Proposed

Delaware

State Implementation Plan (SIP) Revision

Supplement to Delaware's September 17, 2009 CAA Section 110 "Infrastructure" State Implementation Plan (SIP) Submission

Delaware Department of Natural Resources and Environmental Control

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1. SUMMARY AND PURPOSE

A State Implementation Plan ("SIP") is a state plan that identifies how that state will attain and maintain air quality that conforms to each primary and secondary National Ambient Air Quality Standard ("NAAQS"). The SIP is a complex, fluid document containing regulations, source-specific requirements, and non-regulatory items such as plans and emission inventories.

Delaware's initial SIP was approved by the EPA on May 31, 1972. Since this initial approval, the Delaware SIP has been revised numerous times to address air quality non-attainment and maintenance issues. This was done by updating plans and inventories, and adding new and revised regulatory control requirements. Delaware's SIP is compiled at 40 C.F.R. Part 52 Subpart I.

This document is a revision to Delaware's SIP. The purpose of this SIP revision is to supplement our September 17, 2009 SIP revision that was submitted to satisfy the requirements of Section 110(a)(1) and 110(a)(2) of the Clean Air Act (the Act) pursuant to the National Ambient Air Quality Standards (NAAQS) for Fine Particles ($PM_{2.5}$) promulgated by the United States Environmental Protection Agency (EPA) on October 17, 2006 (71 FR 61224).

Under the CAA, States are required to submit SIP revisions to satisfy Section 110(a)(1) and 110(a)(2) by no later than three years from the date EPA promulgates a new or revised NAAQS or face findings of failure to submit. Therefore, the September 17, 2009 SIP submission made by the Department was timely. However, on September 25, 2009, EPA issued a guidance document entitled, "Guidance on SIP Elements Required Under Sections 110(a)(1) and (2) for the 2006 24-Hour Fine Particle ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS)," which provided guidance on addressing the "infrastructure" elements for SIPs required under Sections 110(a)(1) and 110(a)(2) of the Act for the 2006 24-hour $PM_{2.5}$ NAAQS. According to this guidance document, any state's SIP submission to address the infrastructure element related to interstate transport found at 110(a)(2)(D)(i)(I) must be supported by an "adequate technical analysis." This guidance document further states that it is EPA's intention to complete a rule to address interstate transport in the eastern portion of the continental United States (the Transport Rule). This rule would replace the vacated Clean Air Interstate Transport Rule (CAIR) and would assist states with obligations to address interstate transport that significantly contributes to nonattainment in another state.

However, Delaware could not wait for EPA's SIP guidance or the CAIR replacement rule without facing findings of failure to submit for not meeting the October 17, 2009 due date for submittal of the 110(a)(1) and 110(a)(2) infrastructure SIP elements pursuant to EPA's October 17, 2006 promulgation of the 24-hour NAAQS for $PM_{2.5}$. Therefore, Delaware made a timely SIP submission in which the Department cited to its own SIP-approved regulations to reduce $PM_{2.5}$ precursor emissions of sulfur dioxide (SO_2) and nitrogen oxides (NOx) from electric

generating units, industrial boilers, and peaking units to address the interstate transport requirements of 110(a)(2)(D)(i)(I).

To be clear, Delaware's September 17, 2009 SIP submittal did not include the "technical analysis" called for in EPA's September 25, 2009 guidance document because 1) the EPA guidance was issued too late in the process, as discussed above, and 2) because after review of the guidance Delaware believed the EPA required technical analysis was in line with an analysis of whether or not emission from the state significantly impact any area, with the result of the analysis being either they do or they do not impact. And, if they do impact then the state must take action to address the impact.

In the development of Delaware's SIP-approved regulations to reduce $PM_{2.5}$ precursor emissions of SO_2 and NOx from electric generating units, industrial boilers, and peaking units to address the interstate transport requirements of 110(a)(2)(D)(i)(I), Delaware started with the assumption that it did significantly impact downwind areas. With this assumption, Delaware moved forward and regulated NOx and SO_2 emissions from its large EGU and industrial boilers, to include EGUs with small annual emission but high daily emissions (i.e., typically referred to as high energy demand day units) with Best Available Control Technology (BACT) level controls. Because of this Delaware believed it has clearly mitigated significant transport and adequately addressed CAA 110 requirements.[1]

Since the time of our September 17, 2009 SIP submittal, EPA proposed the Transport Rule (August 2, 2010). In that proposal, EPA concluded that the State of Delaware was to be included among the states covered by the Transport Rule. Given Delaware's stringent SIP-approved EGU, peaking unit and large boiler control regulations, this was not expected. On October 1, 2010, the Department submitted timely comments to EPA's rulemaking docket for the proposed Transport Rule including extensive technical data and information to support our contention that Delaware should not be included in the Transport Rule. It is our belief that the comments, data, and information we submitted on the proposed Transport Rule are more than sufficient to satisfy EPA's September 25, 2009 guidance that a SIP submitted to address 110(a)(2)(D)(i)(I) include an adequate technical analysis.

Despite the above, in the best interests of the State of Delaware, the Department is hereby using the comments, data, and information we submitted on the Transport Rule to form the basis of a technical analysis in support of our September 17, 2009 SIP revision to comply with EPA's September 25, 2009 guidance document. Upon completion of the CAA's required public

[1] This does not imply that Delaware believes transport is limited to EGU and large boiler emissions. To the contrary, Delaware believes programs like reasonably available control technology (RACT), new source review (NSR), transportation conformity, etc. are needed in all upwind areas to mitigate transport. This position is portrayed clearly in Delaware's December 2009 CAA 126 petition. However, in the context of EPA transport rule, which is the impetus for this SIP revision, BACT level controls on EGUs are clearly adequate to mitigate significant impact on downwind states.

participation procedures, the Department will formally submit this technical analysis as a supplement to its September 17, 2010 SIP submission to address satisfy 110(a)(2)(D)(i)(I) for interstate transport along with the associated administrative materials required by 40 CFR Part 51 Appendix *v*.

1.1 BACKGROUND

This document supplements our September 17, 2009 SIP by adding more detail as to how Delaware meets the requirements of Clean Air Act ("CAA") §110(a)(2)(D)(i)(I),[2] addressing interstate transport by demonstrating that Delaware has fulfilled its requirements to control sources that contribute significantly to non-attainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard which address downwind contributions (interstate transport) from Delaware sources.

Delaware's September 17, 2009 submittal indicated that its implementation plan and recently submitted SIP revisions presently contain adequate provisions prohibiting sources from emitting air pollutants in amounts which will contribute significantly to non-attainment or interfere with maintenance with any NAAQS and to prevent interference with measures related to preventing significant deterioration of air quality or which have to date proved adequate to protect visibility and to address interstate and international pollutant abatement. Specifically, under 110(a)(2)(D)(i)(I) major stationary sources for the annual and 24-hr $PM_{2.5}$ NAAQS are currently subject to Nonattainment New Source Review (NNSR) and Prevention of Significant Deterioration (PSD) permitting programs under the PSD and EOP provisions of 7 DE Admin. Code 1125, Preconstruction Review. As provided in the $PM_{2.5}$ NSR Implementation Rule (73 FR 28321), NNSR in New Castle County for $PM_{2.5}$ will continue to be administered under the provisions of Appendix S until no later than May 16, 2011 when the EOP section of 7 DE Admin. Code 1125 and the Delaware SIP have been revised to reflect the provisions of 73 FR 28321. Also, in Kent and Sussex counties, $PM_{2.5}$ PSD activities will continue to be administered using PM_{10} as a surrogate for $PM_{2.5}$, without consideration of precursors, until no later than May 16, 2011 when changes to 7 DE Admin. Code 1125 and the SIP have been completed. Delaware has complied with §110(a)(2)(D) through promulgation of 7 DE Admin. Code 1146, Electric Generating Unit Multi-Pollutant Regulation; 7 DE Admin. Code 1142, Section 2, Control of NO_X Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries; and 7 DE Admin. Code 1148, Control of Stationary Combustion Turbine Electric Generating Unit

[2] §110(a)(2)(D)(i)(I) states, "Contain adequate provisions – (i) prohibiting, consistent with the provisions of this title, any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will - (I) contribute significantly to non-attainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard, or (II) interfere with measures required to be included in the applicable implementation plan for any other State under part C to prevent significant deterioration of air quality or to protect visibility, (ii) insuring compliance with the applicable requirements of sections 126 and 115 (relating to interstate and international pollution abatement)."

Emissions; which significantly reduce emissions from Delaware's largest EGUs, industrial boilers, and peaking units. These regulations impose BACT level controls, and have been approved by the EPA as revisions to Delaware's SIP.

As mentioned previously, on September 25, 2009 EPA issued a Memo[3] which includes guidance on the technical analysis. The Memo discusses the analysis, elements therein and states, *"Information to support the states determination with respect to significant contribution to nonattainment might include, but not limited to, information concerning emissions in the state, meteorological conditions in the state and the potentially impacted states, monitored ambient concentrations in the state and the potentially impacted states, the distance to the nearest area that is not attaining the standard, and air quality modeling."* Therefore, this analysis will discuss:

- Evaluation of EPA's proposed Transport Rule (TR) modeling to help provide weight-of-evidence that Delaware is not a significant contributor to downwind states
- Delaware vs. EPA TR emissions analysis to help provide weight-of-evidence that Delaware is not a significant contributor to downwind states
- Monitoring data
- Recent and significant Delaware control measures that mitigate transport

While reading this analysis, we ask the reader to remember that:

1. **Delaware EGU projections are less than the EGU budgets in the proposed TR. Since those budgets are the level of SO_2 and NOx emissions that states must meet to remedy their "significant contribution," based on EPA modeling, and we demonstrate Delaware EGUs will meet those budgets in 2012, it follows that Delaware has met its requirements to address downwind transport.**
2. Delaware does not have the staff or resources to gather regional data, project emissions, and subsequently model downwind contributions from sources to every downwind county in the eastern U.S. Delaware further believes that expectation for such an analysis to be conducted by every state is entirely unreasonable and technically impractical. Therefore, **for purposes of this technical analysis Delaware Division of Air Quality (DAQ) will combine an EPA-Delaware emission analysis with EPA's modeling used for the TR**.

[3] Guidance on SIP Elements Required Under Sections 110(a)(1) and (2) for the 2006 24-Hour Fine Particle ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS),"

1.2 Responsibilities.

The agency with direct responsibility for preparing and submitting this document is Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air Quality (DAQ), under the Division Director, Ali Mirzakhalili, P.E. The working responsibility for Delaware's air quality planning falls within DAQ's Planning Branch, under the Program Manager, Ronald Amirikian. The Planning Branch is instrumental in completing this document. Specifically,

- Jack Sipple, M.S., is the project leader and responsible for emission projections, as well as principal author of this SIP revision;
- Ron Amirikian, Planning Branch Manager, QA
- Dave Fees, P.E., Managing Engineer, DAQ Emission Inventory Program, is the supporting lead for the 2005 base year emission inventory;
- Bob Clausen, EGU analysis and projections;
- Betsy Frey, M.S., is the supporting lead for $PM_{2.5}$ monitoring data;
- Mark Prettyman, Environmental Scientist, supporting staff and data management

2. TRANSPORT RULE MODELING AND CONTRIBUTION ASSESSMENT

On August 2, 2010 EPA proposed the TR to address downwind contributions of sulfur dioxides and nitrogen oxides. In that Rule, EPA 2012 "Base Case" emissions were modeled to determine whether States met a threshold for "linkage" and thus meet the criteria for "significant contribution to, and/or interference with maintenance" to downwind areas. The results of EPA's modeling in Table 1 suggest that Delaware's downwind contribution exceeds one or both of these thresholds. The "significant" thresholds are 0.20 and 0.35 ug/m3 for the annual and 24-hr NAAQS, respectively.

Table 1. Delaware's largest contribution to downwind areas based on EPA modeling in the TR

NAAQS	Largest Downwind Contribution to Nonattainment (ug/m3)	Largest Downwind Contribution to Maintenance (ug/m3)	Affected Counties (Linkages) for Nonattainment	Affected Counties (Linkages) for Maintenance

Annual	0.20	0.14	Lancaster, PA York, PA	None
Daily	0.50	0.36	Union, PA Dauphin, PA	Cumberland, PA New York, NY

As we will show later in this document, the 2005 base year that EPA used in the projections was flawed, because those emissions were significantly higher than what Delaware submitted in its 2005 Periodic Emissions Inventory. Furthermore, the EPA 2012 projections were based on those EPA 2005 inflated numbers, which resulted in inflated 2012 numbers. And finally, because recent Delaware control initiatives were not included in the EPA's 2012 projections they were even further inflated. Subsequently, these inflated projections were used by EPA to model and assess whether states significantly contribute. But inflated projections used in any contribution assessment yields inflated contributions. Therefore, Delaware believes that if EPA used up-to-date and accurate emissions data (i.e. the Delaware PEI and recent Delaware control measures), EPA modeling would have shown that Delaware does <u>not</u> significantly contribute to downwind areas.

3. EMISSIONS

Delaware compared its 2005 Periodic Emissions Inventory (PEI) with EPA's 2005 NEI (and 2002) emissions used in their assessment of significant contributions for the TR. Delaware then projected its 2005 PEI emissions to 2012, and compared them to EPA's 2012 Base Case emissions. Delaware's sulfur dioxide (SO_2) and nitrogen oxides (NOx) emissions are significantly overstated in the TR contribution assessment. 2005 and 2012 emissions can be found in the attachments to this document (attachment 1 contains the emission summary tables).

EPA used the 2005 National Emissions Inventory (NEI), Version 2 for point sources, and 2002 emissions for a few other categories, such as nonpoint sources. Alternatively, DAQ used a more recent and refined 2005 inventory PEI for the 2005 emissions analysis. EPA also used NMIM and MOVES, which are discussed in more detail below. The results of our comparison show that 2005 emissions differences between EPA's TR 2005 emissions and DAQ's 2005 PEI are insignificant for EGUs and non-EGU point sources, but significant in the nonpoint and nonroad categories. EPA apparently used a "top-down" approach for the nonpoint and marine vessels. Delaware used state-specific data, i.e. a "bottom-up" approach. Bottom-up approaches have

always been the preferred method for emission calculations. Table 2 summarizes the 2005 differences, with a discussion of each sector afterwards. [4]

Table 2 2005 Emissions

2005 SO2	EGU	NonEGU	Nonpoint	Nonroad	Onroad	Total
Transport Rule	32,378	34,859	5,859	11,648	422	85,166
DE PEI Emissions	31,745	34,686	1,034	2,755	422	70,642
DE Emission Difference (tpy)	**-633**	**-173**	**-4,825**	**-8,893**	**0**	**-14,524**
% Difference	**2%**	**0%**	**82%**	**76%**	**0%**	**17%**
2005 NOX	**EGU**	**NonEGU**	**Nonpoint**	**Nonroad**	**Onroad**	**Total**
Transport Rule	11,917	5,567	3,259	15,567	22,569	58,879
DE PEI Emissions	11,397	5,999	2,317	11,728	22,569	54,010
DE Emission Difference	**-520**	**432**	**-942**	**-3,839**	**0**	**-4,869**
% Difference	**4%**	**-8%**	**29%**	**25%**	**0%**	**8%**

3.1 2005 Source Sector Discussion

3.1.1 EGUs: EPA and Delaware PEI EGUs emission differences are insignificant for 2005.

3.1.2 Non-EGU Point: No difference in 2005.

3.1.3 Nonpoint: The nonpoint category in Table 2 shows significant differences between EPA and DAQ 2005 emissions. The large discrepancy most likely lies with differences in how the several fuel combustion categories (industrial, commercial, and residential) were calculated. EPA assumed 2002 emissions for the TR 2005 fuel combustion sources, without growth.[5]

DAQ calculated its emissions using Delaware-specific 2005 fuel sales data obtained from the US Department of Energy's Energy Information Administration (EIA) publications and emission factors obtained from AP-42 and other EPA documents. Delaware also backs out fuel usage already reported under the point source or nonroad source sectors. EPA may have double-counted the fuel combustion emissions.

Another possible reason for the difference between DAQ methods for fuel combustion and those employed by EPA, is that we concluded (since the 2002 inventory) that fuel used by industrial and commercial non-stationary equipment (forklifts, aerial lifts, floor sweepers/scrubbers, etc.) was contained in the EIA state energy industrial and commercial sector usages, instead of in the

[4] DAQ emission tables can be found in the attachments (summaries, EGUs, non-EGUs, marine vessels and fuel combustion).

[5] *Technical Support Document (TSD) for the Transport Rule Docket*. ID No. EPA-HQ-OAR-2009-0491. Table 2-1. Sectors Used in the TR Emissions Modeling Platform.

off-highway sector. Since emissions from these equipment types are included in the NONROAD model, we needed to back their fuel usage out of the EIA total. This did have a fairly significant effect.

3.1.4 Nonroad:

The nonroad 2005 emission differences were very large, particularly for SO_2 as shown in Table 2. As will be discussed later, this is due to differing methods for marine vessel calculations. However, all of the non-road categories are addressed here:

1. *Nonroad equipment (the NMIM model):* EPA used NMIM, but Delaware could not find data on EPA's website whereby we could "separate" non-road equipment emissions from marine, aircraft and locomotive (MAR). However, since DAQ also used NMIM for 2005 (and national defaults for the bigger NOx sub-categories), we believe that 2005 EPA vs. DAQ emissions differences in nonroad equipment (NMIM) category are most likely insignificant, and thus not a key factor in the total nonroad emissions differences.

2. *Locomotives and non-C3 Marine*: EPA used 2002 emissions.[6] Delaware has refined the 2005 PEI to use more recent emission factors and activity data.

3. *Aircraft Emissions*: EPA used the 2005 NEI version. Delaware has refined its 2005 PEI to use more recent emission factors and/or activity data.

4. *C3 Marine Vessels*: This is the sub-category likely responsible for the large differences between EPA and DAQ nonroad 2005 numbers (and thus 2012), i.e., EPA 2005 SO_2 is 11,648 tpy while DAQ is 2,755 tpy. EPA 2005 NOx is 15,567 tpy and DAQ's is 11,728 tpy. Delaware knows from experience that this category is largely responsible for SO_2 emissions from nonroad sources, and a little less so for NOx. In fact, marine vessel SO_2 emissions rank only behind EGUs and large industrial boilers.

EPA obtained their 2005 emissions for the TR from the EPA rule called "Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder", usually described as the Emissions Control Area (ECA) study, originally called SO_2 ("S") ECA.[7] Because EPA relied on rule development emissions, DAQ believes EPA's method is a "top-down" approach, and does not estimate emissions to the level of detail undertaken by Delaware DAQ staff, which uses local activity data. More importantly, Delaware has learned from discussions with OAQPS that **EPA allocated C3 marine vessels to States out to 200 nautical miles**. That is well beyond our state boundaries. Below is a summary of Delaware's methods,

[6] *Technical Support Document (TSD) for the Transport Rule Docket*. ID No. EPA-HQ-OAR-2009-0491. Table 2-1. Sectors Used in the TR Emissions Modeling Platform.
[7] *Technical Support Document (TSD) for the Transport Rule Docket*. ID No. EPA-HQ-OAR-2009-0491. Table 2-1. Sectors Used in the TR Emissions Modeling Platform.

including improvements to the methodology for 2005 as compared to Delaware's 2002 inventory.

The Delaware inventory for CMVs includes exhaust emissions from ocean-going vessels, tow and tug boats, ferries, and dredges, and is reported to EPA under the following SCCs: 2280002100, 2280002200, 2280003100, and 2280003200. Delaware accounts for vessel cruising, maneuvering, and hoteling time-in-mode and engine energy output in kilowatt-hours. For most of the length of the Delaware Bay and River, emissions are split between Delaware and New Jersey since the state boundary coincides with the shipping channel. The state boundary for the northern portion of New Castle County extends to low mean time on the New Jersey side of the river and thus all emissions from vessel traveling this stretch of river are included in Delaware's inventory.

Delaware obtains individual ship movement data from the Maritime Exchange, and is able to use this information to determine which vessels berth at Delaware ports and which vessels transit Delaware waters on their way to ports in Philadelphia, Camden, and other ports north of the Delaware state line. The use of individual ship movement data was first obtained and used for the 2005 inventory. ***Previous inventories relied on annual ship movement data obtained from the US Army Corps of Engineers' (USACE) Waterborne Commerce of the United States publication***. The use of the Maritime Exchange data enabled Delaware to determine vessels that made multiple berths within the Delaware River and Bay. Prior to 2005, each vessel movement provided by the USACE publication was treated as a separate transit of Delaware waters from the mouth of the Delaware Bay to the Delaware/Pennsylvania state line.

A second important change to the methodology was to eliminate the assumption that every vessel traveling up and down the Delaware River and Bay was escorted by a tug boat. In conversations with personnel at the Maritime Exchange, few vessels receive an escort the length of the bay. CMVs are met by a tug a few miles before reaching port in order to assist the vessel maneuvering into port and up to its berth.

As a result of these important changes, the 2005 emissions were reduced by 40% or more from 2002 estimates, suggesting another reason why the large discrepancies exist between the EPA TR 2005 and DAQ's PEI.

3.1.5 Onroad: Delaware does not have the ability to run MOVES in time for the comment due date. Therefore, we accept EPA's 2005 onroad emissions as-is for purposes of this analysis.

4.0 Delaware 2012 Projections (as projected by DAQ)

DAQ used our 2005 PEI as the base year for the 2012 projections. EPA used the 2005 NEI version 2, 2002 emissions, MOVES and NMIM in the base year, as described above. Because we have shown that EPA's nonroad and nonpoint emissions are significantly higher for SO_2 and

NOx in 2005, it follows that EPA's 2012 projections for those categories would likely be higher too. Table 3 illustrates the magnitude of those differences. Each source sector is discussed afterwards in more detail.

Table 3 2012 Projected Emissions

2012 SO2	EGU	NonEGU	Nonpoint	Nonroad	Onroad	Total
Transport Rule	7,841	10,974	5,858	14,193	98	38,964
DE Projections	7,356	5,941	1,034	2,201	98	16,630
DE Emission Difference	**-485**	**-5,033**	**-4,824**	**-11,992**	**0**	**-22,334**
% Difference	**6%**	**46%**	**82%**	**84%**	**0%**	**57%**
2012 NOX	**EGU**	**NonEGU**	**Nonpoint**	**Nonroad**	**Onroad**	**Total**
Transport Rule	4,639	5,567	3,248	15,511	10,700	39,665
DE Projections	2,418	4,504	2,315	10,370	10,700	30,307
DE Emission Difference	**-2,221**	**-1,063**	**-933**	**-5,141**	**0**	**-9,358**
% Difference	**48%**	**19%**	**29%**	**33%**	**0%**	**24%**

4.1 2012 Source Sector Discussion

4.1.1 EGUs

EPA used IPM, which is a tool for predicting future regional strategies and emissions. DAQ's understanding of the IPM used for the TR is that it projects current controls using an out-dated Delaware NEEDS database, regional growth as well as non-enforceable controls (ex. new units that we know won't come online or current units shutting down that we know won't shutdown, such as Unit 3 at Conectiv). DAQ EGU projections used essentially the same methods inherent to IPM, except we have state specific data and information based on discussions with Delaware sources, which we believe is better than the EPA data.

In accordance with the definition of EGU in the rule, Delaware's population of EGU's consists of the following units: Christiana Units 11 and 14, Edge Moor Units 1, 2, 3, and 4, Hay Road Units 1, 2, 3, 5, 6, and 7, VanSant 11, McKee Run Unit 3, NRG Dover Units 2 and 3, Indian River Units 1, 2, 3 and 4, and Beasley Unit 1. These units are principally comprised of municipal and merchant generating units that operate within the PJM network. Operation of the generating units is primarily on an economic dispatch basis, which includes operational incentive in the southern part of the Delmarva Peninsula that experiences transmission constraints during a significant portion of the year. The northern part of the state also suffers some transmission constraint issues, primarily during high demand periods. Delaware as a state is a net importer of electricity, typically generating less than 50% of the electric load within the Delaware borders.

For this review, 2009 was selected as the base year for two reasons; 1) 2009 represented the latest available data and included EGU operation in compliance with recent state regulatory requirements, and 2) region-specific information was available from PJM to predict 2012 generation requirements. For determining the 2009 generation and emissions data for the population of Delaware's generating units, data from EPA's CAMD database was utilized. Generation data for each of the units came from annual CAMD data. In order to be more representative of emission controls that came into effect for some of the units on May 1, 2009 in response to Delaware regulatory requirements, NOx and SO_2 emission data was taken to be the 2009 CAMD ozone season data. To determine the electric demand increase, PJM's January 2010 Load Forecast Report was consulted. Delaware is part of PJM's DPL region. In PJM report, PJM predicted increases in annual electric consumption for the: 1.4% above 2009 for 2010, 1.4% above 2010 for 2011, and 1.5% above 2011 for 2012. These increases along with the 2009 CAMD data were utilized to estimate the 2012 generation for the Delaware EGUs on a facility and unit basis.

For the purpose of this evaluation, the 2012 generation for the Christiana Units 11 and 14 was assumed to be that grown from the 2009 data. The 2012 NOx and SO_2 emission rates were assumed to remain the same as the 2009 data, as there are no known plans for changes in emission controls for these units through 2012.

The recent new owner of Edge Moor Unit 3 has indicated that Edge Moor Unit 3 will no longer fire coal fuel, but will operate on its current alternate fuels of residual fuel oil, natural gas, and landfill gas. Because this unit also is the normal steam supply for an adjacent industrial plant, its operation is not as directly dependent upon economic dispatch as other units in the region. As the unit will already be on line for support of the industrial facility and not subject to startup/shutdown costs, it will remain able to pick up economic dispatch/opportunity load, tending to keep the overall capacity factor at approximately historic levels in spite of a change in fuel costs. Regarding NOx emissions, the unit was assumed to come in compliance with the requirements of Delaware's 7 DE Admin Code 1146, 0.125 lb. /MMBTU. Regarding SO_2 emissions, it was assumed that the SO_2 emission rate would be that demonstrated by Edge Moor Unit 5 during 2009, as Edge Moor Unit 5 already fired the same set of fuels that Edge Moor 3 will be utilizing with similar fuel costs and constraints.

The recent new owner of Edge Moor Unit 4 has indicated that the Edge Moor Unit 4 will no longer fire coal fuel, but will operate in its current alternate fuels of residual oil, natural gas, and landfill gas. Because of the increase in fuel costs, it is assumed that this unit's position in the economic dispatch hierarchy will change and the unit will be called on PJM less frequently. For this review, Edge Moor Unit 4's annual capacity factor was assumed to be 3%, which is similar to other oil/gas steam units in the area. Regarding NOx emissions, the unit was assumed to come in compliance with the requirements of Delaware's 7 DE Admin Code 1146, 0.125 lb. /MMBTU. Regarding SO_2 emissions, it was assumed that the SO_2 emission rate would be that

demonstrated by Edge Moor Unit 5 during 2009, as Edge Moor Unit 5 already fired the same set of fuels that Edge Moor 4 will be utilizing with similar fuel costs and constraints. The drop in generation from the 2009 level for this unit is assumed to be picked up evenly by the adjacent six Hay Road 1-6 combustion turbines and associated combined cycle steam units.

For the purposes of this evaluation, the 2012 generation for Edge Moor Unit 5 was assumed to be that grown from the 2009 data. The 2012 SO_2 emission rates were assumed to remain the same as the 2009 data, as there are no known plans for changes in SO_2 controls for this unit through 2012. Regarding NOx emissions, the unit was assumed to come in compliance with the requirements of Delaware's 7 DE Admin Code 1146, 0.125 lb./MMBTU.

For the purposes of this evaluation, the 2012 generation for each of the six Hay Road units was the 2009 values increased for generation growth and to also include the generation dropped from Edge Moor Unit 4 as described above (the generation increase was evenly split between the six units). NOx and SO_2 emission rates for 2012 were assumed to remain the same as the 2009 values as there are no known plans for the addition of any controls prior to 2012.

Indian River Units 1 and 2 were assumed to be mothballed prior to 2012 in compliance with an existing consent decree.

For the purposes of this evaluation, generation levels for Indian River Unit 3 and 4 were evaluated together to account for the loss in generation associated with the Indian River Units 1 and 2 due to IR 1&2 shutdown, and to account for transmission constraints during high electric demand with Indian River Units 1 and 2 out of service. Therefore the 2012 generation levels for both Indian River Units 3&4 increased noticeably due to both generation growth and to account for the makeup for the Indian River Units 1 and 2 shutdowns. The evaluation indicated that there were 1008 hours where the generation requirements appeared to exceed the ability of Indian River Units 3 and 4. It was assumed that this shortfall in generation had to be made up by Kent County units due to grid reliability, stability, and voltage control reasons. McKee Run Unit 3 was evaluated to be able to assume 80,976 MWh of the estimated shortfall, and the remaining shortfall (16,267 MWh) was assigned evenly to the two NRG Dover CT units. The 2012 generation values for McKee Run Unit 3 and NRG Dover Units 2 and 3 were revised to reflect these increases.

For the purposes of this evaluation, the 2012 Indian River Unit 3 SO_2 and NOx emission rates were assumed to be unchanged from the 2009 values.

For the purposes of this evaluation, the 2012 Indian River Unit 4 NOx and SO_2 emission rates were assumed to comply with an existing consent decree's emission rate limitations of 0.2 lb/MMBTU for SO_2 and 0.1 lb/MMBTU for NOx.

For the purposes of this evaluation, the 2012 generation from McKee Run Unit 3 was assumed to increase from 2009 due to both generation growth and the shortfall related to the Indian River units, as discussed above. The 2012 NOx and SO_2 emission rates were assumed to be the same as 2009 as there are no known plans for additional emission controls prior to 2012.

For the purposes of this evaluation, the 2012 VanSant Unit 11 generation was increased from 2009 due to generation growth, and the 2012 NOx and SO_2 emission rates were assumed to be the same as 2009 as there are no known plans for additional emission controls prior to 2012.

For the purposes of this evaluation, the 2012 generation for NRG Dover Units 2 and 3 was increased from 2009 due to both generation growth and the shortfall from the Indian River facility as discussed above (shortfall was evenly split between the two units). The 2012 NOx and SO_2 emission rates were assumed to remain the same as 2009 as there are no known plans for additional emission controls prior to 2012.

For the purposes of this evaluation, the 2012 generation for the Beasley Unit 1 was increased from 2009 due to generation growth. The 2012 NOx and SO_2 emission rates were assumed to remain the same as 2009 as there are no known plans for additional emission controls prior to 2012.

2012 EGU emissions are summed in Table 3. Detailed data is available in the attachment 1 to this document.

Table 4 shows that even if DAQ EGU 2012 emissions are assumed to be the same as EPA's 2012 IPM projections, which is not a good assumption given the Delaware specific data discussed above, the overall differences are still significant (The table also reflects removal of OTW NOx CAPS at the refinery in the non-EGU sector).

Table 4 2012 Projected Emissions Substituting EPA IPM runs for DE projected EGUs

2012 SO2	EGU	NonEGU	Nonpoint	Nonroad	Onroad	Total
Transport Rule	7,841	10,974	5,858	14,193	98	**38,964**
DE Projections	7,841	5,941	1,034	2,201	98	**17,115**
DE Emission Difference	0	-5,033	-4,824	-11,992	0	**-21,849**
% Difference	0%	46%	82%	84%	0%	**56%**
2012 NOX	**EGU**	**NonEGU**	**Nonpoint**	**Nonroad**	**Onroad**	**Total**
Transport Rule	4,639	5,567	3,248	15,511	10,700	**39,665**
DE Projections	4,639	4,934	2,315	10,370	10,700	**32,958**
DE Emission Difference	0	-633	-933	-5,141	0	**-6,707**
% Difference	0%	11%	29%	33%	0%	**17%**

4.1.2 Non-EGU Point Sources

DAQ followed EPA's methods and assumed zero growth for non-EGU point sources, and then applied controls as discussed shortly. There is a significant difference in SO_2 and NOx, as shown in Table 3. This is due to control strategies which will be discussed later in this document, which presumably the EPA was unaware of when developing the Rule.

<u>Non-EGU Point Source Controls</u>

The following is a list of significant SO2 and NOx controls, which Delaware has adopted to further reduce emissions by 2012.

- A May 2010 agreement between the Department and the Delaware City Refining Company placing a facility-wide NOx cap of 2,225 tons per year (TPY). This yields a 10% reduction by 2012 and a 40% reduction by 2014.
- Dover Air Force Base - Ceased using residual fuel oil in March 2010; will replace central boiler plant with small natural gas-fired package boilers. Boilers No. 1 – 4 retired.
- DuPont Stine-Haskell Laboratory - Removed Boilers 3 and 4 (fuel oil # 6)
- DuPont Wilmington Office Building - Issued construction permits for natural gas conversion with # 6 fuel as back up (permitted up to 10% # 6 usage)
- Mountaire Farms of Delaware Inc. -Millsboro - Switching to Nat Gas
- SPI Poly-OLs - Boiler No. 1 removed
- Invista - Boilers 1 and 3 (coal) will be retired by 2012, Boiler 2 (coal/# 6) was retired on 12/09 (Consent Decree)
- Dow Reich hold Specialty Latex LLC – Shutdowns of: Flare, #6 Fuel Oil Fired Boiler, Natural Gas & #6 Fuel Oil Fired Boiler, Emergency Generator

4.1.3 Nonpoint Sources

Delaware did not grow or control nonpoint source emissions for the 2012 projections – our 2012 projections are the same as our 2005 PEI. Previously, we discussed how SO_2 and NOx were primarily from fuel combustion for Delaware area sources.

Note that DAQ has historical sales information from the U.S. Energy Information Administration (EIA) which shows 2009 distillate and residual fuel-sales in Delaware have decreased by 45% and 57%, respectively since 2000. See Figures 1 and 2. Regardless, DAQ assumed zero growth for those categories to be conservative. If we included the negative growth in our projections, the 2012 emissions would be even less. But we took the conservative approach.

Figure 1

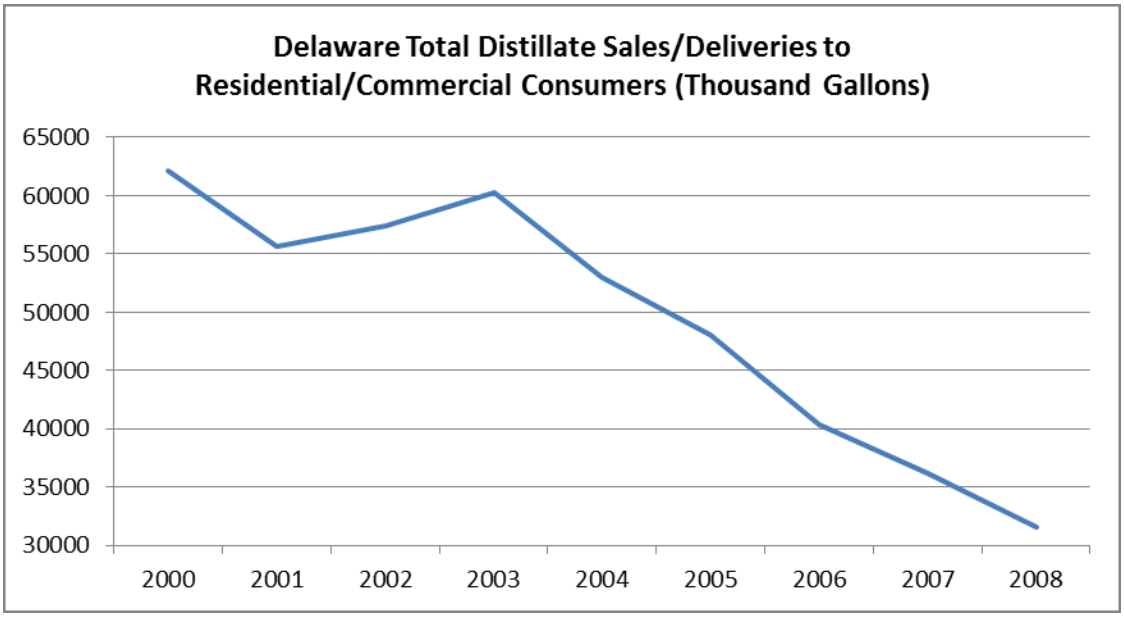
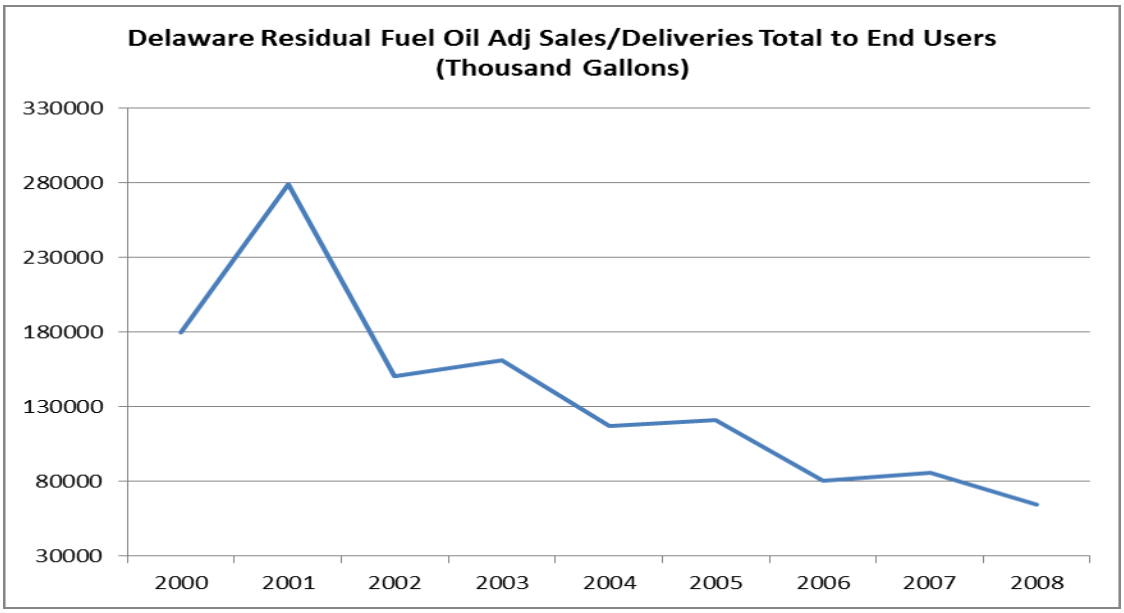


Figure 2



4.1.4 Nonroad Mobile Sources

Locomotives and non-C3 Marine: Delaware assumed no growth and controls. Therefore, the 2012 emissions are the same as 2005. This results in a conservative projection, since the Nonroad Rule is not taken into account.

Aircraft Emissions: Delaware assumed no growth and controls, because the large majority of NOx is from Dover Air Force Base (aircraft SO_2 emissions are insignificant). We determined a 2007-2013 growth factor of 1.00 for Dover Air Force Base as part of our 2006 $PM_{2.5}$ and Ozone SIP development process. Therefore, we assume 2012 emissions are the same as 2005.

<u>Nonroad Equipment</u>

Nonroad equipment (NMIM): Delaware relied upon 2012 projections developed as part of MANEVU's consultation process for Regional Haze SIPs for this category, due to time constraints. Those estimates were peer-reviewed by OTC/MANEVU states.

EPA's NMIM2005 model and NONROAD2005 model was used to estimate annual emission projections of non-road engines in all MANE_VU states, including Delaware as part of the Regional Haze consultation process. A Contractor was hired to facilitate the projections (MACTEC).

The controls for non-road mobile engines (except aircraft, locomotives, and marine vessels) that were applied when projecting 2012 emissions include all relevant federal rules, such as fuel sulfur content rule, gasoline Reid Vapor Pressure (RVP) requirements, and reformulated fuel programs. Controls for the 2012 emissions include all relevant federal rules and requirements, as outlined below.

(1) Phase I and Phase II Emissions Standards for Gasoline-Powered Non-Road Utility Engines, Federal Rule

> This standard promulgated by the EPA applies to VOC emissions from small non-road, spark-ignition (i.e., gasoline-powered) utility engines, as authorized under 42 U.S.C. §7547. The measure affects gasoline-powered (or other spark-ignition) lawn and garden equipment, construction equipment, chain saws, and other such utility equipment as chippers and stump grinders, wood splitters, etc., rated at or below 19 kilowatts (an equivalent of 25 or fewer horsepower). Phase 2 of the rule applied further controls on handheld and non-handheld outdoor equipment. See References 4-2, 4-3, and 4-4.

(2) Emissions Standards for Diesel-Powered Non-Road Utility Engines of 50 or More Horsepower, Federal Rule

This standard promulgated by the EPA applies to VOC and NOX emissions from non-road, compression-ignition (i.e., diesel-powered) utility engines, as authorized under 42 U.S.C. § 7547. The measure affects diesel-powered (or other compression-ignition) construction equipment, industrial equipment, etc., rated at or above 37 kilowatts (37 kilowatts is approximately equal to 50 horsepower). See References 4-5, 4-6, and 4-7.

(3) Emissions Standards for Spark Ignition (SI) Marine Engines, Federal Rule

This standard promulgated by the EPA applies to exhaust PM, VOC and NOx emissions from new spark-ignition (SI) gasoline marine engines, including outboard engines, personal watercraft engines, and jet boat engines. Of nonroad sources studied by EPA, gasoline marine engines were found to be one of the largest contributors of hydrocarbon (HC) emissions (30 percent of the nationwide nonroad total).

(4) Emissions Standards for Large Spark Ignition Engines, Federal Rule

This EPA measure controls VOC and NOx emissions from several groups of previously unregulated nonroad engines, including large industrial spark-ignition engines.

The starting point for the emission projections was Version 3 of the MANE_VU 2002 Nonroad emission inventory (*Documentation of the MANE-VU 2002 Nonroad Sector Emission Inventory, Version 3, Draft Technical Memorandum*, March 2006). MACTEC's approach to developing emission projections for these sources was to use combined growth and control factors developed from emission projections for U.S. EPA's Clean Air Interstate Rule (CAIR) development effort. MACTEC obtained emission projections developed for the CAIR rule. MACTEC then calculated the combined growth and control factors by determining the ratio of emissions between 2002 and each of the MANE-VU projection years (2009, 2012, and 2018). The CAIR emissions were available for 2001, 2010, 2015 and 2020. Thus, they developed intermediate year estimates using linear interpolation between the actual CAIR years and the MANE-VU years.

Using this approach MACTEC developed State/county/SCC/pollutant growth/control factors for use in projecting the MANE-VU base year data to the out-years. These values were then used to multiply times the base year value to obtain the projected values. Since the development of the CAIR factors included both growth and controls, no separate control factors were developed for these sources except where exceptions to this method were used for States that requested alternative growth/control methods. Because emissions from aircraft, commercial marine vessels, and locomotives are not projected by the NONROAD model, emission projections for these sources were developed separately, as described below.

Commercial Marine Vessels:

C3 Marine Vessels: EPA grew base year 2002 emissions were grown to future years without Emissions Control Area (ECA) or International Marine Organization (IMO) global NOx and SO_2 controls.[8] Delaware grew 2005 emissions to 2012 to include growth and controls per EPA "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Category 3 Marine Diesel Engines, EPA420-R-09-019."

For the purpose of emission regulations, marine engines are divided into three categories based on displacement (swept volume) per cylinder. Category 1 and Category 2 marine diesel engines typically range in size from about 500 to 8,000 kW (700 to 11,000 hp). These engines are used to provide propulsion power on many kinds of vessels including tugboats, push boats, supply vessels, fishing vessels, and other commercial vessels in and around ports. They are also used as stand-alone generators for auxiliary electrical power on many types of vessels. Category 3 marine diesel engines typically range in size from 2,500 to 70,000 kW (3,000 to 100,000 hp). These are very large marine diesel engines used for propulsion power on ocean-going vessels such as container ships, oil tankers, bulk carriers, and cruise ships.

The majority of vessels in this category are powered by diesel engines that are either fueled with distillate or residual fuel oil blends. For the purpose of emission inventories, EPA has assumed that Category 3 vessels primarily use residual blends while Category 1 and 2 vessels typically used distillate fuels.

EPA developed regional emission inventories for Category 1 & 2 vessel and Category 3 vessels for calendar years 2002 through 2040. The data DAQ used to develop the 2012 emission projections (for both a baseline and controlled scenario) are documented in Regulatory Impact Analysis: Control or Emissions of Air Pollution from Locomotive Engines and Marine Compression Engines Less than 30 Liters Per Cylinder, EPA420-R-08-001a (http://www.epa.gov/otaq/regs/nonroad/420r08001a.pdf), Regulatory Impact Analysis: Control of Emissions of Air Pollution from Category 3 Marine Diesel Engines, EPA420-R-09-019 (http://www.epa.gov/otaq/regs/nonroad/marine/ci/420r09019.pdf)and Proposal to Designate an Emissions Control Area for Nitrogen Oxides, Sulfur Oxides, and Particulate Matter, EPA-420-R-09-007 (http://www.epa.gov/otaq/regs/nonroad/marine/ci/420r09007-chap2.pdf). DAQ used the EPA data from these RIAs to develop separate growth and control factors for Category 1 &2 vessels (diesel) and Category 3 vessels (residual).

CMV Diesel Growth Factors

EPA used a variety of data sources to project fuel consumption by Category 1 & 2 engines, account for the impact of existing engine regulations (i.e., the 2004 Clean Air Nonroad Diesel

[8] *Technical Support Document (TSD) for the Transport Rule Docket*. ID No. EPA-HQ-OAR-2009-0491. Page 12.

Rule that will decrease the allowable levels of sulfur in fuel used in locomotives by 99 percent) and marine vessel fleet composition to develop baseline inventory projections for all years up to 2040. Using the EPA-provided baseline inventory projections, we calculated growth factors for each pollutant based on the ratio of the future year baseline emissions (2012) to the 2005 estimated emissions (emissions data from EPA 420-R-08-001a, May 2008). *CMV Diesel Control Factors*

In March 2008, EPA finalized a three part program that will dramatically reduce emissions from marine diesel engines below 30 liters per cylinder displacement. The 2008 final rule includes the first-ever national emission standards for existing marine diesel engines, applying to engines larger than 600kW when they are remanufactured. The rule also sets Tier 3 emissions standards for newly-built engines that are phasing in from 2009.

Using the EPA-provided controlled inventory projections, we calculated controlled factors for each pollutant (emissions data from EPA 420-R-08-001a, May 2008).

CMV Residual Oil Growth Factors

EPA's Emissions TSD, states "*Class 3 commercial marine vessel sector (seca_c3): base year 2002 emissions grown to future years without Emissions Control Area (ECA) or International Marine Organization (IMO) global NOX and SO_2 controls and did not apply sulfur controls for C3 marine engines in 2012.* " [9]

DAQ re-projected this category's emissions using our 2005 PEI. EPA used a variety of data sources to project fuel consumption by Category 3 engines, to account for the impact of existing engine regulations (i.e., the 2003 Tier 1 Marine Diesel Engines rule and marine vessel fleet composition to develop baseline inventory projections for all years up to 2040. EPA projected emissions for nine U.S. regions. The East Coast Region extends roughly from the Florida Keys to the Maine/Canada border. Using the EPA-provided baseline inventory projections for the East Coast Region in EPA420-R-09-019, DAQ calculated growth factors for each pollutant based on the ratio of the 2012 East Coast baseline emissions in 2012 to the 2005 estimated emissions.

CMV Residual Oil Control Factors

On December 22nd, 2009, EPA announced final emission standards under the Clean Air Act for new marine diesel engines with per-cylinder displacement at or above 30 liters (called Category 3 marine diesel engines) installed on U.S.-flagged vessels. The final engine standards are equivalent to those adopted in the amendments to Annex VI to the International Convention for the Prevention of Pollution from Ships (a treaty called "MARPOL"). The emission standards apply in two stages: near-term standards for newly-built engines will apply beginning in 2011,

[9] *Technical Support Document (TSD) for the Transport Rule Docket*. ID No. EPA-HQ-OAR-2009-0491. Page 12, bullet 2.

and long-term standards requiring an 80 percent reduction in nitrogen dioxides (NOx) will begin in 2016. EPA also adopted changes to the diesel fuel program to allow for the production and sale of diesel fuel with up to 1,000 ppm sulfur for use in Category 3 marine vessels. The regulations generally forbid production and sale of fuels with more than 1,000 ppm sulfur for use in most U.S. waters, unless operators achieve equivalent emission reductions in other ways.

On March 26, 2010, the International Maritime Organization (IMO) officially designated waters off North American coasts as an emissions control area (ECA) in which stringent international emission standards will apply to ships. In practice, implementation of the ECA means that ships entering the designated area would need to use compliant fuel for the duration of their voyage that is within that area, including time in port as well as voyages whose routes pass through the area without calling on a port. The North American ECA includes waters adjacent the Atlantic extending up to 200 nautical miles from east coast of the United States. The quality of fuel that complies with the ECA standard will change over time. From effective date in August, 2012 until 2015, fuel used by all vessels operating in designated areas cannot exceed 1.0 percent sulfur (10,000 ppm). (Beginning in 2015, fuel used by vessels operating in these areas cannot exceed 0.1 percent sulfur (1,000 ppm. Beginning in 2016, NOx aftertreatment requirements become applicable).

Using the EPA inventory projections in EPA 420-R-09-019, we calculated 2005-2012 NOx combined growth and control factors. The growth and control factor calculations are provided in the spreadsheets.

DAQ took a somewhat different approach for SO_2, however. DAQ contacted U.S. EPA, Office of Transportation and Air Quality, Assessment and Standards Division (ASD) and learned that 10,000 ppm (1%) sulfur limits will not "enter into force" until August 1, 2012. As a result, we used EPA 420-R-09-019 to determine growth, but developed our own control factor based on existing residual fuel averages of 2.7% sulfur.[10] Dividing the 1% limits that take effect on August 1, 2012 by 2.7% gives a control factor of 0.37. DAQ multiplied the growth factor by the control factor (1.00) to 2005 PEI emissions to give 1,536 tpy from January 1 through July 31, 2012, and the control factor (0.37) by the growth factor to give 406 tpy for the remainder of the year, for a total of 1,804 tpy. See Table 5.

[10] U.S. Environmental Protection Agency Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories, Final Report, Table 2-9. April 2009. ICF International

Table 5 C-3 Marine Engine SO_2 Emissions from residual fuel oil

Date	2005 Emissions	05_12 Growth	Control Factor	Growth + Control	2012 tpy
Jan 1 - July 31 tons	1,100	1.40	1.00	1.40	1,536
Aug 1 - Dec 31 tons	786	1.40	0.37	0.52	406
Totals	**1,886**				**1,942**

4.1.5 Onroad Mobile Sources:

EPA used the MOVES model to estimate Delaware 2005 emissions and 2012 projections. Due to time constraints, Delaware Division of Air Quality (DAQ) assumed for purposes of this study that the mobile emissions generated by MOVES are accurate for 2005 and 2012. Therefore, no differences occur as shown in Tables 2 and 3.

5. DELAWARE MEETS PROPOSED TRANSPORT RULE BUDGETS

Despite that EPA inventories for DE are inflated, EPA's TR indicates that Delaware has met its obligations to mitigate transport, i.e.:

> Without variability limits, EPA proposes at 40 CFR 97.410 a 2012 Delaware NOx budget of 6,206 TPY, and at 40 CFR 97.710 a 2012 Delaware SO_2 budget of 7,784 TPY. EPA has indicted that a state's emissions budget *"...is the quantity of emissions that would remain in that state from covered sources after elimination of that portion of each state's significant contribution and interference with maintenance that EPA has identified in today's proposal, before accounting for the inherent variability in power system operations... The state emissions budget is a mechanism for converting the quantity of emissions that a state must reduce (i.e., the state's significant contribution and interference with maintenance) into enforceable control requirements. In other words, it provides a quantity of emissions to use in developing a remedy..."*

EPA's 2012 base case emissions for Delaware EGU's are 4,639 TPY for NOx and 7,841 TPY for SO_2, Since the EPA is establishing Delaware's EGU budgets at a level that is not less than its 2012 base case emissions, Delaware has already met its obligation to remedy downwind contributions for NOx and SO_2, using EPA's own numbers. [11]

Furthermore, Delaware calculated its own 2010 EGU projections, which are more accurate than EPA's IPM method (DAQ has first-hand knowledge of our sources plans, recent permits and

[11] The difference between the EPA 2012 base case SO2 inventory and the budget for Delaware is 57 TPY. By Delaware correcting the problems with the inventory 1) overall modeled contributions would be much less given that EPA's 2012 SO2 projections are inflated on the order of 57%, and 2) Delaware's 2012 EGU projection will be less than the budget.

agreeements). As can be seen in table 3, DAQ 2012 projections are 7,356 tpy and 2,418 for SO_2 and NOx, respectively. These are less than EPA's budgets in the TR (7,784 tpy SO_2 and 6,206 tpy NOx), and thus provide additional evidence to EPA's projections of our EGUs, that Delaware has mitigated its significant contribution to downwind sources**.**

6. MONITORING DATA SHOWS ATTAINMENT

The EPA Guidance Memo suggests that States include a discussion of monitors in their analysis. As can be seen from Tables 6 - 11 all monitors in DE, NJ, Southeastern PA and the NY CMSA are attainment using 2007-2009 design values, [12] including those counties for which the TR showed a linkage to Delaware.[13] **DNREC emphasises that all of these counties are in attainment <u>prior to</u>**:

- Delaware's Phase II (SO_2 controls) multi-pollutant regulation taking effect in 2012
- Invista coal unit shutdown for Units 1 and 2
- Indian River Units 1, 2 and 3 coal-unit shutdowns
- Connectiv Edgemoor Power Plant – Unit 3 and 4 switching from coal to natural gas/# 6 oil backup
- Reductions from implementation of the final transport rule

Table 6 Delaware 2007-2009 annual monitoring data

PM2.5 values	New Castle County Bllfte	MLK -a	Nwrk -a	Lums	Kent County Dover	Killens	Sussex County Seaford
2007	13.4	14.4	13.4	12.5	12.1	12.1	13.2
2008	13.0	13.5	12.6	11.6	11.2	11.3	12.2
2009	10.2	11.2	10.6	10.0	9.4	9.5	9.7

[12] A few monitors in PA, NY and NJ were either shut down or had incomplete data for one year. However, the latest data shows those monitors in attainment nonetheless. Also, all monitors in MD are in attainment, based on discussions with MARAMA.

[13] The Dauphin County, PA monitor was not operational in 2009 so DAQ averaged 2007-2008 for purposes of this analysis. NOTE: this average is not meant to mean "design value" for that monitor. Nonetheless the data shows compliance with the NAAQS for 2009 (see Tables 12 and 13).

Table 7 Delaware annual 3-yr design values 2007-2009

PM2.5 design values	**New Castle County** Bllfte	ML K-a	Nwrk -a	Lums	**Kent County** Dover	Killens	**Sussex County** Seaford
2007-2009	12.2	13.0	12.2	11.3	10.9	11.0	11.7

Table 8 Delaware 24-hr 2007-2009 monitoring data

PM2.5 98th percentiles	**New Castle County** Bllfte	MLK-a	Nwrk-a	Lums	**Kent County** Dover	Killens	**Sussex County** Seaford
2007	32.3	33.6	31.0	29.6	30.2	30.9	32.5
2008	30.1	34.8	28.6	28.1	28.7	27.6	27.0
2009	23.2	28.4	23.4	20.6	19.4	20.7	20.2

Table 9 Delaware 24-hr 3-yr design values 2007-2009

PM2.5 3-yr Averages	**New Castle County** Bllfte	MLK-a	Nwrk-a	Lums	**Kent County** Dover	Killens	**Sussex County** Seaford
2007-2009	29	32	28	26	26	26	27

Table 10 Philadelphia CMSA monitoring data – daily and annual

PHILADELPHIA NONATTAINMENT AREA				**Daily PM2.5**				**Annual PM2.5**			
State	**County**	**Monitor Site**	**AQS Monitor ID**	**2007**	**2008**	**2009***	**2007-09 DV****	**2007**	**2008**	**2009***	**2007-09 DV****
NJ	Camden	Camden Trailer	34 007 0003	34	34	37	35	12.2	13.7	13.6 (no Q4)	13.1
	Camden	Pennsauken	34 007 1007	35	28	25	29	14.0	11.8	9.5	11.7
	Gloucester	Gibbstown	34 015 5001	31	27	22	27	13.4	11.5	9.3	11.4

DE	New Castle	Bellefonte	10 003 1003	32	30	23	29	13.4	13.0	10.2	12.2
	New Castle	MLK-a	10 003 2004	34	35	28	32	14.4	13.5	11.2	13
	New Castle	Nwrk-a	10 003 1012	31	29	23	28	13.4	12.6	10.6	12
	New Castle	Lums	10 003 1007	30	28	21	26	12.5	11.6	10.0	11
PA	Bucks	Bristol	42 017 0012	35	31	26	31	13.0	13.5	10.8	12.4
	Chester	New Garden	42 029 0100	38	32	31	34	14.1	14.7	14.2	14.3
	Delaware	Chester	42 045 0002	35	29	27	30	14.5	14.7	12.1	13.7
	Montgomery	Norristown	42 091 0013	30	24	27	27	13.1	12.1	10.4	11.9
	Philadelphia	LAB	42 101 0004	35	35	26	32	13.7	13.0	10.9	12.5
	Philadelphia	NEA	42 101 0024	34	31	26	30	12.9	12.0	9.9	11.6
	Philadelphia	CHS, Broad St.	42 101 0047	35	33	29	32	14.4	13.5	11.1	13.0
	Philadelphia	RIT-F	42 101 0055	NA	35	29	NA	NA	13.5	11.3	NA
	Philadelphia	FAB-FA	42 101 0057	33	33	28	31	12.0	13.3	11.1	12.1
	Philadelphia	Elmwood, Amtrak	42 101 0136	32	NA	NA	NA	13.3	NA	NA	NA

Notes

* = 98th percentile for the year, not final

** =Design Value=average of three year period, not final. Three years of annual mean concentrations for PM2.5 are used to calculate the design value at a monitor.

NA = Data Not Available

SD = Monitor Shutdown

Data sources are either from the State Agency or AirData (EPA's public query system that accesses AQS)

Table 11 New York nonattainment area

NEW YORK NONATTAINMENT AREA				Daily PM2.5				Annual PM2.5			
State	**County**	**Monitor Site**	**AQS Monitor ID**	**07**	**08**	**09***	**07-09 DV****	**07**	**08**	**09***	**07-09 DV****
CT	Fairfield	Roosevelt School	09 001 0010	30	32	31	31	12.7	11.9	10.2	11.6
	Fairfield	Danbury	09 001 1123	30	28	32	30	12.0	11.7	9.6	11.1
	Fairfield	Norwalk	09 001 3005	32	26	31	30	11.9	11.8	9.9	11.2
	Fairfield	Westport	09 001 9003	29	31	34	31	10.9	10.2	9.5	10.2
	New Haven	Woodward Avenue	09 009 0026	30	31	34	31	11.6	11.5	9.8	11.0
	New Haven	James Street	09 009 0027	31	32	35	32	11.5	11.3	10.2	11.0
	New Haven	State Street	09 009 1123	31	32	35	32	12.3	12.1	10.4	11.6
	New Haven	New Haven	09 009 2008	29	25	29	28	10.8	10.6	8.9	10.1

	New Haven	Bank Street	09 009 2123	33	28	34	32	12.0	11.7	9.8	11.2
NJ	Bergen	Fort Lee	34 003 0003	35	32	27	31	13.3	11.6	9.0	11.3
	Essex	Newark Cultural Center	34 013 0015	35	29	SD	NA	13.4	13.7	SD	NA
	Hudson	Jersey City Primary	34 017 1002	35	32	29	32	13.2	12.1	10.3	11.9
	Hudson	Union City	34 017 2002	93	33	25	33	15.1	13.3	10.7	13.0
	Mercer	Trenton	34 021 0008	33	31	23	29	12.1	11.2	9.2	10.8
	Mercer	Washington Crossing	34 021 8001	27	28	25	27	10.2	10.0	7.8	9.3
	Middlesex	New Brunswick	34 023 0006	30	29	21	27	12.3	10.9	8.0	10.4
	Morris	Morristown	34 027 0004	32	24	22	26	11.5	9.4	8.1	9.7
	Morris	Chester	34 027 3001	31	24	21	26	10.4	8.8	7.1	8.8
	Passaic	Paterson	34 031 0005	37	29	26	30	13.5	11.4	8.9	11.3
	Union	Elizabeth Turnpike Primary	34 039 0004	35	34	28	32	13.9	12.9	11.2	12.7
	Union	Elizabeth Downtown	34 039 0006	36	31	26	31	13.1	12.4	9.3	11.6
	Union	Rahway	34 039 2003	33	30	25	29	13.2	12.0	9.3	11.5
NY	Bronx	Morrisania	36 005 0080	36	33	30	33	15.6	13.5	12.7	13.9
	Bronx	200th Street And Southern Blvd, Botanical Garden	36 005 0083/013 3	33	NA	27	30	13.2	11.7	10.0	11.6
	Bronx	E. 156th St.	36 005 0110	34	33	31	32	12.7	11.8	10.8	11.8
	Brooklyn	JHS 126	36 047 0122	34	31	27	31	13.9	12.0	10.7	12.2
	Nassau	Cedarhurst	36 059 0008	29	29	26	28	11.1	10.9	9.0	10.3
	New York	PS 59	36 061 0056	37	33	NA	NA	16.1	15.9	NA	NA
	New York	Post Office,350 Canal Street	36 061 0062	35	NA	NA	NA	15.8	NA	NA	NA
	New York	JHS 45	36 061 0079	34	33	29	32	13.6	12.4	10.5	12.2
	New York	PS 19	36 061 0128	38	26	29	31	15.6	13.1	12.0	13.6
	New York	PS 124	36 061 0134	37	32	29	33	13.3	13.2	11.6	12.7
	Queens	Newburgh, 55 Broadway	36 071 0002	30	31	21	27	10.6	9.6	7.9	9.4
	Queens	Queens College	36 081 0124	32	31	27	30	11.4	11.0	9.6	10.7
	Staten Island	Port Richmond	36 085 0055	33	29	25	29	13.0	12.1	9.8	11.6
	Staten Island	Susan Wagner HS	36 085 0067	29	28	23	27	11.5	10.8	8.5	10.3
	Suffolk	East Farmingdale/Babylon	36 103 0001	29	27	22	26	10.9	10.1	8.1	9.7
	Westchester	Mamaroneck	36 119 1002	31	31	27	29	11.7	11.0	9.1	10.6

Notes

* = 98th percentile for the year, not final

** =Design Value=average of three year period, not final. Three years of annual mean concentrations for PM2.5 are used

to calculate the design value at a monitor.
NA = Data Not Available
SD = Monitor Shutdown
Data sources are either from the State Agency or AirData (EPA's public query system that accesses AQS)

Table 12 Delaware Linkages 2007-2009 24-hr design values/average

	2007	2008	2009	2007-09 AVG
Union, NJ 34-039-0004				32
Dauphin, PA 42-043-0401	35.6	34.3	NA	35 (07-08 avg)
Lancaster, PA 42-071-0007				35
York, PA 42-133-0008				32
Cumberland, PA 42-041-0101				33
New York, NY 36-061-0079				32

Table 13 Delaware Linkages 2007-2009 annual design value/average

	2007	2008	2009	2007-09 AVG
Union, NJ 34-039-0004				13
Dauphin, PA 42-043-0401	14.28	13.28	NA	14 (07-08 avg)

Lancaster, PA 42-071-0007				14
York, PA 42-133-0008				14
Cumberland, PA 42-041-0101				13
New York, NY 36-061-0079				12

From Table 1, we saw that the TR says that Delaware will significantly contribute to Lancaster, PA; York, PA, Union, PA; Dauphin, PA, Cumberland, PA and New York, NY in 2012 (i.e. "Linkages"). However, these counties are already in attainment as shown in shown in Tables 13 and 14.

Futhermore, because all the monitors in Delaware, and the CMSAs for Philadephia and New York have a 2007-2009 design value meeting both the 1997 and 2006 PM2.5 NAAQS, we find it difficult to believe that we would contribute 0.50 ug/m3 in 2012 per table 1 - to ***any*** downwind area. To do so would require our worst year (2007-2009) to be much higher than MLK's 2008 98th percentile of 34.8 ug/m^3 (see Table 9).

DAQ also notes that the nearest nonattaining monitor using 2007-2009 data is in Allegheny County, PA (approximately 250 mi from central Delaware). [14] However, Delaware is not "linked" to Allegheny County.

7. CONTROL MEASURES

Delaware has complied with §110(a)(2)(D)(i)(I) through promulgation of:

- 7 DE Admin. Code 1146, Electric Generating Unit Multi-Pollutant Regulation,
- 7 DE Admin. Code 1142, Section 2, Control of NO_X Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries, and
- 7 DE Admin. Code 1148, Control of Stationary Combustion Turbine Electric Generating Unit Emissions

Each of the above is based on Best Available Control Technology (BACT), and significantly reduces emissions from Delaware's largest EGUs, industrial boilers, and peaking units. These regulations have been approved by the EPA as revisions to Delaware's SIP.

[14] Based on air travel distance between Dover to Pittsburgh. Both cities are the approximate centroid to Delaware, and Allegheny County. http://www.travelmath.com/flight-distance/from/Dover,+DE/to/Pittsburgh,+PA

8. SUMMARY:

EPA-IPM 2012 EGU NOx emission projections for Delaware are less than the budgets in the EPA's proposed Transport Rule. EPA-IPM 2012 EGU SO_2 emission projections for Delaware are 57 tpy higher than the budgets in the EPA's proposed Transport Rule (but we have shown EPA 2012 SO_2 projections are also approximately 22,000 tpy over-estimated). Delaware DAQ 2012 projections for NOx and SO_2 are less than the budgets in the proposed Transport Rule. ***The EPA TR budgets are those 2012 EGU emission levels that when met; demostrate that States have mitigated their significant downwind contributions to nonattainment areas and/or interfere with maintenance of the NAAQS*. Therefore, considering the transport budgets alone, Delaware has mitigated its significant contribution to downwind areas.**

Delaware believes that if EPA used up-to-date and accurate emissions data (i.e. the Delaware PEI), and projected recent Delaware control measures, the TR modeling would have shown that Delaware does not significantly contribute to downwind areas

The counties shown in EPA's TR that have "linkages" to Delaware have been in attainment for the last three years[15]. In fact, all counties in Delaware, and the New York and Philadelphia CMSAs have 2007-2009 design values that meet both the 1997 and 2006 $PM_{2.5}$ NAAQS.

Eight (8) of nine (9) coal units operating, that were operating in 2005, will be shut down or switching to cleaner fuels during the years 2009 to 2014. The remaining unit (Indian River Unit 4) will be controlled by SCR for NOx and scrubbers for SO2.

Delaware has complied with §110(a)(2)(D) through promulgation of: 7 DE Admin. Code 1146, Electric Generating Unit Multi-Pollutant Regulation; 7 DE Admin. Code 1142, Section 2, Control of NO_X Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries; and 7 DE Admin. Code 1148, Control of Stationary Combustion Turbine Electric Generating Unit Emissions; which significantly reduce emissions from Delaware's largest EGUs, industrial boilers, and peaking units. These regulations impose BACT level controls, and have been approved by the EPA as revisions to Delaware's SIP.

For the above reasons, and with the above technical analysis, Delaware believes it has demonstrated that it has mitigated its significant downwind transport and satisfied CAA 110(a)(2)(D)(i)(I) requirements.

[15] Dauphin County did not have monitor data for 2009. However, 2007-2008 annual data was in attainment and in 2008 (latest year of data) was in attainment for the 24-hr NAAQS, with trends going downward from 2006.

Appendices

1.0 **Emission Table Summaries, EGUs, and Projections**

Fuel Combustion

2 a Commercial_Fuel_Combustion
2 b Residential_Fuel_Combustion
2 c Industrial_Fuel_Combustion

Nonroad (marine vessels)

3 a Commercial_Marine_Vessel
3 b Towboats_&_Tugboats
3 c Dredging
3 d Ferries

4. **Permit Changes**
Croda Boiler
Dupont Stine Haskell Blr 3
Montaire Farms fuel switch
Invista Permit Cancel

5 **Invista Consent Decree**

6 **Final Agreement – DNREC and DE City Refinery**