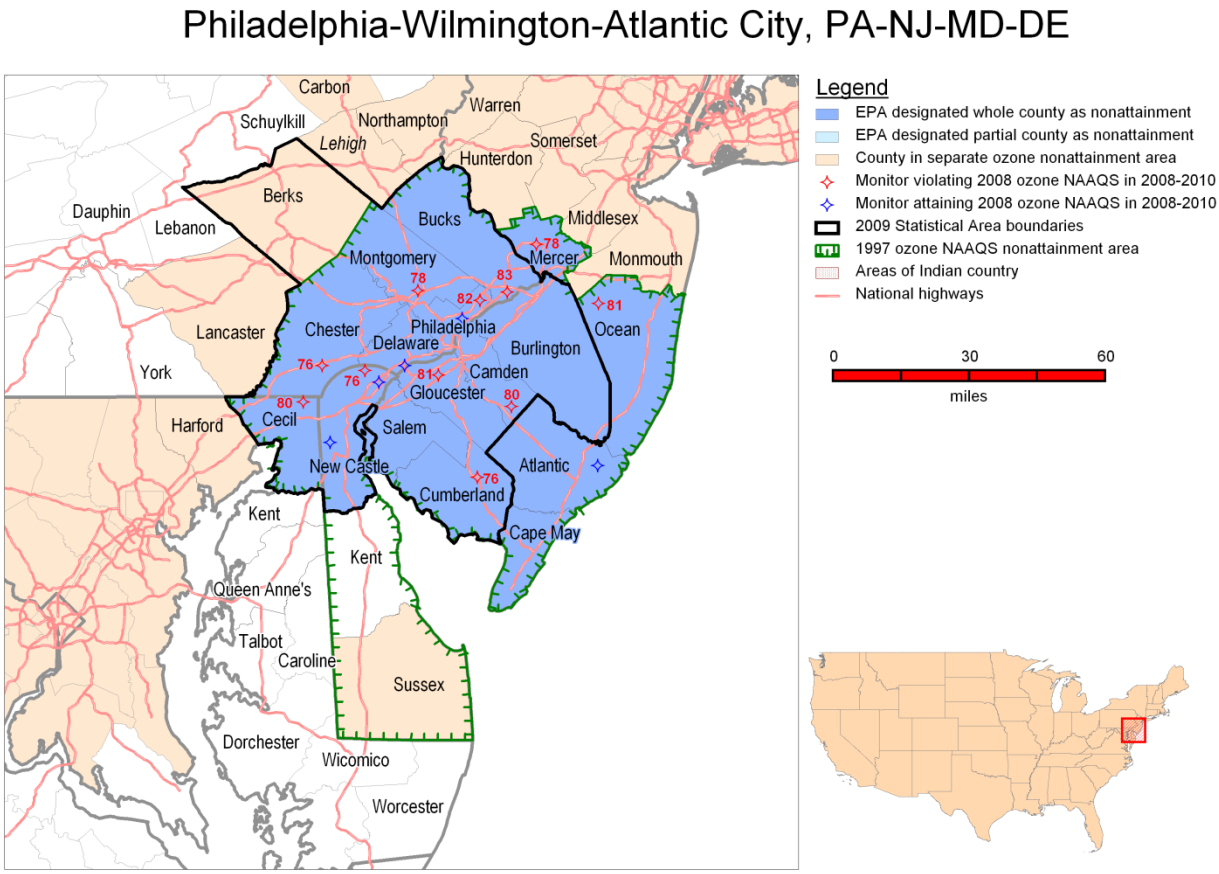
In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors (such as population) used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

[3] Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html . The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Technical Analysis for the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area

Figure 1 is a map of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area. The map provides other relevant information including the locations and 2010 design values of air quality monitors, county and other jurisdictional boundaries. The map shows the boundaries of the Philadelphia-Camden-Vineland, PA-NJ-DE-MD CSA, the existing nonattainment area boundary for the 1997 ozone NAAQS, and EPA's nonattainment boundary for the 2008 ozone NAAQS.

Figure 1.



For purposes of the 1997 8-hour ozone NAAQS, much of this area was designated nonattainment. The Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area at that time included the entire counties of Kent, New Castle, and Sussex in Delaware; Cecil in Maryland; Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem in New Jersey; and Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania.

In March 2009, the State of Delaware recommended that no counties in Delaware be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area for the 2008 ozone NAAQS based on air quality data from 2006-2008. Instead, Delaware recommend a large, multi-state nonattainment area, covering the entire States of Delaware, Maryland, Michigan, New Jersey,

New York, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia, and the District of Columbia. Alternatively, Delaware recommended that the entire State of Delaware be designated as a stand-alone nonattainment area. In October 2011, Delaware updated its recommendations. In that letter, Delaware expanded its recommended large multi-state nonattainment area to include the States of Kentucky, Indiana, Illinois, Missouri, Tennessee, and Wisconsin. In addition, in its October 2011 letter, the State of Delaware specified that if EPA did not accept either of its designation options, then Kent County should not be designated nonattainment. This recommendation was based on 2008-2010 data and continues to be true based on preliminary 2009-2011 data. The data are from Federal Reference Method (FRM) monitors or Federal Equivalent Method (FEM) monitors sited and operated in accordance with 40 CFR Part 58. (See the March 18, 2009 letter from Governor Jack A. Markell to EPA, received on April 3, 2009; and the October 28, 2011 letter from the Delaware Department of Natural Resources and Environmental Control.)

In March 2009, the State of Maryland recommended that Cecil County be designated as nonattainment as part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area for the 2008 ozone NAAQS based on air quality data from 2006-2008. This is the same Maryland County that was included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 ozone NAAQS. This recommendation was based on data from FRM monitors or FEM monitors sited and operated in accordance with 40 CFR Part 58. (See the March 10, 2009 letter from Governor Martin O'Malley to EPA, received on March 16, 2009.) EPA has confirmed that the area is still nonattainment, based on the design value for 2010, which uses data from 2008 through 2010.

In April 2009, the State of New Jersey recommended that the same nine counties in New Jersey that were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 ozone NAAQS be designated as nonattainment in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area for the 2008 ozone NAAQS based on air quality data from 2006-2008. This recommendation was based on data from FRM monitors or FEM monitors sited and operated in accordance with 40 CFR Part 58. (See the April 1, 2009 letter from the New Jersey Department of Environmental Protection to EPA.) EPA has confirmed that the area is still nonattainment, based on the design value for 2010, which uses data from 2008 through 2010.

In March 2009, the Commonwealth of Pennsylvania recommended that the same five counties in Pennsylvania that were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 ozone NAAQS be designated as nonattainment in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD for the 2008 ozone NAAQS based on air quality data from 2006-2008. Pennsylvania provided an update to the original recommendation in November 2011 based on air quality data from 2009-2011. That recommendation was to remove Chester and Delaware Counties from the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD, and designate those counties as attainment. This recommendation was based on data from FRM monitors or FEM monitors sited and operated in accordance with 40 CFR Part 58. (See the March 17, 2009 and November 22, 2011 letters from the Pennsylvania Department of Environmental Protection to EPA.)

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating 16 counties in Delaware, Maryland, New Jersey, and Pennsylvania

(identified in Table 1 below) as "nonattainment" for the 2008 ozone NAAQS as the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area.

Table 1. State's Recommended and EPA's Designated Nonattainment Counties for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Area.

Philadelphia	State-Recommended Nonattainment Counties	Counties Designated by EPA as Nonattainment
Delaware	None	New Castle
Maryland	Cecil	Cecil
New Jersey	Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem	Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem
Pennsylvania	Bucks, Montgomery, and Philadelphia	Bucks, Chester, Delaware, Montgomery, and Philadelphia

Factor Assessment

The counties evaluated in this analysis include all counties in the Philadelphia-Camden-Vineland, PA-NJ-MD-DE CSA plus the counties outside the CSA that were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 ozone NAAQS. A more detailed meteorological assessment is included in a factor assessment for New Jersey's request for Ocean and Mercer Counties is attached.

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in parts per billion (ppb)) for air quality monitors in counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data for the entire area.

However, Pennsylvania submitted certified 2011 air quality data to EPA in November 2011. The only effect of using 2011 data is a slight change in the highest design value for the nonattainment area and the location of the highest design value. Since none of the other states in the nonattainment area submitted certified 2011 data to EPA while EPA was in the process of evaluating the states submittal, that is, though March 2011, EPA is using 2010 ozone data as the last year of data for evaluation of these requests. In ordinary circumstances, EPA does not use data from different years in different parts of nonattainment areas. The effects of using 2011 data from Pennsylvania are noted in Appendix C.

A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

Note: Monitors that are eligible for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are sited in accordance with 40 CFR Part 58, Appendix D (Section 4.1) and operating with a federal reference method (FRM) or federal equivalent method (FEM) monitor that meets the requirements of 40 CFR part 58, appendix A. All data from a special purpose monitor (SPM) using an FRM or FEM which has operated for more than 24 months is eligible for comparison to the NAAQS unless the monitoring agency demonstrates that the data came from a particular period during which the requirements of appendix A (quality assurance requirements) or appendix E (probe and monitoring path siting criteria) were not met.

The 2010 DVs for the ozone NAAQS for counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD CSA and several nearby surrounding counties are shown in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2010 8-hour Ozone DV (ppb)
Atlantic, NJ	Yes	74
Berks, PA	Yes, other area	79
Bucks, PA	Yes	83
Burlington, NJ	Yes	--
Camden, NJ	Yes	80
Cape May, NJ	Yes	--
Cecil, MD	Yes	80
Chester, PA	No	76
Cumberland, NJ	Yes	76
Delaware, PA	No	74
Gloucester, NJ	Yes	81
Kent, DE	No	74
Mercer, NJ	Yes	78
Montgomery, PA	Yes	78
New Castle, DE	Yes, other area	76
Ocean, NJ	Yes	81
Philadelphia, PA	Yes	82
Salem, NJ	Yes	--
Sussex, DE	Yes, other area	77

Note: Counties with no ozone monitor are identified with "--" in the 2010 8-hour Ozone DV column.

In accordance with section 107(d) of the Clean Air Act, EPA must designate an area nonattainment if it is violating the 2008 ozone NAAQS. New Castle and Sussex Counties in Delaware; Cecil County, Maryland; Berks, Bucks, Montgomery, and Philadelphia Counties in Pennsylvania; and Camden, Cumberland, Gloucester, Mercer, and Ocean Counties in New Jersey show violations of the 2008 ozone NAAQS. Therefore, these counties must be included in a nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is

located near a county with a violating monitor has been evaluated based on the weight of evidence of the five factors and other relevant information to determine whether it contributes to the nearby violation.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources.

Table 3 shows emissions of NO_x and VOC (given in tons per year) for counties in the area of analysis.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment?	NO_x (tpy)	VOC (tpy)
Atlantic, NJ	Yes	6,143	10,713
Berks, PA	Yes, other area	18,908	15,918
Bucks, PA	Yes	17,736	21,160
Burlington, NJ	Yes	10,919	12,909
Camden, NJ	Yes	12,725	10,731
Cape May, NJ	Yes	6,407	7,774
Cecil, MD	Yes	4,763	3,715
Chester, PA	No	16,806	16,351
Cumberland, NJ	Yes	4,916	5,727
Delaware, PA	No	28,118	15,881
Gloucester, NJ	Yes	18,335	11,756
Kent, DE	No	7,667	5,381
Mercer, NJ	Yes	9,909	8,160
Montgomery, PA	Yes	22,741	26,372
New Castle, DE	Yes, other area	22,633	14,133
Ocean, NJ	Yes	9,909	19,572
Philadelphia, PA	Yes	33,176	32,021
Salem, NJ	Yes	6,106	3,308
Sussex, DE	Yes, other area	14,870	9,972

Philadelphia County, PA has the highest NOx and VOC emissions in the area of analysis. Other counties with comparatively high emissions are New Castle County in Delaware; Delaware and Montgomery Counties in Pennsylvania and Ocean and Burlington Counties in New Jersey. Counties with comparatively low emissions are Kent County, Delaware; Cecil County, Maryland; and Salem County in New Jersey.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to ozone formation. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Atlantic, NJ	Yes	274,549	0.45	21,569	+9%
Berks, PA	Yes, other area	411,442	0.48	36,945	+10%
Bucks, PA	Yes	625,249	1.01	25,841	+4%
Burlington, NJ	Yes	448,734	0.55	24,255	+6%
Camden, NJ	Yes	513,657	2.26	6,064	+1%
Cape May, NJ	Yes	97,265	0.34	(5,043)	-5%
Cecil, MD	Yes	101,108	0.27	14,643	+17%
Chester, PA	No	498,886	0.66	63,107	+14%
Cumberland, NJ	Yes	156,898	0.31	10,547	+7%
Delaware, PA	No	558,979	2.93	6,938	+1%
Gloucester, NJ	Yes	288,288	0.86	31,962	+12%
Kent, DE	No	162,310	0.27	35,200	+28%
Mercer, NJ	Yes	366,513	1.60	14,979	+4%
Montgomery, PA	Yes	799,874	1.64	48,936	+7%
New Castle, DE	Yes, other area	538,479	1.11	36,620	+7%
Ocean, NJ	Yes	576,567	0.76	62,913	+12%
Philadelphia, PA	Yes	1,526,006	10.71	12,194	+1%
Salem, NJ	Yes	66,083	0.19	1,867	+3%
Sussex, DE	Yes, other area	197,145	0.20	39,710	+25%

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

Philadelphia County, Pennsylvania has the highest population and population density in the area of analysis. Bucks, Chester, Montgomery, and Delaware Counties, in Pennsylvania; New Castle County in Delaware; and Ocean County in New Jersey also have comparatively large populations compared to Kent County, Delaware and Salem County in New Jersey with comparatively small populations and population densities. Most counties in the analysis have experienced some population growth.

Traffic and commuting patterns

EPA evaluated the total Vehicle Miles Traveled (VMT) for each county in the area. In combination with the population/population density data and the location of main transportation arteries (see Figure 1, above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows total 2008 VMT for each county.

Table 5. Traffic (VMT) Data.

County	State Recommended Nonattainment?	2008 VMT* (million miles)
Atlantic, NJ	Yes	2,863
Berks, PA	Yes, other area	3,335
Bucks, PA	Yes	5,021
Burlington, NJ	Yes	4,524
Camden, NJ	Yes	3,923
Cape May, NJ	Yes	1,040
Cecil, MD	Yes	1,350
Chester, PA	No	4,410
Cumberland, NJ	Yes	1,163
Delaware, PA	No	3,782
Gloucester, NJ	Yes	2,645
Kent, DE	No	1,565
Mercer, NJ	Yes	3,306
Montgomery, PA	Yes	6,883
New Castle, DE	Yes, other area	5,266
Ocean, NJ	Yes	3,834
Philadelphia, PA	Yes	5,955
Salem, NJ	Yes	992
Sussex, DE	Yes, other area	2,122

* MOBILE model VMT are those inputs into the NEI version 1.5.

New Castle County, Delaware; and Bucks, Montgomery, and Philadelphia Counties in Pennsylvania; and Burlington County in New Jersey have the highest VMT in the area of analysis. Kent County, Delaware; Cecil County, Maryland; and several counties in New Jersey have relatively low VMT.

Table 6. County to County Worker Flow.

Residence County → / **Workplace County ↓**	Kent, DE	New Castle, DE	Sussex, DE	Cecil, MD	Berks, PA	Bucks, PA	Chester, PA	Delaware, PA	Montgomery, PA	Philadelphia, PA
Kent, DE	47,455	3,927	5,704	186	157	18	131	112	41	65
New Castle, DE	6,058	209,742	1,119	14,059		493	12,976	9,002	1,201	1,856
Sussex, DE	3,779	319	52,073	33			29	15	6	39
Cecil, MD	243	3,379	42	18,446		18	557	192		52
Atlantic, NJ	11	142		31	4	172	73	231	181	831
Burlington, NJ	40	475	25	27	40	4,250	426	1,306	1,559	5,087
Camden, NJ	55	434	10	72	27	2,039	539	2,287	1,844	7,196
Cape May, NJ		27	20		13	54	81	118	95	324
Cumberland, NJ	26	164	5	19		42	24	103	66	140
Gloucester, NJ		750	19	82	16	362	411	1,251	405	1,502
Mercer, NJ	10	78	12	7	37	20,812	222	345	1,298	1,676
Ocean, NJ		13	30	8	5	220	23	10	13	86
Salem, NJ	32	1,841	11	139		37	155	245	59	84
Berks, PA		4	48	5	140,819	410	1,916	187	4,231	243
Bucks, PA	12	261	12	22	675	168,090	1,133	2,060	23,722	23,248
Chester, PA	37	4,738	33	941	5,596	3,036	137,678	18,504	25,006	7,810
Delaware, PA	125	8,150	61	373	505	2,754	17,870	137,988	11,758	21,802
Montgomery, PA	27	1,851	53	176	12,727	48,414	25,673	28,144	245,619	59,970
Philadelphia, PA	83	5,386	131	254	702	31,892	10,568	48,151	54,576	429,667

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

Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania have the highest numbers of commuters to other counties in the Philadelphia-Camden-Vineland PA-NJ-MD-DE CSA. New Castle County, Delaware, Cecil County, Maryland, and Berks County, Pennsylvania have moderate numbers of commuters into other counties in the CSA. Sussex and Kent Counties in Delaware, which are not in the Philadelphia-Camden-Vineland PA-NJ-MD-DE CSA, have the fewest commuters into the CSA. More about Ocean and Mercer Counties in Appendix A.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data, consisting of 30-year average summertime wind directions from the National Weather Service, and trajectories on high ozone days to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation.

The highest ozone design values, over 80 ppb, are in Bucks and Philadelphia Counties, in

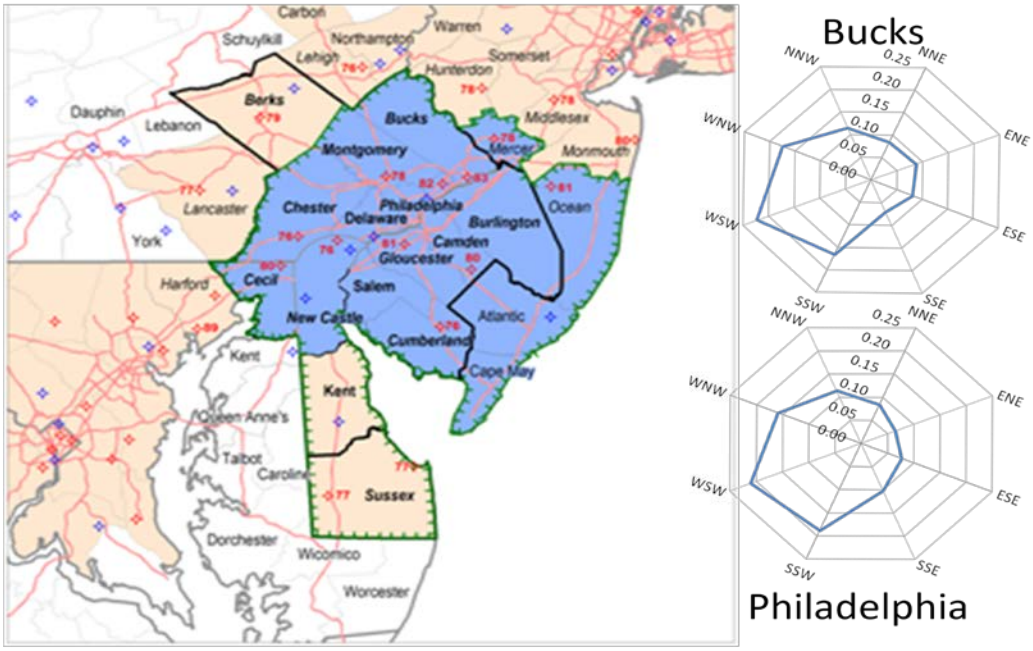
Pennsylvania, and Ocean County in New Jersey. Bucks County had the highest 2010 DV in the Philadelphia area, while Philadelphia County has the highest 2011 DV. Wind rose and trajectory analyses for Bucks and Philadelphia Counties provide data on the influence of weather on the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area in general. An analysis for Ocean County, the third highest site, is in Appendix A, where the wind and trajectories analyses are used to determine if Ocean (and nearby Mercer) Counties are better suited to be in the Philadelphia-Wilmington-Atlantic City area or the New York – Northern New Jersey-Long Island area.

The NWS 30-year average summertime wind directions are shown in Figure 2 for both Bucks and Philadelphia Counties. As can be seen from Figure 2, the winds during the ozone season come predominantly from the southwest. This indicates that emissions from Chester and Delaware Counties in Pennsylvania; New Castle County, Delaware; Cecil County, Maryland; and counties in southwest New Jersey contribute to the downwind violations in Bucks, Philadelphia and Ocean Counties during most of the ozone season. Considering prevailing wind patterns and the location of the highest violating monitors, Berks County, Pennsylvania and Kent and Sussex Counties in Delaware are less likely to contribute to downwind violations during most of the ozone season, and Ocean and Mercer are more likely to be affected by emissions in the core of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area than the core of the New York City area.

This is supported by two more detailed analyses for wind flows affecting monitors in Philadelphia and Bucks Counties (below) and Ocean and Mercer Counties (in Appendix A).

Detailed Analysis of Meteorological Transport Conditions for the Philadelphia Nonattainment Area

Figure 1. 30-Year Average Summertime Wind Directions in the Philadelphia Area



To further understand the meteorological transport conditions within the area around the Philadelphia area, we also evaluated 24-hour back trajectories for the 2007-2011 time period, using the National Oceanic and Atmospheric Administration (NOAA) Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model. The model uses the monitoring location as a starting point, and goes back in time using meteorological data to determine how a parcel of air would have traveled on a given day. EPA evaluated three separate elevations for each exceedance day to better characterize the wind pattern and pollution transport to the monitor. EPA used monitor 42-101-0024 in Bucks County as the starting point for the HYSPLIT back trajectories, as it currently has the highest DV in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area. The air quality monitoring data and HYSPLIT results for those exceedance days are available in the docket for this action.

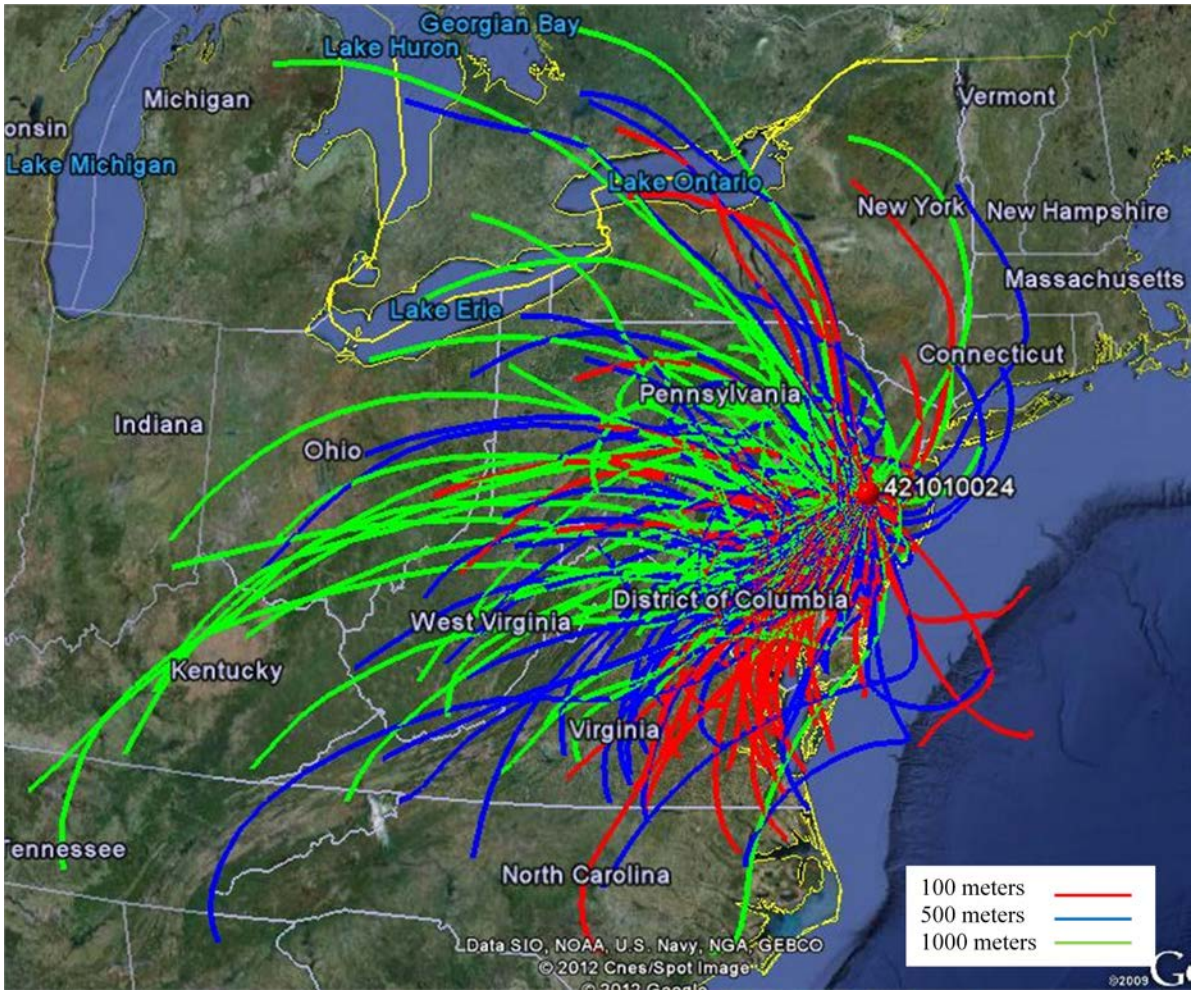
Table 1. 2007 to 2011 Exceedance-Day 8-Hour Ozone Values at Monitor 42-101-0024

Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)
5/29/2006	0.077		7/28/2007	0.079		6/26/2010	0.084
5/30/2006	0.086		8/2/2007	0.104		7/5/2010	0.082
6/1/2006	0.084		8/3/2007	0.082		7/6/2010	0.084
6/17/2006	0.082		8/4/2007	0.08		7/7/2010	0.077
6/18/2006	0.096		8/17/2007	0.079		7/16/2010	0.08
6/19/2006	0.077		8/29/2007	0.077		7/19/2010	0.076
6/22/2006	0.081		8/30/2007	0.087		7/23/2010	0.088
7/11/2006	0.078		9/21/2007	0.083		7/28/2010	0.076
7/17/2006	0.085		4/19/2008	0.087		8/10/2010	0.088
7/18/2006	0.087		6/7/2008	0.079		8/19/2010	0.094
7/19/2006	0.077		6/10/2008	0.099		8/20/2010	0.062
7/31/2006	0.079		6/13/2008	0.08		8/29/2010	0.076
8/1/2006	0.08		6/14/2008	0.082		8/30/2010	0.079
8/2/2006	0.077		6/21/2008	0.079		9/1/2010	0.092
8/3/2006	0.077		7/3/2008	0.083		9/22/2010	0.079
8/6/2006	0.077		7/11/2008	0.082		6/1/2011	0.094
5/15/2007	0.076		7/12/2008	0.077		6/7/2011	0.089
5/25/2007	0.084		7/17/2008	0.078		6/8/2011	0.092
5/27/2007	0.087		7/18/2008	0.088		6/9/2011	0.093
5/30/2007	0.076		7/22/2008	0.085		6/10/2011	0.081
5/31/2007	0.095		7/29/2008	0.08		7/6/2011	0.076
6/1/2007	0.079		7/30/2008	0.087		7/7/2011	0.082
6/8/2007	0.097		9/4/2008	0.079		7/10/2011	0.077
6/19/2007	0.087		8/15/2009	0.084		7/18/2011	0.087
6/26/2007	0.095		5/1/2010	0.078		7/21/2011	0.085
7/9/2007	0.106		6/2/2010	0.08		7/22/2011	0.086

Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)
7/14/2007	0.076		6/4/2010	0.079		7/29/2011	0.079
7/15/2007	0.076		6/19/2010	0.078			
7/17/2007	0.081		6/22/2010	0.082			

Figure 2 overlays HYSPLIT 24-hour back trajectories for all the 2007-2011 ozone exceedances at monitor 42-101-0024 on a Google Earth map of the northeastern United States. It gives an overview of long-range transport to the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area. As seen in Figure 2, the 24-hour back trajectories indicate regional transport from many directions and over several states.

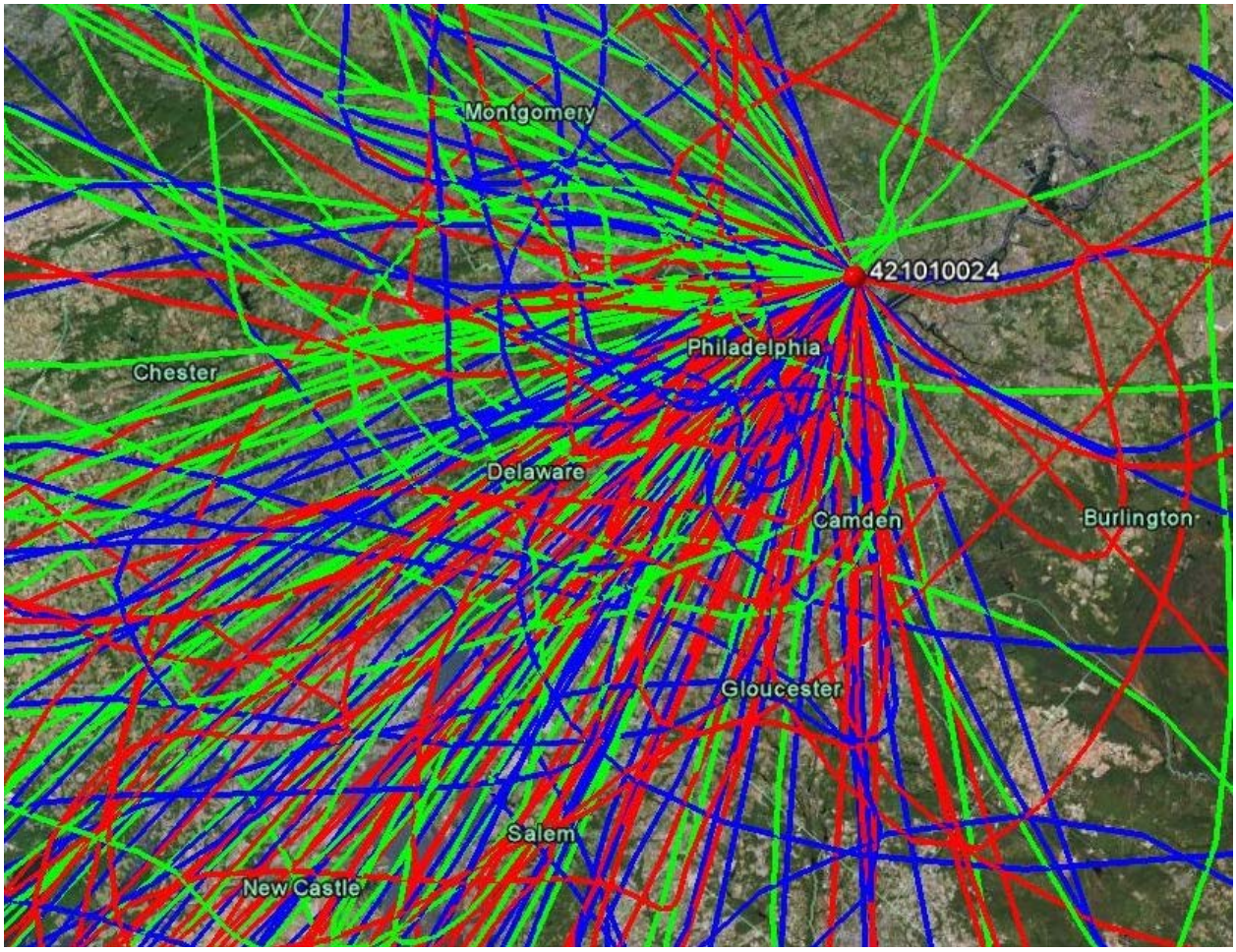
Figure 2. NOAA HYSPLIT 24-Hour Back Trajectories for 2007-2011 Exceedances Days - Overview



In Figure 3, below, these EPA has zoomed in on these same 24-hour HYSPLIT back trajectories, showing more of the nearby transport on high ozone days. This zoomed in perspective shows that on exceedance days, winds are predominantly from the south and southwest. This correlates

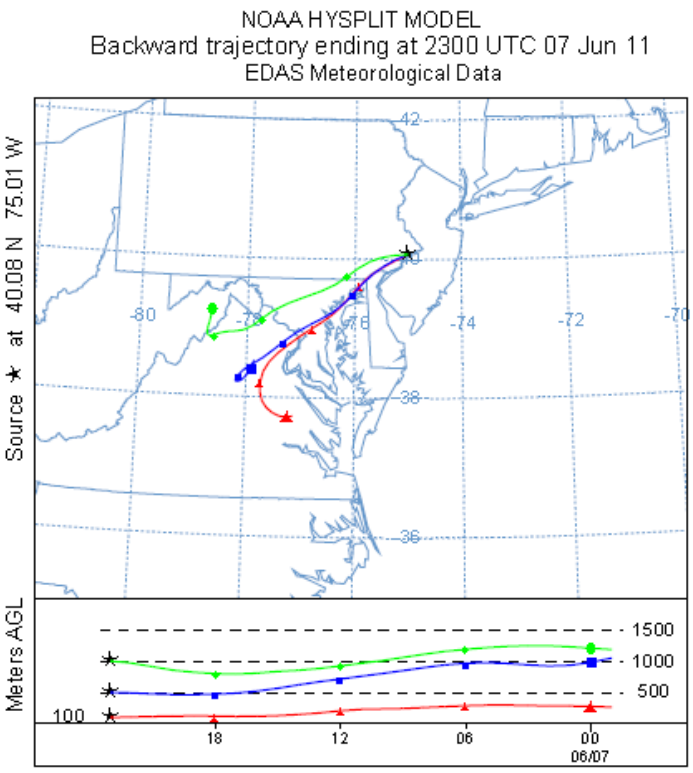
reasonably well with the NWS 30-year average wind directly given above, which gave prevailing winds as from the west-southwest and south-southwest. Figure 3 also shows a large percent of exceedance days with winds coming from the northwest, and several exceedance days with winds coming from the east.

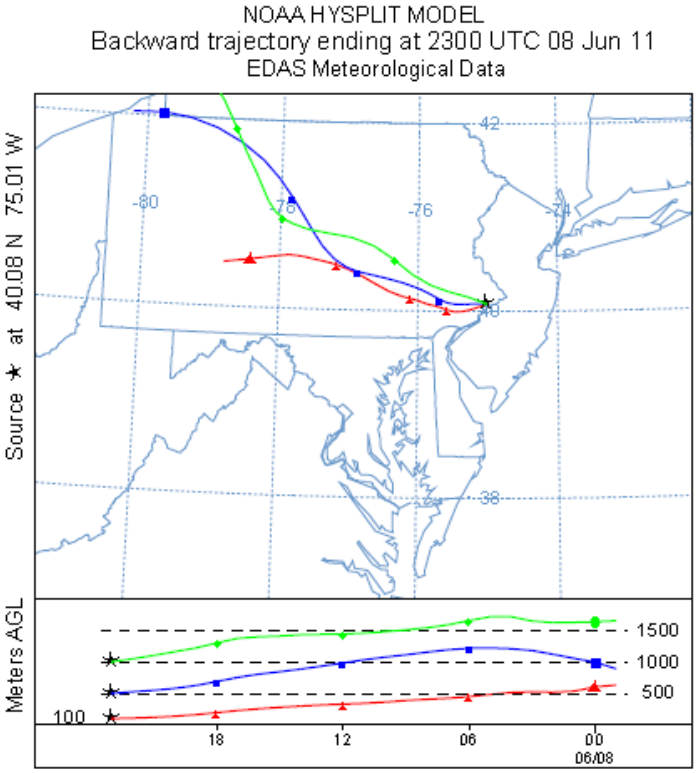
Figure 3. NOAA HYSPLIT 24-Hour Back Trajectories for 2006-2010 Exceedances Days - Zoom View

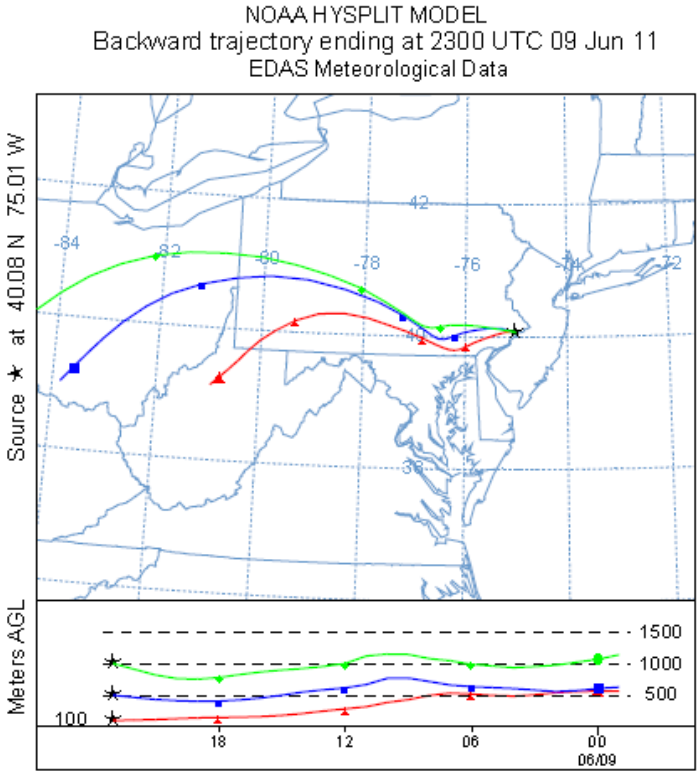


To further illustrate the local transport situation in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, EPA has selected specific trajectories for two "ozone episodes," periods when the ozone levels are high for several consecutive days. As shown in Table 1, the 8-hour average ozone value at monitor 42-101-0024 was above the standard for three days in a row in 2011 (June 7-9) and 2007 (May 30-June 1). Figure 4 shows that at the start of the 2011 episode, winds came from the predominant southwesterly direction. Figures 5 and 6 show that during the second and third days of the 2011 episode, wins were mainly from the west. Figures 7 through 9 depict the HYSPLIT back trajectories for the 2007 episode. These figures show that the while winds can start out northwest of at monitor 42-101-0024, throughout most of the 2007 episode winds were from the southwest.

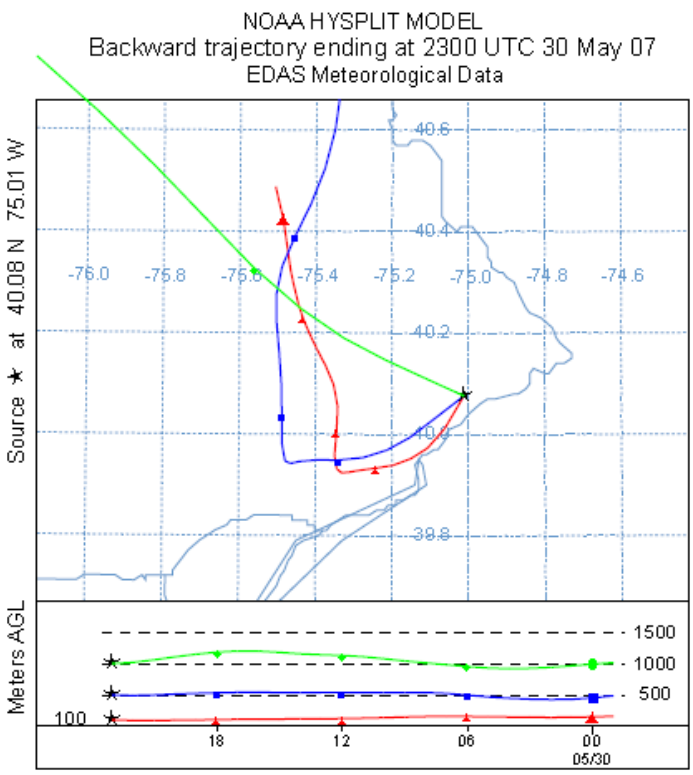
Figures 4, 5 & 6, NOAA HYSPLIT 24-Hour Back Trajectories June 7-9, 2011

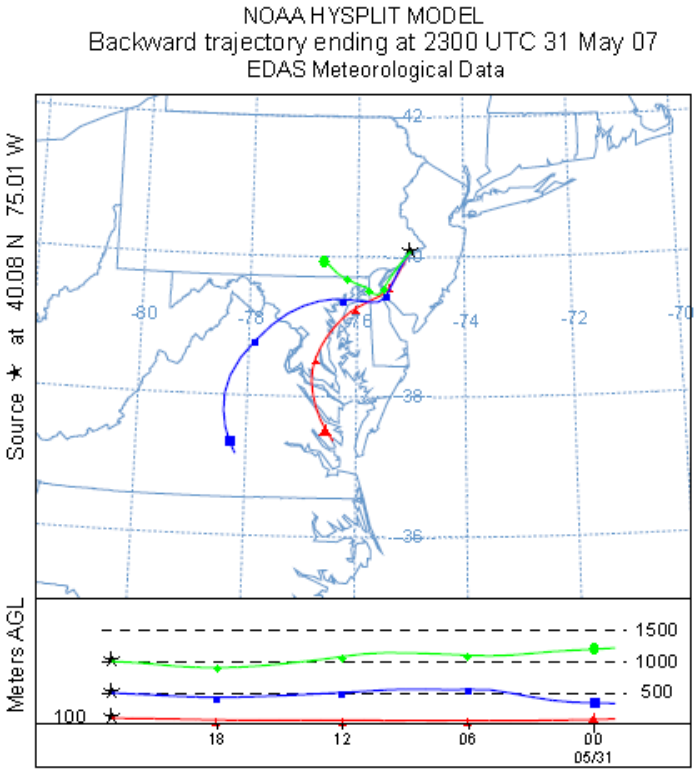


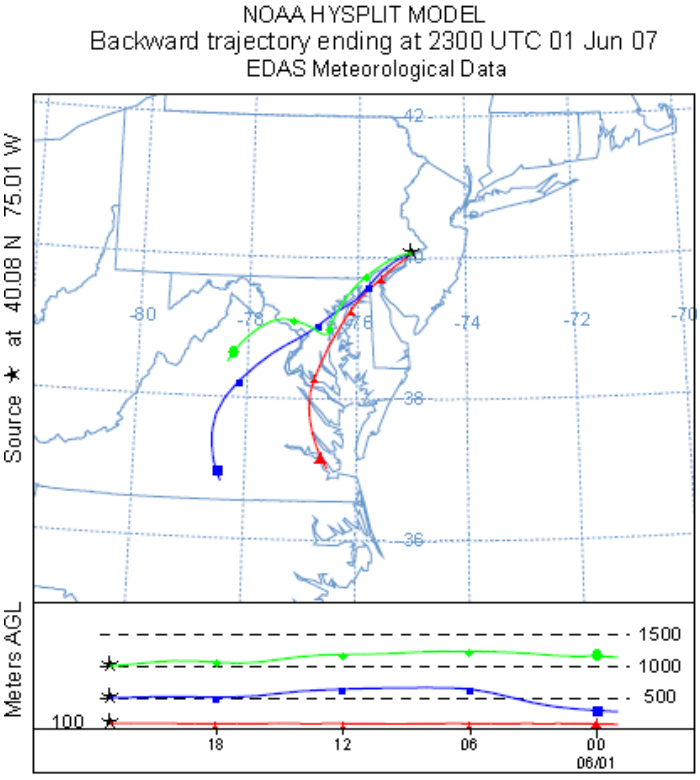




Figures 7, 8, & 9 NOAA HYSPLIT 24-Hour Back Trajectories May 30-June 1, 2007







Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, there are no barriers to contribution from upwind areas.

Factor 5: Jurisdictional boundaries

EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and so that areas designated nonattainment have the legal authority and cooperative planning necessary to carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment areas for ozone or other urban-scale pollutants, counties, air districts, townships, metropolitan planning organizations, state lines, urban growth boundary, etc. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates are used.

The major jurisdictional boundaries in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area are the state lines between Pennsylvania, Delaware, and New Jersey. Air-quality monitors that violate the 2008 8-hour ozone NAAQS in the Philadelphia Area are located in Delaware, Maryland, New Jersey, and Pennsylvania.

The Philadelphia-Camden-Vineland CSA consists of New Castle County, Delaware; Cecil County, Maryland; Burlington, Camden, Cumberland, Gloucester, and Salem Counties in New Jersey, and Berks, Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania. All those counties, except for Berks County, Pennsylvania are included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 8-hour ozone NAAQS. The nonattainment area also includes Kent and Sussex Counties, Delaware and Atlantic, Cape May, Mercer, and Ocean Counties, New Jersey.

Mercer and Ocean Counties, New Jersey are part of the New York-Newark-Bridgeport, NY-NJ-CT-PA CSA. Atlantic County makes up the Atlantic City-Hammonton, NJ MSA. Cape May County makes up the Ocean City, NJ MSA. In Delaware, Kent County, Delaware makes up the Dover MSA and Sussex County makes up the Seaford Micropolitan Statistical Area.

The Delaware Valley Regional Planning Commission (DVRPC), the metropolitan planning organization (MPO) in the Philadelphia Area, serves Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania, and Burlington, Camden, Gloucester, and Mercer Counties in New Jersey. New Castle County, DE and Cecil County, Maryland are in a separate MPO, the Wilmington Area Planning Council (WILMAPCO).

Delaware

New Castle County has historically been part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for ozone (1-hour and 8-hour) and fine particulate matter ($PM_{2.5}$). New Castle County is part of the Wilmington, DE-MD-NJ Metropolitan Division of the Philadelphia-Camden-Wilmington Metropolitan Statistical Area (MSA) in the Philadelphia-Camden-Vineland CSA. Being part of a statistical area indicates that counties are linked through employment and commuting. According to the Office of Management and Budget's "Standards for Defining Metropolitan and Micropolitan Statistical Areas," published in the Federal Register on December 27, 2000 (65 FR 82228), the "general concept of a Metropolitan Statistical Area or a Micropolitan Statistical Area is that of an area containing a recognized population nucleus and adjacent communities that have a high degree of integration with that nucleus." Delaware, Pennsylvania, Maryland and New Jersey have a long history of working cooperatively through the Ozone Transport Commission (OTC) and the Mid-Atlantic Northeast Visibility Union (MANE-VU) with ozone attainment planning. Furthermore, the two local MPOs, DVRPC and WILMAPCO, have worked together for decades.

Kent and Sussex Counties are less connected to the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area. They are not part of the Philadelphia-Camden-Vineland CSA. Kent County makes up the Dover MSA, and Sussex County makes up the Seaford Micropolitan Statistical Area. The Dover/Kent County MPO is the planning organization for Kent County, Delaware. This MPO covers 20 municipalities including all of Smyrna, which is also in New Castle County and all of Milford, which is also in Sussex County. Planning for Sussex County is done by the Sussex County Planning and Zoning Commission While Kent County was part of the Philadelphia-Wilmington-Trenton nonattainment area for the 1-hour ozone NAAQS, Sussex County was a separate nonattainment area.

Maryland

Cecil County has historically been part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for ozone (1-hour and 8-hour) and $PM_{2.5}$. Cecil County is part of the Wilmington, DE-MD-NJ Metropolitan Division of the Philadelphia-Camden-Wilmington MSA in the Philadelphia-Camden-Vineland CSA. Maryland, Delaware, Pennsylvania, and New Jersey have a long history of working cooperatively through the OTC and MANE-VU and with ozone attainment planning. Furthermore, the two local MPOs, DVRPC and WILMAPCO, have worked together for decades.

Pennsylvania

Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties have historically been part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for ozone (1-hour and 8-hour) and $PM_{2.5}$. These five counties are part of the Philadelphia, PA Metropolitan Division of the Philadelphia-Camden-Wilmington MSA in the Philadelphia-Camden-Vineland CSA. These counties are part of DVRPC, the main MPO for the Philadelphia Area.

Berks County is less connected to the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area. While it was added to the Philadelphia-Camden-Vineland CSA in December 2005, it's in a separate MSA, the Reading, PA MSA. Berks County has historically not been part of the Philadelphia nonattainment area for 8-hour ozone and $PM_{2.5}$, but has been designated separately as the Reading area. Berks County was designated

attainment/unclassifiable for 1-hour ozone. In addition, Berks County is covered by a separate MPO, the Berks County Planning Commission.

See Appendix B for EPA's response to comments on the boundaries of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area in Pennsylvania.

New Jersey

Southern New Jersey, from Mercer and Ocean Counties southward, are part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD ozone nonattainment area since EPA's previous eight-hour ozone standard designations in 2004, which were upheld by the US Court. Ocean County is part of the NYC transportation planning area and Mercer County is part of the Philadelphia planning area. We note that New Jersey's desire to continue to include Ocean and Mercer Counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area is important to this factor, since New Jersey has to balance inconveniences due to transportation planning areas that are different from the nonattainment areas with benefits of including Ocean and Mercer Counties in the Philadelphia nonattainment area.

New Jersey also requested that EPA designate all of the counties from New Jersey that were designated as nonattainment for Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area for the 2008 ozone standard be designated as nonattainment for the 2011 ozone standard, even those counties that are not in the Philadelphia-Canden-Vineland CSA.

Conclusion

Based on the assessment of factors described above, and with additional details in the enclosed Appendices, EPA concluded that the following counties meet the CAA criteria for inclusion in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 2008 eight-hour ozone standard: New Castle County, Delaware; Cecil County, Maryland; Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem Counties in New Jersey; and Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania. The Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 1997 8-hour ozone NAAQS included these same counties, plus Kent and Sussex Counties in Delaware.

New Castle County in Delaware; Cecil County in Maryland; Berks, Bucks, Montgomery and Philadelphia Counties in Pennsylvania and Camden, Cumberland, Gloucester, Mercer and Ocean Counties in New Jersey show violations of the 2008 ozone NAAQS based on 2010 design values. Maryland and Pennsylvania have requested that these violating counties in their respective States be included as part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area, which is consistent with their inclusion of that area for the 1-hour and 1997 8-hour NAAQS and the PM2.5 NAAQS. New Jersey requested that its violating counties listed above be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, as

they were for the 1997 8-hour NAAQS. The factors above support inclusion of these counties and neighboring counties recommended by the states in that nonattainment area. Therefore, we will include them as part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 2008 ozone NAAQS.

We have made a further analysis of the other counties in the area that Delaware and Pennsylvania did not include in their request for the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area, as well as further analysis of New Jersey's request for Ocean and Mercer Counties to be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, summarized as follows.

New Castle County, Delaware has relatively high emissions, high population, and high VMT. Considering prevailing winds from the southwest, this county likely contributes to downwind violations of the ozone NAAQS in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area. Furthermore, New Castle County is part of the Philadelphia-Wilmington-Atlantic City 8-hour ozone nonattainment area for the 1997 ozone standard and the Philadelphia-Camden-Vineland CSA. New Castle County has a moderate degree of commuting into the other counties in the CSA, including over 24,000 commuters into Cecil, Chester, Delaware, Montgomery, and Philadelphia Counties. Therefore, EPA will designate New Castle County as nonattainment as part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area.

Chester and Delaware Counties in Pennsylvania are part of the Philadelphia, PA Metropolitan Division of the Philadelphia-Camden-Wilmington MSA in the Philadelphia-Camden-Vineland CSA. These counties have been historically part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment areas for ozone (8-hour and 1-hour) and $PM_{2.5}$ and are linked together with significant commuting throughout the 5 counties. These counties have relatively high populations and population densities. Delaware County has the second highest NOx emissions in the areas of analysis and among the highest VOC emissions. Taking into account the prevailing winds during the ozone season are predominantly from the southwest, emissions from Chester and Delaware Counties likely contribute to downwind violations in Bucks and Philadelphia Counties during most of the ozone season. Considering all these factors, EPA has concluded that Chester and Delaware Counties are included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area.

In addition, monitors in **Sussex County, Delaware and Berks County, Pennsylvania** show violations of the 2008 ozone NAAQS and must be designated nonattainment. We believe that Sussex County, Delaware and Berks County, Pennsylvania should be designated as in separate nonattainment areas, and explained below.

Berks County, Pennsylvania has a violating monitor, but relatively moderate emissions, population, and VMT. There is some commuting from Berks County to the other counties in the Philadelphia Area, and Berks County is part of the Philadelphia-Camden-Vineland CSA. However, Berks County has historically been a separate ozone and PM2.5 nonattainment area. The County's MPO, the **Berks County Planning Commission,** is separate from the Philadelphia Area's MPO, DVRPC. Furthermore, meteorology indicates that on typical summer days when the violating monitors are experiencing exceedances of the ozone NAAQS, emissions from

Berks County are not upwind of those monitors in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area and thus we believe emissions from Berks County do not significantly contribute to nonattainment at those monitors. Therefore, EPA has concluded that Berks County should not be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area, and should be designated as nonattainment in a separate area[4].

Sussex County, Delaware has a monitor that is violating the 2008 ozone NAAQS. It has moderate emissions and population in the area as compared with the other counties in the area of analysis. It is not part of the Philadelphia-Camden-Vineland CSA. Furthermore, considering prevailing winds from the southwest and the location of the highest violating monitors in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Area, it is not likely that Sussex County is contributing significantly to the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area. Therefore, EPA has concluded that Sussex County should not be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, and should be designated as nonattainment in a separate area[5].

Kent County, Delaware has a monitor that meets the 2008 8-hour ozone NAAQS. This county has comparatively low emissions, population and VMT, and is not part of the Philadelphia-Camden-Vineland CSA. Therefore, EPA has concluded that Kent County should not be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, and should be designated as unclassifiable/attainment.

Ocean and Mercer Counties are more affected by emissions from counties in the Philadelphia metropolitan area than emissions from counties in the New York City metropolitan area and EPA concludes that Ocean and Mercer Counties should be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area, as they were for the 1997 8-hour ozone NAAQS.

New Jersey requested all of the counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 1997 ozone NAAQS designations should be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 2008 ozone NAAQS designations. As noted in the beginning of this TSD, the issue placing Ocean and Mercer Counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area when they are in the New York CSA is decided on the basis of the factor analysis. However, the other counties recommended by New Jersey for inclusion in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area that were in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD area for the 1997 ozone NAAQS designations are approved by EPA, since New Jersey's counties that are outside the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD CSA are not in a metropolitan area shared by another state. Thus, EPA concurs with New Jersey's recommendation for **Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, and Salem Counties** to be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD nonattainment area for the 2008 ozone NAAQS.

[4] See EPA's Technical Analysis for the Reading Area, sent to the Commonwealth of Pennsylvania by EPA Region III.
[5] See EPA's Technical Analysis for the Seaford Area, sent to the State of Delaware by EPA Region III.

Appendix A.

Factor Analysis for New Jersey's Request to Include Ocean and Mercer Counties in the Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD Nonattainment Area

New Jersey proposes that the entire state be designated as nonattainment for the 2008 ozone NAAQS[6], but requested that the boundary between the New York City nonattainment area and Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD (Philadelphia nonattainment area) be different from the CSA boundaries.

EPA has determined that several factors are relevant to determining if the boundaries of the New York City and Philadelphia areas proposed by the State of New Jersey are approvable. The following sections provide additional information, as available and relevant.

Factor 1: Air Quality Data

Air quality data is based on the 8-hour ozone design values (in ppb) for air quality monitors in New Jersey, based on data for the 2008-2010 period (i.e., the 2010 design value, or DV). These are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm (75ppb) or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for counties New Jersey are in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2010 8-hour Ozone DV (ppb)
Atlantic, NJ	Yes	74
Berks, PA	Yes, other area	79
Bucks, PA	Yes	83
Burlington, NJ	Yes	--
Camden, NJ	Yes	80
Cape May, NJ	Yes	--
Cecil, MD	Yes	80
Chester, PA	No	76
Cumberland, NJ	Yes	76

[6] New Jersey (as well as Maryland, Delaware and Connecticut) requested a large, regional nonattainment area, with local designations if EPA did not approve the larger area designation. See EPA's separate response to the states, elsewhere in these Technical Support Documents.

Delaware, PA	No	74
Gloucester, NJ	Yes	81
Kent, DE	No	74
Mercer, NJ	Yes	78
Montgomery, PA	Yes	78
New Castle, DE	Yes, other area	76
Ocean, NJ	Yes	81
Philadelphia, PA	Yes	82
Salem, NJ	Yes	--
Sussex, DE	Yes, other area	77

Note: Counties with no ozone monitor are identified with "--" in the 2010 8-hour Ozone DV column

The highest design value in NJ is 81ppb in Ocean and Gloucester Counties. The highest design value in the Philadelphia nonattainment area is 83ppb in Bucks Co., PA. The highest design value in the New York City nonattainment area is 84 ppb in Suffolk County, Long Island, NY. The elevated design values in Ocean County is a reason for including Ocean in the Philadelphia-Wilmington-Atlantic City nonattainment area, as other factors show its ozone is mostly from Philadelphia, not New York.

The air quality monitoring data are included in the docket for this action.

As shown in Figures 1 and 2, design values decrease further north and east from Ocean County, until the next set of peak design values occur downwind of New York City on Long Island and in Connecticut. This is an indication that Ocean County is affected strongly and mostly by sources to the south and west, which includes the Philadelphia area. This is typical of the northeastern United States, since most of peak ozone design values are found north and east of the centers of major urban areas.

Factor 2: Emissions and Emissions-Related Data

This factor does not provide much information related to New Jersey's request for Ocean and Mercer Counties to be included in the prospective Philadelphia nonattainment area.

Emissions Data

Not evaluated because New Jersey has proposed that every county in New Jersey is proposed to be nonattainment. There are no counties proposed to be attainment in New Jersey.

The only issue, whether Mercer and Ocean Counties should continue to be included with the Philadelphia area as opposed to the New York area, does not use this factor as a deciding factor. The question that needs a multi-factor analysis is about whose emissions affect Ocean and Mercer Counties the most, which is best determined by analysis of transport of ozone and ozone-forming emissions.

Population density and degree of urbanization

Not evaluated since the question is the impact of urban ozone on Ocean and Mercer County and less so about whether Ocean and Mercer Counties affect other areas.

Traffic and commuting patterns

EPA evaluated the commuting patterns of residents in the area. A neighboring county with high VMT and/or a high number of commuters coming into the county with a violating monitor is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. The attached spreadsheet shows traffic and commuting pattern data, including total 2008 VMT* and 10-year VMT growth, number of commuters in each county who drive to another county within the area, the percent of total commuters in each county who commute to other counties within the area**, and the total vehicle miles traveled (VMT) for each county.

* MOBILE model VMTs are those inputs into the NEI version 1.5.
** U.S. Census Bureau estimates for 2000 County-to-County Worker Flow http://www.census.gov/hhes/commuting/data/commuting.html.

The County-to-County Worker Flow data from 2000 was used in the previous 2004 analysis for the 1997 ozone standard.

Based on 2000 data, the 2004 analysis noted that more commuters either stay in Ocean County or Mercer Counties or go to the Philadelphia area than go to the New York City area.

The data are included in the docket for this action.

Commuting from Ocean and Mercer Counties into central Philadelphia is much lower than the counties with the highest numbers of commuters heading into Philadelphia. For Ocean County, most of the top-ranked counties for its commuters are in the New York-Newark-Bridgeport, NY-NJ-CT-PA CSA. Mercer County's second-ranked destination is New York County (Manhattan). However, the reason for including Ocean and Mercer Counties in the Philadelphia-Wilimington-Atlantic City nonattanment area is due to the impact that the Philadelphia area has on Ocean and Mercer Counties, not their impact on Philadelphia.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation.

Wind rose for 1988-1992

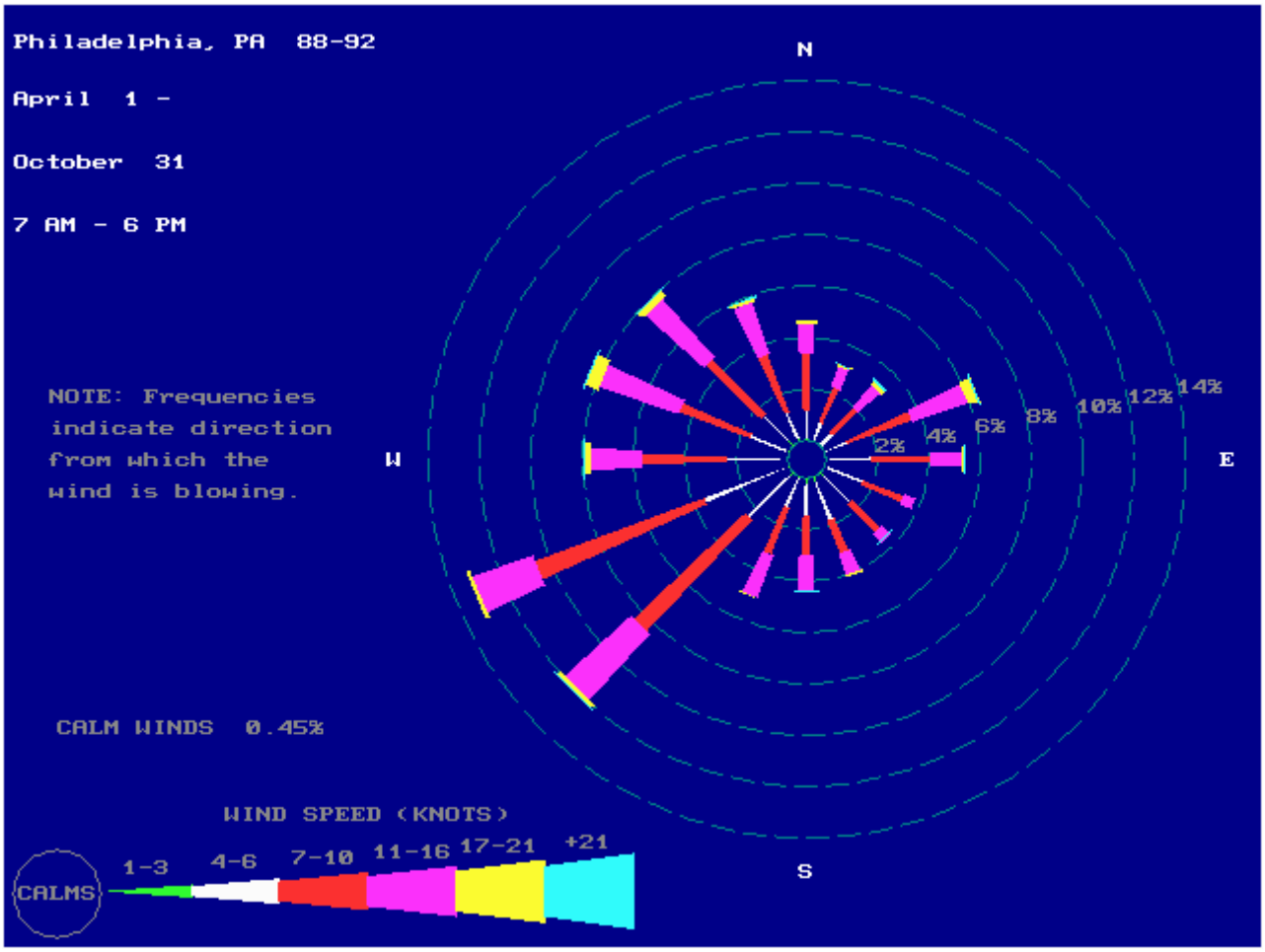


Figure 3-1. Daytime wind rose during ozone season, Philadelphia, PA.

The 1997 designation assessment showed, via wind roses (see above), trajectory analysis and contribution assessments, that Ocean County (and by extension, Mercer County) are downwind of the Philadelphia metropolitan area and are not as strongly affected by emissions from the New York City metropolitan area. More recent trajectory analyses continue to support New Jersey's request.

EPA produced trajectories from NOAA's HYSPLIT program for days when monitoring sites in Mercer and Ocean Counties had the highest ozone concentrations from 2008 through 2011. Trajectories were run backwards from the monitoring site with the arrival time at the monitoring site at 1400 local standard time. Three trajectories were run for each day – starting at different altitudes that are climatologically within the mixed layer during the afternoon, when peak ozone typically occurs and thermal mixing from sunshine is at a maximum. These trajectories predominantly come through eastern Pennsylvania and less frequently from southeastern New York. Thus, emissions from the Philadelphia metropolitan area are more likely to affect Ocean and Mercer Counties than the New York City metropolitan area.

In summary, these trajectories show when the air comes from on high ozone days at these monitoring sites in recent years.

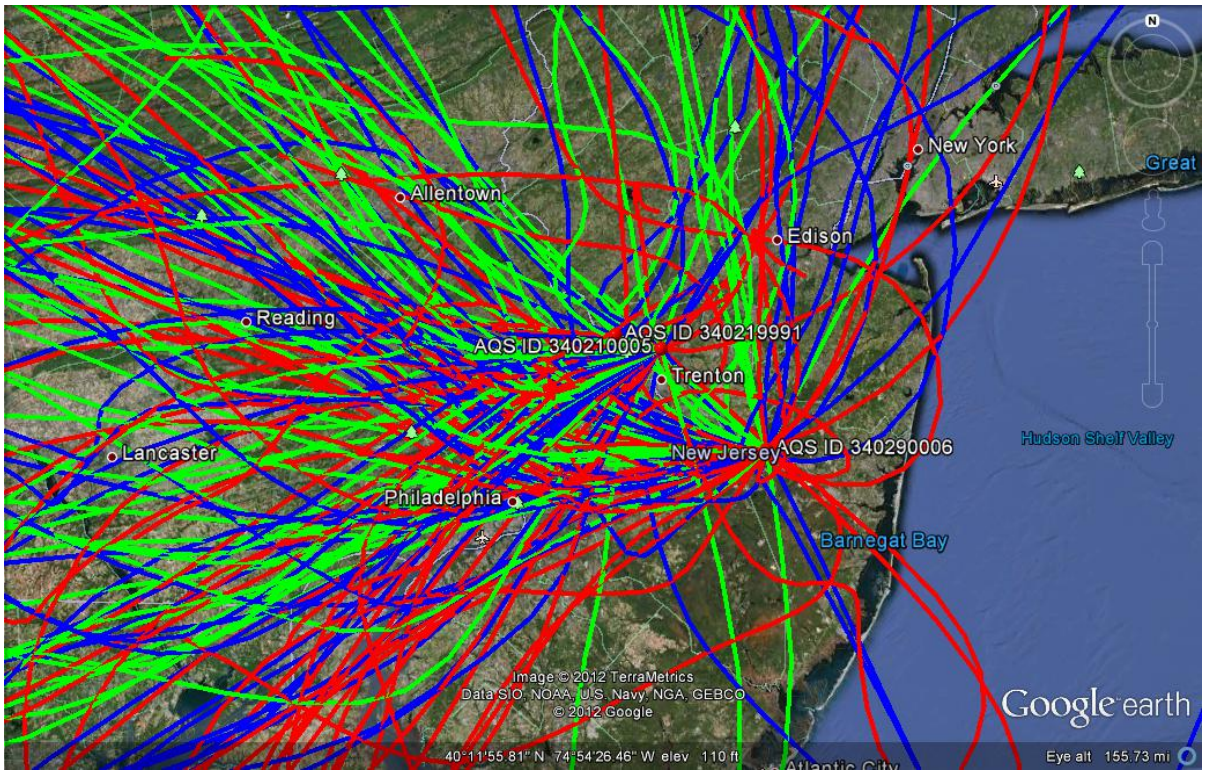


Figure 3-2. Trajectories for high ozone days at monitors in Ocean and Mercer Counties.

Figure 3-2, with all of the trajectories for the three monitoring sites in Ocean and Mercer Counties, is too busy to examine closely. However, it shows that the thicket of trajectories is thickest over eastern Pennsylvania, and markedly less so over New York. This is not surprising, since the basic conceptual model for ozone formation in the metropolises of the northeastern corridor of the United States is for ozone to form on sunny days with surface winds from the southwest and winds aloft from the west.

Here's the classic example of the conceptual model from the University of Maryland:

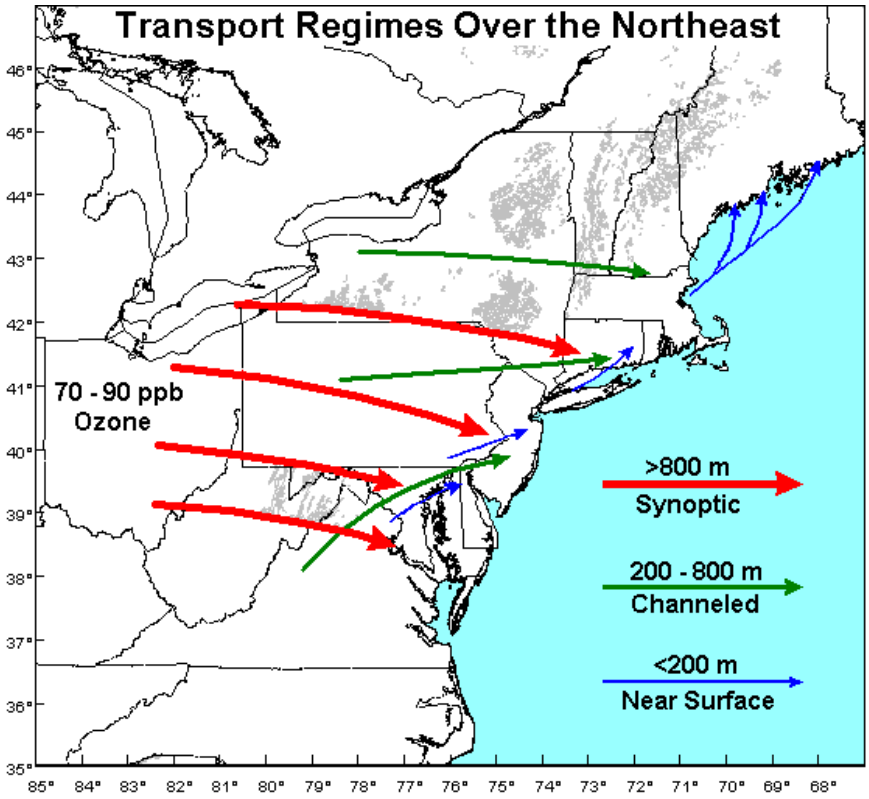


Figure 3-3. Conceptual model of ozone transport

Here are composite graphics of the trajectories for each site in Ocean and Mercer Counties, as well as for each of the three altitudes:

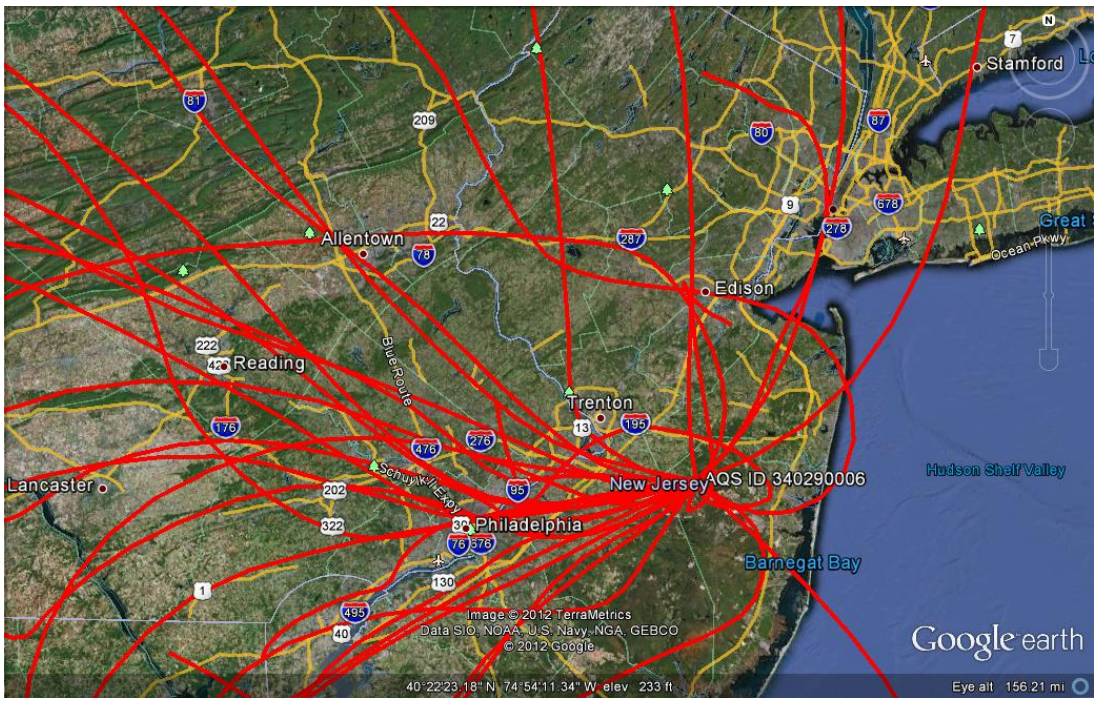


Figure 3-4. Trajectories to the ozone monitor in Ocean County, ending at 100 meters above ground level in mid-afternoon on high ozone days.

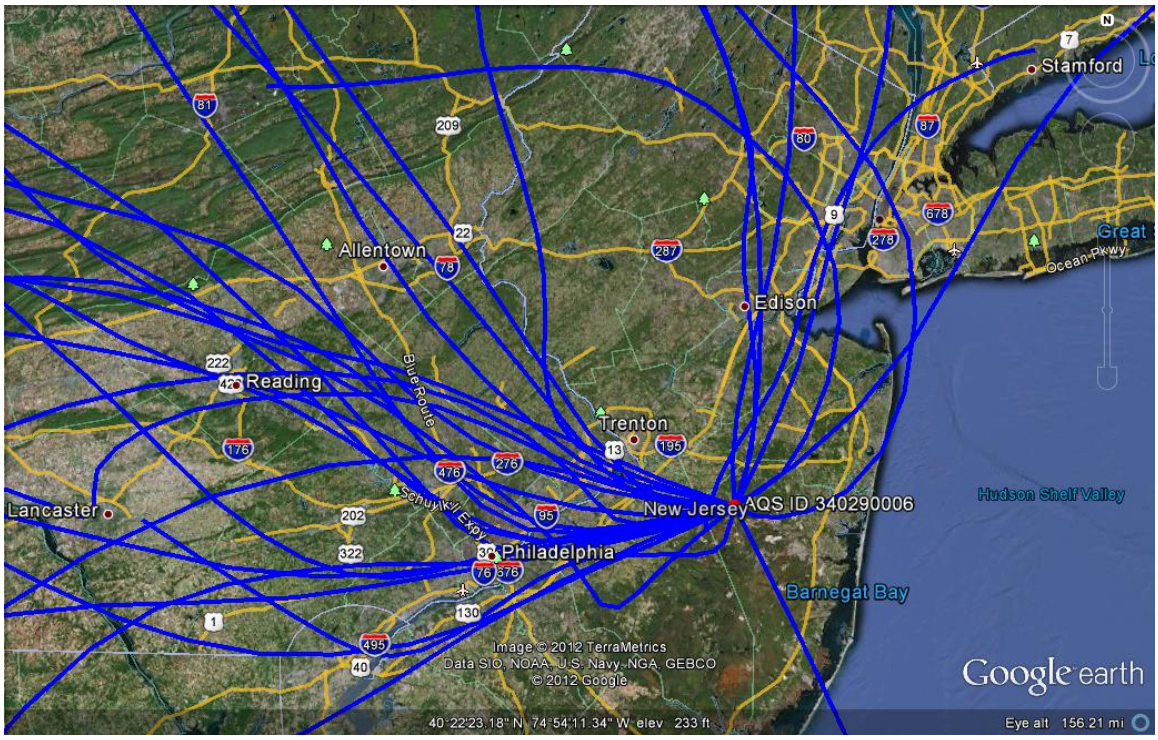


Figure 3-5. Trajectories to the ozone monitor in Ocean County, ending at 500 meters above ground level in mid-afternoon on high ozone days.

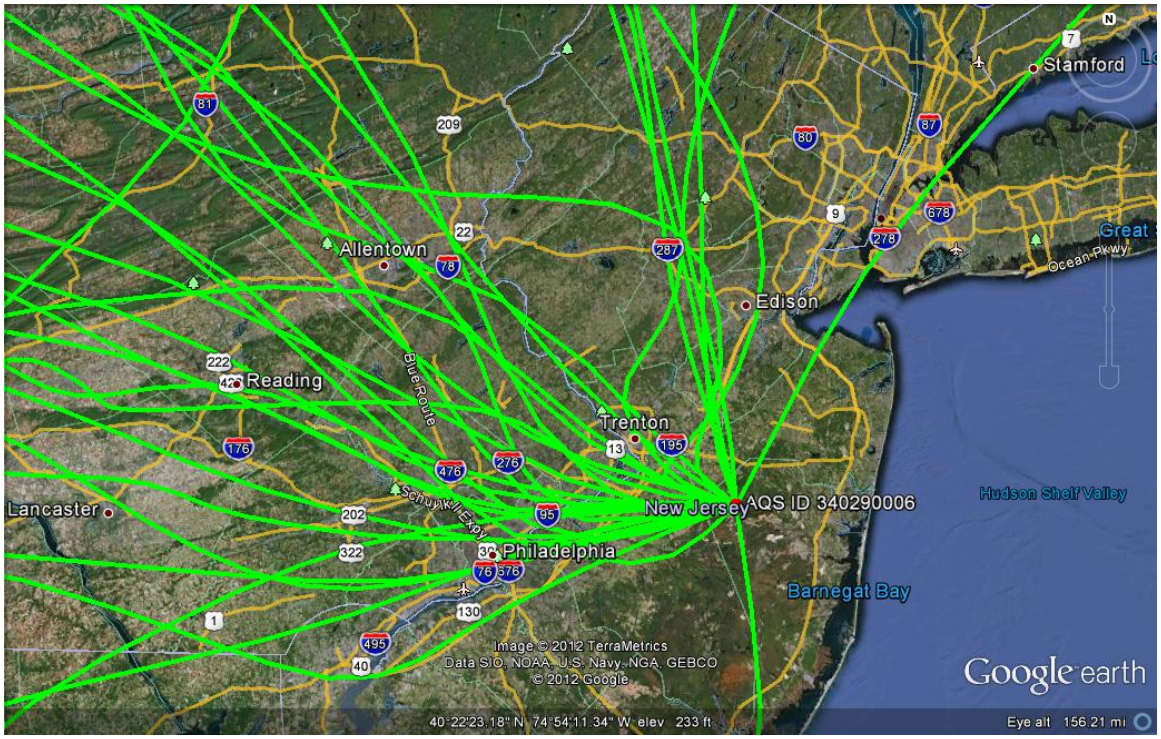


Figure 3-6. Trajectories to the ozone monitor in Ocean County, ending at 1000 meters above ground level in mid-afternoon on high ozone days.

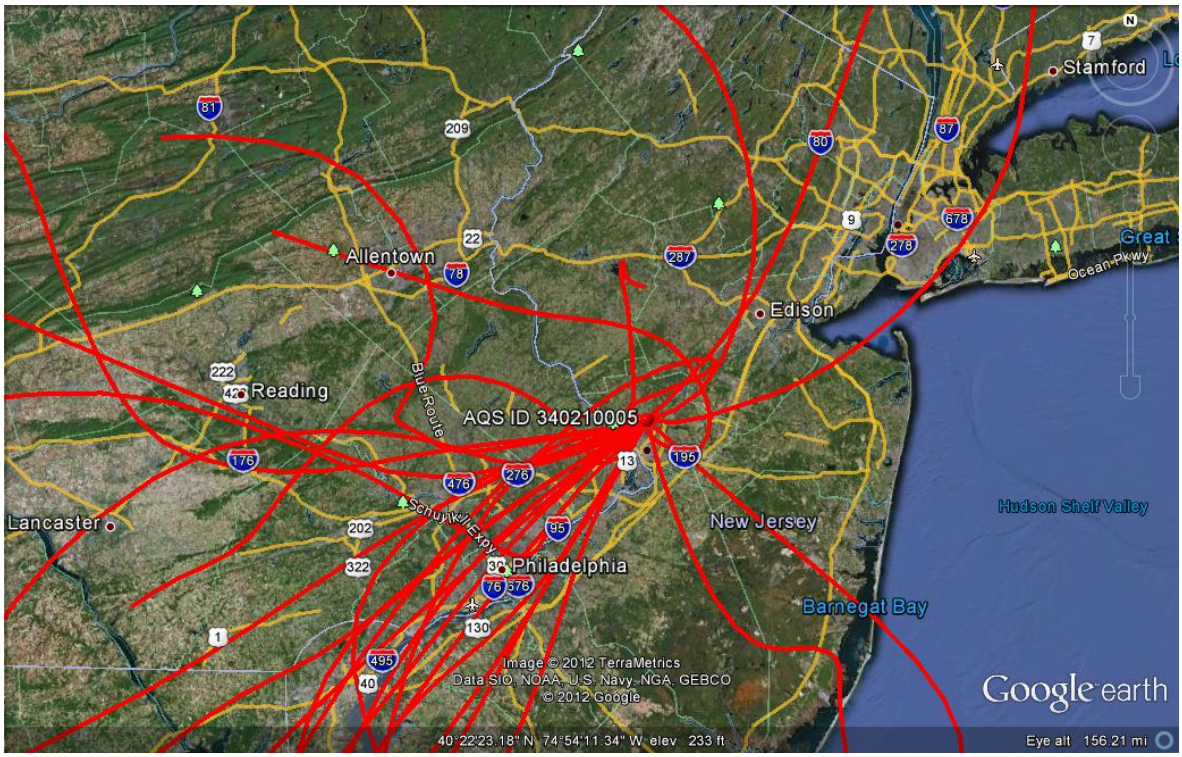


Figure 3-7. Trajectories to the Rider University ozone monitor in Mercer County, ending at 100 meters above ground level in mid-afternoon on high ozone days.

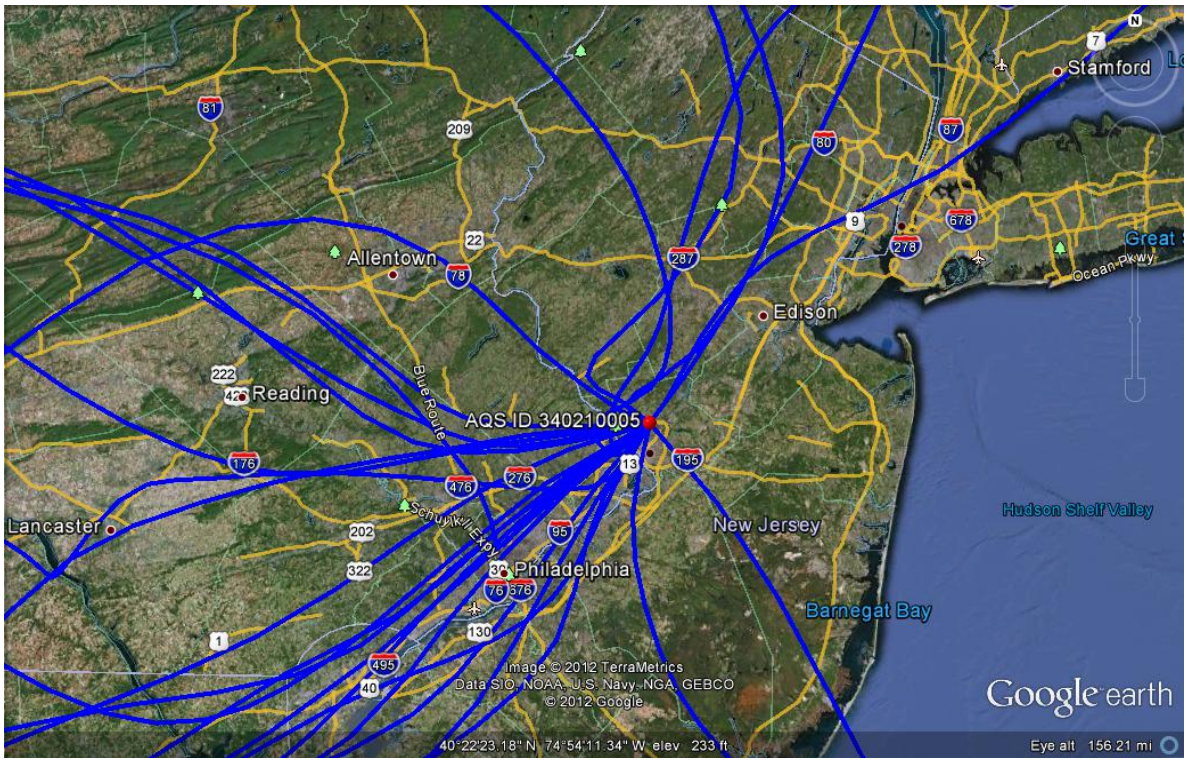


Figure 3-8. Trajectories to the Rider University ozone monitor in Mercer County, ending at 500 meters above ground level in mid-afternoon on high ozone days.

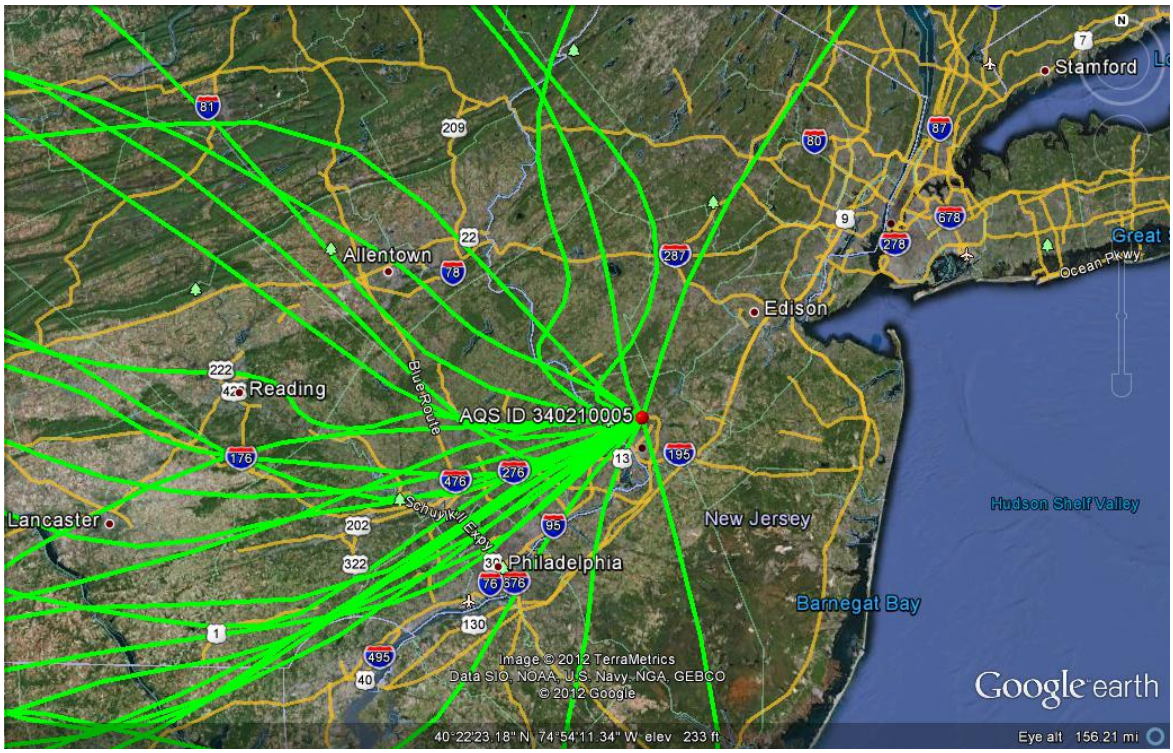


Figure 3-9. Trajectories to the Rider University ozone monitor in Mercer County, ending at 1000 meters above ground level in mid-afternoon on high ozone days.

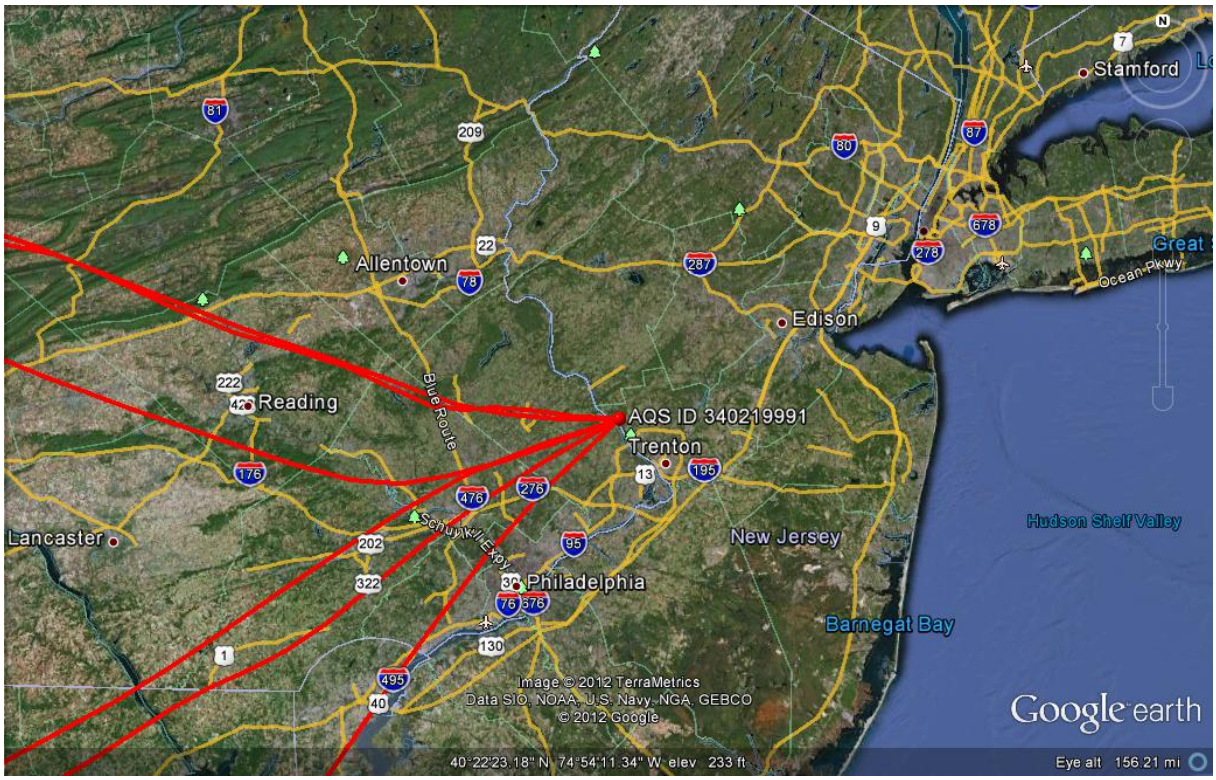


Figure 3-10. Trajectories to the Washington Crossing ozone monitor in Mercer County, ending at 100 meters above ground level in mid-afternoon on high ozone days.

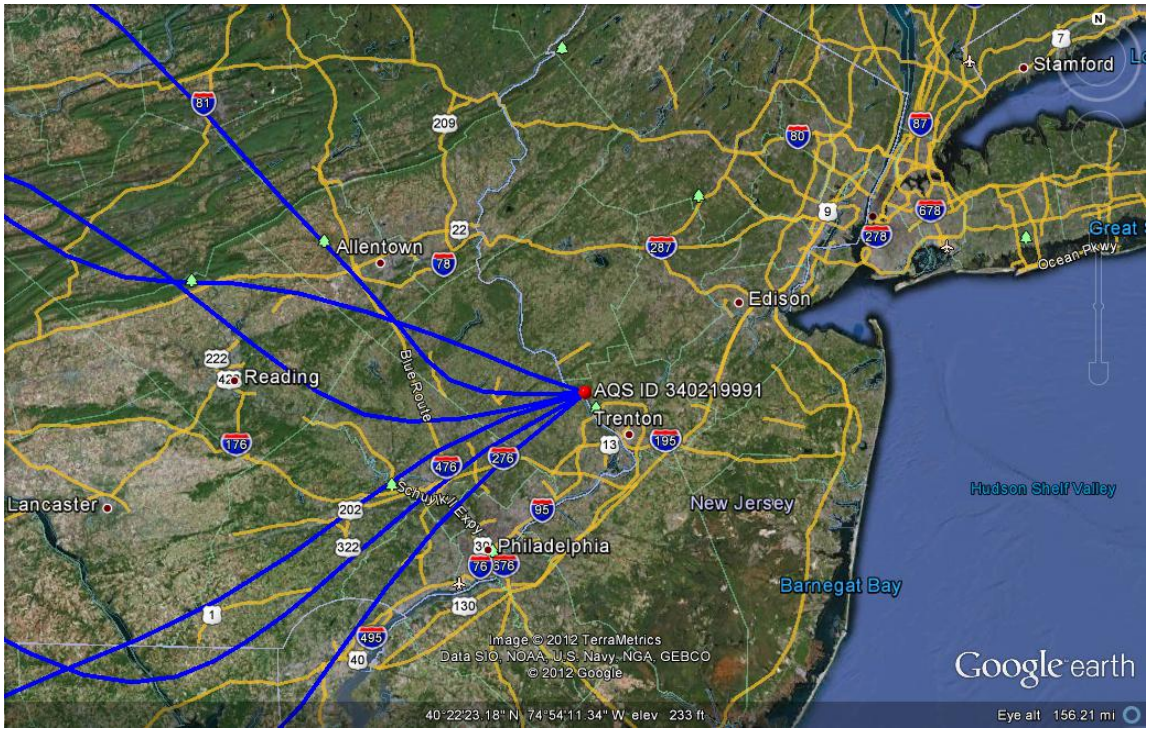


Figure 3-11. Trajectories to the Washington Crossing ozone monitor in Mercer County, ending at 500 meters above ground level in mid-afternoon on high ozone days.

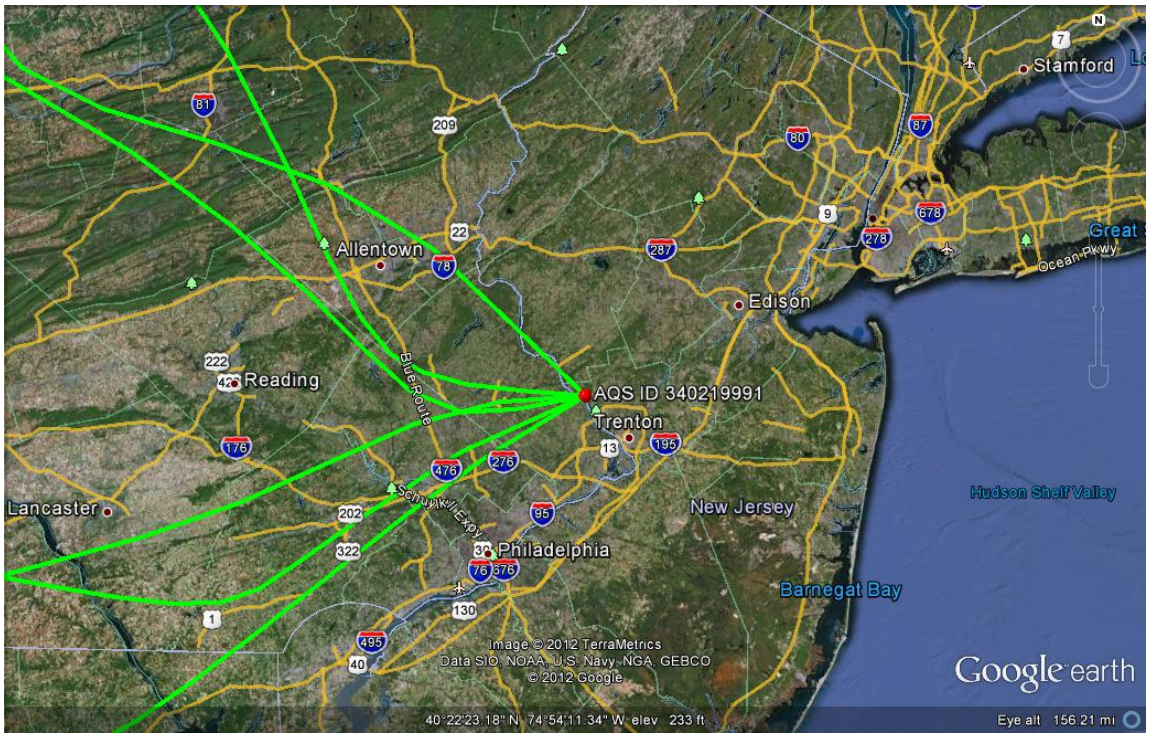


Figure 3-12. Trajectories to the Washington Crossing ozone monitor in Mercer County, ending at 1000 meters above ground level in mid-afternoon on high ozone days.

The original mapping file for the trajectory analysis is included in the docket for this action.

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

New Jersey's division of its nonattainment areas into two areas is not based on, nor affected by, topographic barriers.

Factor 5: Jurisdictional boundaries

Once the general areas to be included in the nonattainment area were determined, EPA considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment areas for ozone or other urban-scale pollutants, counties, air districts, townships, metropolitan planning organizations, state lines, Reservations, urban growth boundary, etc. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

EPA approved the inclusion of Ocean and Mercer Counties into the Philadelphia nonattainment area for the 2004 ozone nonattainment designations.

Ocean County is in the New York City metropolitan transportation planning organization. Mercer County is in the Philadelphia metropolitan transportation planning organization. Since 2004, New Jersey has worked with Ocean County being within the Philadelphia nonattainment area and in the New York City-centered transportation planning organization. If New Jersey requests that Ocean County should be included with the Philadelphia nonattainment area despite the possible difficulties of this situation, this factor should not be a reason for declining New Jersey's request.

Summary

EPA has determined that ozone concentrations in Mercer and Ocean Counties are more strongly affected by emissions from the Philadelphia metro area in eastern Pennsylvania than the New York City metro area in southeastern New York. Ocean and Mercer Counties should be in the Philadelphia ozone nonattainment area as they were for designations for the previous 1997 eight-hour ozone standard.

EPA uses five types of factors when we consider how to determine the boundaries of a nonattainment area:

1. Air quality data (including the design value calculated for each FRM or FEM monitor in the area);

Both Ocean and Mercer Counties violate the air quality standard; with Ocean County having a higher design value than any monitors further downwind of Ocean County, except the peak monitors downwind of New York City.

2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
   This factor has a limited relevance to this issue, as the issue is whether the Ocean and Mercer Counties are more affected by the Philadelphia nonattainment area than the New York City area. However, one factor from the 2004 analysis noted that more commuters stay in Ocean County or go to the Philadelphia area than go to the New York City area.[7]
3. Meteorology (weather/transport patterns);
   The 2004 analyses of the evaluation of boundaries for the 1997 ozone NAAQS[8] show that Ocean County is much more likely to be impacted by winds from the Philadelphia area than winds from the New York City area. However, more recent wind rose data and trajectory analyses support New Jersey's recommendation that Mercer and Ocean County are affected more strongly by the Philadelphia area than the New York area.
4. Geography and topography (mountain ranges or other basin boundaries);
   Not much of a factor, since there are no major topographic features affecting conclusions from the wind flow analyses.
5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))
   Ocean County is part of the NYC transportation planning area and Mercer County is part of the Philadelphia planning area. However, Ocean and Mercer Counties have been in the Philadelphia nonattainment area since 2004. New Jersey's desire to continue to include Ocean and Mercer Counties in the Philadelphia area prevails, since New Jersey has to deal with any inconveniences due to transportation planning areas that are different from the nonattainment areas.

EPA received no negative comments during the comment period about the assignment of Ocean and Mercer Counties to the Philadelphia nonattainment area.

[7] This factor uses Census Bureau data from 2000, which will be updated if newer data are available.
[8] http://www.epa.gov/ozonedesignations/1997standards/documents/tsd/ch3.pdf

Appendix B: Response to Comments on Berks County and the Philadelphia Nonattainment Area

In Pennsylvania's February 28, 2012 response to EPA's December 9, 2011 "120-day letter", the Commonwealth provided information to respond to public comments on EPA's preliminary recommendations. Comments were submitted to EPA, recommending that the agency include Reading (Berks County) in Philadelphia area because Reading is part of the Philadelphia-Camden-Vineland Consolidated Statistical Area (CSA). The Commonwealth disagreed with this suggestion and supported EPA's proposal to designate Berks County as a single county nonattainment area for the following reasons:

- The Commonwealth's recommendation and EPA's preliminary response are consistent with the Office of Management and Budget (OMB) definition. The OMB defines the Reading metropolitan statistical area as an area that consists of only Berks County. Although the OMB added Berks County to the Philadelphia CSA in 2006 because of increasing commuting ties to the larger area, Berks County traditionally has its own planning functions, including its own countywide transportation planning organization.
- EPA designated Berks County as a single-county nonattainment area for the 1-hour ozone standard, the 1997 8-hour ozone standard and the 1997 fine particulate matter standard.
- Analysis of the most current work destination data for Berks County' indicates that in 2009, 57.7 percent of the employment of Berks County residents was in Berks County.
- The Reading Air Basin, defined in 25 Pa. Code § 121,1 and codified in 40 CFR 52.2020, covers portions of Berks County and no other county.
- Based on the 2008 National Emissions Inventory shown below, VOC and NOx emissions (tons per year) in Berks County are low compared to emissions in the 5-county Philadelphia Area. The five Pennsylvania counties (Bucks, Chester, Delaware, Montgomery and Philadelphia) are part of a much larger CSA, which in turn is only part of the proposed four-state Philadelphia-Wilmington-Atlantic City nonattainment area. Therefore, the inclusion of Berks County in the Philadelphia-Wilmington-Atlantic City area is unlikely to have a significant effect on the area attaining the standard.

Appendix C. Ozone Design Values in Pennsylvania Calculated Including 2011 Ozone Data

Pennsylvania submitted certified ozone data for 2011 to EPA in November 2011. Since no other states in the Philadelphia Area submitted certified ozone data for 2011 during EPA's review process, EPA will not include Pennsylvania's 2011 ozone data in calculating design values for designations. The effect of using 2011 data from Pennsylvania is listed below for information purposes, with the 2011 design value being calculated with air quality data from 2009, 2010 and 2011.

County	State Recommended Nonattainment?	2010 8-hour Ozone DV (ppb)	2011 8-hour Ozone DV (ppb)
Atlantic, NJ	Yes	74	
Berks, PA	Yes, other area	79	77
Bucks, PA	Yes	83	80
Burlington, NJ	Yes	--	
Camden, NJ	Yes	80	
Cape May, NJ	Yes	--	
Cecil, MD	Yes	80	
Chester, PA	No	76	74
Cumberland, NJ	Yes	76	
Delaware, PA	No	74	73
Gloucester, NJ	Yes	81	
Kent, DE	No	74	
Mercer, NJ	Yes	78	
Montgomery, PA	Yes	78	77
New Castle, DE	Yes, other area	76	
Ocean, NJ	Yes	81	
Philadelphia, PA	Yes	82	83
Salem, NJ	Yes	--	
Sussex, DE	Yes, other area	77	

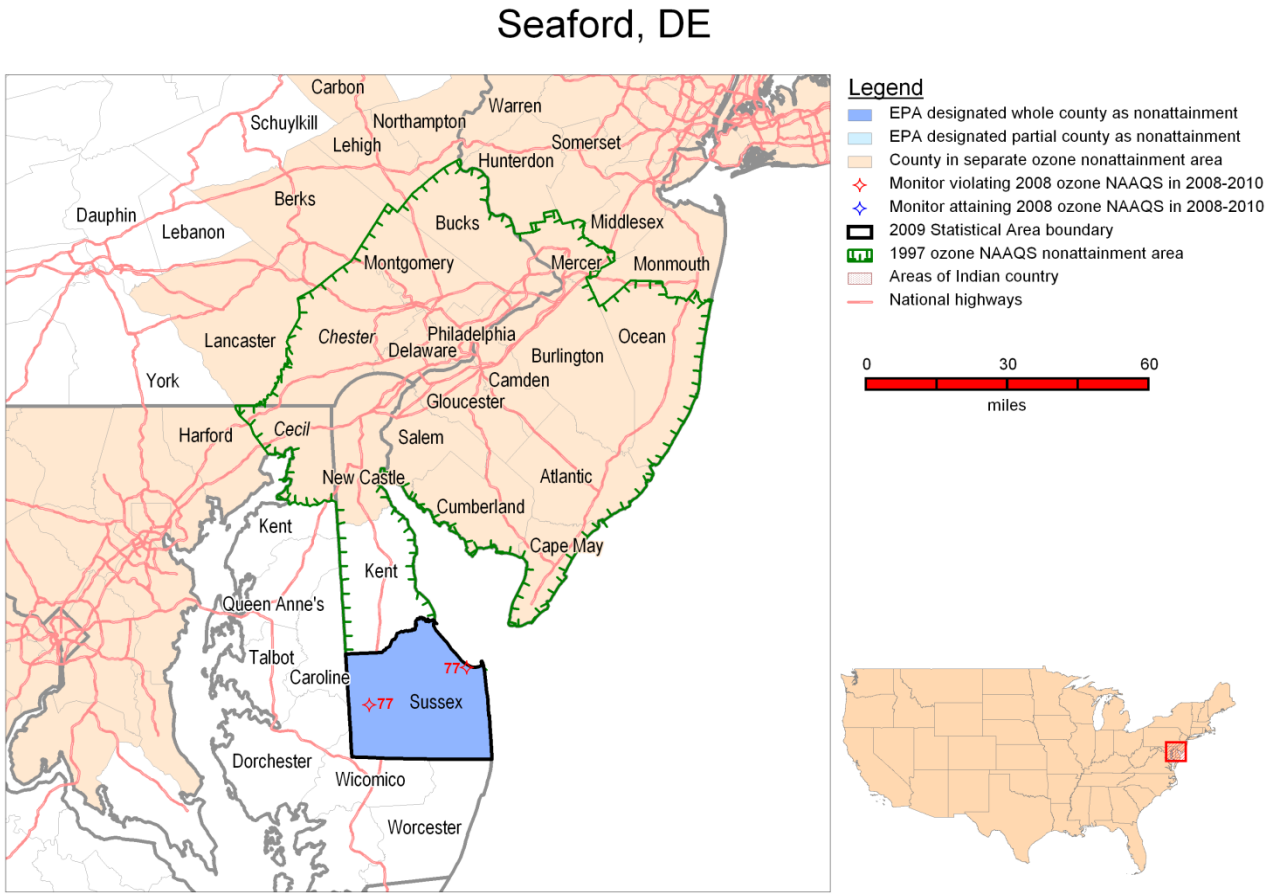
Notes: Counties with no ozone monitor are identified with "--" in the 2010 8-hour Ozone DV column.
2001 DVs are included for Pennsylvania counties because Pennsylvania submitted certified 2011 data to EPA in November 2011.

The highest ozone design values, over 80 ppb, are in Bucks and Philadelphia Counties, in Pennsylvania, and Ocean County in New Jersey. Buck County had the highest 2010 DV in the Philadelphia area, while Philadelphia County has the highest 2011 DV.

Technical Analysis for the Seaford Area

Figure 1 is a map of the Seaford, DE nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, county and other jurisdictional boundaries. The map shows the boundaries of the Seaford Micropolitan Statistical Area (Sussex County, Delaware), the Dover Metropolitan Statistical Area (MSA) (Kent County, Delaware), the Philadelphia-Camden-Vineland CSA, the existing nonattainment area boundary for the 1997 ozone NAAQS, and EPA's nonattainment boundary for the 2008 ozone NAAQS.

Figure 1.



For purposes of the 1997 ozone NAAQS, the entire State of Delaware, including the Seaford Area, was designated nonattainment and was included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area.

In March 2009, the State of Delaware recommended a large, multi-state nonattainment area, covering the entire States of Delaware, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia, and the District of Columbia. Alternatively, Delaware recommended that the entire State of Delaware be designated as a stand-alone nonattainment area. In October 2011, Delaware updated its recommendations. In that letter, Delaware expanded its recommended large multi-state nonattainment area to include the States of Kentucky, Indiana, Illinois, Missouri, Tennessee, and Wisconsin. In addition, in its

October 2011 letter, the State of Delaware specified that if EPA did not accept either of its designation options, then Kent County should not be designated nonattainment. This recommendation is based on 2008-2010 data and preliminary 2009-2011 data. The recommendations were based on data from Federal Reference Method (FRM) monitors or Federal Equivalent Method (FEM) sited and operated in accordance with 40 CFR Part 58. (See the March 18, 2009 letter from Governor Jack A. Markell to EPA, received on April 3, 2009; and the October 28, 2011 letter from the Delaware Department of Natural Resources and Environmental Control.)

After considering these recommendations and based on EPA's technical analysis described below, EPA is designating a new nonattainment area, the Seaford area, which consists of one county in Delaware, Sussex County (identified in Table 1 below) as "nonattainment" for the 2008 ozone NAAQS.

Table 1. State's Recommended and EPA's Designated Nonattainment Counties for the Seaford Area.

Seaford	State-Recommended Nonattainment Counties	EPA Designated Nonattainment Counties
Delaware	None	Sussex

Factor Assessment

The area covered by this analysis is the Seaford Micropolitan Statistical Area (Sussex County, Delaware) and surrounding counties, except for Cape May and Cumberland Counties, New Jersey. Based on EPA's five-factor analyses, EPA has determined that Cape May and Cumberland Counties should be designated as nonattainment in the Philadelphia-Wilmington-Atlantic City Area for the 2008 ozone NAAQS. See EPA's technical analyses for the Philadelphia-Wilmington-Atlantic City Area for EPA's rationale supporting our nonattainment designation for these counties. To the extent that emissions from the Cape May and Cumberland Counties may contribute ozone concentrations in the Seaford nonattainment area, that contribution will be lessened by emission controls put in place in those separate nonattainment areas. Therefore, EPA is not including Cape May and Cumberland Counties in this analysis for the Seaford nonattainment area.

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (DV) (in parts per billion (ppb)) for air quality monitors in the county in the Seaford Area (Sussex County, Delaware) and counties in the nearby surrounding area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm (75 ppb) or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several

monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest DV.

Note: Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) at population-oriented locations with an FRM or FEM monitor. All data from Special Purpose Monitors (SPM) using an FRM or FEM are eligible for comparison to the relevant NAAQS, subject to the requirements given in the October 17, 2006 Revision to Ambient Air Monitoring Regulations (71 FR 61236). All monitors used to provide data must meet the monitor siting and eligibility requirements given in 71 FR 61236 to 61328 in order to be acceptable for comparison to 2008 ozone NAAQS for designation purposes.

The 2010 DVs for the ozone NAAQS for counties in the Seaford Area (Sussex County, Delaware) and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data.

County	State Recommended Nonattainment?	2010 8-hour Ozone DV (ppb)
Caroline, MD	No	--
Dorchester, MD	No	--
Kent, DE	No	74
Sussex, DE	Yes, other area	77
Talbot, MD	No	--
Wicomico, MD	No	--
Worcester, MD	No	--

Note: Counties with no ozone monitor are indicated with "--" in the 2010 8-hour Ozone DV column.

In accordance with section 107(d) of the Clean Air Act, EPA must designate an area nonattainment if it is violating the 2008 ozone NAAQS. Sussex County, Delaware shows a violation of the 2008 ozone NAAQS. Therefore, this county must be included in a nonattainment area.

Note that the absence of a violating monitor is not a sufficient reason to eliminate counties as candidates for nonattainment status based upon contribution to violations in other nearby areas. Each county is evaluated based on the weight of evidence of the five factors.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See

http://www.epa.gov/ttn/chief/net/2008inventory.html) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. For this factor, we also considered any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that are in place before final designations are issued and emissions increases due to new sources. EPA received no such additional emissions data for the Seaford Area.

Table 3 shows emissions of NO_x and VOC (in tons per year (tpy)) for violating and potentially contributing counties in the Seaford Area.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment?	NO_x (tpy)	VOC (tpy)
Caroline, MD	No	983	1,324
Dorchester, MD	No	1,666	3,516
Kent, DE	No	7,667	5,381
Sussex, DE	Yes, other area	14,870	9,972
Talbot, MD	No	1,822	2,869
Wicomico, MD	No	2,391	3,669
Worcester, MD	No	2,154	4,860

Sussex County, Delaware has the highest NOx and VOC emissions in the area of analysis. Kent County, Delaware has the next highest emissions, but those emissions are about half that of Sussex County's. Caroline and Talbot Counties, Maryland, have the lowest emissions. Thus, the most likely source of ozone precursors for the Seaford Area is Sussex County, Delaware.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends in the Seaford Area and the nearby surrounding area as indicators of the probable location and magnitude of non-point source emissions. These include ozone-creating emissions from sources such as on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NO_x and VOC emissions that may contribute to ozone formation. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Caroline, MD	No	33,066	0.10	3,241	+11%
Dorchester, MD	No	32,618	0.05	35,200	+28
Kent, DE	No	162,310	0.27	35,200	+28%
Sussex, DE	Yes, other area	197,145	0.20	39,710	+25%
Talbot, MD	No	37,782	0.12	3,890	+11%
Wicomico, MD	No	98,733	0.25	13,872	+16%
Worcester, MD	No	51,454	0.09	4,678	+10%

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011. (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTPL2.STO5&prodType=table)

Sussex and Kent Counties, Delaware have the largest populations. Caroline, Dorchester, Talbot, and Worcester Counties in Maryland have the smallest population and are the least densely populated in the area of analysis. All counties in the area of analysis have experienced population growth from 2000 to 2010. Note that the eastern coast of Sussex County, Delaware has several popular beaches, including Lewes and Rehoboth. The population of these beach areas increases substantially in the summertime (i.e., in the ozone season). Thus, non-point source emissions in Sussex County are higher in the ozone season than the rest of the year.

Traffic and commuting patterns

EPA evaluated the total Vehicle Miles Traveled (VMT) for each county in the Seaford Area and nearby surrounding area. In combination with the population/population density data and the location of main transportation arteries (see Figure 1, above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows the total VMT for each county in 2008.

Table 5. Traffic (VMT) Data.

County	State Recommended Nonattainment?	2008 VMT* (million miles)
Caroline, MD	No	371
Dorchester, MD	No	395
Kent, DE	No	1,565
Sussex, DE	Yes, other area	2,122
Talbot, MD	No	614
Wicomico, MD	No	1,008
Worcester, MD	No	645

* MOBILE model VMT are those inputs into the NEI version 1.5.

Sussex County, Delaware has the highest VMT in the area of analysis. Furthermore, as stated above, the eastern coast of Sussex County, Delaware has several popular beaches, including Lewes and Rehoboth. The traffic through Sussex County to the beach areas increases substantially in the summertime (i.e., in the ozone season). Thus, VMT and mobile source emissions in Sussex County are higher in the ozone season than the rest of the year. Caroline and Dorchester Counties, Maryland have the lowest VMT.

Table 6. County to County Worker Flow.

Residence County →	Kent, DE	Sussex, DE	Caroline, MD	Dorchester, MD	Talbot, MD	Wicomico, MD	Worcester, MD
Workplace County ↓							
Kent, DE	47,455	5,704	731	55	51	109	28
Sussex, DE	3,779	52,073	504	416	43	2,422	1,112
Caroline, MD	297	607	6,219	734	598	104	13
Dorchester, MD	68	373	566	9,391	774	844	20
Talbot, MD	121	371	3,221	1,955	12,194	274	21
Wicomico, MD	112	3,518	120	646	74	32,576	2,896
Worcester, MD	29	1,869	8	43	2	2,954	15,463

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

As shown in Table 6, above, Kent County, Delaware; and Wicomico and Worcester Counties, Maryland have the most commuting to and from Sussex County, Delaware. Caroline, Dorchester, and Talbot Counties, Maryland have comparatively little commuting to and from Sussex County, Delaware. The counties in New Jersey have no commuters to and from Sussex County, Delaware.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data, consisting of 30-year average summertime wind directions from the National Weather Service, to help determine how weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation in the Seaford Area.

As shown in Figure 2 below, in Sussex County, Delaware, the prevailing winds during the ozone season come predominantly from the south-southwest. This indicates that emissions from Kent County, Delaware and the counties in New Jersey are not expected to contribute to violations at the Sussex County, Delaware monitors. Dorchester, Wicomico, and Worcester Counties in Maryland are upwind of the violating monitors. Although emissions from those counties might contribute to violations in downwind Sussex County, Delaware, the emissions levels from those counties are so low that little actual contribution is expected.

Figure 2. 30-Year Average Summertime Wind Directions in Sussex County, Delaware.

To further understand the meteorological transport conditions within the area around Seaford, we also evaluated 24-hour back trajectories for the 2006-2010 time period, using the National Oceanic and Atmospheric Administration (NOAA) Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model. The model uses the monitoring location as a starting point, and goes back in time using meteorological data to determine how a parcel of air would have traveled on a given day. EPA evaluated three separate elevations for each exceedance day to better characterize the wind pattern and pollution transport to the monitor.

For this analysis, EPA used monitor 10-005-1002 as the starting point for the HYSPLIT back trajectories. EPA selected monitor 10-005-1002 because, of the two violating monitors in the Seaford Area, this monitor has the highest 2010 DV, 77.3 ppb versus 77.0 ppb at monitor 10-005-1003. EPA used HYSPILT to evaluated wind patterns at the violating monitor for all days where the 8-hour average was above the 0.075 ppm standard (exceedance days) at monitor 10-005-1002. The air quality monitoring data and HYSPLIT results for those exceedance days are available in the docket for this action. Table 7 lists the exceedance days and corresponding 8-hour average ozone values for each exceedance day. Please note that there were no exceedance days in the Seaford Area in 2009.

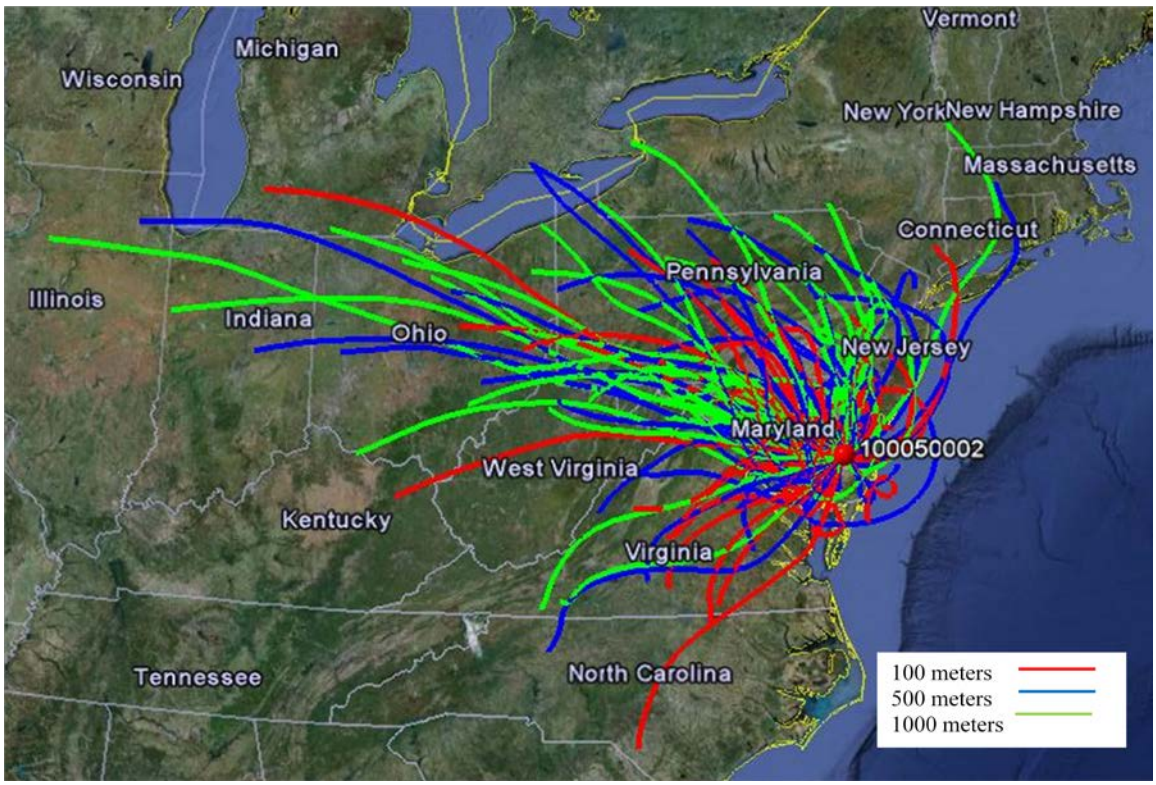
Table 7. 2006 to 2010 Exceedance-Day 8-Hour Ozone Values at Monitor 10-005-1002

Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)
5/30/2006	0.083		6/12/2008	0.081
6/20/2006	0.081		6/26/2008	0.078
6/21/2006	0.079		7/12/2008	0.077
7/18/2006	0.076		7/16/2008	0.081
8/2/2006	0.082		7/17/2008	0.091
8/3/2006	0.089		7/18/2008	0.085

Exceedance Day	8-hour average (ppm ozone)		Exceedance Day	8-hour average (ppm ozone)
8/23/2006	0.083		8/1/2008	0.079
8/25/2006	0.078		5/6/2010	0.079
5/26/2007	0.084		6/23/2010	0.084
6/18/2007	0.081		7/5/2010	0.087
6/21/2007	0.076		7/6/2010	0.078
7/7/2007	0.078		7/7/2010	0.091
8/4/2007	0.081		8/10/2010	0.08
8/8/2007	0.084		8/11/2010	0.086
8/30/2007	0.077		8/30/2010	0.078
8/31/2007	0.078		9/24/2010	0.077
4/18/2008	0.079			

Figure 3 overlays HYSPLIT 24-hour back trajectories for all the 2006-2010 ozone exceedances at monitor 10-005-1002 on a Google Earth map of the northeastern United States. It gives an overview of long-range transport to the Seaford Area. As seen in Figure 3, the 24-hour back trajectories indicate regional transport from many directions and over several states.

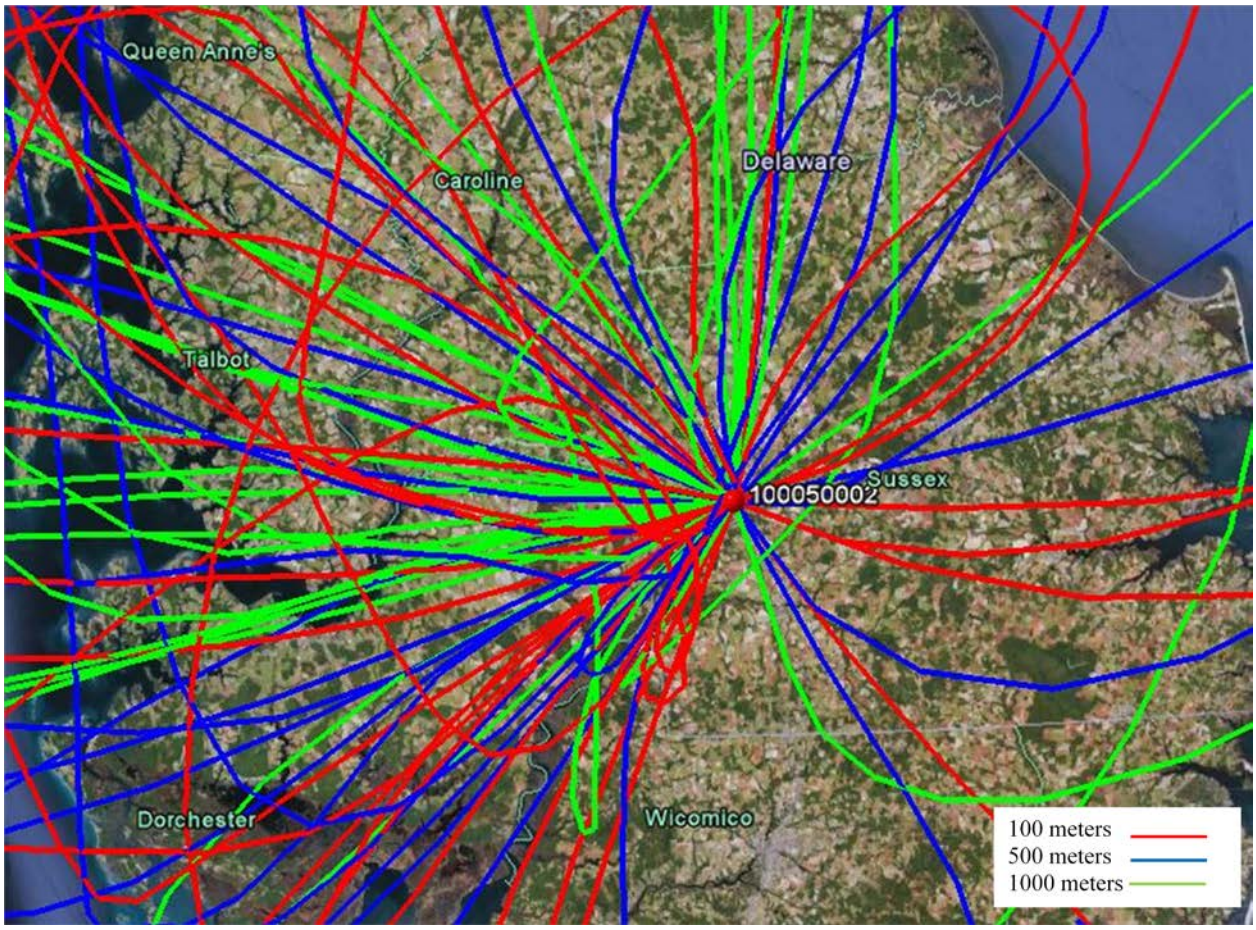
Figure 3. NOAA HYSPLIT 24-Hour Back Trajectories for 2006-2010 Exceedances Days - Overview



In Figure 4, below, these EPA has zoomed in on these same 24-hour HYSPLIT back trajectories, showing more of the nearby transport on high ozone days. This zoomed in perspective shows

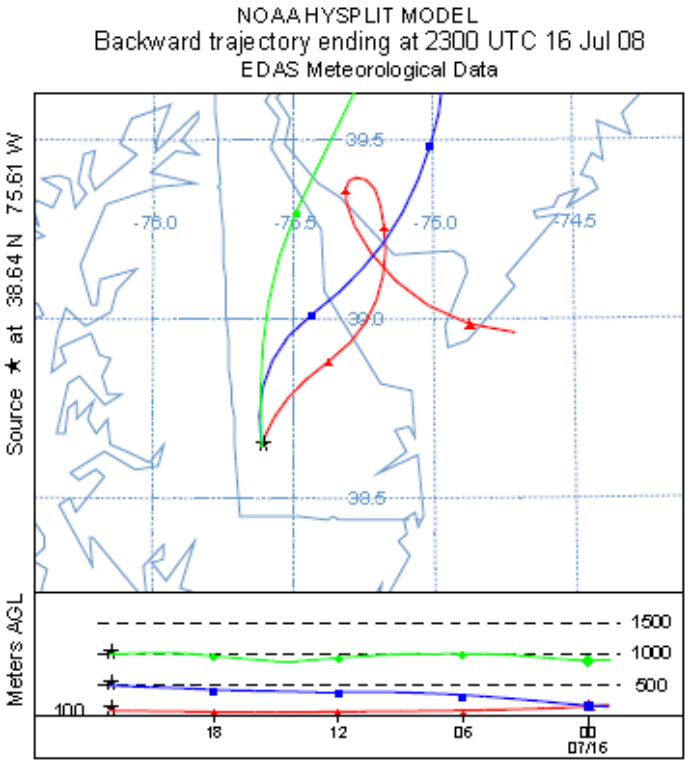
that on exceedance days, there is no one dominant wind direction. However, on exceedance days, winds from the north, northwest, west, and southwest are more likely than winds from the east, southeast, and south.

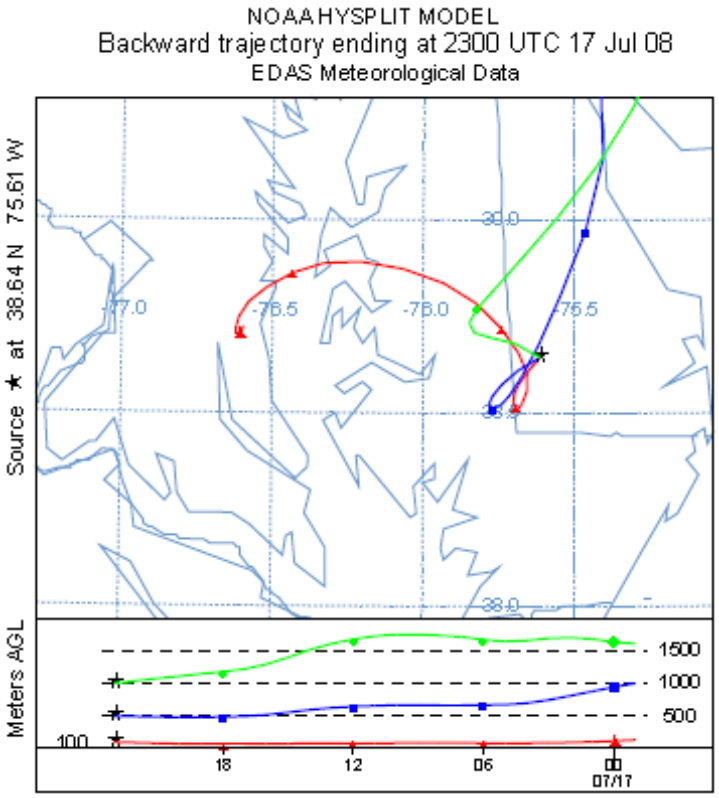
Figure 4. NOAA HYSPLIT 24-Hour Back Trajectories for 2006-2010 Exceedances Days - Zoom View

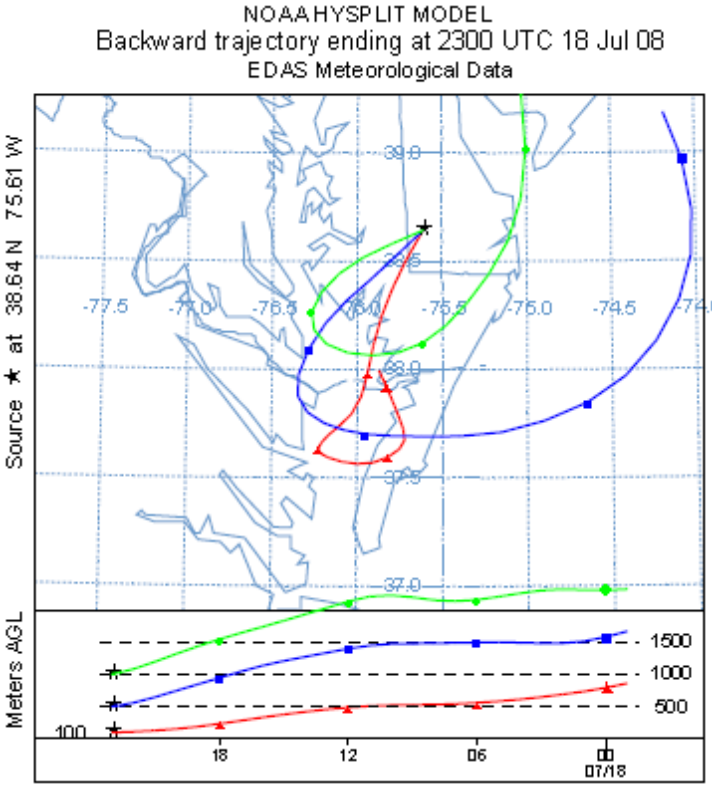


To further illustrate the local transport situation in the Seaford Area, EPA has selected specific trajectories for two "ozone episodes," periods when the ozone levels are high for several consecutive days. As shown in Table 7, the 8-hour average ozone value at monitor 10-005-1002 was above the standard for three days in a row in 2008 (July 16-18) and 2010 (July 5-7). As shown in Figures 5 through **7**, during the ozone episode in 2008, winds passed through almost all of the counties surrounding Sussex County. In Figure 5, the back trajectories pass through Kent County, Delaware, and Cape May and Cumberland Counties in New Jersey. In Figure 6, back trajectories pass through Caroline and Talbot Counties in Maryland, and Kent County, Delaware. In Figure 7, back trajectories pass through Dorchester, Wicomico, and Worcester Counties in Maryland, and Cape May County, New Jersey. Although emissions from those counties might contribute to violations in downwind Sussex County, Delaware, the emissions levels from those counties are relatively low, and relatively little actual contribution is expected, compared to the contribution of ozone precursors from Sussex County.

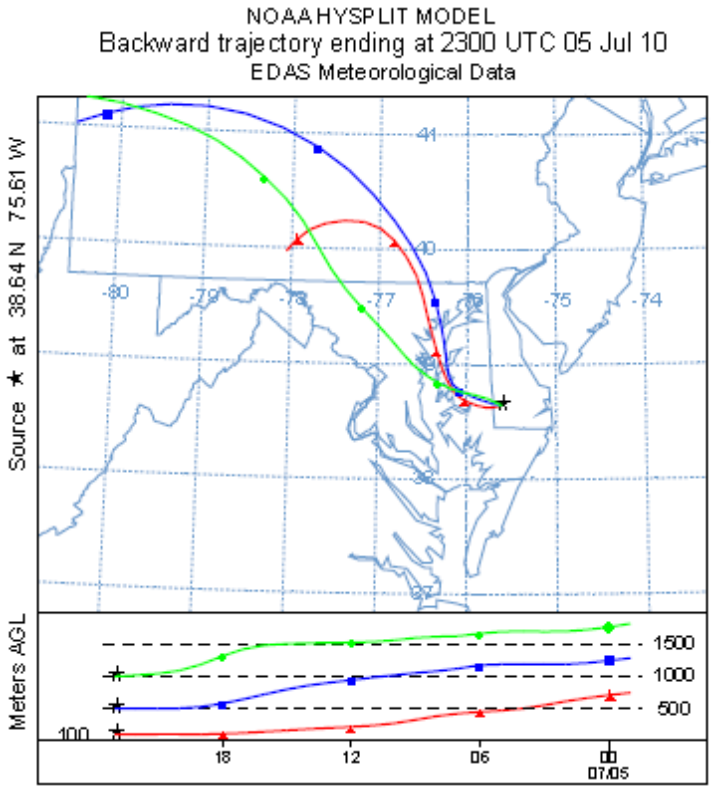
Figures 5, 6 & 7, NOAA HYSPLIT 24-Hour Back Trajectories July 16 - 18, 2008

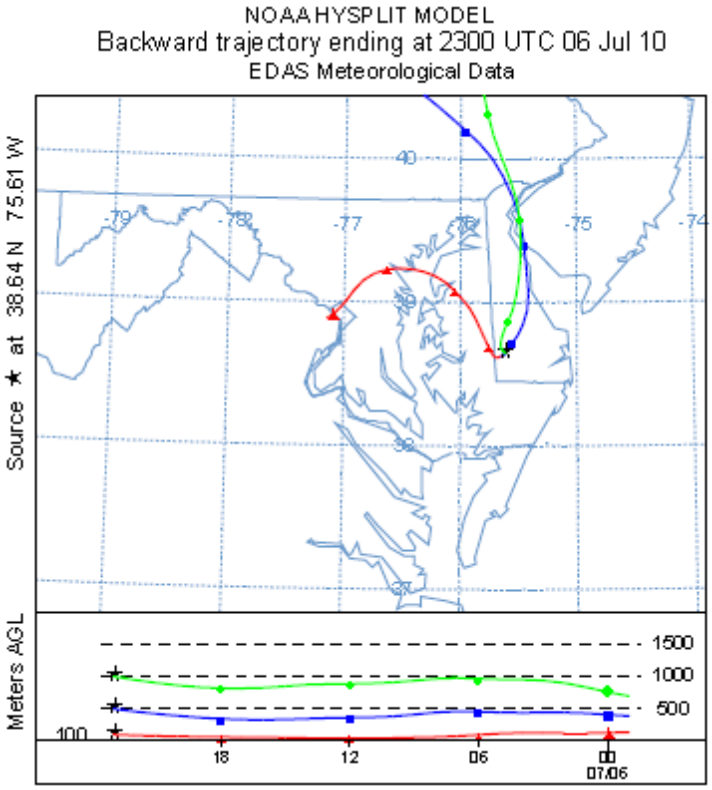


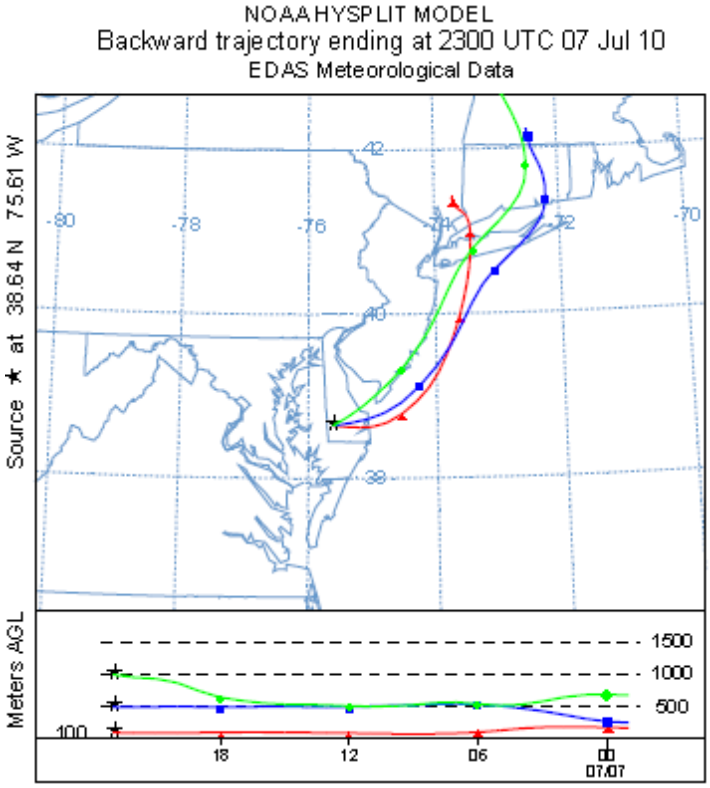




Figures 8, 9 & 10, NOAA HYSPLIT 24-Hour Back Trajectories July 5 -7, 2010







The ozone episode in 2010 shows winds coming to Sussex County from the north, the west via Baltimore and Washington, DC, and the east via the Atlantic Ocean and New York City. This episode illustrates the regional nature of ozone. While this goes beyond the scope of the designation process, which focuses on nearby contribution to attainment, this highlights the need for rules to address transport ozone precursors, such as the Cross State Air Pollution Rule (currently stayed by the court).

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Seaford Area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, there are no barriers to contribution from upwind areas.

Factor 5: Jurisdictional boundaries

EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and so that areas designated nonattainment have the legal authority and cooperative planning necessary to carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment areas for ozone or other urban-scale pollutants, counties, air districts, townships, metropolitan planning organizations, state lines, Reservations, urban growth boundary, etc. Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates are used.

Kent and Sussex Counties, Delaware were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 ozone NAAQS. However, EPA is not including them in that area for the 2008 ozone NAAQS, as supported by EPA's five-factor analysis for the Philadelphia-Wilmington-Atlantic City area[9].

Sussex and Kent Counties in Delaware are in separate statistical areas. Being part of a statistical area indicates that counties are linked through employment and commuting. According to the Office of Management and Budget's "Standards for Defining Metropolitan and Micropolitan Statistical Areas," published in the Federal Register on December 27, 2000 (65 FR 82228), the "general concept of a Metropolitan Statistical Area or a Micropolitan Statistical Area is that of an area containing a recognized population nucleus and adjacent communities that have a high degree of integration with that nucleus." Sussex County makes up the Seaford Micropolitan Statistical Area, while Kent County, Delaware makes up the Dover MSA. The Dover/Kent County MPO is the planning organization for Kent County. This MPO covers 20 municipalities

[9] See EPA's Technical Analysis for the Philadelphia-Wilmington-Atlantic City nonattainment area.

including all of Smyrna, which is also in New Castle County, and all of Milford, which is also in Sussex County. While Kent County was part of the Philadelphia-Wilmington-Trenton nonattainment area for the 1-hour ozone NAAQS, Sussex County was a separate nonattainment area.

The main jurisdiction boundaries that separate Caroline, Dorchester, Talbot, Wicomico, and Worcester Counties, Maryland; and Cape May and Cumberland Counties, New Jersey from the Seaford Area are state boundaries. Furthermore, these counties are not part of the Seaford Micropolitan Statistical Area. Cape May County, New Jersey is in the Ocean City, NJ MSA. Cumberland County, New Jersey is in the Vineland-Millville-Bridgeton, NJ MSA, which is part of the Philadelphia-Camden-Vineland, DE-MD-NJ-PA CSA. Dorchester County, Maryland is in the Cambridge, MD Micropolitan Statistical Area. Talbot County, Maryland makes up the Easton, MD Micropolitan Statistical Area. Worcester County, Maryland makes up the Ocean Pines, MD micropolitan statistical area and Wicomico County, Maryland is in the Salisbury, MD MSA, which are both part of the Salisbury-Ocean Pines, MD CSA. Therefore, the Seaford Area is generally unconnected with these other counties.

Conclusion

Based on the assessment of factors described above, EPA has concluded that Sussex County, Delaware meets the Clean Air Act criteria for inclusion in its own nonattainment area, the Seaford nonattainment area.

Sussex County, Delaware has violating monitors and the highest emissions, population, and VMT in the area of analysis. EPA has concluded that inclusion of the other counties in this analysis in the Seaford Area is not warranted. These counties have comparatively low emissions, populations, and VMT. Kent County, Delaware; and Cape May County, New Jersey have the next highest emissions, but those counties emissions are about half that of Sussex County's. Furthermore, Cape May County is being designated in the Philadelphia-Wilmington-Atlantic City nonattainment area. To the extent that emissions from the Cape May County may contribute ozone concentrations in the Seaford nonattainment area, that contribution will be lessened by emission controls put in place in that separate nonattainment area. Wind directions on ozone exceedance days show potential impacts from all counties in the area of analysis. Although emissions from those counties might contribute to violations in downwind Sussex County, Delaware, the emissions levels from those counties are relatively low, and relatively little actual contribution is expected, compared to the contribution of ozone precursors from Sussex County. Furthermore, the other counties in the area of analysis are not linked jurisdictionally to Sussex County and are not part of the Seaford Microplitan Statistical Area.