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October 28, 2011

Mr. Shawn M. Garvin
Region 3 Office Administrator
US Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Dear Administrator Garvin:

In a March 18, 2009 letter Delaware provided the U.S. Environmental Protection Agency (EPA) with a timely recommendation regarding designation of areas and the establishment of non-attainment area boundaries under the EPA's March 2008 0.075 parts per million (ppm) ozone National Ambient Air Quality Standard (NAAQS) (see Attachment 1). On January 6, 2010, the EPA extended by one year the deadline under which it was required to finalize area designations and establish non-attainment area boundaries while it reconsidered the standard. This one-year extension – to March 12, 2011 – represented the latest date that the Clean Air Act (CAA) provides for EPA to finalize area designations and boundaries for the 2008 ozone NAAQS. We are disappointed that EPA's decision was ultimately not to change the standard to a level more protective of public health in the range recommended by its science advisory board (0.060 and 0.070ppm) at this time.

On September 22, 2011, the EPA announced that it intends to resume the designation process for the 0.075ppm ozone NAAQS by issuing "120-day letters" by December 15, 2011. Because more than 2½ years have elapsed since Delaware submitted its timely recommendation, and more than 7-months have elapsed since the latest date that the CAA provides for the EPA to finalize designations and boundaries, Delaware requests the EPA consider in the designation process 1) Delaware's most recent ozone monitoring data, 2) the updated technical information and analysis in this letter and in the attached "9-factor analysis" regarding non-attainment area boundaries (see attachment 2). Delaware understands that the EPA has agreed to consider such information it receives by October 28, 2011.

Regarding Delaware's most recent ozone monitoring data, as a result of the implementation of state and federal control measures the air quality in Delaware has improved significantly since our March 2009 letter. Design values for the 2006-2008 period (i.e., the most

recent at the time of our March 2009 letter) are compared to design values for the most recent two years in the table below. [1]

County	2006-2008 Design Values (ppm)	2008-2010 Design Values (ppm)	2009-2011[2] Design Values (ppm)
New Castle	0.083	0.076	0.077
Kent	0.081	0.074	0.071
Sussex	0.081	0.077	0.076

These recent design values indicate that the air quality in New Castle and Sussex counties are not in attainment, and the air quality in Kent County is in attainment relative to the 0.075ppm ozone NAAQS.

Regarding non-attainment area boundaries, the recommendations provided in Delaware's March 18, 2009 letter, and the rationale and analysis provided in that letter have not changed. Except as detailed below, this letter and the attached 9-factor analysis are not a replacement for, but rather are in addition to the information presented in the March 2009 letter.

- Revision to Delaware's Non-Attainment Boundary Recommendation. In the March 18, 2009 letter Delaware recommended that the following ten (10) states, plus District of Columbia (D.C.), be included in a single, large ozone non-attainment area: Delaware, Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia. Based on the EPA's recent Cross State Air Pollution Rule (CSAPR) modeling, Delaware is revising this recommendation to include the following six (6) additional States: Kentucky, Indiana, Illinois, Missouri, Tennessee, and Wisconsin.

  The emissions from these sixteen (16) states plus D.C. are the emissions that are causing or contributing significantly to the 0.075ppm ozone non-attainment and maintenance problems in and around Delaware, and that continue to cause great harm to public health and the economy of Delaware. It is untenable that these other states may be subject to less strict air pollution standards than Delaware, when it is the emissions from these states that cause Delaware's attainment problems. When a state has implemented necessary controls at great cost to their citizens and industry, all areas that are sufficiently near to it so that their emissions contribute to impeded air quality must be subject to the same standards.

- Great Economic Harm and Unfairness is Being Levied on Delaware. Emission controls have been established and implemented in Delaware at a great economic cost to Delaware citizens and industry. After many rounds of regulation[3] Delaware's sources

[1] Note that the current ozone design values are at the levels predicted in Delaware's 2007 Attainment Demonstration SIP for the 0.08ppm ozone NAAQS which is currently pending EPA approval.
[2] Based on preliminary 2011 data.
[3] For example, all Delaware electric generating units (EGUs) have been subject to reasonably available control requirements (RACT) in 1995, the OTC NOx Budget Program in 1998, the EPA NOx 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

that cause and contribute to ozone formation (i.e., volatile organic compound (VOC) and nitrogen oxides (NOx) emitting sources) are well controlled. Both large and small new and modified sources have been subject to costly non-attainment New Source Review control and offset requirements for more than two decades. Sources with the potential-to-emit either VOC or NOx at levels as low as twenty-five (25) tons per year are subject to Title V permitting requirements. Power plants, industrial boilers, consumer products and paints are regulated in Delaware at levels far below national levels – and the list goes on. While these programs have significantly reduced emissions, they have also been an impediment to economic development and have placed Delaware at a competitive disadvantage. This is because these other areas that cause and contribute to our air quality problems have not been subject to similar requirements, because they have not been properly designated non-attainment by the EPA.

Delaware's emissions are likely controlled to a much 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 (i.e., whammy 1), and despite this have not reaped the economic benefit of clean air (i.e., whammy 2) because of uncontrolled emissions generated outside of Delaware's borders. Delaware is being hit by an economic double whammy.

If the EPA again establishes small, metropolitan based non-attainment 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 non-attainment 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.

- <u>EPA's Presumptive Approach is Ineffective.</u> Inclusion of Delaware's three (3) counties in a Philadelphia-Wilmington-Trenton non-attainment area, like was done under the 1997 8-hour ozone NAAQS, would yet again yield ineffective results. The results are ineffective because the inclusion of Delaware within this small non-attainment area would again subject all of Delaware to another round of CAA non-attainment requirements, while all or parts[4] of the following states, whose emissions significantly impact the Philadelphia area would not be subject to the CAA non-attainment requirements: Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin.

  Establishing boundaries of a non-attainment area in a manner that is designed to address any transport issues is a critical first step in the non-attainment process because these

available control technology (BACT) controls that were installed at a cost of between $1,200 and $11,000 per ton of NOx reduced. In contrast, EPA's recent CSAPR is based on NOx controls costing $500 per ton of NOx reduced.

[4] Under EPA's presumptive approach only a portion of some states have been subject to CAA non-attainment requirements.

boundaries establish the areas that are subject to the CAA emission control requirements. Consider the problem we are preparing to solve; air monitors in Delaware and other parts of the Philadelphia area are recording ozone concentrations in excess of the 0.075ppm ozone standard. Consider the facts that are generally agreed to: 1) VOC and NOx emissions cause the high ozone concentrations, and 2) these VOC and NOx emissions are substantially generated from within the sixteen (16) state plus D.C. region identified above. It is fairly obvious that to solve the problem, the VOC and NOx emissions that are causing the problem must be reduced.

The EPA designed an approach to address air pollution by creating small, metropolitan-based non-attainment areas. Unfortunately, it has turned out that this presumptive approach that EPA outlined in its policies[5] sets up artificial non-attainment area boundaries that fail to address the problem on the regional scope that is necessary to adequately address the emissions that are causing the problem:

- VOC and NOx emitting sources within small non-attainment areas are subject to the CAA non-attainment requirements, and as a result the VOC and NOx emitting sources in these areas become well controlled.

- However, VOC and NOx emitting sources outside each small non-attainment area (i.e., those that EPA has excluded in its narrow metropolitan area approach[6]) are not subject to CAA non-attainment requirements. The EPA has chosen to partially regulate a subset of the NOx emitting sources – those sources that in EPA's judgment can be easily regulated at the federal level, where in EPA's judgment NOx controls are "highly cost effective," and that are in EPA's judgment located in states that "significantly" contribute to non-attainment or maintenance – through rules like the Clean Air Interstate Rule (CAIR) and the more recent CSAPR[7]. This is very narrow criteria, and as a result many of the emitting sources whose emissions contribute to the problem remain uncontrolled.

So, under the EPA approach some of the emitting sources that are causing the problem are required to be well controlled (i.e., those within the small non-attainment boundaries), and some of the emitting sources that are causing the problem are not required to be controlled at all (i.e., all of the VOC sources, and many of the NOx sources that are outside the small non-attainment boundaries). Worse yet, emitting sources within the small-attainment boundaries are subject to higher and higher costs for smaller and smaller incremental emission reductions, while highly polluting sources that are contributing to non-attainment in the same area because of transport are allowed to continue to operate without controls.

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[5] "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards," December 2008

[6] EPA's interpretation of the term "nearby" is not consistent with the CAA relative to the pollutant ozone. For the reasons discussed in our March 18, 2009 letter, the term "nearby" must be interpreted consistent with the scale of the problem.

[7] CSAPR was designed to mitigate transport at the 0.085ppm level. Delaware does not agree that CSAPR mitigated the impact at this level, and despite this disagreement, it is a fact that EPA has not even attempted to mitigate any impact between 0.075ppm and 0.085ppm.

This problem can be addressed by EPA scrutinizing the approach it has taken to defining "nearby" sources, which are supposed to be subject to the same requirements. A more workable definition of "nearby" would be whether a source is "near enough to contribute" to nonattainment or interfere with maintenance. Delaware appreciates that EPA initially took an approach that was narrowly tailored in an effort to see if it could reach air quality improvements in that manner. Unfortunately, time has shown that the narrow view of "near" needs to be adjusted in a manner that fulfills the intent of the Clean Air Act.

Here is a perfect example to illustrate why the metropolitan area approach is insufficient to fulfill the intent of the CAA. On many days the air coming into Delaware and the Philadelphia area contains ozone concentrations in excess of 0.075ppm. This means that no matter what is done – no matter how high an emission control cost imposed, the ozone non-attainment problem cannot be solved because sources outside the area are not controlled. And these sources will not be subject to the CAA requirements that require them to be controlled because the EPA has made an arbitrary presumption that they are not "nearby." Further, Delaware and other small metropolitan based non-attainment areas will continue to endure the economic and public health burden associated with poor air quality. This is untenable, and is totally avoidable.

The EPA must establish a large non-attainment area that fully encompasses all areas that are "near" enough to be causing the problem. Delaware recommends that its three (3) counties (Kent, New Castle and Sussex) be designated non-attainment, and placed in a sixteen (16) state (plus D.C.) non-attainment area that consists of the entire states of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Establishing a large non-attainment area is required by the CAA, and is the most effective and economical way to address the pervasive ozone nonattainment problem in the northeast region. Delaware recommended this approach before, as did Maryland and New Jersey as one of their proposed alternatives.

However, if the EPA chooses to not establish large non-attainment boundaries, we request that Delaware be established as a standalone non-attainment area, such that the geographical boundaries of the State of Delaware constitute Delaware's ozone non-attainment boundaries. This request is based on the facts that Delaware sources are now well controlled, and Delaware's ozone nonattainment and maintenance problems are mainly caused by ozone and ozone precursors transported into Delaware from upwind states[8]. Under this approach the EPA would need to commit to develop and implement effective regional controls to completely mitigate ozone/precursor transport in the timeframe of Delaware (and other downwind states) attainment schedule according to the CAA. Delaware intends to use every tool available to ensure unlawful upwind emissions are mitigated.

Finally, to be clear, under no circumstances should the EPA construe this recommendation to imply that Kent County Delaware be designated non-attainment and included

[8] EPA's recent CSAPR modeling indicates that about 90% of Delaware's ozone problem is caused by emissions from outside of Delaware. And, the Delaware emissions that contribute to Delaware and downwind states attainment and maintenance problems are well controlled under enforceable state and federal requirements.

within any non-attainment area boundaries other than the large non-attainment area or the Delaware stand alone non-attainment area, as recommended in this letter. This is because Kent County Delaware is not part of the Philadelphia Consolidated Metropolitan Statistical Area (CMSA), has very low emissions due to the implementation of state and federal emissions control requirements, and has been monitoring attainment for the 0.075ppm ozone NAAQS for the past two years (see the table above).

Thank you for your consideration of our recommendations. If you have any question regarding this letter or our March 18, 2009 letter, or would like to discuss the relevant issues further, please contact Mr. Ali Mirzakhalili, Director of our Division of Air Quality, at (302)739-9402.

Sincerely,

Collin P. O'Mara
Secretary

pc: Ali Mirzakhalili, Director of DAQ-DNREC

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March 18, 2009

Mr. William T. Wisniewski (3RA00)
Acting Regional Administrator
Region III
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Dear Administrator Wisniewski:

On March 12, 2008, the EPA revised the primary and secondary National Ambient Air Quality Standards (NAAQS) for ground-level ozone from the current 0.08 parts per million (ppm) to a new 0.075 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. It also recommends the placement of Delaware's counties in non-attainment status under the new 0.075 ppm standard in a non-attainment area.

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, a waterway that connects the Chesapeake Bay with the Delaware Bay. This part of New Castle County is more metropolitan and industrialized than the remainder of Delaware. The remainder of Delaware lies south of the Chesapeake and Delaware Canal, and comprises the southern portion of New Castle County, and all of Kent and Sussex Counties. All three counties share similar air quality problems with respect to ozone, because the problem is predominantly caused by ozone and ozone precursor emissions from upwind states.

Delaware's ozone monitoring network includes ambient ozone monitors in each of its counties (three monitors in New Castle, one monitor in Kent, and one monitor in Sussex). Based on 2006 through 2008 ozone monitoring data (i.e., the most recent three years), the 8-hour ozone

design values for New Castle, Kent and Sussex counties are 0.083 ppm, 0.081 ppm, and 0.081 ppm, respectively. Since these design values are all greater than the 0.075 ppm standard, all three counties in Delaware should be designated as non-attainment for both the primary and secondary 8-hour ozone NAAQS.

Placement of Delaware's Counties in a Large Nonattainment Area

Ground-level ozone and ozone precursor emissions are pervasive and readily transported. Numerous epidemiological studies conducted during the past decade have revealed that prolonged (i.e., 8-hour) exposure to ozone is associated with increased mortality and a range of serious morbidity health effects, including aggravation of a variety of respiratory symptoms and lung impairment, asthma attacks, respiratory hospital admissions and emergency department visits, and cardiovascular problems. This level of ozone concentration is also associated with adverse public welfare effects, which include impacts on vegetation, and forest ecosystems, and agricultural crop yields. The pervasive nature of ozone, and the serious adverse health and welfare effects associated with ozone non-attainment make non-attainment boundary determinations critical.

Under the 1997 8-hour ozone NAAQS, the EPA included Delaware's three counties in the Philadelphia-Wilmington-Trenton Nonattainment Area. In establishing this area the EPA relied on their policy presumption of using Consolidated Metropolitan Statistical Area (CMSA) boundaries and the prior 1-hour nonattainment area (NAA) boundaries as 8-hour nonattainment area boundaries, except they also considered the impact of upwind emissions and included Ocean County, NJ, despite Ocean County, NJ being part of the New York CMSA. Delaware believes that full consideration of upwind contribution when establishing non-attainment boundaries is necessary because ozone and ozone precursor emissions are pervasive and readily transported. It is important that the emissions that are causing Delaware's ozone problem be subject to the CAA non-attainment requirements.

In its guidance entitled "Area Designation for the 2008 Revised Ozone NAAQS (December 4, 2008)," EPA recommends using the Core Based Statistical Area (CBSA) or Combined Statistical Area (CSA), similar to the previous CMSA concept, to delineate nonattainment boundaries. In the guidance, EPA recognizes that upwind contribution is significant, and indicates that "In addition to nearby areas with sources contributing to nonattainment, ozone concentrations in a local area may be affected by long-range transport of ozone and its precursors (notably nitrogen oxides). In certain parts of the country, such as the eastern United States, ozone is a widespread problem." However, in this guidance document EPA also indicted that where this is the case, the CAA does not require that all contributing areas be designated nonattainment, but only the nearby areas; and that regional strategies, such as those employed in the Ozone Transport Region and EPA's NOx SIP Call are needed to address the long-range transport component of ozone nonattainment, while the local component must be addressed through local planning in and around the designated nonattainment area. The EPA's practice being guided by this interpretation has led to a separation between regional controls and local controls, which has been proved to be substantially ineffective in ozone NAAQS strategy

planning and attainment. In particular, this interpretation has led ineffective, insufficient and delayed regional controls, and insufficient and even no local controls being installed in many areas due to exclusion of many contributing areas/counties in the nonattainment designation.

Section 107(d)(1) of the CAA defines a nonattainment area as "any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant." In the context of a regional problem like ozone nonattainment, the term "nearby" must be interpreted consistent with the scale of the problem and the nature of the pollutant. For the purposes of solving air quality problems associated with pollutants like sulfur dioxide and carbon monoxide, CMSA or CBSA/CSA scale boundaries have proven adequate. This is because concentrations of these pollutants above the standard are generally driven by emission sources that are very close, geographically and do not involve complex atmospheric chemistry. However, this is not the case with ozone. Over the past 35+ 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 non-attainment relative to ozone. High ozone concentrations in Delaware are not driven by emission sources that are geographically close, but rather emissions sources that are many miles away. Given this, Delaware believes that it is necessary to consider regional transport of ozone and ozone precursor emissions in establishing non-attainment area boundaries. More specific reasons for this belief include:

- The CBSA/CSA approach is based on census data rather than air-shed monitoring and/or analysis data. Census data, in comparison to air-shed data, represents a poor surrogate for determining ozone non-attainment boundaries. This is particularly true for areas like Delaware that are heavily affected by long-range transport of ozone and ozone precursors.
- Detailed regional air-shed studies have been completed in the past decade or so, such as the Regional Oxidant Modeling (ROM) project covering most of the Ozone Transport Region (OTR) states, the Ozone Transport Assessment Group (OTAG) project, the NOx SIP Call analysis covering most of the Eastern U.S., and the EPA Clean Air Interstate Rule (CAIR) analysis. These studies have demonstrated that the ozone problem is transport-driven and regional in scope, rather than localized or confined to the relatively small CBSA/CSA domains.
- The studies mentioned above have further demonstrated that individual CBSA/CSA based non-attainment areas do not have the ability to achieve attainment regardless of the levels of emission controls they implement within their own jurisdictional boundaries. Delaware believes that this conclusion should become the cornerstone of good air quality planning and policy, starting with the crucial boundary determinations.
- In many downwind nonattainment areas, including Delaware, the air coming into a county is often with ozone concentration greater than 0.075 ppm (i.e., greater than NAAQS). Therefore, it becomes impossible for such an area to solve its non-attainment problem under its own authority. The CBSA/CSA approach has led to situations where many downwind areas are struggling with non-cost-effective controls to reduce ambient ozone components that come from upwind areas that are not subject to the reasonable emission control requirements. As a result, protection of public health in those

downwind areas has been severely hindered and delayed because reasonable emission controls are not in place in the upwind areas.

- The CBSA/CSA approach has led to stringent controls being implemented within individual non-attainment areas. This approach has had success in the OTR toward achieving attainment of both 1-hour (0.12 ppm) and the current 8-hour (0.08 ppm) ozone NAAQS, however, the most success toward attainment of ozone NAAQS in the OTR to date is attributable to national measures taken by the EPA, and regional measures developed and adopted by the Ozone Transport Commission (OTC) member states. The area is also facing with having to implement measures that will provide diminishing returns. We are revisiting standards for a second or third time for sectors that go uncontrolled in the contributing upwind states.

In its December 4, 2008 guidance, EPA recommends nine factors for states to use to justify their boundary recommendations. The EPA states its rationale for recommending these factors as being that they are similar to the ones used to establish CBSAs and CSAs. Delaware believes, however, using these factors to justify ozone non-attainment boundaries because they are similar to the ones used to establish CBSAs and CSAs is not appropriate. Instead, boundary recommendations must be evaluated with consideration given to the pervasive nature of the pollutant ozone, and the ozone/precursor transport issue discussed above.

Based on the above discussion Delaware recommends that EPA include Delaware's three counties in a single multi-state regional large nonattainment area (NAA) that includes all counties in the states of Maryland, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Virginia, and West Virginia. This area encompasses the emissions that are causing Delaware's ozone non-attainment problems, and rationale for it is more fully described in the CAA Section 126 petition that Delaware submitted to the EPA on December 15, 2008. A map that details Delaware's recommended nonattainment area boundaries is attached to this letter. Delaware believes that this approach would:

- Reinforce the science-based and wide-accepted fact that ozone non-attainment is a "regional problem" and not only a "local problem";
- Include all or most of the counties necessary to solve this regional problem, give them a vested interest in solving this regional problem, and foster cooperative development and implementation of control strategies that are most effective to solving the wide-spread ozone nonattainment problem;
- Remove political barriers and level the playing field by setting the consistent baseline of control requirements of Subpart 2 of Title I, Part D of the CAA within the region, which include New Source Review (NSR), vehicle Inspection and Maintenance, and highly cost effective Reasonably Available Control Technology (RACT) requirements;
- Effectively compliment national and regional rules that address regional transport;
- Greatly simplify and provide equity to the process of implementing the new 8-hour NAAQS.

implementation of control strategies that are most effective to solving the wide-spread ozone nonattainment problem;

- Remove political barriers and level the playing field by setting the consistent baseline of control requirements of Subpart 2 of Title I, Part D of the CAA within the region, which include New Source Review (NSR), vehicle Inspection and Maintenance, and highly cost effective Reasonably Available Control Technology (RACT) requirements;
- Effectively compliment national and regional rules that address regional transport;
- Greatly simplify and provide equity to the process of implementing the new 8-hour NAAQS.

Delaware believes that the above large-NAA recommendation represents the most effective and economical way to address the pervasive ozone nonattainment problem in the northeast region. If, however, the EPA chooses not to embrace the above recommendation (i.e., not to fully consider upwind contribution in setting nonattainment boundaries, and not to establish a large regional ozone non-attainment area), despite our confidence that is a better course of action, then Delaware proposes that the EPA establish Delaware as a stand-alone ozone nonattainment area (i.e., the geographical boundaries of Delaware constitute Delaware's ozone nonattainment boundaries). Delaware suggests this stand-alone alternative not because it is the best approach to clean the air, but rather because it is more rationale than a CBSA/CSA supported designation under the muse that emissions within the CBSA/CSA area are causing the nonattainment problem. Note that Delaware's ozone nonattainment problems are mainly caused by long-range ozone/precursor transport from upwind sources, and under this approach the EPA would need to commit to develop and implement effective regional controls to completely mitigate ozone/precursor transport in the timeframe of Delaware (and other downwind states) attainment schedule according to the CAA.

Thank you for your consideration of the above recommendations. If you feel you cannot support the large non-attainment boundary approach discussed above Delaware would like to have an opportunity to continue this discussion before you propose any modification. If you have any questions concerning this submittal or would like to discuss it further, please contact Mr. Ali Mirzakhalili, the administrator of our air quality management section, at (302)739-9402.

Sincerely,

Jack A. Markell
Governor

pc: Dave Small
Jim Werner
Ali Mirzakhalili
Judith Katz

Attachment 1

Delaware Recommendation of Large Nonattainment Area Boundaries for the 2008 Revised Ozone NAAQS

Delaware Recommended 8-hour Ozone Non-attainment Boundaries

Attachment 2

Supplemental Information to Delaware's Ozone Non-Attainment Boundary Recommendation Letter to US EPA on 10/28/2011

The 9-Factor Analyses For Designation of Nonattainment Area Boundaries for the 0.075 ppm 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 9 factors: [1] air quality data, emission data, population density and degree of urbanization, traffic and commuting patterns, growth rates and patterns, meteorology, geography and topography, jurisdictional boundaries, and level of control of emission sources. These factors are consistent with those used in the designation process for the 1997 ozone standard and are factors EPA plans to consider in evaluating and making decisions on the nonattainment area boundaries for the 2008 0.075 ppm ozone standards. Additionally, states and tribes may identify and evaluate other relevant factors or circumstances specific to a particular area.

Delaware hereby provides some detailed discussions and analyses on those 9 factors. The approach that Delaware follows in the discussions is (1) to see if the factor(s) would have a direct relation with the ambient air quality and ozone precursor emissions, (2) to assess if the factor(s) could lead to meaningful and reasonable designation results, and (3) to evaluate that the designation results would lead to effective future controls to reduce emissions and to mitigate upwind transport. As indicated in the discussions and analyses below, Delaware strongly suggests that EPA consider the 9 factors together with their relations with, effects on, and contributions to ambient air quality and to ozone/precursor transport. The lessons in the past decade or so have shown that these factors, if not considered closely together with the large-scale nature of the ambient ozone (or, its association with the large-scale air-shed) and the transport issues, could not make much practical sense in nonattainment area (NAA) designation. A few factors may not be directly related to the transport issues, and Delaware believes that these factors are more applicable to developing proper control strategies for specific counties or zones within the non-attainment area after a large non-attainment area boundary is established.

1. Air quality data

The ambient monitoring data continuously show that the 8-hour ozone nonattainment is a large-scale or regional problem. Table 1 below is a list of the 2008-10 design values of northeastern and mid-western states,[2] most of them are in the Delaware recommended large NAA.

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[1] Memorandum: Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standard; Robert J. Meyers, Principal Deputy Assistant Administrator, US EPA, December 4, 2008.
[2] EPA's Air Quality System (AQS) data query (6/27/2011); a complete list is at http://www.epa.gov/airtrends/values.html..

Table 1. Northeastern and Mid-Western States 2008-10 Design Values*

State	2008-10 Design Value (ppm)
Connecticut	0.081
Delaware	0.077
District of Columbia	0.079
Illinois	0.074
Indiana	0.073
Kentucky	0.075
Maryland	0.089
Massachusetts	0.077
Michigan	0.075
Missouri	0.077
New Jersey	0.081
New York	0.084
North Carolina	0.082
Ohio	0.079
Pennsylvania	0.083
Rhode Island	0.076
Tennessee	0.077
Virginia	0.081
West Virginia	0.073
Wisconsin	0.078

*The values are the highest 2008-10 design values of individual states.

The data in Table 1 indicate clearly that almost all northeastern states are to be in non-attainment status under the 0.075 ppm ozone standard. In addition, EPA's Air Now maps clearly show that on many days ozone episodes are broad in nature, covering much of the mid-west and eastern portions of the U.S. Very few ozone episodes are observed as being limited in scale to metropolitan areas. Therefore, Delaware believes that ambient air quality is not a local factor and must be considered on a regional basis in the upcoming designation process.

Due to its regional nature, the air quality with respect to ozone in a downwind CBSA/CSA (core based statistical area/combined statistical area) is significantly affected by upwind sources and therefore can be significantly improved by regional controls. Figure 1 presents the design values of all monitors in the Philadelphia-Wilmington-Atlantic City nonattainment area in the past decade or so. The data in Fig. 1 indicates that the air quality within the Philadelphia CBSA-based NAA has been significantly improved by the regional control of NOx SIP Call, which became effective in 2003-2004 timeframe.[3]

[3] Note that this does not indicate that establishment of small metropolitan based non-attainment areas, coupled with programs like CAIR and CSAPR are allowed by the CAA to address ozone nonattainment. To the contrary, this clearly shows that ozone non-attainment problem is broad, reductions over a broad area work. The CAA requires this broad area to be subject to the CAA non-attainment requirements. Regional control programs like CAIR and CSAPR address EGUs, but leave many cost effective controls that can be applied to other source categories on the table. And, because of this, downwind states are put at a disadvantage by being forced to adopt higher cost control measures to compensate for the lack of cost effective upwind controls.

The data in Fig. 1 also indicates that all of the monitors in the Philadelphia area move together, meaning that when one monitor is recording high ozone concentrations all monitors in the region are recording high concentrations. This same pattern is, generally, observed beyond the Philadelphia area, which indicates that the ozone problem and emission that are driving the ozone problem are occurring over a large area.

The air quality data within a CBSA/CSA, if not interpreted with consideration given the transport of ozone and its precursors, would lead to improper or contradictory conclusions and ineffective control strategy. For example, ambient ozone concentrations at Fair Hill monitor, Cecil County, Maryland, has been among the highest in the Philadelphia NAA. Historically, Cecil County has been included in the Philadelphia NAA based on those monitored air quality data. However, the air quality around the Fair Hill monitor is believed to be predominantly affected by emission sources outside the county, with the exception of mobile emissions along Interstate Highway 95. Emission inventory review indicates that there are no major point and area sources in Cecil County, and non-road activity level is relatively low. In addition, emissions, population density, traffic patterns, and growth rates and patterns in Cecil County are all different from some major metropolitan counties in the Philadelphia NAA. Designating Cecil County as part of a small non-attainment area, like the Philadelphia nonattainment area, based solely on its monitored air quality data is contrary to conclusions from analyses of those additional factors. EPA's CAIR and CSAPR modeling both confirm that many upwind states, Illinois, Indiana, Kentucky, North Carolina, Tennessee, Pennsylvania, New Jersey, Maryland, New York, Ohio, Virginia and West Virginia, contribute significantly to the violating air quality in Cecil County. Additionally, placing Cecil County within a small non-attainment area, like the Philadelphia NAA, and not including the upwind states that are causing/contributing to the problem, will not lead to any effective controls in those upwind states and will therefore not address the problem.

The Fair Hill monitor in the example above is not a unique case. Analyzing most other ozone monitors in the eastern half of the United States will lead to a similar conclusion, that is, upwind emissions and transport is a driving force of the high ozone concentrations detected in many downwind states' monitors.

Fig. 1 Philadelphia Ozone Non-Attainment Area 8-Hour Ozone Design Value Trend

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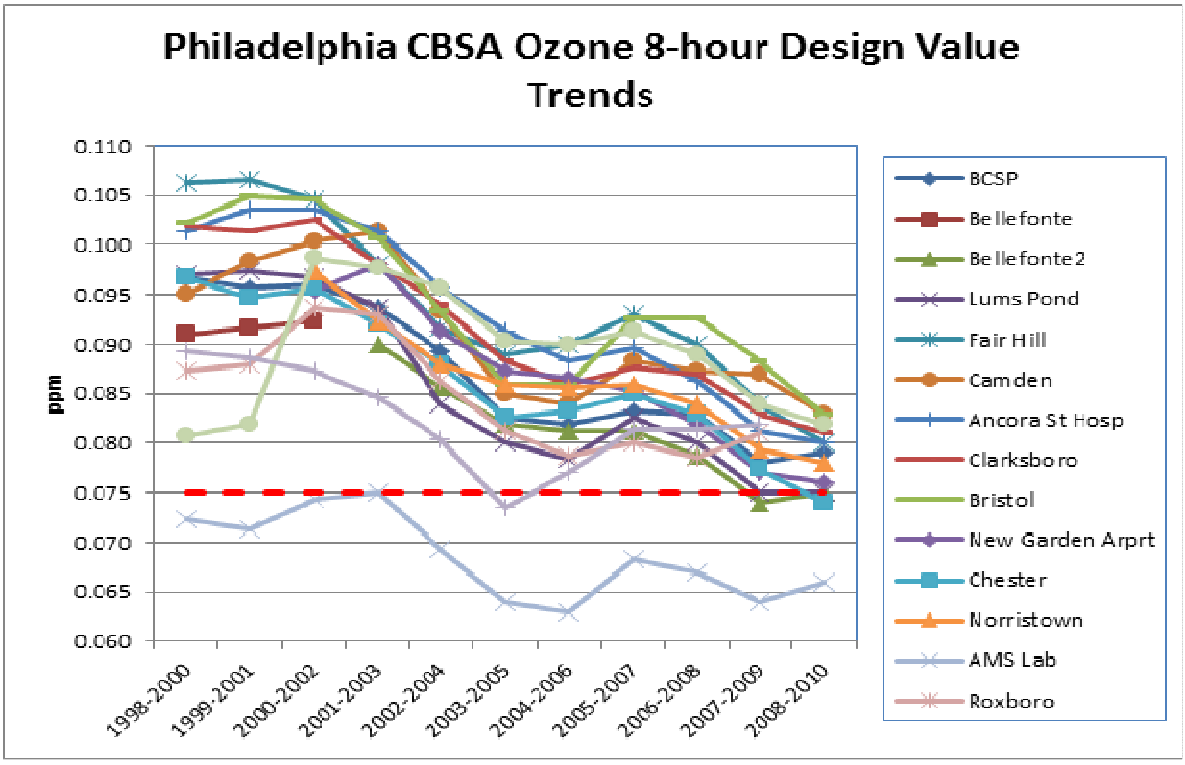
Regional programs like CSAPR are good, and they can help states mitigate their impact on downwind areas, but they are not a substitute for establishing proper ozone non-attainment area boundaries.



Analysis of the "air quality data" factor indicates that the area that many monitors throughout the eastern half of the United States are violating the 0.075ppm ozone standard. Analysis of the "air quality data" factor also indicates that the ozone precursor emissions over a large, contiguous area have a direct relation with the ambient air quality throughout the area, and the emissions cause and contribute to this large-scale non-attainment. Delaware concludes that because the area violating the standard is large, and because the nearby emissions from a large area are the cause of the violations, the air quality data supports the establishment of large non-attainment area boundaries, and the establishment of these boundaries would lead to effective future controls to reduce emissions and to mitigate upwind transport.

2. Emissions data (location of sources and contribution to ozone concentrations)

Emission sources in one county or CBSA/CSA have been proven to contribute not only to local or close-by ambient ozone concentrations but also to ozone concentrations in many downwind areas far away from the sources. This factor has been extensively studies in the past decade or so. For example, both NOx SIP Call study and EPA's CAIR/CSAPR modeling analyses have shown that major point sources such as EGUs in many counties upwind of OTR have significant contributions to OTR's ozone nonattainment problems under the 1997 0.08 ppm ozone standard and the 2008 0.075 ppm ozone standard. Many of those upwind counties, however, have not been classified as nonattainment with respect to the relevant standards. Therefore, this factor must be considered in the designation process closely together with the transport issues, so that major emission sources in the upwind states

can be properly controlled under the 0.075 ppm ozone standard. A detailed example analysis for this factor follows.

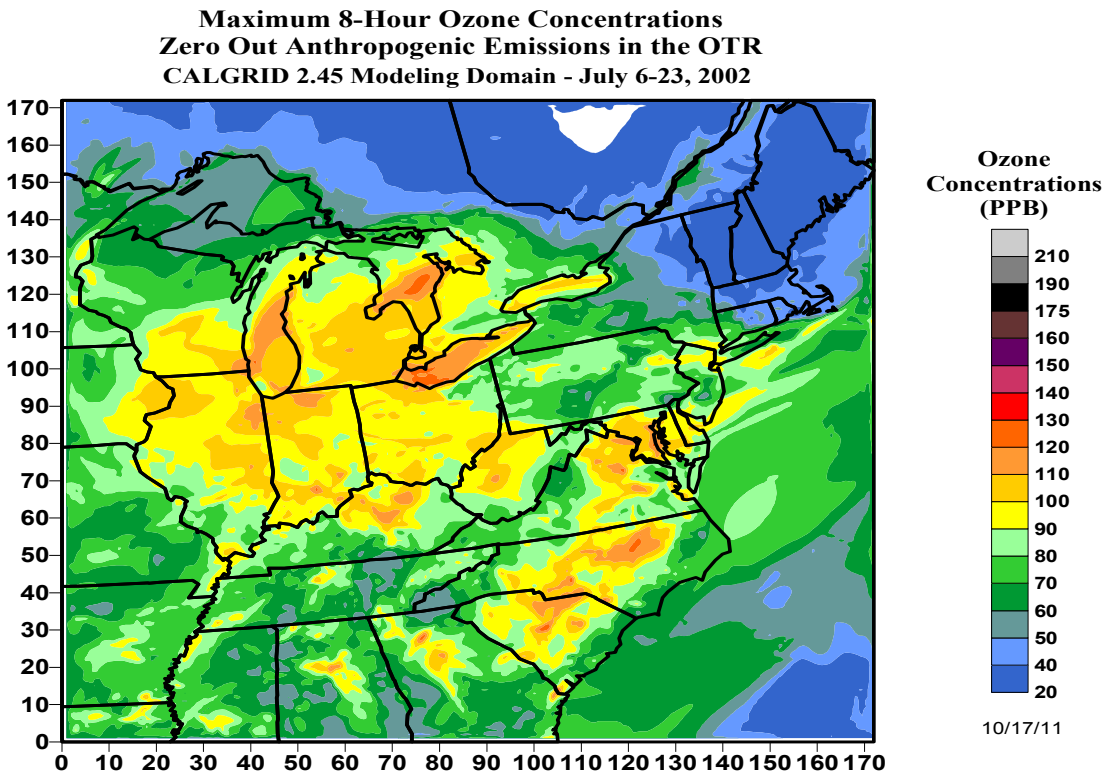
Using the same methodology EPA used in their recent CSAPR modeling analysis, Delaware concludes that at least one monitor in the Philadelphia NAA are significantly affected, relative to the 0.075ppm ozone standard, by emissions in the following states:

Delaware
Illinois
Indiana
Kentucky
Maryland
Michigan
Missouri
New Jersey
New York
North Carolina
Ohio
Pennsylvania
Tennessee
Virginia
West Virginia
Wisconsin

It should be pointed out that 11 of the above 16 states are over hundreds of miles away from the small, CMSA-based Philadelphia NAA that EPA has established to address prior ozone standards, and their emission sources are still making significant contributions to the Philadelphia NAA's ozone nonattainment problem. It becomes very clear that these upwind emissions must be considered in the designation process so that their impacts on Delaware and other downwind states can be addressed properly and effectively later.

Our modeling experience with CALGRID v2.45, a photochemical model designed as an OTC Platform, provided useful information on the impacts of other states on the OTR. A zero-out modeling conducted by zeroing out all anthropogenic emissions in OTR for July 6-23, 2002 meteorological episode informs us that the OTR is likely to receive transported ozone, especially the southern OTR region, at levels higher than the current ozone NAAQS (see Figure 2 below).

Fig. 2. Result from CALGRID v2.45 Modeling for Zero-out Emission Scenario



In addition, emission source locations and their contributions to ozone formation within a CBSA/CSA vary significantly, which further disqualifies, rather than supports, the CBSA/CSA-based nonattainment designation approach. More analyses and discussions of Delaware's three counties, a part of the CBSA/CSA-based Philadelphia NAA, are provided in the next section.

The above analysis of emission data together with the regional nature of air quality clearly demonstrates that emissions of local sources in many upwind states not only cause local air quality problems but also contribute significantly to ozone air quality problems in many downwind states. The transported ozone and its precursors are the root of the widespread regional ozone non-attainment situation in the northeastern U.S. Upcoming designation of ozone non-attainment area boundaries must not be based on a source's locality, but on a source's impact and contribution to the regional non-attainment situation.

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

Population and urbanization usually show similar levels in the cities and counties within a CBSA/CSA, and have a significant impact on daily-activity based emissions and local traffic emissions. Also, they may or may not, have a direct relation with major point sources. For example, some mega power plants are located in areas far away from urban centers and even outside a CBSA/CSA. Delaware believes that this factor must be analyzed with consideration given to together with other factors and the transport issues. A high population density or degree of urbanization is a driver of significant activity based emissions and local mobile source emissions, and these emissions contribute to ozone and

ozone precursor concentrations in downwind states, the same way that power plants and other industrial sources contribute. Delaware believes that this factor should not be considered alone in establishing non-attainment area boundaries. Rather this factor should be given much consideration in the design of control strategies within large non-attainment boundaries.

The population and urbanization, as well the traffic patterns (Factor 4) and the growth rates/patterns (Factor 5), are closely related to the air quality factor (Factor 1) and the emission factor (Factor 2). They have to be analyzed together. The following analysis is based on data from Delaware 2002 emission inventory (the most recent State Implementation Plan (SIP) inventory), and will provide demonstrative examples and some insight discussions of how these factors (i.e., population, urbanization, and traffic patterns) are related to the emission factor and the air quality factor. In a later section (Factor 5, Growth), the relation of population and growth will be discussed.

Table 2 is the demographic data from Delaware's 2002 SIP inventory. Table 3 is the emission data for the three counties from the 2002 SIP inventory. Table 4 is the countywide total emission densities, where the total emission of a county is the sum of emissions from all source sectors in the county (i.e., point, non-point, non-road mobile and on-road mobile sectors). The emission densities are defined in two terms, one by population in TPD (tons per day) emission per 10,000 population, and one by land area in TPD per 10 square miles.

Table 2. Demographic data of Delaware's three counties.*

Demographic Parameter	Kent	New Castle	Sussex
Population	131,069	512,360	163,946
Households	49,127	191,787	66,471
Land Area (square miles)	594	439	950
Annual VMT (million miles)	1,406	5,338	2,091
Population Density per sq. mile**	221	1167	173

*Data from Delaware 2002 SIP Emission Inventory.
** Not in the original 2002 SIP Inventory, but calculated from the data in Table 2.

Table 3. Ozone precursor emissions in Delaware's three counties.*

County	VOC, TPD	NOx, TPD
Kent	16.86	34.50
New Castle	58.66	107.22
Sussex	40.02	57.37

*Data from Delaware 2002 SIP Emission Inventory.

Table 4. Countywide total emission density.*

County	VOC Emis.		NOx Emis.	
	TPD/10000cap.	TPD/10sq.mile	TPD/10000cap.	TPD/10sq.mile
Kent	1.29	0.28	2.63	0.58
New Castle	1.14	1.34	2.09	2.44
Sussex	2.44	0.42	3.50	0.60

* Total emission of a county is the sum of emissions from all source sectors in a county, as shown in Table 3.

An initial review of data in Table 2 and Table 3 indicates that the total emissions from Delaware's three individual counties follow relatively well the patterns of their populations, households and annual VMT (vehicle miles traveled), that is, New Castle is the highest, followed by Sussex, and then Kent. However, more careful review of the data, plus those in Table 4, reveals that these data can provide other meaningful indications for the NAA designation.

First, both VOC and NOx emissions in New Castle are significantly higher than those in Kent and Sussex. In addition, New Castle has the smallest land area, which makes its area-based emission densities are 3 to 4 times as big as those in Kent and Sussex (Table 4). However, the 2008-10 design value (DV) of New Castle is 0.076 ppm, while the 2008-10 DVs of Kent and Sussex are 0.074 ppm and 0.077 ppm, respectively. In other words, the ambient ozone concentration in New Castle is not significantly different from those in Kent and Sussex, even though New Castle County bears much heavier VOC and NOx emission loads from local sources. This fact can reasonably lead to the conclusion that the air quality in Delaware must not be determined by its own population distribution, urbanization patterns, and local emissions, but rather by impacts from factors outside Delaware's boundary, in particular, ozone and its precursors transported from upwind states or areas.

Second, Table 4 shows that Sussex has population-based emission densities much higher than those of New Castle and Kent, although Sussex is a less urbanized county. The indication is that there are significant major emission sources in Sussex that are not proportional or compatible to its population and urbanization pattern (See also analyses of Tables 5, 8 and 9 below). This indication strongly suggests that the population-urbanization factor be closely considered together with the emission data, specifically, using the population-based emission density, in the upcoming NAA designation process. If not, Delaware believes that many upwind counties would be left once again outside NAA, which would make many major sources in those counties escape again from the next round of control efforts, thus consequently sabotaging and delaying the attainment process of the 0.075 ppm ozone NAAQS.

Table 5 presents the countywide point source emission density data for the three counties in Delaware. Again, Table 5 shows that Sussex has much higher population-based VOC and NOx emission densities than New Castle and Kent. The data in Table 5 helps explain the higher total emission densities of Sussex in Table 4, that is, Sussex has major point sources for both VOC and NOx that are not compatible to its population and urbanization level. Delaware wants to point out that (1) those major point sources have been

identified in Sussex (Maritrans lightering operation as the major VOC point source, and Indian River power plant as the major NOx point source) for decades, (2) Delaware had difficulties in implementing effective controls on those sources under the 1-hour ozone standard since Sussex was not designated as a severe nonattainment area under the 1-hour standard, and (3) after Sussex was classified as nonattainment area together with Kent and New Castle in 2004, emission control efforts in Sussex has become streamlined with those in Kent and New Castle, and timely and stringent controls have been implemented to control emissions from those sources (for Maritrans, Regulation 1124.46 became effective in May 2007, and for Indian River plant, Regulation 1146 became effective in December 2007). The experience indicates clearly that including a rural county with a small population but major emission source(s) in a NAA can significantly enhance and streamline implementation of effective controls in the NAA.

Table 5. Countywide point source emission density.

	VOC Emis.		NOx Emis.	
County	TPD/10000cap.	TPD/10sq.mile	TPD/10000cap.	TPD/10sq.mile
Kent	0.04	0.01	0.39	0.09
New Castle	0.18	0.21	0.86	1.00
Sussex	0.82	0.14	1.52	0.26

Table 6 presents the countywide non-point source emission density data for the three counties in Delaware. The non-point source emissions (formerly termed as area source emissions) are mainly derived from human-activity levels. Therefore, activity level, population density and degree of urbanization will be reflected in the non-point source emission density. In Table 6, population-based emission densities of both VOC and NOx are more or less the same for all three counties in Delaware, indicating that the related activity levels are about the same throughout Delaware. However, area-based emission densities in New Castle are much higher than those in Kent and Sussex, reflecting the higher activity density in New Castle County (i.e., more people engaging in the same activity on a unit area).

Table 6. Countywide non-point source emission density.

	VOC Emis.		NOx Emis.	
County	TPD/10000cap.	TPD/10sq.mile	TPD/10000cap.	TPD/10sq.mile
Kent	0.44	0.10	0.03	0.01
New Castle	0.39	0.46	0.04	0.04
Sussex	0.45	0.08	0.05	0.01

Table 7 presents the countywide non-road mobile source emission density data for the three counties in Delaware. Since a significant portion of non-road mobile emissions is also activity-derived, a discussion similar to Table 6 will apply to Table 7. For example, area-based emission densities in New Castle are much higher than those in Kent and Sussex, reflecting the higher activity density in New Castle (i.e., more people engaging in the same

activity on a unit area). In addition, Table 7 shows that the population-based emission densities in both Kent and Sussex are higher than that in New Castle. Possible explanations include (1) more agricultural equipments being operated in Kent and Sussex, (2) more marine vessel activities in Kent and Sussex, (3) more recreational non-road activities in Sussex County, and (4) intensive Air Force Base activity in Kent County.

Table 7. Countywide non-road mobile source emission density.

	VOC Emis.		NOx Emis.	
County	TPD/10000cap.	TPD/10sq.mile	TPD/10000cap.	TPD/10sq.mile
Kent	0.39	0.09	1.15	0.25
New Castle	0.24	0.28	0.48	0.56
Sussex	0.57	0.10	0.80	0.14

Table 8 presents the countywide annual VMT (vehicle miles traveled) density data for the three counties in Delaware. Table 9 presents the countywide on-road mobile source emission density data for the three counties in Delaware. The data in these two tables reveals some meaningful messages.

Table 8. Countywide annual VMT density.

	Kent	New Castle	Sussex
VMT/Population, 1000mile/cap.	10.7	10.4	12.8
VMT/Household, 1000mile/Hshd	28.6	27.8	31.5

Table 9. Countywide on-road mobile source emission density.

	VOC Emis.		NOx Emis.	
County	TPD/10000cap.	TPD/10sq.mile	TPD/10000cap.	TPD/10sq.mile
Kent	0.42	0.09	1.07	0.24
New Castle	0.33	0.39	0.71	0.83
Sussex	0.61	0.10	1.13	0.19

First, Table 8 shows that the population VMT density and the household VMT density are very close in Kent and New Castle, but significantly higher (>10%) in Sussex. Explanations may include that (1) a significant portion of VMT in Sussex is created by outstate and out-county drivers who are traveling to the highly attractive beach areas in Sussex (Lewes Beach, Rehoboth Beach and Bethany Beach), (2) outstate and out-county drivers in Kent (those by-passing drivers to Sussex and commuters to New Castle) also contributes to Kent's VMT, but not as significantly as to Sussex's, (3) outstate drivers in New Castle (such as those on I-95) contribute to New Castle's VMT as well, but the much higher population and household numbers of New Castle make the contribution less significant or less noticeable, and (4) the explanations in (2) and (3) help explain why Kent and New Castle have similar population and household VMT densities.

Second, Table 9 shows that New Castle has a much higher area-based on-road mobile emission density, reflecting its more urbanized nature, i.e., many more drivers within a unit area. However, Table 9 also shows that New Castle has the lowest population-based on-road mobile emission density, followed by Kent, while Sussex has the highest. The implication of this set of data is that vehicles in New Castle have average VOC and NOx emission rates lower than those in Kent and Sussex. Explanations may include the following.

- New Castle has the most stringent on-road mobile source controls due to its nonattainment status and the relevant transportation planning requirements under the associated transportation conformity requirements.
- Sussex has the least stringent controls on on-road mobile sources. Historically, Sussex was not designated as a severe NAA under the 1-hour ozone standard. In fact, a less stringent vehicle inspection and maintenance (I/M) program was still in effect in Sussex when the 2002 emission inventory was compiled.
- Outstate vehicles from "attainment counties" have contributed significantly to Kent and Sussex's VMTs (see the discussion in the previous paragraph). Those vehicles are not subject to stringent inspection and maintenance requirements in their home counties and are very likely to have higher emission rates. A preliminary review of attainment or nonattainment statuses of the Delmarva Peninsula under the 1997 0.08 ppm standard indicates that all counties adjacent to Kent and Sussex to the west and to the south are in attainment status. It can be reasonably assumed that proper inspection and maintenance programs do not exist in those counties. Vehicles from those counties, however, are constantly visiting Kent and Sussex, and very likely bringing up vehicle emission rates in Kent and Sussex.

The above discussion on on-road mobile emission densities has a meaningful indication, that is, vehicles from adjacent "attainment counties" may contribute significantly to VMTs and on-road mobile emission loads in the neighboring nonattainment counties. To reduce the VMT contribution seems unfeasible (e.g., Delaware cannot and will not prohibit those outstate vehicles from running on Delaware's land). However, it should be reasonable and fair for the affected counties (e.g., Kent and Sussex) to expect those contributing counties to implement adequate I/M programs for their vehicles. One feasible way is that EPA could place those contributing counties under the same nonattainment and transportation conformity requirements.

In summary, the analysis of this factor for the three counties in Delaware has demonstrated that population and urbanization levels, which are believed to be good indicators for defining CBSA/CSA, and good factors for designing control strategies within a non-attainment area, are not good factors in designating attainment or nonattainment areas, or establishing non-attainment area boundaries for the 0.075 ppm ozone standard.

4. 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 on-road mobile emissions seem to be more apparent or more easily identified on a local scale, as discussed in Factor 3 above. Delaware believes that it is not appropriate to consider traffic activities and commuting patterns solely in a local scale, while ignoring their connections with the regional ozone non-attainment problem.

National, regional and local emission inventory data have shown for many years that the on-road mobile source emissions remain a major portion of an area's or county's total emission inventory. Consequently, mobile source emissions from upwind areas/counties continue contributing to the ozone nonattainment problems in the downwind states through transport of ozone and its precursors. Therefore, it is imperative that EPA continue implementing stringent national/regional rules and emission limits on vehicles so that their impacts on downwind states can be effectively mitigated. On the other hand, improvements in traffic and commuting patterns are important to reduce the total emission load within an area, and its contribution to downwind areas. Delaware believes that this factor should not be considered as a decisive factor as used in defining CMSA r CSA. Instead, it would be more applicable for state/county/city authorities to develop local traffic management strategies after regional nonattainment areas are established.

5. Growth Rates and Patterns

The growth and development of an area can be reflected in various demographic and economic aspects, such as population and household growths, urbanization development, employment increase, and local GDP (gross domestic product) growth. The discussions in Factor 3 (Population and Urbanization) have provided some analyses on static population and urban data (i.e., one year data) and their relations with the emission data. This section provides discussions on dynamic demographic and economic data (i.e., growth).

First, Delaware believes that local (or state) demographic and economic growth data should be analyzed with regional and even national data. Table 10 presents some population estimates extracted from the US Census Bureau March 2011 Release.[4] According to the data in Table 10, the population growth rate in Delaware between 2000 and 2010 is the biggest among the neighboring states. However, the absolute number of population increase in Delaware is the smallest. During this period, the population increases in Maryland, New Jersey and Pennsylvania are approximately 3 to 4 times as many as that in Delaware.

Table 10. Population estimates of Delaware and neighboring states.

	Population Counted		2000-2010 Change	
	2000	2010	Number	%
Delaware	783,600	897,934	114,334	14.6%

[4] *Population Distribution and Change: 2000 to 2010*. U.S. Census Bureau, U.S. Department of Commerce, March 2011: http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf.

Maryland	5,296,486	5,773,552	477,066	9.0%
New Jersey	8,414,350	8,791,894	377,544	4.5%
Pennsylvania	12,281,054	12,702,379	421,325	3.4%
United States	281,421,906	308,745,538	27,323,632	9.7%

In addition, the population growth data does not reflect the actual economic development. In the past few years, GDP for Delaware has experienced its ups and downs, but the overall GDP growth in Delaware has lagged behind the US GDP growth. For example, Delaware's GDP fell by 4.8% in 2007-2008, increased by 2.1% in 2008-2009, and then increased again by 1.3% in 2009-2010.[5] The GDP data for the neighboring states for the past years are not readily available. However, the most recent available data from the Bureau of Economic Analysis show that the GDP growths for Delaware, Maryland, New Jersey, Pennsylvania, and US in the 2009-2010 period are 1.3%, 2.9%, 2.5%, 3.0%, and 2.6%, respectively.[6] Apparently, Delaware's GDP growth is lower than those of its neighboring states and the national average. Therefore, from the economic development viewpoint, Delaware should not be designated as nonattainment area along with its neighboring states.

Second, Delaware believes that population and economic growth do not necessarily have direct relations with local emission changes and the ozone/precursor transport. Since 1990, ozone NAAs like Delaware have been required to reduce their VOC and/or NOx emissions not only to offset their economic growths but also to meet the stringent RFP (reasonable further progress) and AD (attainment demonstration) provisions in the CAA. To achieve such significant emission reductions, Delaware and other NAAs have implemented numerous controls within their boundaries, including many regional, NAA-wide, and local controls. On the other hand, areas and counties throughout the country with attainment or marginal nonattainment statuses have implemented minimum local controls over their emission sources. Those areas/counties have enjoyed their economic growths, but have not done much to reduce their emissions to offset such economic growths. The fact is, however, emissions from those counties have been, and will continue to be, parts of upwind contributions to downwind ozone nonattainment problems.

Third, economic growth of an area or county does not necessarily have a direct relation with its ambient ozone air quality. Since 1990, the nationwide ozone ambient air quality has been continuously improving along with the nation's economic growth. This improvement in ozone air quality has been believed to be one of the greatest achievements of the CAA since it has mandated or laid foundation for the following: (1) federally-mandated national controls such as standards over vehicle emissions and fuels, (2) regionally-adopted controls to address ozone and/or its precursor transport such as NOx SIP Call and model rules of OTR states, and (3) countless controls over emission sources within NAAs. The

[5] *The 2010 Delaware Annual Economic Report*, Delaware Department of Labor, September 2011.
[6] *Economic Recovery Widespread across States in 2010, Advance Statistics of GDP by States*. Bureau of Economic Analysis, US Department of Commerce, June 2011: http://www.bea.gov/newsreleases/regional/gdp_state/gsp_highlights.pdf.

ambient ozone air quality in many counties with an "attainment" status under the previous 1-hour standard (0.12 ppm) and the 1997 standard (0.08 ppm) has been improving as well.

In general, higher growth rates and uncontrolled urban development patterns (i.e., sprawling) are thought to be associated with increases in emissions and deterioration in ambient air quality. However, in order to connect the growth factor with the ozone nonattainment designation, a comprehensive analysis, which is much broader beyond a state scale, would be needed. Therefore, Delaware believes that the growth factor should not influence much in the upcoming NAA designation process, unless a comprehensive and in-depth analysis together with other factors (such as Factor 1, ambient air quality, and Factor 2, emission data) and the transport issues could be conducted in a regional and national scale. Delaware thinks that this factor would be more applicable for developing local control strategies to manage economic growth and urban planning after nonattainment areas are established.

6. Meteorology (weather/transport patterns)

There are many components in meteorology, such as precipitation, cloud coverage, solar radiation, temperature gradients and wind, which affect ozone formation and transport. Extensive studies have been done on effects of meteorological components on ozone formation and transports, and the results are consistently supporting the vast range of the ozone problem and its transport (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 (See Factor 7 next). 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.

7. Geography/topography (mountain ranges or other air basin boundaries)

The geography-topography analysis looks at physical features of the land that might have an effect on the air shed and, therefore, on the formation, distribution and transport of ozone and its precursors. Within OTR, most of the land surface is coastal and relatively level, and presents no significant barriers for ozone/precursor transport. The Appalachian Mountain seems to present a barrier for ozone/precursor transport from the mid-Atlantic region to the northeast region. However, a study by MARAMA ("A Guide to Mid-Atlantic Regional Air Quality," October 2005.) points out that the pollutants, like ozone and its precursors, can make its way over the mountain from the west and will then turn northeastward once it reaches the coastal plain, due to the existence of the so-called Appalachian Lee-Side Through. Therefore, long-range transport and contribution does not seem to be significantly blocked or hindered by the Appalachian Mountain. In fact, the effect of the Appalachian Lee-Side Through, which helps to channel a more concentrated ozone plume and contribute to the formation of nocturnal low level jets, is the engine of rapid nighttime transport (See Factor 6 above).

In addition, the Appalachian Mountains act as a physical barrier confining, to some degree, pollution to the coastal plain. They also induce local effects such as mountain and valley breezes, which, in the case of down-slope winds, can raise surface temperatures, thereby enhancing photo-chemical reactivity. Therefore, the Appalachian Mountains may be a factor enhancing the formation and transport of ozone to and within the OTR.

8. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, reservations, metropolitan planning organizations (MPOs))

Delaware believes that this is an important factor to be considered in the designation process because the jurisdictional boundary is a major drawback of the CBSA/CSA -based nonattainment designation. The jurisdictional boundary limits the authority of a nonattainment area (a county or state within CBSA/CSA) to address upwind impacts on its nonattainment problems. Although Sections 110 and 126 of the Clean Air Act provide states an option to petition to EPA for controls on upwind emission sources, previous experiences have shown that this option is resource-intensive, extremely time-consuming, and practically very difficult to achieve actual results in downwind air quality improvement.

Discussions in the previous sections (such as Factor 1, air quality, Factor 2, emission data, Factor 3, population and urbanization, Factor 5, Growth) have indicated the necessity of designating ozone NAA boundaries beyond jurisdictional boundaries. Additional discussions are also provided in the following section.

9. Level of control of emission sources

This factor is very important in nonattainment area designation and must be considered with the ozone/precursor transport. The key point is that if the nonattainment areas are not defined large and comprehensive enough, many upwind contributing counties/areas will not implement necessary control measures over emission sources within their boundaries. As a result, the pervasive transport impacts to downwind nonattainment areas will not be solved in a timely and cost-effective manner.

The EPA indicates that this factor looks at the levels of controls of emission sources to assess whether to include additional nearby areas outside the metropolitan area as part of the designated nonattainment area. This approach, if and only if implemented properly, will be appropriate and effective in addressing transport and contribution issues because it will strongly support the establishment of a large nonattainment area. For the pollutant ozone and its precursors, the term "nearby" must be interpreted not only by geographical locations but also by transport and contribution scales. For example, Delaware has met reasonable available control technology (RACT) requirements over all major sources of volatile organic compounds (VOCs) and nitrogen oxides (NOx). Delaware has also adopted rules that reduce emissions from diesel generators, and distributed generation sources. Delaware's mobile source emissions must conform to stringent emission budgets. Delaware's power plants are subject to unit specific requirements that go beyond RACT. All these control levels are significantly greater than the levels of controls in many upwind States or areas, although extensive analyses have demonstrated that those states and area have contributed, are still contributing, and will continue to contribute significantly to Delaware's ozone nonattainment problem. A proper solution of this problem is to include those upwind states and areas as "nearby" areas and thus as a part of the large nonattainment area, so that they will be subject to the same levels of controls over their major emission sources.

For example, Delaware modeling study has shown that upwind NOx reductions similar in magnitude to the reductions achieved by the NOx SIP Call are needed for Delaware to attain the new 0.075 ppm ozone NAAQS. The data in Table 11 below shows that the NOx SIP call got about 140,050 tons/year of NOx reduction from power plants in the states that impact Delaware (i.e., difference between 2003-2007 actual emissions). If the power plants in these upwind states could be subject to the same levels of controls as the levels for the power plants in Delaware, NOx emissions in those states would be reduced by about 91,280 tons/year (at Phase I level) and about 108,350 tons/year (at Phase II level) tons from current NOx SIP Call levels (i.e., the multi-P 2007 actual emission levels). Those NOx reductions are so significant, although just from one major point-source subsector. The importance of implementing the same control levels over a large region becomes so clear.

Table 11. NOx Emission Reductions from Upwind Power Plants*

State	2003 Actual O.S. NOx Mass	2007 Actual O.S. NOx Mass	CAIR O.S. 2009-2014 State Allocation	CAIR O.S. 2015 and Beyond State Allocation	Estimated O.S. NOx With Phase I Multi-P/No Backsliding	Estimated O.S. With NOx Phase II Multi-P/No Backsliding
DE	3755	4074	2226	1855	2074	1742
MD	18048	14907	12834	10695	7875	7033
MI	46531	36252	28971	24142	22785	19507
NC	48965	24167	28392	23660	17219	15320
NJ	8152	5004	6654	5545	3116	2858
NY	24109	16691	20632	17193	13510	12296
OH	129209	55373	45664	39945	32242	28734
PA	46057	52073	42171	35143	29311	26392
VA	24895	17110	15994	13328	9472	8169
WV	59465	26682	26859	26525	17300	16108
Total	409187	252333	230397	198031	154904	138160

*Note: Data are obtained from Delaware Multi-Pollutant Regulation 1146 Analysis.

These reductions are similar in magnitude to those of the NOx SIP Call. These reductions, plus reductions from CAA requirements like transportation conformity and RACT on all major sources in these upwind states, are necessary to bring Delaware and other OTR non-attainment areas into attainment. Creating a large nonattainment area that includes the 16 states in Delaware's recommendation would require all these upwind states to comply with requirements similar to Delaware (i.e., the CAA nonattainment requirements). Conversely, if this large nonattainment area cannot be defined in the upcoming designation process, many upwind contributing counties/areas will not implement necessary, cost-effective control measures over emission sources within their boundaries. As a result, the pervasive transport impacts to downwind nonattainment areas will not be solved in a timely and cost-effective manner.

The EPA also implemented or plans to implement more stringent national limits for vehicle emissions and fuel standards. The regional NOx controls, however, have been so far focused on EGU (electric generating units) emissions, which constitute only a portion of the whole emission inventory. The national on-road mobile controls, though proved to be efficient and cost-effective, also cover a portion of the emission inventory. Table 12 provides proportional estimates of the emission inventory in the east half of the country.

Table 12. Proportional Estimates of Emission Inventory*

Midwest Region (Including IL, MI, ND, IN, MN, OH, IA, MO, SD, KS, NE, WI)

EGU section:	25%
Non-EGU section:	20%
Non-Point section:	10%

Non-road section: 20%
On-road section: 25%

Southeast (Including AL, KY, SC, AR, LA, TN, DC, MS, VA, FL, NC, WV, GA)
EGU section: 20%
Non-EGU section: 20%
Non-Point section: 10%
Non-road section: 30%
On-road section: 20%

Northeast (Including CT, MA, PA, DE, NH, RI, ME, NJ, VT, MD, NY)
EGU section: 15%
Non-EGU section: 15%
Non-Point section: 15%
Non-road section: 25%
On-road section: 30%

Midwest + Southeast + Northeast:
Total NOx: Approximately ~8,000,000 Ton/Year
EGU section: 20%
Non-EGU section: 20%
Non-Point section: 10%
Non-road section: 25%
On-road section: 25%

*Note: Emission percentages are estimated from a 2020 emission analysis, presented by Marc Houyoux, OAQPS, US EPA, dated 04/27/2010. The percent numbers are further rounded to 5%-intervals for simplification and demonstration purposes.

From Table 12, it can be seen that the EGU emissions represent about 20% of the total emission inventory and the on-road vehicles represent about 25% of the total emission inventory. If a large NAA boundary could be established, as Delaware recommends, implementation of comprehensive controls in other emission sections under the CAA in the upwind states will help addressing the remaining 55% of emission sources. For example, there are many RACT sources remaining uncontrolled in the eastern US in all previously classified "attainment counties." If all those sources could be controlled with the cost-effective RACTs, the regional baseline of VOC and NOx emissions could be lowered significantly. The collective result from RACT controls in a large NAA would be another effective "regional" SIP Call.

The analysis of this factor (level of emission controls) has clearly shown an inconsistency in control levels over the same emission sources between the CBSA/CSA-based non-attainment areas and attainment areas. The analysis again supports Delaware's large NAA recommendation, but not the traditional CMSA/CSA based designation.

Attachment 3

Delaware Recommended 8-hour Ozone Non-attainment Boundaries