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September 23, 2016

Shawn M. Garvin  
Regional Administrator  
Region III  
U.S. Environmental Protection Agency  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

Dear Administrator Garvin:

On October 1, 2015, the EPA strengthened the primary and secondary National Ambient Air Quality Standards (NAAQS) for ground-level ozone from the current 0.075 parts per million (ppm) over an 8-hour period to a new 0.070 ppm. Section 107(d) of the Clean Air Act (CAA) requires the Governor of each State to submit to the EPA a list of all areas (or portions thereof) in the State, designating each as nonattainment, attainment, or unclassifiable. This letter fulfills Delaware's obligations under Section 107(d) of the CAA.

Emissions cause ozone nonattainment and Delaware believes it is necessary to establish nonattainment boundaries that encompass enough of these emissions to make attainment a feasible and possible goal for the area. To this end Delaware hereby recommends that the nonattainment area borders associated with New Castle County be the borders of the States of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin, as shown in Figure 1 in the attached Executive Summary, due to EPA's analysis that these states significantly impact Delaware as part of the CSAPR and CSAPR Update. If the EPA again rejects establishing a nonattainment area that is consistent with science to solve the problem, Delaware requests EPA establish New Castle County as a stand-alone nonattainment area under the 2015 8-hour ozone NAAQS. The attached five factor analysis supports this recommendation.

Mr. Shawn M. Garvin  
September 23, 2016  
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Thank you for your consideration of the above recommendations. If you have any questions concerning this submittal or would like to discuss it further, please contact Mr. Ali Mirzakhali, the Director of the Division of Air Quality, at (302)739-9402.

Sincerely,

A handwritten signature in blue ink, consisting of a stylized 'J' followed by a horizontal line that curves upwards at the end.

Jack A. Markell  
Governor

Attachment

pc: David Small  
Ali Mirzakhali  
Cristina Fernandez, EPA Region III

## Executive Summary

### Area Description and Attainment/Nonattainment Status

Delaware is composed of three counties, namely New Castle, Kent, and Sussex, laying from north to south. The northern portion of New Castle County lies above the Chesapeake and Delaware Canal (C&D Canal), a waterway that connects the Chesapeake Bay with the Delaware Bay. The remainder of Delaware lies south of the Canal and is connected to the north primarily by the Route 1 Bridge. The portion of New Castle County located above the C&D Canal is more metropolitan and industrialized than the remainder of Delaware; however this area has experienced a significant decline in heavy industrial sources over the last two decades. Delaware is geographically situated, along with portions of Maryland and Virginia, on a land mass known as the Delmarva Peninsula. This land mass is separated from the Continental U.S. by the Chesapeake Bay on the west and from the State of New Jersey by the Delaware Bay on the east. These large water bodies surrounding the relatively large, flat Peninsula, plus the Atlantic Ocean, situate Delaware in an area that is geographically unlike any other. Further, these large water bodies create complex meteorological mountains and valleys that at times funnel transported emissions around the Peninsula and up the I-95 corridor, and at other times trap upwind emissions such that those emissions are recirculated by ocean and bay breezes, and impact Delaware multiple times.

Delaware operates a dense ozone monitoring network that includes ambient ozone monitors in each of its counties (four monitors in New Castle, one monitor in Kent, and two monitors in Sussex). Based on certified 2013 through 2015 ozone monitoring data (i.e., the most recent, certified three years), the 8-hour ozone design values for New Castle, Kent, and Sussex counties are 0.069 ppm, 0.065 ppm, and 0.069 ppm, respectively. However, 2016 ozone monitoring data shows that these three counties have 8-hour ozone design values based upon 2014 through 2016 ozone monitoring data of 0.072 ppm, 0.066 ppm, and 0.069 ppm, respectively. Based on 2014 through 2016 data Delaware recommends that Kent and Sussex County be designated as attainment, and that New Castle County be designated as nonattainment for both the primary and secondary 0.070 ppm 8-hour ozone NAAQS.

### Nonattainment Area Boundaries associated with New Castle County

Over the past 40+ years, and in particular since 1990, Delaware's local sources of ozone precursor emissions have all been well controlled, yet Delaware's air quality remains nonattainment relative to ozone. Emission controls have been established and implemented in Delaware at a great economic cost to Delaware citizens and industry. Both large and small, new and modified, sources have been subject to costly nonattainment New Source Review control and offset requirements for more than two decades. Power plants, industrial boilers, consumer products, and paints are regulated in Delaware at levels far below national levels – and the list goes on. After many rounds of regulation<sup>1</sup>, Delaware's sources that cause and contribute to ozone formation (i.e., volatile organic compound (VOC) and nitrogen oxides (NO<sub>x</sub>) emitting sources) are well controlled. Delaware's

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<sup>1</sup> For example, all Delaware electric generating units (EGUs) have been subject to reasonably available control requirements (RACT) in 1995, the OTC NO<sub>x</sub> Budget Program in 1998, the EPA NO<sub>x</sub> SIP Call in 2002, the EPA CAIR in 2006, and 7 DE Admin Code 1146 in 2008. All Delaware EGUs are now subject to unit specific best available control technology (BACT) controls that were installed at a cost of between \$1,200 and \$11,000 per ton of NO<sub>x</sub> reduced.

emissions are likely controlled to a greater level than any other state that impacts Delaware's air quality – yet Delaware's air quality remains unhealthy because of high ozone concentrations. Many studies have shown that the health benefits of clean air far outweigh the cost of controls needed to clean the air; typically by more than 10:1. Delaware citizens and industry have endured the cost of controls, and despite this, have not reaped the economic benefit of clean air because of uncontrolled emissions generated outside of Delaware's borders. As such, Delaware suffers from this dual malfeasance.

The establishment of nonattainment boundaries is critical because it is within these boundaries that the nonattainment provisions of the CAA are applied. If the EPA again establishes small, metropolitan based nonattainment areas, Delaware's well controlled sources will undergo another round of costly regulation, and any additional emission reductions will come at a high cost, with control strategies generally being technology forcing. In contrast, very cost effective emissions reduction opportunities outside this small nonattainment area will not be realized, and the uncontrolled sources that are contributing to the problem will remain uncontrolled. This is unfair, and contrary to the CAA.

Emissions cause ozone nonattainment and Delaware believes it is necessary to establish nonattainment boundaries that encompass enough of these emissions to make attainment a feasible and possible goal for the area. To this end Delaware hereby recommends that the nonattainment area borders associated with New Castle County be the borders of the States of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin, as shown in Figure 1, due to EPA's analysis that these states significantly impact Delaware as part of the CSAPR and CSAPR Update. Delaware has made this same recommendation in the past and the EPA has provided the following rationale for rejecting this recommendation in the past. Delaware asks EPA to reconsider its position for the following reasons.

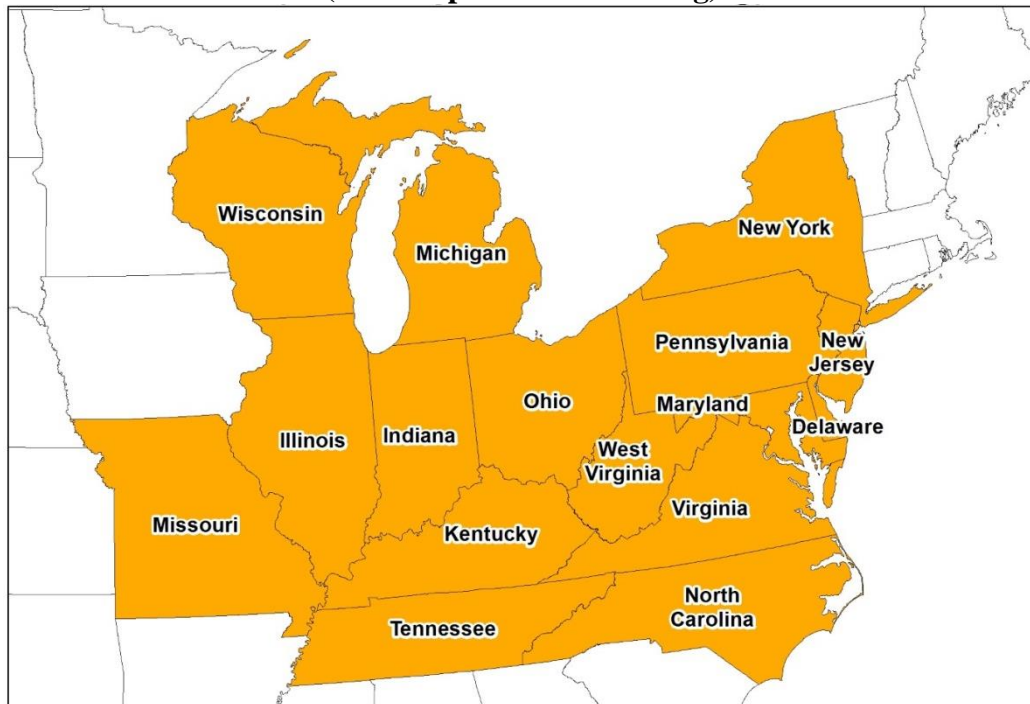
- EPA has indicated that Section 107(d) of the CAA requires EPA to designate as nonattainment all areas violating the ozone NAAQS and any nearby areas that are contributing to a violation in another area. Under the designation provision, only "nearby" areas that contribute to the violation must be included as part of the nonattainment area. The issue here is that the term nearby must be interpreted consistent with the scale of the problem. The Courts have ruled that EPA has discretion on how it interprets the term nearby, and that interpreting nearby as a large area is a feasible construct of the statutory language.
- EPA has indicated that there are other provisions of the CAA that address longer range transport of ozone pollution, such as sections 110(a)(2)(D), 126, and 176A. The phenomenon of ozone transport must be balanced against the need to have smaller areas that can focus on local control measures. Delaware has and continues to take action under these CAA provisions, but notes the dates for EPA to take action come and go and EPA fails to act. EPA has effectively made these provisions of no effect. Further, given that this would be the 4th round of applying the CAA ozone requirements to the Philadelphia area since 1990 there are few local control measures that remain for this area to focus on. It is not reasonable for EPA to knowingly establish nonattainment area boundaries that task the areas within the boundaries to achieve a goal that they cannot achieve, that requires these

areas to make demonstrations and implement costly controls that cannot lead to attainment, and point to solutions that lead to other discretionary processes that are also outside the control of these areas. EPA ignoring the scale of the problem during the designation process does nothing more than penalize these areas with unhealthy air quality.

- EPA in the past has noted that most of the states that Delaware seeks to include as part of this large nonattainment area did not make a similar request. EPA indicated that in the absence of broad agreement among a large group of states to create such a large nonattainment area, demonstrating a commitment to work together to address both long-range and local transport of emissions, they do not intend to designate a large nonattainment area as suggested by Delaware. Seeking broad agreement makes no sense and will not happen. Agreement was sought through the State Collaborative On Ozone Transport (SCOOT) process, but did not occur. Due to the upwind/downwind nature and the false perception that almost all of the potential benefits of reducing emissions lie in the Northeastern states while all costs lie in the Midwestern states. EPA alone has the authority to designate areas and federal intervention is necessary to require the area to work together and resolve the problem.

Figure 1 - Delaware Recommended Large Nonattainment Area

(Based Upon EPA Modeling)



## Attachment 1

### Delaware's Five Factor Analysis For Establishment of Nonattainment Area Boundaries For the 0.070 ppm 8-Hour Ozone NAAQS

As a framework for area-specific analyses, the EPA has recommended that states and tribes base their boundary recommendations on an evaluation of the following five factors<sup>1</sup>: Air Quality Data, Emissions and Emissions-Related Data, Meteorology, Geography/Topography, and Jurisdictional Boundaries. This EPA guidance indicates that states and tribes may identify and evaluate other relevant factors or circumstances specific to a particular area.

Delaware's primary boundary recommendation is to include New Castle County as part of a large multi-state nonattainment area. The information and analysis that Delaware submitted to the EPA in its nonattainment boundary recommendations for the 2008 8-hour ozone NAAQS still stand as justification for recommending a large nonattainment area. This recommendation is in line with current science and the Courts have ruled that EPA has sufficient authority under the CAA to adopt it. In the event that EPA does not accept Delaware's recommendation for the establishment of a large nonattainment area, Delaware hereby provides the following detailed discussion and analyses on each of the five factors, which indicate New Castle County should be established as a stand-alone nonattainment area. This alternate recommendation follows EPA guidance but not science.

Delaware considers in this analysis all counties considered by the EPA in their factor assessment associated with the Area Designations for Delaware under the 2008 Ozone National Ambient Air Quality Standards.<sup>2</sup> These counties are identified in Table 1 and are represented in Figure 1.

**Table 1 - Counties of Interest**

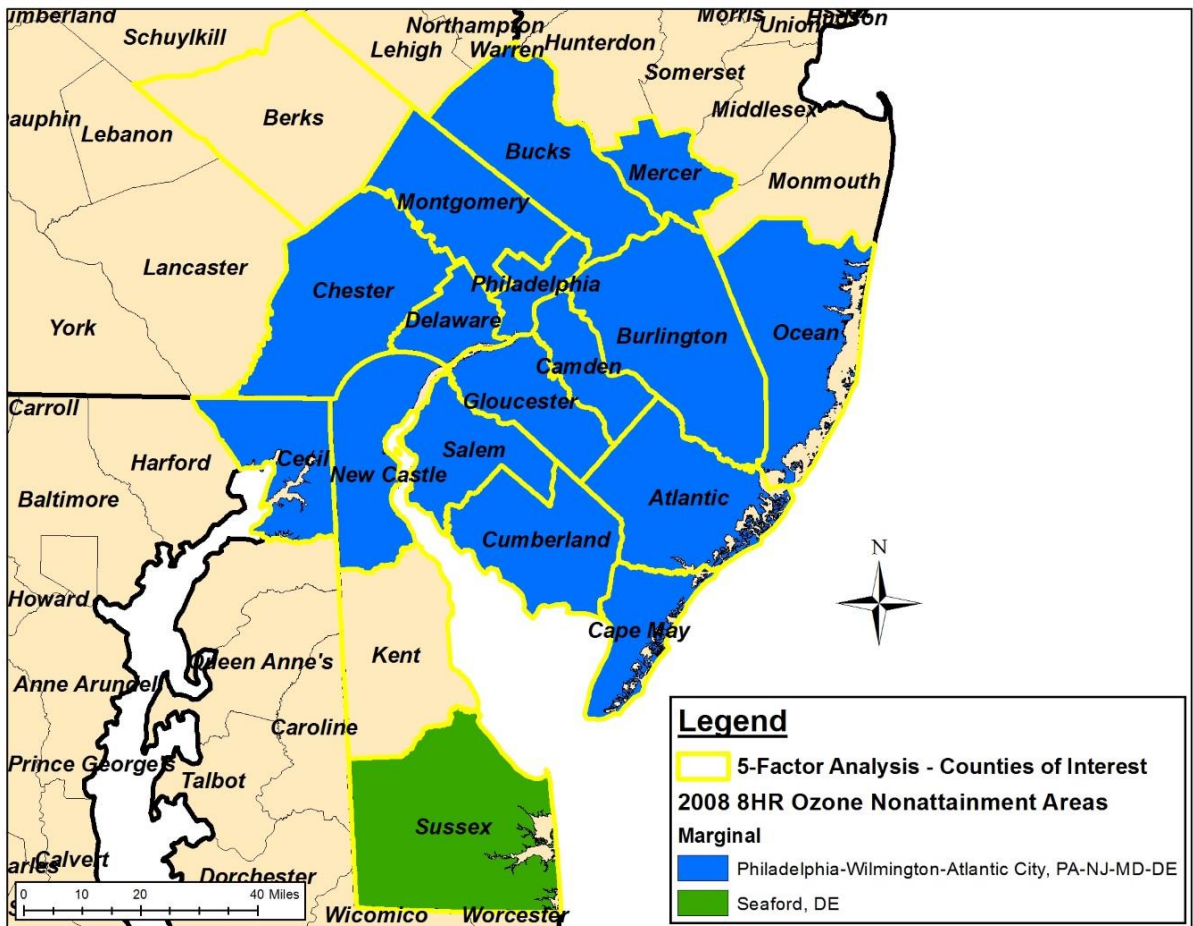
FIPS Code	State	County
10001	DE	Kent County, Delaware
10003	DE	New Castle County, Delaware
10005	DE	Sussex County, Delaware
24015	MD	Cecil County, Maryland
34001	NJ	Atlantic County, New Jersey
34005	NJ	Burlington County, New Jersey
34007	NJ	Camden County, New Jersey
34009	NJ	Cape May County, New Jersey
34011	NJ	Cumberland County, New Jersey
34015	NJ	Gloucester County, New Jersey
34021	NJ	Mercer County, New Jersey
34029	NJ	Ocean County, New Jersey

<sup>1</sup> Memorandum: Area Designations for the 2015 Ozone National Ambient Air Quality Standards; Janet G. McCabe, Acting Assistant Administrator, US EPA, February 25, 2016.

<sup>2</sup> <https://archive.epa.gov/ozonedesignations/web/html/region3r.html>

FIPS Code	State	County
34033	NJ	Salem County, New Jersey
42011	PA	Berks County, Pennsylvania
42017	PA	Bucks County, Pennsylvania
42029	PA	Chester County, Pennsylvania
42045	PA	Delaware County, Pennsylvania
42091	PA	Montgomery County, Pennsylvania
42101	PA	Philadelphia County, Pennsylvania

**Figure 1 - Counties of Interest**



**Factor 1: Air Quality Data**

For this factor Delaware evaluated 8-hour ozone design values (DV, in parts per million (ppm)) for air quality monitors in the counties of interest. A monitor’s DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2015 8-hour ozone NAAQS is met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years, is 0.070 ppm or less. 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 value. Delaware considered monitoring data for the 2014-2016. This is the 2 most recent years of certified air quality data, plus uncertified 2016 data through 9/14/16. Delaware believes it is important to consider 2016 data at this time because 1) EPA has indicated they will consider it when they make final designations in 2017, and 2) ozone concentrations were low in 2015 due to abnormal meteorological conditions.

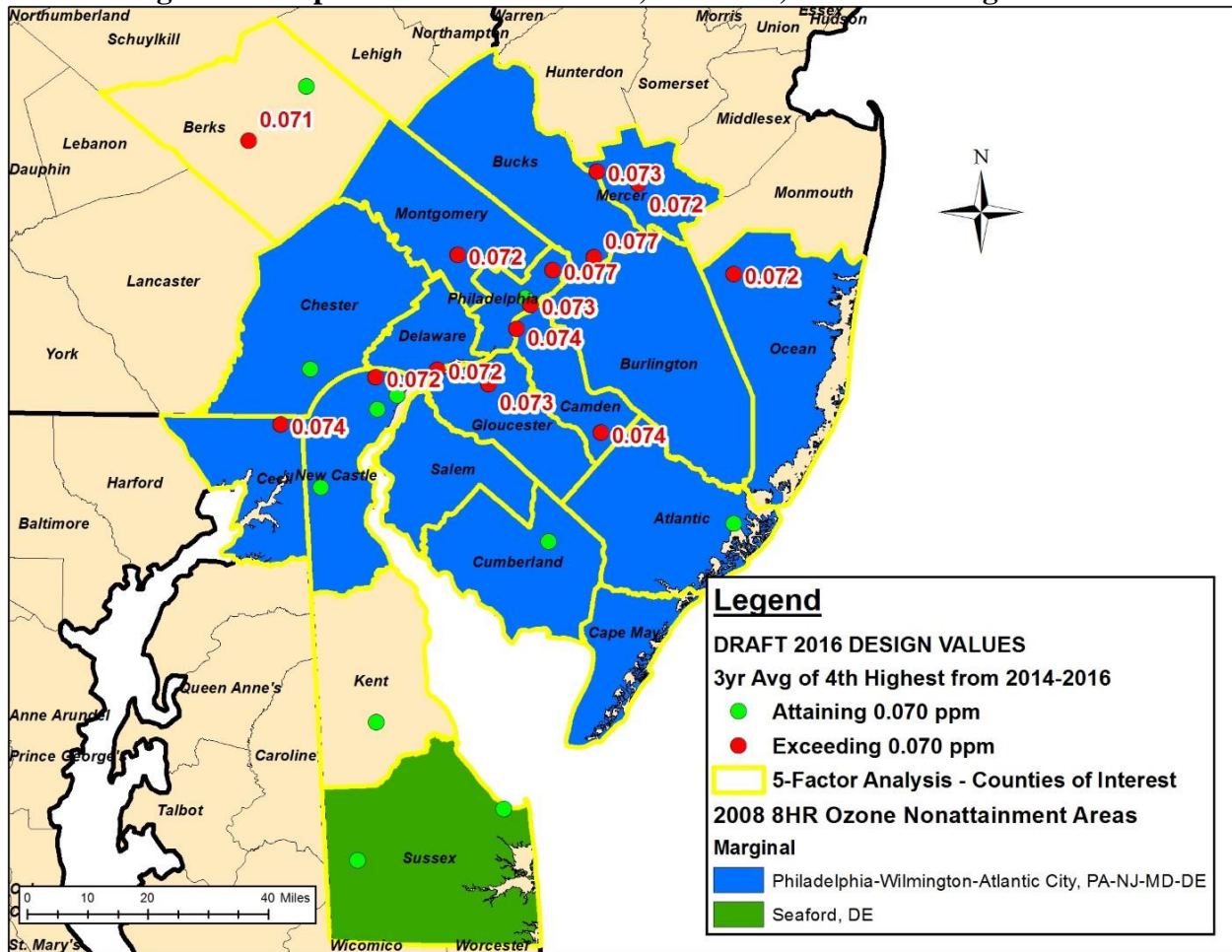
Table 2 and Figure 2 below detail the draft 2016 DVs for the counties of interest, as well as the violating monitors in these counties. While all monitors in Delaware were monitoring attainment with the 2015 8-hour ozone NAAQS based upon 2015 DVs, it is only with the most recent, uncertified 2016 data that New Castle County's northern-most monitor located in the Brandywine Creek State Park (Site ID 100031010) exceeds the 2015 8-hour ozone NAAQS. The closest monitor to the Brandywine monitor is Delaware's Bellefonte monitor (Site ID 100031013), which is monitoring attainment just 4.6 miles away to the southeast, while the second closest monitor is the Chester monitor (Site ID 420450002) in Delaware County, Pennsylvania, which is monitoring nonattainment 10.3 miles away to the east.

**Table 2 - Counties of Interest – 2016 Design Values**

County	2016 8-hour Ozone DV (ppm)
Atlantic, NJ	0.064
Berks, PA	0.071
Bucks, PA	0.077
Burlington, NJ	--
Camden, NJ	0.074
Cape May, NJ	--
Cecil, MD	0.074
Chester, PA	0.070
Cumberland, NJ	0.067
Delaware, PA	0.072
Gloucester, NJ	0.073
Kent, DE	0.066
Mercer, NJ	0.073
Montgomery, PA	0.072
New Castle, DE	0.072
Ocean, NJ	0.072
Philadelphia, PA	0.076
Salem, NJ	--
Sussex, DE	0.069



**Figure 2 - Map of Counties of Interest, Monitors, and 2016 Design Values**



In accordance with section 107(d) of the Clean Air Act, EPA must designate an area nonattainment if it is violating the 2015 8-hour ozone NAAQS. New Castle County in Delaware is violating the 2015 8-hour ozone NAAQS.

**Factor 2: Emissions and Emissions-Related Data**

Emissions

Table 3 and Table 4 show the emissions of NO<sub>x</sub> and VOC (in tons per year) for the counties of interest. The emissions were provided by EPA and are from the 2011 NEI V3 dataset.<sup>3</sup>

<sup>3</sup> <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>

**Table 3 - 2011 NEI V3 NOx Emissions**

<b>FIPS</b>	<b>State</b>	<b>County</b>	<b>NOX Fires (tpy)</b>	<b>NOX Nonpoint<sup>4</sup> (tpy)</b>	<b>NOX Nonroad (tpy)</b>	<b>NOX Onroad (tpy)</b>	<b>NOX Point (tpy)</b>	<b>NOX Total (tpy)</b>
42101	PA	Philadelphia County	-	5,791	2,480	10,201	2,568	<b>21,041</b>
42045	PA	Delaware County	21	2,839	1,124	5,643	7,642	<b>17,270</b>
42091	PA	Montgomery County	-	2,369	3,076	9,533	1,456	<b>16,435</b>
42011	PA	Berks County	15	1,766	1,529	7,665	3,140	<b>14,114</b>
10003	DE	New Castle County	7	2,889	1,748	6,459	2,755	<b>13,859</b>
42017	PA	Bucks County	1	1,631	2,196	7,680	1,271	<b>12,779</b>
42029	PA	Chester County	1	1,208	2,214	6,841	1,530	<b>11,794</b>
10005	DE	Sussex County	11	2,109	1,721	4,399	2,457	<b>10,697</b>
34007	NJ	Camden County	9	2,441	1,150	5,353	433	<b>9,386</b>
34005	NJ	Burlington County	30	1,365	1,512	5,936	286	<b>9,128</b>
34021	NJ	Mercer County	7	1,323	1,433	4,659	639	<b>8,061</b>
34015	NJ	Gloucester County	2	1,734	871	3,576	1,758	<b>7,942</b>
34029	NJ	Ocean County	30	1,388	2,264	3,969	255	<b>7,905</b>
34001	NJ	Atlantic County	7	936	1,161	2,808	202	<b>5,115</b>
10001	DE	Kent County	4	1,026	878	2,583	412	<b>4,902</b>
34009	NJ	Cape May County	-	1,022	1,227	1,193	602	<b>4,045</b>
34011	NJ	Cumberland County	29	1,106	766	1,394	723	<b>4,017</b>
24015	MD	Cecil County	0	494	529	2,757	77	<b>3,858</b>
34033	NJ	Salem County	1	345	311	1,078	1,540	<b>3,276</b>

<sup>4</sup> EPA's 2011 NEI V3 Emissions data included biogenic emissions within the nonpoint emissions data. The nonpoint NOx emissions in Table 3 exclude the biogenics emissions which EPA had added for each county.

**Table 4 - 2011 NEI V3 VOC Emissions**

<b>FIPS</b>	<b>State</b>	<b>County</b>	<b>VOC Fires (tpy)</b>	<b>VOC Nonpoint<sup>5</sup> (tpy)</b>	<b>VOC Nonroad (tpy)</b>	<b>VOC Onroad (tpy)</b>	<b>VOC Point (tpy)</b>	<b>VOC Total (tpy)</b>
42101	PA	Philadelphia County	-	11,129	2,518	5,641	1,598	<b>20,886</b>
42091	PA	Montgomery County	-	8,756	4,211	5,016	729	<b>18,712</b>
42017	PA	Bucks County	14	7,382	3,206	4,025	524	<b>15,150</b>
34029	NJ	Ocean County	1,002	4,968	4,416	2,636	73	<b>13,095</b>
42011	PA	Berks County	168	5,845	1,651	3,831	1,224	<b>12,719</b>
42029	PA	Chester County	14	4,766	2,646	3,223	799	<b>11,448</b>
42045	PA	Delaware County	491	4,715	1,788	3,000	1,393	<b>11,387</b>
10003	DE	New Castle County	15	4,626	1,931	3,051	848	<b>10,470</b>
34005	NJ	Burlington County	969	4,424	2,036	2,518	237	<b>10,183</b>
34007	NJ	Camden County	259	4,756	1,433	2,450	219	<b>9,117</b>
34015	NJ	Gloucester County	25	5,129	1,240	1,499	939	<b>8,832</b>
10005	DE	Sussex County	88	2,315	2,589	2,856	817	<b>8,665</b>
34021	NJ	Mercer County	75	4,168	1,185	1,964	135	<b>7,528</b>
34001	NJ	Atlantic County	204	3,245	2,230	1,261	98	<b>7,038</b>
34011	NJ	Cumberland County	889	2,613	780	676	70	<b>5,028</b>
34009	NJ	Cape May County	-	1,534	2,943	517	21	<b>5,014</b>
10001	DE	Kent County	80	1,578	1,127	1,010	85	<b>3,878</b>
24015	MD	Cecil County	4	951	1,055	853	20	<b>2,883</b>
34033	NJ	Salem County	13	1,024	525	387	199	<b>2,148</b>

<sup>5</sup> EPA's 2011 NEI V3 Emissions data included biogenic emissions within the nonpoint emissions data. The nonpoint VOC emissions in Table 4 exclude the biogenics emissions which EPA had added for each county.

Philadelphia County has the highest individual NOx or VOC emissions of the counties of interest and the highest combined emissions (NOx + VOC emissions). New Castle County's combined emissions are about half of Philadelphia County's combined emissions. New Castle County's emissions beyond 2011 have decreased, and continue to decline, in part due to enforceable coal to gas fuel switching; adoption and implementation of NOx measures which significantly reduce refinery emissions and VOC measures such as the updated AIM and Consumer Products rules; and adoption of CA LEV III.

During the designations process for the 2008 8-hour ozone NAAQS, the EPA's factor assessment characterized Berks County emissions as "moderate," and excluded Berks County from the 2008 Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area (2008 Philadelphia NAA). Berks County's total 2008 NOx and VOC emissions were similar to New Castle County's total 2008 NOx and VOC emissions, as well as Chester County's (which separates Berks County and New Castle County), both of which were included within the 2008 Philadelphia NAA. Berks County's 2011 NOx and VOC emissions are higher than New Castle County's emissions. For this reason, emissions indicate New Castle County is separate from the other counties of interest.

#### Population and Degree of Urbanization

Table 5 contains various demographic information for the counties of interest, to include each county's land area (in square miles), 2014 population, population density, and the percent of the population which reside in an urban area. These demographic data were obtained from the U.S. Census Bureau website at [www.census.gov](http://www.census.gov).<sup>6</sup>

**Table 5 - 2014 Population and Density**

FIPS	State	County	Land Area (SQ MI, US 2014 Gazetteer)	2014 Population (5yr ACS)	2014 Population/ Sq. Mile (people/mile <sup>2</sup> )	% Urban Population (2010 Census)
42101	PA	Philadelphia County	134.11	<b>1,546,920</b>	11,535	100.0%
42091	PA	Montgomery County	483.04	<b>809,372</b>	1,676	97.1%
42017	PA	Bucks County	604.32	<b>626,205</b>	1,036	91.2%
34029	NJ	Ocean County	628.83	<b>581,413</b>	925	97.1%
42045	PA	Delaware County	183.84	<b>560,775</b>	3,050	99.5%
10003	DE	New Castle County	426.29	<b>545,846</b>	1,280	95.4%
34007	NJ	Camden County	221.27	<b>512,632</b>	2,317	98.4%
42029	PA	Chester County	750.51	<b>506,422</b>	675	86.7%
34005	NJ	Burlington County	798.58	<b>450,155</b>	564	93.3%
42011	PA	Berks County	856.48	<b>413,016</b>	482	76.3%

<sup>6</sup> Land Area obtained from US Census Bureau, 2014 U.S. Gazetteer Files, <http://www.census.gov/geo/maps-data/data/gazetteer2014.htm>. Population estimates are from the U.S. Census Bureau, American Community Survey, 5 year estimates. <http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>.

34021	NJ	Mercer County	224.57	<b>369,526</b>	1,645	96.5%
34015	NJ	Gloucester County	322.02	<b>289,705</b>	900	91.7%
34001	NJ	Atlantic County	555.71	<b>275,325</b>	495	87.3%
10005	DE	Sussex County	936.09	<b>203,737</b>	218	58.7%
10001	DE	Kent County	586.32	<b>167,477</b>	286	73.0%
34011	NJ	Cumberland County	483.76	<b>157,429</b>	325	77.0%
24015	MD	Cecil County	346.28	<b>101,803</b>	294	57.9%
34009	NJ	Cape May County	251.43	<b>96,286</b>	383	82.5%
34033	NJ	Salem County	331.99	<b>65,501</b>	197	54.7%

Philadelphia County has the highest population and population density among the counties of interest. Bucks, Chester, Delaware, and Montgomery Counties, in Pennsylvania; Burlington, Camden, and Ocean Counties in New Jersey; and New Castle County in Delaware have somewhat large populations compared to Kent and Sussex Counties in Delaware. Although Cecil County in Maryland and several counties in New Jersey that were included in the 2008 Philadelphia NAA have comparatively small populations and population densities, they have lower populations and population densities than Berks County, which was excluded from the 2008 Philadelphia NAA. Although New Castle County’s population and population density are higher than those of Berks County, these values are more alike than the values between New Castle County and Philadelphia County. In the factor assessment for Berks County for the 2008 8-hour ozone NAAQS, EPA states that it considers these demographic factors as indicators of the probable location and magnitude of nonpoint source emissions. For the factor assessment of Berks County EPA stated, “...non-point source emissions from Lebanon or Schuylkill Counties are not likely to contribute to ozone violations in Berks County” since Berks County’s population was nearly three times higher than the other two counties. By this reasoning, it would suggest that nonpoint source emissions from New Castle County are not likely to contribute to ozone violations in Philadelphia County.

### Traffic and Commuting Patterns

Traffic and commuting patterns usually show similarities in cities and counties with similar rural or urban patterns, such as within a CBSA/CSA. Their relations with local onroad mobile emissions seem to be more apparent or more easily identified on a local scale. As shown in Table 6, New Castle County’s vehicle miles traveled (VMT) in 2011 are similar to that of the counties in and around Philadelphia County.<sup>7</sup>

**Table 6 - 2011 VMT**

FIPS	State	County	Vehicle Miles Traveled (VMT)
42091	PA	Montgomery County	<b>6,505,446,421</b>
42101	PA	Philadelphia County	<b>5,344,508,760</b>

<sup>7</sup> 2011 Vehicle Miles Traveled provided by EPA at <https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data>

<b>FIPS</b>	<b>State</b>	<b>County</b>	<b>Vehicle Miles Traveled (VMT)</b>
10003	DE	New Castle County	5,201,246,605
42017	PA	Bucks County	4,727,709,143
34029	NJ	Ocean County	4,617,759,793
34005	NJ	Burlington County	4,477,567,355
42029	PA	Chester County	4,277,236,066
34007	NJ	Camden County	3,848,560,437
42011	PA	Berks County	3,381,679,887
42045	PA	Delaware County	3,336,446,326
34021	NJ	Mercer County	3,325,914,191
34015	NJ	Gloucester County	2,713,227,986
34001	NJ	Atlantic County	2,676,389,714
10005	DE	Sussex County	2,224,310,996
10001	DE	Kent County	1,601,985,389
24015	MD	Cecil County	1,356,020,045
34011	NJ	Cumberland County	1,122,284,008
34009	NJ	Cape May County	1,043,389,878
34033	NJ	Salem County	779,668,486

National, regional, and local emission inventory data have shown for many years that the onroad mobile source emissions remain a major portion of an area’s or county’s total emission inventory. The emissions data in Table 3 and Table 4 show that onroad emissions contribute between one third to two thirds of the NOx emissions in the counties of interest, while onroad emissions contribute no more than a third of the VOC emissions. While onroad emissions contribute to less than half of the NOx emissions in New Castle County, onroad emissions contribute to well more than half of the NOx emissions in some counties surrounding Delaware. Not surprisingly, onroad contributions of NOx and VOC emissions from the onroad sector, compared to emissions in total, are more prevalent in counties along the I-95 corridor. However, Berks County is an exception to this statement, which is not near the I-95 corridor, and has relatively fewer VMT in 2011 than New Castle County. Yet, 54% and 30% of Berks County’s total 2011 NOx and VOC emissions, respectively, are onroad emissions (both of which are greater percentages than New Castle County’s onroad emissions contributions).

Table 7 contains the “Commuting (Journey to Work) Worker Flows” for the counties of interest.<sup>8</sup> From the data it can be seen that most Delaware commuters work within Delaware. This makes sense as most commuters work in the same county in which they live, and is true for most of the counties shown. For New Castle County, over 26,000 commuters travel into Pennsylvania to work in one of the counties of interest, with over 24,000 traveling specifically to either Chester County, Delaware County, or Philadelphia County. Cecil County has many commuters who

<sup>8</sup> Commuting (Journey to Work) Worker Flows are from US, Census Bureau, American Community Survey, 5 year estimates 2009-2013. <http://www.census.gov/hhes/commuting/data/commutingflows.html>

work in the same county, but about 10,000 of its commuters travel to Delaware, primarily in New Castle County. In Pennsylvania, only a small percentage of commuters travel into Delaware, but the total commuters to Delaware just from the 5 counties of interest in Pennsylvania are almost the same as all Delaware commuters which travel into Pennsylvania. The same can be said about the counties of interest in New Jersey, in that the number of commuters from those counties is nearly the same as all Delaware commuters which travel into New Jersey. In regards to New Castle County specifically, more commuters travel into the county from the counties of interest (about 47,000, excluding Kent and Sussex Counties in Delaware), than commuters from New Castle County travel to counties of interest of the surrounding states (about 36,000, excluding Kent and Sussex Counties in Delaware). By this metric, more onroad emissions are coming into New Castle County from out of state commuters than from Delaware workers commuting to the surrounding states.

In the factor assessment for Delaware for the 2008 8-hour ozone NAAQS, Berks County is shown to have as many workers commuting into Chester, Delaware, Montgomery, and Philadelphia Counties in Pennsylvania as New Castle County (based upon commuting work flows from the 2000 Census). EPA excluded Berks County from the 2008 Philadelphia NAA despite this data. The latest worker flow data below confirms that both New Castle County and Berks County still have about the same number of workers which commute into one of the four previously named counties in Pennsylvania.

Table 7 - County to County Commuting Flows- ACS 2009-2013

COMMUTING FROM...

		10001	10003	10005	24015	34001	34005	34007	34009	34011	34015	34021	34029	34033	42017	42017	42029	42045	42091	42101	
		Kent	New Castle	Sussex	Cecil	Atlantic	Burlington	Camden	Cape May	Cumberland	Gloucester	Mercer	Ocean	Salem	Berks	Bucks	Chester	Delaware	Montgomery	Philadelphia	
FIPS	County Name																				
10001	Kent	52,320	3,529	6,208	345	20	18	25		22	4		28	38			77	48	49	99	
10003	New Castle	9,460	211,593	1,133	10,409	149	702	1,447	23	298	2,376	87	69	2,428	184	492	14,602	9,451	1,431	2,712	
10005	Sussex	5,819	464	65,614	12						10		30		13			120	48		
24015	Cecil	553	4,384	28	21,722		36			2	4			94		38	1,215	157		43	
34001	Atlantic	6	148	12		102,097	1,920	4,846	5,622	4,105	3,041	141	4,405	252		111	91	588	151	587	
34005	Burlington	64	625	3		2,083	121,646	34,850	415	574	9,378	4,969	4,209	468	29	5,919	441	1,423	2,128	6,054	
34007	Camden	98	777	66	36	3,492	25,242	119,946	471	1,350	23,078	985	789	1,266	62	1,989	470	2,322	1,947	8,352	
34009	Cape May		48	14		3,890	292	343	32,131	1,898	404		406	40	23	110	169	326	259	305	
34011	Cumberland		211	45	10	3,769	441	1,760	974	43,792	4,209	62	138	2,909		87	16	77	65	480	
34015	Gloucester	91	1,312	19	40	1,619	3,203	17,249	215	3,120	63,519	234	212	4,833		397	376	1,765	407	3,066	
34021	Mercer	38	153	3		256	22,362	4,210	186	333	1,265	117,053	6,964	114	26	19,632	271	394	1,682	3,075	
34029	Ocean		31	8		1,298	2,127	512	137	46	223	899	141,719	44		335	6	62	47	150	
34033	Salem	159	1,601	23	105	222	264	991	60	2,214	2,874	46	45	13,443	29	34	201	321	115	185	
42011	Berks		13	20	59	59		22	4		7	10			142,041	308	2,545	204	4,313	195	
42017	Bucks	60	332		54	246	4,328	1,857	159	19	961	4,753	340	84	1,090	175,586	1,386	1,838	25,722	24,860	
42029	Chester	155	6,466	141	1,168	202	502	689	113	126	939	134	47	86	7,499	2,741	158,395	19,107	25,083	7,479	
42045	Delaware	294	9,318	120	482	225	1,244	2,642	219	114	3,455	202	112	600	550	2,457	19,784	137,377	12,435	17,181	
42091	Montgomery	31	2,036	126	96	236	3,205	3,356	287	185	2,321	896	304	151	14,822	45,800	29,813	28,263	258,752	59,146	
42101	Philadelphia	465	8,290	161	396	1,602	16,425	33,685	777	754	16,075	1,776	564	862	1,039	34,856	12,577	51,283	59,910	460,086	

**BOLD YELLOW** - Represents destination counties with commuters within the top 25% of commuters to counties of interest from a single county.

COMMUTING TO



Sonoma Technologies Inc. (STi) conducted air quality modeling using the Comprehensive Air Quality Model with extensions (CAMx) Ozone Source Apportionment Technology (OSAT), and its results indicates that mobile emissions significantly impact monitors in and around Delaware.<sup>9</sup> The maximum impact to any monitor in the area, from onroad emissions in a single state, is shown in Table 8.

**Table 8 – Maximum Impacts from State Onroad Emissions, To Monitors In and Around Delaware**

<b>State</b>	<b>Maximum Impact from State (ppb)</b>
Pennsylvania	20.76
Maryland	17.65
New Jersey	10.74
Virginia	7.52
Ohio	4.93
Delaware	4.82
Michigan	4.11
New York – Downstate	3.51
New York – Upstate	3.42
Indiana	2.86
Connecticut	1.58
Illinois	1.57
District of Columbia	1.04
West Virginia	0.99

Mobile emissions from Pennsylvania and Maryland impact the area the most, followed by New Jersey, Virginia, Ohio, and then Delaware. The large impacts from Maryland onroad emissions are likely from the Baltimore area and not from Cecil County. The maximum impact of Delaware onroad mobile emissions on the area are about 45% less than the impacts of Virginia onroad mobile emissions, and are on par with the onroad mobile impacts of Ohio, Michigan, and throughout New York.

Mobile sources are regulated at the federal level through tailpipe emissions standards, and at the state level through vehicle inspection/maintenance programs, transportation conformity, and adoption of California Low Emission Vehicles. Each of the counties in the Philadelphia area have these programs in place. Transportation conformity is implemented at the county level – each county in the area has established and demonstrates compliance with its own conformity budget separate from the other parts of the CBSA. This means that mobile emissions and planning do not, and have not, historically tie the area together. The lack of interstate planning, to include transportation conformity coordination, indicates that mobile emissions should not be a significant consideration in establishing small, local scale nonattainment area boundaries

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<sup>9</sup>Ozone Impacts from Brunner Island Power Plant in 2011, Sonoma Technology Inc., August 6, 2015, [https://content.sierraclub.org/coal/sites/content.sierraclub.org/coal/files/docs/Sonoma\\_8-6-15\\_Brunner\\_Memo\\_1.pdf](https://content.sierraclub.org/coal/sites/content.sierraclub.org/coal/files/docs/Sonoma_8-6-15_Brunner_Memo_1.pdf).

around the Philadelphia area. Similarly, while the impact of mobile emissions to the area is significant, modeling shows that most of the mobile source impact is due to emissions outside of the area immediately surrounding Philadelphia; and the impact of Delaware onroad mobile emissions are more like the areas further away from the Philadelphia area.

Evaluation of Factor 2 indicates New Castle County be established as a stand alone nonattainment area, separate from the other counties of interest.

### **Factor 3: Meteorology**

There are many components in meteorology which affect ozone formation and transport, such as precipitation, cloud coverage, solar radiation, temperature gradients, and wind. Extensive studies have been done on effects of meteorological components on ozone formation and transport, and the results consistently support the regional nature of the ozone problem (see “The Nature of the Ozone Air Quality Problem in the Ozone Transport Region: A Conceptual Description,” Final Report by NESCAUM, October 2006; “A conceptual Model for Ozone Transport,” by Dr. Robert Hudson, University of Maryland, January, 2006; and “A Guide to Mid-Atlantic Regional Air Quality,” by MARAMA, October 2005.).

In brief, a number of meteorological processes affect local ozone levels within the Ozone Transport Region (OTR). Transport within the OTR can be divided into three principle components: ground level transport at the surface, transport by the nocturnal low level jet, and transport aloft. All three modes of transport depend on the location of the high pressure system. Ground level transport is the result of interaction between the synoptic flow and local effects, such as the sea breeze and the Appalachian lee side trough. Transport within the OTR can occur by the nocturnal low level jet that forms late at night or in the very early morning hours. This phenomenon is a result of the differential heating of the air between the Appalachian Mountains and the Atlantic Ocean. It has been observed from Georgia to Maine. The nocturnal low level jet can transport ozone that formed within the OTR or was transported into the OTR from outside the region. Transport aloft is dominated by the anti-cyclonic flow around a high pressure system, which can lead to transport of an ozone reservoir, created by emissions in areas that lie outside the OTR, into the OTR. Local emissions within the OTR add to the polluted air mixing down from above that arrived from more distant locations. A number of modeling studies indicate that pollution sources in the Ohio River Valley and the Southeast significantly contribute to ozone nonattainment problems in various portions of the OTR. In fact, meteorology and its impact on ozone and ozone precursor transport, and its impact on the formation of ozone in the atmosphere, make this a main factor that sets ozone part from other criteria pollutants. Delaware believes that the meteorology factor strongly supports the establishment of large nonattainment boundaries due its wide-range impacts.

Despite the fact that science supports establishment of large nonattainment area boundaries, an evaluation of the local Philadelphia area indicates meteorology in New Castle County is different than other parts of the Philadelphia area. Table 9 below shows the days in 2013 through 2016 which were forecast to be Air Quality Action Days (AQAD) for ozone in Delaware and the

“Greater Philadelphia Region,” as forecast by the Department of Meteorology of The Pennsylvania State University.<sup>10</sup>

**Table 9 - Air Quality Action Days Forecast in Delaware and the Greater Philadelphia Region for Ozone for 2013 through 2016**

2016			2015		
Date	Greater Philadelphia Region	Delaware	Date	Greater Philadelphia Region	Delaware
5/25/2016	Code Orange	Code Orange	6/11/2015	Code Orange	Code Orange
5/26/2016	Code Red	Code Red	6/12/2015	Code Orange	Code Orange
5/27/2016	Code Orange	Code Orange	7/12/2015	Code Orange	Code Yellow
6/11/2016	Code Yellow	Code Orange	7/19/2015	Code Orange	Code Orange
6/18/2016	Code Orange	Code Yellow	7/29/2015	Code Orange	Code Orange
6/19/2016	Code Orange	Code Yellow	8/15/2015	Code Orange	Code Yellow
6/20/2016	Code Orange	Code Orange	8/16/2015	Code Orange	Code Yellow
6/26/2016	Code Orange	Code Yellow	8/17/2015	Code Orange	Code Yellow
7/6/2016	Code Orange	Code Orange	9/1/2015	Code Orange	Code Yellow
7/7/2016	Code Orange	Code Orange	9/3/2015	Code Orange	Code Orange
7/17/2016	Code Orange	Code Yellow	9/17/2015	Code Orange	Code Orange
7/22/2016	Code Orange	Code Orange	9/18/2015	Code Orange	Code Orange
7/28/2016	Code Orange	Code Yellow			
<b># of AQADs</b>	<b>12</b>	<b>8</b>	<b># of AQADs</b>	<b>12</b>	<b>7</b>

2014			2013		
Date	Greater Philadelphia Region	Delaware	Date	Greater Philadelphia Region	Delaware
6/17/2014	Code Orange	Code Orange	5/30/2013	Code Orange	Code Orange
7/12/2014	Code Orange	Code Orange	5/31/2013	Code Orange	Code Orange
7/22/2014	Code Orange	Code Yellow	6/22/2013	Code Orange	Code Yellow
8/5/2014	Code Orange	Code Orange	6/23/2013	Code Orange	Code Green
8/27/2014	Code Orange	Code Orange	6/25/2013	Code Orange	Code Orange
<b># of AQADs</b>	<b>5</b>	<b>4</b>	7/17/2013	Code Orange	Code Orange
			7/18/2013	Code Orange	Code Orange
			7/19/2013	Code Orange	Code Yellow
			8/20/2013	Code Orange	Code Yellow
			8/21/2013	Code Orange	Code Yellow
			<b># of AQADs</b>	<b>10</b>	<b>5</b>

This data shows that there have been more AQADs forecast in Delaware and the Greater Philadelphia Region in the last two years,<sup>11</sup> but there have been fewer AQADs forecast for Delaware than the Greater Philadelphia Region. Additionally, the daily ozone forecast values for Delaware (of which the Air Quality Index and AQADs are based) were typically lower than the daily forecast values for the Greater Philadelphia Region. During the months of May through

<sup>10</sup> AQAD data is summarized from daily emails received by DAQ staff regarding the ground level ozone forecasts received either directly from Penn State University or from the Enviroflash listserve emails in recent years.

<sup>11</sup> Beginning in 2016, AQADs were based on forecasts which exceeded the new 0.070 ppm standard, whereas AQADs in 2013, 2014, and 2015 were based on forecasts which exceeded the previous 0.075 ppm standard.

September, from May 2013 until the end of July 2016, the daily ozone forecast for Delaware has been lower than that of the Greater Philadelphia Region 65% of the time.<sup>12</sup> On average, the Delaware daily ozone forecast values have been 1.5 parts per billion (ppb) lower than those of the Greater Philadelphia region (see Table 10). When averaging the values by month, over the same time period, it can be seen from Table 10 that the Delaware forecast values vary between 0.64 ppb to 2.24 ppb lower than Greater Philadelphia region forecast values.

**Table 10 -Average Difference in Daily Ozone Forecast Values 5/1/13 – 7/30/16  
(Greater Philadelphia Region – Delaware)**

	<b>(ppb)</b>
<b>Overall Average Difference</b>	<b>1.50</b>
Average Difference in May	0.64
Average Difference in June	1.42
Average Difference in July	1.65
Average Difference in August	2.24
Average Difference in September	1.74

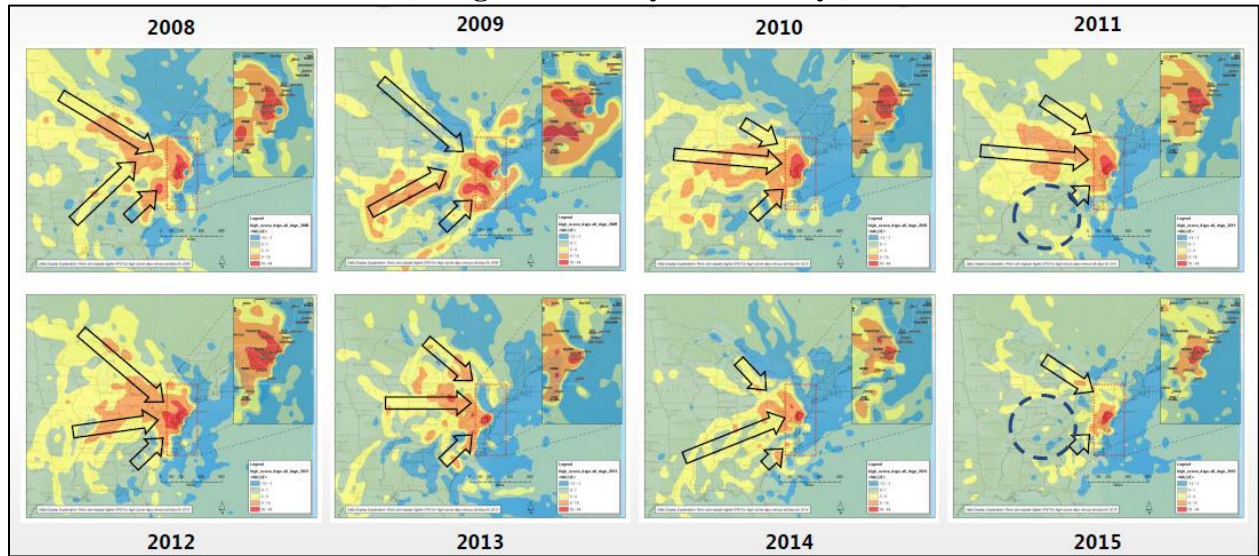
This is in part due to the different weather patterns that Delaware sees versus those of the Philadelphia area. During 2013 to 2015, hot weather was seen to still be necessary for high ozone concentrations, but it is no longer sufficient to solely cause high ozone concentrations. Temperatures during June, July, and August 2015 were about average compared to 1981-2010, which would suggest an average ozone season, which indeed it was. However, 2015, like 2013-2014, was marked by an atypical weather pattern that limited the development of heat waves in June-August and inhibited the frequency of westerly transport aloft. In a study for Delaware that analyzed air mass transport patterns in the Northeast, STi looked at ozone data and back trajectories for 2008 through 2015. In comparing the ozone data from all days in the ozone season to days with high ozone (the top 10% daily 8-hr max), STi found discernable trajectory patterns between high ozone days and all days. As shown in Figure 3 there are differences in transport patterns in 2011 and 2015 compared to all other years. Specifically in 2015, the study confirms a more persistent westerly and northwesterly flow inhibited southerly transport. This shift in weather patterns in 2015 likely contributed to the recent “step-down” in observed ozone levels in Delaware, although the effects are minor compared to ongoing reductions on ozone precursor emissions, of which Delaware has made huge strides.<sup>13</sup>

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<sup>12</sup> Daily ozone forecast data obtained from Dr. Amy K. Huff, Department of Meteorology, The Pennsylvania State University, via email on 8/7/16. Analysis performed on days when there were forecasts for both Delaware and the Greater Philadelphia Region – 507 days out of 557 days.

<sup>13</sup> “State of Delaware Final Report: Ozone Observations and Forecasts in 2015,” A Report Prepared for the Delaware Department of Natural Resources and Environment, by Dr. Amy K. Huff and William F. Ryan, Department of Meteorology, The Pennsylvania State University, February 29, 2016

**Figure 3 - Difference Comparisons  
(# High Ozone Days - # All Days)**



**Factor 4: Geography/Topography**

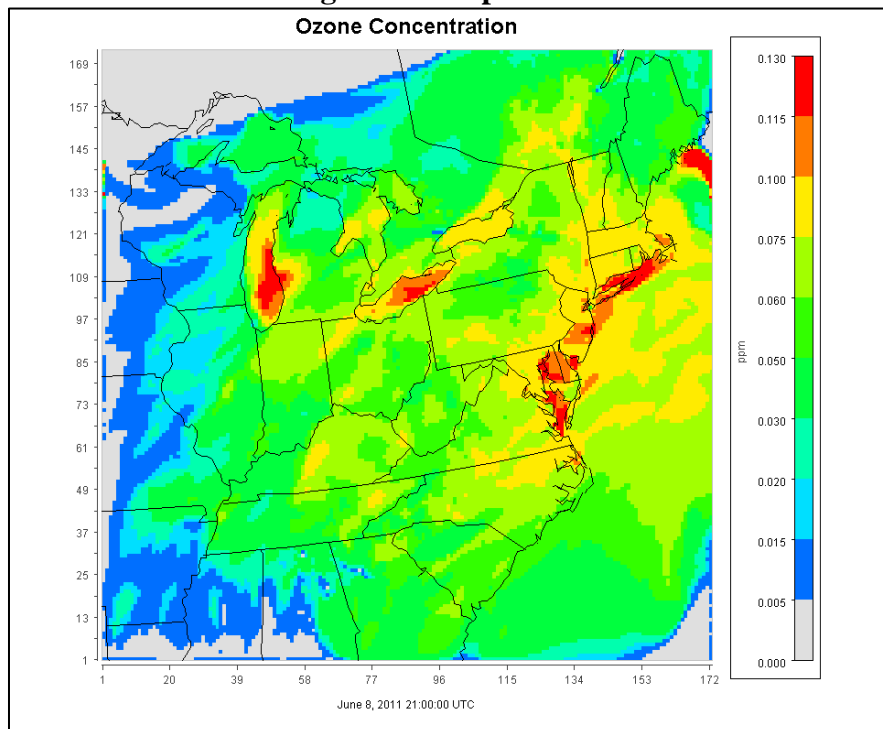
Delaware is on a level plain, with the lowest mean elevation of any state in the nation. It is bounded to the north by Pennsylvania; to the east by the Delaware River, Delaware Bay, part of New Jersey, and the Atlantic Ocean; and to the west and south by Maryland. Beyond Maryland to the west of Delaware is the Chesapeake Bay. The distance between the Chesapeake Bay and the Delaware River is less than 20 miles across Maryland and Delaware at the narrowest land area around the Chesapeake & Delaware Canal (C&D Canal). New Castle County is separated from New Jersey by about 1 mile of water at its closest and about 5 miles of water at its furthest (at the southern most boundary of New Castle County). Together, Delaware’s geography and the land, water, and air interactions discussed below play an important part in Delaware’s air quality. The two bays on either side of Delaware potentially segregate local and transported emissions, by both blocking some emissions yet concentrating other emissions. Delaware is unique in this aspect, in that it is the only state which is almost entirely surrounded by water, thus making it geographically different from the Philadelphia region.

In the OTR, land and sea breezes, and mountain and valley breezes, can have an important influence on local air quality. These local winds are driven by a difference in temperature that produces a difference in pressure. The sea breeze forms in the afternoon when the land is considerably hotter than the ocean or bay. Air then flows from the high pressure over the ocean toward the low pressure over land. At night, the opposite may happen as the land cools to below the ocean’s temperature, and a land breeze blows out to sea. Because the nighttime land and water temperature differences are usually much smaller than in the day, the land breeze is weaker

than the sea breeze. Sea breezes typically only penetrate a few kilometers inland because they are driven by temperature contrasts that disappear inland.<sup>14</sup>

Along coastlines, such as coastal Delaware, sea breezes bring in air pollution transported near the surface over water from urban locations located to the southwest. These sites are located many miles away from the coast, and receive ozone transported over water from the sea up through the coastal bays and rivers. In other cases, sea breezes can affect air quality in coastal cities because, under stagnant synoptic-scale winds, a city's emissions may be recirculated or pushed back over land after having drifted out over the sea earlier. Before sea breeze circulation begins, air pollution from a coastal city can move out over the water. In the absence of a shift in winds due to a sea breeze, the city's air pollution will be blown away. When a sea breeze circulation sets up, however, the polluted air is pushed back toward the city. The sea breeze only pushes a few miles inland, which is where the barrier to mixing lies. Later in the day, the air may be quite clean on the ocean side of the city, but the air is usually quite dirty on the inland side. The city suffers from its own recirculated pollution, and also from the sea breeze that does not allow pollution from the city to flow away from it. Depending on the exact conditions (time of day, meteorology, local emissions, etc.), the pollution may even be more concentrated off the coast, as shown in Figure 4, which represents modeled ozone concentrations for the high-ozone episode of 6/8/2011.

**Figure 4 – Modeled Ozone Concentrations (ppm)  
For the High-Ozone Episode of 6/8/2011**



<sup>14</sup> "The Nature of the Ozone Air Quality Problem in the Ozone Transport Region: A Conceptual Description" Prepared by NESCAUM, October 2006. [www.nescaum.org/documents/2006-1013b-o3-conceptual-model-draft-final-all.pdf/](http://www.nescaum.org/documents/2006-1013b-o3-conceptual-model-draft-final-all.pdf/)

The bay breeze is a shallow circulation over large inland bays, and may only extend a couple hundred meters above the surface. For example, bay breezes from the Chesapeake Bay often make Baltimore's summertime air quality particularly poor. Air from the city cannot escape directly across the Bay. On the other hand, a few miles closer to the Bay, conditions are often considerably cleaner, since no fresh emissions have gotten into the air there since earlier that morning. Polluted air from the west side of the Bay can still mix upward, where it meets the stronger winds aloft, pass over the Bay breeze circulation and come back down on the east side of the Bay. In a recent study, results from meteorological and air-quality model simulations, airborne and shipborne in situ air-quality observations, and routine air-quality and meteorological observations from ground-based monitoring stations were used to investigate how the Chesapeake Bay breeze affects air quality.<sup>15</sup> The study's results show that a strong and prolonged bay breeze on July 11, 2011 caused locally high surface ozone concentrations near the bay breeze convergence zone, which penetrated into the urban corridor. An extended period of convergence of air pollution at the bay breeze front resulted in a significant amount of air pollution being transported up and into the free troposphere. This elevated layer of air pollution aloft was transported far downwind into New England by early the following morning where it likely mixed down to the surface, affecting air quality in that region.

### **Factor 5: Jurisdictional Boundaries**

Jurisdictional boundaries limits the authority of a nonattainment area (a county or state within a CBSA/CSA) to address upwind impacts on its nonattainment problems. Sections 110 and 126 of the Clean Air Act provide states a mechanism to petition to EPA for controls on upwind emission sources, and although Delaware has petitioned EPA under these provisions, EPA has not responded effectively. As part of EPA's reasoning for incorporating New Castle County in a multi-state nonattainment area under the 2008 8-hour ozone NAAQS, EPA states:

“New Castle County has historically been part of the Philadelphia nonattainment area for ozone (1-hour and 8-hour) and fine particulate matter (PM<sub>2.5</sub>). 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

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<sup>15</sup> Christopher P. Loughner, Maria Tzortziou, Melanie Follette-Cook, Kenneth E. Pickering, Daniel Goldberg, Chinmay Satam, Andrew Weinheimer, James H. Crawford, David J. Knapp, Denise D. Montzka, Glenn S. Diskin, and Russell R. Dickerson. “Impact of Bay-Breeze Circulations on Surface Air Quality and Boundary Layer Export.” *Journal Of Applied Meteorology And Climatology*, vol. 53, July 2014, pp. 1697-1713. DOI: 10.1175/JAMC-D-13-0323.1

ozone attainment planning. Furthermore, the two local MPOs, DVRPC and WILMAPCO, have worked together for decades.”

While it is true that New Castle County has historically been part of a Philadelphia based nonattainment area and statistical area, it is not logical to keep the county in future Philadelphia based nonattainment areas simply to keep the “status quo.” EPA’s logic that Delaware’s cooperation with its immediately neighboring states as part of the OTR or MANE-VU as a basis for including it in a multi-state nonattainment area does not make sense. The OTR and OTC were created under the Clean Air Act to advise EPA on transport issues and to develop and implement regional solutions to ground-level ozone in the OTR. These entities are established and operate separate from nonattainment designations. Using EPA’s logic, each state, in whole, in the OTR should be incorporated into a single multi-state nonattainment area as every state in the OTR works cooperatively at ozone attainment planning. Delaware has petitioned EPA to expand the OTR to include all of the States that science indicates should be included and the EPA has not yet acted on this petition despite the statutory deadline for action having passed more than 15 months ago. Also, EPA was incorrect that local MPOs support including New Castle County, Delaware as part of the Philadelphia area in the 2008 designations, and that rationale remains incorrect now. Transportation conformity is implemented at the county level – each county in the area has established and demonstrates compliance with its own conformity budget separate from the other parts of the CBSA. This means that mobile emissions and planning do not, and have not, historically tie the area together. The lack of interstate planning, to include transportation conformity coordination, indicates that mobile emissions should not be a significant consideration in establishing small, local scale nonattainment area boundaries around the Philadelphia area. Thus, unless Delaware’s primary recommendation of a large nonattainment area is accepted by EPA, Delaware believes evaluation of this factor supports establishment of a nonattainment boundary for New Castle County that follows the jurisdictional boundaries of the county.

### **Summary**

The above five factor analysis in determining the nonattainment boundary that would include New Castle County is summarized as follows:

- Delaware air quality, based on 2014-2016 monitoring data, indicates nonattainment of the 2015 8-hour ozone NAAQS in New Castle County.
- In New Castle County, ozone exceedances are generally associated with two general scenarios: long-range transport from the southwest or west, and local circulation along the I-95 corridor which runs from southwest to northeast. Differences in daily ozone forecast values between Delaware and southeastern counties in Pennsylvania suggest that meteorological differences between the areas are an important part of the differences in ozone values in each area.
- New Castle County’s emissions of VOC and NO<sub>x</sub> are similar, yet lower, than many other counties surrounding it. Its 2011 emissions are lower than those of Berks County, which was excluded from the 2008 Philadelphia NAA despite having similar 2008 emissions as New Castle County.



- The population, population density, and level of urbanization of New Castle County are relatively similar to those of the counties of interest. By EPA's reasoning that such demographic data is an indicator of nonpoint emissions, New Castle County's nonpoint emissions have no greater impact on ground-level ozone than most other counties surrounding it. Philadelphia County's high population, population density, and high 2011 nonpoint emissions reflect EPA's rationale.
- The numbers of vehicle miles traveled in New Castle County is similar to that in other counties surrounding it, though more workers commute into New Castle County than workers which commute out of the county. Its VMT and worker flow data is similar to Berks County, which was excluded from the 2008 Philadelphia NAA, despite Berks County having just as much impact to the Philadelphia "urban core" as New Castle County. In fact, New Castle County's 2011 onroad emissions are less than Berks County's 2011 onroad emissions.
- Delaware is geographically in an area that is unlike any other. The large water bodies which practically surround the state create complex meteorological mountains and valleys that at times funnel transported emissions around the Delmarva Peninsula and up the I-95 corridor, and at other times trap upwind emissions such that those emissions are recirculated by ocean and bay breezes, and impact Delaware multiple times.

Based on the data and analysis presented above, Delaware recommends a standalone nonattainment area be established for New Castle County. Also, Based upon EPA's rationale for segregating Berks County as its own nonattainment area in the previous assessment, New Castle County should be segregated into its own nonattainment area in the current assessment. New Castle County has lower emissions than Berks County, similar demographics to Berks County, and similar commuting patterns to Berks County. Delaware's unique geography and meteorology (due to the land, water, and air interactions) make New Castle County even more unique than Berks County.