

**Philadelphia-Wilmington-Atlantic City, PA-NJ -MD-DE Nonattainment Area
Final Area Designations for the
2015 Ozone National Ambient Air Quality Standards
Technical Support Document (TSD)**

1.0 Summary

This technical support document (TSD) describes EPA’s final designations for the Philadelphia-Wilmington-Atlantic City nonattainment area in Pennsylvania, New Jersey, Delaware, and Maryland (Philadelphia-Wilmington-Atlantic City Area) as nonattainment for the 2015 ozone national ambient air quality standards (NAAQS).

On October 1, 2015, EPA promulgated revised primary and secondary ozone NAAQS (80 FR 65292; October 26, 2015). EPA strengthened both standards to a level of 0.070 parts per million (ppm). In accordance with Section 107(d) of the Clean Air Act (CAA), whenever EPA establishes a new or revised NAAQS, EPA must promulgate designations for all areas of the country for that NAAQS.

Under section 107(d), states were required to submit area designation recommendations to EPA for the 2015 ozone NAAQS no later than 1 year following promulgation of the standards, i.e., by October 1, 2016. Tribes were also invited to submit area designation recommendations.

On October 3, 2016, the Commonwealth of Pennsylvania submitted initial nonattainment recommendations for the 2015 ozone NAAQS based on air quality data from 2013-2015. On April 11, 2017, Pennsylvania updated its recommendations, based on air quality data from 2014-2016. In these recommendation letters, Pennsylvania recommended that Bucks, Chester, Delaware, Montgomery, and Philadelphia be designated as nonattainment in the Philadelphia-Wilmington-Atlantic City Area. Pennsylvania further updated its recommendations on February 28, 2018, in response to EPA’s December 20, 2017 letter to Governor Tom Wolf (PA 120 day letter) (EPA-HQ-OAR-2017-0548-0145), this time asking EPA to exclude Montgomery County from the Philadelphia-Wilmington-Atlantic City area if EPA approves Pennsylvania’s exceptional events (EE) demonstration, which outlined the impact the May 2016 Canadian wildfires had on ozone concentrations across Pennsylvania, and which is available in the docket for these final designations. EPA concurred on Pennsylvania’s EE demonstration for the Norristown monitor (monitor 420910013) in Montgomery County on March 6, 2018. Thus, Montgomery County has ambient air quality monitoring data that meets the 2015 ozone NAAQS. However, considering the five factors analysis below, EPA has determined that Montgomery County is contributing to violations in the Philadelphia-Wilmington-Atlantic City (Philadelphia) nonattainment area. Because the Clean Air Act requires EPA to designate as nonattainment areas not only areas that violate the standards but also nearby areas that contribute to the violation, Montgomery County is included in the Philadelphia-Wilmington-Atlantic City Area. EPA’s additional responses to Pennsylvania’s revised recommendation can be found in the Response to Comments document prepared for these final designations. The counties identified in the third column of Table 1 represent Pennsylvania’s updated recommendations. Pennsylvania recommended that EPA designate as “attainment/unclassifiable” all other counties not identified in the third column of Table 1.

On September 29, 2016, New Jersey recommended a large nonattainment area, spanning from Connecticut to northern Virginia, to be designated as a nonattainment area for the 2015 ozone NAAQS. On February 27, 2018, in response to EPA’s December 20, 2017 letter to Governor Chris Christie (NJ 120 day letter) (EPA-HQ-OAR-2017-0548-0142), New Jersey updated its recommendation to request that

EPA designate separate northern and southern multistate nonattainment areas. The southern nonattainment area roughly corresponded to the Philadelphia-Wilmington-Atlantic City Area. However, New Jersey requested that the Pennsylvania counties of Berks, Lebanon, Lancaster and York be included in New Jersey's southern multistate nonattainment area. EPA's response to New Jersey's recommendation that these additional four areas be included in the Philadelphia nonattainment area in the Response to Comments document prepared for these final designations. The New Jersey counties identified in the third column of Table 1 represent New Jersey's updated recommendation for the Philadelphia-Wilmington-Atlantic City Area.

On September 23, 2016, the State of Delaware recommended that the states of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin be designated as a nonattainment area for the 2015 ozone NAAQS or, as an alternative, that New Castle County, DE be designated as a single-county New Castle County nonattainment area based on air quality data from 2013-2015. Delaware updated its recommendations on February 28, 2018, in response to EPA's December 20, 2017 letter to Governor John Carney (DE 120 day letter) (EPA-HQ-OAR-2017-0548-0123), requesting that New Castle County be designated as a single-county stand-alone nonattainment area. Considering the five-factor analysis below, EPA addresses why it is including New Castle, DE as part of the Philadelphia nonattainment area in this TSD. Specifically, EPA concludes that emissions from New Castle County, DE contribute to air quality at violating monitors other counties within the Philadelphia Area. EPA further responds to Delaware's revised recommendation in the Response to Comments document prepared for these final designations. The third column of Table 1 reflects Delaware's updated recommendations. Delaware recommended that EPA designate as "attainment/unclassifiable" all other counties not identified in the second third of Table 1.

On March 23, 2017 the State of Maryland recommended that Cecil County, identified in the second column of Table 1, be designated as nonattainment for the 2015 ozone NAAQS in the Philadelphia-Wilmington-Atlantic City Area based on preliminary air quality data from 2014-2016. Maryland's recommendations for the remainder of the state are addressed in the Baltimore, MD and Washington, DC-MD-VA TSD.

After considering these recommendations and based on EPA's technical analysis as described in this TSD, EPA is designating the counties identified in the last column of Table 1 as nonattainment for the 2015 ozone NAAQS. As identified in Table 1, EPA is modifying Pennsylvania's, Delaware's, and New Jersey's recommendations regarding the Philadelphia-Wilmington-Atlantic City Area. EPA must designate an area nonattainment if it has an air quality monitor that is violating the standard or if it has sources of emissions that are contributing to a violation of the NAAQS in a nearby area. A Detailed description of the nonattainment boundary for this area is found in the supporting technical analysis in Section 3.

Table 1. States' Recommended Nonattainment Areas and EPA's Final Designated Nonattainment Areas for the 2015 Ozone NAAQS

Area	State/Commonwealth's Recommended Nonattainment Counties		EPA's Final Nonattainment Counties
	Initial	After 120-day letters	
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE (PA)	Bucks, Chester, Delaware, Montgomery, and Philadelphia	Bucks, Chester, Delaware, and Philadelphia	Bucks, Chester, Delaware, Montgomery, and Philadelphia
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE (NJ)*	Large nonattainment area spanning from Connecticut to northern Virginia	Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem (Plus Berks, Lebanon, Lancaster and York Counties in PA)	Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE (DE)	(1) Large nonattainment area including Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin or (2) New Castle County as a stand-alone area	New Castle County as a stand-alone area, not part of the Philadelphia-Wilmington-Atlantic City,	New Castle
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE (MD)*	Cecil	Cecil	Cecil

* There are additional TSDs for the other nonattainment areas in New Jersey and Maryland.

In the PA 120 day letter, EPA stated its intention to designate Berks County as the single-county Reading, PA nonattainment area. In the PA 120 day letter, EPA also stated that, if EPA approves Pennsylvania's EE demonstration, the 2014-2016 design value for the Berks County monitor would move from violating to attaining the 2015 ozone NAAQS. In that case, EPA would designate the Reading Area attainment/unclassifiable. EPA concurred on Pennsylvania's EE demonstration for the Reading airport ozone monitor (monitor 420110011) in Berks County on March 6, 2018. Therefore, EPA is designating Berks County as attainment/unclassifiable. For more information, please see the EE TSD available in the docket for these final designations.

EPA is designating the remainder of Pennsylvania and Delaware Counties not yet designated for the 2015 ozone NAAQS as attainment/unclassifiable based on their recommendations, ambient monitoring data for the 2014-2016 period showing compliance with the 2015 ozone NAAQS, and EPA's assessment that

these areas are not contributing to a violation in a nearby area.¹ EPA's final designations for the remainder of New Jersey and Maryland are addressed in separate TSDs.

On November 6, 2017 (82 FR 54232; November 16, 2017), the EPA signed a final rule designating most of the areas states did not recommend for designation as nonattainment as attainment/unclassifiable.² EPA explains in section 2.0 the approach it is now taking to designate the remaining areas.

2.0 Nonattainment Area Analyses and Final Boundary Determination

The EPA evaluated and determined the boundaries for each nonattainment area on a case-by-case basis, considering the specific facts and circumstances of the area. In accordance with CAA section 107(d), the EPA is designating as nonattainment the areas with the monitors that are violating the 2015 ozone NAAQS and nearby areas with emissions sources (i.e., stationary, mobile, and/or area sources) that contribute to the violations. As described in the EPA's designations guidance for the 2015 NAAQS (hereafter referred to as the "ozone designations guidance"³) after identifying each monitor indicating a violation of the ozone NAAQS in an area, the EPA analyzed those nearby areas with emissions potentially contributing to the violating area. In guidance issued in February 2016, the EPA provided that using the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA)⁴ as a starting point for the contribution analysis is a reasonable approach to ensure that the nearby areas most likely to contribute to a violating area are evaluated. The area-specific analyses may support nonattainment boundaries that are smaller or larger than the CBSA or CSA.

On November 6, 2017, the EPA issued attainment/unclassifiable designations for approximately 85% of the United States and one unclassifiable area designation.⁵ At that time, consistent with statements in the designations guidance regarding the scope of the area the EPA would analyze in determining nonattainment boundaries, EPA deferred designation for any counties in the larger of a CSA or CBSA where one or more counties in the CSA or CBSA was violating the standard and any counties with a

¹ EPA uses a designation category of "attainment/unclassifiable" for areas that are monitoring attainment and for areas that do not have monitors but which EPA believes are likely attainment and do not have emissions sources that are contributing to a violation in a nearby area based on the five factor analysis and other available information.

² In previous ozone designations and in the designation guidance for the 2015 ozone NAAQS, the EPA used the designation category label Unclassifiable/Attainment to identify both areas that were monitoring attainment and areas that did not have monitors but for which the EPA had reason to believe were likely attainment and were not contributing to a violation in a nearby area. The EPA is now reversing the order of the label to be Attainment/Unclassifiable so that the category is more clearly distinguished from the separate Unclassifiable category.

³ The EPA issued guidance on February 25, 2016 that identified important factors that the EPA evaluated in determining appropriate area designations and nonattainment boundaries for the 2015 ozone NAAQS. Available at <https://www.epa.gov/ozone-designations/epa-guidance-area-designations-2015-ozone-naaqs>

⁴ Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The Office of Management and Budget (OMB) adopts standards for defining statistical areas. The statistical areas are delineated based on U.S. Census Bureau data. The lists are periodically updated by the OMB. The EPA used the most recent July 2015 update (OMB Bulletin No. 15-01), which is based on application of the 2010 OMB standards to the 2010 Census, 2006-2010 American Community Survey, as well as 2013 Population Estimates Program data.

⁵ Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards published on November 16, 2017(82 FR 54232).

violating monitor not located in a CSA or CBSA. In addition, the EPA deferred designation for any other counties adjacent to a county with a violating monitor. The EPA also deferred designation for any county that had incomplete monitoring data, any county in the larger of the CSA or CBSA where such a county was located, and any county located adjacent to a county with incomplete monitoring data.

The EPA is proceeding to complete the remaining designations consistent with the designations guidance (and EPA's past practice) regarding the scope of the area EPA would analyze in determining nonattainment boundaries for the ozone NAAQS as outlined above. For those deferred areas where one or more counties violating the ozone NAAQS or with incomplete data are located in a CSA or CBSA, in most cases the technical analysis for the nonattainment area includes any counties in the larger of the relevant CSA or CBSA. For counties with a violating monitor not located in a CSA or CBSA, EPA explains in the 3.0 Technical Analysis section, its decision whether to consider in the five-factor analysis for each area any other adjacent counties for which EPA previously deferred action. We are designating all counties not included in five-factor analyses for a specific nonattainment or unclassifiable area analyses, as attainment/unclassifiable. These deferred areas are identified in a separate document entitled "Designations for Deferred Counties and County Equivalents Not Addressed in the Technical Analyses" which is available in the docket.

Master Legend

Ozone monitoring site with 2014-2016 design value

- No valid value
- 0 - 0.070 parts per million (ppm)
- 0.071 and above


National Emissions Inventory (NEI) 2014 v1


- Large Point Sources (VOC or NOx >= 100 gross tons)
- ★ Small Point Sources


Hysplit


Elevation (Meters)


- ~ 100
- ~ 500
- ~ 1,000


 EPA's Final Nonattainment Area Boundary


 Federal American Indian Reservations and Off Reservation Lands

 State Boundaries



 County Boundaries

 CSAs - Combined Statistical Areas



 CBSAs - Metropolitan Statistical Areas

 CBSAs - Micropolitan Statistical Areas






NAAAs-8 Hour Ozone (1997 NAAQS)

-  Maintenance (NAAQS revoked)
-  Nonattainment (NAAQS revoked)






NAAAs-8 Hour Ozone (2008 NAAQS)

-  Nonattainment
-  Maintenance






County Population (2010)

-  > 5,194,675 to 9,818,605
-  > 2,035,210 to 5,194,675
-  > 744,344 to 2,035,210
-  > 220,000 to 744,344
-  0 to 220,000

Census Tracts Population (2012)

-  0 to 2,825
-  > 2,825 to 4,481
-  > 4,481 to 6,373
-  > 6,373 to 10,145
-  > 10,145 to 39,143

Vehicle Miles Traveled - 2014

-  0 - 36,071,088
-  36,071,088.01 - 52,484,020
-  52,484,020.01 - 88,659,368
-  88,659,368.01 - 204,018,496
-  204,018,496.01 - 5,247,588,352

Figures in the remainder of this document refer to the master legend above.

3.0 Technical Analyses for Nonattainment Areas

This technical analysis identifies the area(s) with monitors that violate the 2015 ozone NAAQS. It also provides EPA's evaluation of this area and any nearby areas to determine whether those nearby areas have emissions sources that potentially contribute to ambient ozone concentrations at the violating monitor in the area, based on the weight-of-evidence of the five factors recommended in EPA's ozone designations guidance and any other relevant information. In developing this technical analysis, EPA used the latest data and information available to EPA (and to the states and tribes through the Ozone Designations Mapping Tool and EPA Ozone Designations Guidance and Data web page).⁶ In addition, EPA considered any additional data or information provided to EPA by states or tribes.

3.1 Technical Analysis for the Philadelphia-Wilmington-Atlantic City Area

This technical analysis first identifies the areas with monitors that violate the 2015 ozone NAAQS. EPA then evaluates these areas and any nearby areas to determine whether those nearby areas have emission sources that potentially contribute to ambient ozone concentrations at the violating monitors in the areas, based on the weight-of-evidence of the five factors recommended in EPA's ozone designations guidance and any other relevant information. In developing this technical analysis, EPA used the latest data and information available to EPA (and to the states and tribes through the Ozone Designations Mapping Tool and EPA Ozone Designations Guidance and Data web page).⁷ In addition, EPA considered any additional data or information provided to EPA by states or tribes.

The area of analysis for this technical support document is the Philadelphia-Reading-Camden, PA-NJ-MD-DE CSA, plus two counties in New Jersey (Mercer and Ocean) that are in the New York-Newark, NY-NJ-CT-PA CSA, and are in the current Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area for the 2008 ozone NAAQS. Mercer and Ocean Counties in New Jersey were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 2008 ozone NAAQS. Based on EPA's analysis, Ocean and Mercer Counties, NJ were more affected by emissions from counties in the Philadelphia metropolitan area than emissions from counties in the New York City metropolitan area, thus EPA concluded that Ocean and Mercer Counties, NJ should be included in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area. The Philadelphia-Reading-Camden CSA includes several CBSAs in Pennsylvania (PA), New Jersey (NJ), Delaware (DE), and Maryland (MD). The Philadelphia-Camden-Wilmington CBSA includes Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania, Burlington, Camden, Gloucester, and Salem Counties in New Jersey, New Castle County in Delaware, and Cecil County in Maryland. In New Jersey, the Atlantic City-Hammonton, Ocean City, and Vineland-Bridgeton CBSAs include Atlantic, Cape May, and Cumberland Counties, respectively. The Dover CBSA includes Kent County in Delaware, and the Reading CBSA includes Berks County in Pennsylvania.

The five factors recommended in EPA's guidance are:

1. Air Quality Data (including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitor);
2. Emissions and Emissions-Related Data (including locations of sources, population, amount of emissions, and urban growth patterns);
3. Meteorology (weather/transport patterns);

⁶ EPA's Ozone Designations Guidance and Data web page can be found at <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>.

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4. Geography/Topography (including mountain ranges or other physical features that may influence the fate and transport of emissions and ozone concentrations); and
5. Jurisdictional Boundaries (e.g., counties, air districts, existing nonattainment areas, areas of Indian country, Metropolitan Planning Organizations (MPOs)).

Figure 1 is a map of EPA's final nonattainment boundaries for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Area. The map shows the location of the air quality monitors, counties, and other jurisdictional boundaries for the area. It also shows the 2008 nonattainment boundary.

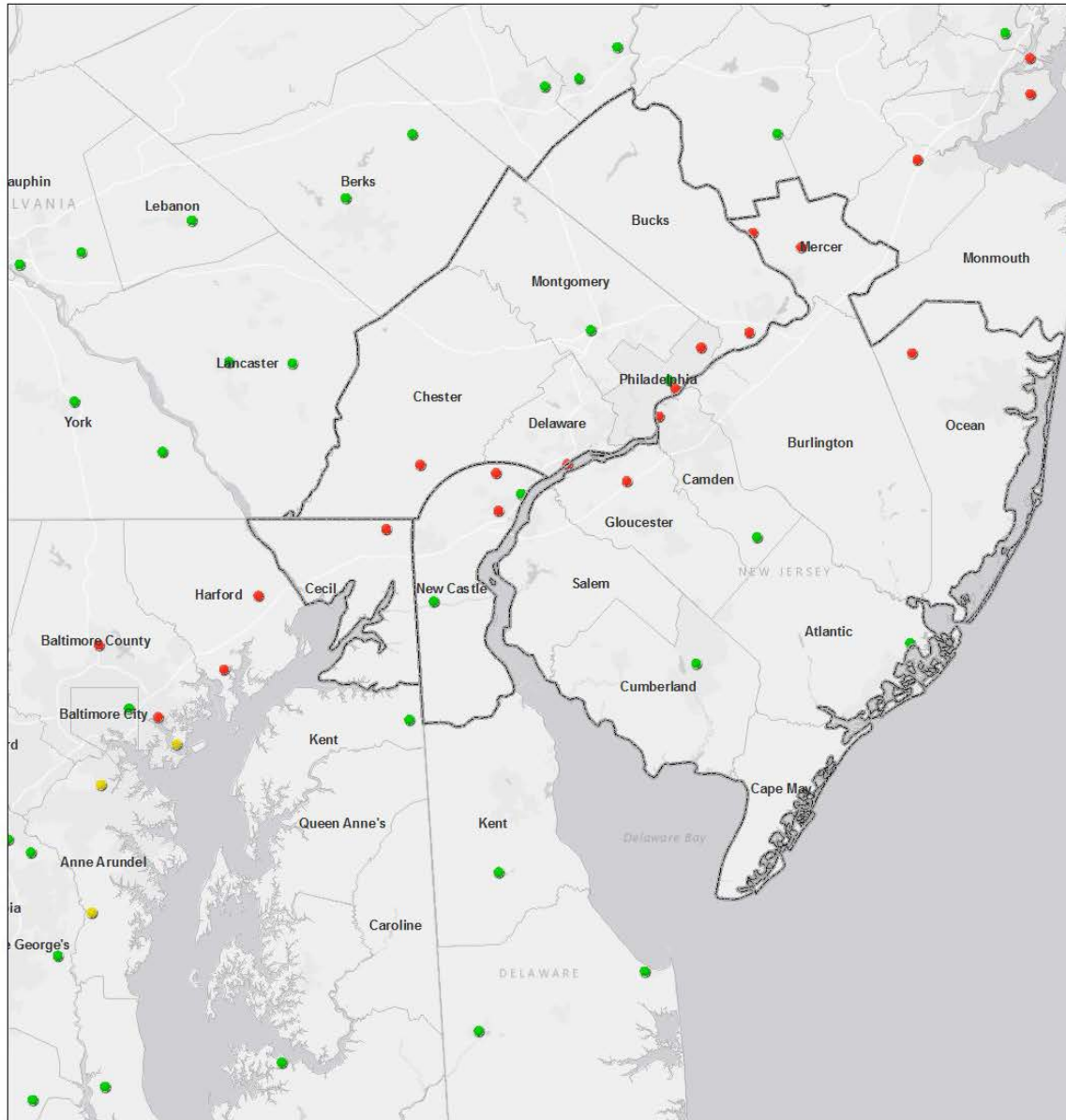
For purposes of the 1997 and 2008 ozone NAAQS, the Philadelphia-Wilmington-Atlantic City Area was designated as nonattainment. The boundary for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area for the 1997 and 2008 ozone NAAQS included the entire counties of Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem Counties in New Jersey; New Castle County in Delaware; and Cecil County in Maryland (Figure 1). For the Philadelphia-Wilmington-Atlantic City Area, the final boundary for the 2015 ozone NAAQS is the same as the boundary for the 1997 and 2008 ozone NAAQS.

Exceptional Events

Pennsylvania submitted an EE demonstration for numerous monitors in Pennsylvania, including the Berks and Montgomery County monitors. EPA concurred on the EE demonstration for the Berks and Montgomery County monitors, and the updated 2014-2016 design values for these monitors meet the 2015 ozone NAAQS. IN its updated recommendation submitted during the 120-day period, Pennsylvania recommended attainment for Berks and Montgomery Counties. As explained below, EPA is designating Berks County as attainment/unclassifiable and is designating Montgomery County as nonattainment as part of the Philadelphia-Wilmington-Atlantic City Area.

In addition, Maryland submitted an EE demonstration for numerous monitors in Maryland, including the Cecil County monitor. EPA concurred on the EE demonstration for the Cecil County monitor. However, the monitor is still violating the 2015 ozone NAAQS based on the updated 2014-2016 design value.

Figure 1. EPA's Final 2015 Ozone Nonattainment Boundaries for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE Area



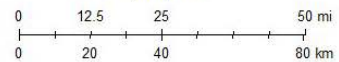
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- State Boundaries
- USA_Counties
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA

Ozone 2016 Site Level DVs 04-09-2017

- No Valid Value
- 0 - 0.070
- 0.071 and above

1:1,155,581



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EPA must designate as nonattainment any area that violates the NAAQS and any nearby areas that contribute to the violation in the violating area. New Castle County, DE; Cecil County, MD; Bucks, Chester, Delaware, and Philadelphia Counties in PA, and Camden, Gloucester, Mercer, and Ocean Counties, NJ, all have monitors in violation of the 2015 ozone NAAQS, therefore these counties are included in the nonattainment area. EPA evaluated the counties within the area of analysis to determine whether to include them as part of the nonattainment based on a five factor analysis. The following sections describe the five factor analysis. While the factors are presented individually, they are not independent. The five factor analysis process carefully considers the interconnections among the different factors and the dependence of each factor on one or more of the others, such as the interaction between emissions and meteorology for the area being evaluated.

Factor Assessment

Factor 1: Air Quality Data

EPA considered 8-hour ozone design values in ppm for air quality monitors in the area of analysis based on data for the 2014-2016 period (i.e., the 2016 design value, or DV). This is the most recent three-year period with fully-certified air quality data. The design value is the 3-year average of the annual 4th highest daily maximum 8-hour average ozone concentration.⁸ The 2015 NAAQS are met when the design value is 0.070 ppm or less. Only ozone measurement data collected in accordance with the quality assurance (QA) requirements using approved (FRM/FEM) monitors are used for NAAQS compliance determinations.⁹ EPA uses FRM/FEM measurement data residing in EPA's Air Quality System (AQS) database to calculate the ozone design values. Individual violations of the 2015 ozone NAAQS that EPA determines have been caused by an exceptional event that meets the administrative and technical criteria in the Exceptional Events Rule¹⁰ are not included in these calculations. Whenever several monitors are located in a county (or designated nonattainment area), the design value for the county or area is determined by the monitor with the highest valid design value. The presence of one or more violating monitors (i.e. monitors with design values greater than 0.070 ppm) in a county or other geographic area forms the basis for designating that county or area as nonattainment. The remaining four factors are then used as the technical basis for determining the spatial extent of the designated nonattainment area surrounding the violating monitors based on a consideration of what nearby areas are contributing to a violation of the NAAQS.

EPA identified monitors where the most recent design values violate the NAAQS, and examined historical ozone air quality measurement data (including previous design values) to understand the nature of the ozone ambient air quality problem in the area. Eligible monitors for providing design value data generally include State and Local Air Monitoring Stations (SLAMS) that are operated in accordance with 40 CFR part 58, appendix A, C, D and E and operating with an FRM or FEM monitor. These requirements must be met in order to be acceptable for comparison to the 2015 ozone NAAQS for designation purposes. All data from Special Purpose Monitors (SPMs) using an FRM or FEM are eligible

⁸ The specific methodology for calculating the 2015 and 2016 ozone design values, including computational formulas and data completeness requirements, is described in 40 CFR part 50, appendix U.

⁹ The QA requirements for ozone monitoring data are specified in 40 CFR part 58, appendix A. The performance test requirements for candidate FEMs are provided in 40 CFR part 53, subpart B.

¹⁰ EPA finalized the rule on the Treatment of Data Influenced by Exceptional Events (81 FR 68513) and the guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events in September of 2016. For more information, see <https://www.epa.gov/air-quality-analysis/exceptional-events-rule-and-guidance>.

for comparison to the NAAQS, subject to the requirements given in the March 28, 2016 Revision to Ambient Monitoring Quality Assurance and Other Requirements Rule (81 FR 17248).

The 2014-2016 design values for counties in the Philadelphia-Reading-Camden, PA-NJ-MD-DE CSA (area of analysis) are shown in Table 2.

Table 2. Air Quality Data (all values in ppm)^a.

County, State	State Recommended Nonattainment?	AQS Site ID	2014-2016 DV	2014 4 th highest daily max value	2015 4 th highest daily max value	2016 4 th highest daily max value
Kent, DE	No	100010002	0.066	0.066	0.066	0.068
New Castle, DE	Yes	100031007	0.068	0.071	0.065	0.069
		100031010	0.074	0.074	0.071	0.078
		100031013	0.070	0.069	0.069	0.074
		100032004	0.071	0.068	0.072	0.073
Cecil, MD	Yes	240150003	0.074^b	0.074	0.074	0.080
Atlantic, NJ	Yes	340010006	0.064	0.061	0.068	0.063
Burlington, NJ	Yes	No monitor				
Camden, NJ	Yes	340070002	0.075	0.068	0.079	0.078
		340071001	0.069	0.068	0.072	0.069
Cape May, NJ	Yes	No monitor				
Cumberland, NJ	Yes	340110007	0.068	0.067	0.068	0.069
Gloucester, NJ	Yes	340150002	0.074	0.070	0.076	0.076
Mercer, NJ	Yes	340210005	0.072	0.071	0.073	0.074
		340219991	0.073	0.071	0.075	0.074
Ocean, NJ	Yes	340290006	0.073	0.072	0.075	0.072
Salem, NJ	Yes	No monitor				
Berks, PA	No	420110006	0.066	0.063	0.066	0.070
		420110011	0.070^c	0.068	0.071	0.075
Bucks, PA	Yes	420170012	0.077	0.071	0.082	0.080
Chester, PA	Yes	420290100	0.073	0.071	0.068	0.080
Delaware, PA	Yes	420450002	0.072	0.073	0.074	0.071
Montgomery, PA	No	420910013	0.070^c	0.072	0.073	0.073
Philadelphia, PA	Yes	421010004	0.061	0.058	0.057	0.069
		421010024	0.077	0.072	0.079	0.080
		421010048	0.074	0.068	0.078	0.076

^a The highest design value in each county is indicated in bold type.

^b By letters and enclosures dated May 26, 2017 and October 20, 2017, Maryland submitted an EE demonstration related to the May and July 2016 Canadian wildfires. By letter dated December 26, 2017, EPA concurred on 17 monitor days, including days measured by the Cecil County monitor. The design value has been updated accordingly.

^c The design values have been updated after EPA concurred on Pennsylvania's EE demonstration.

New Castle County, DE; Cecil County, MD; Bucks, Chester, Delaware, and Philadelphia, PA; and Camden, Gloucester, Mercer, and Ocean Counties, NJ all show violations of the 2015 ozone NAAQS, therefore, these counties are included in the 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.

Figure 1, shown previously, identifies the Philadelphia-Wilmington-Atlantic City nonattainment area and the violating monitors. Table 2 identifies the design values for all monitors in the area of analysis. Figure 2a, below, shows the historical trends of design values for the violating monitors except for monitor 421010048 (in Philadelphia), which is a new monitor that started operating in October 2013. The 2014-2016 design value of 0.074 ppm is the first valid design value for this monitor. Figures 2b and 2c, below, show more detail by separating the monitors into two groups, those with design values equal to or greater than 0.074 ppm, and those less than 0.074 ppm, respectively.

As indicated on the map in Figure 1, there are 13 violating monitors located in 10 counties in the area of analysis. Seven violating monitors are located adjacent to Interstate 95 (I-95), one in Bucks County, PA, two in the City of Philadelphia, PA, one in the City of Chester, in Delaware County, PA, one in Camden County, NJ, one in Mercer County, NJ at Rider University in Lawrenceville, and one in New Castle County, DE in the City of Wilmington. Another violating monitor in New Castle County, DE is located due north of the City of Wilmington, near U.S. Route 202. Another violating monitor in Mercer County, NJ is located along the Delaware River in Washington Crossing State Park. The violating monitor in Ocean County, NJ is located in the Colliers Mills Wildlife Management Area. The violating monitor in Gloucester County, NJ is located adjacent to the New Jersey Turnpike. The violating monitor in Delaware County, PA is adjacent to U.S. Route 1. The violating monitor in Cecil County, MD is located in the Fair Hill Natural Resource Management Area, a Maryland state park.

Figure 2a. Three-Year Design Values for Violating Monitors (2006-2016).

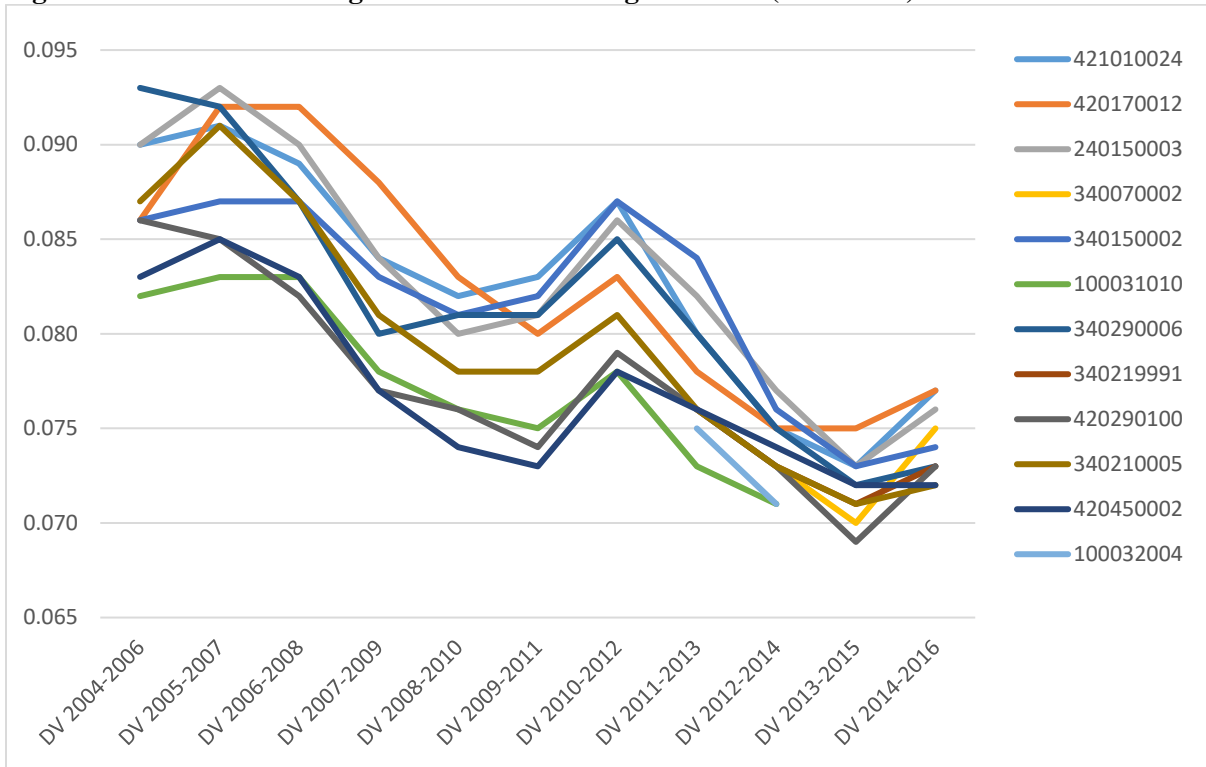


Figure 2b. Three-Year Design Values for Violating Monitors (2006-2016) – Highest Violating Monitors (Design Values > 0.074 ppm).

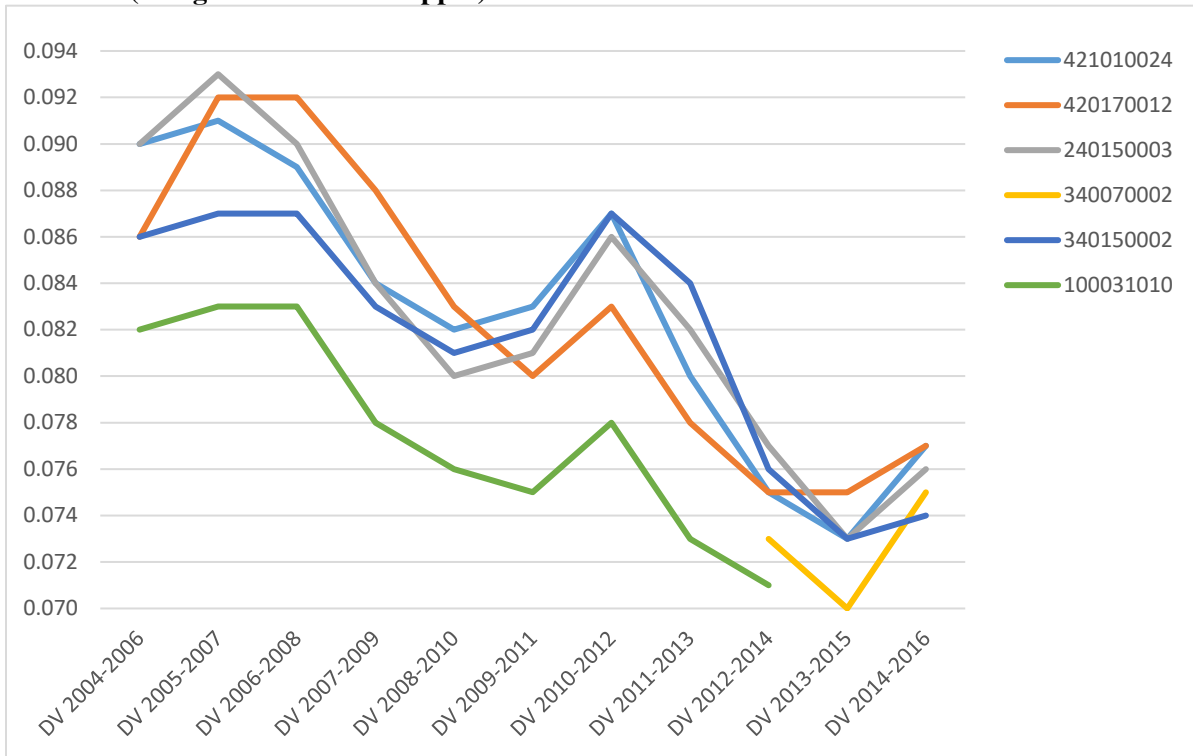
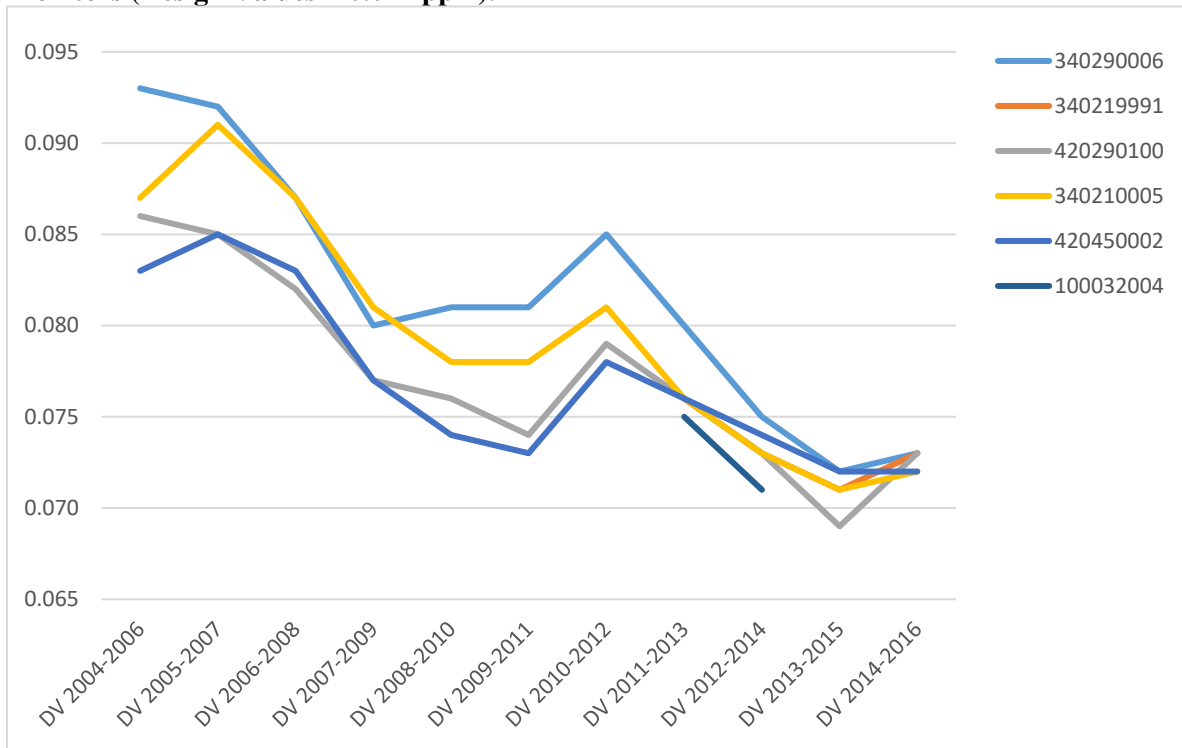


Figure 2c. Three-Year Design Values for Violating Monitors (2006-2016) – Other Violating Monitors (Design Values < 0.074 ppm).



Almost all the violating monitors in the area of analysis show design value peaks in 2007, 2012, and 2016 and lows in 2011 and 2015. Monitors in Bucks (420170012) and Philadelphia (421010024) Counties in Pennsylvania have the highest 2014-2016 design values, at 0.077 ppm, with the Camden County, NJ monitor (340070002) close behind at 0.075 ppm.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated ozone precursor emissions of nitrogen oxides (NO_x) and volatile organic compounds (VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA reviewed data from the 2014 National Emissions Inventory (NEI). For each county in the area of analysis, EPA examined the magnitude of large sources (NO_x or VOC emissions greater than 100 tons per year) and small point sources and the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, non-road mobile, on-road mobile, and fires. Emission levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

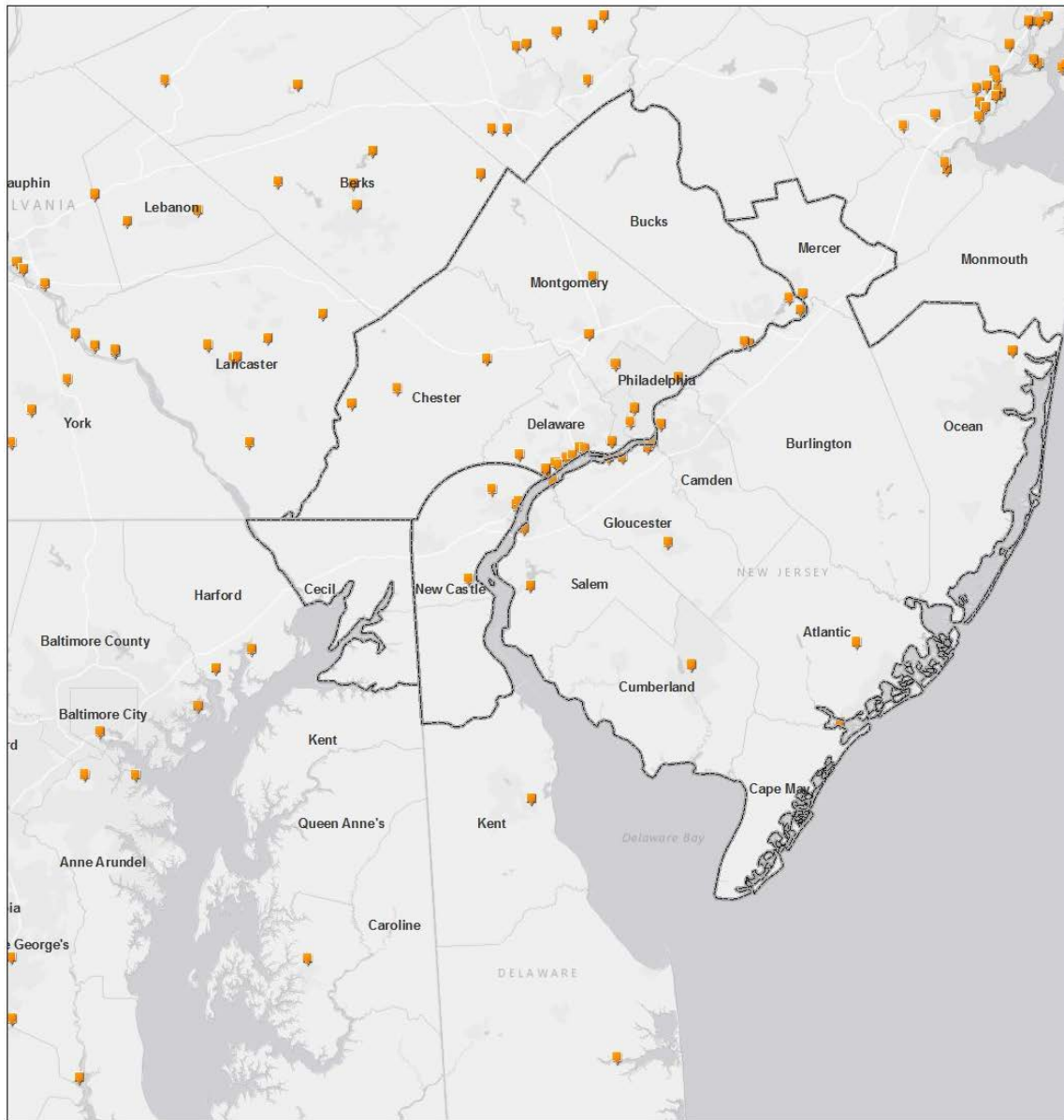
Table 3a provides a county-level emissions summary of NO_x and VOC (given in tons per year (tpy)) emissions for the area of analysis considered for inclusion in the Philadelphia-Wilmington-Atlantic City nonattainment area.

Table 3a. Total County-Level NO_x and VOC Emissions.

County	State Recommended Nonattainment?	Total NO_x (tpy)	Total VOC (tpy)
Kent, DE	No	6,760	5,255
New Castle, DE	Yes	15,115	9,191
Cecil, MD	Yes	3,662	2,794
Atlantic, NJ	Yes	5,795	6,351
Burlington, NJ	Yes	7,900	15,844
Camden, NJ	Yes	7,243	9,311
Cape May, NJ	Yes	3,645	4,122
Cumberland, NJ	Yes	3,445	6,173
Gloucester, NJ	Yes	6,168	8,640
Mercer, NJ	Yes	6,400	6,134
Ocean, NJ	Yes	12,990	16,317
Salem, NJ	Yes	2,919	1,945
Berks, PA	No	13,379	13,067
Bucks, PA	Yes	13,311	16,700
Chester, PA	Yes	11,246	13,627
Delaware, PA	Yes	13,144	11,009
Montgomery, PA	No	18,285	21,117
Philadelphia, PA	Yes	20,210	21,732
Area wide		171,617	189,329

In addition to reviewing county-wide emissions of NO_x and VOC in the area of analysis, EPA also reviewed emissions from large point sources. The location of these sources, together with the other factors, can help inform nonattainment boundaries. The locations of the large point sources are shown in Figures 3a and large and small point sources are shown in Figure 3b, below. The final nonattainment boundaries are also shown.

Figure 3a. Large Point Sources in the Area of Analysis.



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- USA_Counties
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA
- Large Point Sources (VOC GT 100 or NOx GT 100)

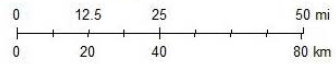
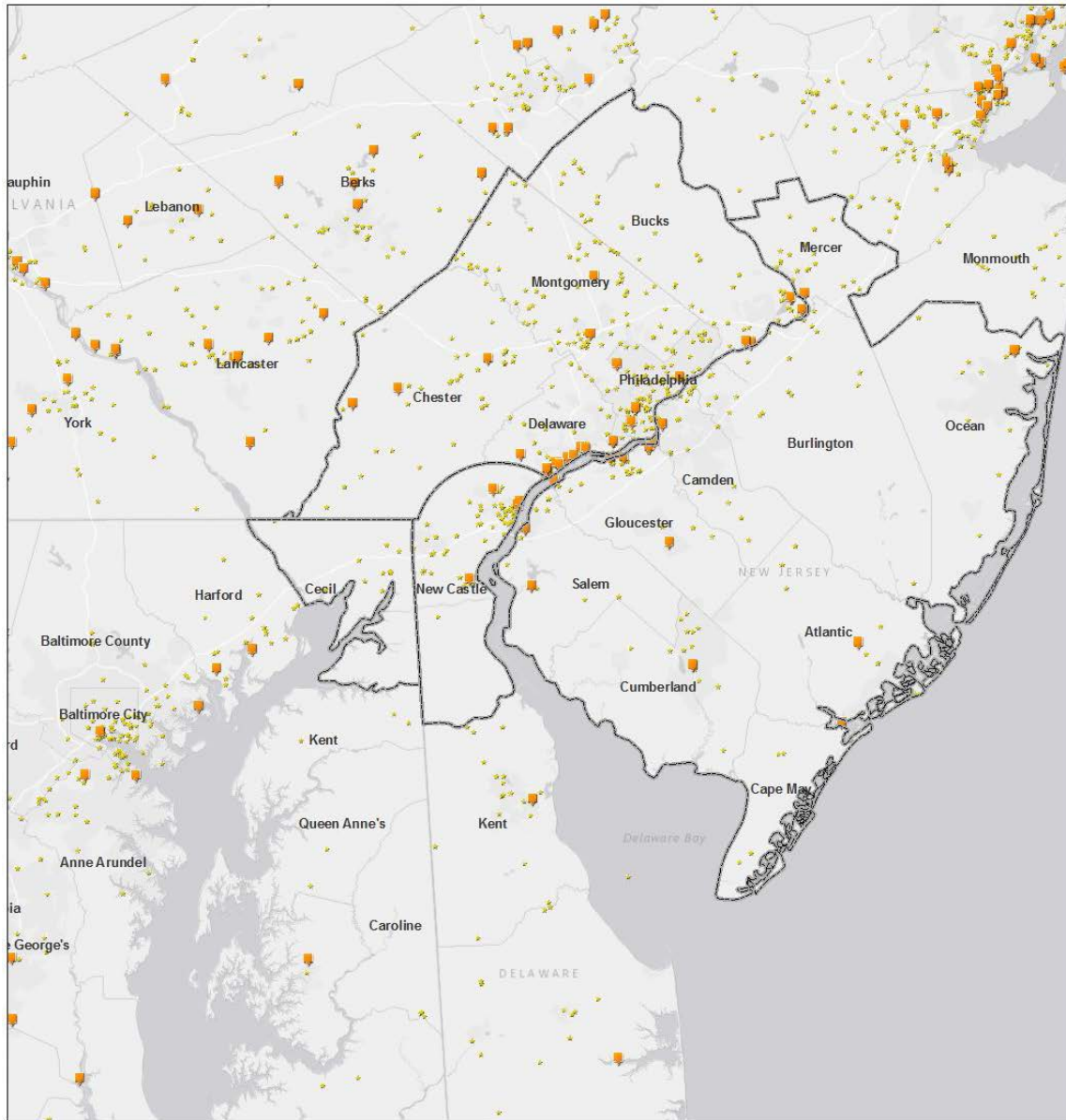


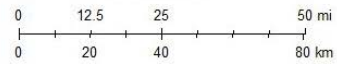
Figure 3b. Large and Small Point Sources in the Area of Analysis.



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- USA_Countries
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA
- Large Point Sources (VOC GT 100 or NOx GT 100)
- Small Point Sources



As shown in Table 3a, Philadelphia County, PA has the highest NO_x emission in the area of analysis. Philadelphia County, PA also has the highest VOC emissions, followed closely by Montgomery County, PA. Salem, Cumberland, and Cape May Counties, NJ, and Cecil County, MD have the lowest NO_x emissions in the area of analysis. Salem County, NJ and Cecil County, MD have the lowest VOC emissions. Out of the 16 counties in the area of analysis, Kent County, DE has the seventh lowest NO_x emissions and the fourth lowest VOC emissions. New Castle County, DE, Burlington and Ocean Counties, NJ, and Berks, Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, PA all have over 13,000 tons of NO_x and/or VOC emissions.

As shown in Figure 3a and Table 3b, Kent County, DE, and Atlantic, Burlington, Camden, Cape May, Cumberland, Mercer, and Ocean Counties, NJ each have only one large point source. The other counties in the area of analysis have multiple large sources. The Delaware City Refinery in New Castle County, DE and the Philadelphia International Airport in Delaware County, PA have the highest NO_x emissions in the area of analysis. Both sources emit over 1900 tons per year of NO_x. Other sources in Berks, Delaware, and Philadelphia Counties, PA have NO_x emissions over 1000 tons per year. As can be seen in Figure 3b, all counties in the area of analysis have numerous small NO_x and VOC sources. Philadelphia and Montgomery Counties, PA appear to have the highest density of small sources, while Atlantic County, NJ has the lowest density of small sources.

As shown in Figure 3c, Berks, Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, PA; New Castle County, DE; and Ocean County, NJ have the highest county-level NO_x emissions in the area of analysis, while Cape May, Cumberland, and Salem Counties have the lowest. As shown in Figure 3d, Berks, Bucks, Chester, Montgomery, and Philadelphia Counties, PA, and Atlantic, Burlington, and Ocean Counties, NJ have the highest county-level VOC emissions in the area of analysis.

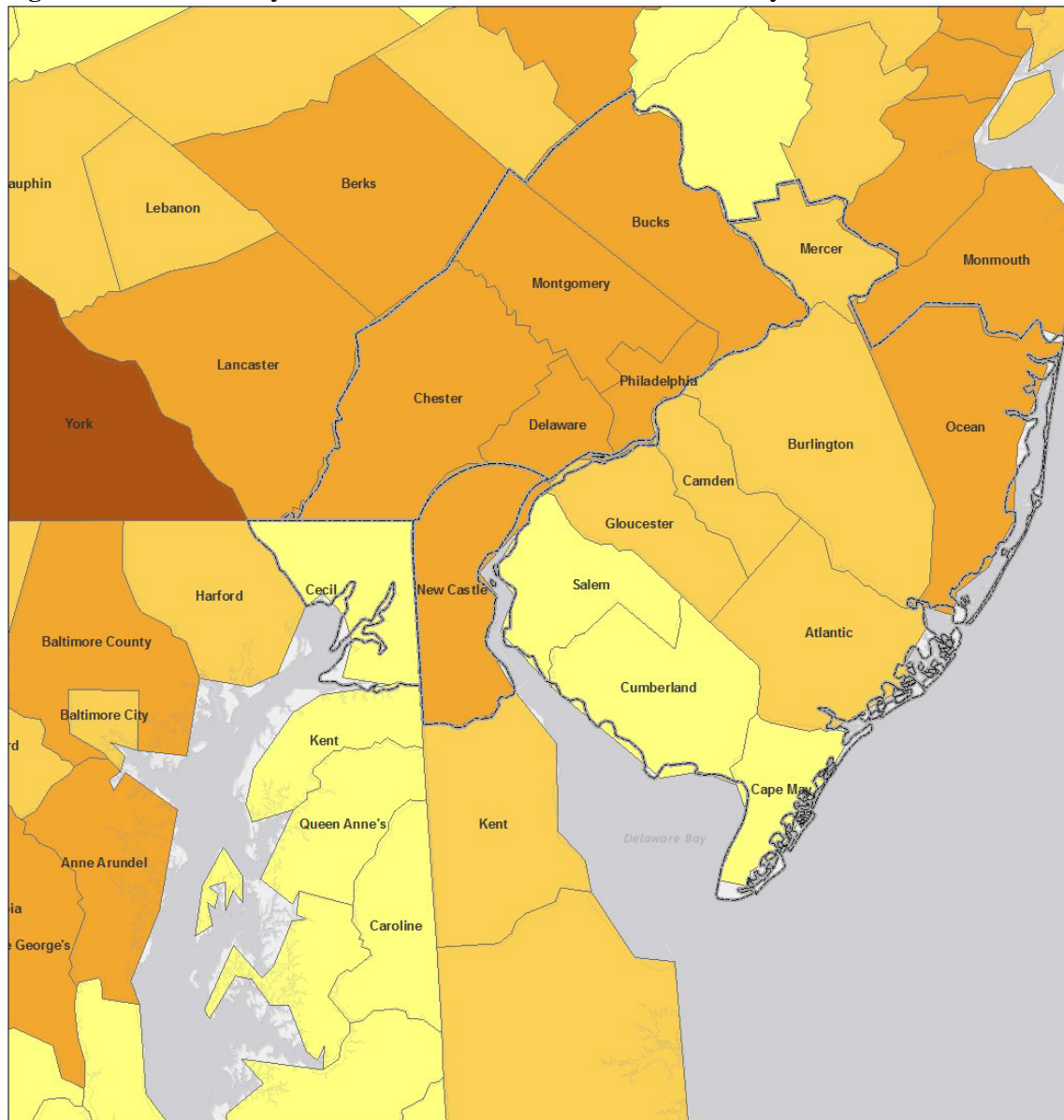
Table 3b. Large Point Sources and Emissions (tpy)

County	Facility Site Name	Facility Source Description	NO _x	VOC
Kent, DE	Dover Airforce Base Airport	Airport	693	337
New Castle, DE	Delaware City Refinery	Petroleum Refinery	1968	192
	Hay Road Energy Center	Electricity Generation via Combustion	886	38
	Edge Moor Energy Center	Electricity Generation via Combustion	334	27
	Dupont Edge Moor	Chemical Plant	33	114
	Dupont Experimental Station		198	11
Atlantic, NJ	Atlantic City International	Airport	283	119
Burlington, NJ	Burlington Generating Station	Electricity Generation via Combustion	119	4
Camden, NJ	Camden County Energy Recovery Associates, L.P.	Municipal Waste Combustor	327	2
Cape May, NJ	B. L. England Generating Station	Electricity Generation via Combustion	538	11
Cumberland, NJ	Gerresheimer Glass Inc.	Glass Plant	119	2
Gloucester, NJ	Eagle Point Tank Farm and Dock		6	124
	West Deptford Energy Station	Electricity Generation via Combustion	122	4
	Aleris Rolled Products, Inc		5	166
	Paulsboro Refining Company LLC	Petroleum Refinery	649	322
	Wheelabrator Gloucester Company L P	Municipal Waste Combustor	229	1
	Logan Generating Plant	Electricity Generation via Combustion	546	2

County	Facility Site Name	Facility Source Description	NO _x	VOC
Mercer, NJ	PSEG Fossil LLC Mercer Generating Station	Electricity Generation via Combustion	236	20
Ocean, NJ	Essential Power Operating Company LLC	Electricity Generation via Combustion	152	10
Salem, NJ	Ardagh Glass Containers Inc.	Glass Plant	353	10
	Carneys Point Generating Plant	Electricity Generation via Combustion	896	3
Berks, PA	Texas Eastern Trans/Bernville	Compressor Station	155	6
	Texas Eastern Trans/Bechtelsville	Compressor Station	171	29
	Novipax LLC/Reading			541
	Lehigh Cement Co LLC/ Evansville Cement Plant & Quarry	Portland Cement Manufacturing	1419	24
	Carpenter Tech Corp/Reading	Steel Mill	246	72
Bucks, PA	Exelon Generation Co/Croydon Gen Station	Electricity Generation via Combustion	130	0
	Wheelabrator Falls Inc/Falls Twp	Municipal Waste Combustor	793	7
	Fairless Energy LLC/Falls Twp	Electricity Generation via Combustion	194	35
Chester, PA	Transcontinental Gas/Frazer Station 200	Compressor Station	138	15
	Quad / Graphics Atglen	Printing/Publishing Facility	11	288
	ArcelorMittal Plate LLC/Coatesville	Steel Mill	235	135
Delaware, PA	FPL Energy Marcus Hook LP/750 MW	Electricity Generation via Combustion	274	20
	Laurel Pipeline Co LP/Boothwyn Breakout Station			115
	Liberty Elec Power LLC/Eddystone	Electricity Generation via Combustion	155	15
	Braskem America Inc/Marcus Hook	Plastic, Resin, Syn Fiber or Rubber Products Plant	9	180
	PQ Corp/Chester	Chemical Plant	243	1
	Kimberly Clark Pa LLC/Chester Operations	Pulp and Paper Plant	220	14
	Exelon Generation Co/Eddystone	Electricity Generation via Combustion	161	5
	Monroe Energy LLC/Trainer	Petroleum Refinery	696	334
	Covanta Delaware Valley LP /Delaware Valley Resource Recovery	Municipal Waste Combustor	1231	11
	Philadelphia International	Airport	1980	388
Montgomery, PA	Merck Sharp & Dohme / West Point	Pharmaceutical Manufacturing	119	30
	Covanta Plymouth Renewable Energy/ Plymouth	Municipal Waste Combustor	793	2
Philadelphia, PA	Honeywell/Frankford Plant		239	106

County	Facility Site Name	Facility Source Description	NO_x	VOC
	Grays Ferry Cogen Partnership/Philadelphia	Electricity Generation via Combustion	216	10
	Paperworks Industries Inc/Mill Division	Pulp and Paper Plant	109	8
	Philadelphia Energy Solutions Refining	Petroleum Refinery	1458	593

Figure 3c. Total County-Level NO_x Emissions in the Area of Analysis



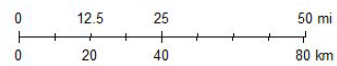
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- USA_Countries
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA

County Emissions - NO_x Total

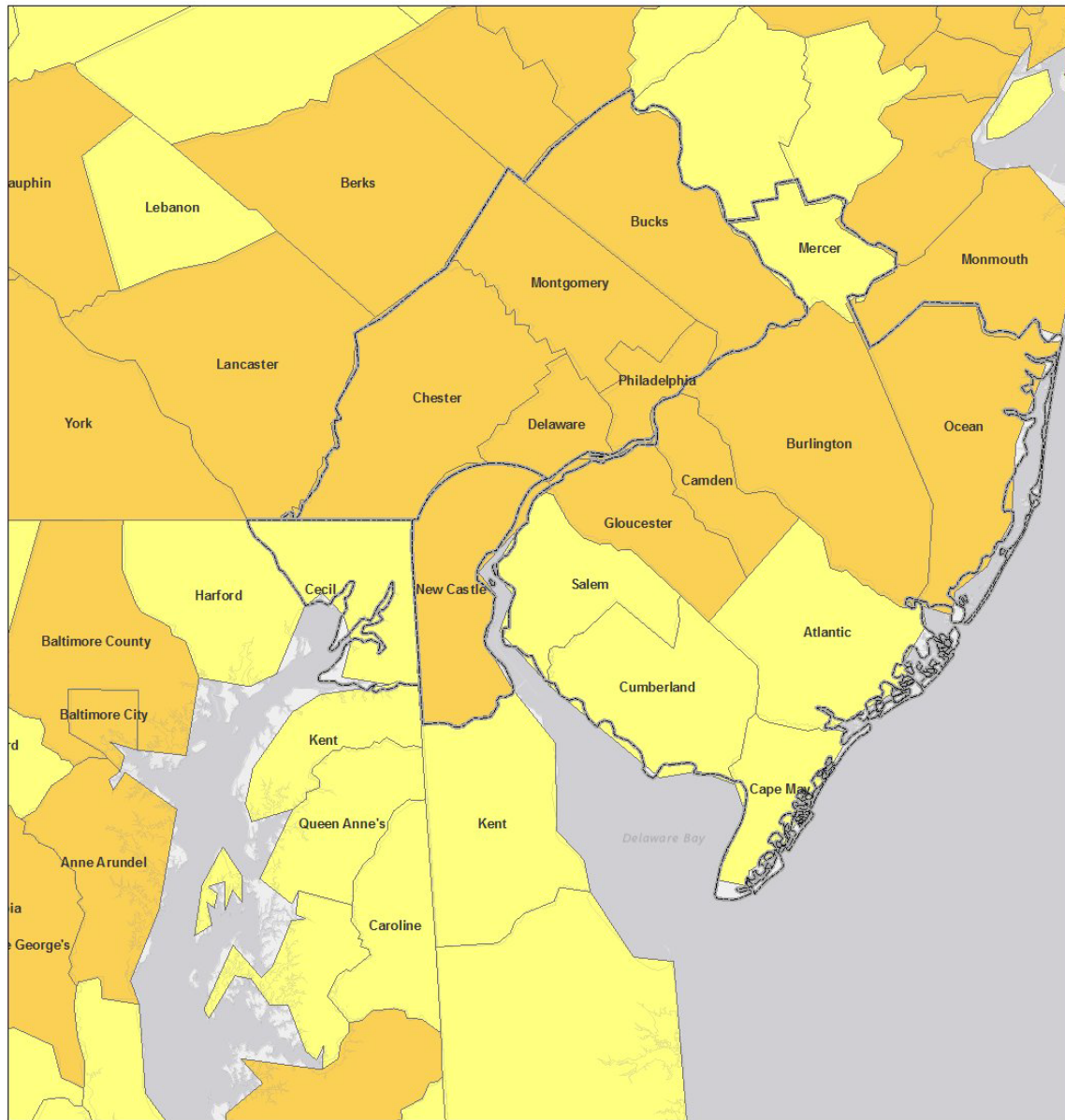
- 4 - 3,871
- 3,872 - 10,553
- 10,554 - 23,750
- 23,751 - 53,119
- 53,120 - 98,056

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Figure 3d. Total County-Level VOC Emissions in the Area of Analysis



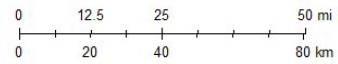
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- USA_Counties
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA

County Emissions - VOC Total

- 3 - 7,324
- 7,325 - 24,047
- 24,048 - 70,807
- 70,808 - 205,621
- 205,622 - 398,197



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Population density and degree of urbanization

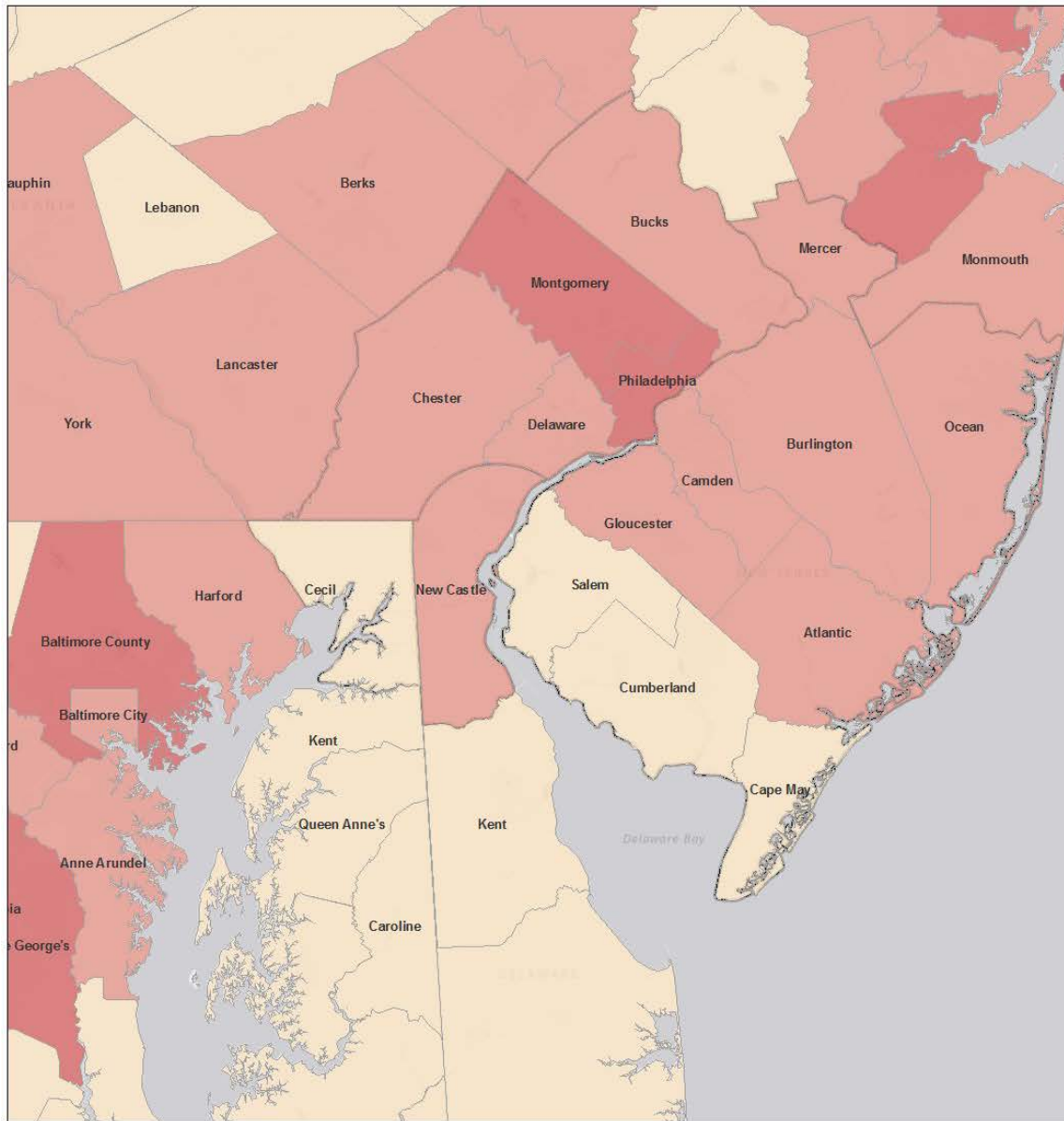
In this part of the factor analysis, EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include emissions of NO_x and VOC from on-road and non-road vehicles and engines, consumer 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 violations of the NAAQS. Table 4 shows the population, population density, and population growth information for each county in the area of analysis. Figure 4 depicts the county-level population.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2015 Population	2015 Population Density (per sq. mi.)	Absolute change in population (2010-2015)	Population % change (2010-2015)
Kent, DE	No	162,310	173,533	296	11,223	7
New Castle,	Yes	538,479	556,779	1,306	18,300	3
Cecil, MD	Yes	101,108	102,382	296	1,274	1
Atlantic, NJ	Yes	274,549	274,219	493	-330	-0.1
Burlington,	Yes	448,734	450,226	564	1,492	0.3
Camden, NJ	Yes	513,657	510,923	2,309	-2,734	-0.5
Cape May,	Yes	97,265	94,727	377	-2,538	-3
Cumberland,	Yes	156,898	155,854	322	-1,044	-0.7
Gloucester,	Yes	288,288	291,479	905	3,191	1
Mercer, NJ	Yes	366,513	371,398	1,654	4,885	1
Ocean, NJ	Yes	576,567	588,721	936	12,154	2
Salem, NJ	Yes	66,083	64,180	193	-1,903	-3
Berks, PA	No	411,442	415,271	485	3,829	0.9
Bucks, PA	Yes	625,249	627,367	1,038	2,118	0.3
Chester, PA	Yes	498,886	515,939	687	17,053	3
Delaware,	Yes	558,979	563,894	3067	4,915	0.9
Montgomery	No	799,874	819,264	1696	19,390	2
Philadelphia,	Yes	1,526,006	1,567,442	11,689	41,436	3
Area wide		8,010,887	8,143,598	994	132,711	2

Source: U.S. Census Bureau population estimates for 2010 and 2015. <https://www.census.gov/data.html>.

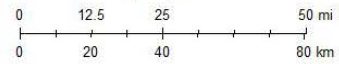
Figure 4. County-Level Population.



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- USA_Counties
- USA_Counties
- 0 to 220,000
- > 220,000 to 744,344
- > 744,344 to 2,035,210
- > 2,035,210 to 5,194,675
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA

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Philadelphia and Montgomery Counties, PA have the highest populations in the area of analysis, and Kent County, DE, Cecil County, MD, and Cape May, Cumberland, and Salem Counties, NJ have the lowest. Philadelphia, PA has the highest population density, at 11,689 people per square mile, while Cecil County, MD and Kent County, DE are tied for the lowest, at 296 people per square mile. Atlantic, Camden, Cape May, Cumberland and Salem Counties experienced a decrease in population between 2010 and 2015. Philadelphia, PA experienced the biggest absolute increase in population in the same time period, while Kent County, DE experienced the largest percent increase in population.

Traffic and Vehicle Miles Travelled (VMT)

EPA evaluated the commuting patterns of residents, as well as the total vehicle miles traveled (VMT) for each county in the area of analysis. In combination with the population/population density data and the location of main transportation arteries, this information helps identify the probable location of non-point source emissions. A county with high VMT and/or a high number of commuters is generally an integral part of an urban area and high VMT and/or high number of commuters indicates the presence of motor vehicle emissions that may contribute to violations of the NAAQS. Rapid population or VMT growth in a county on the urban perimeter may signify increasing integration with the core urban area, and thus could indicate that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. In addition to VMT, EPA evaluated worker data collected by the U.S. Census Bureau¹¹ for the area of analysis. Table 5a shows the traffic and commuting pattern data, including total VMT for each county, number of residents who work in each county, number of residents that work in counties with violating monitors, and the percent of residents working in counties with violating monitors. In addition, Table 5b shows the number and percentage of residents who commute within their county of residence. The data in Tables 5a and 5b are 2014 data.

Table 5a. Traffic and Commuting Patterns.

County	State Recommended Nonattainment?	2014 Total VMT (Million Miles)	Number of County Residents Who Work	Number Commuting to or Within Counties with Violating Monitors	Percentage Commuting to or Within Counties with Violating Monitors
Kent, DE	No	1,650	68,246	16,255	23.8%
New Castle, DE	Yes	5,546	255,431	224,722	88.0%
Cecil, MD	Yes	1,275	44,500	27,319	61.4%
Atlantic, NJ	Yes	2,759	125,197	15,373	12.3%
Burlington, NJ	Yes	4,699	223,456	90,307	40.4%
Camden, NJ	Yes	3,941	238,179	157,242	66.0%
Cape May, NJ	Yes	996	38,277	4,615	12.1%
Cumberland, NJ	Yes	1,162	60,502	11,604	19.2%
Gloucester, NJ	Yes	2,746	143,718	101,223	70.4%
Mercer, NJ	Yes	3,390	164,236	91,740	55.9%
Ocean, NJ	Yes	4,827	231,657	119,004	51.4%
Salem, NJ	Yes	786	33,649	15,091	44.8%
Berks, PA	No	3,298	194,993	18,356	9.4%
Bucks, PA	Yes	4,652	317,908	206,537	65.0%

¹¹ The worker data can be accessed at: <http://onthemap.ces.census.gov/>.

Chester, PA	Yes	4,193	246,357	177,041	71.9%
Delaware, PA	Yes	3,278	265,338	209,042	78.8%
Montgomery, PA	No	6,458	405,300	163,081	40.2%
Philadelphia, PA	Yes	5,496	572,291	445,884	77.9%
Total:		61,152	3,629,235	2,094,436	57.7%

* Counties with monitors violating the NAAQS are indicated in bold.

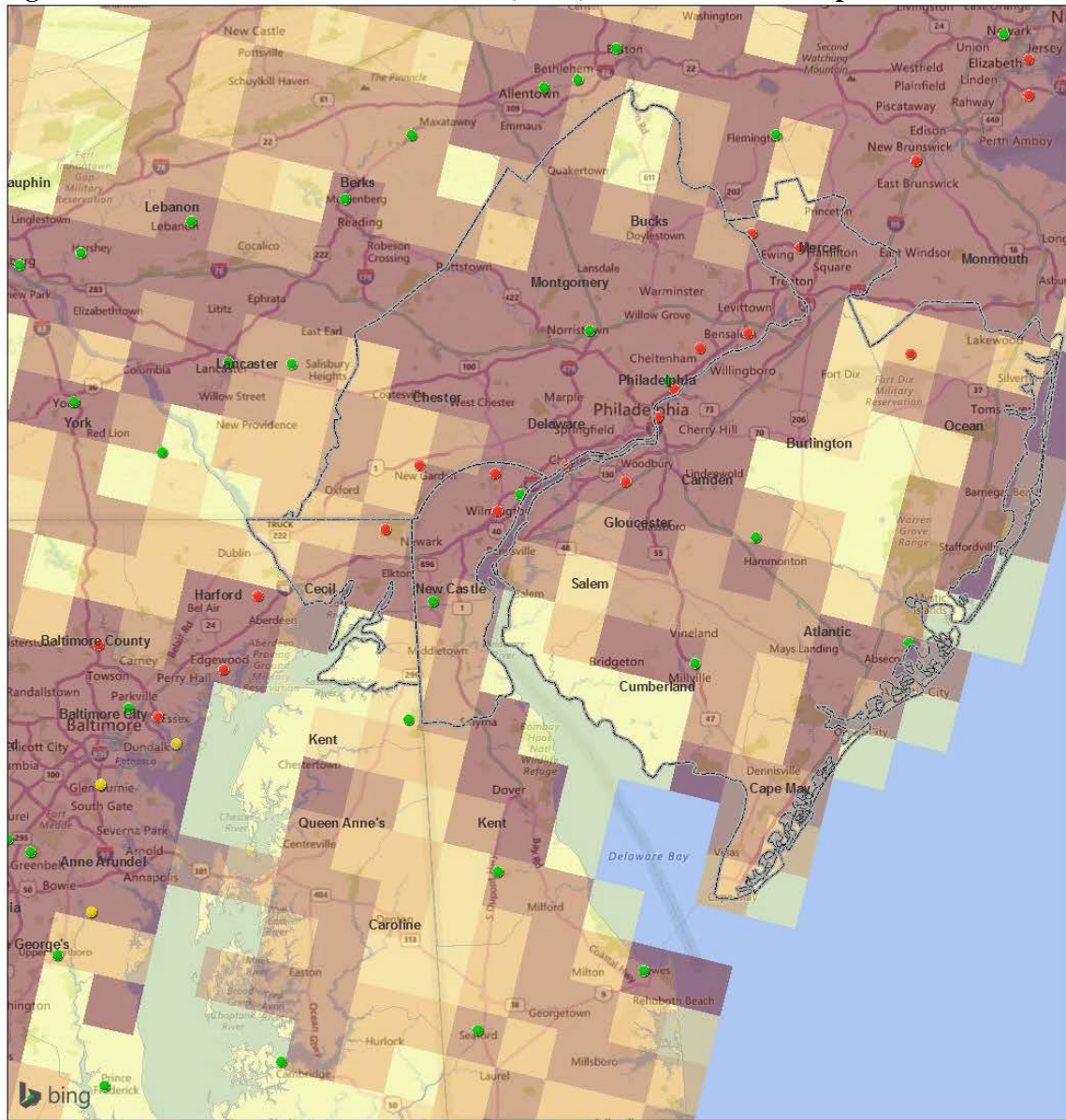
Table 5b. Commuting Patterns Including Commuting Within County of Residence.

County	State Recommended Nonattainment?	Number of County Residents Who Work	Number Commuting to or Within Counties with Violating Monitors	Percentage Commuting to or Within Counties with Violating Monitors	Number Commuting Within County of Residence	Percentage Commuting Within the County of Residence
Kent, DE	No	68,246	16,255	23.8%	39,070	57.2%
New Castle, DE	Yes	255,431	224,722	88.0%	192,971	75.5%
Cecil, MD	Yes	44,500	27,319	61.4%	13,908	31.3%
Atlantic, NJ	Yes	125,197	15,373	12.3%	84,158	67.2%
Burlington, NJ	Yes	223,456	90,307	40.4%	83,745	37.5%
Camden, NJ	Yes	238,179	157,242	66.0%	90,701	38.1%
Cape May, NJ	Yes	38,277	4,615	12.1%	20,793	54.3%
Cumberland, NJ	Yes	60,502	11,604	19.2%	31,385	51.9%
Gloucester, NJ	Yes	143,718	101,223	70.4%	43,131	30.0%
Mercer, NJ	Yes	164,236	91,740	55.9%	78,888	48.0%
Ocean, NJ	Yes	231,657	119,004	51.4%	102,034	44.0%
Salem, NJ	Yes	33,649	15,091	44.8%	9,130	27.1%
Berks, PA	No	194,993	18,356	9.4%	111,542	57.2%
Bucks, PA	Yes	317,908	206,537	65.0%	130,805	41.1%
Chester, PA	Yes	246,357	177,041	71.9%	112,313	45.6%
Delaware, PA	Yes	265,338	209,042	78.8%	104,298	39.3%
Montgomery, PA	No	405,300	163,081	40.2%	194,295	47.9%
Philadelphia, PA	Yes	572,291	445,884	77.9%	348,108	60.8%
Total:		3,629,235	2,094,436	57.7%	1,791,275	49.4%

* Counties with monitors violating the NAAQS are indicated in bold.

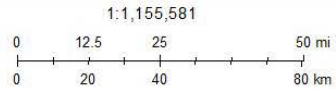
To show traffic and commuting patterns, Figure 5 overlays twelve-kilometer gridded VMT from the 2014 NEI with a map of the transportation arteries.

Figure 5. Twelve Kilometer Gridded VMT (Miles) Overlaid with Transportation Arteries.



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- State Boundaries
 - USA_Countries
 - Philadelphia-Wilmington-Atlantic City NJ
 - Philadelphia-Wilmington-Atlantic City DE
 - Philadelphia-Wilmington-Atlantic City MD
 - Philadelphia-Wilmington-Atlantic City PA
- Ozone 2016 Site Level DVs 04-09-2017
- No Valid Value
 - 0 - 0.070
 - 0.071 and above
- Vehicle Miles Traveled
- 0 - 36,071,088
 - 36,071,088.01 - 52,484,020



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 U.S. EPA Office of Air and Radiation (OAR) - Office of Air Quality
 Planning and Standards (OAQPS)

Web AppBuilder for ArcGIS

As can be seen in Tables 5a and 5b, Montgomery County, PA, New Castle County, DE, and Philadelphia, PA have the highest VMT in the area of analysis, and Salem County, NJ has the lowest.

Cape May and Salem Counties, NJ and Cecil County, MD have the fewest residents who work, while Philadelphia and Montgomery Counties, PA have the most. Berks County, PA has the lowest percentage of workers commuting into counties with violating monitors, followed by Atlantic and Cape May Counties, NJ, with the majority of their residents commuting within their own counties. Chester, Delaware, and Philadelphia Counties, PA and New Castle County, DE have the highest percentage of workers commuting into counties with violating monitors. However, 60.8% of Philadelphians and 75.5% of residents of New Castle County commute within their own counties.

As shown in Figure 5, I-95 runs through the area of analysis from Cecil County, MD northeast through New Castle County, DE, and Delaware, Philadelphia, and Bucks Counties, PA, and into Mercer County, NJ. The New Jersey Turnpike and I-295 parallel I-95 on the east side of the Delaware River, through Mercer, Burlington, Camden, Gloucester, and Salem Counties, NJ. The Pennsylvania Turnpike (I-76) starts in Philadelphia and extends west through Montgomery, Chester Counties, PA, and through the southern tip of Berks County, PA into Lancaster County, PA. Figure 5 shows high VMT through these traffic corridors, where the majority of violating monitors in the area of analysis are located.

Factor 3: Meteorology

Evaluation of meteorological data helps to assess the fate and transport of emissions contributing to ozone concentrations and to identify areas potentially contributing to the monitored violations. Results of meteorological data analysis may inform the determination of nonattainment area boundaries. In order to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of ozone and precursor emissions from sources in the area., EPA evaluated 2014-2016 HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) trajectories at 100, 500, and 1000 meters (m) above ground level (AGL) that illustrate the three-dimensional paths traveled by air parcels to a violating monitor. The 24-hour HYSPLIT back trajectories in red, blue and green, representing 100, 500, and 1000 m AGL, respectively, for each exceedance day (i.e., daily maximum 8 hour values that exceed the 2015 ozone NAAQS) for the violating monitors. Figures 6a through 6o show the HYSPLIT back trajectories for the violating monitors.

Please note that Figures 6f and 6j, which represented the HYSPLIT back trajectories for the Berks and Montgomery County monitors in the TSD for the 120 day letter letters, have been omitted.

Figure 6a. HYSPLIT Back Trajectories for Monitor 100031010 New Castle County, Delaware

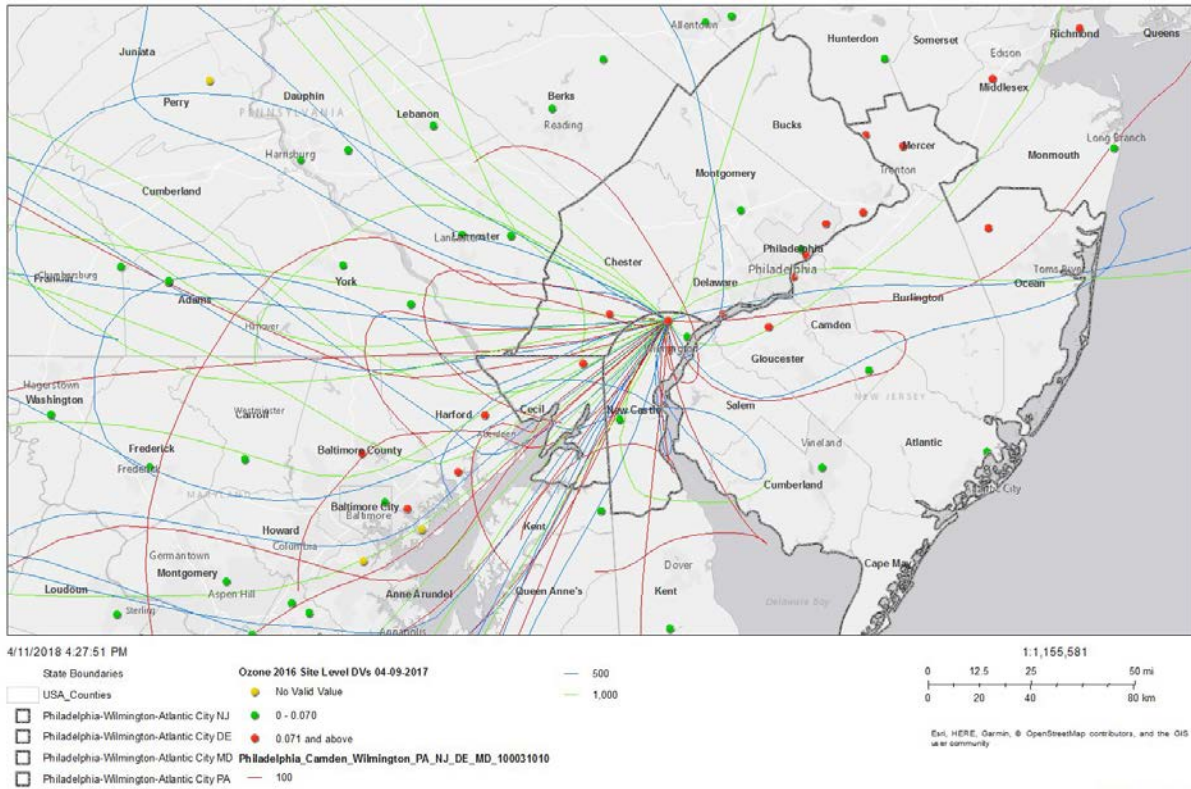


Figure 6b. HYSPLIT Back Trajectories for Monitor 100032004 New Castle County, Delaware

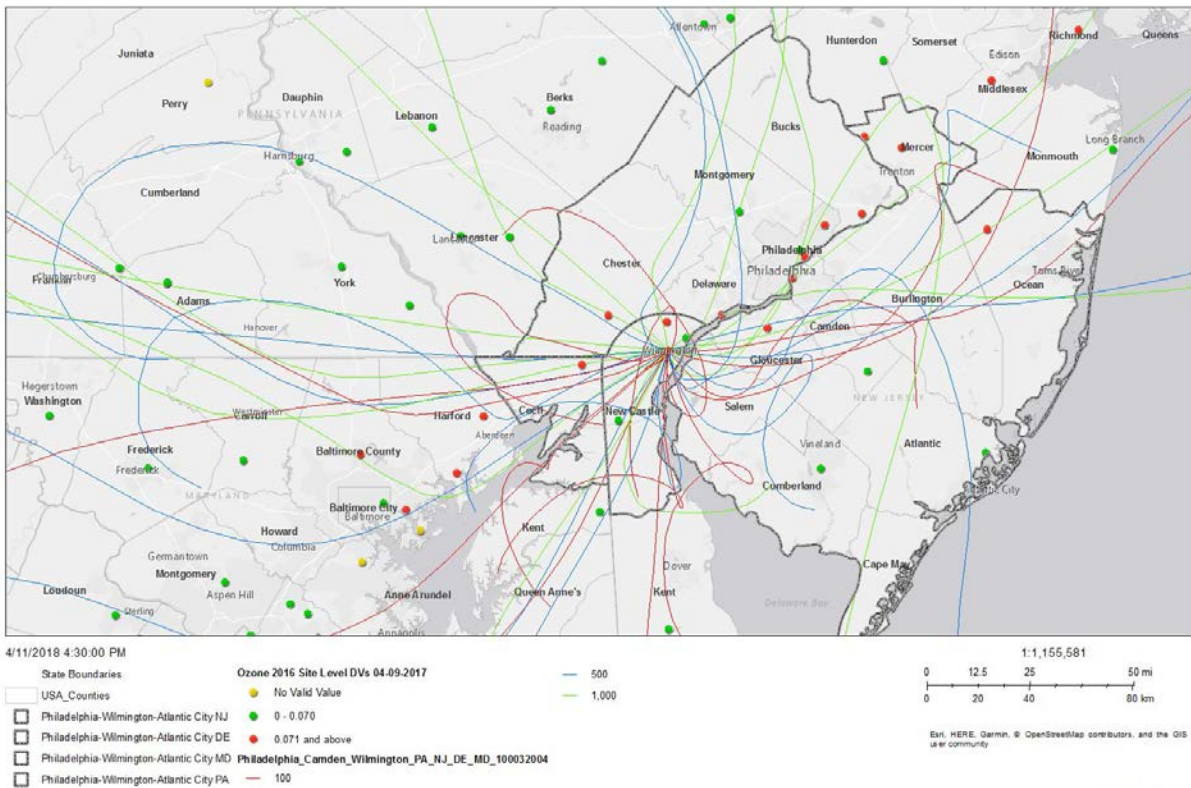


Figure 6c. HYSPLIT Back Trajectories for Monitor 240150003 Cecil County, Maryland

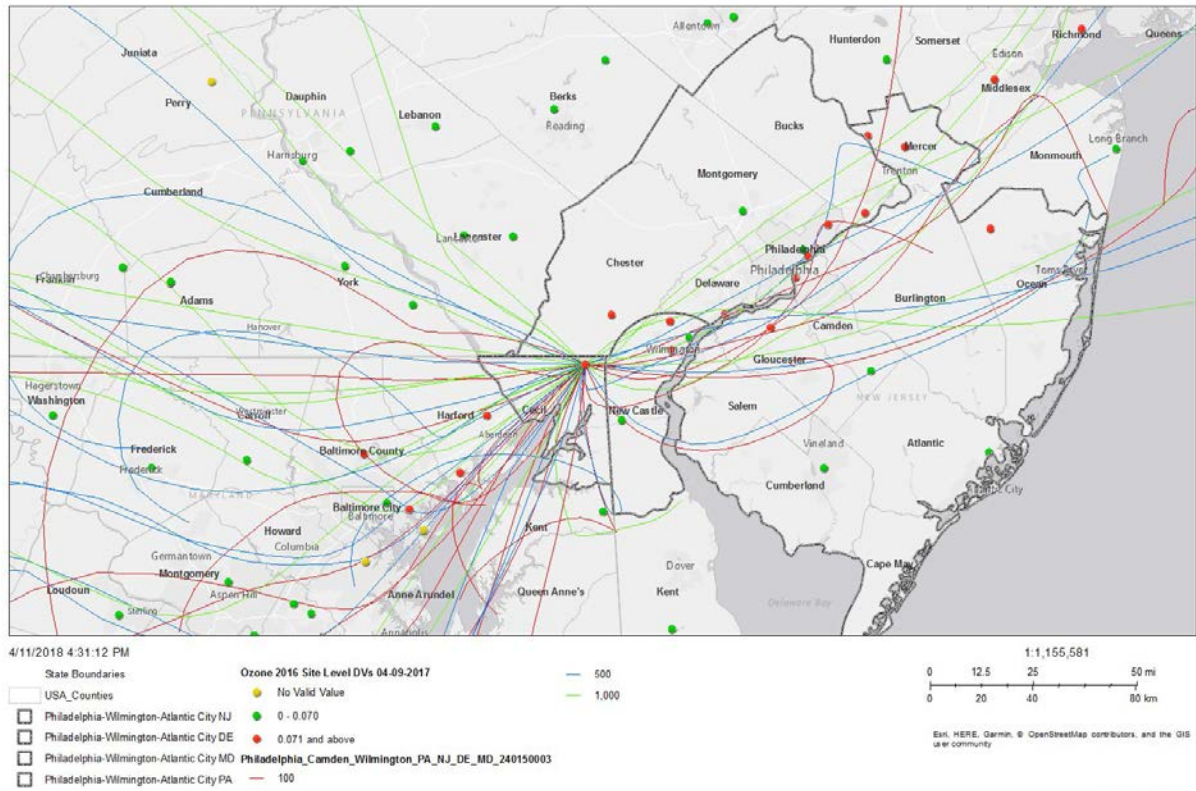


Figure 6d. HYSPLIT Back Trajectories for Monitor 340070002 Camden County, New Jersey

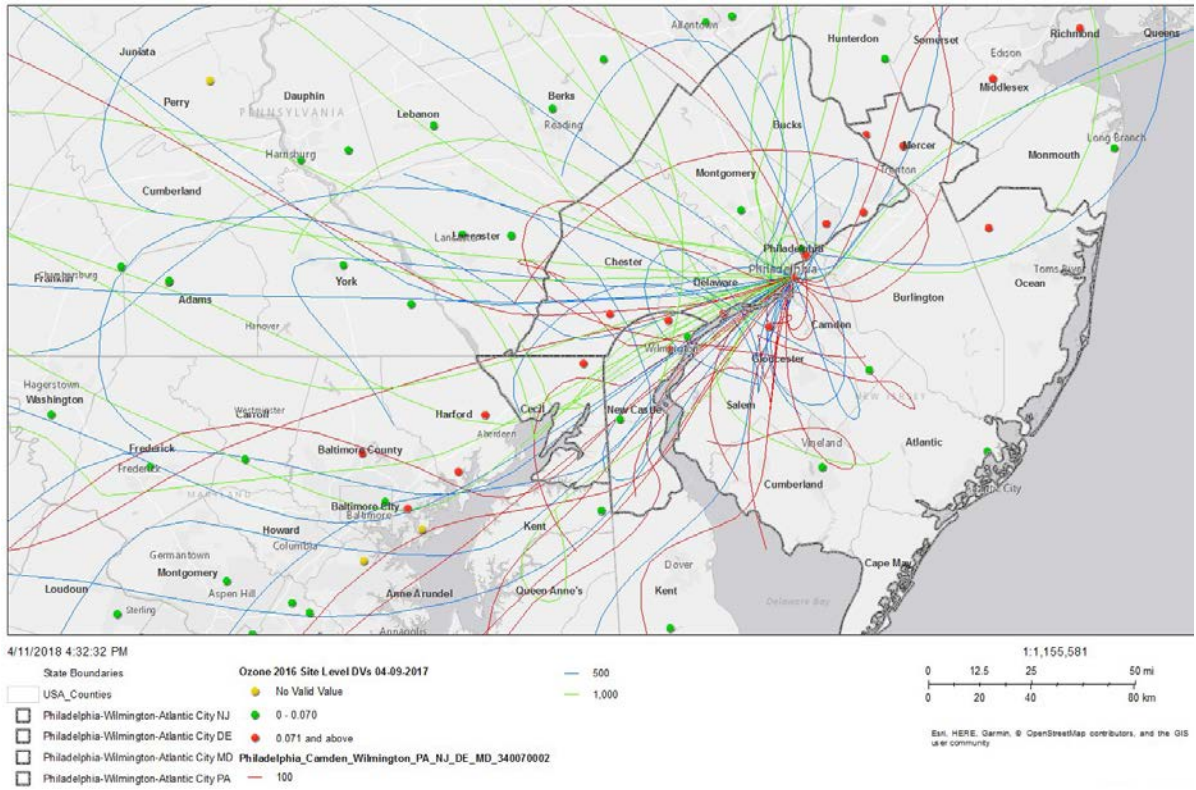


Figure 6e. HYSPLIT Back Trajectories for Monitor 340150002 Gloucester County, New Jersey

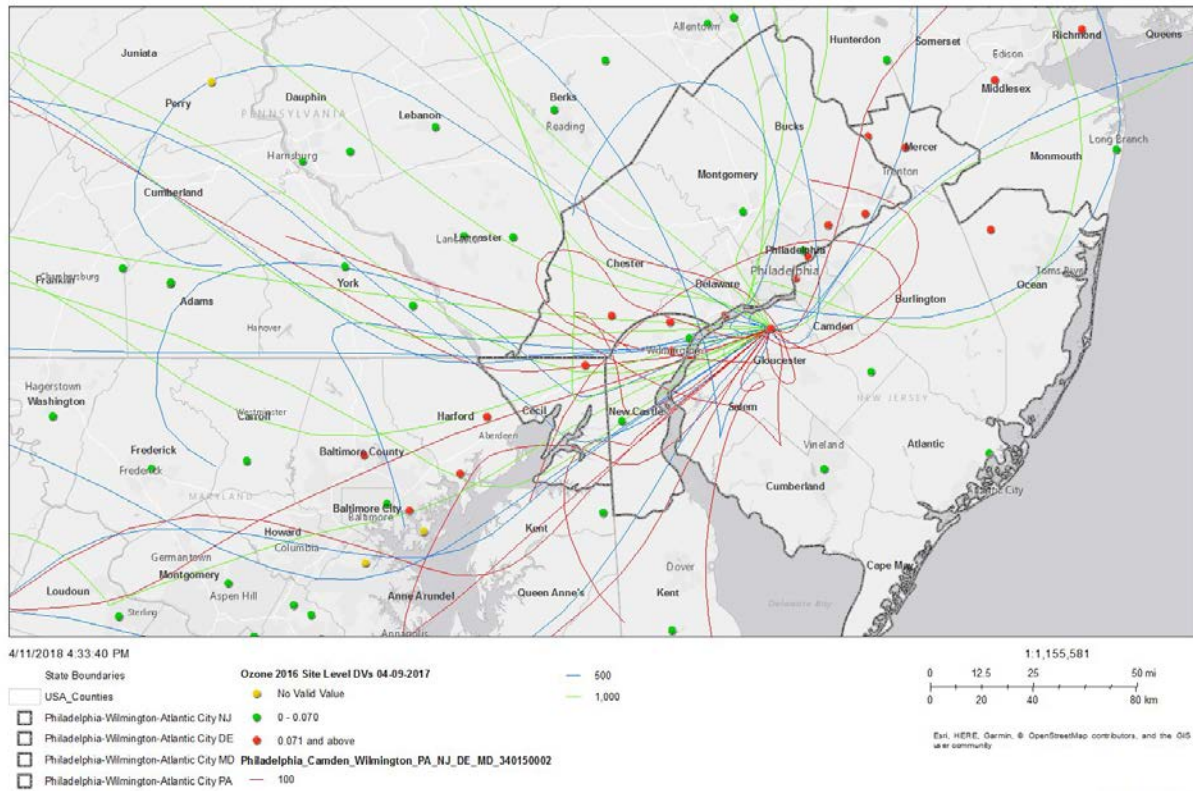


Figure 6g. HYSPLIT Back Trajectories for Monitor 420170012 Bucks County, Pennsylvania

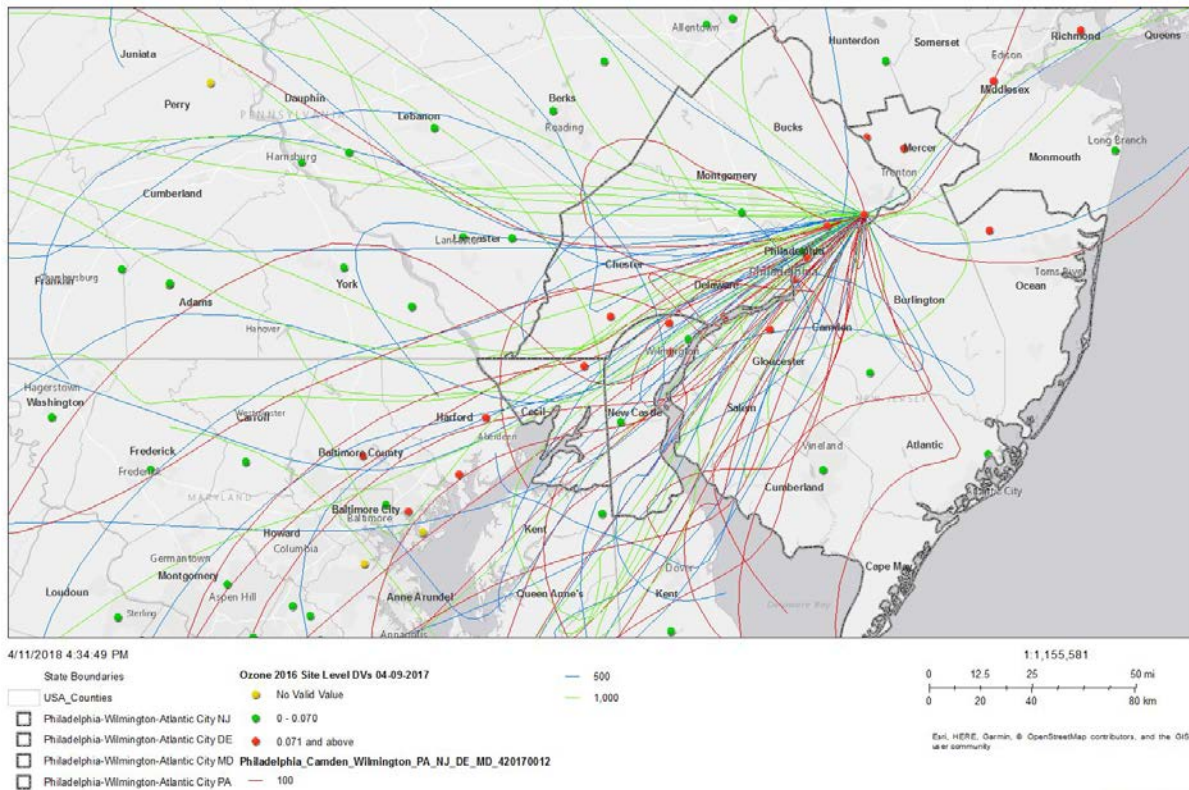


Figure 6h. HYSPLIT Back Trajectories for Monitor 420290100 Chester County, Pennsylvania

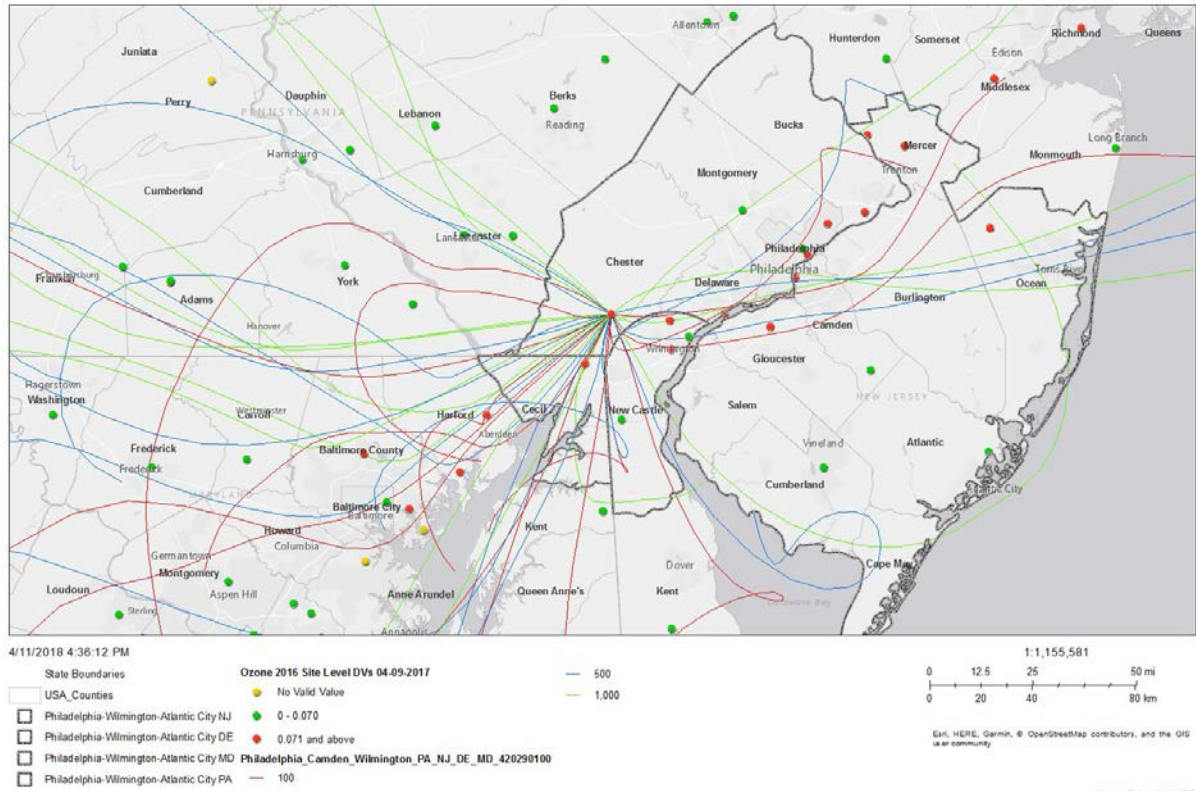


Figure 6i. HYSPLIT Back Trajectories for Monitor 420450002 Delaware County, Pennsylvania

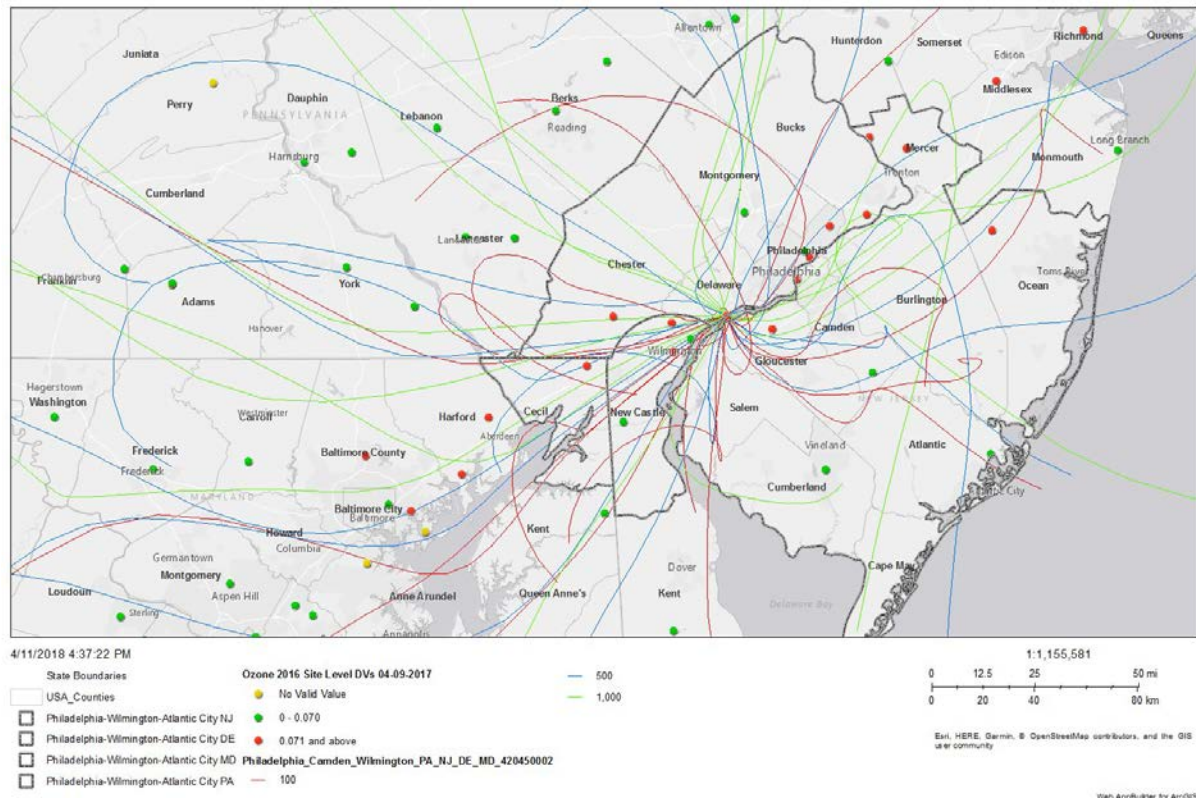


Figure 6k. HYSPLIT Back Trajectories for Monitor 421010024 Philadelphia County, Pennsylvania

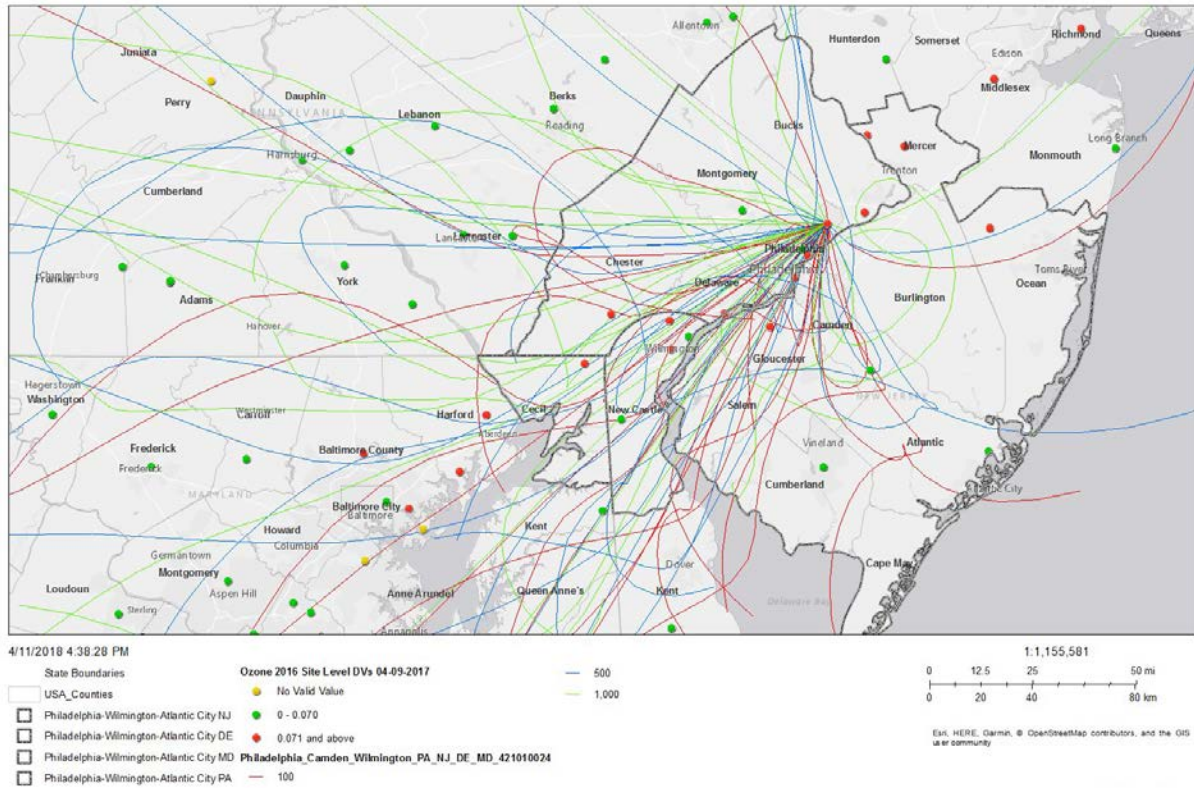


Figure 6l. HYSPLIT Back Trajectories for Monitor 421010048 Philadelphia County, Pennsylvania

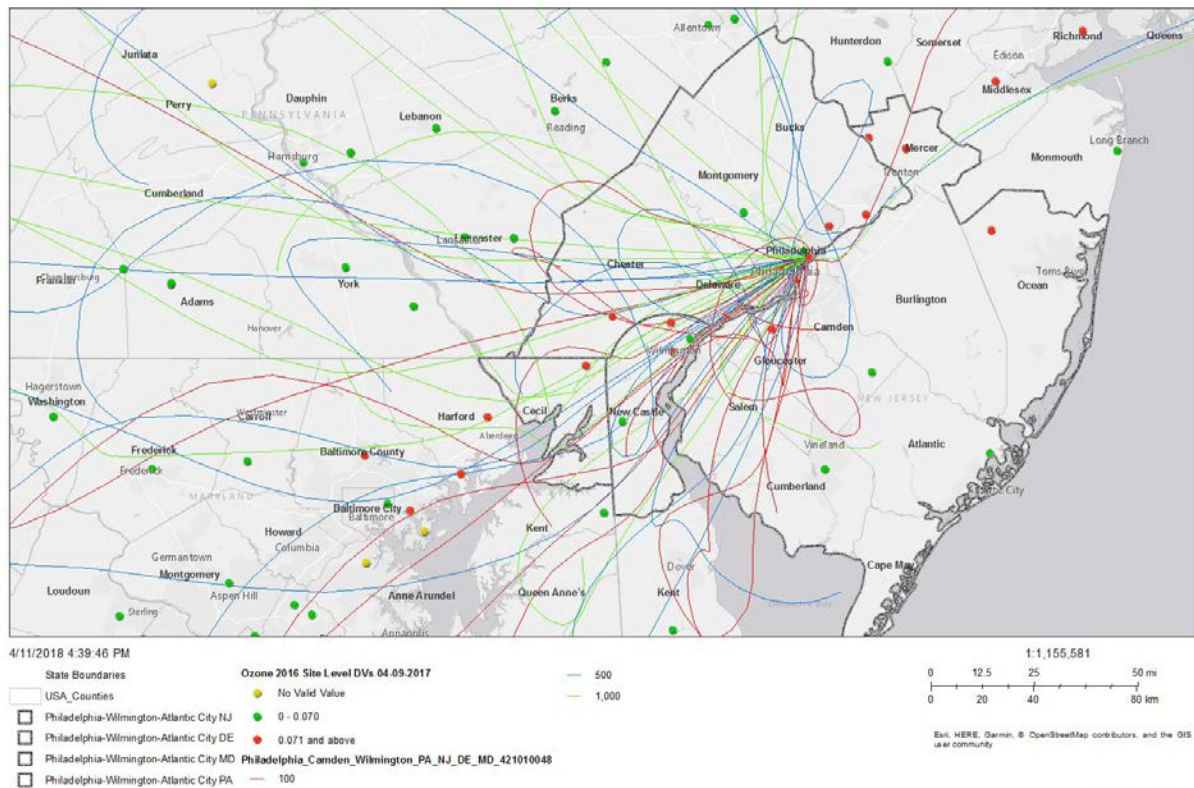


Figure 6m. HYSPLIT Back Trajectories for Monitor 340210005 Mercer County, New Jersey

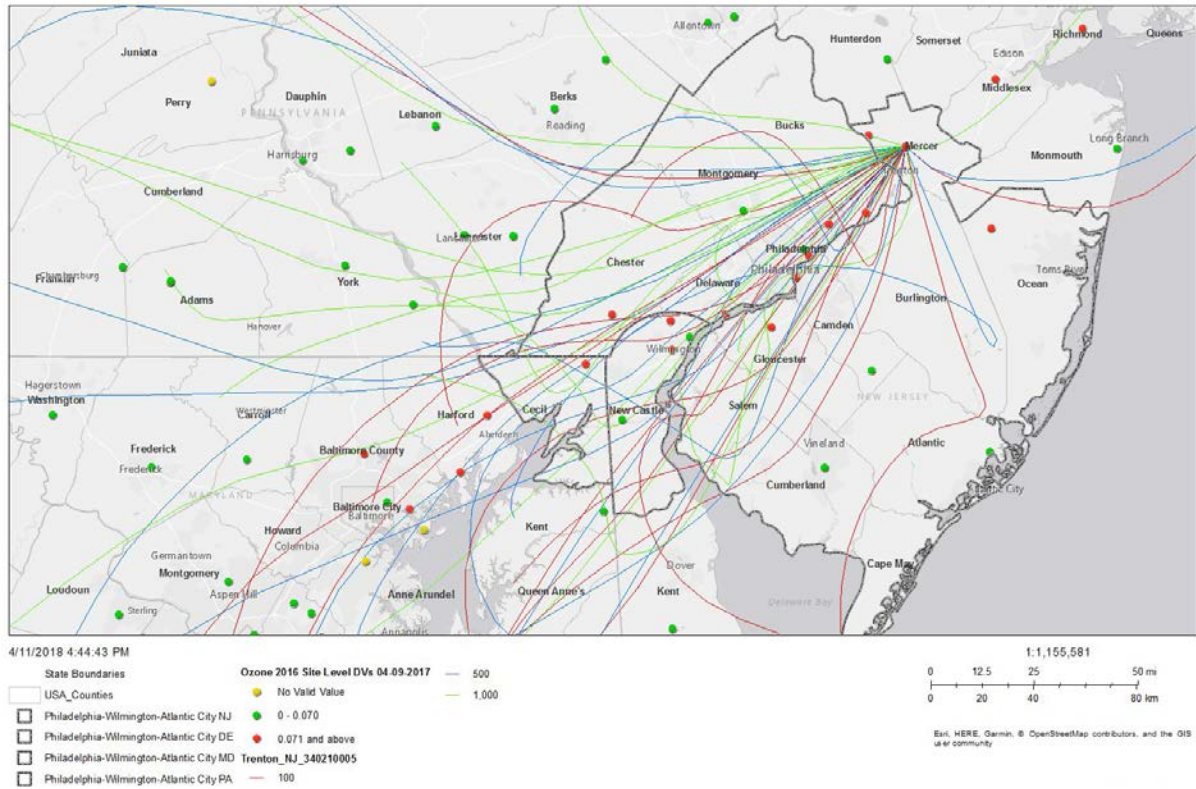


Figure 6n. HYSPLIT Back Trajectories for Monitor 340219991 Mercer County, New Jersey

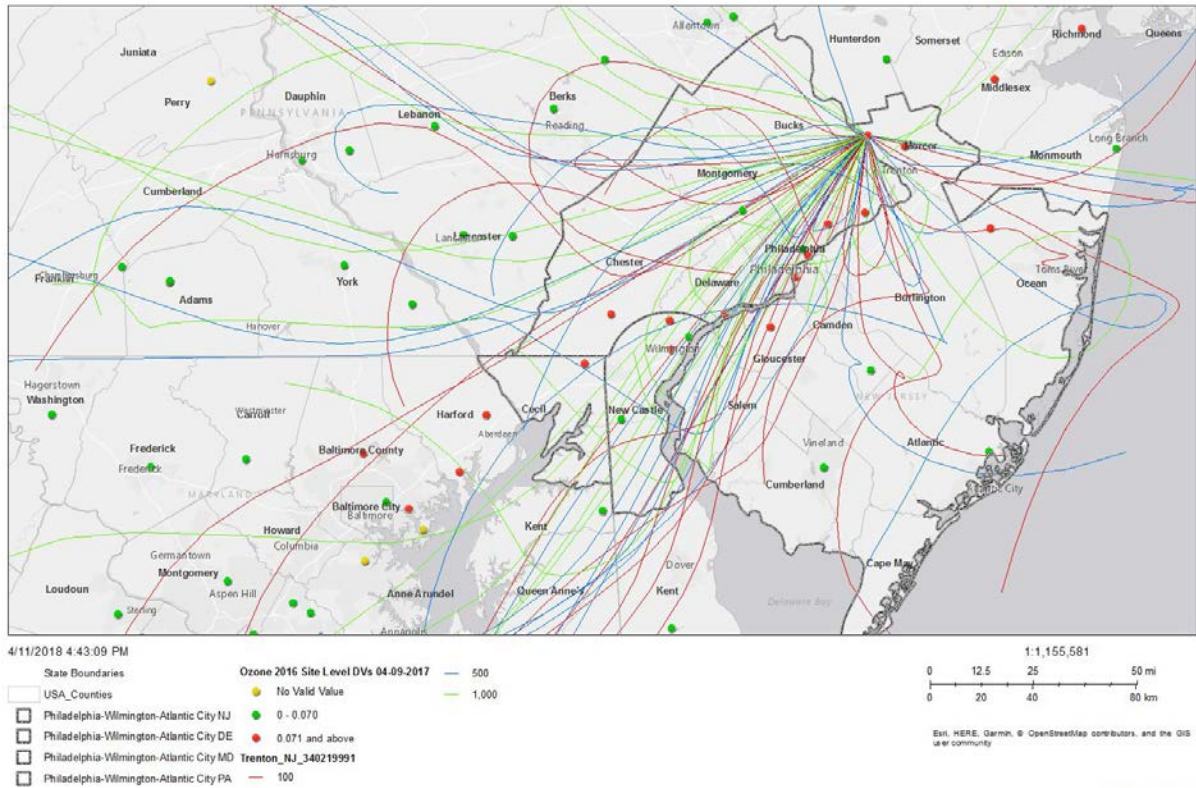
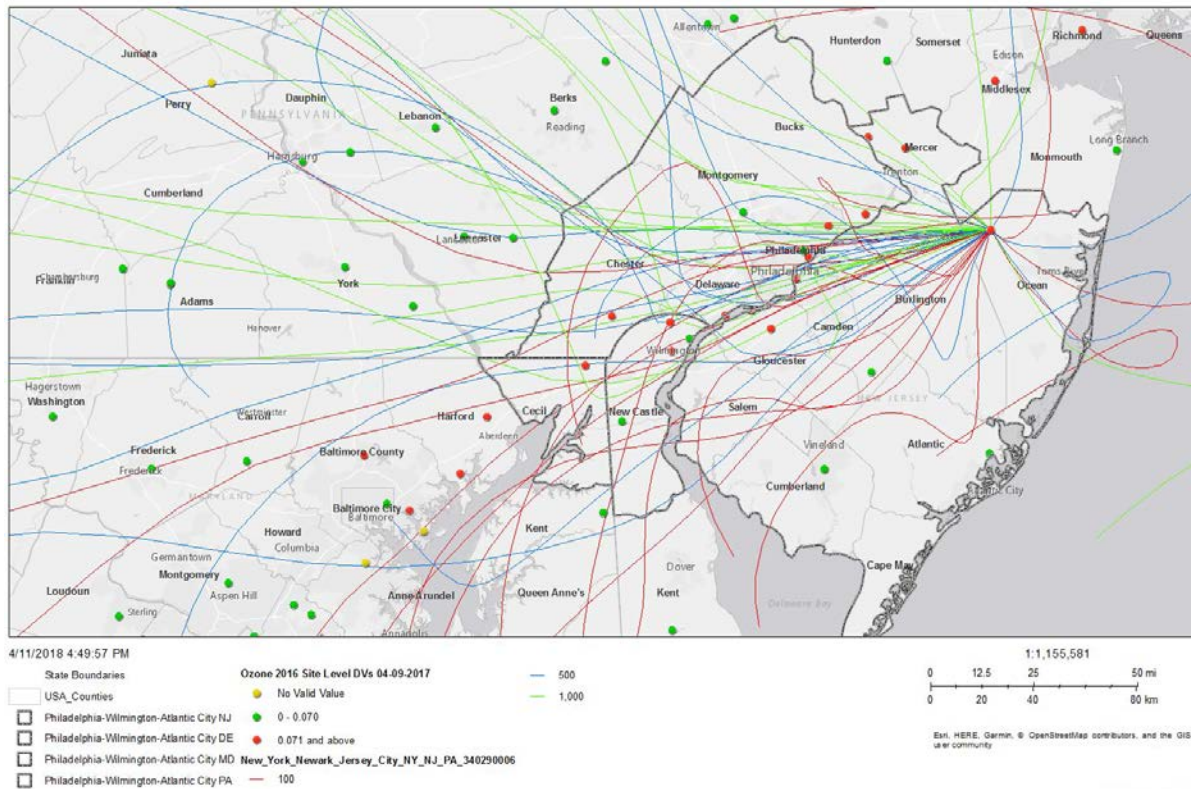


Figure 60. HYSPLIT Back Trajectories for Monitor 340290006 Ocean County, New Jersey



Figures 6a and 6b show HYSPLIT back trajectories for the two violating monitors in New Castle County, DE. Figure 6a shows that for most violating days, winds were coming generally from the west and southwest, through Chester County, PA and Cecil County, MD as well as the Eastern Shore of Maryland. Figure 6b shows southwestern winds, but also contribution from the east, through Salem, Gloucester, Camden, and Burlington Counties, NJ.

Figure 6c shows HYSPLIT back trajectories for the violating monitor in Cecil County, MD. This figure shows predominant winds from the southwest, but also contribution from the northeast, through New Castle County, DE, and Salem, Gloucester, Camden, Burlington, and Mercer Counties, NJ and Delaware and Philadelphia Counties, PA, and from the northwest through Chester, Lancaster, and York Counties, PA.

Figures 6d and 6e show HYSPLIT back trajectories for the violating monitors in Camden and Gloucester Counties, NJ. Both figures show southwestern winds, but also contribution from almost every direction including circular wind patterns. The back trajectories in Figure 6d show contribution to the violating monitor in Camden County, NJ from Gloucester and Salem Counties, NJ, New Castle County, DE, and Chester, Delaware, Montgomery, Philadelphia, Bucks and Berks Counties, PA, and to a lesser extent from Cumberland, Atlantic, and Burlington Counties, NJ. The back trajectories in Figure 6e show contribution to the violating monitor in Gloucester County, NJ from Salem, Camden, and Burlington Counties, NJ, New Castle County, DE, and Chester, Delaware, and Bucks Counties, PA, and to a lesser extent from Philadelphia, Montgomery, and Berks Counties, PA.

Figure 6f shows HYSPLIT back trajectories for the violating monitor in Bucks County, PA. This figure shows that on violating days, winds are predominantly from the southwest, through Montgomery, Philadelphia, Delaware, and Chester Counties, PA, Burlington, Camden, Gloucester, Salem, and

Cumberland Counties, NJ, New Castle County, DE, and Cecil County, MD. There is a lesser northeasterly contribution, through Mercer County, NJ.

Figure 6h shows HYSPLIT back trajectories for the violating monitor in Chester County, PA. The back trajectories in this figure show that on violating days, the predominant wind direction is from the southwest, through Cecil County, MD. There is also a northwesterly contribution through Lancaster County, PA, and a lesser easterly component, through New Castle County, DE, Delaware and Philadelphia Counties, PA, and Gloucester, Camden, and Burlington Counties, NJ.

Figure 6i shows HYSPLIT back trajectories for the violating monitor in Delaware County, PA. The back trajectories in this figure show that on violating days at the Delaware County, PA monitor, winds are from almost every direction. However, there are western, southwestern, and southern winds, through Chester County, PA, New Castle County, DE, and Salem and Gloucester Counties, NJ. There are also eastern, northeastern, and northern winds, through Gloucester, Camden, Burlington, and Mercer Counties, NJ, and Philadelphia, Montgomery, and Bucks Counties, PA.

Figures 6k and 6l show HYSPLIT back trajectories for the two violating monitors in Philadelphia County, PA. Both figures show that the predominant wind direction into Philadelphia on violating days is from the southwest, through Chester and Delaware Counties, PA, New Castle County, DE, and Camden, Gloucester, and Salem Counties, NJ. The back trajectories also show contribution from Montgomery, Bucks, and Lancaster Counties, PA, and, to a lesser extent, Berks County, PA, and Burlington, Cumberland, and Atlantic Counties, NJ.

Figures 6m and 6n show HYSPLIT back trajectories for the two violating monitors in Mercer County, NJ. Both figures show that the predominant wind direction on violating days in Mercer County, NJ is southwest, through Bucks, Montgomery, Philadelphia, Chester, and Delaware Counties, PA, and Burlington, Camden, Gloucester, and Salem Counties, NJ, New Castle and Kent Counties, DE, and Cecil County, MD, and to a lesser extent, Ocean and Atlantic County, NJ.

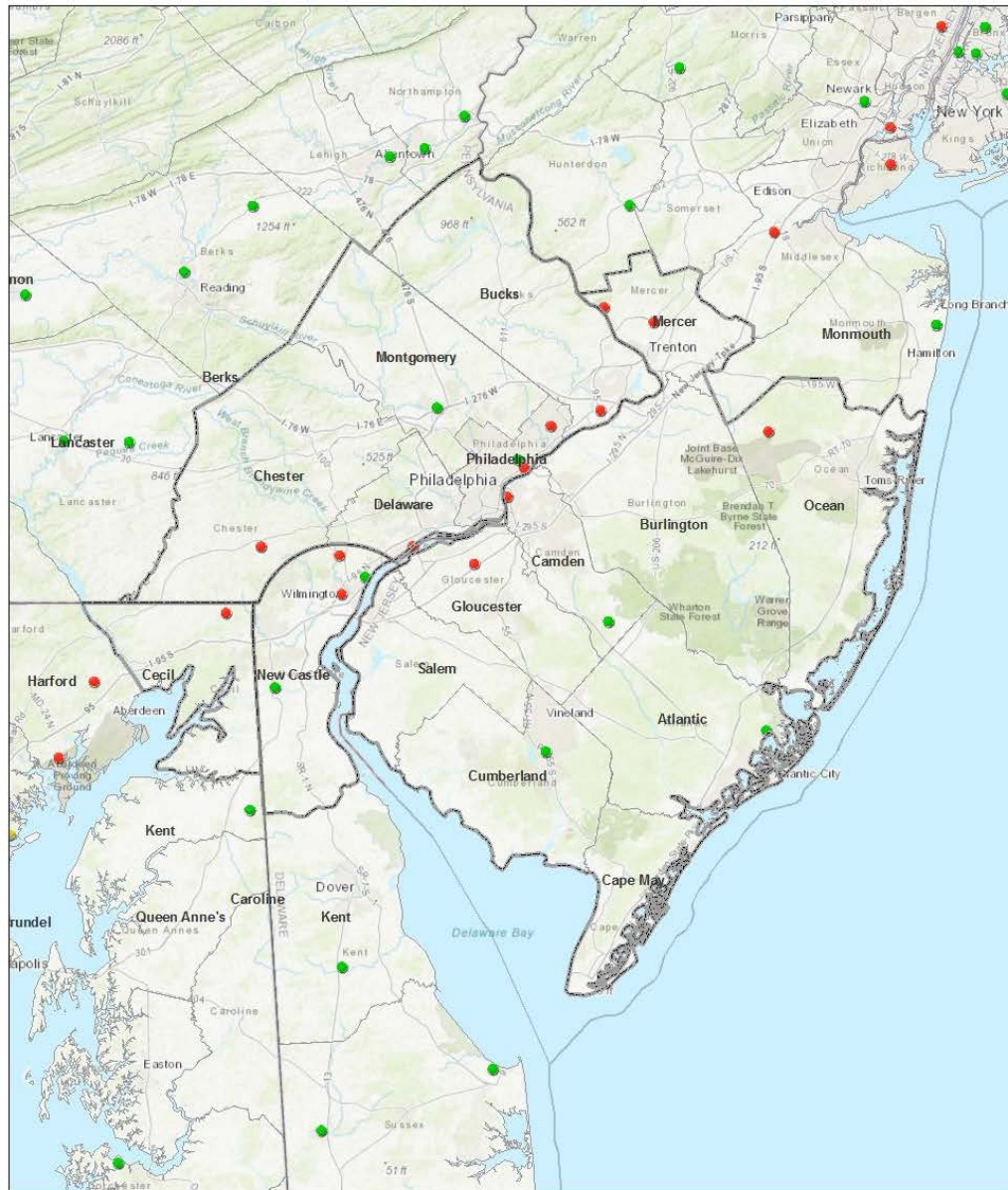
Figure 6o shows HYSPLIT back trajectories for the violating monitor in Ocean County, NJ. This figure shows predominant winds from the west-southwest, through Burlington, Camden, Gloucester, and Salem Counties, NJ, Philadelphia, Chester, Delaware, Montgomery, and Bucks Counties, PA, New Castle County, DE, and Cecil County, MD on days when the Ocean County, NJ monitor is violating.

Factor 4: Geography/topography

Consideration of geography or topography can provide additional information relevant to defining nonattainment area boundaries. Analyses should examine the physical features of the land that might define the air shed. Mountains or other physical features may influence the fate and transport of emissions as well as the formation and distribution of ozone concentrations. The absence of any such geographic or topographic features may also be a relevant consideration in selecting boundaries for a given area.

EPA used geography/topography analysis to evaluate the physical features of the land that might affect the air shed and, therefore, the distribution of ozone over the area. The Philadelphia-Wilmington-Atlantic City Area does not have any geographical or topographical features significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a role in this evaluation.

Figure 7. Topographic Illustration of the Physical Features.

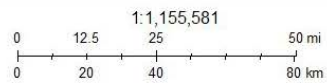


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- State Boundaries
- USA_Counties
- Philadelphia-Wilmington-Atlantic City NJ
- Philadelphia-Wilmington-Atlantic City DE
- Philadelphia-Wilmington-Atlantic City MD
- Philadelphia-Wilmington-Atlantic City PA

Ozone 2016 Site Level DVs 04-09-2017

- No Valid Value
- 0 - 0.070
- 0.071 and above



Factor 5: Jurisdictional boundaries

Once the geographic extent of the violating area and the nearby area contributing to violations is determined, EPA considers existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary to carry out the air quality planning and enforcement functions for nonattainment areas. In defining the boundaries of the Philadelphia-Wilmington-Atlantic City nonattainment area, EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Examples of jurisdictional boundaries include, but are not limited to: counties, air districts, areas of Indian country, metropolitan planning organizations, and existing nonattainment areas. If an existing jurisdictional boundary is used to help define the nonattainment area, it must encompass all of the area that has been identified as meeting the nonattainment definition. Where existing jurisdictional boundaries are not adequate or appropriate to describe the nonattainment area, EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the designated areas.

The Philadelphia-Wilmington-Atlantic City Area has previously established nonattainment boundaries associated with the 1997 and 2008 ozone NAAQS. Pennsylvania and Maryland had recommended the same boundary for the Philadelphia-Wilmington-Atlantic City Area for the 2015 ozone NAAQS. However, during the 120-day period, Pennsylvania requested that EPA exclude Montgomery County from the Philadelphia-Wilmington-Atlantic City Area. Delaware and New Jersey have recommended different boundaries for the 2015 ozone NAAQS. Delaware initially recommended a large nonattainment area across multiple states or, alternatively, New Castle County as a single county nonattainment area, separate from the Philadelphia-Wilmington-Atlantic City Area. During the 120-day period, Delaware reiterated its request that New Castle County as a stand-alone nonattainment area. New Jersey initially recommended that the entire state be designated nonattainment in an expanded New York City nonattainment area, extending from Connecticut to northern Virginia, and containing the entire States of Connecticut, New Jersey, and Delaware, along with eastern New York State and eastern Pennsylvania, the Baltimore nonattainment area, and the Washington, DC-MD-VA nonattainment area. However, during the 120-day period, New Jersey requested that EPA include Berks, Lebanon, Lancaster and York Counties in Pennsylvania in the Philadelphia-Wilmington-Atlantic City Area.

Pennsylvania recommended attainment for the Reading Area (Berks County) based on 2013-2015 air quality monitoring data.

The Delaware Valley Regional Planning Commission (DVRPC), the MPO in the greater Philadelphia area, serves Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania, and Burlington, Camden, Gloucester, and Mercer Counties in New Jersey. The MPO for Atlantic, Cape May, Cumberland, and Salem Counties is the South Jersey Transportation Planning Organization. Ocean County is part of the North Jersey Transportation Planning Organization, which also includes Bergen, Essex, Newark, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Passaic, Somerset, Sussex, Union, and Warren Counties, including Newark and Jersey City. New Castle County, DE and Cecil County, MD are in the Wilmington Area Planning Council (WILMAPCO) MPO. Kent County, DE is served by the Dover/Kent County MPO. Berks County is covered by a separate MPO, the Berks County Planning Commission.

Conclusion for the Philadelphia-Wilmington-Atlantic City Area

Based on the assessment of factors described above, EPA is designating following counties in the intended Philadelphia-Wilmington-Atlantic City Area: Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, PA: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem Counties, NJ: New Castle County, DE: and Cecil County, MD. These are the same counties that are included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 and 2008 ozone NAAQS. EPA is not modifying the states' recommendations for Bucks, Chester, Delaware, and Philadelphia Counties, PA: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Mercer, Ocean, and Salem Counties, NJ; and Cecil County, MD. EPA is modifying Pennsylvania's recommendation to designate Montgomery County, PA as attainment Delaware's recommendation to designate New Castle County, DE as a stand-alone nonattainment area. Based on the five factor analysis presented in this TSD, EPA is designating Montgomery County, PA and New Castle County, DE as nonattainment in the Philadelphia-Wilmington-Atlantic City Area.

The air quality monitors in Bucks, Chester, Delaware, and Philadelphia Counties, PA, Camden, Gloucester, Mercer, and Ocean Counties, NJ, New Castle County, DE, and Cecil County, MD indicate violations of the 2015 ozone NAAQS based on the 2014-2016 design values, therefore these counties are included in the nonattainment area. Montgomery County, PA and Atlantic, Burlington, Cape May, Cumberland, and Salem Counties, NJ are nearby counties that do not have violating monitors, but that EPA has determined contribute to violations in the Philadelphia-Wilmington-Atlantic City Area based on the above factor analysis.

Pennsylvania recommended that Montgomery County be designated as attainment/unclassifiable if EPA concurs on Pennsylvania's EE demonstration. EPA did concur on Pennsylvania's EE demonstration for the Norristown monitor (monitor 420910013) in Montgomery County on March 6, 2018. Thus, Montgomery County has ambient air quality monitoring data that meets the 2015 ozone NAAQS. However, considering the five factors above, EPA has determined that Montgomery County is closely tied to the greater Philadelphia area and contributes to other nearby violating monitors in the area of analysis. Montgomery County ranks second in both NO_x and VOC emissions in the area of analysis. Montgomery County ranks second in population, fourth in population density, and first in VMT. Numerous HYSPLIT back trajectories pass through Montgomery County on their way to the various violating monitors in the Philadelphia area, with a high density of trajectories through Montgomery County to the violating monitors in Bucks County, PA, Mercer County, NJ, and Philadelphia County, PA (monitor 421010024). Based on consideration of these factors, EPA has determined that Montgomery County contributes to nearby violating monitors in the Philadelphia-Wilmington-Atlantic City Area and EPA is designating Montgomery County as part of the Philadelphia nonattainment area.

Delaware recommended that New Castle County be designated as a single-county nonattainment area, separate from the Philadelphia-Wilmington-Atlantic City area. However, considering the five factors above, EPA has determined that New Castle County is closely tied to the greater Philadelphia area, and contributes to other nearby violating monitors in the area of analysis. New Castle County, DE has relatively high emissions, high population, and high VMT compared to the other counties in the area of analysis. As shown in Figures 6c-e, 6g, and 6k-m, the prevailing winds from the southwest show that emissions in New Castle County contribute to most counties with violating monitors in the greater Philadelphia area. Furthermore, New Castle County is part of the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 and 2008 ozone NAAQS. Based on its relatively high emissions and meteorology that indicates that it is upwind of nearby violating counties in the Philadelphia-Wilmington-Atlantic City area, EPA concludes that it is contributing to those violations and should be part of that nonattainment area. Furthermore, New Castle County is served by DVRPC, the MPO for the greater

Philadelphia area, and is part of the Philadelphia-Camden-Wilmington CBSA, which includes the Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, PA, four counties in southern New Jersey, and Cecil County, MD. Based on consideration of these factors, EPA has determined that New Castle County contributes to nearby violating monitors in the Philadelphia-Wilmington-Atlantic City Area and EPA is designating New Castle County as part of the Philadelphia nonattainment area. Delaware also recommended attainment for Kent County, and EPA is not modifying the state's recommendation. Kent County has relatively low NO_x and VOC emissions, population, and VMT compared with most counties in the area of analysis. It is served by a separate MPO than the rest of the area, the Dover/Kent County MPO, and is in a separate CBSA, the Dover CBSA. In addition, meteorology shows few trajectories from Kent County to nearby violating monitors in New Castle County, DE, Cecil County, MD, Camden and Gloucester Counties, NJ, and Chester and Delaware Counties, PA, as shown in Figures 6a – 6e, 6h, and 6i. Based on these factors, EPA is designating Kent County, DE as attainment/unclassifiable for the 2015 ozone NAAQS.

EPA is not modifying New Jersey's recommendation that the nine New Jersey counties that were included in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 1997 and 2008 ozone NAAQS be designated nonattainment for the 2015 NAAQS. Camden, Gloucester, Mercer, and Ocean Counties, NJ all show violations of the 2015 ozone NAAQS. As shown in Figures 6a-o, meteorology indicates that counties in the greater Philadelphia area in Pennsylvania, Delaware, and Maryland are upwind and therefore contributing to violating monitors in Camden, Gloucester, Mercer, and Ocean Counties, NJ. Figures 6a-o also show that New Jersey counties in the area of analysis are contributing to counties in the greater Philadelphia area in Pennsylvania, Delaware, and Maryland.

Maryland recommended that Cecil County, which has a violating monitor, be designated as nonattainment in the Philadelphia-Wilmington-Atlantic City nonattainment area, and EPA is not modifying that recommendation. Cecil County has a violating monitor. Moreover, although the County has relatively low emissions, population, and VMT, it is directly upwind of and therefore contributing to the violating monitor in Chester County, PA.

EPA concurred on Pennsylvania's EE demonstration for the Reading airport monitor (monitor 420110011) in Berks County on March 6, 2018. Thus, Berks County has ambient air quality monitoring data that meets the 2015 ozone NAAQS. EPA evaluated Berks County for inclusion in the Philadelphia-Wilmington-Atlantic City Area. It is its own, single-county CBSA, the Reading CBSA, and is served by a single-county MPO, the Berks County Planning Commission. More importantly, meteorology shows, in Figures 6a-e and 6g-o, that violating monitors in the Philadelphia-Wilmington-Atlantic City area are generally not impacted by emissions from Berks County. Therefore, EPA is designating Berks County as attainment/unclassifiable.