OZONE
TRANSPORT
COMMISSION

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June 5, 2020

Mr. Andrew Wheeler, Administrator
U.S. Environmental Protection Agency
Mail Code 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Re: Recommendation of the Ozone Transport Commission for Additional Control Measures under Clean Air Act Section 184(c)

Dear Administrator Wheeler:

The Ozone Transport Commission (OTC) submits the enclosed recommendation to the U.S. Environmental Protection Agency (EPA) under section 184(c) of the Clean Air Act (CAA) for additional control measures on emissions of nitrogen oxides (NOx) from power plants in Pennsylvania (*see* Attachment 1). Consistent with the requirements of section 184(c), this recommendation was supported by a majority of the OTC members.

Per section 184(c), the OTC has provided notice and opportunity for public comment on the recommendation through two 30-day public comment periods and two public hearings. The first public process focused on the need for additional control measures and the second public process focused on OTC's recommendation for those additional control measures to be applied within a part of the Ozone Transport Region (OTR). The OTC has determined that the additional control measures in the recommendation are necessary to bring areas within the OTR into attainment by the dates provided by the CAA. The recommendation is included as Attachment 1.

In submitting this recommendation, we wish to acknowledge that Pennsylvania is undertaking a rulemaking process ("RACT III") that could result in the additional control measures we are requesting. We commend Pennsylvania in its undertaking. We continue to track the rule's progress, and Pennsylvania air agency staff have been actively briefing the OTC on its proposed RACT III components and regulatory status. This has fostered a collaborative atmosphere within the OTC and better informed the OTC members on Pennsylvania's constructive efforts. Should Pennsylvania ultimately succeed in adopting a final RACT III rule that addresses this recommendation, the OTC will withdraw it from further consideration by EPA.

The Commission's decision to submit the recommendation was based primarily on four key pieces of information.

First, ambient ozone monitoring data demonstrates that more reductions are needed to bring multiple ozone nonattainment areas in the OTR into attainment by the dates mandated in the Clean Air Act. Based upon ozone data through the summer of 2019, four marginal ozone nonattainment areas (Washington, D.C., Baltimore, Philadelphia and greater Connecticut) are on the verge of failing to attain the current 2015 ozone national ambient air quality standard (NAAQS) of 70 parts per billion (ppb) by the CAA's mandated deadlines. These nonattainment areas include all or portions of Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, and Virginia, all of which are OTC members. Because these areas are not likely to achieve the ozone NAAQS by the statutory deadline, they are at risk of being re-classified ("bumped up") into a higher status with additional regulatory requirements. This means that these areas could potentially face economic burdens in part because of air pollution that is not entirely under their control. In addition, portions of Connecticut, New Jersey and New York still fail to meet the 2008 NAAQS of 75 ppb.

Second, extensive research shows that regional reductions of nitrogen oxide (NOx) emissions are highly effective at lowering peak ozone concentrations across the eastern U.S, including the OTR. Numerous air quality modeling studies prior to the NOx SIP Call have since been verified in the real world as ozone levels in the OTR have steeply dropped due to the implementation of this and other major regional NOx emission reduction programs (e.g., mobile source NOx limits). Note, however, that despite these steep drops, additional NOx reductions are needed to ensure that the OTR nonattainment areas are able to achieve the 2008 and 2015 ozone NAAQS.

Third, in its assessment of ozone transport, EPA has identified Pennsylvania as a contributor to high ozone in each of the states failing to meet the 2015 ozone NAAQS. Current Pennsylvania and federal rules allow averaging where an electricity generating unit (EGU) can over-control on some days and control less or avoid running controls on other days, including days when those reductions are most needed. Maryland's May 30, 2019 petition estimated potential additional NOx reductions from daily limits to be as high as 50 tons per day. We recognize that the Maryland estimates are worst-case estimates; however, any potential reduction greater than 5 tons per day is significant.

Finally, the OTC decision – namely to use section 184(c) of the Clean Air Act to recommend that EPA require daily NOx limits at EGUs in Pennsylvania – is necessary, as Pennsylvania, the OTC state with the largest state-wide NOx emissions and the largest NOx emissions from coal-fired EGUs, has not adopted daily limits that were recommended as part of a collaborative OTC process. Delaware, Maryland, and New Jersey have already adopted daily NOx limits for coal-fired EGUs.

While this is an OTC-approved recommendation under section 184(c), it is not unanimous among the OTC membership. Pennsylvania submitted a large number of comments to the OTC during the last six months as the recommendation was finalized. Many of these comments highlighted the need for flexibility and identified concerns over the very specific requirements and limits included in the petition submitted by Maryland. The OTC recommendation has taken those comments into consideration, including current operating trends, and provides

Pennsylvania with the flexibility to establish daily NOx limits that will minimize NOx emissions each day of the ozone season and remain in compliance with Pennsylvania and federal rules.

Attachment 2 provides a more detailed summary of the policy and technical rationale for the OTC recommendation. Attachment 3 is a listing of responses to the comments the OTC received as part of the two public comment processes previously mentioned.

With this recommendation, we urge EPA to move forward as expeditiously as possible under section 184(c). It is of the utmost importance that our recommendation is implemented in a time frame that better protects public health in our states and is consistent with the CAA mandated, and court affirmed, attainment deadlines for the 2015 ozone NAAQS.

Thank you in advance for your prompt action.

Sincerely,

Terrence Gray, P.E.
Deputy Director for Environmental Protection
Rhode Island Department of Environmental Management
OTC Chair

Enc Sec. 184c Recommendation and supporting attachments with response to comments

cc: OTC Commissioners and Air Directors
U.S. EPA Regional Administrators for Regions I, II and III

OTC Recommendation for Establishing Daily Limits for Coal-Fired EGUs in Pennsylvania to Ensure that Existing Control Technologies are Optimized to Minimize Nitrogen Oxide Emissions Each Day of the Summer Ozone Season

The Ozone Transport Commission (OTC) recommends that the U.S. EPA require Pennsylvania to revise the Pennsylvania State Implementation Plan to include additional control measures which would establish daily nitrogen oxides (NOx) emission limits for all coal-fired EGUs with already installed Selective Catalytic Reduction (SCR) or Selective Non Catalytic Reduction (SNCR) control technology to ensure that these technologies are optimized to minimize NOx emissions each day of the ozone season.

These requirements must be as stringent as any one of the rules attached. These rules all establish daily limits designed to optimize the use of SCR and SNCR control technologies to minimize NOx emissions each day of the ozone season. Daily NOx limits for coal-fired EGUs have been adopted by Delaware, New Jersey and Maryland, three of the states adjacent to and directly downwind of Pennsylvania. Pennsylvania contributes significantly to four downwind nonattainment areas in the OTC including Washington D.C., Baltimore, Philadelphia, and New York City. During the summer of 2018, NOx emissions from coal-fired EGUs in Pennsylvania equipped with SCR and SNCR were more than four times greater than the NOx emissions from coal-fired EGUs in Delaware, New Jersey and Maryland combined.

Pennsylvania has not yet adopted daily NOx limits for coal-fired EGUs. Therefore, the OTC is recommending that EPA require Pennsylvania to adopt and implement daily NOx limits as expeditiously as practicable. It is our hope that the three options embodied in the Delaware, New Jersey and Maryland regulations will provide Pennsylvania with the flexibility to implement daily NOx limits in a time frame to help downwind OTC states attain the 2015 ozone standard by the dates required in the Clean Air Act.

Because this recommendation does not involve the purchase or installation of new control technologies, the OTC urges EPA to require that Pennsylvania implement these requirements in time to reduce ozone levels during the summers of 2020 and 2021. All of the marginal nonattainment areas in the Ozone Transport Region (OTR) are on a path to not attain the 2015 ozone standard by 2021, the mandated attainment date for marginal nonattainment areas, if additional NOx reductions are not achieved.

Attachments

1. Delaware Administrative Code, Title 7 Natural Resources & Environmental Control, 1100 Air Quality Management Section, 1146 "Electric Generating Unit (EGU) Multi-Pollutant Regulation" (pages 1-9)

2. New Jersey State Department of Environmental Protection, New Jersey Administrative Code, Title 7, Chapter 27, Subchapter 19, "Control and Prohibition of Air Pollution from Oxides of Nitrogen" (pages 1 & 27-29)

3. Maryland - Code of Maryland Regulations (COMAR), Title 26 Department of the Environment, Subtitle 11 Air Quality, Chapter 38, "Control of NO_x Emissions from Coal-Fired Electric Generating Units" (pages 1-6)

1100 Air Quality Management Section

1146 Electric Generating Unit (EGU) Multi-Pollutant Regulation

12/11/2006

1.0 Preamble

This regulation establishes Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2),and mercury emissions limits to achieve reductions of those pollutants from Delaware's large electric generation units. The reduction in NO_X, SO_2, and mercury emissions will: 1) reduce the impact of those emissions on public health; 2) aid in Delaware's attainment of the State and National Ambient Air Quality Standard (NAAQS) for ground level ozone and fine particulate matter; 3) help address local scale fine particulate and mercury problems attributable to coal and residual oil-fired electric generating units, 4) satisfy Delaware's obligations under the Clean Air Mercury Rule (CAMR), and 5) improve visibility and help satisfy Delaware's EGU-related regional haze obligations.

While the purpose of this regulation is to reduce air emissions, any emission control equipment installed to meet the requirements of this regulation may impact other media (e.g., water), and any overall environmental impacts must be considered by subject entities when they design their overall compliance strategy. Any emission controls installed to meet the requirements of this regulation will be subject to public review and comment through air permitting requirements of 7 **DE Admin. Code** 1102 and 1130.

Separate from this regulation the Department will propose regulations to address CO_2 emissions from these units, and regulations to satisfy direct fine particulate matter Reasonably Available Control Technology (RACT) and Best Available Retrofit Technology (BART) requirements. Together, these regulations will cover current and foreseeable requirements relative to the subject units.

12/11/2006

2.0 Applicability

This regulation applies to coal-fired and residual oil-fired electric generating units located in Delaware with a nameplate capacity rating of 25 MW or greater that commenced operation on or before the effective date of this regulation.

12/11/2006

3.0 Definitions

The following words and terms, when used in this regulation, shall have the following meanings:

"Administrator" means the Administrator of the United States Environmental Protection Agency or the Administrator's duly authorized representative.

"Coal" means any solid fuel classified as anthracite, bituminous, sub-bituminous, or lignite.

"Coal-fired" means combusting any amount of coal or coal-derived fuel, alone or in combination with any amount of other fuel, during any year.

"Department" means the State of Delaware Department of Natural Resources and Environmental Control as defined in 29 **Del.C.**, Ch 80, as amended.

"Designated representative" means the natural person who is authorized by the owners and operators of the source and all units at the source to legally bind each owner and operator in matters pertaining to this regulation. If the source subject to this regulation is also subject to the Federal Acid Rain Program, then this natural person shall be the same person as the designated representative under the Acid Rain Program.

"Emissions" means air pollutants exhausted from a unit or source into the atmosphere.

"Generator" means a device that produces electricity.

"Heat input" means the product (in MMBTU/time or TBTU/time) of the gross calorific value of the fuel (in MMBTU/lb or TBTU/lb) and the fuel feed rate (in lb of fuel/time) into a combustion device; or as calculated by any other method approved by the Department and the Administrator, and does not include the heat derived from pre-heated combustion air, recirculated flue gasses, or exhaust from other sources.

"Inlet mercury" means the average concentration of mercury in the flue gas at the inlet to any pollution control device or devices.

"Nameplate capacity" means, starting from the initial installation of a generator, the maximum electrical generating output (in MWe) that the generator is capable of producing on a steady state basis and during continuous operation (when not restricted by seasonal or other de-ratings) as specified by the manufacturer of the generator or, starting from the completion of any physical change in the generator resulting in an increase in the maximum electrical generating output (in MWe) that the generator is capable of producing on a steady state basis and during continuous operation (when not restricted by seasonal or other de-ratings), such increased maximum amount as specified by the person conducting the physical change.

"Operator" means any person who operates, controls, or supervises a unit or source subject to this regulation and shall include, but not be limited to, any holding company, utility system, or plant manager of such unit or source.

"Ounce" means 28.4 grams.

"Owner" means: A) any holder of any portion of the legal or equitable title in a unit; B) any purchaser of power from a unit under a life-of-the-unit, firm power contractual arrangement; provided that, unless expressly provided for in a leasehold agreement, owner shall not include a passive lessor, or a person who has an equitable interest through such lessor, whose rental payments are not based (either directly or indirectly) on the revenues or income from the unit.

"Residual oil" means No. 5 or No. 6 fuel oil.

"Ton" means 2000 pounds.

"Unit" means, for the purposes of this regulation, a stationary, fossil-fuel-fired boiler supplying all or part of its output to an electric generating device.

12/11/2006

4.0 NO_X Emissions Limitations

4.1 From May 1, 2009 through December 31, 2011, no unit subject to this regulation shall emit NO_x at a rate exceeding 0.15 lb/MMBTU.

4.1.1 Compliance with the requirements of 4.1 of this regulation shall be demonstrated on a rolling 24-hour average basis.

4.1.2 NO_x emissions from multiple units subject to this regulation at a common facility may be averaged on a heat input basis to demonstrate compliance with the requirements of 4.1 of this regulation.

4.2 On and after January 1, 2009, no unit subject to this regulation shall emit annual NO_x mass emissions that exceed the values shown in Table 4-1 of this regulation.

4.2.1 From January 1, 2009 through December 31, 2011, compliance with the requirements of 4.2 of this regulation may be achieved by demonstrating that the total number of tons of NO_X emitted from a common facility does not exceed the sum of the tonnage limitations for all of the units subject to this regulation at that facility.

4.2.2 Compliance with the requirements of 4.2 of this regulation shall not be achieved by using, tendering, or otherwise acquiring NO_x allowances under any state or federal emission trading program.

4.2.3 For the purpose of determining compliance with the requirements of 4.2. of this regulation, the total tons for a specified period shall be calculated as the sum of all recorded hourly emissions, with any remaining fraction of a ton equal to or greater than 0.50 ton deemed to equal one ton and any remaining fraction of a ton less than 0.50 ton deemed equal to zero tons.

4.3 On and after January 1, 2012, no unit subject to this regulation shall emit NO_x at a rate exceeding 0.125 lb/MMBTU, demonstrated on a rolling 24-hour average basis.

4.4 Compliance with the requirements of 4.1 through 4.3 of this regulation shall be demonstrated with a continuous emissions monitoring system that is installed, calibrated, operated, and certified in accordance with 40 CFR Part 75 (May 18, 2005 amendment) or other method approved by the Department and the Administrator, and meeting the requirements of 40 CFR Part 96, subpart HH (April 28, 2006 amendment).

12/11/2006

5.0 SO_2 Emissions Limitations

5.1 From May 1, 2009 though December 31, 2011, no coal fired unit subject to this regulation shall emit SO_2 at a rate exceeding 0.37 lb/MMBTU heat input.

5.1.1 Compliance with the requirements of 5.1 of this regulation shall be demonstrated on a 24-hour rolling average basis.

5.1.2 SO_2 emissions from multiple units subject to this regulation at a common facility may be averaged on a heat input basis to demonstrate compliance with the requirements of 5.1 of this regulation.

5.2 On and after January 1, 2012, no coal-fired unit subject to this regulation shall emit SO_2 at a rate exceeding 0.26 lb/MMBTU heat input, demonstrated on a rolling 24-hour average basis.

5.3 On and after January 1, 2009, no unit subject to this regulation shall emit annual SO_2 mass emissions that exceed the values shown in Table 5-1 of this regulation.

5.3.1 From January 1, 2009 through December 31, 2011, compliance with the requirements of 5.3 of this regulation may be achieved by demonstrating that the total number of tons of SO_2 emitted from a common facility does not exceed the sum of the tonnage limitations for all of the units subject to this regulation at that facility.

5.3.2 Compliance with the requirements of 5.3 of this regulation shall not be achieved by using, tendering, or otherwise acquiring SO_2 allowances under any state or federal emission trading program.

5.3.3 For the purpose of determining compliance with the requirements of 5.3 of this regulation, the total tons for a specified period shall be calculated as the sum of all recorded hourly emissions, with any remaining fraction of a ton equal to or greater than 0.50 ton deemed to equal one ton and any remaining fraction of a ton less than 0.50 ton deemed equal to zero tons.

5.4 Compliance with the requirements of 5.1 through 5.3 of this regulation shall be demonstrated with a continuous emissions monitoring system that is installed, calibrated, operated and certified in accordance with 40 CFR Part 75 (May 18, 2005 amendment) or other method approved by the Department and the Administrator, and meeting the monitoring and reporting requirements of 40 CFR Part 96, subpart HHH (April 28, 2006 amendment).

5.5 On and after January 1, 2009, no residual oil with a sulfur content in excess of 0.5%, by weight, shall be received for any residual oil-fired unit subject to this regulation.

5.5.1 Compliance with the requirements of 5.5 of this regulation shall be demonstrated by fuel oil sampling and analysis. Samples shall be collected:

5.5.1.1 From the transport vessel for each shipment of residual fuel oil received at the facility for combustion in the subject residual oil-fired unit, or

5.5.1.2 From the supply pipeline each day residual oil is delivered to the facility via pipeline for combustion in a residual oil-fired unit subject to this regulation, after sufficient fuel oil has been drained from the sampling line to remove any fuel oil that may have been standing in the sampling line, or

5.5.1.3 From the supply pipeline at the inlet to the residual oil-fired unit subject to this regulation each day the unit fires any quantity of oil fuel, after sufficient fuel oil has been drained from the sampling line to remove any fuel oil that may have been standing in the sampling line.

5.5.2 Fuel oil samples shall be analyzed in accordance with ASTM D 129-00, ASTM D 1552-03, ASTM D 2622-05, or ASTM D 4294-03.

12/11/2006

6.0 Mercury Emissions Limitations

6.1 From January 1, 2009 through December 31, 2012, any coal-fired unit subject to this regulation shall, on a quarterly average basis:

6.1.1 Emit mercury at a rate that does not exceed 1.0 lb/TBTU heat input, or

6.1.2 Capture and control a minimum 80% of baseline inlet mercury emissions.

6.2 On or after January 1, 2013, any coal-fired unit subject to this regulation shall, on a quarterly average basis:

6.2.1 Emit mercury at a rate that does not exceed 0.6 lb/TBTU heat input, or

6.2.2 Capture and control a minimum 90% of baseline inlet mercury emissions.

6.3 Annual mercury mass emissions from the coal-fired units subject to this regulation shall not exceed the values shown in Table 6-1 of this regulation.

6.3.1 Compliance with the requirements of 6.3 of this regulation shall be demonstrated on an annual basis.

6.3.2 Compliance with the requirements of 6.3 of this regulation shall not be achieved by using, tendering, or otherwise acquiring mercury allowances under any state or federal emissions trading program.

6.4 Compliance with the requirements of 6.1 through 6.3 of this regulation shall be demonstrated as follows:

6.4.1 Compliance with the requirements of 6.1.1, 6.2.1 and 6.3 of this regulation shall be demonstrated with a continuous emissions monitoring system that is installed, calibrated, operated, and certified in accordance with 40 CFR Part 75 (May 18, 2005 amendment) and meeting the monitoring and reporting requirements of 40 CFR Part 60 (June 9, 2006 amendment).

6.4.2 Compliance with the requirements of 6.1.2 and 6.2.2 of this regulation shall be demonstrated as follows:

6.4.2.1 During the period January 1, 2007 through March 31, 2008, the owner or operator shall conduct at least four quarterly stack tests to measure the mercury in the flue gas stream.

6.4.2.1.1 Except as provided for in 6.4.2.1.2 of this regulation, the test sampling location shall be located upstream of any pollution control device.

6.4.2.1.2 The sampling location may be located downstream of any SNCR injection points.

6.4.2.2 There shall be at least three valid stack tests per quarter and at least 45 days between stack tests performed for a given quarter and the stack tests performed for the preceding quarter, unless otherwise approved by the Department.

6.4.2.3 Each stack test shall be conducted in accordance with a testing protocol approved by the Department. Proposed test protocols shall be submitted to the Department no less than 90 days prior to conducting the mercury tests.

6.4.2.4 The baseline inlet mercury emission rate for the affected unit, in lb/TBTU, shall be determined as the arithmetic average of the quarterly stack tests conducted on that unit in accordance with 6.4.2.1 of this regulation.

6.4.2.5 No later than June 1, 2008, the owner or operator shall submit a petition to the Department requesting the establishment of a unit specific mercury emission rate limit. As a minimum, the report shall contain the following information:

6.4.2.5.1 Identification and brief description of the affected unit.

6.4.2.5.2 A list and brief description of all emissions control equipment installed on the affected unit at the time of the stack tests, including operating status at the time of the stack tests.

6.4.2.5.3 An accounting of all fuels and fuel quality being fired during the emissions tests.

6.4.2.5.4 Results of each quarterly mercury emissions tests.

6.4.2.5.5 Proposed mercury emission limits that are no greater than 20% of the baseline uncontrolled mercury emission rate determined in accordance with 6.4.2 of this regulation for the annual periods January 1, 2009 through December 31, 2012, and no greater than 10% of the baseline uncontrolled mercury emission rate determined in accordance with 6.4.2 of this regulation for the annual periods starting January 1, 2013 and beyond.

6.4.2.5.6 Summary description of the actions anticipated by the owner or operator of the affected unit to attain compliance with the proposed mercury emission limits.

6.4.2.6 The owner or operator of the affected unit shall submit to the Department any additional information requested by the Department necessary for review and approval of the petition.

6.4.2.7 The Department shall establish, for the affected unit, a unit specific mercury emission rate no greater than 20% of the unit's baseline uncontrolled mercury emissions rate for the period January 1, 2009 through December 31, 2012, and no greater than 10% of the unit's baseline uncontrolled mercury emission rate for the period January 2013 and beyond.

12/11/2006

7.0 Recordkeeping and Reporting

7.1 The owner or operator of a unit subject to this regulation shall comply with all applicable recordkeeping and reporting requirements of 40 CFR Part 75 (May 18, 2005) and this regulation.

7.2 The owner or operator of a unit subject to this regulation shall maintain, for a period of at least five years, copies of all measurements, tests, reports, and other information required by 40 CFR Part 75 (May 18, 2005 amendment) and this regulation. This information shall be provided to the Department upon request at any time.

7.3 After January 1, 2009, the owner or operator of a unit subject to this regulation shall submit to the Department semi-annual reports in conjunction with the reporting requirements of 7 **DE Admin. Code** 1130. The semi-annual reports shall contain, as a minimum, the following information:

7.3.1 Tabulation of emission monitoring results reduced to one-hour averages, on a clock basis, for the period in units consistent with the applicable emission standard.

7.3.2 In addition to the requirements of 8.3.1 of this regulation, the following calculations shall be made and reported in the semi-annual report:

7.3.2.1 For mass emission standards based on daily limits, the daily mass emission on a calendar day basis for each day in the period, in units consistent with the applicable emission standard.

7.3.2.2 For mass emissions based on an annual limit, the calendar year-to-date summation of mass emissions through the period being reported, in units consistent with the applicable emission standard.

7.3.2.3 For emission rate averaging, identification of the units being averaged, hourly heat input of the respective units, hourly emission rate of the respective units, and the hourly combined heat input weighted emission average for the affected units.

7.3.3 Identification of any period~~(s)~~ or periods of, and cause for, any invalid data averages.

7.3.4 Records of any repairs, adjustment, or maintenance to the monitoring system.

7.3.5 The results of all fuel oil sulfur analysis.

7.3.6 Identification of any exceedance of any emission standard provided by this regulation, cause of the exceedance, and corrective action taken in response to the exceedance.

7.3.7 Results from all tests, audits, and recalibrations performed during the period.

7.3.8 Any other relevant data requested by the Department.

7.3.9 A statement, "I am authorized to make this submission on behalf of the owners and operators of the affected facility or affected units for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge true, accurate and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment."

7.3.10 Signature by the designated representative.

12/11/2006

8.0 Compliance Plan

8.1 The owner or operator of a unit subject to this regulation shall submit a compliance plan to the Department on or before July 1, 2007.

8.2 The compliance plan shall contain, at a minimum, the following information:

8.2.1 Identification of the subject unit.

8.2.2 A description of any existing NO_X, SO_2, or mercury emissions control technologies installed on the unit, including identification of the initial installation date of the control technologies.

8.2.3 Identification of the requirements of this regulation applicable to the unit.

8.2.4 A description of the plan or methodology that will be utilized to demonstrate compliance with this regulation.

8.2.5 Identification of emission control technologies, or modifications to existing emission control technologies, that will be utilized to comply with the applicable emissions limitations of this regulation. This shall include:

8.2.5.1 A description of the control technology and its applicability to the subject unit.

8.2.5.2 The design control effectiveness or design emission rate following installation of the emission control technology on the subject unit.

8.2.5.3 Estimated dates for start of construction, start-up of the emissions control technology, and estimated project completion date.

8.2.6 A description of the emissions monitoring methodology to be utilized for demonstrating compliance with the emissions limitations of this regulation, including estimated installation dates, start-up dates, and testing dates.

8.2.7 Identification of any planned changes to administrative or operating procedures or practices intended to achieve compliance with applicable emissions limitations of this regulation.

8.2.8 Any other relevant information requested by the Department.

8.2.9 A statement, “I am authorized to make this submission on behalf of the owners and operators of the affected facility or affected units for which this submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge true, accurate and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.”

8.2.10 Signature by the designated representative.

8.3 A facility that has submitted a complete compliance plan for its impacted units in accordance with the requirements of 8.0 of this regulation may on one occasion for each unit request an extension of up to one year for any deadline set out in 5.1 and 5.3 of this regulation. The facility shall have the burden of demonstrating that good faith efforts have been made to comply with the original deadline; that the facility is unable to comply because of events or circumstances beyond the control of the facility, including any entity controlled by it; that the delay could not have been prevented by the facility’s exercise of due diligence; and that the facility has taken all reasonable steps or measures to avoid or minimize the delay. The Secretary shall exercise his discretion to grant a request that satisfies all the criteria.

12/11/2006

9.0 Penalties

The Department may enforce all of the provisions of this regulation under 7 **Del.C.** Ch 60.

Table 4-1

Annual NO_X Mass Emissions Limits

Unit	**Control Period NO_X Mass Emissions Limit (tons)**
Edgemoor 3	773
Edgemoor 4	1339
Edgemoor 5	1348
Indian River 1	601
Indian River 2	628
Indian River 3	977
Indian River 4	2032
McKee Run	244

Table 5-1
Annual SO_2 Mass Emissions Limits

Unit	Control Period SO_2 Mass Emissions Limit (tons)
Edgemoor 3	1391
Edgemoor 4	2410
Edgemoor 5	4600
Indian River 1	1082
Indian River 2	1130
Indian River 3	1759
Indian River 4	3657
McKee Run	439

13 DE Reg. 499 (10/01/09)

Table 6-1
Annual Mercury Mass Emissions Limits

Unit	Mercury Mass Emissions 2009 - 2012 (ounces)	Mercury Mass Emissions 2013 and Beyond (ounces)
Edgemoor 3	266	106
Edgemoor 4	462	183
Indian River 1	207	82
Indian River 2	216	86
Indian River 3	337	134
Indian River 4	700	278

10 DE Reg. 1022 (12/01/06)
12 DE Reg. 347 (09/01/08)

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
NEW JERSEY ADMINISTRATIVE CODE
TITLE 7
CHAPTER 27
SUBCHAPTER 19

Control and Prohibition of Air Pollution from Oxides of Nitrogen

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Please note: The Department has made every effort to ensure that this text is identical to the official, legally effective version of this rule, set forth in the New Jersey Register. However, should there be any discrepancies between this text and the official version of the rule, the official version will prevail.

7:27-19.4 Boilers serving electric generating units

(a) The owner or operator of any boiler serving an electric generating unit shall cause it to emit NOx at a rate no greater than the applicable maximum allowable NOx emission rate specified in Tables 1, 2 and 3 below, as applicable, unless the owner or operator is complying with N.J.A.C. 7:27-19.3(f) or unless otherwise specified in an enforceable agreement with the Department. Table 1 is operative through December 14, 2012. Table 2 is operative starting December 15, 2012 through April 30, 2015, except that a coal-fired boiler serving an electric generating unit may be eligible for up to a one-year extension of the December 15, 2012 compliance date pursuant to (f) below. Table 3 is operative on and after May 1, 2015. A boiler serving an electric generating unit is also subject to the state-of-the-art requirements at N.J.A.C. 7:27-8.12 and 22.35, lowest achievable emission rate requirements at N.J.A.C. 7:27-18, and best available control technology requirements at 40 CFR 52.21, incorporated herein by reference, as applicable.

TABLE 1
(Operative through December 14, 2012)
Maximum Allowable NO_x Emission Rates for Boilers Serving Electric Generating Units
(pounds per million BTU)

	Firing Method		
Fuel/Boiler Type	**Tangential**	**Face**	**Cyclone**
Coal -Wet Bottom	1.0	1.0	0.60
Coal - Dry Bottom	0.38	0.45	0.55
Oil and/or Gas	0.20	0.28	0.43
Gas Only	0.20	0.20	0.43

TABLE 2
(Operative from December 15, 2012 through April 30, 2015)
Maximum Allowable NO_x Emission Rates for Boilers Serving Electric Generating Units
(pounds per megawatt hour)

	Firing Method		
Boiler Type	**Tangential**	**Face**	**Cyclone**
Coal	1.50	1.50	1.50
Oil and/or Gas	2.00	2.80	4.30
Gas only	2.00	2.00	4.30

TABLE 3
(Operative on and after May 1, 2015)
Maximum Allowable NO_x Emission Rates for Boilers Serving Electric Generating Units
(pounds per megawatt hour)

Fuel	
Coal	1.50
Heavier than No. 2 fuel oil	2.00
No. 2 and lighter fuel oil	1.00
Gas only	1.00

(b) The owner or operator of any boiler serving an electric generating unit shall install on the boiler a continuous emissions monitoring system satisfying the requirements of N.J.A.C. 7:27-19.18.

(c) The owner or operator of any boiler serving an electric generating unit shall adjust the boiler's combustion process before May 1st of each calendar year in accordance with N.J.A.C. 7:27-19.16, except the adjustment may occur within seven days of the first period of operation after May 1, if the boiler has not operated between January 1 and May 1 of that year.

(d) The owner or operator of a boiler serving an electric generating unit shall demonstrate compliance with its applicable maximum allowable NO_x emission rate in Table 2 or 3 as follows:

1. Using the methods at N.J.A.C. 7:27-19.15(a), any coal-fired boiler that is subject to an emission rate at Table 2 above shall demonstrate compliance with the maximum allowable NO_x emission rate in Table 2 either by June 15, 2013 or, if the boiler or control apparatus is altered to meet the Table 2 emission rate, by the date determined by N.J.A.C. 7:27-19.15(c), whichever date is earlier, and thereafter according to the schedule in the approved permit, except that a coal-fired boiler may be eligible for up to a one-year extension of the June 15, 2013 compliance demonstration date pursuant to (f) below; and

2. Using the methods at N.J.A.C. 7:27-19.15(a), any boiler that combusts any fuel other than coal and that is subject to an emission rate at Table 3 above shall demonstrate compliance with the applicable maximum allowable NO_x emission rate in Table 3 by November 1, 2015 or, if the boiler or control apparatus is altered to meet the applicable Table 3 emission rate, by the date determined by N.J.A.C. 7:27-19.15(c), whichever date is earlier, and thereafter according to the schedule in the approved permit.

(e) When calculating a 24-hour NO_x emission rate for an affected coal-fired unit, the owner or operator may exclude emissions from:

1. A unit that has ceased firing fossil fuel, the period of time, not to exceed eight hours, from initial firing of the unit until the unit is fired with coal and synchronized with a utility electric distribution system; and

2. A unit that is to be shut down, the period of time in which the unit is not longer synchronized with any utility electric distribution system and is no longer fired with coal.

(f) The owner or operator of a coal-fired boiler that is subject to Table 2 at (a) above may request up to a one-year extension past the December 15, 2012 Table 2 emission limit compliance deadline required at (a) and the June 15, 2013 compliance demonstration deadline required at (d)1 above by sending a written request to the address at N.J.A.C. 7:27-19.30(c)3. The request shall document the reasons the extension is needed. The Department will approve an extension request only if compliance by December 15, 2012 is not possible due to circumstances beyond the control of the owner or operator that are not reasonably foreseeable, including, but not limited to, the unavailability of a control apparatus needed to comply with the December 15, 2012 compliance deadline or a contractor needed to install the control apparatus.

(g) Each owner or operator identified at N.J.A.C. 7:27-19.29(a) shall submit to the Department a 2009 HEDD Emission Reduction Compliance Demonstration Protocol and annual reports pursuant to N.J.A.C. 7:27-19.29.

(h) Each owner or operator of a boiler serving an electric generating unit that is a HEDD unit shall submit to the Department a 2015 HEDD Emission Limit Achievement Plan and annual progress updates, as applicable, pursuant to N.J.A.C. 7:27-19.30.

7:27-19.5 Stationary combustion turbines

(a) The owner or operator of a simple cycle combustion turbine shall comply with (a)1 through 3 below, as applicable.

1. Until March 7, 2007, the owner or operator of any stationary simple cycle combustion turbine that has a maximum gross heat input rate of at least 30 million BTUs per hour shall cause it to emit NO_x at a rate no greater than the applicable maximum allowable NO_x emission rate specified in Table 4 below, unless the owner or operator is complying with N.J.A.C. 7:27-19.3(f).

2. March 7, 2007 through May 19, 2009, the owner or operator of any simple cycle combustion turbine that has a maximum gross heat input rate of at least 25 million BTUs per hour and is a NO_x Budget source shall cause it to emit NO_x at a rate no greater than the applicable maximum allowable NO_x emission rate specified in

Technology optimization language from Maryland's latest NOx Regulation highlighted in yellow.

Title 26
DEPARTMENT OF THE ENVIRONMENT
Subtitle 11 AIR QUALITY
Chapter 38 Control of NO_x Emissions from Coal-Fired Electric Generating Units

Authority: Environment Article, §§1-404, 2-103, and 2-301—2-303, Annotated Code of Maryland

.01 Definitions.

A. In this chapter, the following terms have the meanings indicated.

B. Terms Defined.

(1) "Affected electric generating unit" means any one of the following coal-fired electric generating units:

(a) Brandon Shores Units 1 and 2;

(b) C.P. Crane Units 1 and 2;

(c) Chalk Point Units 1 and 2;

(d) Dickerson Units 1, 2, and 3;

(e) H.A. Wagner Units 2 and 3;

(f) Morgantown Units 1 and 2; and

(g) Warrior Run.

(2) "Emergency operations" means an event called when PJM Interconnection, LLC or a successor independent system operator, acts to invoke one or more of the Warning or Action procedures in accordance with PJM Manual 13, Revision 57, as amended, to avoid potential interruption in electric service and maintain electric system reliability.

(3) "Operating day" means a 24-hour period beginning midnight of one day and ending the following midnight, or an alternative 24-hour period approved by the Department, during which time an installation is operating, consuming fuel, or causing emissions.

(4) "Ozone season" means the period beginning May 1 of any given year and ending September 30 of the same year.

(5) System.

(a) "System" means all affected electric generating units within the State of Maryland subject to this chapter that are owned, operated, or controlled by the same person and are located:

(i) In the same ozone nonattainment area as specified in 40 CFR Part 81; or

(ii) Outside any designated ozone nonattainment area as specified in 40 CFR Part 81.

(b) "System" includes at least two affected electric generating units.

(6) "System operating day" means any day in which an electric generating unit in a system operates.

(7) "30-day rolling average emission rate" means a value in lbs/MMBtu calculated by:

(a) Summing the total pounds of pollutant emitted from the unit during the current operating day and the previous 29 operating days;

(b) Summing the total heat input to the unit in MMBtu during the current operating day and the previous 29 operating days; and

(c) Dividing the total number of pounds of pollutant emitted during the 30 operating days by the total heat input during the 30 operating days.

(8) "30-day systemwide rolling average emission rate" means a value in lbs/MMBtu calculated by:

(a) Summing the total pounds of pollutant emitted from the system during the current system operating day and the previous 29 system operating days;

(b) Summing the total heat input to the system in MMBtu during the current system operating day and the previous 29 system operating days; and

(c) Dividing the total number of pounds of pollutant emitted during the 30 system operating days by the total heat input during the 30 system operating days.

(9) "24-hour block average emission rate" means a value in lbs/MMBtu calculated by:

(a) Summing the total pounds of pollutant emitted from the unit during 24 hours between midnight of one day and ending the following midnight;

(b) Summing the total heat input to the unit in MMBtu during 24 hours between midnight of one day and ending the following midnight; and

(c) Dividing the total number of pounds of pollutant emitted during 24 hours between midnight of one day and ending the following midnight by the total heat input during 24 hours between midnight of one day and ending the following midnight.

(10) "24-hour systemwide block average emission rate" means a value in lbs/MMBtu calculated by:

(a) Summing the total pounds of pollutant emitted from the system during 24 hours between midnight of one day and ending the following midnight;

(b) Summing the total heat input to the system in MMBtu during 24 hours between midnight of one day and ending the following midnight; and

(c) Dividing the total number of pounds of pollutant emitted during 24 system hours between midnight of one day and ending the following midnight by the total heat input during 24 system hours between midnight of one day and ending the following midnight.

.02 Applicability.

The provisions of this chapter apply to an affected electric generating unit as that term is defined in Regulation .01B of this chapter.

.03 2015 NO_x Emission Control Requirements.

A. Daily NO_x Reduction Requirements During the Ozone Season.

(1) Not later than 45 days after the effective date of this regulation, the owner or operator of an affected electric generating unit (the unit) shall submit a plan to the Department and EPA for approval that demonstrates how each affected electric generating unit will operate installed pollution control technology and combustion controls to meet the requirements of §A(2) of this regulation. The plan shall summarize the data that will be collected to demonstrate compliance with §A(2) of this regulation. The plan shall cover all modes of operation, including but not limited to normal operations, start-up, shut-down, and low load operations.

(2) Beginning on May 1, 2015, for each operating day during the ozone season, the owner or operator of an affected electric generating unit shall minimize NO_x emissions by operating and optimizing the use of all installed pollution control technology and combustion controls consistent with the technological limitations, manufacturers' specifications, good engineering and maintenance practices, and good air pollution control practices for minimizing emissions (as defined in 40 CFR §60.11(d)) for such equipment and the unit at all times the unit is in operation while burning any coal.

B. Ozone Season NO_x Reduction Requirements.

(1) Except as provided in §B(3) of this regulation, the owner or operator of an affected electric generating unit shall not exceed a NO_x 30-day systemwide rolling average emission rate of 0.15 lbs/MMBtu during the ozone season.

(2) The owner or operator of an affected electric generating unit subject to the provisions of this regulation shall continue to meet the ozone season NO_x reduction requirements in COMAR 26.11.27.

(3) Ownership of Single Electric Generating Facility.

(a) An affected electric generating unit is not subject to §B(1) of this regulation if the unit is located at an electric generating facility that is the only facility in Maryland directly or indirectly owned, operated, or controlled by the owner, operator, or controller of the facility.

(b) For the purposes of this subsection, the owner includes parent companies, affiliates, and subsidiaries of the owner.

C. Annual NO_x Reduction Requirements. The owner or operator of an affected electric generating unit subject to the provisions of this regulation shall continue to meet the annual NO_x reduction requirements in COMAR 26.11.27.

D. NO_x Emission Requirements for Affected Electric Generating Units Equipped with Fluidized Bed Combustors.

(1) The owner or operator of an affected electric generating unit equipped with a fluidized bed combustor is not subject to the requirements of §§A, B(1) and (2), and C of this regulation.

(2) The owner or operator of an affected electric generating unit equipped with a fluidized bed combustor shall not exceed a NO_x 24-hour block average emission rate of 0.10 lbs/MMBtu.

.04 Additional NO_x Emission Control Requirements.

A. This regulation applies to C.P. Crane units 1 and 2, Chalk Point unit 2, Dickerson units 1, 2, and 3, and H.A. Wagner unit 2.

B. General Requirements. The owner or operator of the affected electric generating units subject to this regulation shall choose from the following:

(1) Not later than June 1, 2020:

(a) Install and operate a selective catalytic reduction (SCR) control system; and

(b) Meet a NO_x emission rate of 0.09 lbs/MMBtu, as determined on a 30-day rolling average during the ozone season;

(2) Not later than June 1, 2020, permanently retire the unit;

(3) Not later than June 1, 2020, permanently switch fuel from coal to natural gas for the unit;

(4) Not later than June 1, 2020, meet either a NO_x emission rate of 0.13 lbs/MMBtu as determined on a 24-hour systemwide block average or a systemwide NO_x tonnage cap of 21 tons per day during the ozone season.

C. When option §B(4)of this regulation is selected:

(1) Not later than May 1, 2016, the owner or operator of an affected electric generating unit shall not exceed a NO_x 30-day systemwide rolling average emission rate of 0.13 lbs/MMBtu during the ozone season.

(2) Not later than May 1, 2018, the owner or operator of an affected electric generating unit shall not exceed a NO_x 30-day systemwide rolling average emission rate of 0.11 lbs/MMBtu during the ozone season.

(3) Not later than May 1, 2020, the owner or operator of an affected electric generating unit shall not exceed a NO_x 30-day systemwide rolling average emission rate of 0.09 lbs/MMBtu during the ozone season.

D. In order to calculate the 24-hour systemwide block average emission rate and systemwide NO_x tonnage cap under §B(4) of this regulation and the systemwide rolling average emission rates under §C of this regulation:

(1) The owner or operator shall use all affected electric generating units within their system as those terms are defined in Regulation .01B of this chapter; and

(2) The unit or units NO_x emissions from all operations during the entire operating day shall be used where the unit or units burn coal at any time during that operating day.

E. Beginning June 1, 2020, if the unit or units included in a system, as that system existed on May 1, 2015, is no longer directly or indirectly owned, operated, or controlled by the owner, operator, or controller of the system:

(1) The remaining units within the system shall meet either:

(a) The requirements of §B(1)—(3) of this regulation; or

(b) A NO_x emission rate of 0.13 lbs/MMBtu as determined on a 24-hour systemwide block average and the requirements of §C(3) of this regulation.

(2) The unit or units no longer included in the system shall meet the requirements of §B(1)—(3) of this regulation.

F. For the purposes of this regulation, the owner includes parent companies, affiliates, and subsidiaries of the owner.

.05 Compliance Demonstration Requirements.

A. Procedures for Demonstrating Compliance with Regulation .03A of this Chapter.

(1) An affected electric generating unit shall demonstrate, to the Department's satisfaction, compliance with Regulation .03A(2) of this chapter, using the information collected and maintained in accordance with Regulation .03A(1) of this chapter and any additional documentation available to and maintained by the affected electric generating unit.

(2) An affected electric generating unit shall not be required to submit a unit-specific report consistent with §A(3) of this regulation when the unit emits at levels that are at or below the following rates:

Affected Unit	24-Hour Block Average NO_x Emissions in lbs/MMBtu
Brandon Shores	
Unit 1	0.08
Unit 2 ≥650 MWg	0.07 0.15
C.P. Crane	
Unit 1	0.30
Unit 2	0.28
Chalk Point	
Unit 1 only	0.07
Unit 2 only	0.33
Units 1 and 2 combined	0.20
Dickerson	
Unit 1 only	0.24
Unit 2 only	0.24
Unit 3 only	0.24
Two or more units combined	0.24
H.A. Wagner	
Unit 2	0.34
Unit 3	0.07
Morgantown	
Unit 1	0.07
Unit 2	0.07

(3) The owner or operator of an affected electric generating unit subject to Regulation .03A(2) of this chapter shall submit a unit-specific report for each day the unit exceeds its NO_x emission rate under §A(2) of this regulation, which shall include the following information for the entire operating day:

(a) Hours of operation for the unit;

(b) Hourly averages of operating temperature of installed pollution control technology;

(c) Hourly averages of heat input (MMBtu/hr);

(d) Hourly averages of output (MWh);

(e) Hourly averages of ammonia or urea flow rates;

(f) Hourly averages of NO_x emissions data (lbs/MMBtu and tons);

(g) Malfunction data;

(h) The technical and operational reason the rate was exceeded, such as:

(i) Operator error;

(ii) Technical events beyond the control of the owner or operator (e.g. acts of God, malfunctions); or

(iii) Dispatch requirements that mandate unplanned operation (e.g. start-ups and shut-downs, idling, and operation at low voltage or low load);

(i) A written narrative describing any actions taken to reduce emission rates; and

(j) Other information that the Department determines is necessary to evaluate the data or to ensure that compliance is achieved.

(4) An exceedance of the emissions rate under §A(2) of this regulation as a result of factors including but not limited to start-up, shut-down, days when the unit was directed by the electric grid operator to operate at low load or to operate pursuant to any emergency generation operations required by the electric grid operator, including necessary testing for such emergency operations, or which otherwise occurred during operations which are deemed consistent with the unit's technological limitations, manufacturers' specifications, good engineering and maintenance practices, and good air pollution control practices for minimizing emissions, shall not be considered a violation of Regulation .03A(2) of this chapter provided that the provisions of the approved plan as required in Regulation .03A(1) of this chapter are met.

B. Procedures for Demonstrating Compliance with NO_x Emission Rates under this Chapter.

(1) Compliance with the NO_x emission rate limitations in Regulations .03B(1) and D(2); .04B(1)(b) and B(4), C(1)—(3), and E(1)(b); and .05A(2) of this chapter shall be demonstrated with a continuous emission monitoring system that is installed, operated, and certified in accordance with 40 CFR Part 75.

(2) For Regulations .03B(1) and .04C(1)—(3) of this chapter, in order to calculate the 30-day systemwide rolling average emission rates, if 29 system operating days are not available from the current ozone season, system operating days from the previous ozone season shall be used.

(3) For Regulation .04B(1)(b) of this chapter, in order to calculate the 30-day rolling average emission rates, if 29 operating days are not available from the current ozone season, operating days from the previous ozone season shall be used.

.06 Reporting Requirements.

A. Reporting Schedule.

(1) Beginning 30 days after the first month of the ozone season following the effective date of this chapter, each affected electric generating unit subject to the requirements of this chapter shall submit a monthly report to the Department detailing the status of compliance with this chapter during the ozone season.

(2) Each subsequent monthly report shall be submitted to the Department not later than 30 days following the end of the calendar month during the ozone season.

B. Monthly Reports During Ozone Season. Monthly reports during the ozone season shall include:

(1) Daily pass or fail of the NO_x emission rates under Regulation .05A(2) of this chapter;

(2) The reporting information as required under Regulation .05A(3) of this chapter;

(3) The 30-day systemwide rolling average emission rate for each affected electric generating unit to demonstrate compliance with Regulation .03B(1), .04C(1)—(3) of this chapter, as applicable;

(4) For an affected electric generating unit which has selected the compliance option of Regulation .04B(1) of this chapter, beginning June 1, 2020, the 30-day rolling average emission rate calculated in lbs/MMBtu;

(5) For an affected electric generating unit which has selected the compliance option of Regulation .04B(4) of this chapter, beginning June 1, 2016, the 30-day rolling average emission rate and 30-day systemwide rolling average emission rate calculated in lbs/MMBtu;

(6) For an affected electric generating unit which has selected the compliance option of Regulation .04B(4) of this chapter, beginning June 1, 2020, data, information, and calculations which demonstrate the systemwide NO_x emission rate as determined on a 24-hour block average or the actual systemwide daily NO_x emissions in tons for each day during the month; and

(7) For an affected electric generating unit which has selected the compliance option of Regulation .04E(1)(b) of this chapter, beginning June 1, 2020, data, information, and calculations which demonstrate the systemwide NO_x emission rate as determined on a 24-hour block average for each day during the month.

.07 Electric System Reliability During Ozone Seasons.

A. In the event of emergency operations, a maximum of 12 hours of operations per system per ozone season may be removed from the calculation of the NO_x limitations in Regulation .04B(4) of this chapter from the unit or units responding to the emergency operations provided that:

(1) Within one business day following the emergency operation, the owner or operator of the affected electric generating unit or units notifies the Manager of the Air Quality Compliance Program of the emergency operations taken by PJM Interconnection; and

(2) Within five business days following the emergency operation, the owner or operator of the affected electric generating unit or units provides the Department with the following information:

(a) PJM documentation of the emergency event called and the unit or units requested to operate;

(b) Unit or units dispatched for the emergency operation;

(c) Number of hours that the unit or units responded to the emergency operation and the consecutive hours that will be used towards the calculation of the NO_x limitations in Regulation .04B(4) of this chapter; and

(d) Other information regarding efforts the owner or operator took to minimize NO_x emissions in accordance with Regulation .03A(1) of this chapter on the day that the emergency operation was called.

B. Any partial hour in which a unit operated in response to emergency operations under §A of this regulation shall constitute a full hour of operations.

Administrative History

Effective date:

Regulations .01—.05 adopted as an emergency provision effective May 1, 2015 (42:11 Md. R. 722); adopted permanently effective August 31, 2015 (42:17 Md. R. 1111)

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Chapter revised effective December 10, 2015 (42:24 Md. R. 1506)

ATTACHMENT 2

Policy and Technical Rationale Supporting OTC's Recommendation for Additional Control Measures Under CAA Section 184(c)

June 2020

Introduction

This policy and technical support document includes three parts:

- Part 1 – Background information,
- Part 2 – A brief overview of the policy and technical rationale used by OTC to support the recommendation, and
- Part 3 – The public notices for the two public comment processes held pursuant to CAA section 184(c). The following Attachment 3 provides the responses to comments submitted by stakeholders as part of the two public comment processes.

Part 1 - Background

Established under the provisions of Sections 176A and 184 of the CAA, the Ozone Transport Commission (OTC) is comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and the Washington, D.C. metropolitan area that includes the District of Columbia and a portion of Virginia.

Under Section 184(c) of the CAA, any State within the OTR may petition the OTC to develop, after notice and opportunity for public comment, recommendations for additional control measures to be applied within all or a part of the OTR if the OTC determines such measures are necessary to bring any area in the OTR into attainment by the dates provided by the CAA. Also under 184(c), the OTC shall transmit any recommendations it develops in response to a State petition to the U.S. Environmental Protection Agency (EPA) Administrator.

Approximately 30 million people living in the Northeast breathe air that fails to meet the current 2015 ozone national ambient air quality standard (NAAQS) of 70 parts per billion (ppb). As a result, large areas of the region are designated as nonattainment for ozone, including all or portions of the following: Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, and Virginia. In its assessment of ozone transport,[1] the EPA has identified emissions from Pennsylvania as significantly contributing to high ozone in each of the states failing to meet the 2015 ozone NAAQS. In addition, EPA has determined that Pennsylvania contributes to portions of Connecticut, New Jersey and New York that still fail to meet the 2008 NAAQS of 75 ppb.

On May 30, 2019, Maryland petitioned the OTC under CAA Section 184(c). The Maryland petition is included in Part 2B of this document. The petition asks the OTC to consider developing additional control measures within part of the OTR, specifically the need for daily limits at coal-fired electricity generating units (EGUs) in Pennsylvania, which are necessary to bring areas in the OTR into attainment by the dates mandated by the CAA.

[1] U.S. EPA Clean Air Markets, "Notice of Data Availability - Preliminary Interstate Ozone Transport Modeling Data for the 2015 Ozone NAAQS," last updated November 21, 2019. Available at https://www.epa.gov/airmarkets/notice-data-availability-preliminary-interstate-ozone-transport-modeling-data-2015-ozone (accessed February 28, 2020).

On June 26, 2019, the OTC voted to proceed with the initial steps associated with CAA Section 184(c) petition process, including analyzing recent EGU operations in Pennsylvania. The OTC launched a public comment process, with public notices for two separate hearings and opportunities for public comment placed in the Washington Post in July and October of 2019 prior to each public hearing and comment period. Public notices were also posted on the OTC homepage, and emailed to a list of over 250 stakeholders maintained by the OTC.

Starting July 17, 2019, the OTC held a public comment period ending in a public hearing on August 16, 2019. The OTC solicited public comment on the following: 1) whether the OTC should develop additional control measures for Pennsylvania, and if so, 2) how those specific control measures should be structured. The public comments received may be viewed at https://otcair.org/ under "Meetings." The OTC reviewed and analyzed these public comments and, based on this review, developed the proposed recommendation in Attachment 1.

On October 4, 2019, the OTC voted to proceed with the second step associated with a Clean Air Act (CAA) Section 184(c) petition. This action initiated the CAA Section 184(c) process to provide notice and solicit public comment on the OTC's draft recommendation to EPA for additional control measures within part of the OTR, specifically Pennsylvania. Starting on October 20, 2019, OTC accepted public comments on the draft recommendation. Then on November 21, 2019 the OTC held a public hearing, and on November 22, 2019 closed the comment period. The OTC reviewed, analyzed, and prepared responses to the public comments received and consulted with the commissioners on next steps forward. On June 2, 2020, a majority of the OTC members voted to send the recommendation to EPA.

Part 2 - Brief Overview of the Policy and Technical Rationale Used By OTC to Support the Recommendation

The policy and technical rationale that supports the OTC recommendation submitted under section 184(c) is consistent with the requirements of the Clean Air Act. The language in section 184(c) that addresses recommendations reads as follows:

> *CAA Section 184 (c) Additional control measures*
>
> *(1) Recommendations*
>
> *Upon petition of any State within a transport region established for ozone, and based on a majority vote of the Governors on the Commission (or their designees), the Commission may, after notice and opportunity for public comment, develop recommendations for additional control measures to be applied within all or a part of such transport region if the commission determines such measures are necessary to bring any area in such region into attainment by the dates provided by this subpart. The commission shall transmit such recommendations to the Administrator.*

Under this section, the OTC may submit a recommendation if the OTC determines such measures are necessary to bring any area in such region into attainment by the dates prescribed in the Act.

First, the measured ozone data shows clearly that more reductions are needed to bring multiple ozone nonattainment areas in the OTR into attainment by the dates mandated in the Clean Air Act. Based upon ozone data through the summer of 2019, four marginal ozone nonattainment areas (Washington, D.C., Baltimore, Philadelphia and greater Connecticut) are on the verge of failing to attain the current 2015 ozone NAAQS of 70 ppb by the CAA's mandated deadlines. These nonattainment areas include all or portions of Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York, Pennsylvania, and Virginia, all of which are OTC members. Because these areas are not likely to achieve the ozone NAAQS by the statutory deadline, they are at risk of being re-classified ("bumped up") into a higher status with additional regulatory requirements. This means that these areas could potentially face economic burden in part because of air pollution that is not entirely under their control. Based on 2015-2017 design values, portions of Connecticut, New Jersey and New York still failed to meet the 2008 NAAQS of 75 ppb. Based on preliminary 2017-2019 design values, portions of Connecticut are still not meeting the 2008 NAAQS. Part 2A of this document provides a tabulation of select monitors within the OTR at risk of failing to attain one or both ozone NAAQS in 2020.

Second, extensive research over the past ten years on reducing ground-level ozone in the East has proven that regional nitrogen oxide (NOx) emissions reductions will lower peak ozone levels. This research has also been verified in the real world as peak ozone levels in the OTR have dropped while major regional NOx emission reduction programs have been implemented.[2]

Third, daily NOx limits on Pennsylvania EGUs will clearly drive significant deeper NOx reductions on poor ozone days as current Pennsylvania and federal rules allow averaging of NOx emissions where an EGU can over-control on some days and control less or avoid controls on other days. In the EPA assessment of ozone transport mentioned above, it identified Pennsylvania as a contributor to high ozone in each of the states failing to meet the 2015 ozone NAAQS. Maryland's May 30, 2019 petition estimated potential additional NOx reductions from daily limits to be as high as 50 tons per day. We recognize that the Maryland estimates are worst-case estimates; however, any potential reduction greater than 5 tons per day can have significant benefits. Maryland's 184(c) petition is included in Part 2B.

Finally, the OTC decision – namely to use Section 184(c) of the Clean Air Act to require daily NOx limits at EGUs in Pennsylvania – is necessary, as Pennsylvania, the OTC state with the largest state-wide NOx emissions and the largest NOx emissions from coal-fired EGUs, would

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[2] *See, e.g.,* Simon, H., Reff, A., Wells, B., Xing, J., and Frank, N., Ozone Trends Across the United States over a Period of Decreasing NOx and VOC Emissions, *Environ. Sci. Technol.*, 49:186-195 (2015); Aleksic, N., Ku, J.-Y., and Sedefian, L., Effects of the NOx SIP Call program on ozone levels in New York, *JAWMA*, 63:1335-1342 (2013); Butler, T.J., Vermeylen, F.M., Rury, M., Likens, G.E., Lee, B., Bowker, G.E., and McCluney, L., Response of ozone and nitrate to stationary source NOx emission reductions in the eastern USA, *Atmos. Env.*, 45: 1084-1094 (2011).

not adopt these limits as part of a collaborative OTC process. Delaware, New Jersey, and Maryland have already adopted daily NOx limits for coal-fired EGUs.

Pennsylvania submitted a large number of comments to the OTC during the last six months as the recommendation was finalized. Many of these comments highlighted the need for flexibility and identified concerns over the very specific requirements and limits included in the petition submitted by Maryland. The OTC recommendation takes those comments into consideration, including current operating trends, and provides Pennsylvania with the flexibility to establish daily NOx limits that will minimize NOx emissions each day of the ozone season and remain in compliance with Pennsylvania and federal rules.

Part 2A - Measured ozone data through 2019 ozone season

State	Site Name	AQS Code	2017-19 Design Value	2018 4th HIGHEST	2019 4th HIGHEST	2020 THRESH 70 ppb	2020 THRESH 75 ppb
CT	Greenwich	90010017	81	86	84	*43*	*58*
CT	Stratford	90013007	82	83	82	*48*	*63*
CT	Westport	90019003	82	84	81	*48*	*63*
CT	Madison-combined	90099002	82	77	84	*52*	*67*
CT	Middletown-combined	90079007	77	77	76	*60*	*75*
MD	Glen Burnie	240031003	74	75	76	*62*	*77*
MD	Edgewood	240251001	75	74	77	*62*	*77*
PA	Bristol	420170012	76	84	67	*62*	*77*
CT	New Haven	90090027	75	72	78	*63*	*78*
MD	Furley E.S. Rec. Center	245100054	73	74	76	*63*	*78*
NJ	Leonia	340030006	74	79	71	*63*	*78*
PA	NEA-Philadelphia	421010024	75	79	71	*63*	*78*
CT	Groton-Fort Griswold	90110124	75	74	75	*64*	*79*
MD	Beltsville	240339991	72	73	75	*65*	*80*
PA	NEW-Philadelphia	421010048	74	76	72	*65*	*80*
CT	Danbury	90011123	73	75	72	*66*	*81*
NY	Flax Pond	361030044		74	73	*66*	*81*
NY	White Plains	361192004	73	78	69	*66*	*81*
NJ	Rutgers	340230011	73	76	70	*67*	*82*
NY	Babylon	361030002	74	74	72	*67*	*82*
MD	Essex	240053001	72	71	74	*68*	*83*
NJ	Camden-Spruce St.	340070002	73	75	70	*68*	*83*
NJ	Clarksboro	340150002	72	77	68	*68*	*83*
NJ	Washington Crossing	340219991	72	77	68	*68*	*83*
NY	NYBG-Bronx-combined	360050133	71	77	68	*68*	*83*
CT	Stafford	90131001	71	71	73	*69*	*84*
DC	McMillan Reservoir	110010043	71	73	71	*69*	*84*
NY	NYC-Queens	360810124	74	73	71	*69*	*84*
NY	Suffolk County-combined	361030009	71	76	68	*69*	*84*
NJ	Bayonne	340170006	70	78	65	*70*	*85*
NY	NYC-CCNY	360610135	71	77	66	*70*	*85*
RI	East Providence	440071010	73	79	64	*70*	*85*

Note: This table contains the latest available data from a February 21, 2020 EPA Air Quality System (AQS) download (https://www.epa.gov/aqs). The 2019 4th highest data and 2017-19 design values are preliminary and not EPA-certified.

Part 2B – Maryland Petition to the Ozone Transport Commission for Additional Control Measures Pursuant to Section 184(c) of the Clean Air Act (submitted May 30, 2019)

Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

May 30, 2019

David Foerter, Executive Director
Ozone Transport Commission
800 Maine Avenue SW
Suite 200
Washington, DC 20024

RE: Petition to the Ozone Transport Commission for Additional Control Measures Pursuant to Section 184(c) of the Clean Air Act

Dear Mr. Foerter:

The purpose of this letter is to petition the Ozone Transport Commission (OTC or the Commission) under Section 184(c) of the Clean Air Act (CAA) to develop, and transmit to the administrator of the U.S. Environmental Protection Agency (EPA), recommendations for additional control measures to be applied within a part of the Ozone Transport Region (OTR). For the OTC to proceed with a 184(c) petition, it must be supported by a majority vote of the governors on the Commission (or their designees). A draft motion to vote on the petition is included as Attachment 1 and Maryland requests it be considered as a potential action at the June 11, 2019 OTC meeting. A copy of Section 184(c) of the CAA is included as Attachment 2.

Additional control measures are necessary to bring certain areas of the OTR into attainment of the 2008 ozone national ambient air quality standards (NAAQS) and the 2015 ozone NAAQS. Parts of New Jersey, New York, and Connecticut have failed to attain the 2008 ozone NAAQS and parts of Maryland are classified as maintenance under the 2008 ozone NAAQS. Parts of all of these states, as well as parts of other states within the OTR, are classified as nonattainment under the 2015 ozone NAAQS.

Maryland has completed an analysis of excess emissions from Pennsylvania coal-fired power plants in 2017 and 2018 after implementation of Pennsylvania's Reasonably Available Control Technology (RACT) II and the Cross State Air Pollution Rule (CSAPR) Update. Despite significant progress in reducing *long term* average nitrogen oxides (NO_x) emissions from coal-fired power plants, Pennsylvania rules still allow excess emissions on a *daily* basis. The ozone NAAQS is set to address short-term (8-hour) exposures and an air quality monitor's design value—the calculation controlling whether an area is in attainment—is based on the fourth-highest *daily* 8-hour concentration in a season, averaged over three consecutive years. Therefore, reducing excess emissions on a daily basis is critical to attaining and maintaining the ozone NAAQS.

This is especially important on hot summer days when ozone is likely to form. Attachment 3 is a summary of the excess emissions allowed under the current Pennsylvania rules on the day before and the day of an ozone exceedance day in Maryland (days where measured levels are above the standard) in

2017 and 2018. As shown in Attachment 3, on many summer days excess NO_x emissions, up to an excess of 47 tons[1], are released by coal-fired power plants in Pennsylvania. These emissions would not be released if the coal-fired electric generating unit (EGU) operators ran existing control technology consistent with manufacturers' specifications and past best practices. The failure to run existing controls at these Pennsylvania coal-fired EGUs will drive the New York-New Jersey-Connecticut nonattainment area into continued nonattainment of the 2008 ozone NAAQS and 2015 ozone NAAQS. Failure to optimize the existing controls also threatens Maryland's maintenance of the 2008 ozone NAAQS and continued nonattainment for the 2015 ozone NAAQS.

EPA has identified Pennsylvania as a significant contributor to high ozone in Maryland, New Jersey, New York, Connecticut, and eight other jurisdictions within the OTR. Sensitivity modeling performed by the University of Maryland shows that Maryland and other states could see up to a maximum 7.0 parts per billion (ppb) ozone benefit on peak ozone days if Pennsylvania coal-fired power plants optimized the use of their existing control technologies. Attachment 4 includes sensitivity modeling results for maximum daily ozone impacts for each OTC state south of Massachusetts and for key OTC problem monitors.

Maryland analyzed 2017 and 2018 ozone season emissions data not only because it represents the most recent set of full ozone season data, but also because both the Pennsylvania RACT II rule requirements and the federal requirements in the CSAPR Update were both already in place for the 2017 and 2018 ozone season. The fact that there were a large amount of excess *daily* emissions, in spite of both of the above rules, demonstrates that more can and should be done.

These Pennsylvania and federal rules do not include daily limits to ensure that existing controls are run optimally every day of the ozone season. The Pennsylvania rule allows EGUs to average over a 30-day period where emission rates on some days can be much higher than rates on other days. The Pennsylvania rule also allows averaging between coal-fired and non-coal-fired EGUs. This allows some coal-fired EGUs to run without utilizing existing control technology as long as other EGUs are meeting rates much lower than the rates in Pennsylvania's rule. Most other states in the OTR with coal-fired EGUs are already addressing this issue with daily limits that require control equipment to be optimized on each day of the ozone season.

Therefore, the recommendation that Maryland is asking the OTC to develop is to simply require these coal-fired EGUs in Pennsylvania to run their existing controls in an optimized manner every day of the ozone season. This is one of the most important remaining strategies to OTC nonattainment areas.

Attachment 5 is a draft of the recommendation that Maryland is petitioning the OTC to develop. Attachment 6 is the technical support information required under section 184(c).

Sincerely,

Ben Grumbles, Secretary
Maryland Department of the Environment

[1] *To put this number into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all 13 OTC states.*

cc: Shawn Garvin, OTC Chair, and Secretary, Delaware Department of Natural Resources and Environmental Control
Katie S. Dykes, Commissioner, Connecticut Department of Energy and Environmental Protection
Tommy Wells, Director, District of Columbia Department of Energy & Environment
Gerald D. Reid, Commissioner, Maine Department of Environmental Protection
Martin Suuberg, Commissioner, Massachusetts Department of Environmental Protection
Robert R. Scott, Commissioner, New Hampshire Department of Environmental Services
Catherine R. McCabe, Commissioner, New Jersey Department of Environmental Protection
Basil Seggos, Commissioner, New York Department of Environmental Conservation
Patrick McDonnell, Secretary, Pennsylvania Department of Environmental Protection
Janet Coit, Director, Rhode Island Department of Environmental Management
Emily Boedecker, Commissioner, Vermont Department of Environmental Conservation
David K. Paylor, Director, Virginia Department of Environmental Quality

ATTACHMENT 1

Proposed Motion from Maryland for June 11, 2019 OTC Annual Meeting

Maryland moves that the Ozone Transport Commission (OTC) develop, and transmit to the Administrator of the Environmental Protection Agency, recommendations for additional control measures to be applied within part of the Ozone Transport Region (OTR), specifically Pennsylvania, if the OTC determines that such measures are necessary to bring any area in the OTR into attainment by the dates mandated in the Clean Air Act. The recommendations and transmittal must be consistent with Section 184(c) of the Clean Air Act. The recommendations must be transmitted to EPA in a timeframe to impact the 2020 ozone season. The 2020 ozone season is the last year for the seven OTC states with marginal nonattainment areas to attain the 2015 standard and avoid a redesignation to a higher classification.

ATTACHMENT 2

Reprint of Clean Air Act Section 184(c)

CAA Section 184

(c) Additional control measures

(1) Recommendations

Upon petition of any State within a transport region established for ozone, and based on a majority vote of the Governors on the Commission (or their designees), the Commission may, after notice and opportunity for public comment, develop recommendations for additional control measures to be applied within all or a part of such transport region if the commission determines such measures are necessary to bring any area in such region into attainment by the dates provided by this subpart. The commission shall transmit such recommendations to the Administrator.

(2) Notice and review

Whenever the Administrator receives recommendations prepared by a commission pursuant to paragraph (1) (the date of receipt of which shall hereinafter in this section be referred to as the "receipt date"), the Administrator shall—

(A) immediately publish in the Federal Register a notice stating that the recommendations are available and provide an opportunity for public hearing within 90 days beginning on the receipt date; and

(B) commence a review of the recommendations to determine whether the control measures in the recommendations are necessary to bring any area in such region into attainment by the dates provided by this subpart and are otherwise consistent with this chapter.

(3) Consultation

In undertaking the review required under paragraph (2)(B), the Administrator shall consult with members of the commission of the affected States and shall take into account the data, views, and comments received pursuant to paragraph (2)(A).

(4) Approval and disapproval

Within 9 months after the receipt date, the Administrator shall (A) determine whether to approve, disapprove, or partially disapprove and partially approve the recommendations; (B) notify the commission in writing of such approval, disapproval, or partial disapproval; and (C) publish such determination in the Federal Register. If the Administrator disapproves or partially disapproves the recommendations, the Administrator shall specify—

(i) why any disapproved additional control measures are not necessary to bring any area in such region into attainment by the dates provided by this subpart or are otherwise not consistent with the chapter; and

(ii) recommendations concerning equal or more effective actions that could be taken by the commission to conform the disapproved portion of the recommendations to the requirements of this section.

(5) Finding

Upon approval or partial approval of recommendations submitted by a commission, the Administrator shall issue to each State which is included in the transport region and to which a requirement of the approved plan applies, a finding under section 7410(k)(5) of this title that the implementation plan for such State is inadequate to meet the requirements of section 7410(a)(2)(D) of this title. Such finding shall require each such State to revise its implementation plan to include the approved additional control measures within one year after the finding is issued.

ATTACHMENT 3

Summary of the Excess Emissions*Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3A - Total of All Coal-Fired EGUs in Pennsylvania

2017			2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate	Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	15.8355	13.4737	5/1/2018	33.2143	26.7995
5/17/2017	30.5954	25.2417	5/2/2018	34.0092	26.8560
5/18/2017	20.8652	13.9486	5/3/2018	32.2127	24.3410
6/9/2017	14.6912	10.2784	5/4/2018	30.6024	22.0734
6/10/2017	27.3882	20.4652	5/31/2018	11.8276	8.8104
6/11/2017	42.6550	33.6005	6/1/2018	11.7754	9.5523
6/12/2017	37.8615	25.5729	6/16/2018	23.2727	18.1543
6/13/2017	29.6581	18.3291	6/17/2018	28.2657	21.2240
6/14/2017	24.5045	13.9278	6/18/2018	40.9510	31.0909
6/15/2017	24.1780	17.2997	6/29/2018	27.2328	22.1535
6/21/2017	22.7355	17.6924	6/30/2018	37.1244	28.9534
6/22/2017	26.5435	20.7927	7/1/2018	42.2820	31.9524
7/2/2017	34.9546	26.5148	7/2/2018	47.8667	35.9526
7/3/2017	33.8381	23.9221	7/3/2018	40.4700	28.5315
7/4/2017	31.3738	22.8278	7/8/2018	38.1178	31.4099
7/18/2017	30.8749	23.8020	7/9/2018	40.5003	32.4579
7/19/2017	29.2956	22.1134	7/10/2018	32.5975	24.3146
7/20/2017	36.4724	28.7385	7/15/2018	32.5852	25.6061
7/21/2017	33.9775	26.8924	7/16/2018	44.2404	33.0614
7/31/2017	27.4446	21.2695	8/9/2018	38.7924	30.2631
8/1/2017	31.6852	24.2231	8/10/2018	29.4185	20.6060
8/15/2017	36.1081	29.4700	8/26/2018	28.4546	21.8786
8/16/2017	41.9732	32.8235	8/27/2018	31.9345	23.4366
9/24/2017	24.6999	17.4890	9/5/2018	39.5098	27.9122
9/25/2017	31.5224	20.7481	9/6/2018	46.3698	34.9360

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) rate for an entire ozone season calculated from CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

ATTACHMENT 3

Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.1 – Individual EGUs- Homer City Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	10.1209	9.7318		5/1/2018	6.5444	6.3387
5/17/2017	12.4837	12.0303		5/2/2018	4.0307	3.7756
5/18/2017	9.0451	8.6251		5/3/2018	6.5898	6.2843
6/9/2017	0.0000	0.0000		5/4/2018	5.3428	5.0664
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	4.9154	4.6994		6/1/2018	0.0000	0.0000
6/12/2017	6.8922	6.5074		6/16/2018	3.7609	3.5042
6/13/2017	6.8223	6.4452		6/17/2018	5.4442	5.1531
6/14/2017	4.4686	4.1310		6/18/2018	7.2430	6.9088
6/15/2017	6.9154	6.5189		6/29/2018	3.9507	3.6885
6/21/2017	6.1489	5.7748		6/30/2018	4.9354	4.6499
6/22/2017	6.2188	5.8435		7/1/2018	6.1592	5.8524
7/2/2017	5.8056	5.4524		7/2/2018	6.1064	5.7934
7/3/2017	6.2802	5.9146		7/3/2018	6.7601	6.4255
7/4/2017	4.7444	4.4206		7/8/2018	3.7982	3.5452
7/18/2017	8.7993	8.3574		7/9/2018	4.8952	4.6117
7/19/2017	7.8344	7.4180		7/10/2018	4.6335	4.3468
7/20/2017	9.7929	9.3456		7/15/2018	3.6096	3.3473
7/21/2017	7.8158	7.3992		7/16/2018	6.8916	6.5427
7/31/2017	5.4234	5.0767		8/9/2018	7.9263	7.5421
8/1/2017	7.0266	6.6382		8/10/2018	3.8510	3.5762
8/15/2017	0.0000	0.0000		8/26/2018	9.1193	8.7643
8/16/2017	4.8715	4.7189		8/27/2018	8.5315	8.1838
9/24/2017	5.9906	5.6948		9/5/2018	5.1205	4.8322
9/25/2017	9.7820	9.4055		9/6/2018	4.2100	3.9447

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

ATTACHMENT 3

Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.2 – Individual EGUs- Keystone Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	2.2990	1.8058		5/1/2018	2.3530	1.8588
5/17/2017	2.6501	2.1602		5/2/2018	2.4771	1.9861
5/18/2017	2.9505	2.4362		5/3/2018	2.5276	2.0248
6/9/2017	3.9498	3.4664		5/4/2018	2.1836	1.6818
6/10/2017	3.9212	3.4440		5/31/2018	3.0870	2.6362
6/11/2017	3.9937	3.5110		6/1/2018	3.4218	2.9273
6/12/2017	4.1649	3.6637		6/16/2018	3.2816	2.8024
6/13/2017	4.6404	4.1280		6/17/2018	3.3317	2.8455
6/14/2017	5.0060	4.4940		6/18/2018	4.2534	3.7529
6/15/2017	4.4686	3.9629		6/29/2018	4.3894	3.8826
6/21/2017	4.2630	3.7770		6/30/2018	4.0554	3.5466
6/22/2017	4.1905	3.7045		7/1/2018	4.3181	3.8001
7/2/2017	3.6072	3.1148		7/2/2018	9.2626	8.8626
7/3/2017	3.7970	3.2974		7/3/2018	4.4723	3.9728
7/4/2017	3.6541	3.1675		7/8/2018	12.4941	12.2481
7/18/2017	3.9785	3.4698		7/9/2018	13.6645	13.4062
7/19/2017	4.1074	3.5760		7/10/2018	7.4625	7.0167
7/20/2017	4.2257	3.6875		7/15/2018	7.4969	7.0818
7/21/2017	4.0508	3.5145		7/16/2018	4.6576	4.1769
7/31/2017	4.0097	3.5124		8/9/2018	3.1035	2.5621
8/1/2017	3.7504	3.2470		8/10/2018	2.9579	2.4200
8/15/2017	6.8192	6.3239		8/26/2018	2.9854	2.4897
8/16/2017	5.5477	5.0556		8/27/2018	2.8791	2.3524
9/24/2017	0.0000	0.0000		9/5/2018	5.8733	5.3450
9/25/2017	0.0000	0.0000		9/6/2018	5.3851	4.8573

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

ATTACHMENT 3

Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.3 – Individual EGUs- Homer City Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	10.9638	10.1426
5/17/2017	4.6422	4.1936		5/2/2018	8.7790	8.0397
5/18/2017	0.0000	0.0000		5/3/2018	9.6388	8.7407
6/9/2017	0.3044	0.2696		5/4/2018	2.5542	2.3209
6/10/2017	5.8366	4.9775		5/31/2018	0.0000	0.0000
6/11/2017	7.3588	6.3791		6/1/2018	0.0000	0.0000
6/12/2017	2.5553	2.2082		6/16/2018	3.6172	2.8669
6/13/2017	0.0000	0.0000		6/17/2018	5.1410	4.3105
6/14/2017	0.0000	0.0000		6/18/2018	6.7786	5.8030
6/15/2017	0.0000	0.0000		6/29/2018	4.1725	3.4156
6/21/2017	0.0000	0.0000		6/30/2018	5.4596	4.6602
6/22/2017	0.0000	0.0000		7/1/2018	7.0521	6.1733
7/2/2017	5.4759	4.5141		7/2/2018	7.1517	6.2954
7/3/2017	5.8071	4.8140		7/3/2018	5.4877	4.6237
7/4/2017	4.0657	3.1738		7/8/2018	2.8885	2.1674
7/18/2017	6.4668	5.6528		7/9/2018	3.8992	3.1334
7/19/2017	6.1496	5.0802		7/10/2018	4.2962	3.4862
7/20/2017	7.7216	6.5559		7/15/2018	4.1917	3.4559
7/21/2017	7.7929	6.6415		7/16/2018	7.3270	6.3903
7/31/2017	0.0000	0.0000		8/9/2018	4.5460	3.7155
8/1/2017	0.0000	0.0000		8/10/2018	2.7965	1.9814
8/15/2017	8.1652	7.1213		8/26/2018	0.7763	0.6633
8/16/2017	7.9169	6.8448		8/27/2018	6.9334	6.3080
9/24/2017	0.0000	0.0000		9/5/2018	6.8466	5.8840
9/25/2017	0.0000	0.0000		9/6/2018	5.9972	5.1694

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

ATTACHMENT 3

Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.4 – Individual EGUs- Cheswick Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	2.1739	1.2871
5/17/2017	0.0000	0.0000		5/2/2018	3.9844	3.2709
5/18/2017	0.0000	0.0000		5/3/2018	3.7001	2.8275
6/9/2017	4.0111	3.0698		5/4/2018	2.9659	2.0838
6/10/2017	2.9825	2.1970		5/31/2018	3.1530	2.2584
6/11/2017	5.0788	4.1566		6/1/2018	3.6596	2.8481
6/12/2017	3.5405	2.4978		6/16/2018	4.0560	3.5603
6/13/2017	3.1631	2.1121		6/17/2018	3.5892	2.9065
6/14/2017	3.1982	2.1820		6/18/2018	3.3650	2.5426
6/15/2017	3.6010	2.6414		6/29/2018	3.7705	2.9517
6/21/2017	4.5412	3.5945		6/30/2018	3.4695	2.5765
6/22/2017	3.7433	2.7494		7/1/2018	3.5606	2.6773
7/2/2017	0.0000	0.0000		7/2/2018	3.3462	2.3927
7/3/2017	2.7742	2.0430		7/3/2018	3.6560	2.7793
7/4/2017	5.1625	4.3560		7/8/2018	0.0000	0.0000
7/18/2017	4.1217	3.1135		7/9/2018	3.0221	2.3760
7/19/2017	3.5881	2.5078		7/10/2018	4.6126	3.8013
7/20/2017	3.7102	2.6131		7/15/2018	4.4834	3.8314
7/21/2017	3.4153	2.3318		7/16/2018	4.3172	3.5012
7/31/2017	2.8272	1.9725		8/9/2018	3.6164	2.9813
8/1/2017	3.9707	2.9771		8/10/2018	6.2839	5.8227
8/15/2017	4.3763	3.3840		8/26/2018	4.7168	4.3487
8/16/2017	4.4960	3.5185		8/27/2018	3.5621	2.8251
9/24/2017	2.8749	2.4903		9/5/2018	4.9281	4.1928
9/25/2017	2.5332	1.6116		9/6/2018	4.3695	3.5538

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.5 – Individual EGUs- Montour Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	6.1161	4.3499		5/2/2018	0.0000	0.0000
5/18/2017	3.1154	0.1590		5/3/2018	1.1026	0.9119
6/9/2017	0.7610	0.6129		5/4/2018	7.8144	5.7728
6/10/2017	10.8968	8.3910		5/31/2018	0.0000	0.0000
6/11/2017	5.9399	3.2095		6/1/2018	0.0000	0.0000
6/12/2017	4.7194	1.7026		6/16/2018	0.0000	0.0000
6/13/2017	3.4076	0.2798		6/17/2018	0.1466	0.0829
6/14/2017	3.3796	0.4641		6/18/2018	7.6451	6.1226
6/15/2017	4.2966	2.1548		6/29/2018	0.0000	0.0000
6/21/2017	0.1607	0.1018		6/30/2018	0.0000	0.0000
6/22/2017	4.7270	4.0535		7/1/2018	4.9391	3.2473
7/2/2017	6.9877	4.3331		7/2/2018	3.6794	0.4082
7/3/2017	4.9174	2.0566		7/3/2018	3.9741	0.6767
7/4/2017	4.5663	2.0845		7/8/2018	3.7050	1.0733
7/18/2017	0.9634	0.0200		7/9/2018	2.9802	0.0000
7/19/2017	0.2222	0.1487		7/10/2018	2.8449	0.0000
7/20/2017	0.0000	0.0000		7/15/2018	2.6828	0.2060
7/21/2017	0.0000	0.0000		7/16/2018	6.2214	3.3394
7/31/2017	0.1776	0.1185		8/9/2018	4.1266	1.0529
8/1/2017	5.1458	4.3350		8/10/2018	3.9066	0.7037
8/15/2017	5.5512	3.9614		8/26/2018	4.5004	1.5722
8/16/2017	5.8715	2.9527		8/27/2018	3.0183	0.0000
9/24/2017	4.3903	3.0402		9/5/2018	3.8590	0.4800
9/25/2017	4.8160	1.5538		9/6/2018	5.8303	2.6787

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.6 – Individual EGUs- Montour Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	3.3902	1.8049
5/17/2017	0.0000	0.0000		5/2/2018	5.2913	3.4440
5/18/2017	0.0000	0.0000		5/3/2018	2.5486	0.4249
6/9/2017	0.0000	0.0000		5/4/2018	4.0266	2.3188
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	5.0597	4.2618		6/1/2018	0.0000	0.0000
6/12/2017	7.7063	5.7140		6/16/2018	2.9383	1.2822
6/13/2017	5.5750	3.3265		6/17/2018	3.3274	1.3200
6/14/2017	2.6287	0.4917		6/18/2018	2.9822	0.7781
6/15/2017	0.0000	0.0000		6/29/2018	1.4154	1.2319
6/21/2017	0.0000	0.0000		6/30/2018	5.9367	3.7277
6/22/2017	0.0000	0.0000		7/1/2018	4.1155	1.9099
7/2/2017	8.2418	6.3399		7/2/2018	5.0134	2.7785
7/3/2017	5.4289	3.4160		7/3/2018	5.8842	3.6404
7/4/2017	4.2252	2.4387		7/8/2018	0.0000	0.0000
7/18/2017	0.0000	0.0000		7/9/2018	0.0000	0.0000
7/19/2017	0.0402	0.0316		7/10/2018	0.0000	0.0000
7/20/2017	4.2259	2.8866		7/15/2018	0.3495	0.2843
7/21/2017	4.7508	3.1296		7/16/2018	5.9789	3.8817
7/31/2017	6.7505	4.8244		8/9/2018	0.0000	0.0000
8/1/2017	3.8010	1.7507		8/10/2018	0.0000	0.0000
8/15/2017	0.0000	0.0000		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0445	0.0132
9/24/2017	3.7394	1.7349		9/5/2018	3.3559	1.0768
9/25/2017	3.5142	1.3049		9/6/2018	9.9475	7.7367

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.7 – Individual EGUs- Keystone Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.9421	0.6019		5/1/2018	2.5294	2.1830
5/17/2017	1.1077	0.7626		5/2/2018	2.3472	2.0100
5/18/2017	1.0695	0.7141		5/3/2018	0.8320	0.7247
6/9/2017	1.3118	0.9806		5/4/2018	0.0000	0.0000
6/10/2017	0.9543	0.6295		5/31/2018	2.7656	2.4528
6/11/2017	1.1322	0.8054		6/1/2018	3.2204	2.8713
6/12/2017	1.5569	1.3511		6/16/2018	3.0624	2.7239
6/13/2017	0.0000	0.0000		6/17/2018	3.0294	2.6827
6/14/2017	0.0000	0.0000		6/18/2018	3.2780	2.9228
6/15/2017	0.0000	0.0000		6/29/2018	2.9730	2.6211
6/21/2017	1.6826	1.3497		6/30/2018	3.0138	2.6597
6/22/2017	1.8723	1.5398		7/1/2018	5.0371	4.6777
7/2/2017	1.1326	0.8005		7/2/2018	6.4545	6.2682
7/3/2017	1.2303	0.8937		7/3/2018	3.3981	3.0391
7/4/2017	1.0117	0.6833		7/8/2018	7.0881	6.8442
7/18/2017	1.1006	0.7546		7/9/2018	5.3068	5.0103
7/19/2017	1.4116	1.0524		7/10/2018	3.5110	3.1759
7/20/2017	0.8954	0.5327		7/15/2018	6.7289	6.4256
7/21/2017	1.3363	0.9754		7/16/2018	2.8232	2.4684
7/31/2017	1.2948	0.9578		8/9/2018	8.9284	8.6377
8/1/2017	2.1599	1.8183		8/10/2018	3.6647	3.3190
8/15/2017	5.2514	4.9100		8/26/2018	2.7496	2.4092
8/16/2017	5.5411	5.1987		8/27/2018	2.6676	2.3091
9/24/2017	3.5606	3.2261		9/5/2018	2.7648	2.4007
9/25/2017	3.7714	3.4237		9/6/2018	2.7140	2.3500

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.8 – Individual EGUs- Homer City Unit 3

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.0000	0.0000		5/3/2018	0.0000	0.0000
6/9/2017	2.0421	0.8839		5/4/2018	0.0000	0.0000
6/10/2017	1.5130	0.3953		5/31/2018	0.0000	0.0000
6/11/2017	1.0443	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	1.3625	0.0000		6/16/2018	0.5531	0.4211
6/13/2017	1.6058	0.1965		6/17/2018	1.9621	0.9494
6/14/2017	1.5339	0.1560		6/18/2018	1.6456	0.1065
6/15/2017	1.4327	0.1663		6/29/2018	1.3609	0.1822
6/21/2017	1.7101	0.4113		6/30/2018	1.4294	0.1487
6/22/2017	1.5357	0.1775		7/1/2018	1.5406	0.1789
7/2/2017	0.0000	0.0000		7/2/2018	1.5484	0.1511
7/3/2017	0.0000	0.0000		7/3/2018	1.5139	0.1856
7/4/2017	0.0000	0.0000		7/8/2018	1.0935	0.2120
7/18/2017	1.5005	0.1093		7/9/2018	1.2513	0.2343
7/19/2017	1.3417	0.1990		7/10/2018	1.3149	0.1802
7/20/2017	0.0000	0.0000		7/15/2018	1.0992	0.2067
7/21/2017	0.0000	0.0000		7/16/2018	1.4815	0.1997
7/31/2017	0.0000	0.0000		8/9/2018	1.2940	0.3039
8/1/2017	0.0000	0.0000		8/10/2018	1.5249	0.1618
8/15/2017	1.9618	1.2619		8/26/2018	0.9939	0.0531
8/16/2017	1.4954	0.1715		8/27/2018	1.1971	0.0000
9/24/2017	1.4267	0.2253		9/5/2018	1.1007	0.0000
9/25/2017	1.5546	0.1686		9/6/2018	1.1341	0.0838

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.9 – Individual EGUs- Conemaugh Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	1.2591	0.6423
5/17/2017	0.5315	0.0000		5/2/2018	1.0990	0.5255
5/18/2017	0.7130	0.0830		5/3/2018	1.2385	0.6436
6/9/2017	0.0000	0.0000		5/4/2018	1.1549	0.5465
6/10/2017	0.0000	0.0000		5/31/2018	0.2305	0.0000
6/11/2017	5.9788	5.6177		6/1/2018	0.0000	0.0000
6/12/2017	0.8285	0.2466		6/16/2018	0.0000	0.0000
6/13/2017	0.7369	0.1334		6/17/2018	0.0000	0.0000
6/14/2017	1.1809	0.5661		6/18/2018	0.0000	0.0000
6/15/2017	1.4294	0.8503		6/29/2018	0.0000	0.0000
6/21/2017	1.7568	1.2264		6/30/2018	0.0000	0.0000
6/22/2017	1.8244	1.2705		7/1/2018	0.0000	0.0000
7/2/2017	1.0251	0.4987		7/2/2018	0.0000	0.0000
7/3/2017	0.9227	0.3776		7/3/2018	0.0000	0.0000
7/4/2017	2.3423	1.8224		7/8/2018	0.0000	0.0000
7/18/2017	1.0329	0.4776		7/9/2018	0.0000	0.0000
7/19/2017	1.0620	0.4618		7/10/2018	0.0000	0.0000
7/20/2017	1.0213	0.4150		7/15/2018	0.0000	0.0000
7/21/2017	0.9228	0.3175		7/16/2018	0.2251	0.0000
7/31/2017	0.7757	0.2406		8/9/2018	0.0000	0.0000
8/1/2017	0.6432	0.0908		8/10/2018	0.0000	0.0000
8/15/2017	0.9540	0.4073		8/26/2018	0.0000	0.0000
8/16/2017	0.9373	0.3880		8/27/2018	0.0000	0.0000
9/24/2017	0.7556	0.2345		9/5/2018	0.0445	0.0000
9/25/2017	0.8276	0.2555		9/6/2018	0.3168	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.10 – Individual EGUs- Bruce Mansfield Unit 3

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.6695	0.0000		5/1/2018	1.8179	0.7864
5/17/2017	0.8996	0.0000		5/2/2018	1.1961	0.1475
5/18/2017	0.8759	0.0000		5/3/2018	1.6572	0.4639
6/9/2017	0.0000	0.0000		5/4/2018	2.0838	0.8884
6/10/2017	0.0000	0.0000		5/31/2018	0.1162	0.1064
6/11/2017	0.0000	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	1.2382	0.2492		6/16/2018	0.6666	0.0000
6/13/2017	0.5010	0.0000		6/17/2018	0.5242	0.0000
6/14/2017	0.4235	0.0000		6/18/2018	0.7108	0.0000
6/15/2017	0.0000	0.0000		6/29/2018	0.0000	0.0000
6/21/2017	0.1887	0.0000		6/30/2018	0.0000	0.0000
6/22/2017	0.4667	0.0000		7/1/2018	0.2264	0.0000
7/2/2017	0.0000	0.0000		7/2/2018	0.5762	0.0000
7/3/2017	0.0000	0.0000		7/3/2018	0.3470	0.0000
7/4/2017	0.0000	0.0000		7/8/2018	0.1262	0.0000
7/18/2017	0.0401	0.0000		7/9/2018	0.2804	0.0000
7/19/2017	0.0000	0.0000		7/10/2018	0.5706	0.0000
7/20/2017	0.4248	0.1284		7/15/2018	0.8764	0.0532
7/21/2017	0.0000	0.0000		7/16/2018	1.3129	0.3966
7/31/2017	0.0000	0.0000		8/9/2018	0.9691	0.0379
8/1/2017	0.0177	0.0035		8/10/2018	1.2570	0.3074
8/15/2017	0.1412	0.1072		8/26/2018	1.1147	0.4118
8/16/2017	2.2832	1.7301		8/27/2018	1.0516	0.1881
9/24/2017	0.0000	0.0000		9/5/2018	1.7930	0.7335
9/25/2017	2.2755	1.9108		9/6/2018	1.2392	0.1936

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.11 – Individual EGUs- Seward Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.9585	0.6987		5/1/2018	0.0000	0.0000
5/17/2017	1.1188	0.8361		5/2/2018	0.0000	0.0000
5/18/2017	1.2018	0.9020		5/3/2018	0.0000	0.0000
6/9/2017	0.5903	0.3325		5/4/2018	0.0000	0.0000
6/10/2017	0.3320	0.0868		5/31/2018	0.0000	0.0000
6/11/2017	0.4486	0.2055		6/1/2018	0.0000	0.0000
6/12/2017	0.5233	0.2505		6/16/2018	0.0000	0.0000
6/13/2017	0.5839	0.3048		6/17/2018	0.2940	0.0427
6/14/2017	0.3398	0.0822		6/18/2018	0.7493	0.4804
6/15/2017	0.0893	0.0000		6/29/2018	0.9199	0.6411
6/21/2017	0.0000	0.0000		6/30/2018	0.8921	0.6232
6/22/2017	0.0000	0.0000		7/1/2018	1.1433	0.8760
7/2/2017	0.6576	0.4129		7/2/2018	1.1570	0.8806
7/3/2017	0.3636	0.1049		7/3/2018	1.0704	0.7863
7/4/2017	0.0845	0.0000		7/8/2018	0.4713	0.2646
7/18/2017	0.8333	0.5489		7/9/2018	0.9271	0.6963
7/19/2017	0.9069	0.6208		7/10/2018	0.9217	0.6605
7/20/2017	0.8807	0.5866		7/15/2018	0.0256	0.0000
7/21/2017	1.0469	0.7445		7/16/2018	0.8386	0.5777
7/31/2017	0.7065	0.4551		8/9/2018	1.4296	1.1786
8/1/2017	1.0053	0.7361		8/10/2018	0.8552	0.6043
8/15/2017	0.7522	0.4932		8/26/2018	0.0000	0.0000
8/16/2017	0.8030	0.5461		8/27/2018	0.1991	0.0000
9/24/2017	0.1517	0.0000		9/5/2018	1.0309	0.7986
9/25/2017	0.3830	0.1159		9/6/2018	0.0000	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.12 – Individual EGUs- Conemaugh Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.6948	0.6366
5/17/2017	0.0000	0.0000		5/2/2018	3.2665	2.5087
5/18/2017	0.0000	0.0000		5/3/2018	0.6895	0.0000
6/9/2017	0.2380	0.0000		5/4/2018	0.7007	0.0000
6/10/2017	0.2688	0.0000		5/31/2018	0.8644	0.1204
6/11/2017	0.3218	0.0000		6/1/2018	0.1739	0.0000
6/12/2017	0.3550	0.0000		6/16/2018	0.0000	0.0000
6/13/2017	0.4536	0.0000		6/17/2018	0.0000	0.0000
6/14/2017	0.3437	0.0000		6/18/2018	0.0000	0.0000
6/15/2017	0.4207	0.0000		6/29/2018	1.6731	1.5858
6/21/2017	0.0000	0.0000		6/30/2018	5.3210	4.4329
6/22/2017	0.0000	0.0000		7/1/2018	1.1554	0.2289
7/2/2017	0.3971	0.0000		7/2/2018	0.7200	0.0000
7/3/2017	0.3960	0.0000		7/3/2018	0.6232	0.0000
7/4/2017	0.4002	0.0000		7/8/2018	0.5123	0.0000
7/18/2017	0.3189	0.0000		7/9/2018	0.5907	0.0000
7/19/2017	0.3499	0.0000		7/10/2018	0.1583	0.0000
7/20/2017	0.2660	0.0000		7/15/2018	0.0000	0.0000
7/21/2017	0.2351	0.0000		7/16/2018	0.0000	0.0000
7/31/2017	3.1896	2.4450		8/9/2018	0.0000	0.0000
8/1/2017	1.5674	0.6750		8/10/2018	0.0000	0.0000
8/15/2017	0.0324	0.0301		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0000	0.0000
9/24/2017	0.3471	0.0000		9/5/2018	0.0000	0.0000
9/25/2017	0.3211	0.0000		9/6/2018	0.0000	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.13 – Individual EGUs- Seward Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.1138	0.0512		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.6694	0.5055		5/3/2018	0.0000	0.0000
6/9/2017	0.5758	0.3512		5/4/2018	0.0000	0.0000
6/10/2017	0.3301	0.1192		5/31/2018	0.0000	0.0000
6/11/2017	0.4339	0.2279		6/1/2018	0.1479	0.0848
6/12/2017	0.5068	0.2729		6/16/2018	0.0000	0.0000
6/13/2017	0.5662	0.3184		6/17/2018	0.2914	0.0748
6/14/2017	0.3169	0.1003		6/18/2018	0.7148	0.4802
6/15/2017	0.0999	0.0000		6/29/2018	0.9203	0.6632
6/21/2017	1.2723	1.0115		6/30/2018	0.8865	0.6413
6/22/2017	1.2020	0.9448		7/1/2018	1.1533	0.9092
7/2/2017	0.6773	0.4515		7/2/2018	1.1618	0.9064
7/3/2017	0.3658	0.1307		7/3/2018	1.0845	0.8156
7/4/2017	0.0683	0.0000		7/8/2018	0.4746	0.2837
7/18/2017	0.0000	0.0000		7/9/2018	0.9560	0.7428
7/19/2017	0.0000	0.0000		7/10/2018	0.8984	0.6647
7/20/2017	0.0000	0.0000		7/15/2018	0.0029	0.0000
7/21/2017	0.0000	0.0000		7/16/2018	0.8475	0.6026
7/31/2017	0.6733	0.4546		8/9/2018	1.4271	1.1995
8/1/2017	0.9614	0.7291		8/10/2018	0.8579	0.6300
8/15/2017	0.6898	0.4734		8/26/2018	0.0000	0.0000
8/16/2017	0.7373	0.5225		8/27/2018	0.2192	0.0068
9/24/2017	0.1360	0.0000		9/5/2018	1.1368	0.9098
9/25/2017	0.3719	0.1334		9/6/2018	1.7182	1.4294

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.14 – Individual EGUs- Scrubgrass Generating Plant Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.3701	0.2603		5/1/2018	0.3341	0.2843
5/17/2017	0.4378	0.3345		5/2/2018	0.3469	0.2830
5/18/2017	0.3706	0.2724		5/3/2018	0.4487	0.3818
6/9/2017	0.2849	0.1782		5/4/2018	0.4580	0.3999
6/10/2017	0.1802	0.0846		5/31/2018	0.4478	0.3718
6/11/2017	0.2544	0.1569		6/1/2018	0.2448	0.2000
6/12/2017	0.2431	0.1329		6/16/2018	0.3105	0.2474
6/13/2017	0.3687	0.2583		6/17/2018	0.3369	0.2628
6/14/2017	0.4194	0.3128		6/18/2018	0.4738	0.3896
6/15/2017	0.3049	0.1973		6/29/2018	0.4998	0.4210
6/21/2017	0.0000	0.0000		6/30/2018	0.5479	0.4709
6/22/2017	0.0000	0.0000		7/1/2018	0.5606	0.4856
7/2/2017	0.2600	0.1517		7/2/2018	0.4814	0.3964
7/3/2017	0.3191	0.2222		7/3/2018	0.4893	0.4100
7/4/2017	0.2157	0.1234		7/8/2018	0.3834	0.3268
7/18/2017	0.5131	0.4123		7/9/2018	0.3629	0.2927
7/19/2017	0.3413	0.2307		7/10/2018	0.3905	0.3093
7/20/2017	0.2851	0.1788		7/15/2018	0.0000	0.0000
7/21/2017	0.4136	0.3051		7/16/2018	0.0000	0.0000
7/31/2017	0.4659	0.3489		8/9/2018	0.4063	0.3427
8/1/2017	0.6055	0.4883		8/10/2018	0.3977	0.3253
8/15/2017	0.4069	0.2930		8/26/2018	0.4780	0.4101
8/16/2017	0.4875	0.3755		8/27/2018	0.4582	0.3799
9/24/2017	0.2716	0.1564		9/5/2018	0.4807	0.4016
9/25/2017	0.3346	0.2261		9/6/2018	0.4131	0.3461

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.15 – Individual EGUs- Cambria CoGen Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.4278	0.2809
5/17/2017	0.0000	0.0000		5/2/2018	0.4287	0.2800
5/18/2017	0.0000	0.0000		5/3/2018	0.4213	0.2725
6/9/2017	0.0000	0.0000		5/4/2018	0.4383	0.2900
6/10/2017	0.0000	0.0000		5/31/2018	0.3949	0.2648
6/11/2017	0.2683	0.2351		6/1/2018	0.3701	0.2387
6/12/2017	0.4301	0.3242		6/16/2018	0.3530	0.2283
6/13/2017	0.4187	0.2829		6/17/2018	0.3003	0.1851
6/14/2017	0.4538	0.3102		6/18/2018	0.3804	0.2459
6/15/2017	0.4084	0.2697		6/29/2018	0.3689	0.2323
6/21/2017	0.3413	0.2198		6/30/2018	0.3716	0.2353
6/22/2017	0.3763	0.2497		7/1/2018	0.3696	0.2364
7/2/2017	0.3353	0.2137		7/2/2018	0.3845	0.2478
7/3/2017	0.3888	0.2661		7/3/2018	0.3926	0.2470
7/4/2017	0.3368	0.2163		7/8/2018	0.3426	0.2155
7/18/2017	0.3725	0.2436		7/9/2018	0.3520	0.2191
7/19/2017	0.4070	0.2761		7/10/2018	0.3693	0.2343
7/20/2017	0.3493	0.2328		7/15/2018	0.3745	0.2369
7/21/2017	0.3866	0.2573		7/16/2018	0.3795	0.2369
7/31/2017	0.3461	0.2206		8/9/2018	0.3685	0.2300
8/1/2017	0.3834	0.2527		8/10/2018	0.3846	0.2487
8/15/2017	0.4265	0.2726		8/26/2018	0.3178	0.2031
8/16/2017	0.4995	0.3555		8/27/2018	0.3974	0.2672
9/24/2017	0.3108	0.1889		9/5/2018	0.3942	0.2579
9/25/2017	0.3289	0.1952		9/6/2018	0.3999	0.2620

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.16 – Individual EGUs- Cambria CoGen Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.4313	0.2869
5/17/2017	0.0000	0.0000		5/2/2018	0.4252	0.2818
5/18/2017	0.0091	0.0059		5/3/2018	0.4241	0.2809
6/9/2017	0.0000	0.0000		5/4/2018	0.4420	0.3000
6/10/2017	0.0000	0.0000		5/31/2018	0.4119	0.2793
6/11/2017	0.0000	0.0000		6/1/2018	0.3890	0.2569
6/12/2017	0.0136	0.0076		6/16/2018	0.3520	0.2325
6/13/2017	0.4466	0.3149		6/17/2018	0.2673	0.1663
6/14/2017	0.4446	0.3045		6/18/2018	0.3962	0.2620
6/15/2017	0.3944	0.2601		6/29/2018	0.3856	0.2487
6/21/2017	0.3465	0.2257		6/30/2018	0.3848	0.2499
6/22/2017	0.3864	0.2596		7/1/2018	0.3882	0.2542
7/2/2017	0.3515	0.2313		7/2/2018	0.4068	0.2697
7/3/2017	0.4014	0.2792		7/3/2018	0.4130	0.2665
7/4/2017	0.3420	0.2232		7/8/2018	0.3537	0.2283
7/18/2017	0.3908	0.2608		7/9/2018	0.3707	0.2385
7/19/2017	0.4258	0.2941		7/10/2018	0.3832	0.2477
7/20/2017	0.3550	0.2396		7/15/2018	0.3852	0.2469
7/21/2017	0.4035	0.2743		7/16/2018	0.3903	0.2469
7/31/2017	0.3766	0.2506		8/9/2018	0.3799	0.2413
8/1/2017	0.3883	0.2579		8/10/2018	0.4088	0.2730
8/15/2017	0.0000	0.0000		8/26/2018	0.3212	0.2097
8/16/2017	0.0068	0.0033		8/27/2018	0.4123	0.2822
9/24/2017	0.3019	0.1847		9/5/2018	0.4132	0.2739
9/25/2017	0.3289	0.1982		9/6/2018	0.4166	0.2727

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.17 – Individual EGUs- Scrubgrass Generating Plant Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.3617	0.3240		5/1/2018	0.2946	0.2668
5/17/2017	0.6078	0.5746		5/2/2018	0.3371	0.3032
5/18/2017	0.2765	0.2456		5/3/2018	0.3941	0.3594
6/9/2017	0.1479	0.1332		5/4/2018	0.4373	0.4042
6/10/2017	0.1726	0.1402		5/31/2018	0.3563	0.3203
6/11/2017	0.1683	0.1346		6/1/2018	0.1479	0.1253
6/12/2017	0.2622	0.2272		6/16/2018	0.3211	0.2849
6/13/2017	0.2526	0.2180		6/17/2018	0.2800	0.2418
6/14/2017	0.3668	0.3329		6/18/2018	0.3348	0.2954
6/15/2017	0.3168	0.2781		6/29/2018	0.4076	0.3684
6/21/2017	0.0000	0.0000		6/30/2018	0.3697	0.3306
6/22/2017	0.0000	0.0000		7/1/2018	0.4667	0.4277
7/2/2017	0.0000	0.0000		7/2/2018	0.3309	0.2926
7/3/2017	0.1353	0.1062		7/3/2018	0.2548	0.2143
7/4/2017	0.1541	0.1183		7/8/2018	0.3434	0.3093
7/18/2017	0.4201	0.3814		7/9/2018	0.2470	0.2102
7/19/2017	0.2523	0.2162		7/10/2018	0.2302	0.1910
7/20/2017	0.2145	0.1812		7/15/2018	0.2787	0.2301
7/21/2017	0.3257	0.2907		7/16/2018	0.5480	0.5002
7/31/2017	0.4278	0.3918		8/9/2018	0.2705	0.2376
8/1/2017	0.2587	0.2233		8/10/2018	0.2718	0.2323
8/15/2017	0.4679	0.4308		8/26/2018	0.3811	0.3434
8/16/2017	0.4786	0.4418		8/27/2018	0.3630	0.3206
9/24/2017	0.3486	0.3129		9/5/2018	0.3676	0.3256
9/25/2017	0.2779	0.2450		9/6/2018	0.3534	0.3151

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.18 – Individual EGUs- Bruce Mansfield Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.2178	0.0000		5/3/2018	0.0000	0.0000
6/9/2017	0.0000	0.0000		5/4/2018	0.0000	0.0000
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	0.0000	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	0.0000	0.0000		6/16/2018	0.0000	0.0000
6/13/2017	0.0000	0.0000		6/17/2018	0.0000	0.0000
6/14/2017	0.0000	0.0000		6/18/2018	0.0000	0.0000
6/15/2017	0.0000	0.0000		6/29/2018	0.0000	0.0000
6/21/2017	0.1369	0.0000		6/30/2018	0.0000	0.0000
6/22/2017	0.0000	0.0000		7/1/2018	0.0000	0.0000
7/2/2017	0.0000	0.0000		7/2/2018	0.0000	0.0000
7/3/2017	0.3101	0.0000		7/3/2018	0.5222	0.4218
7/4/2017	0.0000	0.0000		7/8/2018	4.0430	3.6916
7/18/2017	0.0000	0.0000		7/9/2018	1.3942	1.2863
7/19/2017	0.7649	0.0000		7/10/2018	0.0000	0.0000
7/20/2017	1.9898	1.1457		7/15/2018	0.0000	0.0000
7/21/2017	1.0074	0.7110		7/16/2018	0.0000	0.0000
7/31/2017	0.0000	0.0000		8/9/2018	0.0000	0.0000
8/1/2017	0.0000	0.0000		8/10/2018	0.0000	0.0000
8/15/2017	0.0000	0.0000		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0000	0.0000
9/24/2017	0.0000	0.0000		9/5/2018	0.0000	0.0000
9/25/2017	0.0000	0.0000		9/6/2018	0.0000	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.19 – Individual EGUs- Bruce Mansfield Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.3507	0.0000		5/3/2018	0.0000	0.0000
6/9/2017	0.4741	0.0000		5/4/2018	0.0000	0.0000
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	0.2582	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	0.8938	0.2170		6/16/2018	0.0000	0.0000
6/13/2017	0.0000	0.0000		6/17/2018	0.0000	0.0000
6/14/2017	0.0000	0.0000		6/18/2018	0.0000	0.0000
6/15/2017	0.0000	0.0000		6/29/2018	0.0000	0.0000
6/21/2017	0.1865	0.0000		6/30/2018	0.0000	0.0000
6/22/2017	0.0000	0.0000		7/1/2018	0.0000	0.0000
7/2/2017	0.0000	0.0000		7/2/2018	0.0000	0.0000
7/3/2017	0.0000	0.0000		7/3/2018	0.0000	0.0000
7/4/2017	0.0000	0.0000		7/8/2018	0.0000	0.0000
7/18/2017	0.0000	0.0000		7/9/2018	0.0000	0.0000
7/19/2017	0.0000	0.0000		7/10/2018	0.0000	0.0000
7/20/2017	0.0000	0.0000		7/15/2018	0.0000	0.0000
7/21/2017	0.0000	0.0000		7/16/2018	0.0000	0.0000
7/31/2017	0.0000	0.0000		8/9/2018	0.0000	0.0000
8/1/2017	0.0000	0.0000		8/10/2018	0.0000	0.0000
8/15/2017	0.1121	0.0000		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0000	0.0000
9/24/2017	0.0000	0.0000		9/5/2018	0.0000	0.0000
9/25/2017	0.0000	0.0000		9/6/2018	1.9248	1.7428

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.20 – Individual EGUs- Panther Creek Energy Unit 2

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.0000	0.0000		5/3/2018	0.0000	0.0000
6/9/2017	0.0000	0.0000		5/4/2018	0.0000	0.0000
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	0.0000	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	0.0378	0.0000		6/16/2018	0.0000	0.0000
6/13/2017	0.0752	0.0102		6/17/2018	0.0000	0.0000
6/14/2017	0.0000	0.0000		6/18/2018	0.0000	0.0000
6/15/2017	0.0000	0.0000		6/29/2018	0.0000	0.0000
6/21/2017	0.0000	0.0000		6/30/2018	0.0510	0.0000
6/22/2017	0.0000	0.0000		7/1/2018	0.0962	0.0172
7/2/2017	0.0000	0.0000		7/2/2018	0.0855	0.0090
7/3/2017	0.0000	0.0000		7/3/2018	0.0499	0.0000
7/4/2017	0.0000	0.0000		7/8/2018	0.0000	0.0000
7/18/2017	0.0221	0.0000		7/9/2018	0.0000	0.0000
7/19/2017	0.0591	0.0000		7/10/2018	0.0000	0.0000
7/20/2017	0.0853	0.0089		7/15/2018	0.0000	0.0000
7/21/2017	0.0502	0.0000		7/16/2018	0.0000	0.0000
7/31/2017	0.0000	0.0000		8/9/2018	0.0000	0.0000
8/1/2017	0.0000	0.0000		8/10/2018	0.0000	0.0000
8/15/2017	0.0000	0.0000		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0000	0.0000
9/24/2017	0.0674	0.0000		9/5/2018	0.0000	0.0000
9/25/2017	0.0636	0.0000		9/6/2018	0.0000	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Summary of the Excess Emissions* Allowed Under Current Pennsylvania Rules on the Day Before and the Day of Ozone Exceedance Days in Maryland in 2017 and 2018

Table 3B.21 – Individual EGUs- Panther Creek Energy Unit 1

2017				2018		
Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate		Date	Excess Daily NOx Tons** High End Estimate	Excess Daily NOx Tons** Low End Estimate
5/16/2017	0.0000	0.0000		5/1/2018	0.0000	0.0000
5/17/2017	0.0000	0.0000		5/2/2018	0.0000	0.0000
5/18/2017	0.0000	0.0000		5/3/2018	0.0000	0.0000
6/9/2017	0.0000	0.0000		5/4/2018	0.0000	0.0000
6/10/2017	0.0000	0.0000		5/31/2018	0.0000	0.0000
6/11/2017	0.0000	0.0000		6/1/2018	0.0000	0.0000
6/12/2017	0.0312	0.0000		6/16/2018	0.0000	0.0000
6/13/2017	0.0407	0.0000		6/17/2018	0.0000	0.0000
6/14/2017	0.0000	0.0000		6/18/2018	0.0000	0.0000
6/15/2017	0.0000	0.0000		6/29/2018	0.0252	0.0193
6/21/2017	0.0000	0.0000		6/30/2018	0.0000	0.0000
6/22/2017	0.0000	0.0000		7/1/2018	0.0000	0.0000
7/2/2017	0.0000	0.0000		7/2/2018	0.0000	0.0000
7/3/2017	0.0000	0.0000		7/3/2018	0.0765	0.0269
7/4/2017	0.0000	0.0000		7/8/2018	0.0000	0.0000
7/18/2017	0.0000	0.0000		7/9/2018	0.0000	0.0000
7/19/2017	0.0308	0.0000		7/10/2018	0.0000	0.0000
7/20/2017	0.0290	0.0000		7/15/2018	0.0000	0.0000
7/21/2017	0.0236	0.0000		7/16/2018	0.0000	0.0000
7/31/2017	0.0000	0.0000		8/9/2018	0.0000	0.0000
8/1/2017	0.0000	0.0000		8/10/2018	0.0000	0.0000
8/15/2017	0.0000	0.0000		8/26/2018	0.0000	0.0000
8/16/2017	0.0000	0.0000		8/27/2018	0.0000	0.0000
9/24/2017	0.0268	0.0000		9/5/2018	0.0000	0.0000
9/25/2017	0.0382	0.0000		9/6/2018	0.0000	0.0000

Ozone exceedance days highlighted with red background
Day before an ozone exceedance day highlighted with yellow background

* To put these numbers into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all OTC states.
** The high end estimate was based upon the best (lowest) ozone season rate calculated using CAMD data for each coal-fired EGU in Pennsylvania. If the best rate for any individual day were to be used, estimated reductions would be even larger. The low end estimate was based upon the highest (least restrictive) 30-day rolling average rate using CAMD data for each coal-fired EGU in Pennsylvania in the year that had the best (lowest) full ozone season rate.

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Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Table 4A – Maximum Ozone Reductions in OTC Jurisdictions South of Massachusetts

State	Maximum Ozone Benefit (ppb)
PA	10.7
MD	7.0
NJ	5.8
DC	4.5
NY	4.2
VA	4.0
DE	3.2
CT	2.1
RI	1.2

Table 4A represents the maximum daily reduction in ozone concentrations had PA coal fired EGUs with SCR or SNCR optimized running their controls. Maryland would have experienced a decrease in ozone concentration of 7 ppb. This was only second to PA which would have experienced a decrease in ozone of over 10 ppb.”

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Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Table 4B – Maximum Ozone Reductions at Key Ozone Monitors in the OTC

Monitor, State	AQS #	Maximum Ozone Benefit (ppb)
Greenwich Point Park, CT	90010017	2.1
Fairfield, CT	90013007	1.9
Sherwood Island Connector, CT	90019003	2.1
Hammonasset State Park, CT	90099002	1.5
Fair Hill, MD	240150003	3.5
Edgewood, MD	240251001	2.6
PG Equestrian Center, MD	240338003	4.9
Ancora State Hospital, NJ	340071001	2.5
Clarksboro, NJ	340150002	2.6
Susan Wagner HS, NY	360850067	4.5
Babylon, NY	361030002	2.4
Bucks County, PA	420170012	3.8
Northeast Airport, PA	421010024	3.6
Aurora Hills Visitors Center, VA	510130020	4.5

Table 4B lists several key OTR ozone monitors with each monitors corresponding maximum ozone benefit had PA coal fired EGUs with SCR or SNCR optimized running their controls during the summer ozone season. The Maryland PG Equestrian monitor had a predicted ozone reduction of 4.9 ppb. The Susan Wagner HS, NY and Aurora Hills Visitors Center, VA both had a predicted ozone reduction of 4.5 ppb.

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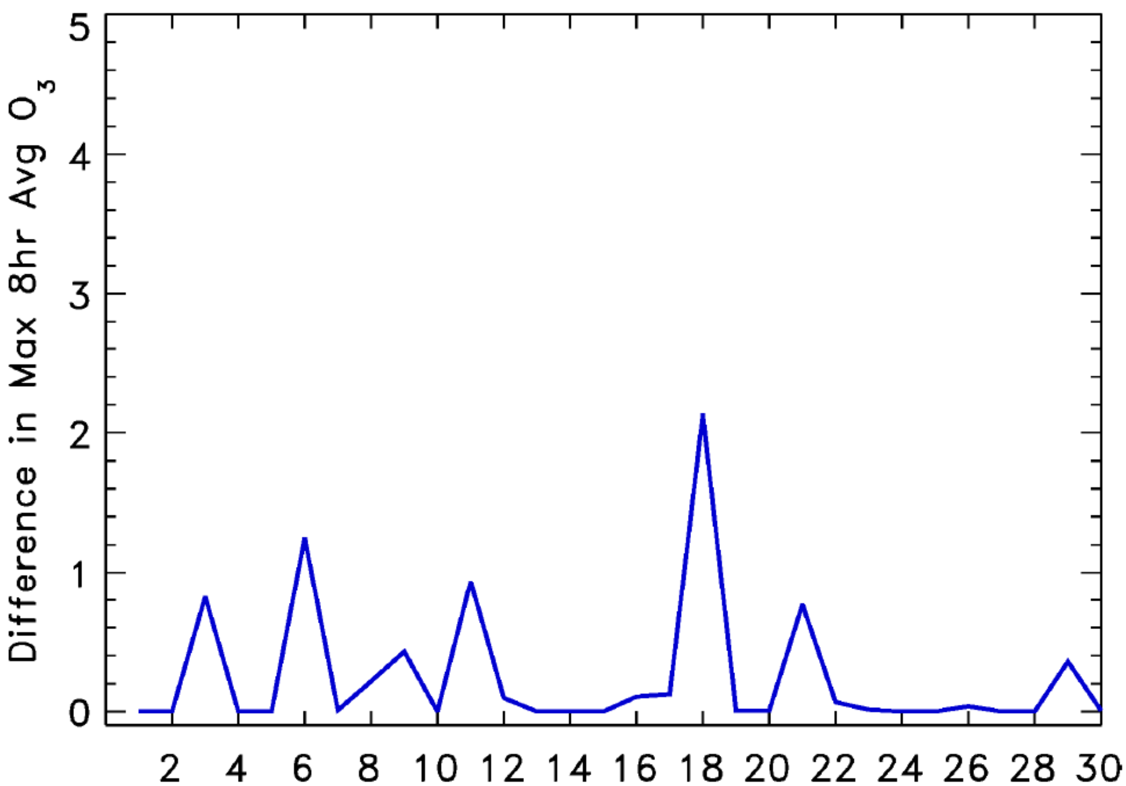
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.1 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Greenwich Point Park, CT (#90010017)



July 2011 Meteorology

Greenwich Point Park, CT (#90010017) Difference in Maximum 8-Hour Average Ozone

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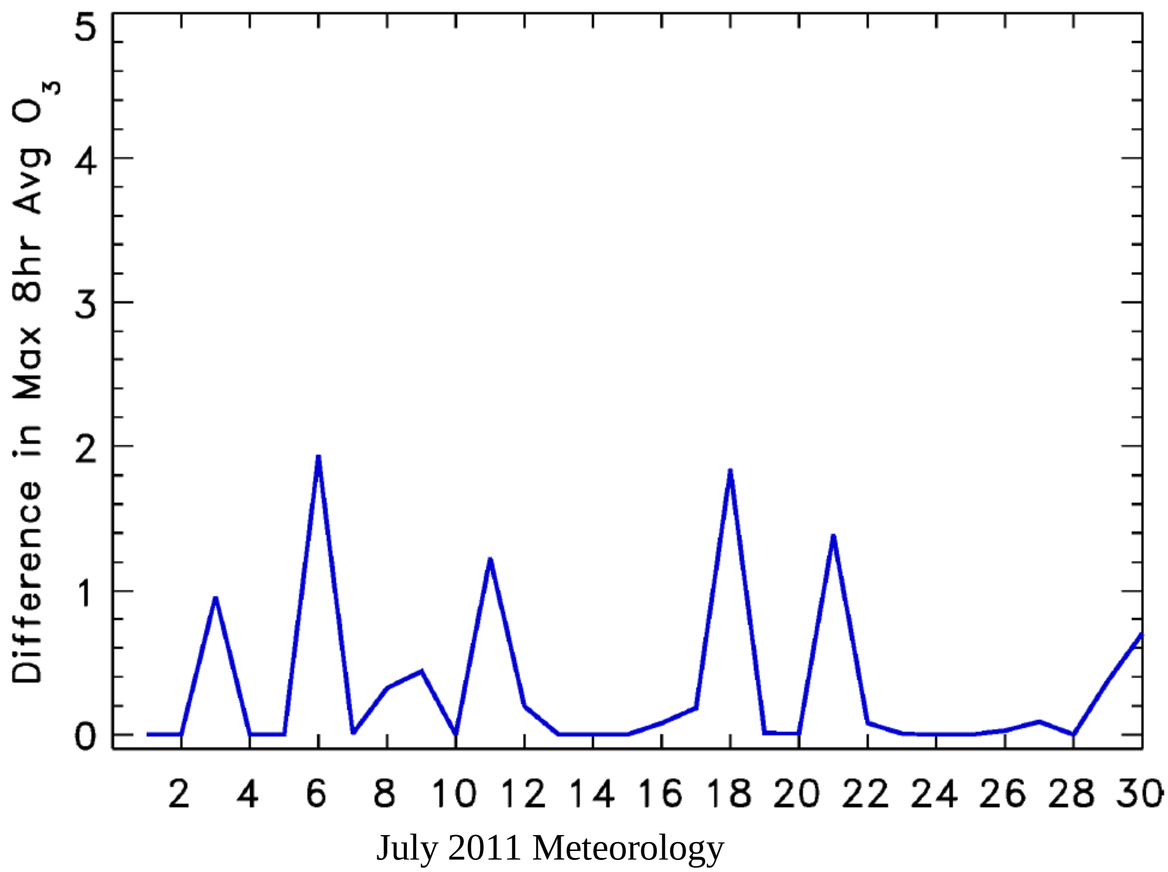
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

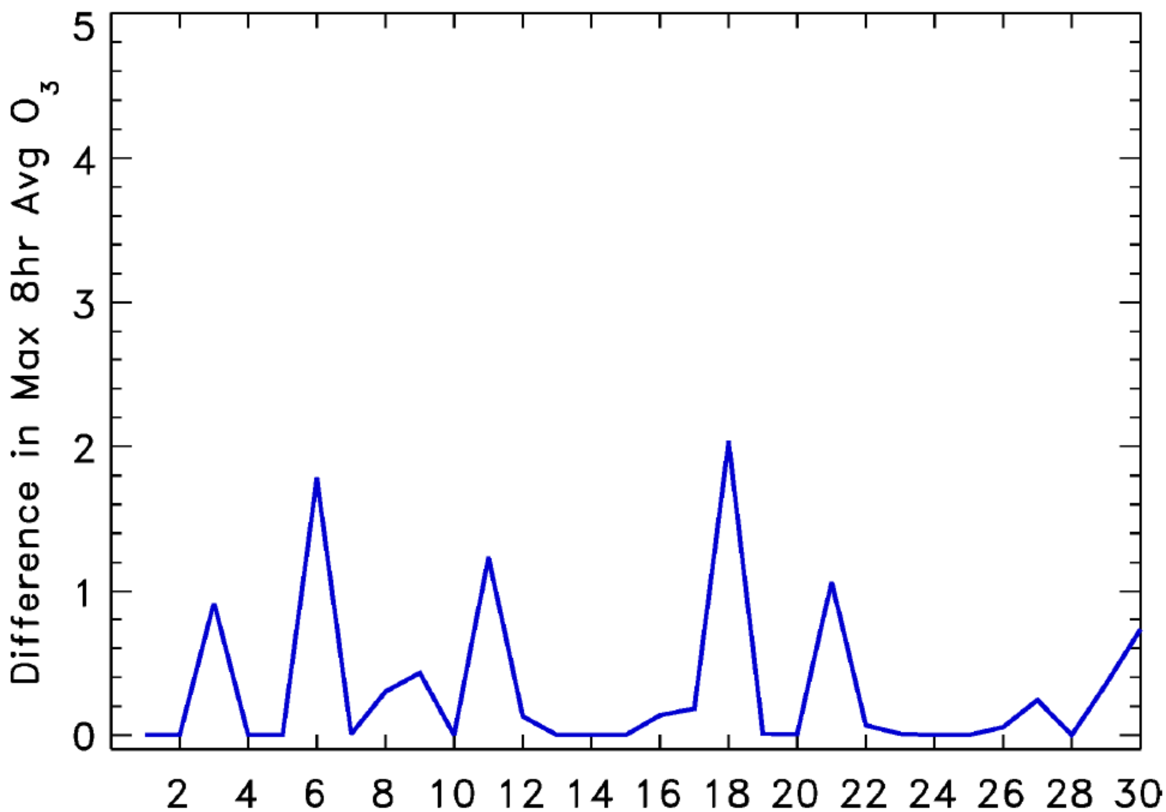
Figure 4C.2 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Fairfield, CT (#90013007)



Fairfield, CT (#90013007) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

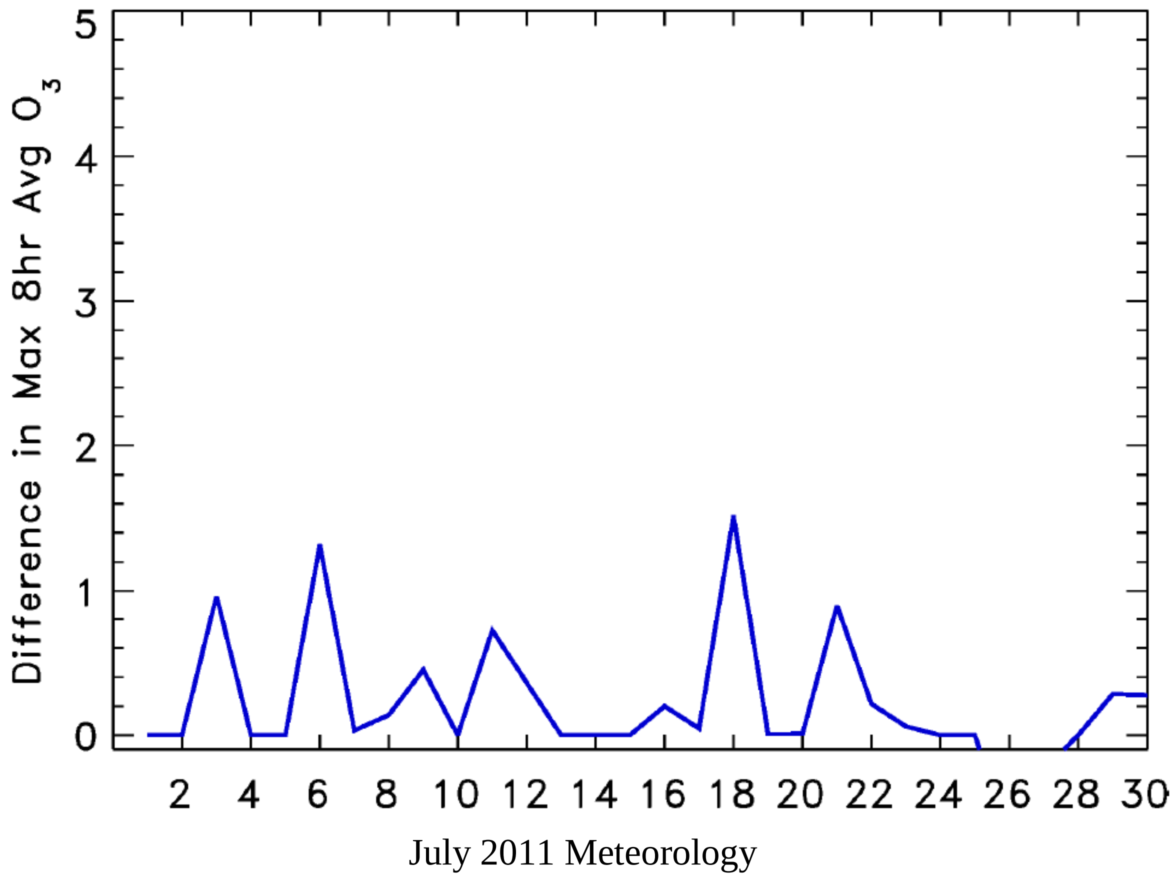
Figure 4C.3 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Sherwood Island Connector, CT (#90019003)



Sherwood Island Connector, CT (#90019003) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.4 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Hammonasset State Park, CT (#90099002)



Hammonasset State Park, CT (#90099002) Difference in Maximum 8-Hour Average Ozone

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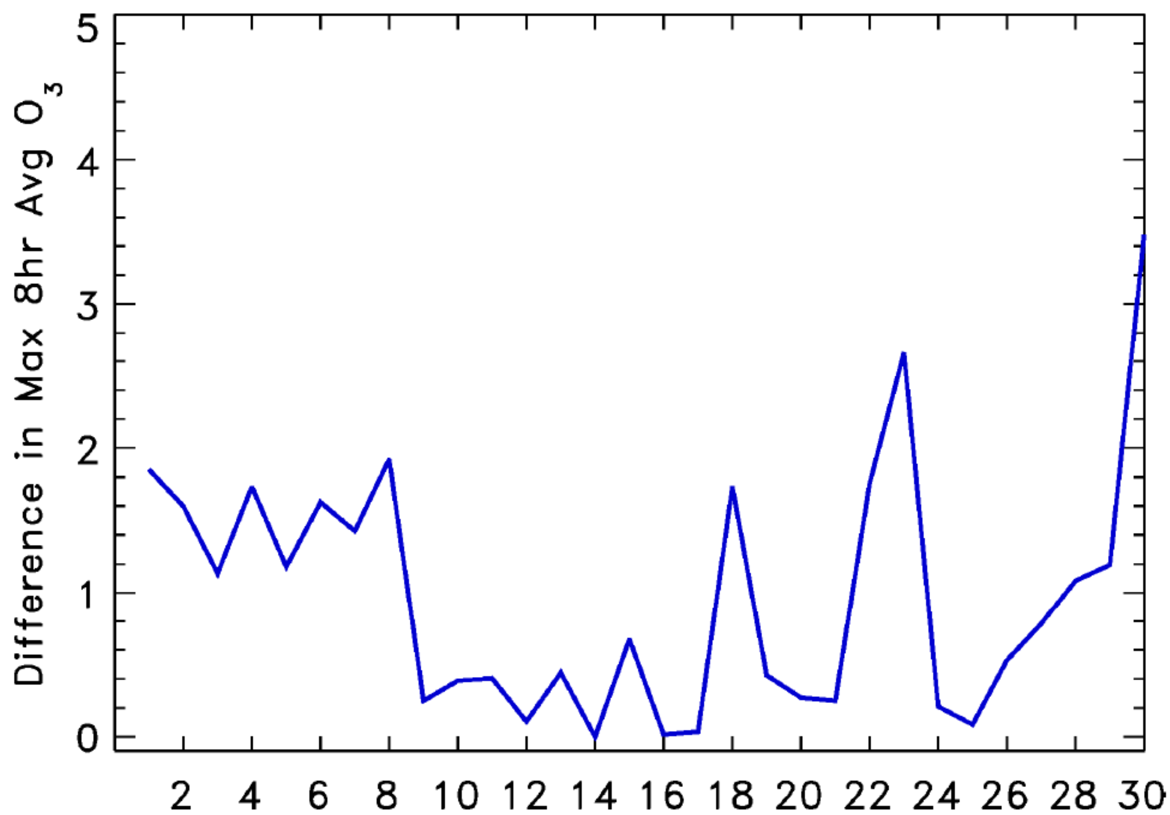
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.5 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Fairhill, MD (#240150003)

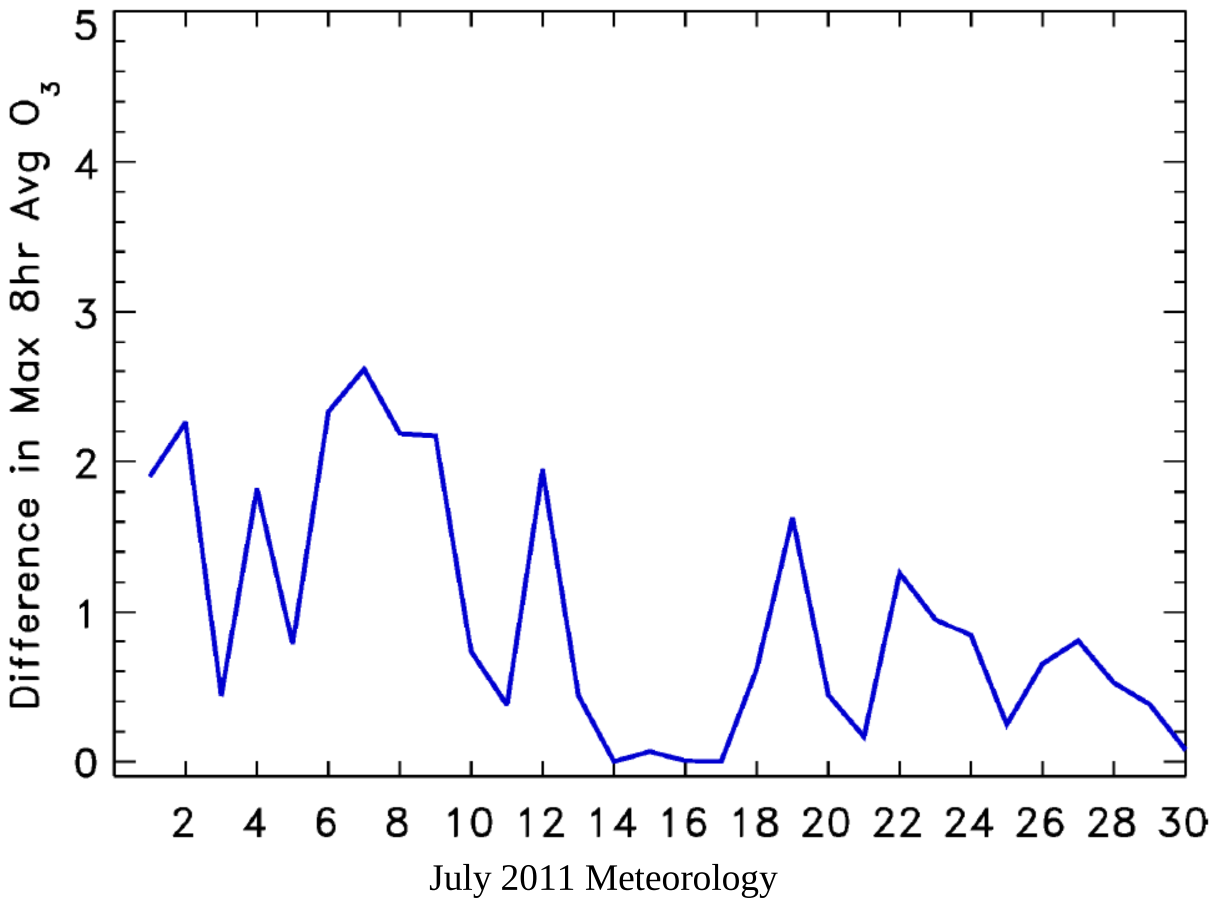


July 2011 Meteorology

Fairhill, MD (#240150003) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.6 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Edgewood, MD (#240251001)



Edgewood, MD (#240251001) Difference in Maximum 8-Hour Average Ozone

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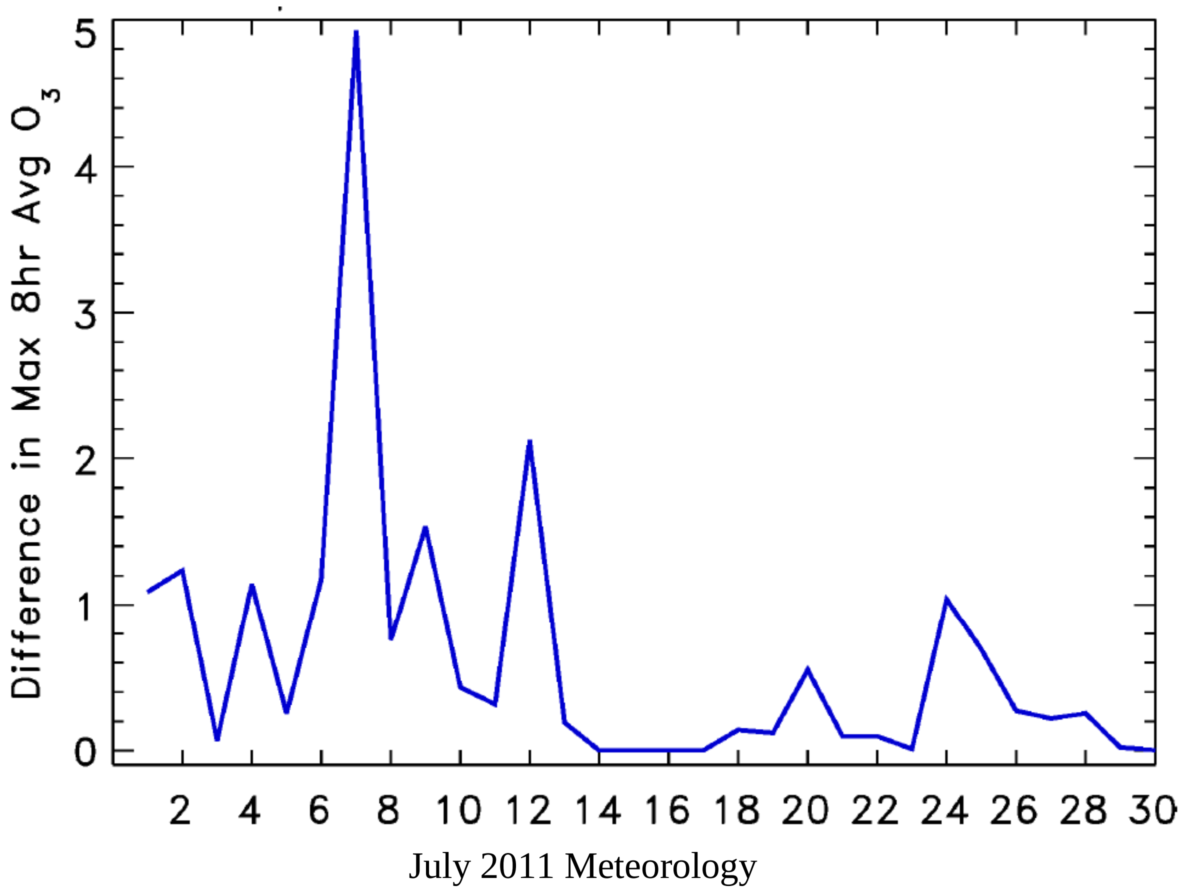
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

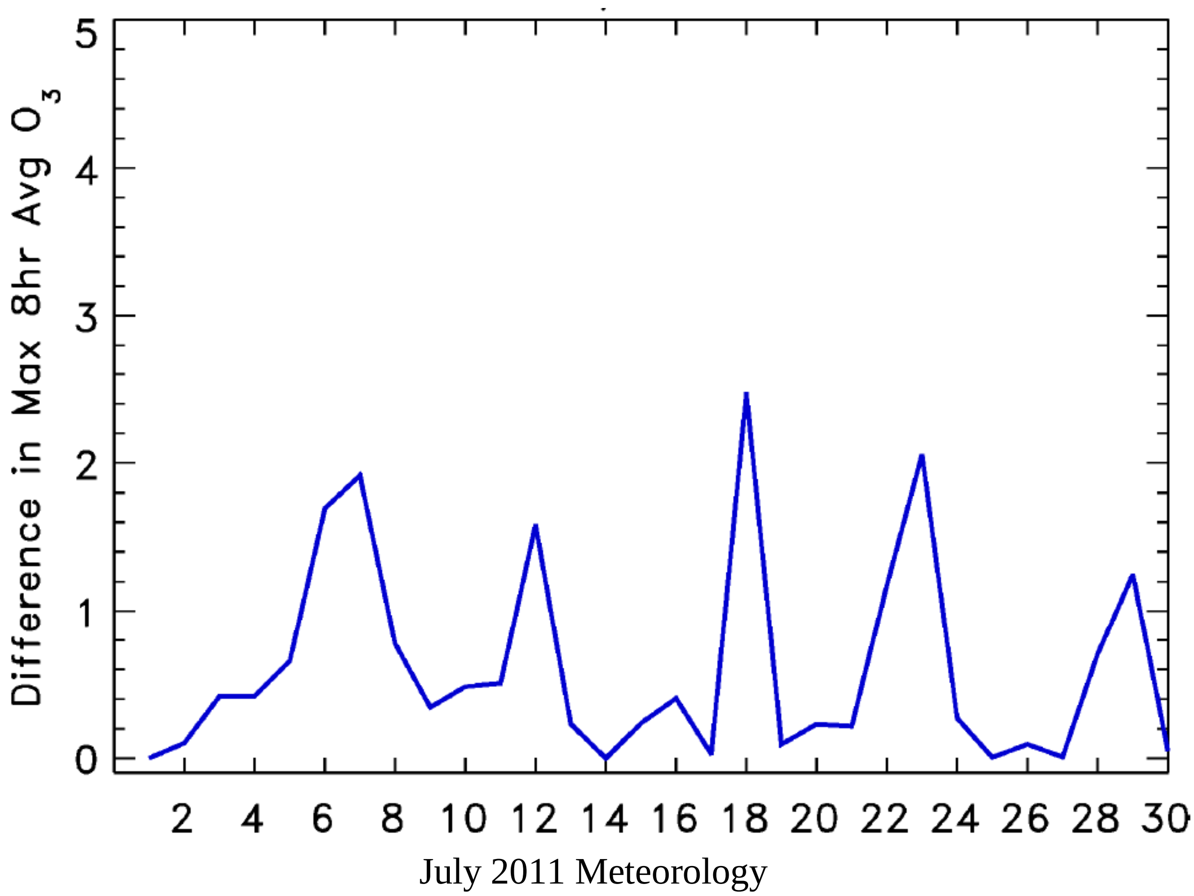
Figure 4C.7 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - PG Equestrian Center, MD (#240338003)



PG Equestrian Center, MD (#240338003) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.8 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Ancora State Hospital, NJ (#340071001)



Ancora State Hospital, NJ (#340071001) Difference in Maximum 8-Hour Average Ozone

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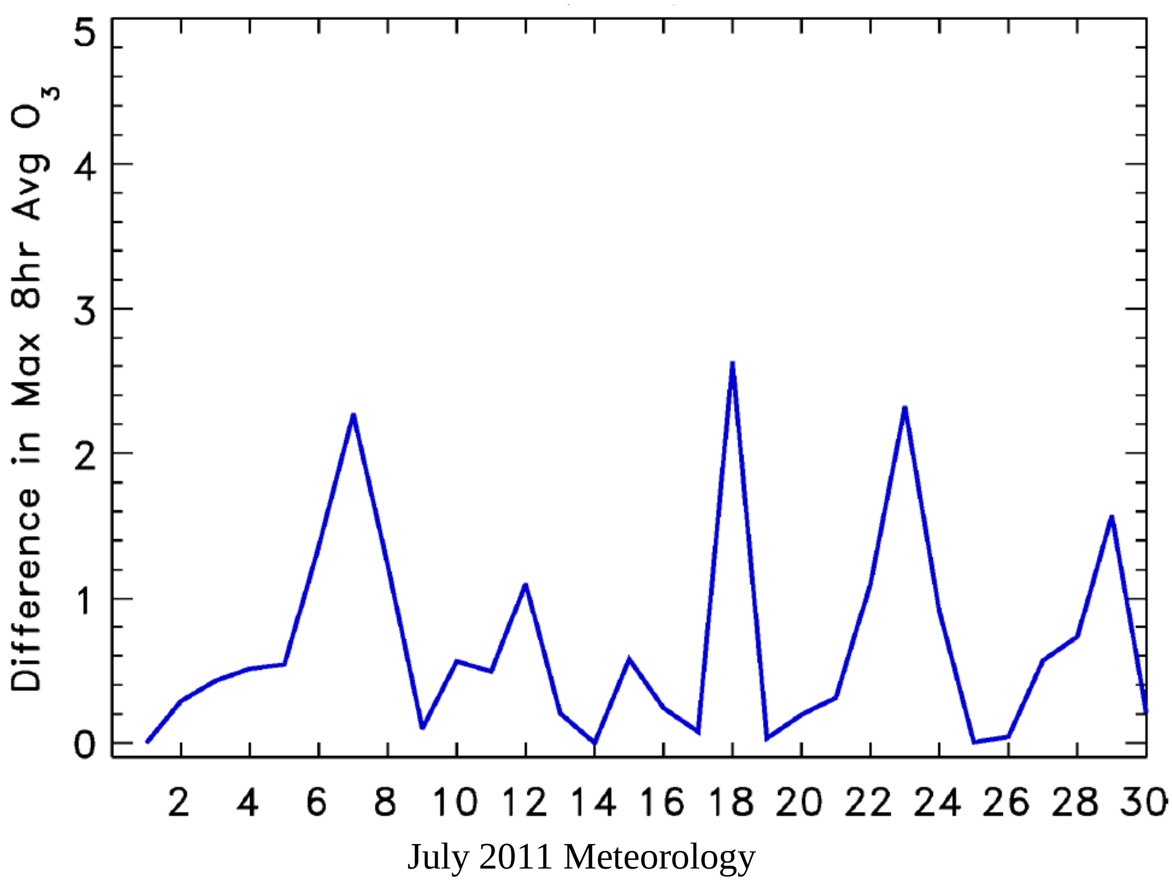
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

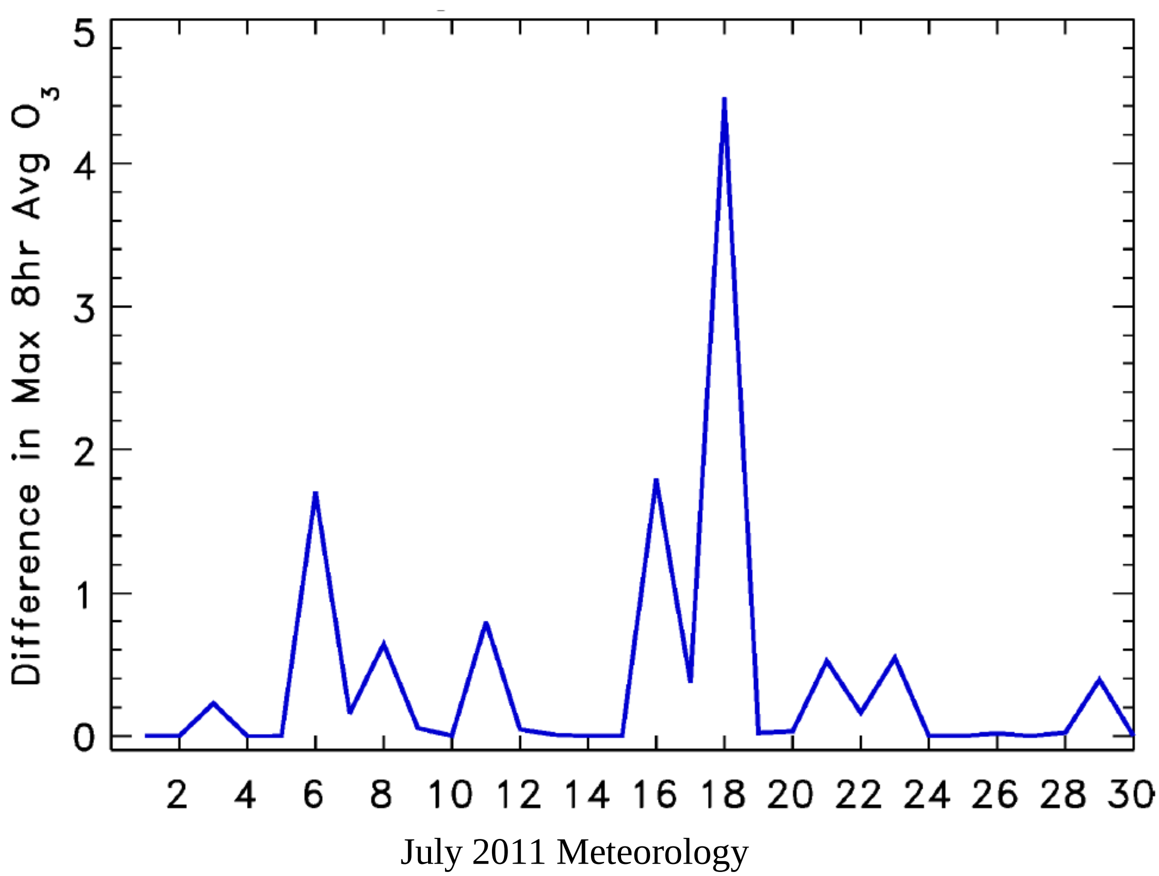
Figure 4C.9 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Clarksboro, NJ (#340150002)



Clarksboro, NJ (#340150002) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

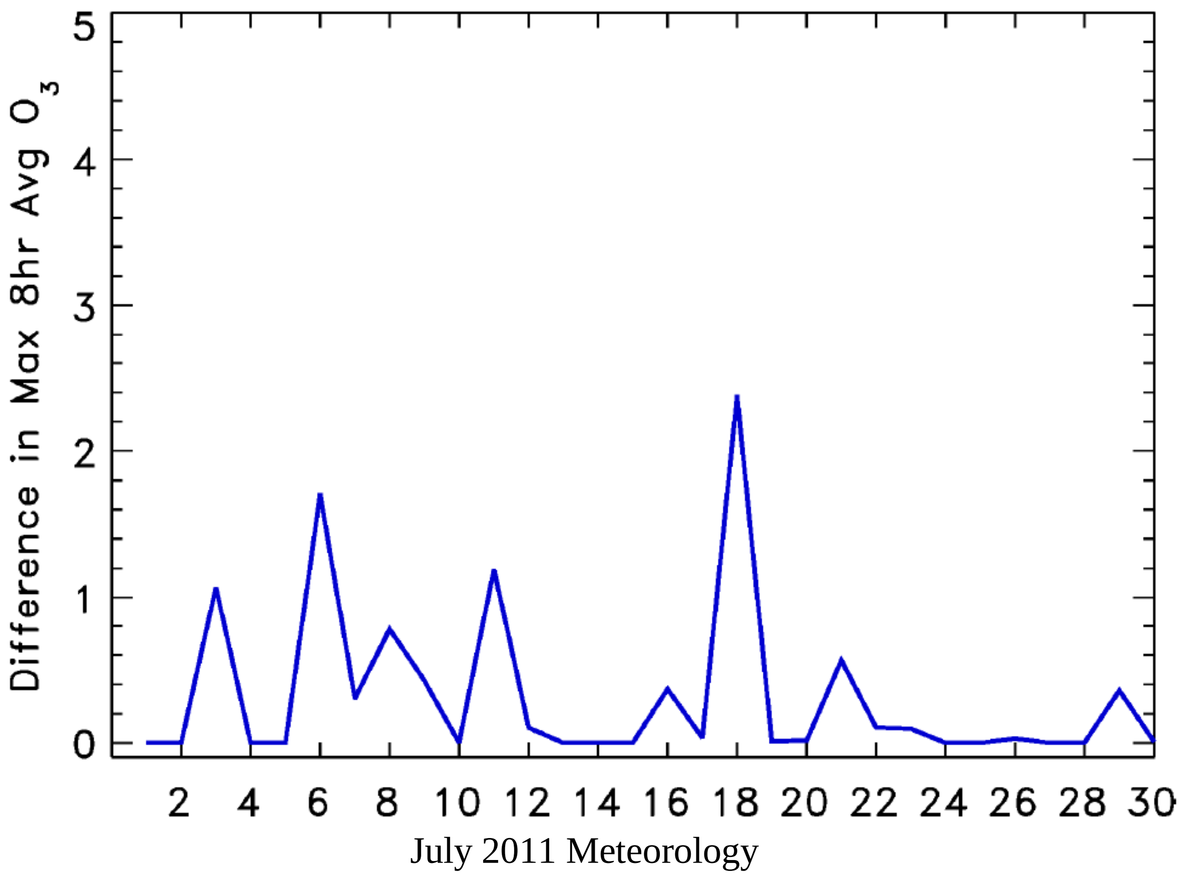
Figure 4C.10 – Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Susan Wagner High School, NY (#360850067)



Susan Wagner High School, NY (#360850067) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.11 – Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Babylon, NY (#361030002)



Babylon, NY (#361030002) Difference in Maximum 8-Hour Average Ozone

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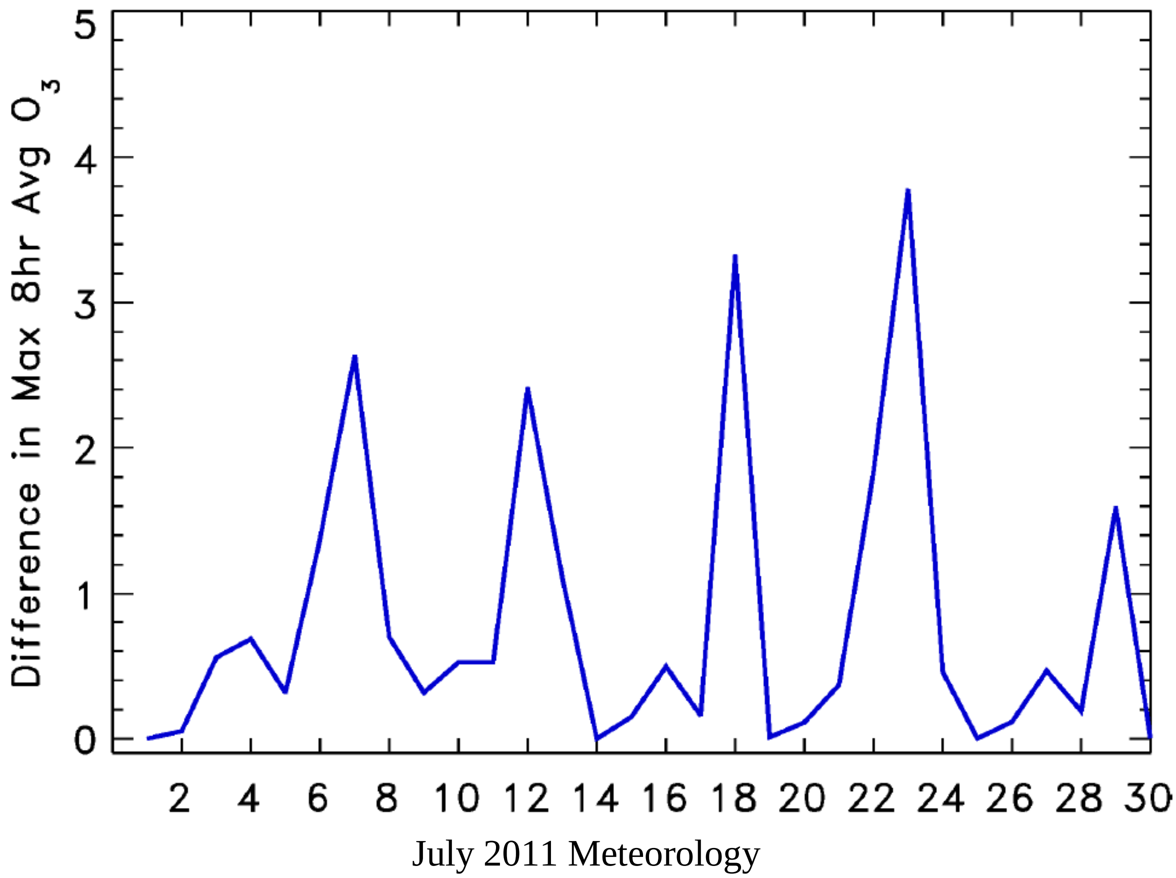
Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.12 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Bucks County, PA (#420170012)

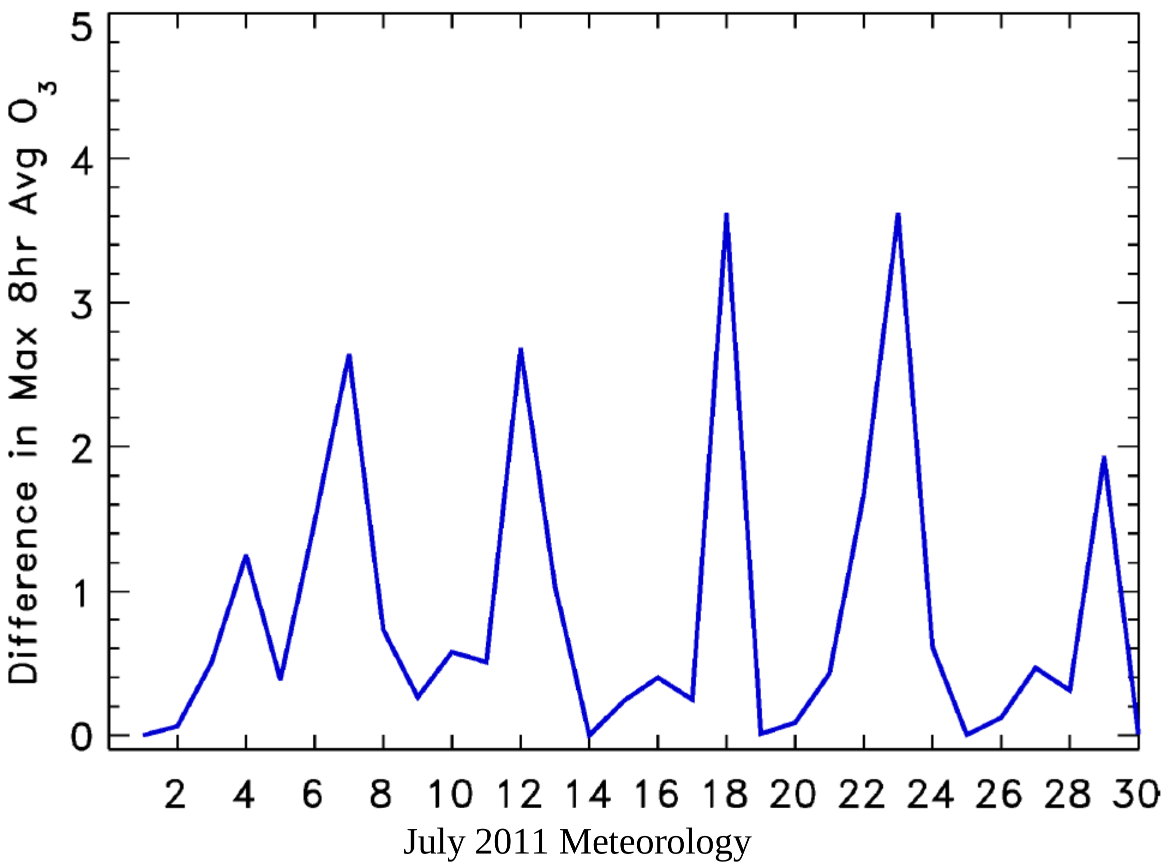


Bucks County, PA (#420170012) Difference in Maximum 8-Hour Average Ozone

ATTACHMENT 4

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

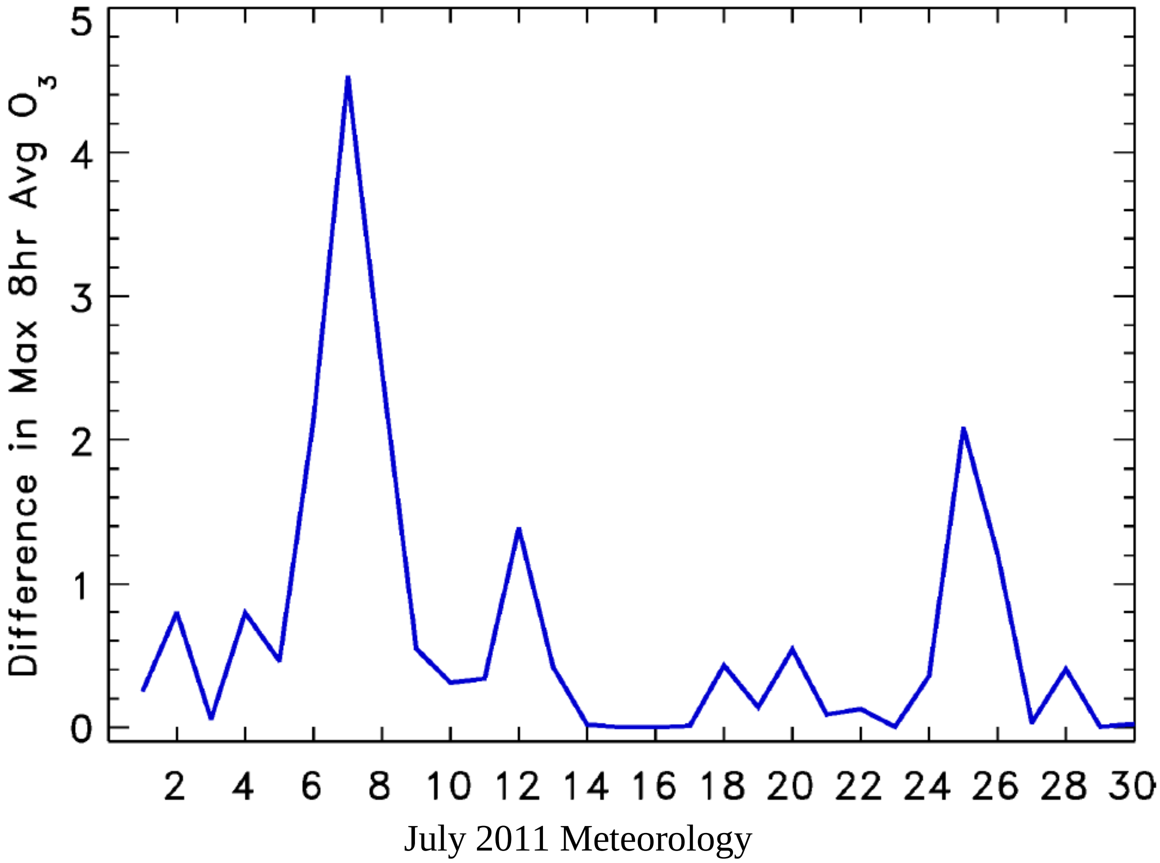
Figure 4C.13 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Northeast Airport, PA (#421010024)



Northeast Airport, PA (#421010024) Difference in Maximum 8-Hour Average Ozone

Maximum Modeled Ozone Benefits if Pennsylvania Coal-Fired EGUs Optimize Existing Control Technologies Every Day of the Ozone Season

Figure 4C.14 –Maximum Daily Ozone Reductions at Key Ozone Monitors in the OTC for the One Month Modeling Period - Aurora Hills Visitors Center, VA (#510130020)



Aurora Hills Visitors Center, VA (#510130020) Difference in Maximum 8-Hour Average Ozone

ATTACHMENT 5

Initial Straw-Man Draft of the Recommendation that Maryland is Petitioning the OTC to Develop

Beginning on May 1, 2020, for each operating day during the ozone season, the owner or operator of a coal-fired electric generating unit in Pennsylvania shall minimize NO_x emissions by operating and optimizing the use of all installed pollution control technology and combustion controls consistent with the technological limitations, manufacturers' specifications, good engineering and maintenance practices, and good air pollution control practices for minimizing emissions (as defined in 40 C.F.R. § 60.11(d)) for such equipment and the unit at all times the unit is in operation while burning any coal.

To ensure that this requirement is met, each unit must meet the 24-hour limit and the 30-day rolling average limit identified in Table 5.1.

Table 5.1 – Daily and 30-Day Rolling Average Limits to Compliment the Optimization Requirement

Facility - Unit	Maximum 24-Hour (Block) NOx Emission Limit (lbs/mmBtu)	Maximum 30-Day Rolling Average NOx Emission Limit (lbs/mmBtu)
Bruce Mansfield - 1	0.12	0.0887
Bruce Mansfield - 2	0.12	0.0862
Bruce Mansfield - 3	0.12	0.0858
Cambria Cogen - 1	0.16	0.1150
Cambria Cogen - 2	0.16	0.1153
Cheswick – 1	0.12	0.0970
Conemaugh - 1	0.12	0.0800
Conemaugh - 2	0.12	0.0876
Homer City - 1	0.12	0.0722
Homer City - 2	0.12	0.0930
Homer City - 3	0.12	0.1049
Keystone - 1	0.12	0.0479
Keystone - 2	0.12	0.0459
Montour - 1	0.12	0.0995
Montour - 2	0.12	0.0876
Panther Creek Energy Facility - 1	0.16	0.1162
Panther Creek Energy Facility - 2	0.16	0.1162
Scrubgrass Generating Plant - 1	0.16	0.0692
Scrubgrass Generating Plant - 2	0.16	0.0856
Seward - 1	0.16	0.0878
Seward - 2	0.16	0.0880

ATTACHMENT 6

Additional Technical Support

Overview

This attachment provides additional technical analyses used to support the petition. Part 1 includes a summary of the technical analyses for emissions, rates, and emission reduction estimates. Part 2 provides technical information on the photochemical modeling.

Part 1 – NO_x Emission Reductions Achieved Through Optimization of PA Coal-Fired EGUs with Post Combustion NO_x Controls

1.1 Purpose

The Maryland Department of the Environment (MDE) has developed a methodology to analyze the optimization of Selective Catalytic Reduction (SCR) and Selective non-Catalytic Reduction (SNCR) controls at coal-fired electric generating units (EGUs). Maryland has used this methodology to analyze unit-level NO_x emissions from Pennsylvania coal-fired power plants and applied the results to the 2017 and 2018 ozone seasons.

Despite significant progress in reducing long term average nitrogen oxides (NO_x) emissions from coal-fired EGUs, Pennsylvania rules still allow excess emissions on a daily basis. The ozone national ambient air quality standard (NAAQS) is set to address short-term (8-hour) exposures and an air quality monitor's design value—the calculation controlling whether an area is in attainment—is based on the fourth-highest daily eight-hour concentration in an ozone season, averaged over three consecutive years. Therefore, reducing excess emissions on a daily basis is critical to attaining and maintaining the ozone NAAQS.

Tables 4-7 are a summary of the excess emissions allowed under the current Pennsylvania rules on the day before and the day of an ozone exceedance day in Maryland (days where measured levels are above the standard) in 2017 and 2018. As shown in Tables 4-7, on many summer days, excess nitrogen oxides (NO_x) emissions, up to 47 tons[1], are released by coal-fired EGUs in Pennsylvania. These emissions would not be released if the EGU operators ran existing control technology consistent with manufacturers' specifications and past practices.

This attachment provides the methodology used in selecting units, determining achievable NO_x emission rates and ascertaining excess daily emissions from Pennsylvania coal-fired EGUs during ozone exceedance episodes in Maryland during the 2017 and 2018 ozone seasons. Continuous emission monitoring data for NOx emissions for 2017-2018 from the EPA's Clean Air Markets Division (CAMD) is used in analysis. Information on Maryland's ozone exceedance days are from MDE's Air Quality Monitoring Program.

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[1] *To put this number into context, the fixes to the aftermarket catalyst program that OTC has been asking for EPA to make would result in approximately 25 tons per day of additional NOx reductions across all 13 OTC states.*

ATTACHMENT 6

1.2 Methodology for Selection of Units and Data

MDE focused on coal-fired units with post-combustion controls after a thorough examination of CAMD[2] data revealed that the NO_x emission rates reported by EGUs of this type deviated significantly from ozone season to ozone season.

MDE assessed SCR/SNCR control optimization for a specific year by comparing ozone season data for that year to a series of rates reflecting various levels of optimization for each unit. These optimized rates are derived from the unit's 2005-2018 ozone season data (adjusted if controls were installed in 2005 or after), available in the U.S. EPA's Air Market Programs Database (AMPD)[3]. For initial screening, the lowest overall ozone season average emission rate was selected for each unit. If the unit installed a SCR or SNCR in 2005 or a later year, the data collection period was narrowed to the first ozone season in the year following the installation to 2018.

1.3 Methodology for Best Emission Rates Selection

Review of the ozone season NO_x emission rates from the AMPD achieved by the selected EGUs from 2005 to 2018 was conducted to select best overall ozone season average emission rate. The selected rates are in the table below.

A "Calculated NO_x Emission Rate" was derived from the CAMD reported NO_x mass and heat input. This calculated NO_x emission rate adjusts and aligns the reported NO_x mass and heat input to the NO_x rate over the entire ozone season.

MDE used this "Calculated NO_x Emission Rate" as the "Best Rate" or "Desired Rate" in the analysis[4] to determine excess emissions from the selected Pennsylvania EGUs on the basis of a best NO_x emission rate. Two spreadsheets entitled "PA Coal Fired Units 184C Best Rates (Final).xls" detailing the emission reductions are available as separate attachments.

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[2] https://www.epa.gov/airmarkets
[3] https://ampd.epa.gov/amp
[4] Spreadsheet titled "PA Coal Fired Units 184C Best Rates (Final).xls"

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Table 1: Best Overall Ozone Season NO_x Rates

PA Coal-Fired Electric Generating Units Best NO_x Rates					
Facility / Unit	Best Ozone Season NOx Emission Rate (Year)	Best Ozone Season Reported NOx Emission Rate (lb/MMBtu)	Best Ozone Season Reported NOx Mass (tons)	Best Ozone Season Reported Heat Input (MMBtu)	Best Ozone Season Calculated NOx Emission Rate (lb/MMBtu)
Bruce Mansfield – 1	2017	0.0723	439.83	13541413	0.0650
Bruce Mansfield – 2	2007	0.0801	1051.41	26994695	0.0779
Bruce Mansfield - 3	2005	0.0744	948.40	25929504	0.0732
Cambria Cogen - 1	2005	0.0945	97.94	2073860	0.0945
Cambria Cogen - 2	2006	0.0949	98.82	2081212	0.0950
Cheswick – 1	2006	0.0901	370.31	9320529	0.0795
Conemaugh - 1	2018	0.0726	821.50	23118507	0.0711
Conemaugh - 2	2018	0.0629	857.65	27862491	0.0616
Homer City – 1	2018	0.0667	651.00	19792060	0.0658
Homer City – 2	2006	0.0826	642.26	17021477	0.0755
Homer City – 3	2006	0.0872	713.68	17136300	0.0833
Keystone – 1	2005	0.0442	601.33	28087735	0.0428
Keystone – 2	2005	0.0433	604.75	28579775	0.0423
Montour – 1	2008	0.0581	554.94	19891173	0.0558
Montour – 2	2006	0.0578	565.19	20449998	0.0553
Panther Creek Energy Facility - 1	2006	0.1051	76.83	1453416	0.1057
Panther Creek Energy Facility - 2	2005	0.1056	80.82	1504674	0.1074
Scrubgrass Generating Plant - 1	2015	0.0573	61.90	2168422	0.0571
Scrubgrass Generating Plant - 2	2005	0.0793	87.60	2224447	0.0788
Seward – 1	2005	0.0747	257.92	6497711	0.0794
Seward – 2	2014	0.0745	224.83	5712805	0.0787

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1.4 Methodology for Development of Maximum 30-day Rolling Average Rate

NO_x emissions data on all coal-fired units in Pennsylvania was first downloaded from CAMD for each individual unit on each day of the unit's best ozone season. The downloaded data comes in combined form with all units in one large table format. The data is separated for each year, individual unit and ozone season day.

Previously MDE investigated options for determining what NO_x rates would be acceptable for a well-controlled unit equipped with SCR or SNCR post-combustion controls. Previous analyses of upwind states (IL, IN, KY, MD, MI, NC, OH, PA, TN, VA and WV) for determining well-controlled NO_x rates focused on unit-level single ozone season average emission rates. This data (from CAMD) was analyzed from 2005-2015 (or for one ozone season after the control was installed if the control was installed after 2005); the lowest ozone season average emission rate was selected, per unit, from that dataset. This value was used in two data packages (dated 5/13/2014 and 9/18/2014) to show the potential reductions in NO_x mass if the units with SCR or SNCR had optimized their post-combustion controls to the lowest reported ozone season average emission rate. This potential NO_x savings was also modeled using the identified lowest ozone season average emission rate by the University of Maryland using two photochemical model platforms – the 2007/2018 MARAMA 7C platform with ERTAC EGU and the 2011/2018 EPA platform with IPM. For these analyses the lowest ozone season average NO_x emission rate was considered representative of a well-controlled unit.

There has been a recent effort to update the dataset and well controlled units best reported emission rates due to internal discussion, feedback from upwind states and as part of the shift to the new photochemical modeling platform MARAMA Alpha 2 2011/2018 with ERTAC EGU.

MDE investigated longer term 30-day rolling average plans as representative of a well-controlled unit, and that information has also been folded into this updated dataset.

1. From the identified lowest ozone season year (as reported to CAMD 2005-2018, or for one ozone season after the control was installed if the control was installed after 2005), daily ozone season NO_x values (rate, mass and heat input) were downloaded
2. Daily adjusted NO_x rates were calculated using the NO_x mass and heat input reported to CAMD. These daily adjusted NO_x rates were utilized to true-up the reported daily NOx mass and daily heat input to the NO_x rate and are referred to as the "Calculated Rate".
3. A series of 30-day rolling averages was calculated, spanning that identified ozone season, beginning on the 30th day of operation during ozone season. 30-day rolling averages were calculated by summing the total tons of NO_x emitted for that day and the previous 29 days and dividing by the sum of the heat input for that day and the previous 29 days. Only days when the units were operating were considered.
4. From those rolling averages, three averages were identified: the minimum 30-day rolling average, the median 30-day rolling average, and the maximum 30-day rolling average.

It was decided, based on internal discussion, that the rate representative of a well controlled unit should be the maximum 30-day rolling average from the best/lowest reported ozone year. This judgment was based on having selected the best or lowest ozone season NO_x emission rate, but also selecting the maximum 30-day rolling average, the combination being considered a readily achievable, NO_x emission rate.

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In order to further ensure that the maximum 30-day rolling average is representative of a well-controlled unit, the maximum 30-day rolling average for each unit was compared to the median 30-day rolling average. For units with a maximum 30-day rolling average deviating more than 75% from the median 30-day rolling average, the maximum 30-day rolling was considered inappropriate and the median 30-day rolling average was prescribed instead. 30-day rolling averages were also provided for units slated to receive SCR or SNCR controls where the units have demonstrated that they can achieve a rate lower than the predicted controlled rate. 30 day rolling average calculations include days during which the units were determined to not have optimized SCR or SNCR controls, giving each unit some leeway to realistically achieve the maximum 30-day rolling average given. For units with SCR, controls were determined not to be optimized on days where the daily NOx rate was more than twice the median 30-day rolling average. For SNCR units, the threshold was set at two standard deviations higher than the median calculated daily NO_x rate.

MDE used this "Maximum 30-Day Rolling Average NOx Emission Rate" as the "Desired Rate" in the analysis[5] to determine excess emissions from the selected Pennsylvania electric generating units on the basis of an achievable NO_x emission rate.

Table 2: 30-Day Rolling Average Ozone Season NO_x Rates

Facility Name	Unit ID	Post Combustion Control Type	Best Performing Ozone Season NOx Emission Rate Year	Best Performing Ozone Season NOx Emission Rate (lb/MMBtu)	Max 30-Day Rolling Average NOx Rate (lb/MMBtu)	Notes
Bruce Mansfield	1	SCR	2017	0.0723	0.0791	
Bruce Mansfield	2	SCR	2007	0.0801	0.0862	
Bruce Mansfield	3	SCR	2005	0.0744	0.0858	
Cambria Cogen	1	SNCR	2005	0.0945	0.1150	
Cambria Cogen	2	SNCR	2006	0.0949	0.1153	
Cheswick	1	SCR	2006	0.0901	0.0795	
Conemaugh	1	SCR	2018	0.0726	0.0810	
Conemaugh	2	SCR	2018	0.0629	0.0678	
Homer City	1	SCR	2006	0.0667	0.0722	
Homer City	2	SCR	2006	0.0826	0.0930	*
Homer City	3	SCR	2005	0.0872	0.1049	
Keystone	1	SCR	2006	0.0431	0.0479	
Keystone	2	SCR	2008	0.0433	0.0459	
Montour	1	SCR	2006	0.0581	0.0558	*

[5] Spreadsheet titled "PA Coal Fired Units 184C – 136 30-Day Rates (Final).xls

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Facility Name	Unit ID	Post Combustion Control Type	Best Performing Ozone Season NOx Emission Rate Year	Best Performing Ozone Season NOx Emission Rate (lb/MMBtu)	Max 30-Day Rolling Average NOx Rate (lb/MMBtu)	Notes
Montour	2	SCR	2006	0.0578	0.0553	
Panther Creek Energy Facility	1	SNCR	2005	0.1051	0.1162	
Panther Creek Energy Facility	2	SNCR	2015	0.1056	0.1162	
Scrubgrass Generating Plant	1	SNCR	2005	0.0573	0.0692	
Scrubgrass Generating Plant	2	SNCR	2005	0.0793	0.0856	
Seward	1	SNCR	2014	0.0747	0.0878	
Seward	2	SNCR	2012	0.0745	0.0880	

*90^{th} percentile for 30-day rolling average rate

Table 3: Example Calculation – Maximum 30-Day Rolling Average Ozone Season NO_x Rate – Bruce Mansfield Unit 1

Facility Name	Unit ID	Date	Operating Time	NOx Rate (lb/MMBtu)	NOx (tons)	Heat Input (MMBtu)	Calculated Actual NOx Rate (lbs/MMBtu)	30-Day Rolling Average (lbs/MMBtu)
Bruce Mansfield	1	5/1/2017	24	0.0913	4.819	105599.3	0.09127	
Bruce Mansfield	1	5/2/2017	24	0.0872	4.623	106015.9	0.087213	
Bruce Mansfield	1	5/3/2017	24	0.0743	3.981	107237.3	0.074247	
Bruce Mansfield	1	5/4/2017	23.58	0.0787	3.805	103719.5	0.073371	
Bruce Mansfield	1	5/8/2017	6.96	0.1198	0.326	4146.435	0.157244	
Bruce Mansfield	1	5/9/2017	24	0.1807	5.979	80151.3	0.149193	
Bruce Mansfield	1	5/10/2017	24	0.0688	4.009	116902.5	0.068587	
Bruce Mansfield	1	5/11/2017	24	0.0596	4.321	147479.5	0.058598	
Bruce Mansfield	1	5/12/2017	24	0.0661	5.483	162694.9	0.067402	
Bruce Mansfield	1	5/13/2017	24	0.064	5.074	157647.8	0.064371	
Bruce Mansfield	1	5/14/2017	24	0.0655	3.962	120095.4	0.065981	
Bruce Mansfield	1	5/15/2017	24	0.0582	4.353	147182.9	0.059151	
Bruce Mansfield	1	5/16/2017	24	0.059	4.077	142924.4	0.057051	
Bruce Mansfield	1	5/17/2017	24	0.0606	4.403	141168	0.06238	
Bruce Mansfield	1	5/18/2017	24	0.0688	4.796	140953.5	0.068051	
Bruce Mansfield	1	5/19/2017	24	0.0733	5.298	145570.3	0.07279	
Bruce Mansfield	1	5/20/2017	24	0.0922	6.581	142210.9	0.092553	
Bruce Mansfield	1	5/21/2017	24	0.0686	3.884	119658.5	0.064918	
Bruce Mansfield	1	5/22/2017	24	0.0883	5.261	125598.5	0.083775	
Bruce Mansfield	1	5/23/2017	24	0.0762	4.124	108218.3	0.076216	
Bruce Mansfield	1	5/24/2017	24	0.0791	4.244	107259.4	0.079135	

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Facility Name	Unit ID	Date	Operating Time	NOx Rate (lb/MMBtu)	NOx (tons)	Heat Input (MMBtu)	Calculated Actual NOx Rate (lbs/MMBtu)	30-Day Rolling Average (lbs/MMBtu)
Bruce Mansfield	1	5/25/2017	24	0.0679	3.648	107219.3	0.068047	
Bruce Mansfield	1	5/26/2017	24	0.0669	4.117	128652.8	0.064002	
Bruce Mansfield	1	5/27/2017	24	0.0748	4.506	124304	0.0725	
Bruce Mansfield	1	5/28/2017	24	0.0704	3.79	107652.2	0.070412	
Bruce Mansfield	1	5/29/2017	24	0.0692	4.016	119522.6	0.067201	
Bruce Mansfield	1	5/30/2017	24	0.0725	5.319	144143.1	0.073802	
Bruce Mansfield	1	5/31/2017	24	0.0482	3.339	136415.9	0.048953	
Bruce Mansfield	1	6/1/2017	24	0.0394	2.555	132368.9	0.038604	
Bruce Mansfield	1	6/2/2017	24	0.0407	2.541	127972.5	0.039712	0.069514
Bruce Mansfield	1	6/3/2017	24	0.0425	2.484	117448.3	0.042299	0.068018
Bruce Mansfield	1	6/4/2017	24	0.0399	2.351	123083.3	0.038202	0.066472
Bruce Mansfield	1	6/5/2017	24	0.1011	5.402	106875.8	0.101089	0.067249
Bruce Mansfield	1	6/6/2017	24	0.0577	3.047	105767.8	0.057617	0.066801
Bruce Mansfield	1	6/7/2017	24	0.058	3.089	106577.8	0.057967	0.066454
Bruce Mansfield	1	6/8/2017	24	0.0616	3.355	109323.5	0.061377	0.064574
Bruce Mansfield	1	6/9/2017	24	0.0458	2.816	126230.3	0.044617	0.063794
Bruce Mansfield	1	6/10/2017	24	0.0613	3.361	113854	0.059041	0.063853
Bruce Mansfield	1	6/11/2017	24	0.0469	2.499	106477.7	0.046939	0.063218
Bruce Mansfield	1	6/12/2017	21.47	0.0277	1.855	135414.5	0.027397	0.061865
Bruce Mansfield	1	6/19/2017	2	0.0465	0.023	868.8	0.052947	0.061725
Bruce Mansfield	1	6/20/2017	24	0.1649	4.172	48125.6	0.17338	0.063368
Bruce Mansfield	1	6/21/2017	6.62	0.097	1.033	27589.59	0.074883	0.063728
Bruce Mansfield	1	6/27/2017	7.03	0.089	0.268	4763.9	0.112513	0.063859
Bruce Mansfield	1	6/28/2017	24	0.1775	3.982	43225.3	0.184244	0.065322
Bruce Mansfield	1	6/29/2017	24	0.041	2.743	138040.6	0.039742	0.063853
Bruce Mansfield	1	6/30/2017	24	0.0343	2.638	153899.8	0.034282	0.061119
Bruce Mansfield	1	7/1/2017	24	0.0384	3.001	156965.8	0.038238	0.059852
Bruce Mansfield	1	7/2/2017	24	0.0609	4.845	158128.7	0.061279	0.05899
Bruce Mansfield	1	7/3/2017	24	0.0689	5.438	157876.5	0.068889	0.058898
Bruce Mansfield	1	7/4/2017	24	0.0418	2.897	144036.2	0.040226	0.057431
Bruce Mansfield	1	7/5/2017	24	0.0405	3.269	160322.5	0.04078	0.0563
Bruce Mansfield	1	7/6/2017	24	0.0521	4.153	159255.8	0.052155	0.055814
Bruce Mansfield	1	7/7/2017	24	0.0612	4.614	152135.6	0.060656	0.055423
Bruce Mansfield	1	7/8/2017	24	0.0608	4.779	157288.3	0.060767	0.055201
Bruce Mansfield	1	7/9/2017	24	0.0569	4.395	154477.8	0.056901	0.054867
Bruce Mansfield	1	7/10/2017	24	0.0478	3.793	158364.7	0.047902	0.053779
Bruce Mansfield	1	7/11/2017	24	0.0613	4.787	156398.1	0.061216	0.054293
Bruce Mansfield	1	7/12/2017	24	0.0611	4.834	158440.3	0.06102	0.055174
Bruce Mansfield	1	7/13/2017	24	0.0524	3.652	144433.3	0.05057	0.05554

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Facility Name	Unit ID	Date	Operating Time	NOx Rate (lb/MMBtu)	NOx (tons)	Heat Input (MMBtu)	Calculated Actual NOx Rate (lbs/MMBtu)	30-Day Rolling Average (lbs/MMBtu)
Bruce Mansfield	1	7/14/2017	24	0.0738	4.005	108490.4	0.073831	0.05653
Bruce Mansfield	1	7/15/2017	24	0.061	3.312	108667.8	0.060956	0.057298
Bruce Mansfield	1	7/16/2017	24	0.0371	2.187	116035.1	0.037695	0.055351
Bruce Mansfield	1	7/17/2017	24	0.0603	3.333	110398	0.060382	0.055439
Bruce Mansfield	1	7/18/2017	24	0.0416	2.268	108853.8	0.041671	0.054945
Bruce Mansfield	1	7/19/2017	24	0.0714	5.884	157606.5	0.074667	0.055608
Bruce Mansfield	1	7/20/2017	24	0.1016	5.879	119739.7	0.098196	0.0574
Bruce Mansfield	1	7/21/2017	9.78	0.1227	2.373	42043.58	0.112883	0.058005
Bruce Mansfield	1	7/26/2017	6.35	0.1233	0.298	3848.795	0.154854	0.058455
Bruce Mansfield	1	7/27/2017	24	0.1559	5.041	84003.2	0.120019	0.061217
Bruce Mansfield	1	7/28/2017	24	0.088	4.826	110075	0.087686	0.062051
Bruce Mansfield	1	7/29/2017	24	0.0879	4.67	106176.6	0.087967	0.061319
Bruce Mansfield	1	7/30/2017	24	0.0845	4.496	106524.1	0.084413	0.061892
Bruce Mansfield	1	7/31/2017	24	0.0622	3.321	106852.7	0.06216	0.061836
Bruce Mansfield	1	8/1/2017	9.72	0.0325	0.893	55996.6	0.031895	0.05998
Bruce Mansfield	1	8/3/2017	0.72	0.008	0	110.448	0	0.060751
Bruce Mansfield	1	8/4/2017	24	0.128	3.933	71528.7	0.10997	0.062899
Bruce Mansfield	1	8/5/2017	4.43	0.1386	1.005	17569.16	0.114405	0.064305
Bruce Mansfield	1	8/10/2017	13.71	0.2028	2.933	23893.6	0.245505	0.065779
Bruce Mansfield	1	8/11/2017	24	0.1433	7.033	106324.7	0.132293	0.06783
Bruce Mansfield	1	8/12/2017	24	0.0394	2.444	127288.6	0.038401	0.067902
Bruce Mansfield	1	8/13/2017	24	0.0394	2.309	117435.7	0.039324	0.068217
Bruce Mansfield	1	8/14/2017	15.45	0.0405	1.769	84276.35	0.041981	0.068329
Bruce Mansfield	1	8/19/2017	17.77	0.2083	4.845	39800.34	0.243465	0.071076
Bruce Mansfield	1	8/20/2017	24	0.0795	4.2	105671.5	0.079492	0.071938
Bruce Mansfield	1	8/21/2017	24	0.0816	4.145	101774.5	0.081455	0.07309
Bruce Mansfield	1	8/22/2017	24	0.0811	4.459	110154.5	0.080959	0.074818
Bruce Mansfield	1	8/23/2017	24	0.0795	4.393	110483	0.079524	0.075775
Bruce Mansfield	1	8/24/2017	24	0.0798	4.439	111389.2	0.079703	0.076796
Bruce Mansfield	1	8/25/2017	24	0.0753	4.033	107028.2	0.075363	0.078153
Bruce Mansfield	1	8/26/2017	24	0.0786	3.994	101537	0.078671	0.078348
Bruce Mansfield	1	8/27/2017	24	0.0785	3.998	101921.5	0.078453	0.07906
Bruce Mansfield	1	8/28/2017	24	0.0368	2.312	129870	0.035605	0.078746
Bruce Mansfield	1	8/29/2017	24	0.0347	2.68	155061.1	0.034567	0.076976
Bruce Mansfield	1	8/30/2017	24	0.0256	2.028	158247.6	0.025631	0.075432
Bruce Mansfield	1	8/31/2017	24	0.0462	3.708	160003.6	0.046349	0.0738
Bruce Mansfield	1	9/1/2017	24	0.031	1.618	104541.9	0.030954	0.07112
Bruce Mansfield	1	9/2/2017	24	0.0321	1.678	104332.7	0.032166	0.069059
Bruce Mansfield	1	9/3/2017	24	0.0421	2.219	105326.6	0.042136	0.067976

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Facility Name	Unit ID	Date	Operating Time	NOx Rate (lb/MMBtu)	NOx (tons)	Heat Input (MMBtu)	Calculated Actual NOx Rate (lbs/MMBtu)	30-Day Rolling Average (lbs/MMBtu)
Bruce Mansfield	1	9/4/2017	24	0.07	3.863	111241.7	0.069452	0.066551
Bruce Mansfield	1	9/5/2017	24	0.059	3.359	113960.9	0.05895	0.065471
Bruce Mansfield	1	9/6/2017	24	0.0387	2.368	122828	0.038558	0.063556
Bruce Mansfield	1	9/7/2017	24	0.0599	4.596	153489.1	0.059887	0.062634
Bruce Mansfield	1	9/8/2017	24	0.0633	3.941	124362.8	0.063379	0.062681
Bruce Mansfield	1	9/9/2017	24	0.0553	2.919	105587.3	0.055291	0.062987
Bruce Mansfield	1	9/10/2017	21.47	0.0731	3.08	94894.16	0.064914	0.063046
Bruce Mansfield	1	9/14/2017	5.2	0.0682	0.124	2501.24	0.099151	0.061997
Bruce Mansfield	1	9/15/2017	15.31	0.2267	2.992	24379.27	0.245454	0.063136
Bruce Mansfield	1	9/18/2017	1.02	0.006	0.001	212.496	0.009412	0.061724
Bruce Mansfield	1	9/19/2017	24	0.2668	8.972	62031.1	0.289274	0.063891
Bruce Mansfield	1	9/20/2017	24	0.1917	9.075	97827.1	0.185531	0.068902
Bruce Mansfield	1	9/21/2017	24	0.0428	2.502	118088.1	0.042375	0.069015
Bruce Mansfield	1	9/22/2017	24	0.0286	2.25	155979	0.02885	0.067727
Bruce Mansfield	1	9/23/2017	24	0.0285	2.332	162044.4	0.028782	0.063591
Bruce Mansfield	1	9/24/2017	24	0.0307	2.432	157658.7	0.030851	0.061497
Bruce Mansfield	1	9/25/2017	24	0.0406	3.29	161927.8	0.040635	0.059872
Bruce Mansfield	1	9/26/2017	24	0.0264	2.016	153072.6	0.02634	0.057661
Bruce Mansfield	1	9/27/2017	24	0.0681	4.93	144545.5	0.068214	0.0574
Bruce Mansfield	1	9/28/2017	24	0.0874	6.266	143464.3	0.087353	0.057927
Bruce Mansfield	1	9/29/2017	24	0.082	5.807	141828.9	0.081887	0.058368
Bruce Mansfield	1	9/30/2017	24	0.0976	6.945	142230.1	0.097659	0.059372
							Maximum 30-Day Rolling Average	**0.07906**

1.5 Daily Limits

The daily limits included in the straw-man draft recommendation in Attachment 5 are the current rates included in Pennsylvania's RACT II regulations converted to a 24-hour block average (midnight to midnight) limit. These daily limits are also generally consistent with daily limits already applicable in Delaware, New Jersey and New York. MDE expects this issue to be a significant area of discussion if OTC proceeds with developing a recommendation.

1.6 Integration of Ambient Air Monitoring Data

MDE was specifically interested in any excess NO_x emissions on ozone exceedances recorded in Maryland. To accomplish this MDE integrated 2017 and 2018 ozone season air monitoring data into the datasets. The integration of the ozone season exceedance days and the previous days is crucial when determining excess emissions released by each selected unit specific to those days. Ozone exceedance days and the day before were identified for the two years. MD evaluated the performance of the units on each of these exceedance days; days when NO_x emission reductions are needed the most.

1.7 Excess Emissions Analysis and Solution Development

Excess NOx emissions were calculated on a daily basis for each ozone exceedance day and the previous day. Excess emissions were calculated using the equation below:

Excess Emissions Formula

$$Excess\ NOx\ Emissions\ (tons) = Actual\ NOx\ Emissions\ (Tons) - \left\{Actual\ NOx\ Emission\ (Tons) \times \frac{Desired\ NOx\ Rate}{Calculated\ NOx\ Rate}\right\}$$

In the two analysis the "Desired Rate" is either the Best Calculated Actual NOx Rate for the identified best ozone season or the 30-day Max Rolling Average. The difference between actual emissions and emissions if unit is operated at best rates produces the excess emission value.

A step-by-step example is provided below for Keystone Unit 2 on August 09, 2018.
Important data from EPA's CAMD database is presented in the following table.

State	Facility Name	Facility ID (ORISPL)	Unit ID	Date	Operating Time	Avg. Reported NOx Rate	NOx (Tons)	Heat Input (MMBtu)	Desired NOx Rate	Avg. Calculated NOx Rate	Excess Emissions (tons)
PA	Keystone	3136	2	8/9/2018	24	0.184	12.366	162,454.3	0.0459	0.152239738	8.637674
						CAMD Data				$= \frac{12.366 \times 2000}{162{,}454.3}$	$= 12.366 - \frac{12.366 \times 0.0459}{0.15224}$

Step 1 – Download daily data for the selected unit for the day to be analyzed

Step 2 – Ensure that all necessary data has been downloaded

Step 3 – Using the reported daily NOx mass (tons) and daily heat input (MMBtu) calculate the NOx rate for the day. (Note that the calculated NOx rate is different than the reported NOx rate)

Step 4 – Determine the appropriate (desired) NOx rate that the combination of unit and control device can achieve. In this analysis the achievable (desired) NOx rate is either the best ozone season rate or the maximum 30-day rolling average rate.

Step 5 – Calculate the daily excess NOx mass emissions using the reported NOx mass, the calculated NOx rate and the desired NOx rate using the excess emissions formula.

Step 6 – Repeat for all units and days being evaluated.

ATTACHMENT 6

Tables 4-7: Summary of Excess Emissions from PA Coal-fired EGUs on MD Ozone Exceedance Days for 2017 and 2018

Table 4: 2017 Best Rate Excess Emissions

Date	All Sources Total Excess Tons	Bruce Mansfield Unit 1	Bruce Mansfield Unit 2	Bruce Mansfield Unit 3	Cambria Cogen Unit 1	Cambria Cogen Unit 2	Cheswick Unit 1	Conemaugh Unit 1	Conemaugh Unit 2	Homer City Unit 1	Homer City Unit 2	Homer City Unit 3	Keystone Unit 1	Keystone Unit 2	Montour Unit 1	Montour Unit 2	Panther Creek Unit 1	Panther Creek Unit 2	Scrubgrass Unit 1	Scrubgrass Unit 2	Seward Unit 1	Seward Unit 2
5/16/2017	15.84	0.000	0.000	0.670	0.000	0.000	0.000	0.000	0.000	10.121	0.000	0.000	2.299	0.942	0.000	0.000	0.000	0.000	0.370	0.362	0.114	0.958
5/17/2017	30.60	0.000	0.000	0.900	0.000	0.000	0.000	0.000	0.532	12.484	4.642	0.000	2.650	1.108	6.116	0.000	0.000	0.000	0.438	0.608	0.000	1.119
5/18/2017	20.87	0.218	0.351	0.876	0.000	0.009	0.000	0.000	0.713	9.045	0.000	0.000	2.951	1.070	3.115	0.000	0.000	0.000	0.371	0.276	0.669	1.202
6/9/2017	14.69	0.000	0.474	0.000	0.000	0.000	4.011	0.238	0.000	0.000	0.304	2.042	3.950	1.312	0.761	0.000	0.000	0.000	0.285	0.148	0.576	0.590
6/10/2017	27.39	0.000	0.000	0.000	0.000	0.000	2.983	0.269	0.000	0.000	5.837	1.513	3.921	0.954	10.897	0.000	0.000	0.000	0.180	0.173	0.330	0.332
6/11/2017	42.65	0.000	0.258	0.000	0.268	0.000	5.079	0.322	5.979	4.915	7.359	1.044	3.994	1.132	5.940	5.060	0.000	0.000	0.254	0.168	0.434	0.449
6/12/2017	37.86	0.000	0.894	1.238	0.430	0.014	3.540	0.355	0.828	6.892	2.555	1.363	4.165	1.557	4.719	7.706	0.031	0.038	0.243	0.262	0.507	0.523
6/13/2017	29.66	0.000	0.000	0.501	0.419	0.447	3.163	0.454	0.737	6.822	0.000	1.606	4.640	0.000	3.408	5.575	0.041	0.075	0.369	0.253	0.566	0.584
6/14/2017	24.50	0.000	0.000	0.423	0.454	0.445	3.198	0.344	1.181	4.469	0.000	1.534	5.006	0.000	3.380	2.629	0.000	0.000	0.419	0.367	0.317	0.340
6/15/2017	24.18	0.000	0.000	0.000	0.408	0.394	3.601	0.421	1.429	6.915	0.000	1.433	4.469	0.000	4.297	0.000	0.000	0.000	0.305	0.317	0.100	0.089
6/21/2017	22.74	0.137	0.187	0.189	0.341	0.347	4.541	0.000	1.757	6.149	0.000	1.710	4.263	1.683	0.161	0.000	0.000	0.000	0.000	0.000	1.272	0.000
6/22/2017	26.54	0.000	0.000	0.467	0.376	0.386	3.743	0.000	1.824	6.219	0.000	1.536	4.190	1.872	4.727	0.000	0.000	0.000	0.000	0.000	1.202	0.000
7/2/2017	34.95	0.000	0.000	0.000	0.335	0.351	0.000	0.397	1.025	5.806	5.476	0.000	3.607	1.133	6.988	8.242	0.000	0.000	0.260	0.000	0.677	0.658
7/3/2017	33.84	0.310	0.000	0.000	0.389	0.401	2.774	0.396	0.923	6.280	5.807	0.000	3.797	1.230	4.917	5.429	0.000	0.000	0.319	0.135	0.366	0.364
7/4/2017	31.37	0.000	0.000	0.000	0.337	0.342	5.163	0.400	2.342	4.744	4.066	0.000	3.654	1.012	4.566	4.225	0.000	0.000	0.216	0.154	0.068	0.084
7/18/2017	30.87	0.000	0.000	0.040	0.373	0.391	4.122	0.319	1.033	8.799	6.467	1.501	3.978	1.101	0.963	0.000	0.000	0.022	0.513	0.420	0.000	0.833
7/19/2017	29.30	0.765	0.000	0.000	0.407	0.426	3.588	0.350	1.062	7.834	6.150	1.342	4.107	1.412	0.222	0.040	0.031	0.059	0.341	0.252	0.000	0.907
7/20/2017	36.47	1.990	0.000	0.425	0.349	0.355	3.710	0.266	1.021	9.793	7.722	0.000	4.226	0.895	0.000	4.226	0.029	0.085	0.285	0.215	0.000	0.881
7/21/2017	33.98	1.007	0.000	0.000	0.387	0.403	3.415	0.235	0.923	7.816	7.793	0.000	4.051	1.336	0.000	4.751	0.024	0.050	0.414	0.326	0.000	1.047
7/31/2017	27.44	0.000	0.000	0.000	0.346	0.377	2.827	3.190	0.776	5.423	0.000	0.000	4.010	1.295	0.178	6.751	0.000	0.000	0.466	0.428	0.673	0.706
8/1/2017	31.69	0.000	0.000	0.018	0.383	0.388	3.971	1.567	0.643	7.027	0.000	0.000	3.750	2.160	5.146	3.801	0.000	0.000	0.605	0.259	0.961	1.005
8/15/2017	36.11	0.000	0.112	0.141	0.427	0.000	4.376	0.032	0.954	0.000	8.165	1.962	6.819	5.251	5.551	0.000	0.000	0.000	0.407	0.468	0.690	0.752
8/16/2017	41.97	0.000	0.000	2.283	0.499	0.007	4.496	0.000	0.937	4.872	7.917	1.495	5.548	5.541	5.871	0.000	0.000	0.000	0.488	0.479	0.737	0.803
9/24/2017	24.70	0.000	0.000	0.000	0.311	0.302	2.875	0.347	0.756	5.991	0.000	1.427	0.000	3.561	4.390	3.739	0.027	0.067	0.272	0.349	0.136	0.152
9/25/2017	31.52	0.000	0.000	2.275	0.329	0.329	2.533	0.321	0.828	9.782	0.000	1.555	0.000	3.771	4.816	3.514	0.038	0.064	0.335	0.278	0.372	0.383
TOTAL	741.73	4.427	2.275	10.446	7.568	6.114	77.710	10.222	28.203	158.198	80.259	23.061	94.045	41.327	91.129	65.688	0.220	0.461	8.154	6.695	10.768	14.761
MIN	14.69	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MAX	42.65	1.990	0.894	2.283	0.499	0.447	5.163	3.190	5.979	12.484	8.165	2.042	6.819	5.541	10.897	8.242	0.041	0.085	0.605	0.608	1.272	1.202
AVERAGE	29.67	0.177	0.091	0.418	0.303	0.245	3.108	0.409	1.128	6.328	3.210	0.922	3.762	1.653	3.645	2.628	0.009	0.018	0.326	0.268	0.431	0.590

Table 5: 2018 Best Rate Excess Emissions

Date	All Sources Total Excess Tons	Bruce Mansfield Unit 1	Bruce Mansfield Unit 2	Bruce Mansfield Unit 3	Cambria Cogen Unit 1	Cambria Cogen Unit 2	Cheswick Unit 1	Conemaugh Unit 1	Conemaugh Unit 2	Homer City Unit 1	Homer City Unit 2	Homer City Unit 3	Keystone Unit 1	Keystone Unit 2	Montour Unit 1	Montour Unit 2	Panther Creek Unit 1	Panther Creek Unit 2	Scrubgrass Unit 1	Scrubgrass Unit 2	Seward Unit 1	Seward Unit 2
5/1/2018	33.21	0.000	0.000	1.818	0.428	0.431	2.174	0.695	1.259	6.544	10.964	0.000	2.353	2.529	0.000	3.390	0.000	0.000	0.334	0.295	0.000	0.000
5/2/2018	34.01	0.000	0.000	1.196	0.429	0.425	3.984	3.267	1.099	4.031	8.779	0.000	2.477	2.347	0.000	5.291	0.000	0.000	0.347	0.337	0.000	0.000
5/3/2018	32.21	0.000	0.000	1.657	0.421	0.424	3.700	0.690	1.238	6.590	9.639	0.000	2.528	0.832	1.103	2.549	0.000	0.000	0.449	0.394	0.000	0.000
5/4/2018	30.60	0.000	0.000	2.084	0.438	0.442	2.966	0.701	1.155	5.343	2.554	0.000	2.184	0.000	7.814	4.027	0.000	0.000	0.458	0.437	0.000	0.000
5/31/2018	11.83	0.000	0.000	0.116	0.395	0.412	3.153	0.864	0.230	0.000	0.000	0.000	3.087	2.766	0.000	0.000	0.000	0.000	0.448	0.356	0.000	0.000
6/1/2018	11.78	0.000	0.000	0.000	0.370	0.389	3.660	0.174	0.000	0.000	0.000	0.000	3.422	3.220	0.000	0.000	0.000	0.000	0.245	0.148	0.148	0.000
6/16/2018	23.27	0.000	0.000	0.667	0.353	0.352	4.056	0.000	0.000	3.761	3.617	0.553	3.282	3.062	0.000	2.938	0.000	0.000	0.310	0.321	0.000	0.000
6/17/2018	28.27	0.000	0.000	0.524	0.300	0.267	3.589	0.000	0.000	5.444	5.141	1.962	3.332	3.029	0.147	3.327	0.000	0.000	0.337	0.280	0.291	0.294
6/18/2018	40.95	0.000	0.000	0.711	0.380	0.396	3.365	0.000	0.000	7.243	6.779	1.646	4.253	3.278	7.645	2.982	0.000	0.000	0.474	0.335	0.715	0.749
6/29/2018	27.23	0.000	0.000	0.000	0.369	0.386	3.770	1.673	0.000	3.951	4.173	1.361	4.389	2.973	0.000	1.415	0.025	0.000	0.500	0.408	0.920	0.920
6/30/2018	37.12	0.000	0.000	0.000	0.372	0.385	3.469	5.321	0.000	4.935	5.460	1.429	4.055	3.014	0.000	5.937	0.000	0.051	0.548	0.370	0.887	0.892
7/1/2018	42.28	0.000	0.000	0.226	0.370	0.388	3.561	1.155	0.000	6.159	7.052	1.541	4.318	5.037	4.939	4.116	0.000	0.096	0.561	0.467	1.153	1.143
7/2/2018	47.87	0.000	0.000	0.576	0.385	0.407	3.346	0.720	0.000	6.106	7.152	1.548	9.263	6.454	3.679	5.013	0.000	0.085	0.481	0.331	1.162	1.157
7/3/2018	40.47	0.522	0.000	0.347	0.393	0.413	3.656	0.623	0.000	6.760	5.488	1.514	4.472	3.398	3.974	5.884	0.076	0.050	0.489	0.255	1.085	1.070
7/8/2018	38.12	4.043	0.000	0.126	0.343	0.354	0.000	0.512	0.000	3.798	2.889	1.094	12.494	7.088	3.705	0.000	0.000	0.000	0.383	0.343	0.475	0.471
7/9/2018	40.50	1.394	0.000	0.280	0.352	0.371	3.022	0.591	0.000	4.895	3.899	1.251	13.664	5.307	2.980	0.000	0.000	0.000	0.363	0.247	0.956	0.927
7/10/2018	32.60	0.000	0.000	0.571	0.369	0.383	4.613	0.158	0.000	4.633	4.296	1.315	7.462	3.511	2.845	0.000	0.000	0.000	0.390	0.230	0.898	0.922
7/15/2018	32.59	0.000	0.000	0.876	0.374	0.385	4.483	0.000	0.000	3.610	4.192	1.099	7.497	6.729	2.683	0.350	0.000	0.000	0.000	0.279	0.003	0.026
7/16/2018	44.24	0.000	0.000	1.313	0.380	0.390	4.317	0.000	0.225	6.892	7.327	1.482	4.658	2.823	6.221	5.979	0.000	0.000	0.000	0.548	0.848	0.839
8/9/2018	38.79	0.000	0.000	0.969	0.368	0.380	3.616	0.000	0.000	7.926	4.546	1.294	3.104	8.928	4.127	0.000	0.000	0.000	0.406	0.271	1.427	1.430
8/10/2018	29.42	0.000	0.000	1.257	0.385	0.409	6.284	0.000	0.000	3.851	2.796	1.525	2.958	3.665	3.907	0.000	0.000	0.000	0.398	0.272	0.858	0.855
8/26/2018	28.45	0.000	0.000	1.115	0.318	0.321	4.717	0.000	0.000	9.119	0.776	0.994	2.985	2.750	4.500	0.000	0.000	0.000	0.478	0.381	0.000	0.000
8/27/2018	31.93	0.000	0.000	1.052	0.397	0.412	3.562	0.000	0.000	8.531	6.933	1.197	2.879	2.668	3.018	0.045	0.000	0.000	0.458	0.363	0.219	0.199
9/5/2018	39.51	0.000	0.000	1.793	0.394	0.413	4.928	0.000	0.045	5.120	6.847	1.101	5.873	2.765	3.859	3.356	0.000	0.000	0.481	0.368	1.137	1.031
9/6/2018	46.37	0.000	1.925	1.239	0.400	0.417	4.370	0.000	0.317	4.210	5.997	1.134	5.385	2.714	5.830	9.948	0.000	0.000	0.413	0.353	1.718	0.000
TOTAL	843.63	5.959	1.925	20.514	9.482	9.752	92.362	17.144	5.568	129.454	127.295	25.039	122.375	90.888	72.977	66.546	0.102	0.283	9.751	8.388	14.899	12.925
MIN	11.78	0.000	0.000	0.000	0.300	0.267	0.000	0.000	0.000	0.000	0.000	0.000	2.184	0.000	0.000	0.000	0.000	0.000	0.000	0.148	0.000	0.000
MAX	47.87	4.043	1.925	2.084	0.438	0.442	6.284	5.321	1.259	9.119	10.964	1.962	13.664	8.928	7.814	9.948	0.076	0.096	0.561	0.548	1.718	1.430
AVERAGE	33.75	0.238	0.077	0.821	0.379	0.390	3.694	0.686	0.223	5.178	5.092	1.002	4.895	3.636	2.919	2.662	0.004	0.011	0.390	0.336	0.596	0.517

Table 6: 2017 30-Day Max Rolling Average Excess Emissions

Date	All Sources Total Excess Tons	Bruce Mansfield Unit 1	Bruce Mansfield Unit 2	Bruce Mansfield Unit 3	Cambria Cogen Unit 1	Cambria Cogen Unit 2	Cheswick Unit 1	Conemaugh Unit 1	Conemaugh Unit 2	Homer City Unit 1	Homer City Unit 2	Homer City Unit 3	Keystone Unit 1	Keystone Unit 2	Montour Unit 1	Montour Unit 2	Panther Creek Unit 1	Panther Creek Unit 2	Scrubgrass Unit 1	Scrubgrass Unit 2	Seward Unit 1	Seward Unit 2
5/16/2017	13.47	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.732	0.000	0.000	1.806	0.602	0.000	0.000	0.000	0.000	0.260	0.324	0.051	0.699
5/17/2017	25.24	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.030	4.194	0.000	2.160	0.763	4.350	0.000	0.000	0.000	0.335	0.575	0.000	0.836
5/18/2017	13.95	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.083	8.625	0.000	0.000	2.436	0.714	0.159	0.000	0.000	0.000	0.272	0.246	0.505	0.902
6/9/2017	10.28	0.000	0.000	0.000	0.000	0.000	3.070	0.000	0.000	0.000	0.270	0.884	3.466	0.981	0.613	0.000	0.000	0.000	0.178	0.133	0.351	0.333
6/10/2017	20.47	0.000	0.000	0.000	0.000	0.000	2.197	0.000	0.000	0.000	4.978	0.395	3.444	0.629	8.391	0.000	0.000	0.000	0.085	0.140	0.119	0.087
6/11/2017	33.60	0.000	0.000	0.000	0.235	0.000	4.157	0.000	5.618	4.699	6.379	0.000	3.511	0.805	3.209	4.262	0.000	0.000	0.157	0.135	0.228	0.206
6/12/2017	25.57	0.000	0.217	0.249	0.324	0.008	2.498	0.000	0.247	6.507	2.208	0.000	3.664	1.351	1.703	5.714	0.000	0.000	0.133	0.227	0.273	0.250
6/13/2017	18.33	0.000	0.000	0.000	0.283	0.315	2.112	0.000	0.133	6.445	0.000	0.196	4.128	0.000	0.280	3.326	0.000	0.010	0.258	0.218	0.318	0.305
6/14/2017	13.93	0.000	0.000	0.000	0.310	0.304	2.182	0.000	0.566	4.131	0.000	0.156	4.494	0.000	0.464	0.492	0.000	0.000	0.313	0.333	0.100	0.082
6/15/2017	17.30	0.000	0.000	0.000	0.270	0.260	2.641	0.000	0.850	6.519	0.000	0.166	3.963	0.000	2.155	0.000	0.000	0.000	0.197	0.278	0.000	0.000
6/21/2017	17.69	0.000	0.000	0.000	0.220	0.226	3.594	0.000	1.226	5.775	0.000	0.411	3.777	1.350	0.102	0.000	0.000	0.000	0.000	0.000	1.011	0.000
6/22/2017	20.79	0.000	0.000	0.000	0.250	0.260	2.749	0.000	1.270	5.843	0.000	0.178	3.704	1.540	4.053	0.000	0.000	0.000	0.000	0.000	0.945	0.000
7/2/2017	26.51	0.000	0.000	0.000	0.214	0.231	0.000	0.000	0.499	5.452	4.514	0.000	3.115	0.801	4.333	6.340	0.000	0.000	0.152	0.000	0.452	0.413
7/3/2017	23.92	0.000	0.000	0.000	0.266	0.279	2.043	0.000	0.378	5.915	4.814	0.000	3.297	0.894	2.057	3.416	0.000	0.000	0.222	0.106	0.131	0.105
7/4/2017	22.83	0.000	0.000	0.000	0.216	0.223	4.356	0.000	1.822	4.421	3.174	0.000	3.168	0.683	2.084	2.439	0.000	0.000	0.123	0.118	0.000	0.000
7/18/2017	23.80	0.000	0.000	0.000	0.244	0.261	3.114	0.000	0.478	8.357	5.653	0.109	3.470	0.755	0.020	0.000	0.000	0.000	0.412	0.381	0.000	0.549
7/19/2017	22.11	0.000	0.000	0.000	0.276	0.294	2.508	0.000	0.462	7.418	5.080	0.199	3.576	1.052	0.149	0.032	0.000	0.000	0.231	0.216	0.000	0.621
7/20/2017	28.74	1.146	0.000	0.128	0.233	0.240	2.613	0.000	0.415	9.346	6.556	0.000	3.687	0.533	0.000	2.887	0.000	0.009	0.179	0.181	0.000	0.587
7/21/2017	26.89	0.711	0.000	0.000	0.257	0.274	2.332	0.000	0.318	7.399	6.642	0.000	3.515	0.975	0.000	3.130	0.000	0.000	0.305	0.291	0.000	0.744
7/31/2017	21.27	0.000	0.000	0.000	0.221	0.251	1.973	2.445	0.241	5.077	0.000	0.000	3.512	0.958	0.119	4.824	0.000	0.000	0.349	0.392	0.455	0.455
8/1/2017	24.22	0.000	0.000	0.003	0.253	0.258	2.977	0.675	0.091	6.638	0.000	0.000	3.247	1.818	4.335	1.751	0.000	0.000	0.488	0.223	0.729	0.736
8/15/2017	29.47	0.000	0.000	0.107	0.273	0.000	3.384	0.030	0.407	0.000	7.121	1.262	6.324	4.910	3.961	0.000	0.000	0.000	0.293	0.431	0.473	0.493
8/16/2017	32.82	0.000	0.000	1.730	0.356	0.003	3.519	0.000	0.388	4.719	6.845	0.172	5.056	5.199	2.953	0.000	0.000	0.000	0.375	0.442	0.522	0.546
9/24/2017	17.49	0.000	0.000	0.000	0.189	0.185	2.490	0.000	0.234	5.695	0.000	0.225	0.000	3.226	3.040	1.735	0.000	0.000	0.156	0.313	0.000	0.000
9/25/2017	20.75	0.000	0.000	1.911	0.195	0.198	1.612	0.000	0.256	9.405	0.000	0.169	0.000	3.424	1.554	1.305	0.000	0.000	0.226	0.245	0.133	0.116
TOTAL	551.46	1.857	0.217	4.129	5.083	4.075	58.120	3.150	15.981	150.149	68.426	4.522	82.520	33.962	50.083	41.651	0.000	0.019	5.700	5.948	6.798	9.064
MIN	10.28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MAX	33.60	1.146	0.217	1.911	0.356	0.315	4.356	2.445	5.618	12.030	7.121	1.262	6.324	5.199	8.391	6.340	0.000	0.010	0.488	0.575	1.011	0.902
AVERAGE	22.06	0.074	0.009	0.165	0.203	0.163	2.325	0.126	0.639	6.006	2.737	0.181	3.301	1.358	2.003	1.666	0.000	0.001	0.228	0.238	0.272	0.363

Table 7: 2018 30-Day Max Rolling Average Excess Emissions

Date	All Sources Total Excess Tons	Bruce Mansfield Unit 1	Bruce Mansfield Unit 2	Bruce Mansfield Unit 3	Cambria Cogen Unit 1	Cambria Cogen Unit 2	Cheswick Unit 1	Conemaugh Unit 1	Conemaugh Unit 2	Homer City Unit 1	Homer City Unit 2	Homer City Unit 3	Keystone Unit 1	Keystone Unit 2	Montour Unit 1	Montour Unit 2	Panther Creek Unit 1	Panther Creek Unit 2	Scrubgrass Unit 1	Scrubgrass Unit 2	Seward Unit 1	Seward Unit 2
5/1/2018	26.80	0.000	0.000	0.786	0.281	0.287	1.287	0.637	0.642	6.339	10.143	0.000	1.859	2.183	0.000	1.805	0.000	0.000	0.284	0.267	0.000	0.000
5/2/2018	26.86	0.000	0.000	0.147	0.280	0.282	3.271	2.509	0.526	3.776	8.040	0.000	1.986	2.010	0.000	3.444	0.000	0.000	0.283	0.303	0.000	0.000
5/3/2018	24.34	0.000	0.000	0.464	0.273	0.281	2.828	0.000	0.644	6.284	8.741	0.000	2.025	0.725	0.912	0.425	0.000	0.000	0.382	0.359	0.000	0.000
5/4/2018	22.07	0.000	0.000	0.888	0.290	0.300	2.084	0.000	0.547	5.066	2.321	0.000	1.682	0.000	5.773	2.319	0.000	0.000	0.400	0.404	0.000	0.000
5/31/2018	8.81	0.000	0.000	0.106	0.265	0.279	2.258	0.120	0.000	0.000	0.000	0.000	2.636	2.453	0.000	0.000	0.000	0.000	0.372	0.320	0.000	0.000
6/1/2018	9.55	0.000	0.000	0.000	0.239	0.257	2.848	0.000	0.000	0.000	0.000	0.000	2.927	2.871	0.000	0.000	0.000	0.000	0.200	0.125	0.085	0.000
6/16/2018	18.15	0.000	0.000	0.000	0.228	0.233	3.560	0.000	0.000	3.504	2.867	0.421	2.802	2.724	0.000	1.282	0.000	0.000	0.247	0.285	0.000	0.000
6/17/2018	21.22	0.000	0.000	0.000	0.185	0.166	2.907	0.000	0.000	5.153	4.310	0.949	2.846	2.683	0.083	1.320	0.000	0.000	0.263	0.242	0.075	0.043
6/18/2018	31.09	0.000	0.000	0.000	0.246	0.262	2.543	0.000	0.000	6.909	5.803	0.107	3.753	2.923	6.123	0.778	0.000	0.000	0.390	0.295	0.480	0.480
6/29/2018	22.15	0.000	0.000	0.000	0.232	0.249	2.952	1.586	0.000	3.689	3.416	0.182	3.883	2.621	0.000	1.232	0.019	0.000	0.421	0.368	0.663	0.641
6/30/2018	28.95	0.000	0.000	0.000	0.235	0.250	2.576	4.433	0.000	4.650	4.660	0.149	3.547	2.660	0.000	3.728	0.000	0.000	0.471	0.331	0.641	0.623
7/1/2018	31.95	0.000	0.000	0.000	0.236	0.254	2.677	0.229	0.000	5.852	6.173	0.179	3.800	4.678	3.247	1.910	0.000	0.017	0.486	0.428	0.909	0.876
7/2/2018	35.95	0.000	0.000	0.000	0.248	0.270	2.393	0.000	0.000	5.793	6.295	0.151	8.863	6.268	0.408	2.779	0.000	0.009	0.396	0.293	0.906	0.881
7/3/2018	28.53	0.422	0.000	0.000	0.247	0.267	2.779	0.000	0.000	6.425	4.624	0.186	3.973	3.039	0.677	3.640	0.027	0.000	0.410	0.214	0.816	0.786
7/8/2018	31.41	3.692	0.000	0.000	0.215	0.228	0.000	0.000	0.000	3.545	2.167	0.212	12.248	6.844	1.073	0.000	0.000	0.000	0.327	0.309	0.284	0.265
7/9/2018	32.46	1.286	0.000	0.000	0.219	0.238	2.376	0.000	0.000	4.612	3.133	0.234	13.406	5.010	0.000	0.000	0.000	0.000	0.293	0.210	0.743	0.696
7/10/2018	24.31	0.000	0.000	0.000	0.234	0.248	3.801	0.000	0.000	4.347	3.486	0.180	7.017	3.176	0.000	0.000	0.000	0.000	0.309	0.191	0.665	0.660
7/15/2018	25.61	0.000	0.000	0.053	0.237	0.247	3.831	0.000	0.000	3.347	3.456	0.207	7.082	6.426	0.206	0.284	0.000	0.000	0.000	0.230	0.000	0.000
7/16/2018	33.06	0.000	0.000	0.397	0.237	0.247	3.501	0.000	0.000	6.543	6.390	0.200	4.177	2.468	3.339	3.882	0.000	0.000	0.000	0.500	0.603	0.578
8/9/2018	30.26	0.000	0.000	0.038	0.230	0.241	2.981	0.000	0.000	7.542	3.716	0.304	2.562	8.638	1.053	0.000	0.000	0.000	0.343	0.238	1.199	1.179
8/10/2018	20.61	0.000	0.000	0.307	0.249	0.273	5.823	0.000	0.000	3.576	1.981	0.162	2.420	3.319	0.704	0.000	0.000	0.000	0.325	0.232	0.630	0.604
8/26/2018	21.88	0.000	0.000	0.412	0.203	0.210	4.349	0.000	0.000	8.764	0.663	0.053	2.490	2.409	1.572	0.000	0.000	0.000	0.410	0.343	0.000	0.000
8/27/2018	23.44	0.000	0.000	0.188	0.267	0.282	2.825	0.000	0.000	8.184	6.308	0.000	2.352	2.309	0.000	0.013	0.000	0.000	0.380	0.321	0.007	0.000
9/5/2018	27.91	0.000	0.000	0.733	0.258	0.274	4.193	0.000	0.000	4.832	5.884	0.000	5.345	2.401	0.480	1.077	0.000	0.000	0.402	0.326	0.910	0.799
9/6/2018	34.94	0.000	1.743	0.194	0.262	0.273	3.554	0.000	0.000	3.945	5.169	0.084	4.857	2.350	2.679	7.737	0.000	0.000	0.346	0.315	1.429	0.000
TOTAL	642.33	5.400	1.743	4.715	6.097	6.397	74.197	9.513	2.358	122.678	109.747	3.959	110.537	83.187	28.329	37.654	0.046	0.026	8.139	7.450	11.045	9.111
MIN	8.81	0.000	0.000	0.000	0.185	0.166	0.000	0.000	0.000	0.000	0.000	0.000	1.682	0.000	0.000	0.000	0.000	0.000	0.000	0.125	0.000	0.000
MAX	35.95	3.692	1.743	0.888	0.290	0.300	5.823	4.433	0.644	8.764	10.143	0.949	13.406	8.638	6.123	7.737	0.027	0.017	0.486	0.500	1.429	1.179
AVERAGE	25.69	0.216	0.070	0.189	0.244	0.256	2.968	0.381	0.094	4.907	4.390	0.158	4.421	3.327	1.133	1.506	0.002	0.001	0.326	0.298	0.442	0.364

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Part 2 – Ozone Modeling Sensitivity Analysis

2.1 Overview

MDE contracted with the University of Maryland, College Park (UMD) Department of Atmospheric & Oceanic Science to perform photochemical sensitivity modeling to demonstrate that emissions from all Pennsylvania (PA) coal fired EGUs significantly contribute to ozone formation in Maryland (MD). The sensitivity modeling completed will show the maximum ozone concentration reductions/ozone benefits if Pennsylvania coal-fired EGUs are required to optimize running their existing SCR and SNCR controls. The sensitivity analysis compares current maximum allowable emission at Pennsylvania coal-fired EGUs to the emissions that would be allowed if Pennsylvania coal-fired EGUs were required to optimize their existing control technologies every day of the ozone season.

This attachment will describe the emissions and meteorological data used as input to the photochemical model, as well as the results in ozone concentrations based on the photochemical sensitivity modeling analysis completed.

2.2 Modeling Emissions

This section will describe the type of model used to prepare the pollutant emissions.

The Sparse Matrix Operator Kernel Emissions (SMOKE) Modeling System was selected for the sensitivity modeling analysis. The SMOKE model was originally developed at the Microelectronics Center of North Carolina (MCNC) to integrate emissions data processing with high-performance computing (HPC) sparse –matrix algorithms. The SMOKE model is now under active development at the Institute for Environment and is partially supported by the Community Modeling and Analysis Systems (CMAS).

The SMOKE model is principally an emissions-processing system and not a true emissions inventory preparation system in which emissions are simulated from ‘first principles’. This means that, with the exception of mobile and biogenic sources, its purpose is to provide an efficient, modern tool for converting emissions inventory data into the formatted gridded, speciated, hourly emissions files required by an air quality simulation model. For mobile emissions the on-road emissions model MOVES2014 was used. For biogenic emissions modeling, SMOKE uses the Biogenic Emission Inventory System, version 3.6 (BEIS3.6).

The SMOKE model is the fastest emissions processing tool currently available to the air quality modeling community. The sparse matrix approach used throughout SMOKE permits rapid and flexible processing of emissions data. The rapid processing is possible because SMOKE uses a series of matrix calculations rather than a less-efficient sequential approach used by previous systems. The process is flexible because the processing steps of temporal projection, controls, chemical speciation, temporal allocation, and spatial allocation have been separated into independent operations wherever possible. The results from these steps are merged together at a final stage of processing using vector-matrix multiplication. This means that individual steps (such as adding a new control strategy, or processing for a different grid) can be performed and merged without having to redo all of the other processing steps.

The SMOKE model supports area, mobile, fire, point, and biogenic sources emissions processing. For biogenic emissions, SMOKE supports both gridded land use and county total land use data.

SMOKE (Version 3.5.1) was used for this sensitivity modeling demonstration using emissions from the MARAMA GAMMA 2011 inventory with projections to 2020 and 2023. The MARAMA GAMMA inventory incorporates datasets from EPA v6.3 2011 modeling platform inventory versions ‘ek’, ‘el’, and ‘en’. EPA’s files were used where possible. For 2011 and 2023, where EPA incorporated northeast state information, GAMMA uses the resulting EPA inventory files unchanged. GAMMA also uses MOVES input files, nonroad, fires, and biogenics directly rather than creating 2011 or 2023 projections. Where MARAMA used the EPA datasets without change, then the future year 2023 EPA datasets were also used. Where EPA datasets were revised, MARAMA re-projected the datasets to 2023. Additional refinements of the EPA inventory datasets made by MARAMA for the GAMMA inventory are described in the GAMMA TSD. Different methodologies were used to project to 2020 and 2023. For 2023, MARAMA had access to the EPA 2011 v6.3 ‘el’ inventory – which was complete for all sectors. For most sectors EPA adopted the more refined MARAMA state-supplied growth factors for the covered region. In addition, EPA included the effect of northeast state rules provided to them as comments in the inventory. As a result MARAMA used many of the EPA 2023 datasets without change. The exception is the EGU sector, where IPM projections were replaced with ERTAC EGU emissions, necessitating a re-working of other point sectors to avoid double counting or missing sources. The MARAMA GAMMA TSD, Figure 2, summarizes the approach taken for each GAMMA dataset for 2011, 2020 and 2023 (McDill, Julie R. and McCusker, Susan, 2018).

2.3 Meteorological Model

This section will describe the type of meteorological model selected to obtain the meteorological parameters needed to perform the air quality simulations for the modeling demonstration.

Meteorological inputs for the Comprehensive Air Quality Model with Extensions (CAMx) sensitivity modeling were developed by EPA for the 2011 modeling platform using version 3.4 of the Weather Research and Forecasting (WRF) numerical weather prediction model (Skamarock et al., 2008). The meteorological outputs from WRF include hourly varying winds, temperature, moisture, vertical diffusion rates, clouds, and rainfall rates. Additional details about this WRF simulation and its performance evaluation can be found in U.S. EPA (2014b).

2.4 Air Quality Model

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This section will describe the photochemical sensitivity modeling system selected to perform the air quality simulations for the modeling demonstration.

The CAMx model version 6.4 was the model used for this sensitivity modeling analysis. The modeling system used the science platform developed by UMD. This model is considered one of the preferred models for regulatory modeling applications. CAMx is generally considered by the scientific community to meet the following prerequisites for photochemical modeling applications:

1. It has been received and been revised in response to a scientific peer review.
2. It is appropriate for the specific application on a theoretical basis.
3. It shall be used with a database that is adequate to support its application.
4. It has been shown to perform well in past ozone modeling applications.
5. It will be applied consistently with a protocol on methods and procedures.

Furthermore, several factors were considered as criteria for choosing the CAMx model as a qualifying air quality model to support this sensitivity modeling and these factors are:

1. Documentation and past track record in similar applications;
2. Advanced science and technical features available in the modeling system;
3. Experience of staff; and
4. Required time and resources versus available time and resources.

For further documentation on the CAMx model, see http://www.camx.com/.

2.5 Modeling Scenarios

This section will describe the sensitivity modeling scenarios used to support this analysis and simulate the effect that having all PA coal fired EGUs fully optimize running their controls will have on reducing ozone concentrations in Maryland and the ozone transport region (OTR). For all scenarios the meteorological period of June 16 – July 31, 2011 was simulated. July was deemed an appropriate period to model since there were a high number of ozone exceedance days. During July 2011 Maryland experienced 21 ozone exceedance days (based on the 2015 ozone NAAQS of 70 ppb). In addition, 2011 National Emissions Inventory (NEI) was selected by EPA to be the base year for their modeling platform that will be used to support the development of the revised ozone NAAQS (US EPA, 2015).

All modeling scenarios were run using the UMD Science Framework (i.e., emissions of NO_x from mobile sources had been reduced by 50% (Anderson et al., 2014)). The Scenario 5r was the base case scenario and consisted of the GAMMA 2023 inventory (included on the books (OTB) and on the way (OTW)), ERTAC EGU 2.7 2023 without CSAPR and un-optimized EGUs.

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Descriptions of the two (2) modeling scenarios are as follows:

Scenario 184C-1 (Scen_184c1):
This scenario consists of starting from the GAMMA 2023 base case (Scenario 5r) and optimized SCR/SNCR controls at all PA coal fired EGUs and compliance with the CSAPR Update at all other EGUs. The ozone season NO_x mass was adjusted down based on the mass percentage adjustment calculated for each of the units to reflect 2023 ozone season NO_x rates consistent with (1) compliance with the CSAPR Update and (2) optimization of SCR/SNCR controls for the sources named in this petition. This scenario is representative of PA EGU coal units operating their SCR or SCNR controls at optimized rates. The EGUs and adjustment percentages are provided in Table 8.

Scenario 184C-2 (Scen_184c2)
This scenario consists of starting from the GAMMA 2023 base case (Scenario 5r) and non-optimized SCR/SNCR controls at all PA coal fired EGUs and compliance with CSAPR Update at all other EGUs. The ozone season NO_x mass was either adjusted up or down based on the mass percentage adjustment calculated for each of the units to reflect 2023 ozone season NO_x rates consistent with (1) compliance with the CSAPR Update and (2) non-optimization of SCR/SNCR controls for the sources named in this petition. This scenario is representative of PA EGU coal units not operating their SCR or SCNR controls at optimized rates. The EGUs and adjustment percentages are provided in Table 8.

The difference between scenarios Scen_184c2 (worst case – PA coal fired EGUs not optimizing their SCR and SNCR controls) and Scen_184c1 (best case – PA coal fired EGUs optimizing their SCR and SNCR controls the best they've ever done) is an estimate of the maximum ozone benefits based on the sensitivity modeling.

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Table 8. Modeling Adjustment Values for Scenarios 184C-1 and 184C-2

Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
AR	202	Carl Bailey	01	-91.3631	35.2597	-41.3602%	-41.3602%
AR	56505	City Water & Light - City of Jonesboro	SN04	-90.7257	35.8481	-10.3332%	-10.3332%
AR	55340	Dell Power Plant	1	-90.0253	35.8619	-72.5714%	-72.5714%
AR	55340	Dell Power Plant	2	-90.0253	35.8619	-75.7143%	-75.7143%
AR	6138	Flint Creek Power Plant	1	-94.5241	36.2561	-2.6549%	-2.6549%
AR	56328	Harry D. Mattison Power Plant	2	-94.2841	36.1855	-5.9921%	-5.9921%
AR	56328	Harry D. Mattison Power Plant	3	-94.2841	36.1855	-18.4888%	-18.4888%
AR	56328	Harry D. Mattison Power Plant	4	-94.2841	36.1855	-34.9886%	-34.9886%
AR	55418	Hot Spring Energy Facility	CT-1	-92.8683	34.2963	-36.0691%	-36.0691%
AR	55418	Hot Spring Energy Facility	CT-2	-92.8683	34.2963	-27.5059%	-27.5059%
AR	55714	Hot Spring Power Co., LLC	SN-01	-92.8333	34.4304	-20.9224%	-20.9224%
AR	6641	Independence	1	-91.4083	35.6733	-10.4297%	-10.4297%
AR	56564	John W. Turk Jr. Power Plant	SN-01	-93.81167	33.651111	-36.8849%	-36.8849%
AR	203	McClellan	01	-92.7917	33.5648	-24.9269%	-24.9269%
AR	55075	Pine Bluff Energy Center	CT-1	-91.9025	34.2181	-0.1435%	-0.1435%
AR	201	Thomas Fitzhugh	2	-93.8053	35.4617	-4.7951%	-4.7951%
AR	55380	Union Power Station	CTG-1	-92.5933	33.2961	-24.2173%	-24.2173%
AR	55380	Union Power Station	CTG-2	-92.5933	33.2961	-22.0095%	-22.0095%
AR	55380	Union Power Station	CTG-4	-92.5933	33.2961	-13.2944%	-13.2944%
AR	55380	Union Power Station	CTG-5	-92.5933	33.2961	-19.1916%	-19.1916%
AR	55380	Union Power Station	CTG-6	-92.5933	33.2961	-15.2148%	-15.2148%
AR	55380	Union Power Station	CTG-7	-92.5933	33.2961	-16.6449%	-16.6449%
AR	55380	Union Power Station	CTG-8	-92.5933	33.2961	-17.8942%	-17.8942%
AR	6009	White Bluff	2	-92.1392	34.4236	-39.8956%	-39.8956%
IN	6137	A B Brown Generating Station	1	-87.715	37.9053	-49.0640%	-49.0640%
IN	6137	A B Brown Generating Station	2	-87.715	37.9053	-18.4904%	-18.4904%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
IN	6705	Alcoa Allowance Management Inc	4	-87.3328	37.915	-42.3001%	-42.3001%
IN	1001	Cayuga	1	-87.4272	39.9239	-64.7917%	-64.7917%
IN	1001	Cayuga	2	-87.4272	39.9239	-60.8261%	-60.8261%
IN	983	Clifty Creek	1	-85.4192	38.7383	-26.2000%	-26.2000%
IN	983	Clifty Creek	2	-85.4192	38.7383	-26.8000%	-26.8000%
IN	983	Clifty Creek	3	-85.4192	38.7383	-27.6000%	-27.6000%
IN	983	Clifty Creek	5	-85.4192	38.7383	-4.8000%	-4.8000%
IN	983	Clifty Creek	6	-85.4192	38.7383	-33.3935%	-33.3935%
IN	1004	Edwardsport	CTG1	-87.2472	38.8067	-46.7214%	-46.7214%
IN	1004	Edwardsport	CTG2	-87.2472	38.8067	-47.7806%	-47.7806%
IN	1012	F B Culley Generating Station	2	-87.3267	37.91	-15.0416%	-15.0416%
IN	6113	Gibson	1	-87.7661	38.3722	-43.5000%	-43.5000%
IN	6113	Gibson	2	-87.7661	38.3722	-59.2308%	-59.2308%
IN	6113	Gibson	3	-87.7661	38.3722	-31.0833%	-31.0833%
IN	6113	Gibson	4	-87.7661	38.3722	-39.0000%	-39.0000%
IN	6113	Gibson	5	-87.7661	38.3722	-54.3125%	-54.3125%
IN	990	Harding Street Station (EW Stout)	GT4	-86.1975	39.7119	-7.6952%	-7.6952%
IN	990	Harding Street Station (EW Stout)	GT5	-86.1975	39.7119	-12.8740%	-12.8740%
IN	990	Harding Street Station (EW Stout)	GT6	-86.1975	39.7119	-3.5840%	-3.5840%
IN	7948	Hoosier Energy Lawrence Co Station	3	-86.4511	38.8003	-8.9549%	-8.9549%
IN	7948	Hoosier Energy Lawrence Co Station	5	-86.4511	38.8003	-1.1046%	-1.1046%
IN	55502	Lawrenceburg Energy Facility	3	-84.8667	39.0913	-18.3787%	-18.3787%
IN	55502	Lawrenceburg Energy Facility	4	-84.8667	39.0913	-17.1669%	-17.1669%
IN	6213	Merom	1SG1	-87.5108	39.0694	-28.2584%	-28.2584%
IN	6213	Merom	2SG1	-87.5108	39.0694	-31.1345%	-31.1345%
IN	997	Michigan City Generating Station	12	-86.9097	41.7203	-1.0000%	-1.0000%
IN	1007	Noblesville	CT3	-85.9714	40.0969	-26.9025%	-26.9025%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
IN	1007	Noblesville	CT5	-85.9714	40.0969	-13.4777%	-13.4777%
IN	994	Petersburg	1	-87.2525	38.5267	-15.4993%	-15.4993%
IN	994	Petersburg	2	-87.2525	38.5267	-52.6260%	-52.6260%
IN	994	Petersburg	3	-87.2525	38.5267	-36.3568%	-36.3568%
IN	55096	Portside Energy	CT	-87.1728	41.6317	-8.2429%	-8.2429%
IN	6085	R M Schahfer Generating Station	14	-87.0239	41.2175	-15.4078%	-15.4078%
IN	6085	R M Schahfer Generating Station	15	-87.0239	41.2175	-18.5333%	-18.5333%
IN	6085	R M Schahfer Generating Station	16A	-87.0239	41.2175	-12.0350%	-12.0350%
IN	6085	R M Schahfer Generating Station	16B	-87.0239	41.2175	-33.0220%	-33.0220%
IN	6085	R M Schahfer Generating Station	17	-87.0239	41.2175	-2.0812%	-2.0812%
IN	6085	R M Schahfer Generating Station	18	-87.0239	41.2175	-5.7679%	-5.7679%
IN	7335	Richmond (IN)	RCT2	-84.9665	39.8383	-7.6362%	-7.6362%
IN	55364	Sugar Creek Power Company, LLC	CT11	-87.5103	39.3922	-15.7580%	-15.7580%
IN	55364	Sugar Creek Power Company, LLC	CT12	-87.5103	39.3922	-17.0327%	-17.0327%
IN	55224	Wheatland Generating Facility LLC	EU-02	-87.2931	38.6716	-7.4897%	-7.4897%
IN	55259	Whiting Clean Energy, Inc.	CT1	-87.4778	41.6739	-7.1054%	-7.1054%
IN	55259	Whiting Clean Energy, Inc.	CT2	-87.4778	41.6739	-1.0373%	-1.0373%
IN	55148	Worthington Generation	3	-87.0128	39.0717	-2.7263%	-2.7263%
KS	1268	Chanute 2	14	-95.4589	37.6956	-55.8209%	-55.8209%
KS	1271	Coffeyville	4	-95.6122	37.0375	-14.3672%	-14.3672%
KS	1336	Garden City	S-2	-100.8955	37.9702	-7.8668%	-7.8668%
KS	1240	Gordon Evans Energy Center	1	-97.5214	37.7907	-12.2604%	-12.2604%
KS	1240	Gordon Evans Energy Center	2	-97.5214	37.7907	-0.1743%	-0.1743%
KS	1235	Great Bend Station aka Arthur Mullergren	3	-98.8694	38.4099	-22.7244%	-22.7244%
KS	1248	Hutchinson Energy Center	CT-1	-97.8724	38.0915	-0.9760%	-0.9760%
KS	1248	Hutchinson Energy Center	CT-2	-97.8724	38.0915	-0.8499%	-0.8499%
KS	1248	Hutchinson Energy Center	CT-3	-97.8724	38.0915	-0.8499%	-0.8499%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
KS	6068	Jeffrey Energy Center	1	-96.1172	39.2868	-61.3750%	-61.3750%
KS	6068	Jeffrey Energy Center	2	-96.1172	39.2868	-19.4667%	-19.4667%
KS	1241	La Cygne	1	-94.6466	38.3472	-15.5208%	-15.5208%
KS	1241	La Cygne	2	-94.6466	38.3472	-73.4976%	-73.4976%
KS	1250	Lawrence Energy Center	4	-95.2697	39.0084	-15.3889%	-15.3889%
KS	1250	Lawrence Energy Center	5	-95.2697	39.0084	-15.8000%	-15.8000%
KS	1242	Murray Gill Energy Center	3	-97.4138	37.5953	-12.8756%	-12.8756%
KS	1242	Murray Gill Energy Center	4	-97.4138	37.5953	-31.6818%	-31.6818%
KS	6064	Nearman Creek	CT4	-94.6972	39.1711	-91.3506%	-91.3506%
KS	6064	Nearman Creek	N1	-94.6972	39.1711	-17.5769%	-17.5769%
KS	7928	Osawatomie Generating Station	1	-94.903	38.5319	-21.2121%	-21.2121%
KS	1295	Quindaro	1	-94.6398	39.1495	-25.1316%	-25.1316%
KS	1295	Quindaro	2	-94.6398	39.1495	-34.4000%	-34.4000%
KS	1239	Riverton	12	-94.6992	37.0726	-36.1314%	-36.1314%
KS	1252	Tecumseh Energy Center	9	-95.5685	39.0536	-24.6939%	-24.6939%
KS	7929	West Gardner Generating Station	1	-94.9856	38.7878	-28.4704%	-28.4704%
KS	7929	West Gardner Generating Station	2	-94.9856	38.7878	-24.1176%	-24.1176%
KS	7929	West Gardner Generating Station	3	-94.9856	38.7878	-15.3571%	-15.3571%
KS	7929	West Gardner Generating Station	4	-94.9856	38.7878	-22.9730%	-22.9730%
KY	1355	E W Brown	1	-84.7139	37.7889	-52.5742%	-52.5742%
KY	1355	E W Brown	10	-84.7139	37.7889	-7.8844%	-7.8844%
KY	1355	E W Brown	11	-84.7139	37.7889	-5.8768%	-5.8768%
KY	1355	E W Brown	2	-84.7139	37.7889	-59.6318%	-59.6318%
KY	1355	E W Brown	5	-84.7139	37.7889	-7.9414%	-7.9414%
KY	1355	E W Brown	6	-84.7139	37.7889	-9.1376%	-9.1376%
KY	1355	E W Brown	8	-84.7139	37.7889	-31.5703%	-31.5703%
KY	6018	East Bend	2	-84.8511	38.9031	-21.7298%	-21.7298%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
KY	1356	Ghent	1	-85.035	38.7497	-16.8088%	-16.8088%
KY	1356	Ghent	2	-85.035	38.7497	-6.5234%	-6.5234%
KY	1356	Ghent	3	-85.035	38.7497	-0.2420%	-0.2420%
KY	1356	Ghent	4	-85.035	38.7497	-30.7741%	-30.7741%
KY	6041	H L Spurlock	3	-83.8175	38.7	-6.0491%	-6.0491%
KY	6041	H L Spurlock	4	-83.8175	38.7	-5.2814%	-5.2814%
KY	1384	John S. Cooper	1	-84.5917	37	-52.5346%	-52.5346%
KY	55232	Marshall	CT2	-88.3958	37.0286	-3.7984%	-3.7984%
KY	55232	Marshall	CT3	-88.3958	37.0286	-11.0225%	-11.0225%
KY	55232	Marshall	CT7	-88.3958	37.0286	-1.9241%	-1.9241%
KY	1364	Mill Creek	2	-85.91	38.0531	-2.4913%	-2.4913%
KY	1364	Mill Creek	3	-85.91	38.0531	-44.2778%	-44.2778%
KY	1364	Mill Creek	4	-85.91	38.0531	-42.2057%	-42.2057%
KY	1378	Paradise	3	-86.9783	37.2608	-32.8174%	-32.8174%
KY	6639	R D Green	G1	-87.5006	37.6467	-1.1728%	-1.1728%
KY	55198	Riverside Generating Company	GTG201	-82.6042	38.1933	-17.7647%	-17.7647%
KY	55198	Riverside Generating Company	GTG301	-82.6042	38.1933	-4.4910%	-4.4910%
KY	1383	Robert Reid	RT	-87.5033	37.6467	-0.0011%	-0.0011%
KY	1379	Shawnee	2	-88.775	37.1517	-27.9344%	-27.9344%
KY	1379	Shawnee	3	-88.775	37.1517	-26.6604%	-26.6604%
KY	1379	Shawnee	5	-88.775	37.1517	-29.9565%	-29.9565%
KY	1379	Shawnee	6	-88.775	37.1517	-28.4748%	-28.4748%
KY	1379	Shawnee	7	-88.775	37.1517	-28.2695%	-28.2695%
KY	1379	Shawnee	8	-88.775	37.1517	-28.9192%	-28.9192%
KY	1379	Shawnee	9	-88.775	37.1517	-28.4349%	-28.4349%
KY	54	Smith Generating Facility	SCT1	-84.1025	37.8824	-32.1280%	-32.1280%
KY	54	Smith Generating Facility	SCT2	-84.1025	37.8824	-12.3203%	-12.3203%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
KY	54	Smith Generating Facility	SCT3	-84.1025	37.8824	-15.9718%	-15.9718%
KY	54	Smith Generating Facility	SCT4	-84.1025	37.8824	-12.0181%	-12.0181%
KY	6071	Trimble County	10	-85.4117	38.5847	-7.5870%	-7.5870%
MS	55063	Batesville Generation Facility	1	-89.9272	34.3345	-18.2244%	-18.2244%
MS	55063	Batesville Generation Facility	2	-89.9272	34.3345	-13.6807%	-13.6807%
MS	55063	Batesville Generation Facility	3	-89.9272	34.3345	-12.8475%	-12.8475%
MS	2050	Baxter Wilson	1	-90.9306	32.2831	-19.5555%	-19.5555%
MS	55197	Caledonia	AA-001	-88.2717	33.6464	-1.7117%	-1.7117%
MS	55197	Caledonia	AA-002	-88.2717	33.6464	-15.7636%	-15.7636%
MS	2047	Chevron Cogenerating Station	5	-88.492	30.34	-15.0753%	-15.0753%
MS	55395	Crossroads Energy Center (CPU)	CT02	-90.5621	34.183	-23.1084%	-23.1084%
MS	55395	Crossroads Energy Center (CPU)	CT04	-90.5621	34.183	-17.1763%	-17.1763%
MS	6073	Daniel Electric Generating Plant	3A	-88.5574	30.5335	-11.0643%	-11.0643%
MS	6073	Daniel Electric Generating Plant	3B	-88.5574	30.5335	-11.3507%	-11.3507%
MS	6073	Daniel Electric Generating Plant	4A	-88.5574	30.5335	-13.9117%	-13.9117%
MS	6073	Daniel Electric Generating Plant	4B	-88.5574	30.5335	-14.3231%	-14.3231%
MS	8054	Gerald Andrus	1	-91.1181	33.3503	-7.6568%	-7.6568%
MS	55451	Magnolia Facility	CTG-2	-89.2017	34.8358	-17.2426%	-17.2426%
MS	55451	Magnolia Facility	CTG-3	-89.2017	34.8358	-5.3603%	-5.3603%
MS	2070	Moselle Generating Plant	**4	-89.2992	31.5289	-0.4288%	-0.4288%
MS	55706	NRG Wholesale Generation LP	CTG2	-89.4201	33.2881	-56.3861%	-56.3861%
MS	55706	NRG Wholesale Generation LP	CTG3	-89.4201	33.2881	-69.0586%	-69.0586%
MS	6061	R D Morrow Senior Generating Plant	1	-89.3933	31.2194	-14.8498%	-14.8498%
MS	6061	R D Morrow Senior Generating Plant	2	-89.3933	31.2194	-25.7742%	-25.7742%
MS	55076	Red Hills Generation Facility	AA001	-89.2183	33.3761	-5.4872%	-5.4872%
MS	2053	Rex Brown	3	-90.2125	32.3564	-32.7678%	-32.7678%
MS	7988	Silver Creek Generating Plant	2	-89.9468	31.6004	-8.3830%	-8.3830%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
MS	55269	Southaven Combined Cycle	AA-001	-90.039	34.9939	-11.1367%	-11.1367%
MS	55269	Southaven Combined Cycle	AA-002	-90.039	34.9939	-4.3414%	-4.3414%
MS	55694	TVA Ackerman Combined Cycle	AA-001	-89.2039	33.3806	-24.2372%	-24.2372%
MS	55694	TVA Ackerman Combined Cycle	AA-002	-89.2039	33.3806	-10.3641%	-10.3641%
NY	7910	23rd and 3rd	2301	-74	40.663	-1.1376%	-1.1376%
NY	7910	23rd and 3rd	2302	-74	40.663	-6.0690%	-6.0690%
NY	10619	Allegany Station No. 133	00001	-78.0661	42.5083	-83.3333%	-83.3333%
NY	2490	Arthur Kill	20	-74.2027	40.5915	-30.5369%	-30.5369%
NY	2490	Arthur Kill	30	-74.2027	40.5915	-18.3223%	-18.3223%
NY	55375	Astoria Energy	CT2	-73.8964	40.7825	-46.5601%	-46.5601%
NY	8906	Astoria Generating Station	20	-73.9122	40.7869	-38.5146%	-38.5146%
NY	55405	Athens Generating Company	1	-73.8492	42.2728	-26.4697%	-26.4697%
NY	54593	Batavia Energy	1	-78.1592	42.9828	-7.2144%	-7.2144%
NY	55699	Bayswater Peaking Facility	2	-73.7614	40.6106	-25.9671%	-25.9671%
NY	2539	Bethlehem Energy Center (Albany)	10001	-73.7636	42.5905	-26.6709%	-26.6709%
NY	2539	Bethlehem Energy Center (Albany)	10002	-73.7636	42.5905	-27.7934%	-27.7934%
NY	2539	Bethlehem Energy Center (Albany)	10003	-73.7636	42.5905	-27.1982%	-27.1982%
NY	50292	Bethpage Energy Center	GT3	-73.4994	40.7469	-10.5562%	-10.5562%
NY	55600	Binghamton Cogen Plant	1	-75.9283	42.1073	-77.1007%	-77.1007%
NY	2625	Bowline Generating Station	1	-73.9689	41.2044	-26.8667%	-26.8667%
NY	2625	Bowline Generating Station	2	-73.9689	41.2044	-25.4667%	-25.4667%
NY	7912	Brentwood	BW01	-73.194	40.7869	-13.7951%	-13.7951%
NY	54914	Brooklyn Navy Yard Cogeneration	1	-73.9758	40.6994	-16.5702%	-16.5702%
NY	54914	Brooklyn Navy Yard Cogeneration	2	-73.9758	40.6994	-23.4545%	-23.4545%
NY	56234	Caithness Long Island Energy Center	0001	-72.9403	40.8142	-3.0603%	-3.0603%
NY	10620	Carthage Energy	1	-75.6225	43.9842	-7.2674%	-7.2674%
NY	8006	Dynegy Roseton	1	-73.9739	41.5711	-30.3333%	-30.3333%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
NY	8006	Dynegy Roseton	2	-73.9739	41.5711	-20.3333%	-20.3333%
NY	2511	E F Barrett	10	-73.6486	40.6169	-2.0050%	-2.0050%
NY	2493	East River	1	-73.9742	40.7281	-18.0096%	-18.0096%
NY	2493	East River	2	-73.9742	40.7281	-9.0876%	-9.0876%
NY	2493	East River	60	-73.9742	40.7281	-30.2000%	-30.2000%
NY	2493	East River	70	-73.9742	40.7281	-36.2000%	-36.2000%
NY	54131	Fortistar North Tonawanda Inc	NTCT1	-78.8539	43.0483	-1.3036%	-1.3036%
NY	2514	Glenwood	U00020	-73.6479	40.8269	-9.1539%	-9.1539%
NY	2514	Glenwood	U00021	-73.6479	40.8269	-9.1738%	-9.1738%
NY	7869	Glenwood Landing Energy Center	UGT013	-73.6478	40.8275	-40.6470%	-40.6470%
NY	7914	Harlem River Yard	HR01	-73.9147	40.7989	-4.4361%	-4.4361%
NY	7913	Hell Gate	HG02	-73.9093	40.7988	-3.3228%	-3.3228%
NY	8007	Holtsville Facility	U00009	-73.0664	40.8153	-0.7105%	-0.7105%
NY	8007	Holtsville Facility	U00015	-73.0664	40.8153	-2.5000%	-2.5000%
NY	50458	Indeck-Corinth Energy Center	1	-73.8125	43.25	-0.5852%	-0.5852%
NY	50450	Indeck-Oswego Energy Center	1	-76.4965	43.4682	-15.8741%	-15.8741%
NY	50451	Indeck-Yerkes Energy Center	1	-78.9182	42.9671	-4.1896%	-4.1896%
NY	54547	Independence	1	-76.4508	43.495	-6.8952%	-6.8952%
NY	54547	Independence	2	-76.4508	43.495	-10.8445%	-10.8445%
NY	54547	Independence	3	-76.4508	43.495	-12.7048%	-12.7048%
NY	54041	Lockport	011854	-78.7453	43.1622	-18.2037%	-18.2037%
NY	54041	Lockport	011855	-78.7453	43.1622	-18.2088%	-18.2088%
NY	54041	Lockport	011856	-78.7453	43.1622	-35.7459%	-35.7459%
NY	2516	Northport	1	-73.3417	40.9231	-38.9969%	-38.9969%
NY	2516	Northport	2	-73.3417	40.9231	-31.5109%	-31.5109%
NY	2516	Northport	3	-73.3417	40.9231	-44.4241%	-44.4241%
NY	2516	Northport	4	-73.3417	40.9231	-5.7592%	-5.7592%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
NY	2594	Oswego Harbor Power	5	-76.53	43.46	-9.4800%	-9.4800%
NY	2594	Oswego Harbor Power	6	-76.53	43.46	-21.1818%	-21.1818%
NY	56188	Pinelawn Power	00001	-73.3881	40.7358	-11.9073%	-11.9073%
NY	2517	Port Jefferson Energy Center	3	-73.0786	40.9503	-37.9342%	-37.9342%
NY	2517	Port Jefferson Energy Center	4	-73.0786	40.9503	-0.6981%	-0.6981%
NY	8053	Pouch Terminal	PT01	-74.069	40.6188	-3.2867%	-3.2867%
NY	2500	Ravenswood Generating Station	20	-73.9451	40.7585	-8.8571%	-8.8571%
NY	2500	Ravenswood Generating Station	30	-73.9451	40.7585	-4.5012%	-4.5012%
NY	2682	S A Carlson	20	-79.2417	42.0917	-4.7500%	-4.7500%
NY	54574	Saranac Power Partners, LP	00001	-73.4557	44.7132	-25.0600%	-25.0600%
NY	54574	Saranac Power Partners, LP	00002	-73.4557	44.7132	-18.0821%	-18.0821%
NY	7146	Wading River Facility	UGT007	-72.8781	40.9575	-62.5000%	-62.5000%
NY	7146	Wading River Facility	UGT008	-72.8781	40.9575	-27.1053%	-27.1053%
NY	7146	Wading River Facility	UGT009	-72.8781	40.9575	-47.4211%	-47.4211%
NY	10617	WPS Beaver Falls Generation, LLC	1	-75.4342	43.8861	-53.2358%	-53.2358%
NY	10621	WPS Syracuse Generation, LLC	1	-76.2144	43.0664	-83.0061%	-83.0061%
OH	2836	Avon Lake Power Plant	10	-82.05	41.5042	-13.3855%	-13.3855%
OH	2836	Avon Lake Power Plant	12	-82.05	41.5042	-24.5329%	-24.5329%
OH	2836	Avon Lake Power Plant	CT10	-82.05	41.5042	-0.0121%	-0.0121%
OH	2878	Bay Shore	1	-83.4375	41.6925	-35.9324%	-35.9324%
OH	55228	Greenville Electric Gen Station	G2CT1	-84.6147	40.0747	-0.3385%	-0.3385%
OH	55228	Greenville Electric Gen Station	G2CT2	-84.6147	40.0747	-0.3517%	-0.3517%
OH	55736	Hanging Rock Energy Facility	CTG1	-82.7833	38.5731	-10.6347%	-10.6347%
OH	55736	Hanging Rock Energy Facility	CTG2	-82.7833	38.5731	-1.8029%	-1.8029%
OH	55736	Hanging Rock Energy Facility	CTG3	-82.7833	38.5731	-5.8590%	-5.8590%
OH	2876	Kyger Creek	1	-82.1281	38.9161	-60.8469%	-60.8469%
OH	2876	Kyger Creek	2	-82.1281	38.9161	-61.4214%	-61.4214%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
OH	2876	Kyger Creek	3	-82.1281	38.9161	-59.9144%	-59.9144%
OH	2876	Kyger Creek	4	-82.1281	38.9161	-57.8189%	-57.8189%
OH	2876	Kyger Creek	5	-82.1281	38.9161	-58.0896%	-58.0896%
OH	55110	Madison Generating Station	1	-84.465	39.4522	-15.1515%	-15.1515%
OH	2832	Miami Fort Generating Station	7	-84.8031	39.1131	-14.5712%	-14.5712%
OH	2861	Niles	CTA	-80.75	41.1667	-0.0329%	-0.0329%
OH	55401	Rolling Hills Generating LLC	CT-1	-82.3328	39.0839	-0.6495%	-0.6495%
OH	55248	Tait Electric Generating Station	CT4	-84.2106	39.7286	-23.4908%	-23.4908%
OH	55248	Tait Electric Generating Station	CT5	-84.2106	39.7286	-14.0200%	-14.0200%
OH	55248	Tait Electric Generating Station	CT6	-84.2106	39.7286	-16.6687%	-16.6687%
OH	55248	Tait Electric Generating Station	CT7	-84.2106	39.7286	-28.9429%	-28.9429%
OH	2866	W H Sammis	5	-80.6311	40.5308	-15.1713%	-15.1713%
OH	2866	W H Sammis	7	-80.6311	40.5308	-2.8958%	-2.8958%
OH	6019	W H Zimmer Generating Station	1	-84.2286	38.8689	-11.2234%	-11.2234%
OH	55503	Waterford Plant	1	-81.7172	39.5314	-30.3330%	-30.3330%
OH	55503	Waterford Plant	2	-81.7172	39.5314	-33.9624%	-33.9624%
OH	55503	Waterford Plant	3	-81.7172	39.5314	-26.0026%	-26.0026%
OH	2869	West Lorain	1A	-82.2633	41.4297	-55.6667%	-55.6667%
OH	2869	West Lorain	1B	-82.2633	41.4297	-51.1667%	-51.1667%
OH	7158	Woodsdale	**GT6	-84.4611	39.4492	-13.3599%	-13.3599%
OK	10671	AES Shady Point	1A	-94.6701	35.170591	-29.4694%	-29.4694%
OK	10671	AES Shady Point	1B	-94.6701	35.170591	-30.6827%	-30.6827%
OK	10671	AES Shady Point	2A	-94.6701	35.170591	-33.4390%	-33.4390%
OK	10671	AES Shady Point	2B	-94.6701	35.170591	-33.8328%	-33.8328%
OK	3006	Anadarko	10	-98.23	35.0847	-2.2128%	-2.2128%
OK	3006	Anadarko	11	-98.23	35.0847	-4.2471%	-4.2471%
OK	3006	Anadarko	3	-98.23	35.0847	-41.5862%	-41.5862%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
OK	3006	Anadarko	4	-98.23	35.0847	-61.5183%	-61.5183%
OK	3006	Anadarko	5	-98.23	35.0847	-48.0243%	-48.0243%
OK	3006	Anadarko	6	-98.23	35.0847	-44.7447%	-44.7447%
OK	3006	Anadarko	9	-98.23	35.0847	-2.3071%	-2.3071%
OK	58325	Charles D Lamb Energy Center	1	-97.1252	36.8138	-10.6936%	-10.6936%
OK	7757	Chouteau Power Plant	3	-95.2756	36.2206	-42.3979%	-42.3979%
OK	7757	Chouteau Power Plant	4	-95.2756	36.2206	-43.5980%	-43.5980%
OK	8059	Comanche (8059)	7251	-98.3244	34.5431	-72.5333%	-72.5333%
OK	8059	Comanche (8059)	7252	-98.3244	34.5431	-46.2000%	-46.2000%
OK	55146	Green Country Energy, LLC	CTGEN1	-95.9346	35.9833	-21.5795%	-21.5795%
OK	55146	Green Country Energy, LLC	CTGEN2	-95.9346	35.9833	-30.6021%	-30.6021%
OK	55146	Green Country Energy, LLC	CTGEN3	-95.9346	35.9833	-20.8012%	-20.8012%
OK	6772	Hugo	1	-95.3206	34.0158	-4.3041%	-4.3041%
OK	55457	McClain Energy Facility	CT1	-97.5896	35.2979	-2.7617%	-2.7617%
OK	2952	Muskogee	4	-95.2847	35.7617	-10.8000%	-10.8000%
OK	2952	Muskogee	5	-95.2847	35.7617	-9.3333%	-9.3333%
OK	2952	Muskogee	6	-95.2847	35.7617	-18.9796%	-18.9796%
OK	2963	Northeastern	3301A	-95.7008	36.4317	-8.2043%	-8.2043%
OK	2963	Northeastern	3301B	-95.7008	36.4317	-14.6168%	-14.6168%
OK	2963	Northeastern	3313	-95.7008	36.4317	-16.4667%	-16.4667%
OK	50558	Oklahoma Cogeneration LLC	CC01	-97.6479	35.4419	-38.0500%	-38.0500%
OK	55225	Oneta Energy Center	CTG-4	-95.6967	36.0119	-10.6008%	-10.6008%
OK	762	Ponca	2	-97.0868	36.7205	-31.8351%	-31.8351%
OK	762	Ponca	3	-97.0868	36.7205	-1.1646%	-1.1646%
OK	55463	Redbud Power Plant	CT-01	-97.2242	35.6853	-2.3314%	-2.3314%
OK	55463	Redbud Power Plant	CT-02	-97.2242	35.6853	-4.2795%	-4.2795%
OK	55463	Redbud Power Plant	CT-04	-97.2242	35.6853	-6.8105%	-6.8105%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
OK	4940	Riverside (4940)	1502	-95.9567	35.9978	-20.1145%	-20.1145%
OK	4940	Riverside (4940)	1503	-95.9567	35.9978	-21.9892%	-21.9892%
OK	4940	Riverside (4940)	1504	-95.9567	35.9978	-80.0666%	-80.0666%
OK	2956	Seminole (2956)	1	-96.7242	34.9678	-48.2759%	-48.2759%
OK	2956	Seminole (2956)	2	-96.7242	34.9678	-57.4057%	-57.4057%
OK	2956	Seminole (2956)	3	-96.7242	34.9678	-38.8415%	-38.8415%
OK	6095	Sooner	1	-97.0527	36.4537	-0.5469%	-0.5469%
OK	6095	Sooner	2	-97.0527	36.4537	-4.5689%	-4.5689%
OK	2964	Southwestern	8002	-98.3524	35.1009	-2.7471%	-2.7471%
OK	2964	Southwestern	801N	-98.3524	35.1009	-21.4115%	-21.4115%
OK	2964	Southwestern	801S	-98.3524	35.1009	-5.3845%	-5.3845%
OK	55651	Spring Creek Power Plant	CT-02	-97.655	35.7422	-13.0732%	-13.0732%
OK	55501	Tenaska Kiamichi Generating Station	CTGDB1	-95.9349	34.6831	-25.8537%	-25.8537%
OK	55501	Tenaska Kiamichi Generating Station	CTGDB2	-95.9349	34.6831	-25.0152%	-25.0152%
OK	55501	Tenaska Kiamichi Generating Station	CTGDB3	-95.9349	34.6831	-24.5814%	-24.5814%
OK	55501	Tenaska Kiamichi Generating Station	CTGDB4	-95.9349	34.6831	-22.8838%	-22.8838%
PA	55710	Allegheny Energy Units 3, 4 & 5	3	-79.7669	40.5456	-45.3928%	-45.3928%
PA	55710	Allegheny Energy Units 3, 4 & 5	4	-79.7669	40.5456	-37.1230%	-37.1230%
PA	55377	Allegheny Energy Units 8 & 9	8	-79.8388	39.7475	-10.4360%	-10.4360%
PA	55377	Allegheny Energy Units 8 & 9	9	-79.8388	39.7475	-12.8122%	-12.8122%
PA	55347	Armstrong Energy Ltd Part	3	-79.3503	40.6383	-7.2464%	-7.2464%
PA	55347	Armstrong Energy Ltd Part	4	-79.3503	40.6383	-4.7208%	-4.7208%
PA	55690	Bethlehem Power Plant	1	-75.3147	40.6175	-29.3466%	-29.3466%
PA	55690	Bethlehem Power Plant	2	-75.3147	40.6175	-23.0419%	-23.0419%
PA	55690	Bethlehem Power Plant	3	-75.3147	40.6175	-31.1487%	-31.1487%
PA	55690	Bethlehem Power Plant	5	-75.3147	40.6175	-22.3602%	-22.3602%
PA	55690	Bethlehem Power Plant	6	-75.3147	40.6175	-38.7501%	-38.7501%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
PA	55690	Bethlehem Power Plant	7	-75.3147	40.6175	-25.1767%	-25.1767%
PA	6094	Bruce Mansfield	1	-80.42	40.6344	-45.8333%	101.7500%
PA	6094	Bruce Mansfield	2	-80.42	40.6344	-27.1151%	58.2778%
PA	6094	Bruce Mansfield	3	-80.42	40.6344	-2.8358%	289.8320%
PA	3140	Brunner Island	1	-76.6962	40.097	-10.1000%	-10.1000%
PA	3140	Brunner Island	2	-76.6962	40.097	-20.3000%	-20.3000%
PA	3140	Brunner Island	3	-76.6962	40.097	-4.2000%	-4.2000%
PA	3096	Brunot Island Power Station	2A	-80.044	40.4638	-45.2908%	-45.2908%
PA	3096	Brunot Island Power Station	2B	-80.044	40.4638	-53.4394%	-53.4394%
PA	55524	Calpine Mid Merit, LLC - York Energy	3	-76.30945	39.737374	-3.9284%	-3.9284%
PA	10641	Cambria Cogen	1	-78.7021	40.4748	-25.2947%	79.3717%
PA	10641	Cambria Cogen	2	-78.7021	40.4748	-26.8071%	69.6781%
PA	55654	Chambersburg Units 12 and 13	12	-77.6859	39.8668	-3.4930%	-3.4930%
PA	55654	Chambersburg Units 12 and 13	13	-77.6859	39.8668	-1.6261%	-1.6261%
PA	8226	Cheswick	1	-79.7906	40.5383	-66.3262%	58.3901%
PA	3118	Conemaugh	1	-79.0611	40.3842	-40.0000%	88.7500%
PA	3118	Conemaugh	2	-79.0611	40.3842	-38.0000%	66.9167%
PA	8012	Croydon Generating Station	11	-74.8917	40.08	-15.7286%	-15.7286%
PA	8012	Croydon Generating Station	12	-74.8917	40.08	-15.7286%	-15.7286%
PA	8012	Croydon Generating Station	21	-74.8917	40.08	-15.7143%	-15.7143%
PA	8012	Croydon Generating Station	22	-74.8917	40.08	-15.7000%	-15.7000%
PA	8012	Croydon Generating Station	31	-74.8917	40.08	-15.7000%	-15.7000%
PA	8012	Croydon Generating Station	32	-74.8917	40.08	-15.7143%	-15.7143%
PA	8012	Croydon Generating Station	41	-74.8917	40.08	-15.7000%	-15.7000%
PA	8012	Croydon Generating Station	42	-74.8917	40.08	-15.6857%	-15.6857%
PA	3161	Eddystone Generating Station	3	-75.323	39.858	-51.2310%	-51.2310%
PA	3161	Eddystone Generating Station	4	-75.323	39.858	-51.6353%	-51.6353%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
PA	55298	Fairless Energy, LLC	1A	-74.7406	40.1464	-4.8542%	-4.8542%
PA	55801	FPL Energy Marcus Hook, LP	0001	-75.4225	39.8083	-6.7926%	-6.7926%
PA	55801	FPL Energy Marcus Hook, LP	0003	-75.4225	39.8083	-3.7353%	-3.7353%
PA	3122	Homer City	1	-79.1968	40.511	-45.0000%	207.2500%
PA	3122	Homer City	2	-79.1968	40.511	-31.6667%	226.2500%
PA	3122	Homer City	3	-79.1968	40.511	-27.5000%	246.9167%
PA	55976	Hunterstown Combined Cycle	CT301	-77.1672	39.8725	-24.1394%	-24.1394%
PA	3136	Keystone	1	-79.3411	40.6604	-63.1667%	209.7500%
PA	3136	Keystone	2	-79.3411	40.6604	-63.9167%	202.5000%
PA	55231	Liberty Electric Power Plant	0001	-75.3361	39.8622	-0.7407%	-0.7407%
PA	3148	Martins Creek	3	-75.107	40.796	-16.7609%	-16.7609%
PA	3148	Martins Creek	4	-75.107	40.796	-29.1612%	-29.1612%
PA	3149	Montour	1	-76.6672	41.0714	-63.3333%	238.4167%
PA	3149	Montour	2	-76.6672	41.0714	-60.6667%	253.5000%
PA	10343	Mt. Carmel Cogeneration	SG-101	-76.4539	40.8092	-56.9552%	-56.9552%
PA	3138	New Castle	3	-80.3681	40.9378	-21.7000%	-21.7000%
PA	3138	New Castle	4	-80.3681	40.9378	-34.7000%	-34.7000%
PA	3138	New Castle	5	-80.3681	40.9378	-22.1000%	-22.1000%
PA	55193	Ontelaunee Energy Center	CT1	-75.9353	40.4219	-2.6606%	-2.6606%
PA	55193	Ontelaunee Energy Center	CT2	-75.9353	40.4219	-17.3008%	-17.3008%
PA	58420	Panda Liberty Power Project	CT1	-76.3899	41.7674	-8.5714%	-8.5714%
PA	58420	Panda Liberty Power Project	CT2	-76.3899	41.7674	-12.8571%	-12.8571%
PA	58426	Panda Patriot LLC	CT1	-76.8392	41.808	-5.7143%	-5.7143%
PA	58426	Panda Patriot LLC	CT2	-76.8392	41.808	-10.0000%	-10.0000%
PA	50776	Panther Creek Energy Facility	1	-75.8781	40.8556	-19.5643%	3.9536%
PA	50776	Panther Creek Energy Facility	2	-75.8781	40.8556	-15.7224%	5.3470%
PA	50974	Scrubgrass Generating Plant	1	-79.8114	41.2678	-54.1069%	25.2848%

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Unit Level Data						Modeling Adjustment Values	
State	oris	Facility Name	unit id	Longitude	Latitude	Scenario 184C-1: Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Down by X% (%)	Scenario 184C-2: Non-Optimized SCR/SNCR in PA & CSAPR Update for All Others. Start from "Off the Shelf/Business as Usual (ERTAC 2.7 Reference Case). Adjust 2023 OS NOx Mass Up or Down by X% (%)
ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	ERTAC 2.7	Calculated	Calculated
PA	50974	Scrubgrass Generating Plant	2	-79.8114	41.2678	-38.1857%	22.2985%
PA	3130	Seward	1	-79.0339	40.4081	-19.0600%	18.2380%
PA	3130	Seward	2	-79.0339	40.4081	-17.5528%	18.1928%
PA	3131	Shawville	1	-78.3656	41.067	-28.6000%	-28.6000%
PA	3131	Shawville	2	-78.3656	41.067	-24.8000%	-24.8000%
PA	3131	Shawville	3	-78.3656	41.067	-37.7000%	-37.7000%
PA	3131	Shawville	4	-78.3656	41.067	-31.8000%	-31.8000%
PA	54634	St. Nicholas Cogeneration Project	1	-76.1736	40.8222	-2.4428%	-2.4428%
PA	50879	Wheelabrator – Frackville	GEN1	-76.1781	40.7817	-31.3786%	-31.3786%
WV	55284	Big Sandy Peaker Plant	GS08	-82.5938	38.3441	-2.0163%	-2.0163%
WV	55284	Big Sandy Peaker Plant	GS09	-82.5938	38.3441	-3.6317%	-3.6317%
WV	55284	Big Sandy Peaker Plant	GS10	-82.5938	38.3441	-2.0699%	-2.0699%
WV	55284	Big Sandy Peaker Plant	GS11	-82.5938	38.3441	-6.1292%	-6.1292%
WV	55284	Big Sandy Peaker Plant	GS12	-82.5938	38.3441	-0.1445%	-0.1445%
WV	3943	Fort Martin Power Station	1	-79.9275	39.7107	-14.2539%	-14.2539%
WV	3944	Harrison Power Station	1	-80.3326	39.384	-45.2475%	-45.2475%
WV	3944	Harrison Power Station	2	-80.3326	39.384	-56.9185%	-56.9185%
WV	3944	Harrison Power Station	3	-80.3326	39.384	-66.2760%	-66.2760%
WV	56671	Longview Power	001	-79.95889	39.70788	-13.3846%	-13.3846%
WV	3954	Mount Storm Power Station	1	-79.2667	39.2014	-14.8282%	-14.8282%
WV	3954	Mount Storm Power Station	3	-79.2667	39.2014	-6.5118%	-6.5118%
WV	55349	Pleasants Energy, LLC	1	-81.3639	39.3328	-6.5543%	-6.5543%
WV	6004	Pleasants Power Station	1	-81.2944	39.3668	-40.2743%	-40.2743%

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2.6 Modeling Results

This section will describe the sensitivity modeling results.

In Table 9 is the maximum ozone benefit for all OTR states south of Massachusetts (MA). Table 9 represents the maximum reduction in ozone concentrations had PA coal fired EGUs with SCR or SNCR optimized running their controls. Maryland would have experienced a decrease in ozone concentration of 7 ppb. This was only second to PA which would have experienced a decrease in ozone of over 10 ppb.

Table 9. Maximum Ozone Benefit for All Ozone Transport Region (OTR) States South of Massachusetts (MA)

State	Maximum Ozone Benefit (ppb)
RI	1.2
CT	2.1
NY	4.2
NJ	5.8
PA	10.7
DE	3.2
MD	7.0
DC	4.5
VA	4.0

In Table 10 are several key OTR ozone monitors with each monitors corresponding maximum ozone benefit had PA coal fired EGUs with SCR or SNCR optimized running their controls during the summer ozone season. For example, the Maryland PG Equestrian monitor had a predicted ozone reduction of 4.9 ppb, and the Susan Wagner HS, NY and Aurora Hills Visitors Center, VA both had a predicted ozone reductions of 4.5 ppb.

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Table 10. Maximum Ozone Benefit for Key Monitors in the Ozone Transport Region (OTR)

Monitor, State	AQS #	Maximum Ozone Benefit (ppb)
Greenwich Point Park, CT	90010017	2.1
Fairfield, CT	90013007	1.9
Sherwood Island Connector, CT	90019003	2.1
Hammonasset State Park, CT	90099002	1.5
Fair Hill, MD	240150003	3.5
Edgewood, MD	240251001	2.6
PG Equestrian Center, MD	240338003	4.9
Ancora State Hospital, NJ	340071001	2.5
Clarksboro, NJ	340150002	2.6
Susan Wagner HS, NY	360850067	4.5
Babylon, NY	361030002	2.4
Bucks County, PA	420170012	3.8
Northeast Airport, PA	421010024	3.6
Aurora Hills Visitors Center, VA	510130020	4.5

Figures 1-14 show the maximum ozone reduction by day in July for each of the monitors in Table 10. The sensitivity modeling was completed for the month of July but only days 1 – 30 are shown. This is due to not having the results for August 1^{st} which is needed to accurately calculate 8-hour ozone on July 31^{st}.

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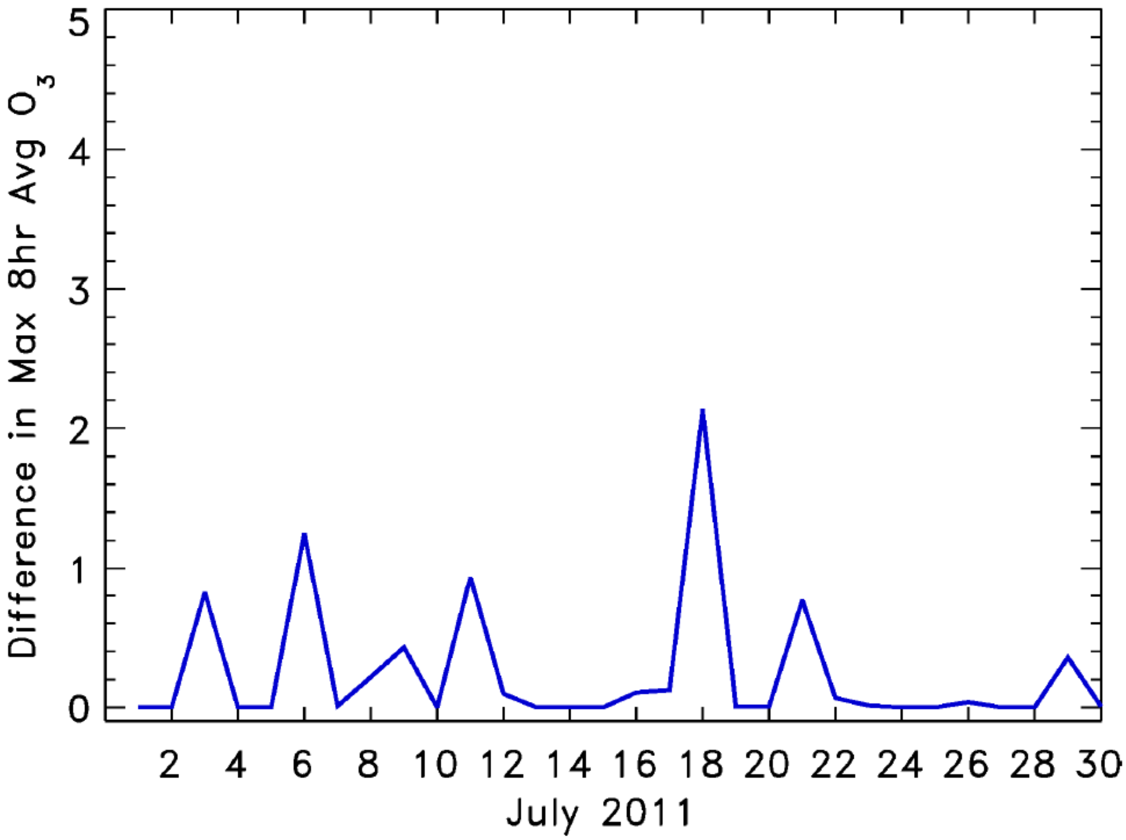

Figure 1 – Greenwich Point Park, CT (#90010017) Difference in Maximum 8-Hour Average Ozone

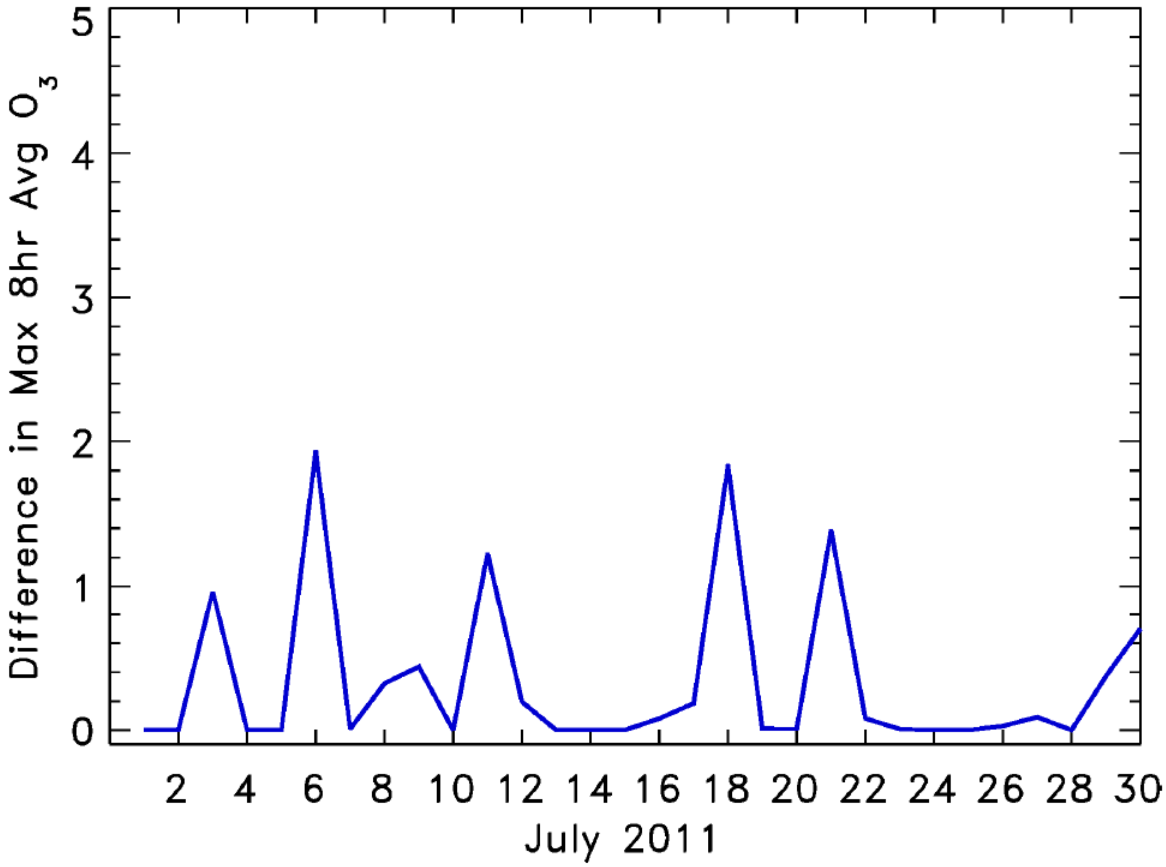

Figure 2 – Fairfield, CT (#90013007) Difference in Maximum 8-Hour Average Ozone

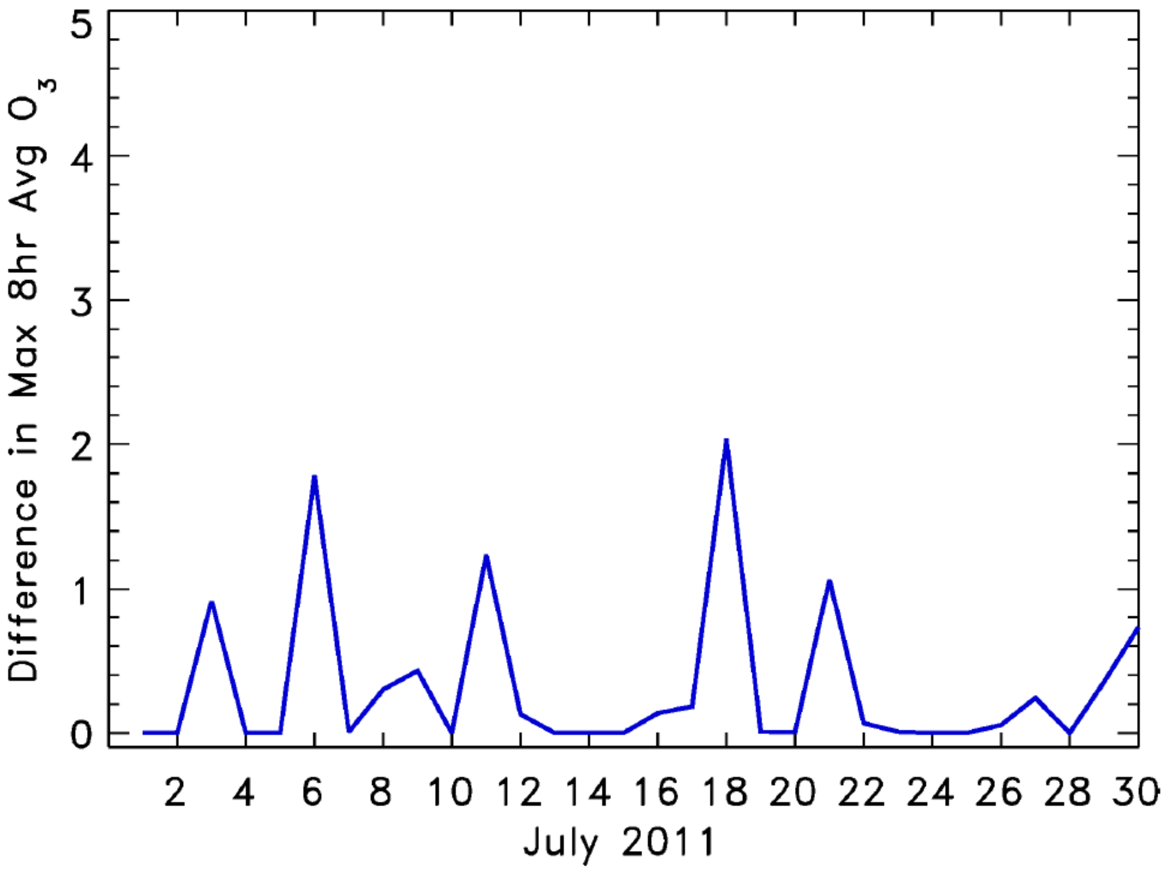

Figure 3 – Sherwood Island Connector, CT (#90019003) Difference in Maximum 8-Hour Average Ozone

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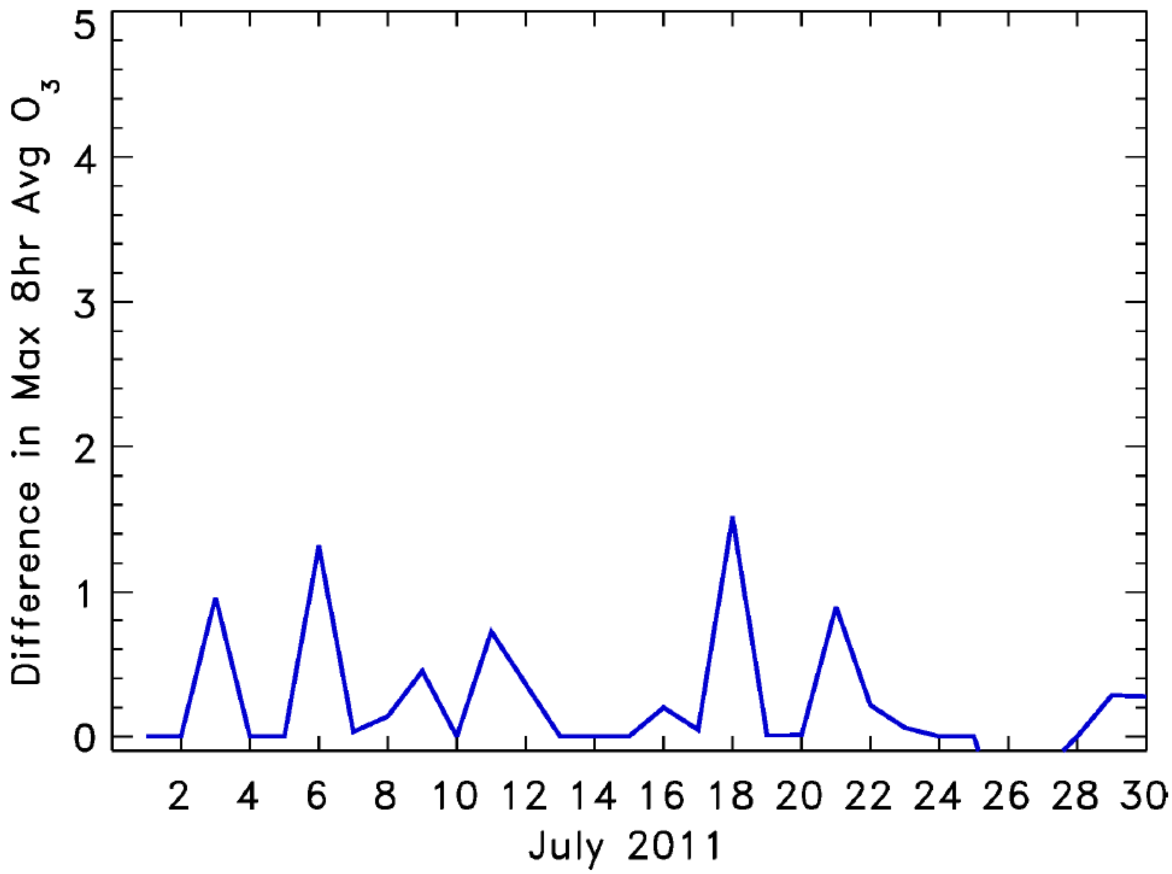

Figure 4 – Hammonasset State Park, CT (#90099002) Difference in Maximum 8-Hour Average Ozone

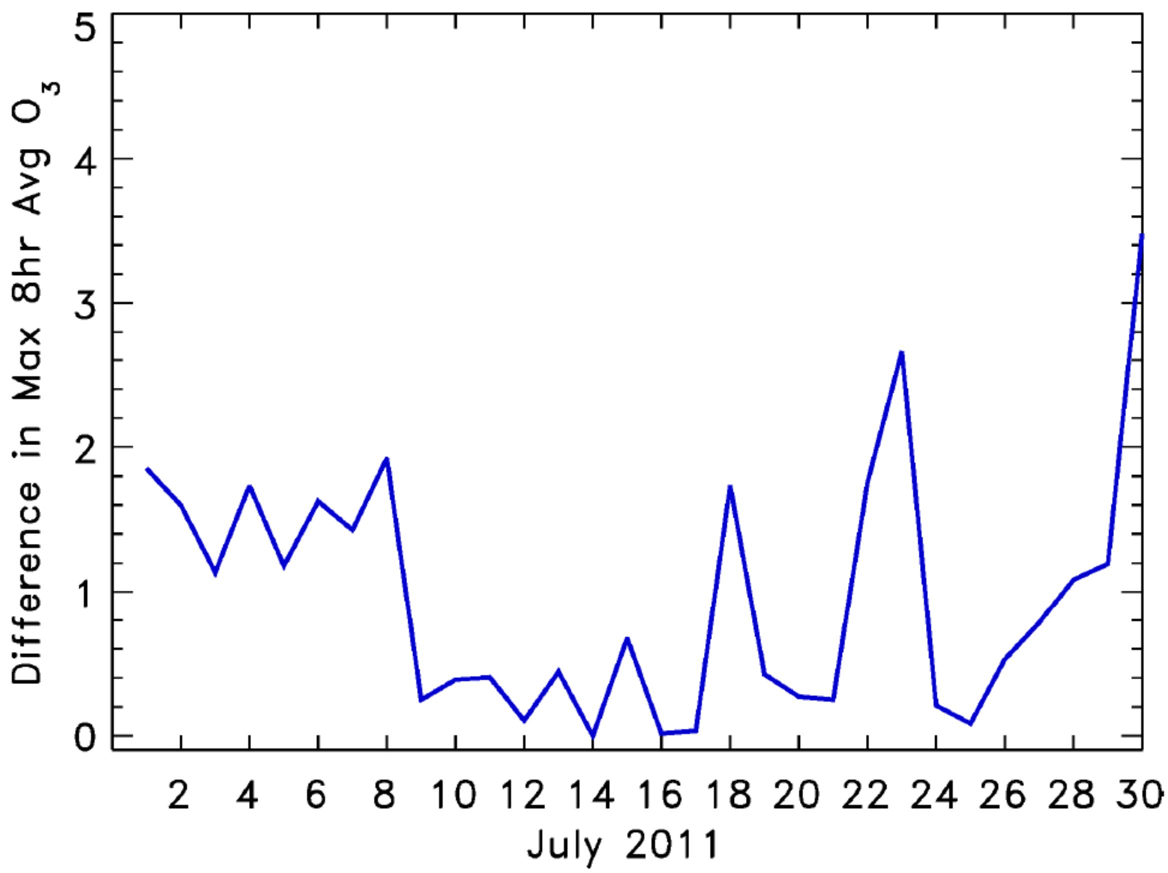

Figure 5 – Fairhill, MD (#240150003) Difference in Maximum 8-Hour Average Ozone

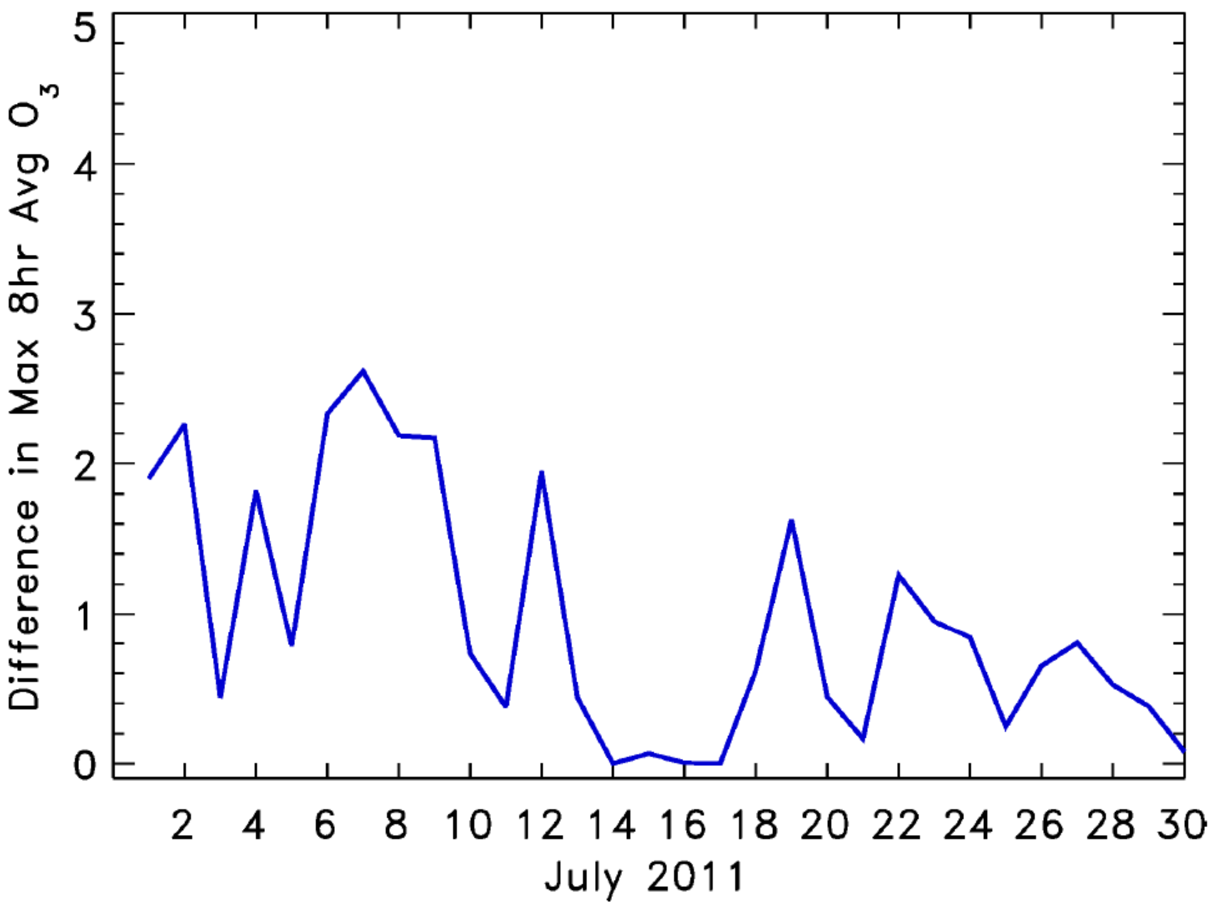

Figure 6 – Edgewood, MD (#240251001) Difference in Maximum 8-Hour Average Ozone

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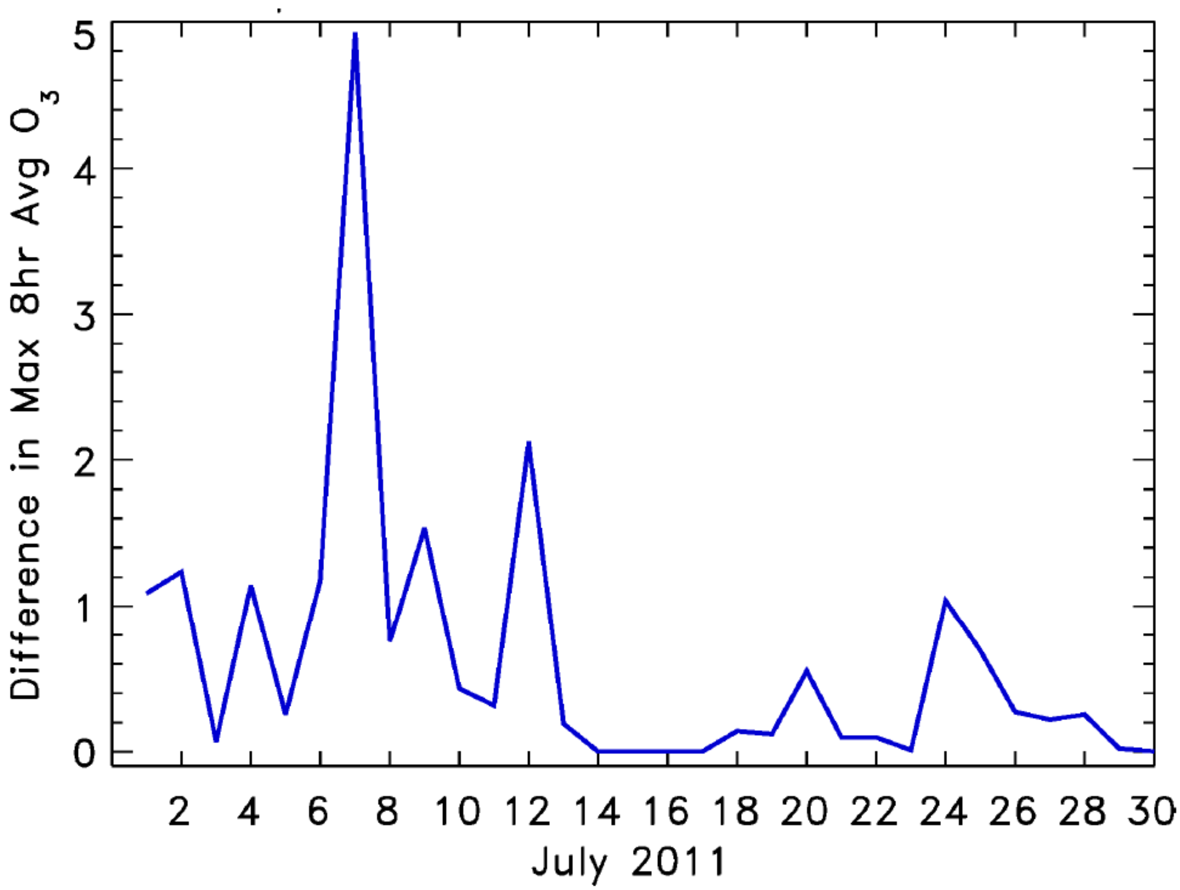

Figure 7 – PG Equestrian Center, MD (#240338003) Difference in Maximum 8-Hour Average Ozone

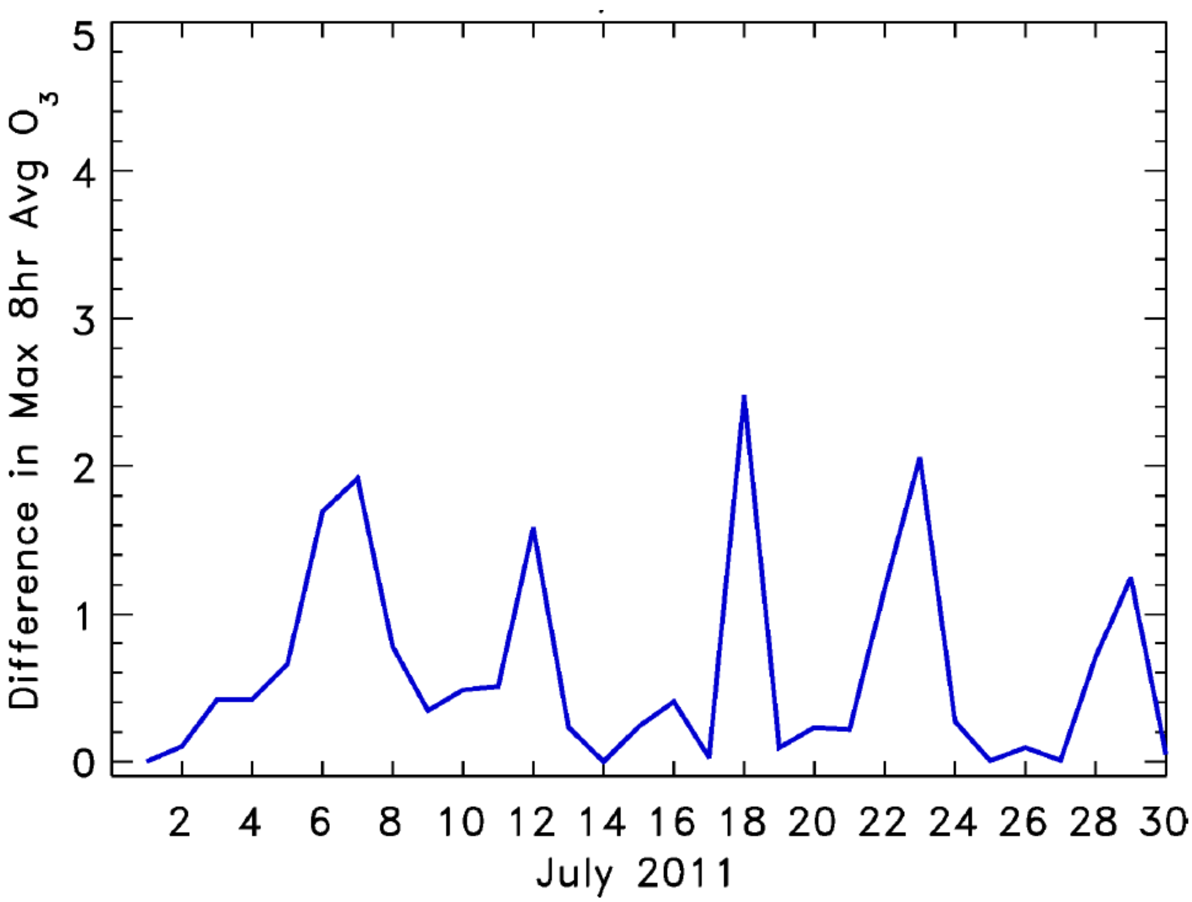

Figure 8 – Ancora State Hospital, NJ (#340071001) Difference in Maximum 8-Hour Average Ozone

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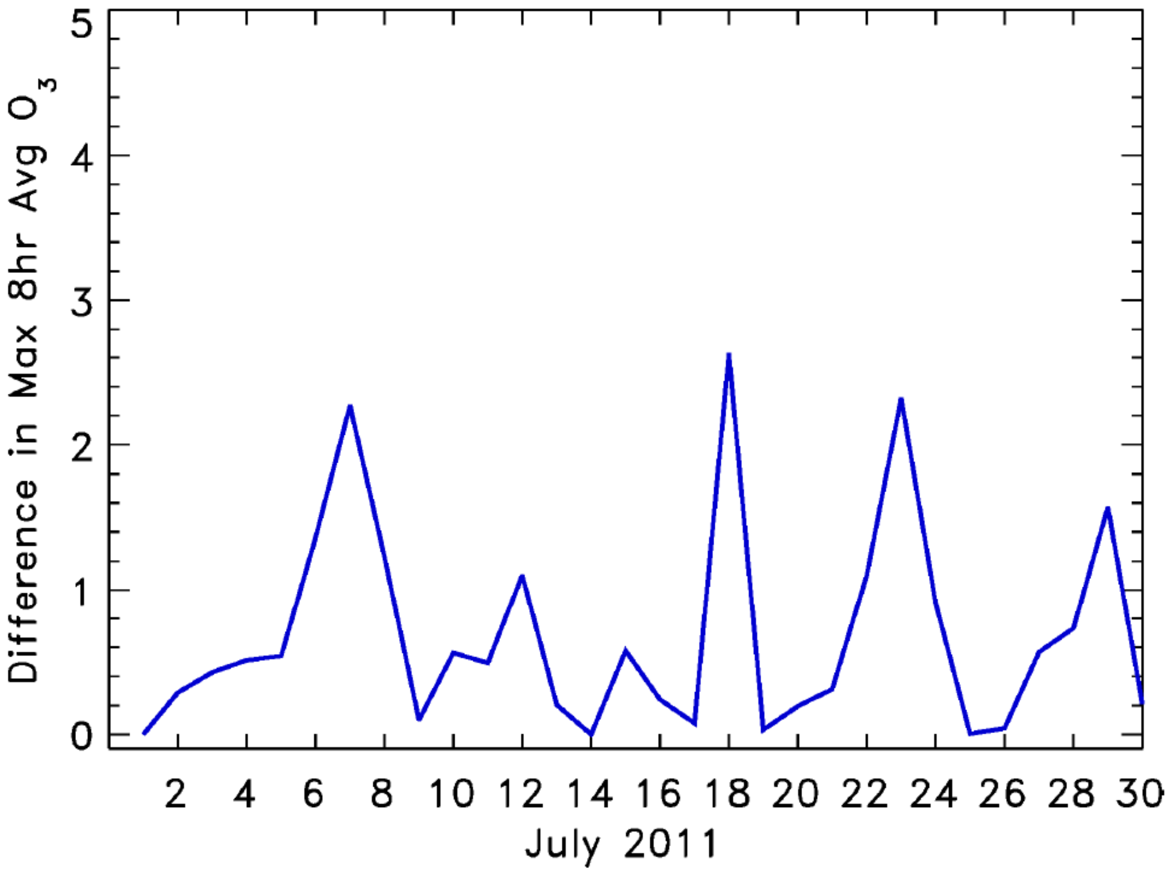

Figure 9 – Clarksboro, NJ (#340150002) Difference in Maximum 8-Hour Average Ozone

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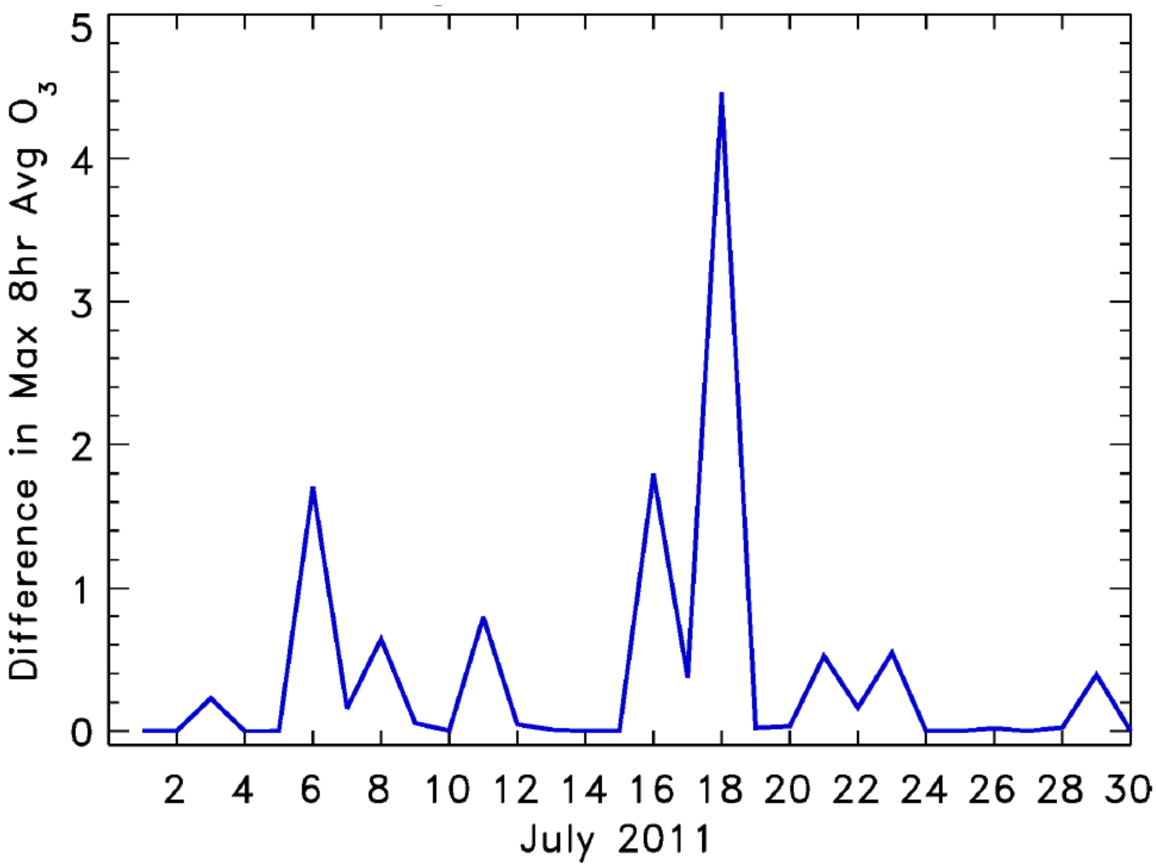

Figure 10 – Susan Wagner High School, NY (#360850067) Difference in Maximum 8-Hour Average Ozone

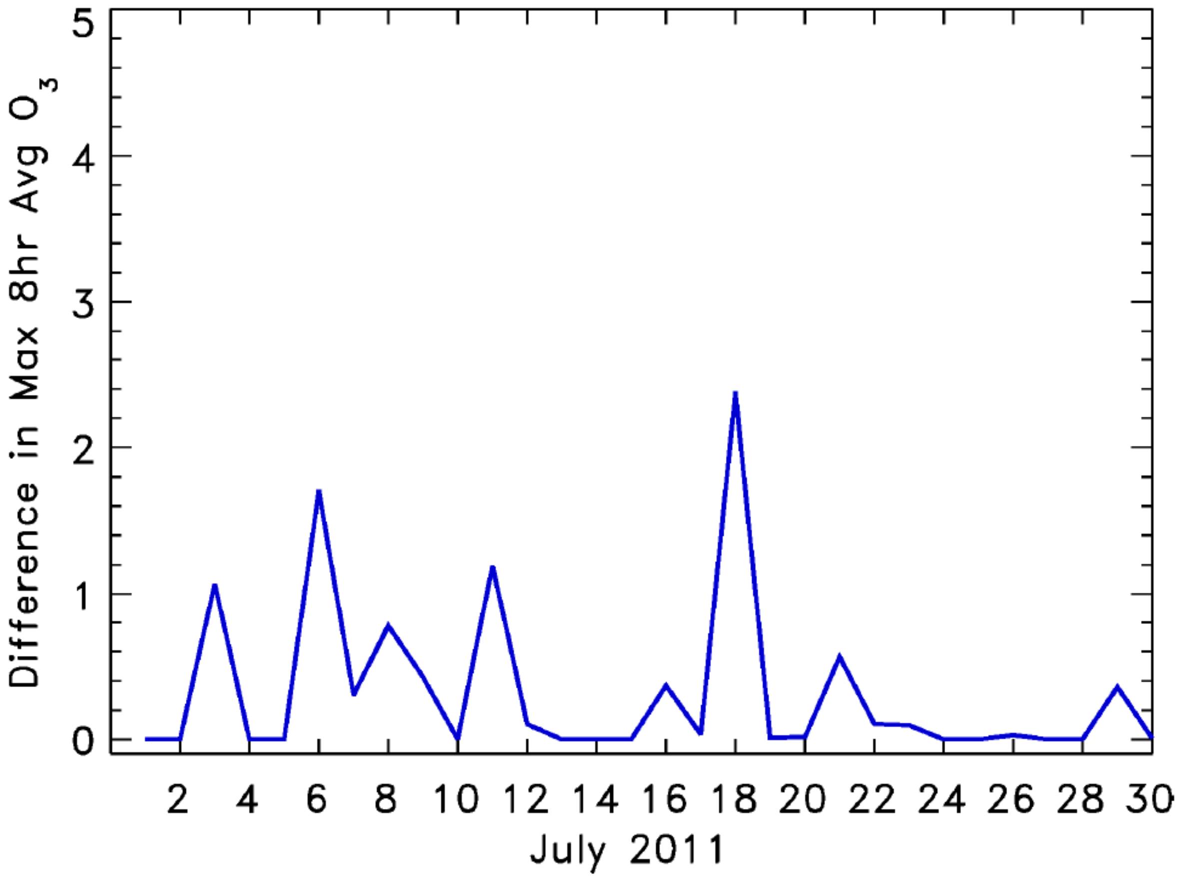

Figure 11 – Babylon, NY (#361030002) Difference in Maximum 8-Hour Average Ozone

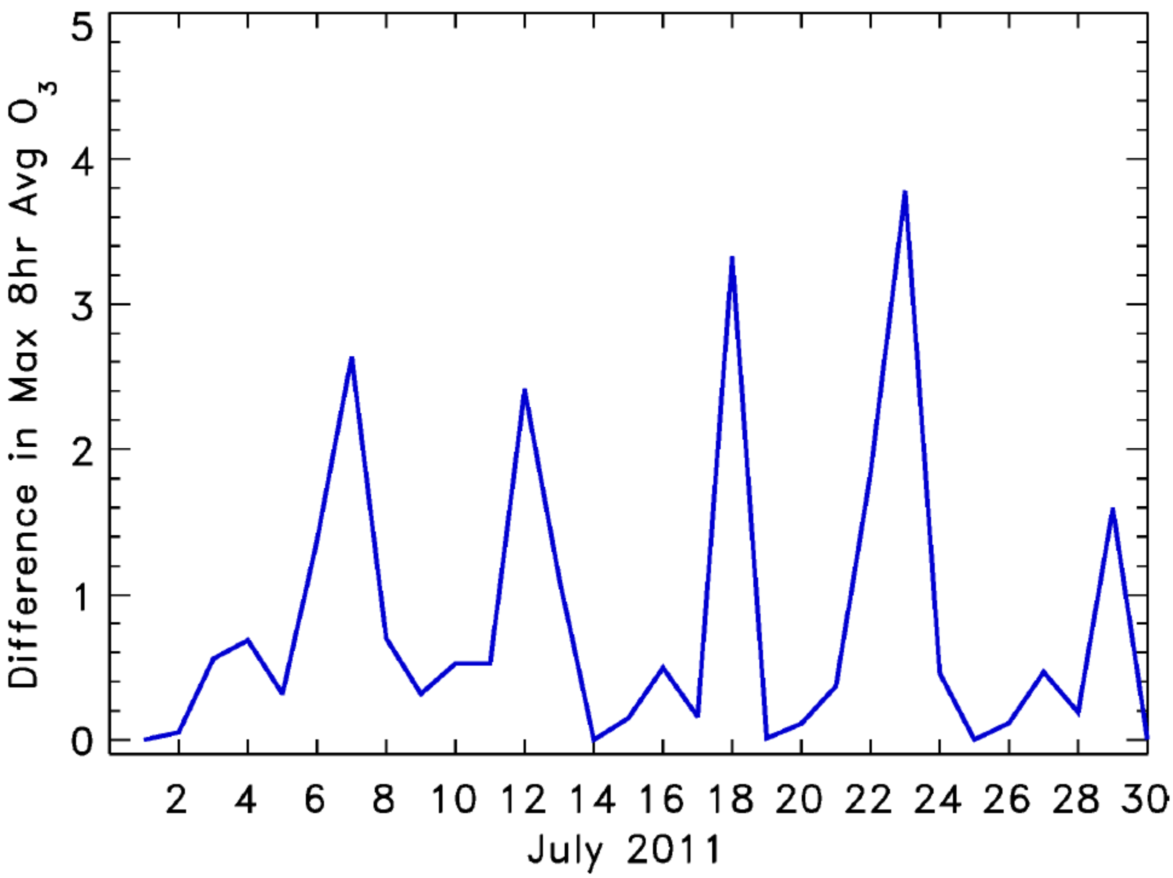

Figure 12 – Bucks County, PA (#420170012) Difference in Maximum 8-Hour Average Ozone

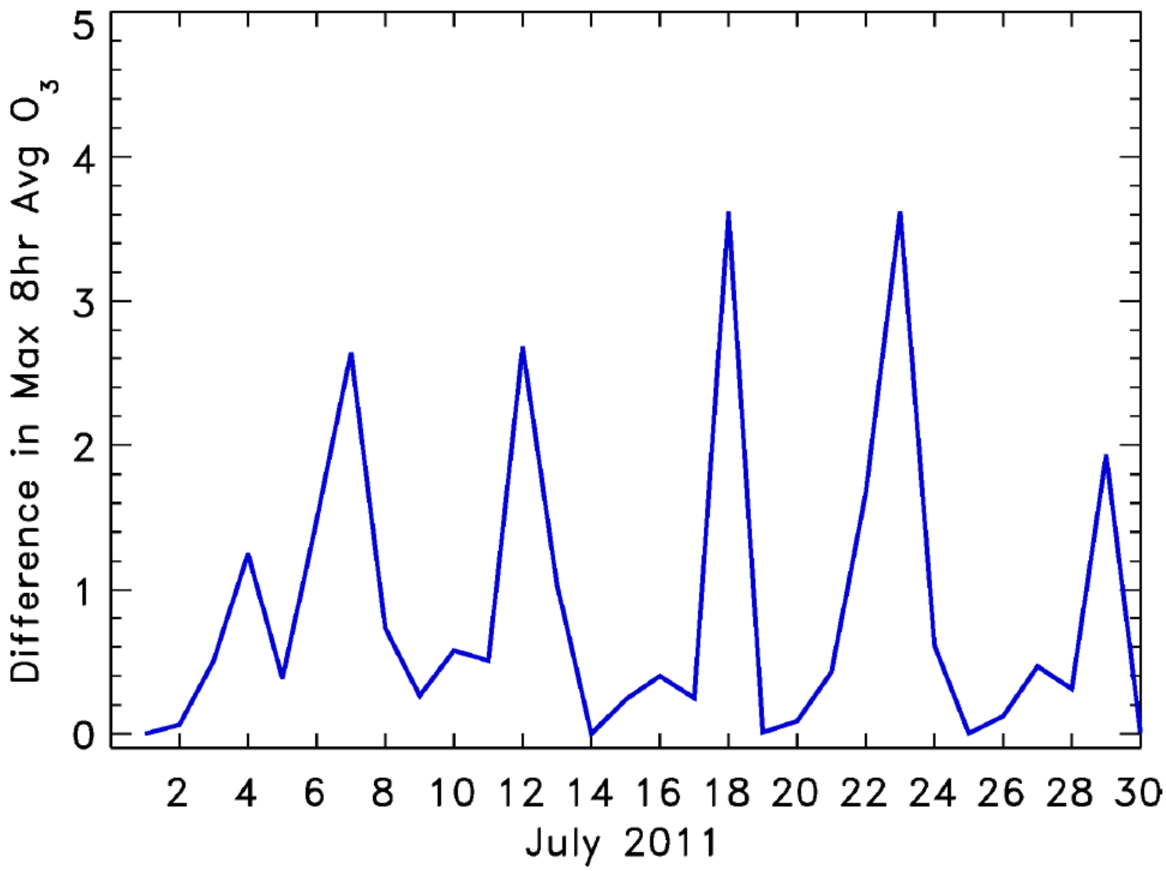

Figure 13 – Northeast Airport, PA (#421010024) Difference in Maximum 8-Hour Average Ozone

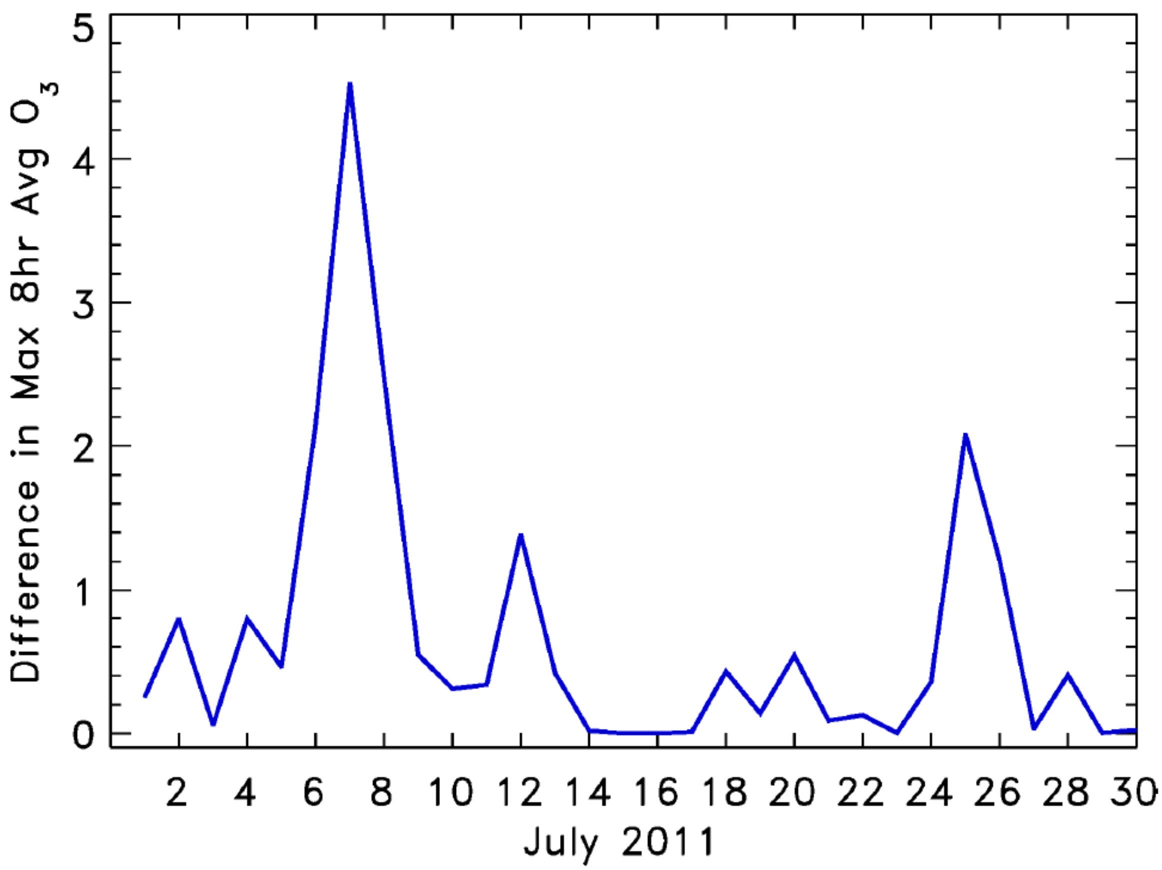

Figure 14 – Aurora Hills Visitors Center, VA (#510130020) Difference in Maximum 8-Hour Average Ozone

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In Table 11 is the full set of modeling results showing the maximum ozone benefit had PA coal fired EGUs with SCR or SNCR optimized running their controls during the summer ozone season analysis.

Table 11 – Full Set of Modeling Results

AQS Code	Site	Max Ozone Daily Benefit (ppb)
90010017	Greenwich Point Park	2.1
90011123	Western Conn State Univ	2.3
90013007		1.9
90019003	Sherwood Island Connector (see coordinates)	2.0
90031003	McAuliffe Park	2.0
90050005	Mohawk Mt-Cornwall	3.1
90070007		1.7
90090027	Criscuolo Park-New Haven	1.8
90099002	Hammonasset State Park	1.5
90110008		0.8
90110124	Fort Griswold Park	0.8
90131001		2.1
100010002	PROPERTY OF KILLENS POND STATE PARK; BEH	3.2
100031003	Bellefonte River Road Park	2.7
100031007		3.2
100031010	OPEN FIELD	3.0
100031013	BELLEVUE STATE PARK, FIELD IN SE PORTION	2.7
100032004	CORNER OF MLK BLVD AND JUSTISON ST, NO T	2.7
100051002	Seaford Shipley State Service Center	2.5
100051003	SPM SITE, NEAR UD ACID RAIN/MERCURY COLL	3.1
110010025	TAKOMA SCHOOL	4.8
110010041	RIVER TERRACE	4.5
110010043	MCMILLAN PAMS	4.5
23001001	DURHAM FIRE STATION	1.2

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
4		
230031100	MICMAC HEALTH DEPARTMENT	0.7
230050027	SHELTER IN PARKING LOT OF INTERSECTION O	1.3
230052003	CETL - Cape Elizabeth Two Lights (State	1.3
230090102	TOP OF CADILLAC MTN (FENCED ENCLOSURE)	1.1
230090103	MCFARLAND HILL Air Pollutant Research Si	1.2
230090301	OZONE AND METEOROLOGY MONITORING STARTED	1.4
230112005	Gardiner, Pray Street School (GPSS)	1.4
230130004	Marshall Point Lighthouse	1.5
230173001		0.9
230194008	WLBZ TV Transmitter Building - Summit of	1.5
230230004		1.4
230230006	BOWDOINHAM, MERRYMEETING BAY, BROWN'S PT	1.0
230290019	Harbor Masters Office; Jonesport Public	1.0
230290032		0.6
230310038	WBFD - West Buxton (Hollis) Fire Departm	1.0
230310040	SBP - Shapleigh Ball Park	1.3
230312002	KPW - Kennebunkport Parson'd Way	1.8
230313002	____________NO INFORMATION AT THIS TIME	1.8
240030014	Davidsonville	4.7
240030019	FT MEADE LAT/LONG POINT IS OF THE SAMPLI	4.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
240051007	Padonia	4.7
240053001	Essex	3.5
240090011	Calvert	4.7
240130001	South Carroll	5.9
240150003	Fair Hill Natural Resource Management Ar	3.5
240170010	Southern Maryland	4.8
240199991	Blackwater NWR	2.5
240210037	Frederick Airport	3.1
240230002	Piney Run	7.0
240251001	Edgewood	2.6
240259001	Aldino	2.8
240290002	Millington	2.4
240313001	Rockville	3.9
240330002	LAT/LONG POINT IS OF SAMPLING INLET.....	4.6
240330030	HU-Beltsville	3.9
240338003	PG Equestrian Center	4.9
240339991	Beltsville	4.1
240430009	Hagerstown	3.8
245100054	Furley	4.3
250010002	TRURO NATIONAL SEASHORE	1.3
25003400	MT GREYLOCK SUMMIT	2.6

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
2		
250051002	LEROY WOOD SCHOOL	0.8
250070001	1 HERRING CREEK RD, AQUINNAH (WAMPANOAG	0.8
250092006	LYNN WATER TREATMENT PLANT	2.3
250094004	SITE LOCATED OFF PARKING LOT 2.	1.9
250094005	NEWBURYPORT HARBOR ST PARKING LOT	2.0
250095005	CONSENTINO SCHOOL.	2.0
250130008	WESTOVER AFB	2.7
250150103	AMHERST	3.2
250154002	QUABBIN RES	2.5
250170009	USEPA REGION 1 LAB	2.1
250171102	inactive military resv 680 hudson rd sud	2.2
250213003	BLUE HILL OBSERVATORY	2.1
250250041	BOSTON LONG ISLAND	1.9
250250042	DUDLEY SQUARE ROXBURY	2.3
250270015	WORCESTER AIRPORT	2.2
250270024	UXBRIDGE	1.9
330012004	FIELD OFFICE ON THE GROUNDS OF THE FORME	1.7
330050007	WATER STREET	2.4
330074001		1.4
330074002	CAMP DODGE, GREENS GRANT	1.0

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
33007400 3	MONITOR LOCATED IN THE GATEHOUSE FOR THE	1.3
33009001 0	LEBANON AIRPORT ROAD	1.7
33011002 0	PEARL ST MUNICIPAL PARKING LOT	2.1
33011101 1	GILSON ROAD	2.2
33011500 1	MILLER STATE PARK	2.9
33013100 7	HAZEN DRIVE	1.9
33015001 4	PORTSMOUTH - PEIRCE ISLAND	1.8
33015001 6	SEACOAST SCIENCE CENTER	1.8
33015001 8	MOOSEHILL SCHOOL	2.1
33019000 3		2.1
34001000 5	NACOTE CREEK RESEARCH STATION	2.2
34001000 6	Brigantine	1.9
34003000 5	TEANECK	3.8
34003000 6	Leonia	3.8
34007000 3	CAMDEN LAB	2.9
34007100 1	Ancora State Hospital	2.5
34011000 7	Millville	2.2
34013000 3	Newark - Firehouse	5.0
34015000 2	Clarksboro	2.6
34017000 6	Bayonne	4.4
34019000	Flemington	4.7

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
1		
340210005	Rider University	3.9
340219991	Wash. Crossing	4.3
340230011	Rutgers University	4.4
340250005	Monmouth University	2.7
340273001	Chester	5.7
340290006	Colliers Mills	3.4
340315001	Ramapo	4.4
340410007	Columbia WMA	5.8
360010012	LOUDONVILLE	2.4
360050110	IS 52	4.0
360050133	PFIZER LAB SITE	3.6
360130006	DUNKIRK	2.4
360130011	WESTFIELD	4.0
360150003	ELMIRA	3.0
360270007	MILLBROOK	3.9
360290002	AMHERST	0.5
360310002	WHITEFACE SUMMIT	1.0
360310002	WHITEFACE SUMMIT	1.0
360310003	WHITEFACE BASE	1.0
360337003	Y001	0.4

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
360410005	PISECO LAKE	3.2
360430005	NICKS LAKE	3.7
360450002	PERCH RIVER	2.3
360530006	CAMP GEORGETOWN	2.9
360551007	ROCHESTER 2	2.2
360610135	CCNY	4.0
360631006	MIDDLEPORT	0.7
360650004	CAMDEN	4.2
360671015	EAST SYRACUSE	3.7
360715001	VALLEY CENTRAL HIGH SCHOOL	4.1
360750003	FULTON	2.8
360790005	MT NINHAM	2.5
360810098	COLLEGE POINT POST OFFICE	4.0
360810124	QUEENS COLLEGE 2	3.4
360830004	GRAFTON STATE PARK	2.5
360850067	SUSAN WAGNER HS	4.5
360870005	Rockland County	3.0
360910004	STILLWATER	3.7
360930003	SCHENECTADY	3.7
361010003	PINNACLE STATE PARK	4.2
36103000	BABYLON	2.4

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
2		
361030004	RIVERHEAD	1.5
361030009	HOLTSVILLE	1.5
361030009	HOLTSVILLE	1.5
361111005	BELLEAYRE MOUNTAIN	3.5
361173001	WILLIAMSON	2.5
361192004	WHITE PLAINS	2.4
420010002		5.7
420030008	Lawrenceville	7.4
420030010	LAT/LON IS APPROXIMATE LOCATION OF SCIEN	7.4
420030067	South Fayette	5.2
420031005	Harrison	8.7
420050001	LAT/LON IS CENTER OF TRAILER	8.5
420070002		4.7
420070005	DRIVEWAY TO BAKEY RESIDENCE	3.2
420070014		7.2
420110001	A420110001LAT/LONG POINT IS OF SAMPLING	4.4
420110006	Kutztown	4.7
420110009	A420110009LAT/LONG POINT IS OF SAMPLING	3.7
420110011	Reading Airport	3.7
420130801		10.4

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
420170012	A420170012LAT/LONG POINT IS OF SAMPLING	3.8
420210011		9.2
420270100	LAT/LON=POINT SW CORNER OF TRAILER	9.8
420274000	PA DEPT CONSERVATION & NATURAL RESOURCES	9.1
420279991	Penn State	10.7
420290050	LAT/LON POINT IS OF CORNER OF TRAILER	3.4
420290100	CHESTER COUNTY TRANSPORT SITE INTO PHILA	3.2
420334000	MOSHANNON STATE FOREST	8.1
420430401	A420430401LAT/LON POINT IS AT CORNER OF	8.1
420431100	A420431100LAT/LON POINT IS AT CORNER OF	6.5
420450002	A420450002LAT/LON POINT IS OF CORNER OF	3.0
420490003		3.9
420550001	HIGH ELEVATION OZONE SITE	7.0
420590002	75 KM SSW OF PITTSBURGH RURAL SITE ON A	3.0
420630004		8.6
420690101	A420690101LAT/LON POINT IS AT CORNER OF	8.8
420692006	A420692006LAT/LON POINT IS AT CORNER OF	8.8
420710007	A420710007LAT/LON POINT AT CORNER OF TRA	5.5
420710012	Lancaster DW	4.7
420730015		8.1
42075010	Lebanon	6.2

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
0		
420770004	A420770004LAT/LONG POINT IS OF SAMPLING	4.1
420791100	A420791100LAT/LON POINT IS AT CORNER OF	10.5
420791101	A420791101LAT/LON POINT IS AT CORNER OF	9.2
420810100	MONTOURSVILLE	5.9
420814000	NEXT TO TIADAGHTON SPORTMANS CLUB - NORT	6.2
420850100		5.7
420890002	SWIFTWATER	7.3
420910013	A420910013LAT/LON POINT IS OF CORNER OF	3.8
420950025	LAT/LON POINT IS CENTER OF TRAILER	4.3
420958000	COMBINED EASTON SITE (420950100) AND EAS	5.1
420990301	A420990301LAT/LON POINT IS AT CORNER OF	9.0
421010004	Air Management Services Laboratory (AMS	3.3
421010014	Roxborough (ROX)	3.6
421010024	North East Airport (NEA)	3.6
421010136	ON AMTRAK RIGHT OF WAY - NEAR AIRPORT HI	3.3
421011002	BAXTER (BAX)	3.6
421119991	Laurel Hill	8.1
421174000	PENN STATE OZONE MONITORING SITE	4.6
421250005		5.8
421250200		7.0

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
421255001		4.7
421290006		9.0
421290008	LAT/LON POINT IS TRAILER	6.6
421330008	A421330008LAT/LON POINT AT CORNER OF TRA	5.4
421330011	York DW	4.8
440030002	AJ	1.2
440071010	FRANCIS SCHOOL East Providence	1.7
440090007	US-EPA Laboratory	0.7
500030004	Morse Airport - State of Vermont Propert	2.5
500070007	PROCTOR MAPLE RESEARCH CTR	1.4
510130020	Aurora Hills Visitors Center	4.5
510590005		4.5
510590018		4.7
510590030	Lee District Park	4.8
510591005		4.8
510595001		4.4
511071005	Broad Run High School, Ashburn	3.8
511530009	James S. Long Park	4.0
515100009	Alexandria Health Dept.	4.7
170010006	ST BONIFACE SCHOOL	0.2
17001000	JOHN WOOD COMMUNITY COLLEGE	0.2

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
7		
170190004	BOOKER T. WASHINGTON ES	1.0
170190007	BOOKER T. WASHINGTON ES	1.0
170230001	416 S. State St. Hwy 1- West Union	0.7
170310001	VILLAGE GARAGE	0.9
170310032	SOUTH WATER FILTRATION PLANT	0.9
170310050	SE POLICE STATION	0.9
170310064	UNIVERSITY OF CHICAGO	0.9
170310076	COM ED MAINTENANCE BLDG	0.9
170311003	TAFT HS	0.7
170311601	COOK COUNTY TRAILER	0.8
170314002	COOK COUNTY TRAILER	0.8
170314007	REGIONAL OFFICE BUILDING	0.6
170314201	NORTHBROOK WATER PLANT	0.6
170314201	NORTHBROOK WATER PLANT	0.6
170317002	WATER PLANT	0.3
170436001	MORTON ARBORETUM	0.8
170491001	CENTRAL JR HIGH	0.9
170650001	DALE ELEMENTARY SCHOOL	0.5
170650002	TEN MILE CREEK DNR OFFICE	0.5
170831001	ILLINI JR HIGH	0.2

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
170859991	Stockton	0.3
170890005	LARSEN JUNIOR HIGH	0.7
170971002	NORTH FIRESTATION	0.3
170971007	CAMP LOGAN TRAILER	0.3
171110001	CARY GROVE HS	0.6
171132003	ISU HARRIS PHYSICAL PLANT	0.5
171150013	IEPA TRAILER	0.7
171170002	IEPA TRAILER	0.3
171190008	CLARA BARTON SCHOOL	0.3
171191009	SOUTHWEST CABLE TV	0.4
171192007	IEPA-RAPS TRAILER	0.4
171193007	WATER PLANT	0.3
171199991	Alhambra	0.6
171430024	FIRESTATION	0.4
171431001	PEORIA HEIGHTS HS	0.4
171570001	IEPA TRAILER	0.7
171613002	ROCK ISLAND ARSENAL	0.3
171630010	IEPA-RAPS TRAILER	0.4
171670010	IDPH WAREHOUSE	0.3
171670014	Illinois Building State Fairgrounds	0.3
17197100	FITNESS FORUM	0.8

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
8		
171971011	COM ED TRAINING CENTER	0.7
172010009	WALKER SCHOOL	0.6
172012001	MAPLE ELEMENTARY SCHOOL	0.6
180030002		0.4
180030004	Ft. Wayne- Beacon St.	0.5
180110001	Perry Worth ELEMENTRY SCHOOL, WEST OF WH	1.4
180150002	Flora-Flora Airport	1.5
180190008	Charlestown State Park- 1051.8 meters Ea	1.0
180350010	Albany- Albany Elem. Sch.	2.0
180390007	Bristol- Bristol Elem. Sch.	0.3
180431004	New Albany- Green Valley Elem. Sch.	0.8
180510011	TOYOTA SITE	0.4
180550001	Plummer, 2500 S. W- Citizens gas Plummer	0.5
180570005		1.5
180570006	Our Lady of Grace- Noblesville	1.5
180590003	Fortville- Fortville Municipal Building	1.2
180630004	AVON SCHOOL'S BUS BARN	0.9
180690002	Roanoke- Roanoke Elem. School	0.5
180710001	Brownstown- 225 W & 200 N. Water facilit	0.7
180810002	Indian Creek Elementary School in Trafal	0.7

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
180839991	Vincennes	0.5
180890022	Gary-IITRI/ 1219.5 meters east of Tennes	0.9
180890024	LOWELL CITY WASTEWATER TREATMENT PLANT	0.8
180890030	Whiting- Whiting HS	0.9
180892008	HAMMOND CAAP- Hammond- 141st St.	0.9
180910005	Michigan City- 4th Street NIPSCO Gas St	0.6
180910010	LAPORTE OZONE SITE AT WATER TREATMENT PL	0.6
180950010	SCHOOL LOCATED ON THE SW CORNER OF US 36	1.5
180970042		0.6
180970050	Indpls.- Ft. Harrison	1.0
180970057	Indpls- Harding St.	0.8
180970073	Indpls.- E. 16th St.	0.8
180970078	Indpls- Washington Park/ in parking lot	0.8
181090005	Monrovia- Monrovia HS.	0.6
181230009	Leopold- Perry Central HS	0.3
181270020		0.7
181270024	Ogden Dunes- Water Treatment Plant	0.6
181270026	VALPARAISO	0.7
181290003	ST. PHILLIPS- St. Phillips road CAAP tra	0.4
181410010	Potato Creek State Park	0.4
18141001	SOUTH BEND-Shields Dr.	0.3

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
5		
181411007		0.3
181450001	TRITON Middle SCHOOL, NORTH OF FAIRLAND	0.7
181630013	Inglefield/ Scott School	0.4
181630021	Evansville- Buena Vista	0.4
181670018	TERRE HAUTE CAAP/ McLean High School	0.7
181670024	Sandcut/ SITE LOCATED BY HOME BEHIND SH	0.7
181730008	Boonville- Boonville HS	0.4
181730009	Lynnville- Tecumseh HS	0.4
181730011	Dayville	0.4
260050003	Holland	0.9
260190003		0.2
260210014	Coloma	0.6
260270003	Cassopolis	0.4
260330901	NORTH OF EASTERDAY AVENUE	0.1
260370001	ROSE LAKE, STOLL RD.(8562 E.)	0.8
260490021		0.7
260492001	Otisville	0.8
260630007	RURAL THUMB AREA OZONE SITE	1.3
260650012		1.1
260770008	KALAMAZOO FAIRGROUNDS	0.4

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
260810020	GR-Monroe	0.9
260810022	APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE	0.9
260890001		0.2
260910007	6792 RAISIN CENTER HWY, LENAWEE CO.RD.CO	3.7
260990009	New Haven	1.4
260991003		4.6
261010922		0.2
261050007	LOCATED 550 FT NORTH OF US10	0.3
261130001	LOCATED ABOUT 1/4 MILE WEST OF SITE	0.5
261210039		1.3
261250001	Oak Park	3.1
261390005	Jenison	0.9
261470005	Port Huron	0.2
261530001	Seney	0.1
261610008	TOWNER ST, SOUTH; 2 LANE RESIDENIAL - HO	1.5
261630001	Allen Park	4.4
261630016		3.1
261630019	East 7 Mile	4.6
390030009	LIMA BATH	1.2
390071001	CONNEAUT	3.5
39009000	ATHENS OU	2.5

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
4		
390170004	HAMILTON	1.3
390170018	MIDDLETOWN	1.4
390179991	Oxford	0.9
390230001	SPRINGFIELD WELL FIELD	1.4
390230003	MUD RUN	1.4
390250022	BATAVIA	2.0
390271002	LAUREL OAKS_JVS	2.1
390350034	5TH DISTRICT	2.6
390350060	GT CRAIG	1.6
390350064	BEREA	1.4
390355002	MAYFIELD	2.4
390410002	DELAWARE	2.5
390479991	Deer Creek	1.4
390490028	KOEBEL SCHOOL IN SOUTH COLUMBUS	1.4
390490029	NEW_ALBNY	1.8
390490037	FRANKLIN_PK	1.5
390490081	MAPLE_C	1.8
390550004	GEAUGA	3.9
390570006	XENIA	2.2
390610006	SYCAMORE	1.4

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
390610010	COLERAIN	1.2
390610040	TAFT	1.7
390810017	STEUBEN	3.2
390830002	CENTERBURG	2.6
390850003	EASTLAKE	3.1
390850007	JFS (PAINSVILLE)	3.4
390870006		1.2
390870011	WILGUS	1.2
390870012	ODOT (IRONTON)	1.2
390890005	HEATH	2.1
390930018	SHEFFIELD	2.3
390950024	ERIE	3.6
390950027	WATERVILLE	2.7
390950034	LOW_SER	3.5
390950081	FRIENDSHIP PARK	3.6
390970007	LONDON	1.3
390990013		5.0
391030003	MEDINA	1.2
391030004	CHIPPEWA	1.2
391090005	MIAMI EAST	1.1
39113001		1.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
9		
39113003 7	EASTWOOD	1.1
39133100 1	ROCKWELL	3.0
39135100 1	NATIONAL TRAIL SCHOOL	1.0
39151001 6	MALONE_COL	2.4
39151002 2	BREWSTER (WANDLE)	4.7
39151100 9		1.1
39151400 5	ALLIANCE	3.2
39153002 0	PATTERSON PARK (PATT_PARK)	1.8
39155000 9	KINSMAN	3.4
39155001 1	TCSEG	4.4
39165000 7	LEBANON	1.7
39167000 4	MARIETTA_TWP.	2.3
39173000 3	BOWLING GREEN	2.4
55003001 0	BAD RIVER	0.0
55009002 6	UW GREEN BAY	0.1
55021001 5	COLUMBUS	0.3
55025004 1	MADISON EAST	0.3
55027000 1	Horicon Wildlife Area	0.3
55027000 7	MAYVILLE	0.3
55029000 4	NEWPORT PARK	0.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
550350014	Eau Claire DOT	0.0
550370001		0.0
550390006	FOND DU LAC	0.3
550410007		0.0
550450001	NW CORNER OF TRAILER	0.4
550550002	JEFFERSON	0.2
550590002	KENOSHA - BARBERSHOP QUARTET SOCIETY	0.3
550590019	CHIWAUKEE PRAIRIE-STATELINE	0.3
550610002	JUMBOS DRIVE-IN PROPERTY, SOUTH END OF K	0.1
550630012	LACROSSE - DOT BUILDING	0.1
550710004	MOBILE SHELTER, APPROX 3/4 MI E OF COLLI	0.2
550710007	MANITOWOC/WOODLAND DUNES	0.2
550730012	LAKE DUBAY	0.0
550790010	HEALTH CENTER	0.4
550790026	DNR SER HQRS SITE	0.3
550790041	MILWAUKEE UWM-NORTH	0.3
550790044	APPLETON AVE	0.3
550790085	BAYSIDE	0.3
550791025		0.4
550870009	APPLETON AAL	0.2
55089000		0.3

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
8		
55089000 9	HARRINGTON BEACH PARK	0.4
55101001 7	RACINE	0.3
55105002 4	BELOIT-CUNNINGHAM	0.5
55109100 2	SOMERSET	0.0
55111000 7	DEVILS LAKE PARK	0.2
55117000 6	SHEBOYGAN KOHLER ANDRE	0.3
55117000 7	ON ROOF	0.3
55119999 1	Perkinstown	0.0
55123000 8	ON HILL NEAR PARK OFFICE AND MAINTENANCE	0.1
55125000 1	TROUT LAKE	0.0
55127000 5	LAKE GENEVA	0.5
55131000 9	REPLACED SITE 55-131-0007	0.4
55133001 7	WAUKESHA, CARROLL COLLEGE	0.4
55133002 7	CLEVELAND SITE	0.4
55139001 1	ON SOUTHERN PROPERTY LINE OF PVHC PROPER	0.1
10270001	ASHLAND	0.1
10331002	MUSCLE SHOALS	0.0
10499991	Sand Mountain	0.1
10510001	DBT, WETUMPKA	0.0
10550011	SOUTHSIDE	0.0
10730023	North Birmingham	0.0
10731003		0.0
10731005	McAdory	0.0
10731009		0.0

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
10731010	Leeds	0.0
10732006		0.0
10735002		0.0
10735003		0.0
10736002		0.0
10790002	SIPSEY (closed 11-01-2007)	0.0
10890014	HUNTSVILLE OLD AIRPORT	0.0
11011002	MOMS, ADEM	0.0
11030011	DECATUR, Alabama	0.0
11130002	LADONIA, PHENIX CITY	0.0
11170004	HELENA	0.0
11190002	GASTON (SUMTER)	0.0
11210003	TALLADEGA, (HONDA) Closed 11/01/06	0.0
11250010	DUNCANVILLE, TUSCALOOSA	0.0
130210012	Macon SE	0.1
130210013		0.1
130510021	Savannah-E. President Street	0.3
130550001	Summerville-DNR Fish Hatchery	0.1
130590002	FIRE STATION # 7	0.6
130670003	Kennesaw-National Guard	0.1
130730001	Evans-Riverside Park	0.1
130770002	Newnan	0.1
130850001	Dawsonville, Georgia Forestry Commission	0.2
130890002	South DeKalb	0.1
130893001	Tucker-Idlewood Road	0.2
130970004	W. Strickland Street	0.1
131130001	DOT STORAGE FACILITY	0.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
131210055	Confederate Avenue	0.1
131270006	Risley Middle School	0.2
131350002	GWINNETT TECH	0.3
131510002	McDonough-County Extension Office	0.1
132130003	Fort Mountain	0.3
132150008	Columbus-Airport	0.0
132151003	Columbus-Crime Lab	0.0
132230003	Yorkville, King Farm	0.1
132319991	Georgia Station	0.1
132450091	Bungalow Road	0.2
132470001	Monastery	0.1
132611001	Leslie-Union High School	0.0
210130002	MIDDLESBORO	0.3
210150003	EAST BEND	1.2
210190017	ASHLAND PRIMARY (FIVCO)	1.3
210290006	SHEPHERDSVILLE	0.4
210370003	SITE LOCATED AT NORTHERN KY WATER SERVIC	1.8
210373002	NORTHERN KENTUCKY UNIVERSITY (NKU)	1.8
210430500	GRAYSON LAKE	1.8
210470006	HOPKINSVILLE	0.2
21059000	OWENSBORO PRIMARY	0.5

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
5		
210610501	Mammoth Cave National Park, Houchin Mead	0.2
210670001		1.3
210670012	LEXINGTON PRIMARY	1.3
210830003		0.4
210890007	WORTHINGTON	1.2
210910012	LEWISPORT	0.3
210930006	ELIZABETHTOWN	0.5
211010014	BASKETT	0.4
211110027	Bates	0.8
211110051	Watson Lane	0.3
211110067	CANNONS LANE	0.6
211111021		1.1
211130001	NICHOLASVILLE	1.0
211390003	SMITHLAND	0.6
211451024	JACKSON PURCHASE (PADUCAH PRIMARY)	0.5
211490001		0.6
211850004	BUCKNER	1.4
211930003	HAZARD	0.8
211950002	PIKEVILLE PRIMARY	1.1
211990003	SOMERSET	0.6

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
21209000 1		1.7
21213000 4	FRANKLIN	0.1
21221001 3		0.3
21221800 1	OLD DOVER HIGHWAY CADIZ,KY	0.1
21227000 8	OAKLAND	0.2
21229999 1	Mackville	1.2
28011000 1	Cleveland	0.0
28033000 2	Hernando	0.0
28049001 0	Jackson FS19	0.0
28075000 3	Meridian	0.0
28081000 5	TUPELO AIRPORT NEAR OLD NWS OFFICE	0.0
28089000 2		0.0
28149000 4		0.0
28161999 1	Coffeeville	0.0
37003000 4	Waggin` Trail	0.8
37011000 2	Linville Falls	0.8
37011999 1	Cranberry	1.0
37021003 0	Bent Creek	1.2
37027000 3	Lenoir (city)	0.9
37033000 1	Cherry Grove	1.0
37037000	Pittsboro	1.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
4		
370510008		0.9
370511003	Golfview	0.8
370590002	Cooleemee WATER TREATMENT PLANT	0.9
370590003	Mocksville	0.6
370610002	Kenansville	1.1
370630013		1.7
370630015	Durham Armory	1.7
370650099	Leggett	3.8
370670022		0.4
370670027	NEAR TOWN OF TOBACCOVILLE, BY POLLIROSA	0.4
370670028	NEW O3 SLAMS SITE 4/1/96; REPLACES FERGU	0.5
370670030		0.4
370671008		0.4
370690001	Franklinton	2.6
370750001	Joanna Bald	0.9
370770001	Butner	1.7
370810011		0.7
370810013	Mendenhall School	0.7
370870004	SW CORNER OF ROOF HAYWOOD CO HEALTH DEPA	1.0
370870008	Waynesville School	1.0

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
370870035	Frying Pan Mountain	1.0
370870036	Purchase Knob	0.8
370990005	OZONE MONITOR ON SW SIDE OF TOWER/MET EQ	0.9
371010002	West Johnston Co.	1.2
371070004	Lenoir Co. Comm. Coll.	1.6
371090004	Crouse	1.1
371170001	Jamesville School	2.6
371190041	Garinger High School	1.2
371191005	Arrowood	1.2
371191009	County Line	1.3
371239991	Candor	0.9
371290002	Castle Hayne	0.5
371310002	SITE IS APPROX1/2DISTANCE BETWEEN GASTON	4.8
371450003	Bushy Fork	1.3
371470006	Pitt Agri. Center	2.2
371470099		2.0
371510004	SITE AT NEW MARKET ELEMENTARY SCHOOL	0.9
371570099	Bethany sch.	0.7
371590021	Rockwell	1.3
371590022	Enochville School	1.3
37173000	Bryson City	0.8

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
2		
37179000 3	Monroe School	1.1
37183001 4	Millbrook School	1.9
37183001 5		1.9
37183001 6	Fuquay-Varina	1.2
37183001 7	TV TOWER LOCATED AT AUBURN NC	1.7
37183001 7	TV TOWER LOCATED AT AUBURN NC	1.7
37183001 7	TV TOWER LOCATED AT AUBURN NC	1.7
37183001 7	TV TOWER LOCATED AT AUBURN NC	1.7
37199000 3		0.8
37199000 4	Mt. Mitchell	0.8
45001000 1	DUE WEST	1.0
45003000 3	JACKSON MIDDLE SCHOOL	0.2
45007000 5	Big Creek	1.4
45011000 1	BARNWELL CMS	0.2
45015000 2	BUSHY PARK PUMP STATION	0.3
45019004 6	CAPE ROMAIN (VISTAS)	0.4
45021000 2	Cowpens	1.2
45023000 2	CHESTER	1.4
45025000 1	CHESTERFIELD	1.0
45029000 2	ASHTON	0.3

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
45031000 3	Pee Dee Experimental Station	1.2
45037000 1	TRENTON	0.1
45045001 6	Hillcrest Middle School	1.8
45045100 3	FAMODA FARM	1.3
45073000 1	LONG CREEK	1.2
45077000 2	CLEMSON CMS	1.3
45079000 7	PARKLANE	0.8
45079002 1	CONGAREE BLUFF	0.6
45079100 1	SANDHILL EXPERIMENTAL STATION	0.8
45083000 9	NORTH SPARTANBURG FIRE STATION #2 (Shady	1.3
45087000 1	DELTA	1.4
45089000 1	INDIANTOWN	0.5
45091000 6	YORK CMS	1.4
47001010 1	Freel's Bend ozone and SO2 monitoring	0.3
47009010 1	Great Smoky Mountains National Park, Loo	0.7
47009010 2	Great Smoky Mountains National Park, Cad	0.8
47025999 1	Speedwell	0.3
47037001 1		0.1
47037002 6		0.1
47065101 1	Soddy-Daisy High School	0.1
47065400		0.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
3		
470750003	SHELTER IS IN A FLAT GRASSY AREA NEAR US	0.0
470890002	New Market ozone monitor	0.4
470930021	East Knox Elementary School	0.4
470931020	Spring Hill Elementary School	0.3
470990002	Lawrence Co ozone monitor	0.0
471050109	Loudon Middle School ozone monitor	0.2
471210104	Meigs County Ozone monitor	0.1
471410004	TVA PSD SITE IN PUTNAM COUNTY, TN	0.1
471490101	Eagleville Ozone Monitor	0.0
471550101		0.8
471550102	Great Smoky Mountains National Park, Cli	0.9
471570021	Frayser Ozone Monitor	0.0
471570075	Memphis NCORE site	0.0
471571004	Edmund Orgill Park Ozone	0.0
471632002	Blountville Ozone Monitor	0.9
471632003	Kingsport ozone monitor	1.0
471650007	Hendersonville Ozone Site at Old Hickory	0.1
471650101	Cottontown Ozone Monitor	0.1
471870106	FAIRVIEW MIDDLE SCHOOL ozone monitor	0.0
471890103	Cedars of Lebanon Ozone Monitor	0.1

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
510030001	Albemarle High School	2.5
510330001	USGS Geomagnetic Center, Corbin	2.6
510360002	Shirley Plantation	2.9
510410004	VDOT Chesterfield Residency Shop	3.5
510610002	Chester Phelps Wildlife Management Area,	4.5
510690010	Rest	6.2
510719991	Horton Station	2.1
510850003	Turner Property, Old Church	3.2
510870014	MathScience Innovation Center	3.3
511130003	Shenandoah National Park, Big Meadows	2.9
511390004	Luray Caverns Airport	2.9
511479991	Prince Edward	2.9
511611004	East Vinton Elementary School	1.5
511630003	Natural Bridge Ranger Station	2.1
511650003	ROCKINGHAM CO. VDOT	2.5
511790001	Widewater Elementary School	4.6
511970002	Rural Retreat Sewage Treatment Plant	0.6
516500004		2.4
516500008	NASA Langley Research Center	2.1
518000004	Tidewater Community College	2.7
51800000	VA Tech Agricultural Research Station, H	3.4

ATTACHMENT 6

AQS Code	Site	Max Ozone Daily Benefit (ppb)
5		
540030003	MARTINSBURG BALL FIELD	3.9
540110006	HENDERSON CENTER/MARSHALL UNIVERSITY - M	1.3
540219991	Cedar Creek	1.9
540250003	SAM BLACK CHURCH - DOH GARAGE - GREENBRI	2.6
540291004		4.6
540390010	CHARLESTON BAPTIST TEMPLE/SITE MOVED FRO	2.4
540610003		2.1
540690010		5.8
541071002	Neale Elementary School	2.0
50350005	MARION	0.0
50970001		0.0
51010002	DEER	0.0
51130003	EAGLE MOUNTAIN	0.0
51190007	PARR	0.0
51191002	NLR AIRPORT	0.0
51191005	ADEQ	0.0
51191008	DOYLE SPRINGS ROAD	0.0
51430005	SPRINGDALE	0.0
190170011	WAVERLY AIRPORT SITE	0.1
190450021	CLINTON, RAINBOW PARK	0.4
191130028	KIRKWOOD	0.2
191130033	COGGON ELEMENTARY SCHOOL BLDG. NORTHERN	0.2
191130040	Public Health	0.2
191530030	CARPENTER	0.0

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AQS Code	Site	Max Ozone Daily Benefit (ppb)
191530058		0.0
191630014	SCOTT COUNTY PARK	0.2
191630015	DAVENPORT, JEFFERSON SCH.	0.3
191632011	ARGO, HIGHWAY MAINTENANCE	0.3
191690011	SLATER CITY HALL	0.0
191770005	LAKE SUGEMA STATE PARK I	0.2
191770006	LAKE SUGEMA STATE PARK II	0.2
191810022	GRAVEL ROAD IN LAKE AQUABI STATE PARK	0.0
220150008	Shreveport / Airport	0.0
220170001	Dixie	0.0
220730004	Monroe / Airport	0.0
270031001	Cedar Creek	0.0
270031002	Anoka Airport	0.0
270177416	Cloquet	0.0
270495302	Stanton Air Field	0.0
270750005	Fernberg Road	0.0
271095008	Ben Franklin School	0.0
271370034	VOYAGEURS NATIONAL PARK, NEAR SULLIVAN B	0.0
271377550	WDSE	0.0
271390505	Shakopee	0.0
27171320	St. Michael	0.0

ATTACHMENT 6

AQS Code	Site	Max Ozone Daily Benefit (ppb)
1		
290190011	Finger Lakes	0.1
290270002	New Bloomfield	0.2
290390001	El Dorado Springs	0.0
290770026		0.1
290770036	Hillcrest High School	0.1
290770042	Fellows Lake	0.1
290990019	Arnold West	0.3
291130003	Foley	0.1
291370001	MTSP	0.2
291570001		0.6
291831002	West Alton	0.3
291831004	Orchard Farm	0.2
291860005	Bonne Terre	0.3
291890004	FORMERLY 5962 SOUTH LINDBERGH.	0.2
291890005	Pacific	0.2
291890005	Pacific	0.2
291890006		0.2
291890014	Maryland Heights	0.2
291890014	Maryland Heights	0.2
291893001	Ladue	0.2

AQS Code	Site	Max Ozone Daily Benefit (ppb)
291895001		0.3
291897003	.7 MILES E FROM OLD SITE ON S SIDE OF ST	0.2
292130004	Branson	0.0
295100085	Blair Street	0.3
295100086	MARGARETTA CATEGORY B CORE SLAM PM2.5.	0.3
482030002	Karnack	0.0

2.7 Conclusion

Based on the photochemical sensitivity modeling analysis completed, PA coal fired EGUs significantly contribute to ozone formation in MD and other OTR states and interfere with the maintenance and contribute to nonattainment of the 8-hour ozone NAAQS. Based on this sensitivity modeling analysis, the Ozone Transport Commission should immediately take action to develop, and transmit to the Administrator of the Environmental Protection Agency (EPA), recommendations for additional control measures that require all PA coal fired EGUs to run their existing control equipment in optimal manner during the summer ozone season.

2.8 References

McDill, Julie R. and Susan, McCusker (2018), Technical Support Document Emission Inventory Development For 2011 and Projections to 2020 and 2023 For The Northeastern U.S. GAMMA Version, Mid-Atlantic Regional Air Management Association, Inc (MARAMA), Available at https://www.marama.org/images/stories/documents/TSD_GAMMA_Northeast_Emission_Inventory_for_2011_2023_20180131.pdf

Skamarock W.C., Klemp J.B., Dudhia J., Gill D.O., Baker D.M, Duda M.G., Huang X.-Y., Wang W., and Powers J.G (2008) A description of the Advanced Research WRF Version 3. NCAR Technical Note NCAR/TH465+STR, June

U.S. Environmental Protection Agency (2014b) Meteorological model performance for annual 2011 WRF v3.4 simulation. Technical support document prepared by the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, November. Available at http://www.epa.gov/ttn/scram/reports/MET_TSD_2011_final_11-26-14.pdf

ATTACHMENT 6

U.S. Environmental Protection Agency (August 2015) Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform prepared for the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Assessment Division. Available at http://www.epa.gov/ttn/chief/emch /2011v6/2011v6_2_2017_2025_EmisMod_TSD_aug2015.pdf.

Anderson, D. C., et al. (2014), Measured and modeled CO and NOy in DISCOVER-AQ: An evaluation of emissions and chemistry over the eastern US, *Atmospheric Environment*, *96*, 78-87.

Part 3 – Notices of OTC Public Hearings and Comment Periods on Section 184(c) Petition.

OTC Notice on 1st Public Comment Period and Public Hearing

ACTION: Ozone Transport Commission notice of public comment period and public hearing.

SUMMARY: The Ozone Transport Commission (OTC) is announcing a public hearing and soliciting public comment regarding whether the OTC should review recent operations and develop additional control measures within part of the Ozone Transport Region (OTR), specifically the potential need for daily NO_x limits at coal-fired Electricity Generating Units (EGUs) in Pennsylvania, as necessary to bring any area in the OTR into attainment by the dates mandated by the Clean Air Act (CAA). Specifically, the OTC is soliciting public comment on: 1) whether the OTC should develop additional control measures for Pennsylvania, and if so, 2) how those specific control measures should be structured.

DATES:

Comments: Comments must be received no later than 5:00 p.m. on August 16, 2019. Please submit your comments by email to ozone@otcair.org or by mail to the Ozone Transport Commission, 800 Maine Avenue SW, Suite 200, Washington, DC 20024.

The OTC may publish any comment received to a public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment will be considered the official comment and should include discussion of all points you wish to make.

Written comments that are submitted during the comment period will be considered with the same weight as any oral testimony presented at the public hearing. Written comments must be postmarked by the last day of the comment period.

Public hearing: The OTC will hold a public hearing on August 16, 2019. The public hearing will convene at 9:00 a.m. and end at 5:00 p.m. Eastern Time (ET) or 1 hour after the last registered speaker has spoken. The hearing will be held at the U.S. Environmental Protection Agency, Region III, Public Information Center, 1650 Arch Street, Philadelphia, Pennsylvania 19103. Hearing attendees should enter the building through the Arch Street entrance doors. Interested persons are invited to attend and express their views.

If you would like to present oral testimony at the hearing, please notify the OTC via email at ozone@otcair.org or telephone at (202) 318–0190, no later than 5:00 p.m. ET on August 14, 2019. OTC will arrange a general time slot for you to speak. The OTC will make every effort to follow the schedule as closely as possible on the day of the hearing. Oral testimony will be limited to 5 minutes for each commenter. The OTC encourages commenters to provide the OTC with a copy of their oral testimony electronically (via email) or in hard copy form. Commenters should notify

OTC if they need specific translation services for non-English speaking commenters or an interpreter for deaf and hearing impaired persons. The request for any such service should be made at least ten (10) days prior to the hearing.

FOR FURTHER INFORMATION CONTACT: The Ozone Transport Commission, 800 Maine Avenue SW, Suite 200, Washington, DC 20024; phone: (202) 318–0190; email: ozone@otcair.org; website: http://www.otcair.org.

SUPPLEMENTARY INFORMATION: Established under the provisions of Sections 176A and 184 of the CAA, the OTC is comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and the Washington, D.C. metropolitan area that includes the District of Columbia and a portion of Virginia.

Under Section 184(c) of the CAA, any State within the OTR may petition the OTC to develop, after notice and opportunity for public comment, recommendations for additional control measures to be applied within all or a part of the OTR if the OTC determines such measures are necessary to bring any area in the OTR into attainment by the dates provided by the CAA.

About 30 million people living in the Northeast breathe air that fails to meet the current 2015 ozone national ambient air quality standard (NAAQS) of 70 parts per billion (ppb). As a result, large areas of the region are designated as nonattainment for ozone, including all or portions of: Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York and Pennsylvania. In its assessment of ozone transport, the U.S. Environmental Protection Agency (EPA) has identified Pennsylvania as a contributor to high ozone in each of the states failing to meet the 2015 ozone NAAQS. In addition, EPA has determined that Pennsylvania contributes to portions of Connecticut, New Jersey and New York that still fail to meet the 2008 NAAQS of 75 ppb.

On May 30, 2019, Maryland petitioned the OTC under CAA Section 184(c). The Maryland petition may be viewed at https://mde.maryland.gov/programs/Air/Pages/index.aspx. The petition asks the OTC to consider developing additional control measures within part of the OTR, specifically the potential need for daily limits at coal-fired EGUs in Pennsylvania, as necessary to bring areas in the OTR into attainment by the dates mandated by the CAA.

On June 26, 2019, the OTC voted to proceed with the initial steps associated with CAA Section 184(c) petition process, including analyzing recent EGU operations in Pennsylvania. The OTC is now soliciting public comment on: 1) whether the OTC should develop additional control measures for Pennsylvania, and if so, 2) how those specific control measures should be structured.

OTC Notice on 2nd Public Comment Period and Public Hearing

ACTION: Ozone Transport Commission notice of public comment period and public hearing.

SUMMARY: The Ozone Transport Commission (OTC) is soliciting public comments regarding a proposed recommendation it has developed under Section 184(c) of the Clean Air Act (CAA). The proposed recommendation may be viewed at https://otcair.org/.

The OTC's recommendation proposes a control measure to establish daily control technology optimization requirements and daily nitrogen oxide (NO_x) emission limits at coal-fired electricity generating units (EGUs) in Pennsylvania. It was developed to help bring areas of the Ozone Transport Region (OTR) into attainment with the National Ambient Air Quality Standard (NAAQS) for ozone by CAA mandated dates.

If, after public comment, the OTC approves the recommendation, it will be submitted to the U.S. Environmental Protection Agency under CAA Section 184(c).

DATES:

Comments:

Comments must be received no later than 5:00 p.m. ET on November 22, 2019. Please submit your comments by email to ozone@otcair.org or by mail to the Ozone Transport Commission Ozone Transport Commission, 800 Maine Avenue SW, Suite 200, Washington, DC 20024.

The OTC may publish any comment received to a public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment will be considered the official comment and should include discussion of all points you wish to make.

Written comments that are submitted during the comment period will be considered with the same weight as any oral testimony presented at a public hearing, should one be requested. Written comments must be postmarked by the last day of the comment period.

Public Hearing:

A public hearing concerning the OTC's proposed recommendation will be conducted only if requested by November 14, 2019. A request for a public hearing may be submitted to the OTC by email (ozone@otcair.org) or by mail at the address, Ozone Transport Commission, 800 Maine Avenue SW, Suite 200, Washington, DC 20024. If no request for a public hearing is received by the close of business on November 14, 2019, then the hearing will be cancelled by a notice posted on the OTC website at https://otcair.org/. If a public hearing is requested, it will be held on November 21, 2019. The public hearing will convene at 10:00 a.m. and end at 12:00 p.m. Eastern Time (ET) or 1 hour after the last registered speaker has spoken. The hearing will be held at the Hilton Wilmington/Christiana located at 100 Continental Drive, Newark, DE 19713. Interested persons are invited to attend and express their views.

If you would like to present oral testimony at the hearing, please notify the OTC via email at ozone@otcair.org or telephone at (202) 318–0190, no later than 5:00 p.m. ET on November 18, 2019. OTC will arrange a general time slot for you to speak. The OTC will make every effort to follow the schedule as closely as possible on the day of the hearing. Oral testimony will be limited to 5 minutes for each commenter. The OTC encourages commenters to provide the OTC with a copy of their oral testimony electronically (via email) or in hard copy form. Commenters should notify OTC if they need specific translation services for non-English speaking commenters or an interpreter for deaf and hearing-impaired persons. The request for any such service should be made at least ten (10) days prior to the hearing.

FOR FURTHER INFORMATION, CONTACT: The Ozone Transport Commission, 800 Maine Avenue SW, Suite 200, Washington, DC 20024; phone: (202) 318–0190; email: ozone@otcair.org; website: https://otcair.org/.

SUPPLEMENTARY INFORMATION: Established under the provisions of Sections 176A and 184 of the CAA, the OTC is comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and the Washington, D.C. metropolitan area that includes the District of Columbia and a portion of Virginia.

Under Section 184(c) of the CAA, any State within the OTR may petition the OTC to develop, after notice and opportunity for public comment, recommendations for additional control measures to be applied within all or a part of the OTR if the OTC determines such measures are necessary to bring any area in the OTR into attainment by the dates provided by the CAA.

Approximately 30 million people living in the Northeast breathe air that fails to meet the current 2015 ozone national ambient air quality standard (NAAQS) of 70 parts per billion (ppb). As a result, large areas of the region are designated as nonattainment for ozone, including all or portions of the following: Connecticut, Delaware, the District of Columbia, Maryland, New Jersey, New York and Pennsylvania. In its assessment of ozone transport, the U.S. Environmental Protection Agency (EPA) has identified Pennsylvania as a contributor to high ozone in each of the states failing to meet the 2015 ozone NAAQS. In addition, EPA has determined that Pennsylvania contributes to portions of Connecticut, New Jersey and New York that still fail to meet the 2008 NAAQS of 75 ppb.

On May 30, 2019, Maryland petitioned the OTC under CAA Section 184(c). The Maryland petition may be viewed at https://otcair.org/ under “Announcements.” The petition asks the OTC to consider developing additional control measures within part of the OTR, specifically the potential need for daily limits at coal-fired EGUs in Pennsylvania, as necessary to bring areas in the OTR into attainment by the dates mandated by the CAA.

On June 26, 2019, the OTC voted to proceed with the initial steps associated with the CAA Section 184(c) petition process, including analyzing recent EGU operations in Pennsylvania. Starting July 17, 2019, the OTC held a public comment period ending in a public hearing on August 16, 2019. The OTC solicited public comment on the following: 1) whether the OTC should develop additional control measures for Pennsylvania, and if so, 2) how those specific control measures should be structured. The public comments received may be viewed at https://otcair.org/ under

"Meetings." The OTC reviewed and analyzed these public comments and, based on this review, developed the proposed recommendation for which it is now seeking public comment.

ATTACHMENT 3

Responses to Comments Received on OTC 184(c) Recommendation

Basic Responses

- According to 2017-2019 design value data, there are currently 37 monitors failing to attain the 2015 ozone national ambient air quality standard (NAAQS) across eight states in the Ozone Transport Region (OTR). Ten are in Connecticut, seven are in New York, six are in New Jersey, four are in Pennsylvania, six are in Maryland, two are in Rhode Island, and one each in Massachusetts and the District of Columbia. Attainment dates are August 2021 for 18 monitors and August 2024 for 16 monitors. Three monitors are in areas designated as attainment. Of the 37 monitors, 35 have a 4th high daily maximum ozone level threshold for the 2020 ozone season below 70 ppb, above which the monitor would exceed the 2015 ozone NAAQS during the 2018-2020 period. These thresholds range from 43 to 70 parts per billion (ppb).
- There are currently seven monitors in two OTC states that are failing to attain the 2008 ozone NAAQS. Six are located in Connecticut and one is in Pennsylvania. The Pennsylvania monitor is in an area with a clean data determination and the Connecticut monitors have an attainment date of July 2021. Of these monitors, five (all in Connecticut) have a 4th high daily maximum ozone level threshold for the ozone season below 75 ppb, above which would trigger a continuing violation of the 2008 ozone NAAQS. These thresholds range from 58 to 74 ppb.
- Based on modeling submitted by Alpine (and consistent with EPA and OTC modeling), unless additional emission reductions are implemented in time for summer 2020, the Greater Connecticut, Philadelphia, Baltimore and Washington DC 2015 ozone nonattainment areas will not meet their statutory attainment date. Modeling indicates that ozone concentrations needed for attainment during summer 2020 will not yet be reached by 2023. Similarly, Alpine modeling predicts that the New York City nonattainment area for the 2008 ozone NAAQS will not attain by its statutory attainment date. This is also consistent with EPA and OTC modeling, and indicates that the needed ozone concentrations in 2020 will not yet be reached in 2023.
- Modeling for 2023 is inconsistent with statutory attainment dates for most OTR nonattainment areas. It is only pertinent for the 2015 ozone NAAQS for the New York City nonattainment area, which has yet to attain the 2008 ozone NAAQS, and has an attainment date of August 2021.
- Based solely on measured ambient air ozone data, additional emission reductions of nitrogen oxides (NOx) are needed, especially on high ozone days. The measured data indicates that all OTC marginal ozone nonattainment areas in the OTR will most likely be bumped up. Under the Clean Air Act, the OTC States have a responsibility to provide clean air as expeditiously as possible.
- Regional NOx reductions in the OTR will reduce ozone across the OTR. This has been consistently shown by a large body of federal and state research, and modeling performed by the OTC states and EPA. It has also been historically demonstrated in retrospective studies of the ozone impacts from the NOx SIP Call and other regional NOx reductions.

- The OTC States recognize that additional NOx and VOC reductions are also needed from other source sectors, and several OTC states have already adopted and will continue to pursue additional NOx and VOC reductions from these source sectors.
- This OTC 184(c) recommendation is needed as a specific, daily NOx control measure because such a measure could not be achieved through a collaborative process.
- Coal-fired Electricity Generating Units (EGUs) located in Delaware, Maryland, New Jersey and New York State have operated with daily NOx limits. The EGUs have continuously operated their air pollution control equipment to meet stringent emissions limits for many years and are continuing to do so. It is therefore reasonable and cost effective to expect that EGUs operating in Pennsylvania and other states to do the same.
- Although EPA summarily rejected Section 126 petitions filed by Connecticut, Delaware, Maryland and New York, OTC States disagree with comments arguing EPA has already finalized the Section 126 issues. The grounds for EPA's Section 126 decisions have been undermined by court decisions remanding the CSAPR Update rule and vacating the CSAPR Close-Out rule. The United States Court of Appeals for the District of Columbia Circuit (DC Circuit) held that in attempting to address interstate transport, EPA failed to align needed ozone reductions with statutory attainment deadlines and did not provide a complete remedy, and these are the same grounds for the 184(c) recommendation.
- In light of pending attainment deadlines, the OTC States cannot wait for EPA to respond to the remand issued by the DC Circuit in Wisconsin v EPA for the CSAPR Update rule.
- Pennsylvania has the largest statewide NOx emissions of all states located in the Ozone Transport Region (OTR). Pennsylvania also has the highest statewide ozone season and daily NOx emissions from coal-fired EGUs.
- EPA has identified Pennsylvania as the largest or second largest contributor to the Philadelphia, Baltimore and Washington ozone non-attainment areas (NAAs). EPA has also identified Pennsylvania as a significant contributor to the NAAs in Connecticut, New Jersey and New York.
- As part of the 184(c) process, OTC has provided two public comment opportunities and two public hearings. The OTC also is providing this written response to the received comments in the 184(c) recommendation package submitted to EPA. The OTC believes that this is more than what is required under Section 184(c).

<u>Additional Specific Responses</u>

- Daily emissions limits and Reasonably Available Control Technology (RACT) for NOx have been required of EGUs located in New York State since 1995. These regulations have been periodically updated (in 1999, 2004, 2010, 2016, 2019) to align with advances in air pollution control technology.
- New York State EGU NOx emission rates have been reduced 87 percent since 2003 and are among the lowest in the country.
- By comparison, 2016 data from EPA's Emissions & Generation Resource Integrated Database (eGRID - https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid) clearly shows that the ozone season NOx emission rate for EGUs located in Pennsylvania is double that for EGUs located in New York State, and nearly three times the annual average NOx emission rate.
- Coal-fired EGUs located in Delaware, Maryland, New Jersey and New York State have operated with daily NOx limits and have continuously operated their air pollution control equipment to meet stringent emissions

limits for many years and are continuing to do so. It is therefore reasonable and cost effective to expect that EGUs operating in Pennsylvania and other states can do the same.

- During the 2018 ozone season, numerous coal-fired EGUs located in Pennsylvania were emitting ozone-forming NOx at rates that far exceeded past actual performance.
- Recently available NOx emissions data from the 2019 ozone season reinforces the need for tighter NOx limits on Pennsylvania's coal-fired EGUs.
    - Some coal-fired EGUs located in Pennsylvania continue to underperform compared to past actual performance. The following provides two examples.
        - Cheswick Generating Station
            - The Cheswick Unit 1 2018 and 2019 ozone season average NOx emission rates held steady at 0.20 lb/MMBtu.
            - By comparison, the Cheswick Unit 1 ozone season average NOx rates during the 2003-2006 ozone seasons were in the range of 0.06 – 0.09 lb/MMBtu, less than half its 2018-2019 ozone season average. This indicates that this unit is capable of achieving significantly lower emission rates that those demonstrated in 2018 and 2019.
        - Montour Steam Electric Station
            - The Montour power plant July 2019 average NOx emission rate did not appreciably improve between 2018 and 2019, with Unit 1 going from 0.115 lb/MMBtu in 2018 to 0.111 lb/MMBtu in 2019 and Unit 2 going from 0.135 lb/MMBtu in 2018 to 0.132 lb/MMBtu in 2019.
            - By comparison, the average NOx emission rate in July 2005 for Montour Unit 1 was 0.046 lb/MMBtu while Unit 2 was 0.057 lb/MMBtu, both more than 50 percent lower than the 2018 and 2019 emission rates. This indicates that this power plant is capable of achieving significantly lower emission rates than those demonstrated in 2018 and 2019.
    - At the same time, considerable improvement in the performance at certain other coal-fired EGUs located in Pennsylvania occurred. For example, the Homer City Generating Station dramatically improved its average NOx emission rate between 2018 and 2019. This implies that it is technologically and economically feasible for other EGUs in Pennsylvania to improve their performance.
            - The Homer City Unit 1 July NOx emission rate dropped from 0.166 lb/MMBtu in 2018 to 0.103 lb/MMBtu in 2019, a nearly 40 percent improvement.
            - The Homer City Unit 2 NOx emission rate dropped from 0.184 lb/MMBtu in July 2018 to 0.105 lb/MMBtu in July 2019, a 43 percent improvement.
            - The Homer City Unit 3 NOx emission rate dropped from 0.109 lb/MMBtu in July 2018 to 0.086 lb/MMBtu in 2019, a 22 percent improvement.
- As noted above, current ozone monitoring observations indicate all marginal non-attainment areas in the OTR may not attain the 2015 ozone standard by the 2021 deadline if additional NOx reductions do not

occur. The 184(c) petition requests that EPA require Pennsylvania to implement tighter daily NOx limits on Pennsylvania's coal-fired EGUs in time to reduce ozone levels during the summers of 2020 and 2021.

- While a cap-and-trade program can be a cost-effective and efficient means for achieving emission reductions on a region-wide or sector-wide basis, the remanded CSAPR Update annual and seasonal caps are inadequate. The annual and seasonal caps do not effectively limit NOx emissions at individual EGUs nor do they effectively limit NOx emissions at individual EGUs on high ozone days. With the increasing stringency of the ozone NAAQS, such measures are necessary to ensure timely attainment and continued maintenance with the standards.
- The consistently low CSAPR Update NOx allowance prices encourage using allowances instead of operating existing controls to achieve rule compliance. The December 9, 2019 CSAPR Update NOx Ozone Season Allowance price was $80.00/short ton, while the CSAPR Update Annual NOx Allowance price was $2.75/short ton. These prices are well below the cost of operating NOx emission controls.
- The OTC States cannot wait for EPA to respond to the CSAPR rule remand from the DC Circuit in Wisconsin v EPA. The Court has already clearly ruled that an approach allowing upwind States to continue their significant contributions to downwind air quality problems beyond the statutory deadlines is not consistent with the language of the Clean Air Act. Furthermore, EPA has not announced a timeline for responding to the DC Circuit's remand of the CSAPR Update rule.
- EPA's modeling for 2023 is inconsistent with statutory attainment dates for most OTR nonattainment areas and only is pertinent for the 2015 ozone NAAQS for the New York City nonattainment area.
- PA DEP commented that HYSPLIT back trajectories from New Jersey and New York ozone monitors for the July 2, 2018 ozone exceedance day show no link to PA coal fired EGUs. (See list of PA DEP Comment on OTC 184(c) petition 1st of two emails - Attachments 7-1 through 7-6.)
    - A response to this comment is in a separate attached document titled "2017 OTR Ozone Season Exceedances of 2017 NAAQS." This analysis found a significant number of back-trajectories passing over or near PA power plants connected to downwind sites with ozone exceedances on a number of days.
- PA DEP commented that HYSPLIT back trajectories for specific dates in May, July and August 2017 show no link to PA coal-fired EGUs. (See list of PA DEP Comments on OTC 184(c) petition 2nd of two emails - Attachments DOC 2, items 23 through 35.)
    - A response to this comment is in a separate attached document titled "2017 OTR Ozone Season Exceedances of 2017 NAAQS." This analysis found a significant number of back-trajectories passing over or near PA power plants connected to downwind sites with ozone exceedances on a number of days.

2017 OTR Ozone Season Exceedances of 2017 NAAQS

	4/10	4/11	4/14	5/10	5/16	5/17	5/18	5/19	6/10	6/11	6/12	6/13	6/14	6/15	6/21	6/22	6/29	6/30	7/3	7/4	7/5
OTC Max	71	85	72	71	72	86	92	76	77	80	98	96	73	71	75	81	71	79	95	75	76
CT	68	69	53	45	49	84	91	76	76	80	97	95	59	49	75	72	64	74	71	49	52
DE	63	68	56	62	60	79	84	62	70	64	72	74	62	47	64	71	64	61	64	70	55
DC	57	65	55	68	60	72	62	49	66	58	59	64	73	53	60	58	62	56	59	64	53
ME	69	85	48	38	46	78	84	53	71	80	98	62	41	39	51	41	55	56	43	31	40
MD	68	73	56	68	65	84	90	57	73	77	84	92	71	71	67	71	65	63	76	75	62
MA	67	72	49	40	50	83	86	73	72	75	83	96	48	53	67	61	58	72	95	44	50
NH	69	71	52	42	53	70	67	63	68	64	74	60	49	55	49	60	54	55	42	39	50
NJ	69	77	53	59	58	80	83	64	76	71	82	79	61	53	67	76	68	79	64	62	55
NY	67	71	58	44	57	81	82	71	77	73	89	88	52	54	69	68	64	74	69	64	52
PA	70	73	72	71	72	86	92	68	75	68	76	79	70	62	62	81	71	74	65	67	76
RI	61	61	51	37	48	76	85	72	72	76	82	86	49	34	62	54	50	56	59	46	45
VT	71	68	52	38	43	64	70	50	63	63	66	53	46	50	41	42	61	42	38	31	40
VA-OTC	62	66	64	68	59	72	61	49	63	58	61	63	72	64	59	55	60	54	58	63	54

	7/8	7/11	7/12	7/13	7/18	7/19	7/20	7/21	7/22	7/27	8/1	8/2	8/3	8/10	8/16	8/22	9/21	9/24	9/25	9/26	9/27
OTC Max	71	74	86	76	74	79	90	76	81	80	79	74	77	75	72	72	71	78	80	82	73
CT	71	74	86	69	72	76	90	63	58	47	66	66	75	75	53	72	34	54	67	56	28
DE	60	66	59	61	50	62	70	76	73	42	54	51	53	58	52	54	44	63	80	34	38
DC	54	49	51	55	59	76	71	68	58	55	55	58	63	56	59	60	39	56	64	36	47
ME	54	53	44	27	47	54	61	56	46	38	46	55	61	67	34	60	33	49	45	46	48
MD	63	67	67	70	64	78	89	73	66	56	71	59	59	61	72	61	50	57	75	55	62
MA	61	64	61	44	54	60	66	76	51	36	59	58	72	68	57	70	38	52	60	53	34
NH	54	50	57	50	50	51	69	56	46	41	46	53	64	68	37	64	56	48	51	52	48
NJ	63	64	64	70	70	76	77	70	76	46	72	56	66	61	60	62	39	78	69	61	36
NY	64	69	73	76	64	79	77	63	81	56	77	74	77	61	56	67	43	68	66	62	66
PA	58	65	59	56	74	77	74	65	79	80	79	67	65	66	66	61	71	66	79	82	73
RI	64	61	63	34	47	64	66	55	56	33	62	50	48	64	57	51	35	50	53	35	19
VT	51	47	44	25	48	48	49	47	36	33	30	42	48	50	35	51	41	40	31	40	50
VA-OTC	54	47	52	53	66	75	70	67	56	49	56	54	63	55	57	57	42	57	70	41	56

The following pages present back-trajectories for sample monitor exceedances at OTR nonattainment area monitors during the ozone season of 2017. Not all monitor exceedances were modeled due to the volume of needed trajecories. Nearby monitors were used when multiple exceedances occurred in close proximity. Pennsylvania monitors NEA and Bristol were included in the analysis because they are located in a multi-state nonattainment area.

There were 306 exceedances of the 2015 Ozone NAAQS in OTR nonattainment areas during the 2017 ozone season that spanned 28 days.

State	Location	ID	#Ex	NAA		State	Location	ID	#Ex	NAA
CT	Greenwich	90010017	6	NYC		NJ	Leonia	340030006	7	NYC
CT	Danbury	90011123	9	CT		NJ	Camden-Spruce St	340070002	9	PHL
CT	Stratford	90013007	11	CT		NJ	Ancora	340071001	2	PHL
CT	Westport	90019003	9	NYC		NJ	Newark Firehouse	340130003	1	NYC
CT	East Hartford	90031003	4	CT		NJ	Clarksboro	340150002	6	PHL
CT	Cornwall (Mohawk Mt)	90050005	1	CT		NJ	Bayonne	340170006	3	NYC
CT	Middletown	90070007	8	NYC		NJ	Flemington	340190001	4	NYC
CT	New Haven-B	90090027	5	NYC		NJ	Rider U	340210005	3	PHL
CT	Madison-combined (9002 3002	90099002	12	NYC		NJ	Wash Crossing	340219991	4	PHL
CT	Groton Fort Griswold	90110124	8	CT		NJ	Rutgers U	340230011	6	NYC
CT	Stafford	90131001	3	CT		NJ	Monmouth U	340250005	1	NYC
CT	Abington	90159991	4	CT		NJ	Chester	340273001	3	NYC
DE	LUMS2	100031007	2	PHL		NJ	Colliers Mills	340290006	4	PHL
DE	BCSP	100031010	7	PHL		NJ	Ramapo	340315001	1	NYC
DE	BELLFNT2	100031013	3	PHL		NJ	Columbia Site	340410007	1	NYC
DE	Wilmington-MLK Blvd	100032004	4	PHL		NY	NYC-IS52	360050110	2	NYC
DC	McMillan	110010043	4	DC		NY	NYC-Pfizer Lab-combinec	360050133	2	NYC
MD	GLEN BURNIE	240031003	6	BLT		NY	NYC	360610135	2	NYC
MD	Essex	240053001	4	BLT		NY	NYC-Queens	360810124	6	NYC
MD	Hart Miller Island	240053474	10	BLT		NY	NYC-Susan Wagner HS	360850067	7	NYC
MD	CALVERT-B	240090011	2	DC		NY	Rockland County	360870005	1	NYC
MD	South Carroll	240130001	1	BLT		NY	Babylon	361030002	7	NYC
MD	Fair Hill	240150003	8	PHL		NY	Riverhead	361030004	6	NYC
MD	Frederick Co.	240210037	1	DC		NY	Holtsville-combined	361030009	5	NYC
MD	Edgewood	240251001	6	BLT		NY	White Plains	361192004	5	NYC
MD	Aldino	240259001	5	BLT		PA	Bristol	420170012	12	PHL
MD	Rockville	240313001	2	DC		PA	NEWG	420290100	5	PHL
MD	HU-Beltsville	240330030	3	DC		PA	Chester	420450002	2	PHL
MD	Prince Georges Co. Equestrian	240338003	4	DC		PA	Norristown	420910013	7	PHL
MD	Beltsville	240339991	4	DC		PA	NEA	421010024	12	PHL
MD	Furley E.S.Rec Center	245100054	1	BLT		PA	NEW	421010048	9	PHL
						VA-OTC	AURORA HILLS	510130020	3	DC
OTR	OTR Nonattainment Area Exceedances		306			VA-OTC	Franconia	510590030	1	DC

Analysis and Results

There were 306 exceedances of the 2015 Ozone NAAQS in OTR nonattainment areas during the 2017 ozone season. Of these 306 exceedances, PADEP provided trajectories for 13 occurrences where back-trajectories did not show a connection with PA power plants. Most of these trajectories were confirmed by OTC analysis. Since the OTC analysis used NAM meteorology rather than GDAS, there are some differences from those provided by PADEP. The OTC analysis also showed a number of other trajectories, not included in the PADEP comments, that did not show connection to PA power plants. The point being that not all OTR nonattainment area ozone exceedances have back-trajectories that pass over, or nearby, PA power plants.

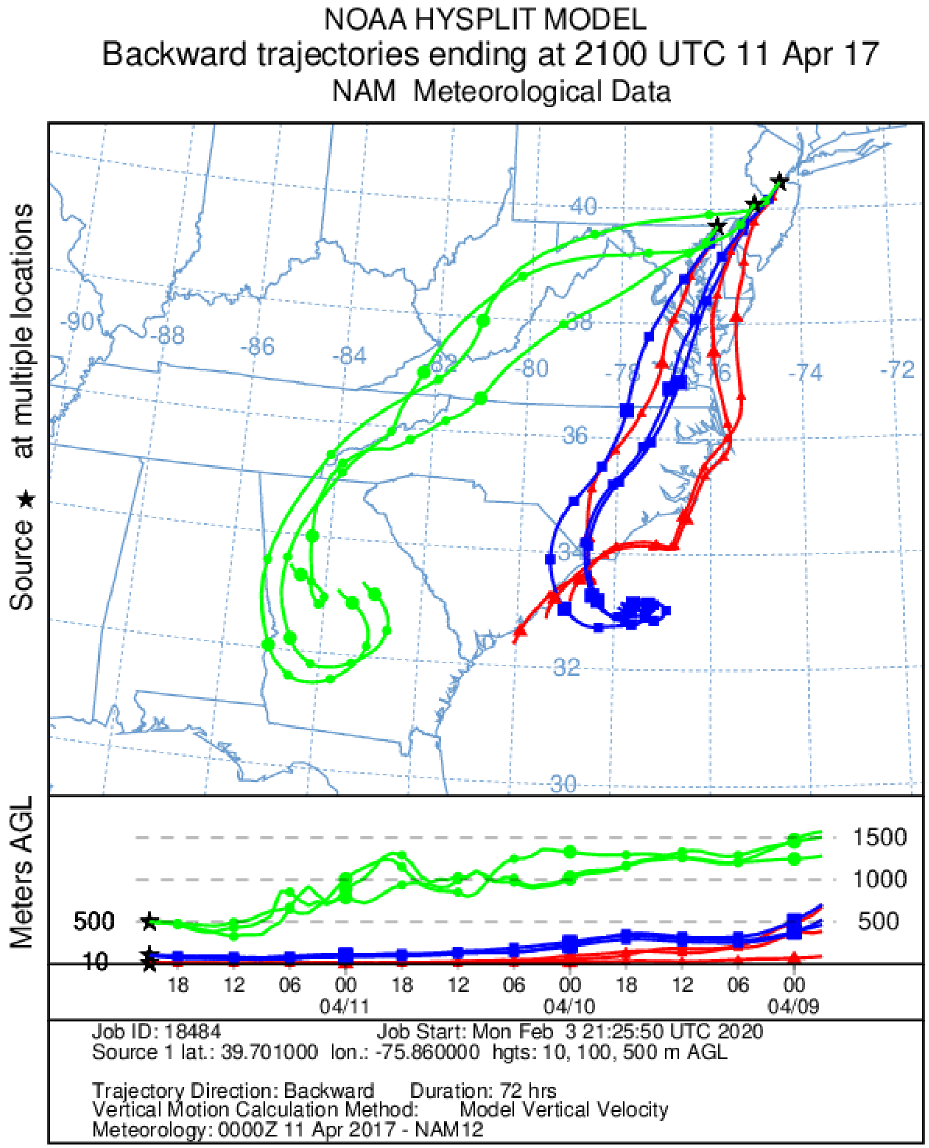
The OTC analysis found a significant number of back-trajectories passing over or near PA power plants connected with ozone exceedances. In two cases (May 17th and May 19th) the change in meteorology model appears to change the PADEP results, from PA power plants not influencing an exceedance, to the power plants could influence the exceedances. In two other cases (July 20th and 22nd), PADEP modeling was confirmed for the one monitor presented, but other monitor(s) did have exceedances with back-trajectories that passed over, or nearby, PA power plants. And in one case (August 10th), PADEP presented a back-trajectory that if run back in time a little further, did pass over areas with PA power plants.

OTC modeling results indicate that of the 28 days where there was an ozone exceedance in an OTR nonattainment area, there was some connection to the power plant regions of PA on 15 days and no apparent connection on 13 days. Monitors indicated in the table below in **bold** indicate the potential connection between the exceedance at that monitor and a PA power plant. While not all (306) exceedances were modeled, exceeding monitors near a monitor that was modeled has a strong possibility of demonstrating the same connection, or lack of connection, to PA power plants. Since one trajectory per day was modeled, this analysis is likely to under-count the connection between exceedances and PA power plants and there is little likelihood it would over-count them. Graphics for HYSPLIT modeling appear on the following pages for each of the 28 exceedance days for up to 6 monitors.

4/11	Fair Hill	Rutgers	NEA			
5/17	**Stratford**	**Camden**	**Edgewood**	**Fair Hill**	**McMillian**	
5/18	Stratford	Camden	Babylon	Edgewood	Fair Hill	
5/19	**Madison**	Babylon				
6/10	**Stratford**	**Camden**	**Fair Hill**	**Aldino**	**Bristol**	**NEA**
6/11	Stratford	Camden	Babylon			
6/12	Stratford	**Camden**	**Babylon**	**Fair Hill**	Edgewood	**Bristol**
6/13	Stratford	**Camden**	**Babylon**	Edgewood	**Fair Hill**	McMillian
6/14	McMillian					
6/21	**Stratford**					
6/22	**Danbury**	Camden	Fair Hill	Aldino	Bristol	NEA
6/30	Danbury					
7/3	Madison					
7/8	**Madison**					
7/11	Madison					

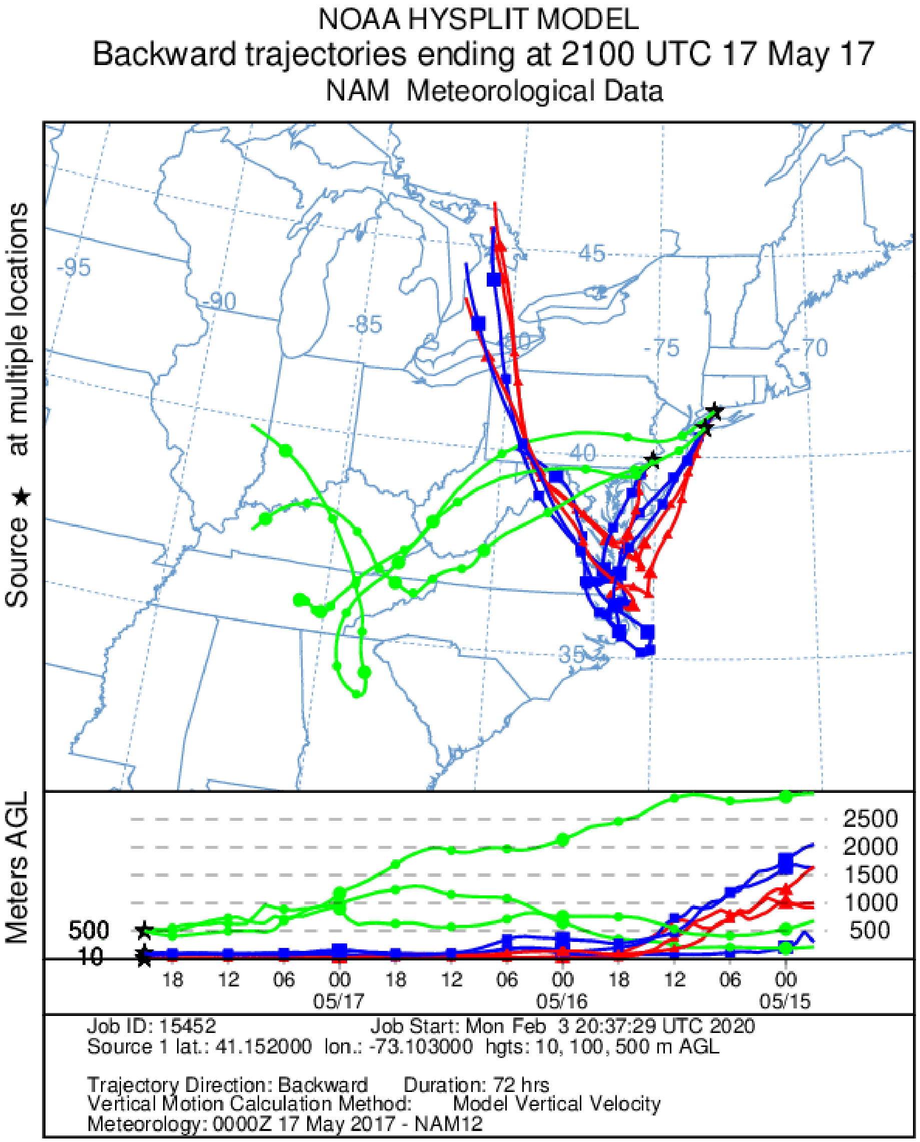
7/12	Madison	**Riverhead**				
7/13	Riverhead					
7/18	Danbury	Bristol	NEA			
7/19	**Stratford**	Madison	Camden	Edgewood	Bristol	McMillian
7/20	**Stratford**	Babylon	**Edgewood**	McMillian	Bristol	
7/21	**Essex**					
7/22	Camden	Queens	**Bristol**	**NEA**		
8/1	Queens	Babylon	**Bristol**	**NEA**		
8/3	Danbury					
8/10	**Stratford**					
8/22	Danbury					
9/24	Rutgers					
9/25	Fair Hill	Bristol	NEA			

April 11, 2017

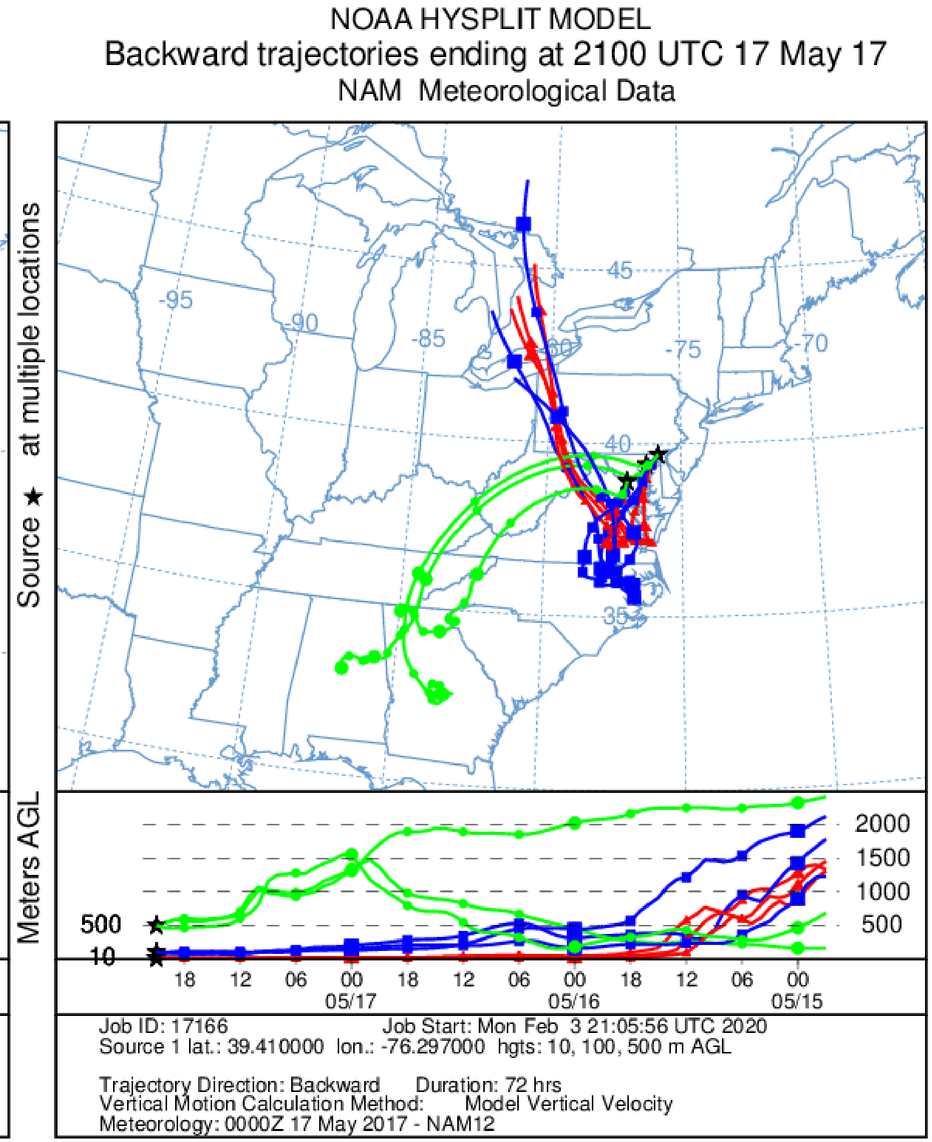


Back-trajectories were run for 72-hours in most cases, with NAM meteorology. Latitude and longitude for up to six OTR nonattainment area monitors exceeding the 2015 ozone NAAQS were used for each modeled day as the starting point for back-trajectories. A single start time of 3PM EDT was modeled for each day. Since trajectories can change through the course of an exceedance day, there is potential that trajectory connection to PA power plant in this analysis is understated. Starting point elevations were 10 meters (red), 50 meters (blue), and 500 meters (green). Only the red and blue back-trajectories were used to identify potential connection to PA power plants, however there is potential that areas between the blue and green trajectories could also influence the monitored exceedance since stack height and plume rise from some power plants can be significant.

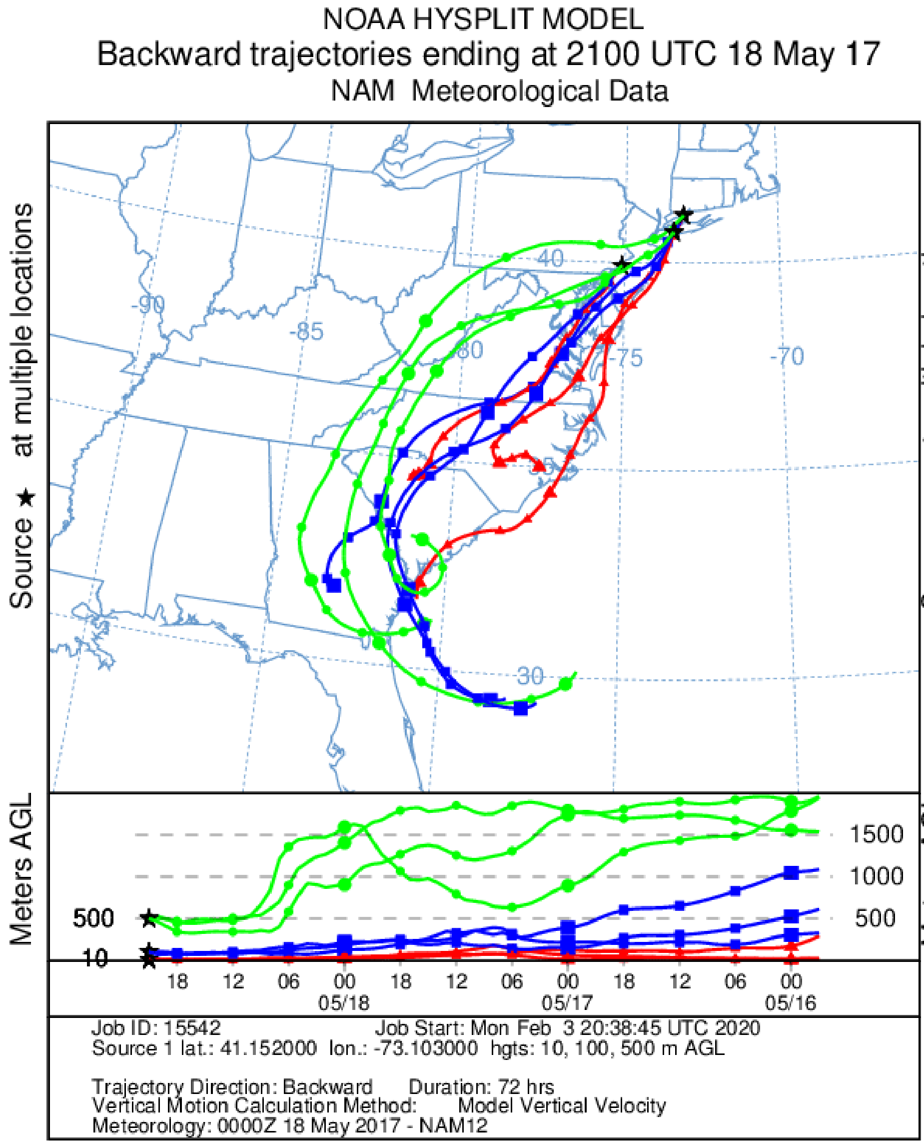
May 17, 2017



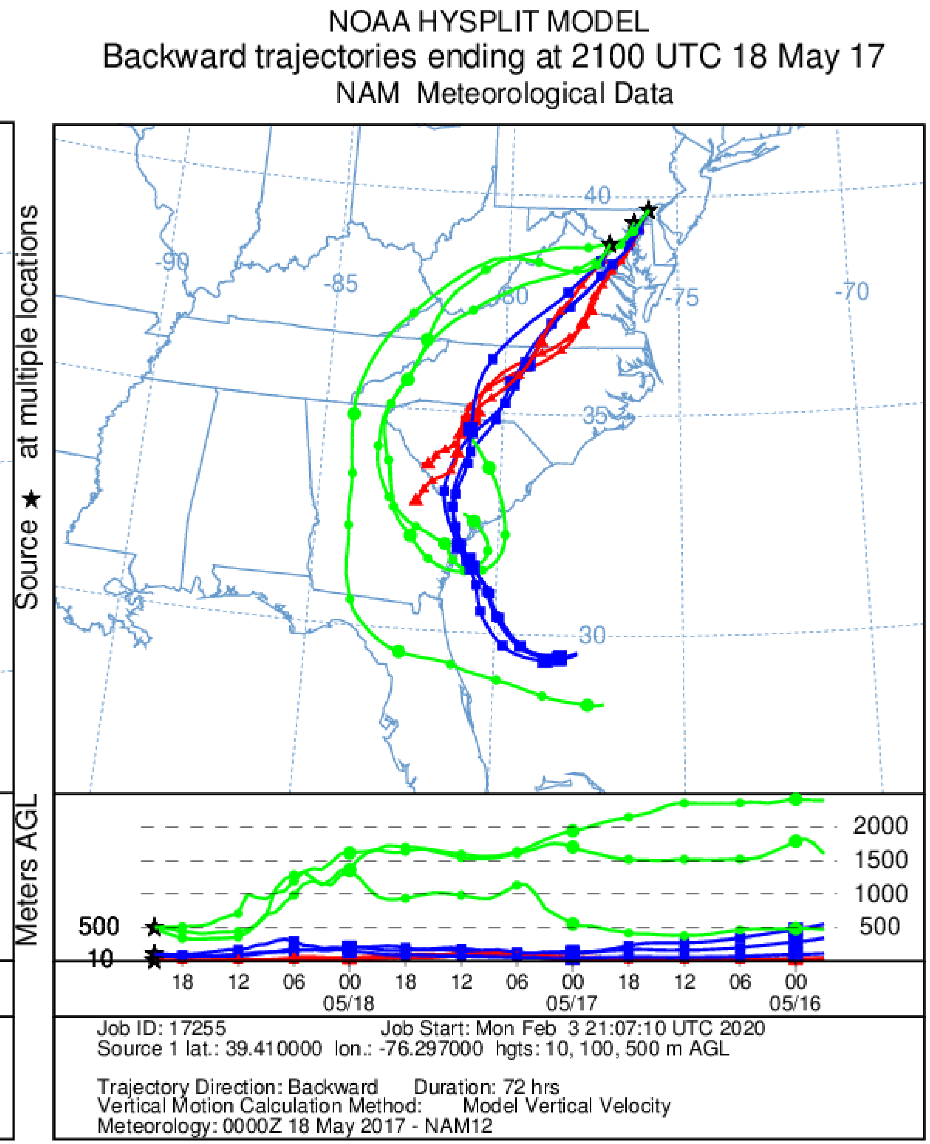
May 17, 2017*



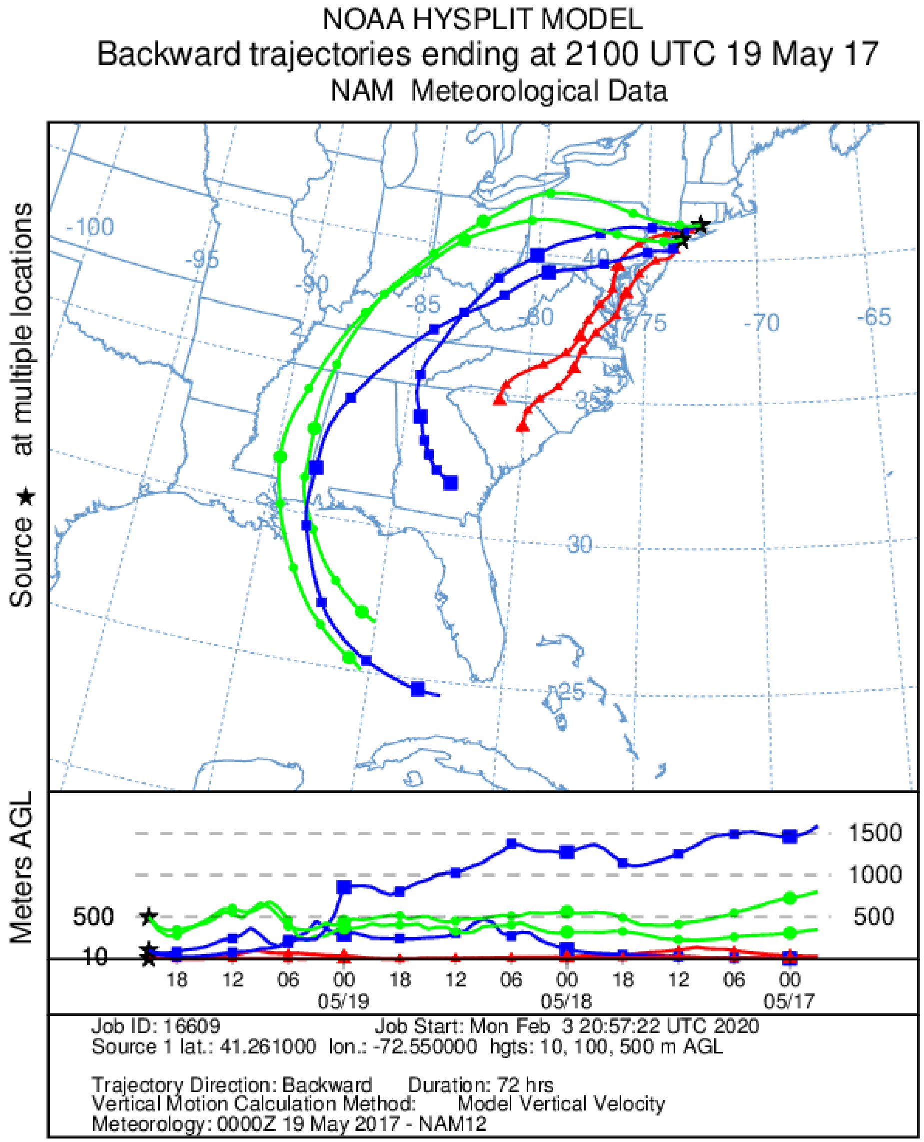
May 18, 2017



May 18, 2017*

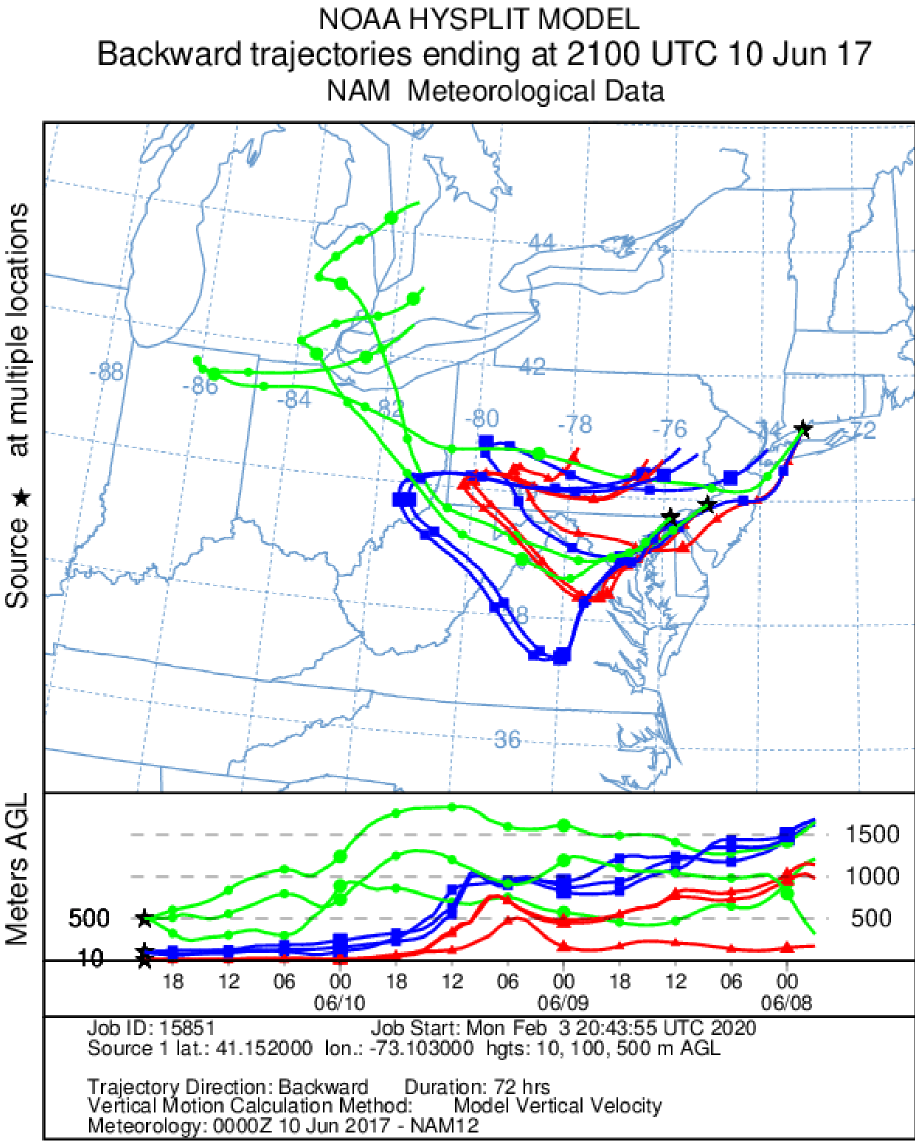


May 19, 2017*

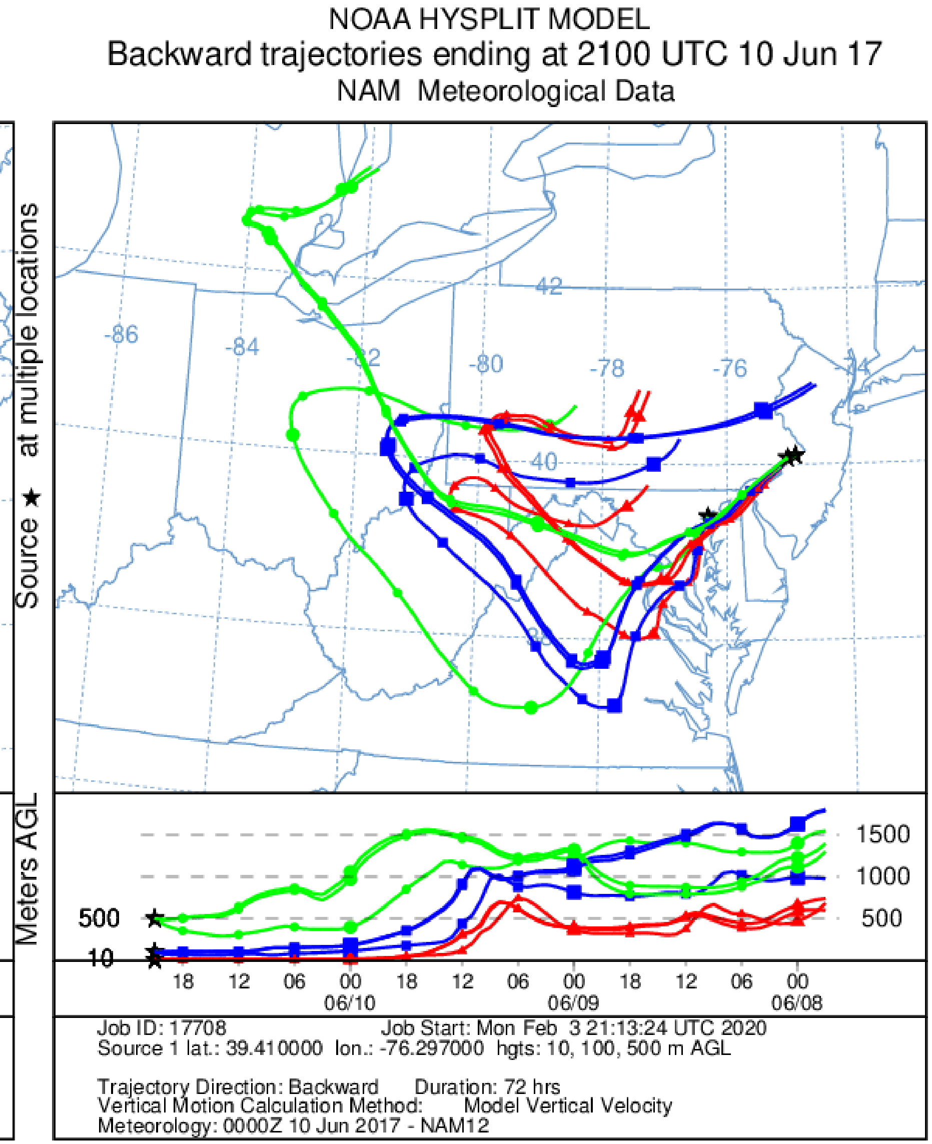


NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 19 May 17
NAM Meteorological Data
Source ★ at multiple locations
-100
-95
-90
-85
-80
-75
-70
-65
40
35
30
25
Meters AGL
1500
1000
500
500
10
18
12
06
00
05/19
18
12
06
00
05/18
18
12
06
00
05/17
Job ID: 16609
Job Start: Mon Feb 3 20:57:22 UTC 2020
Source 1 lat.: 41.261000 lon.: -72.550000 hgts: 10, 100, 500 m AGL
Trajectory Direction: Backward
Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 19 May 2017 - NAM12

June 10, 2017

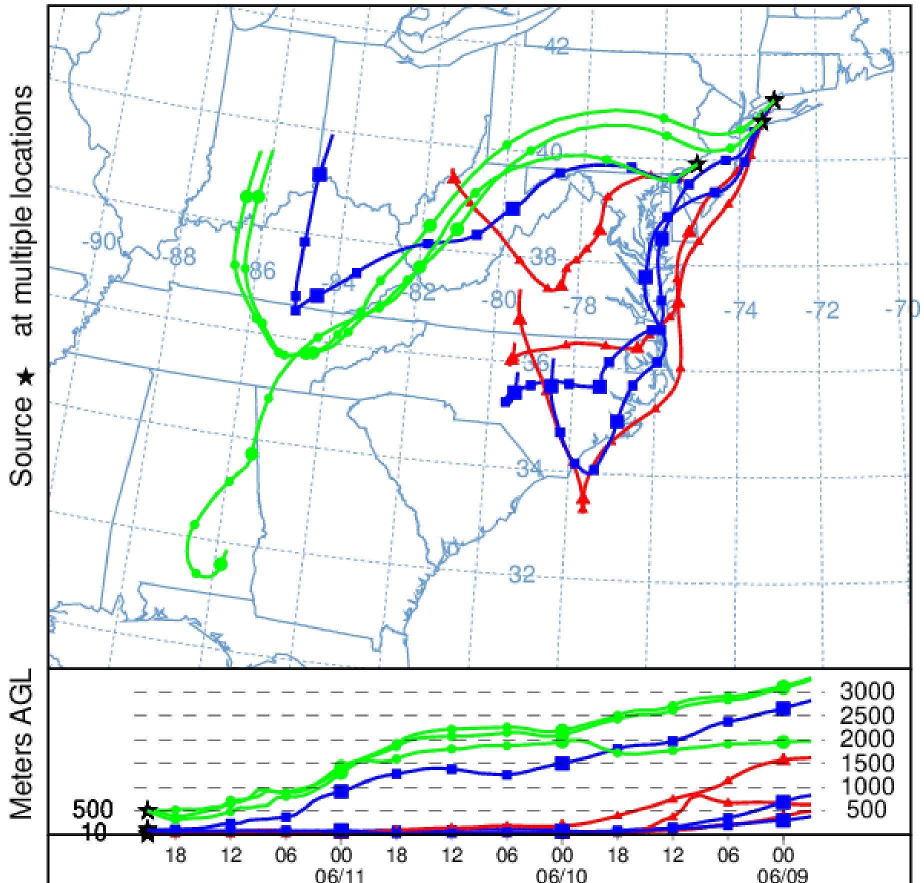


June 10, 2017



June 11, 2017

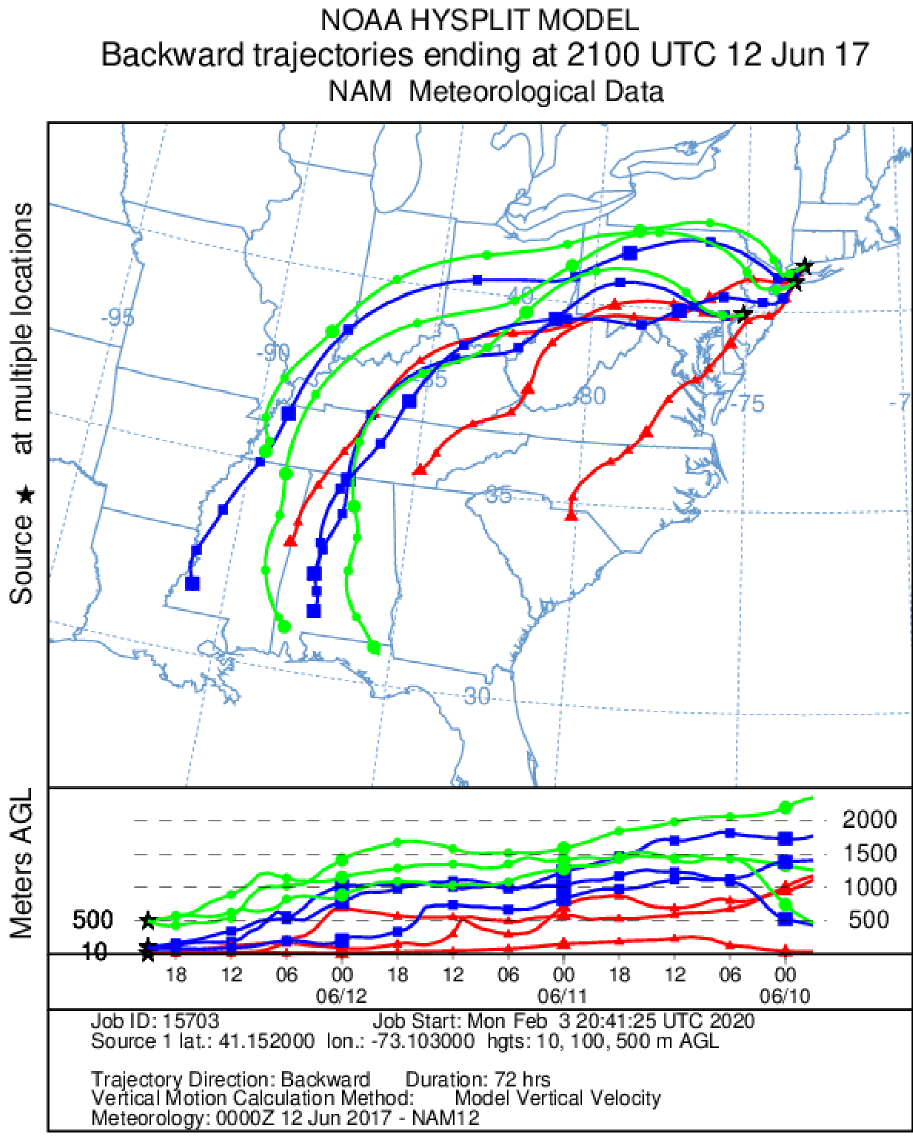
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 11 Jun 17
NAM Meteorological Data



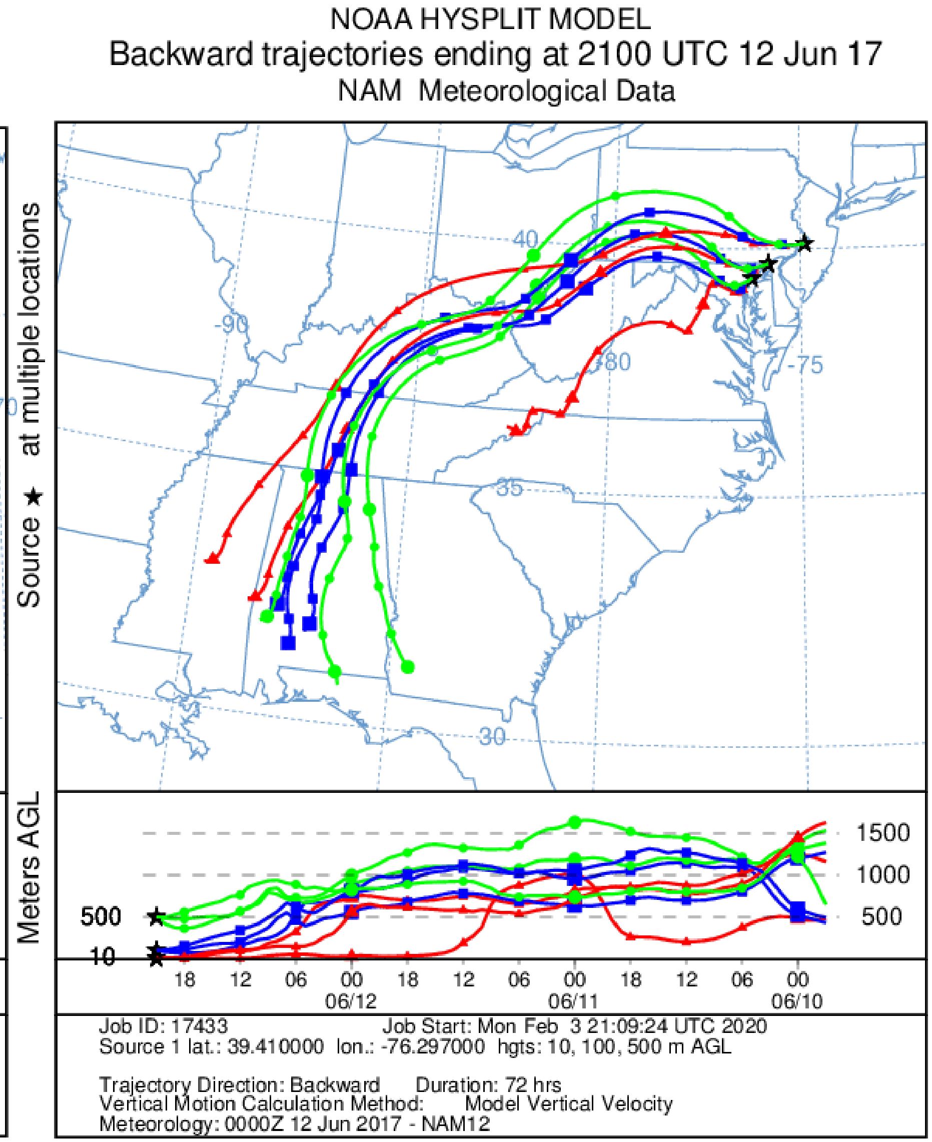
Job ID: 15607 Job Start: Mon Feb 3 20:40:02 UTC 2020
Source 1 lat.: 41.152000 lon.: -73.103000 hgts: 10, 100, 500 m AGL

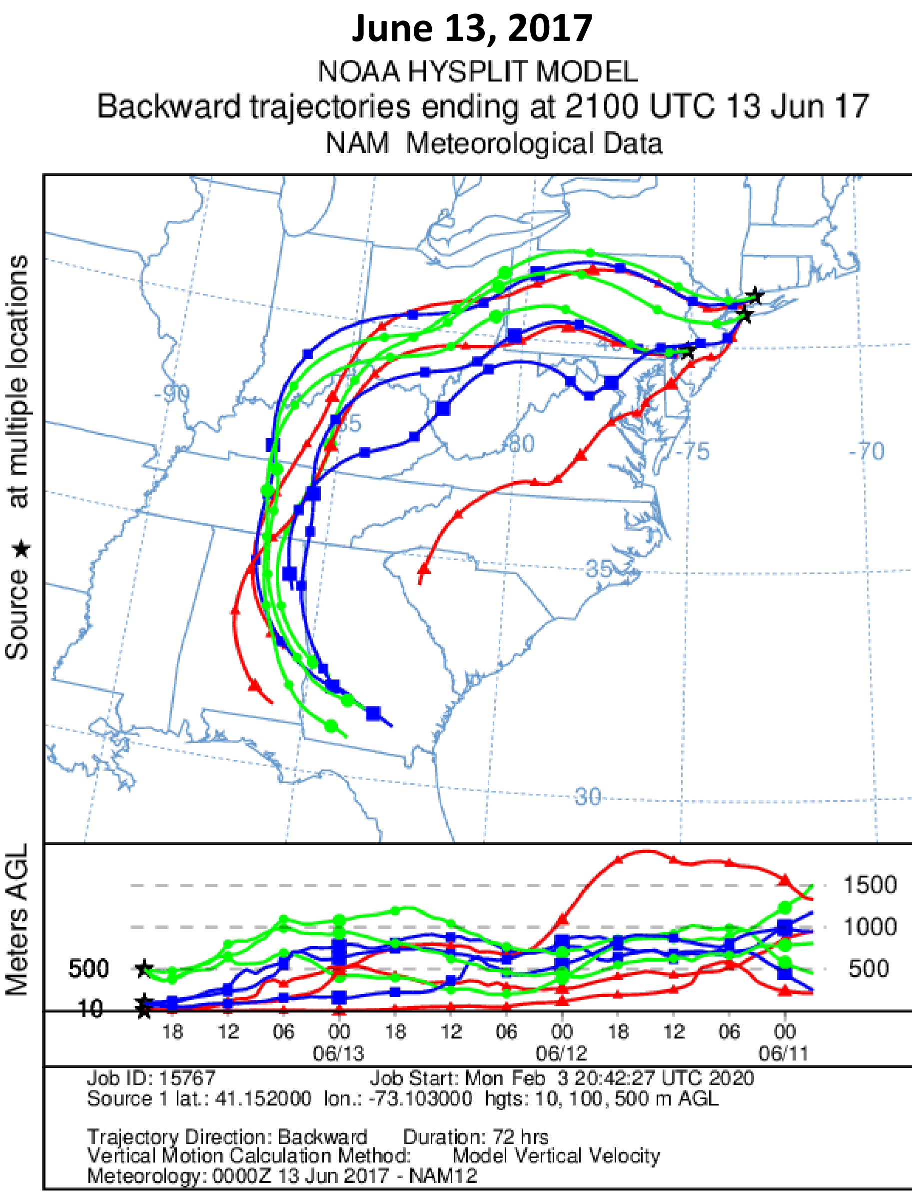
Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 11 Jun 2017 - NAM12

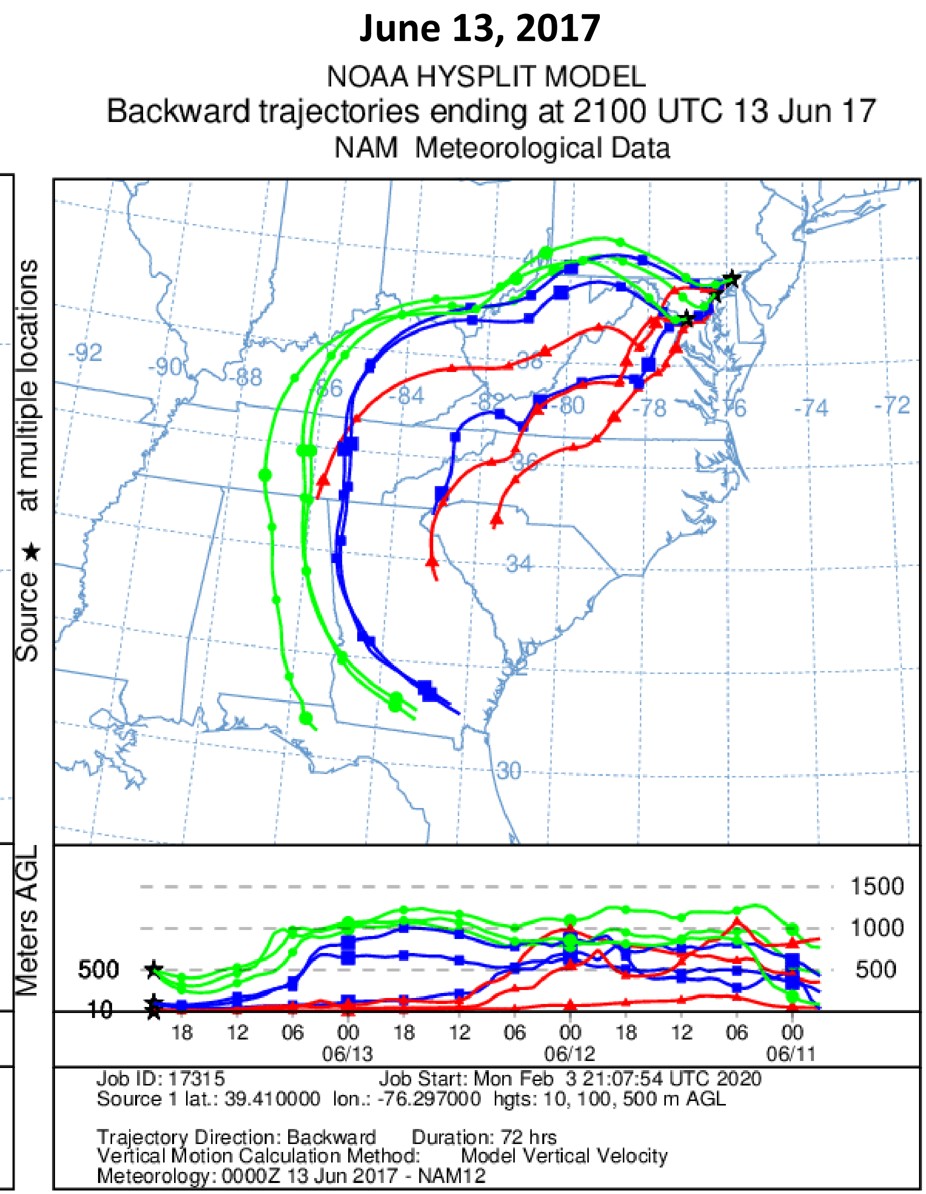
June 12, 2017



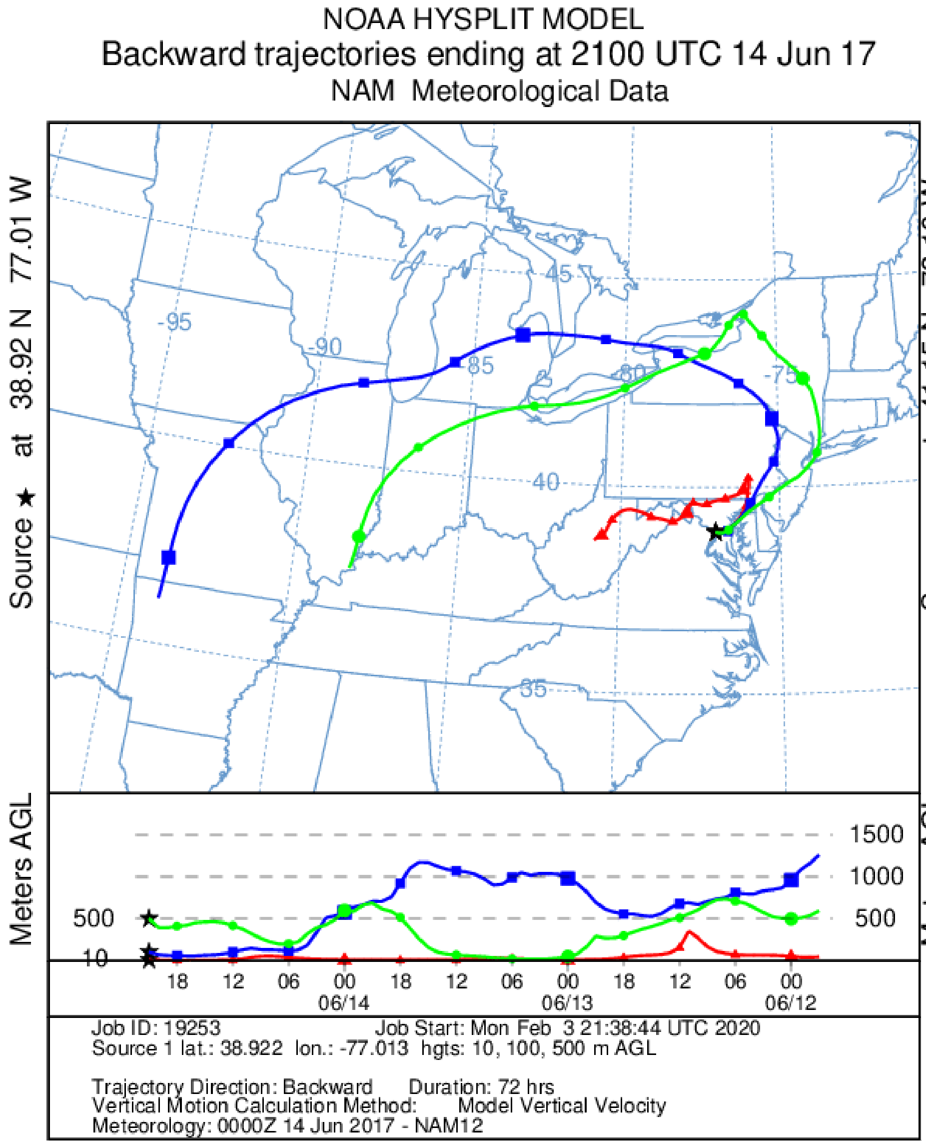
June 12, 2017



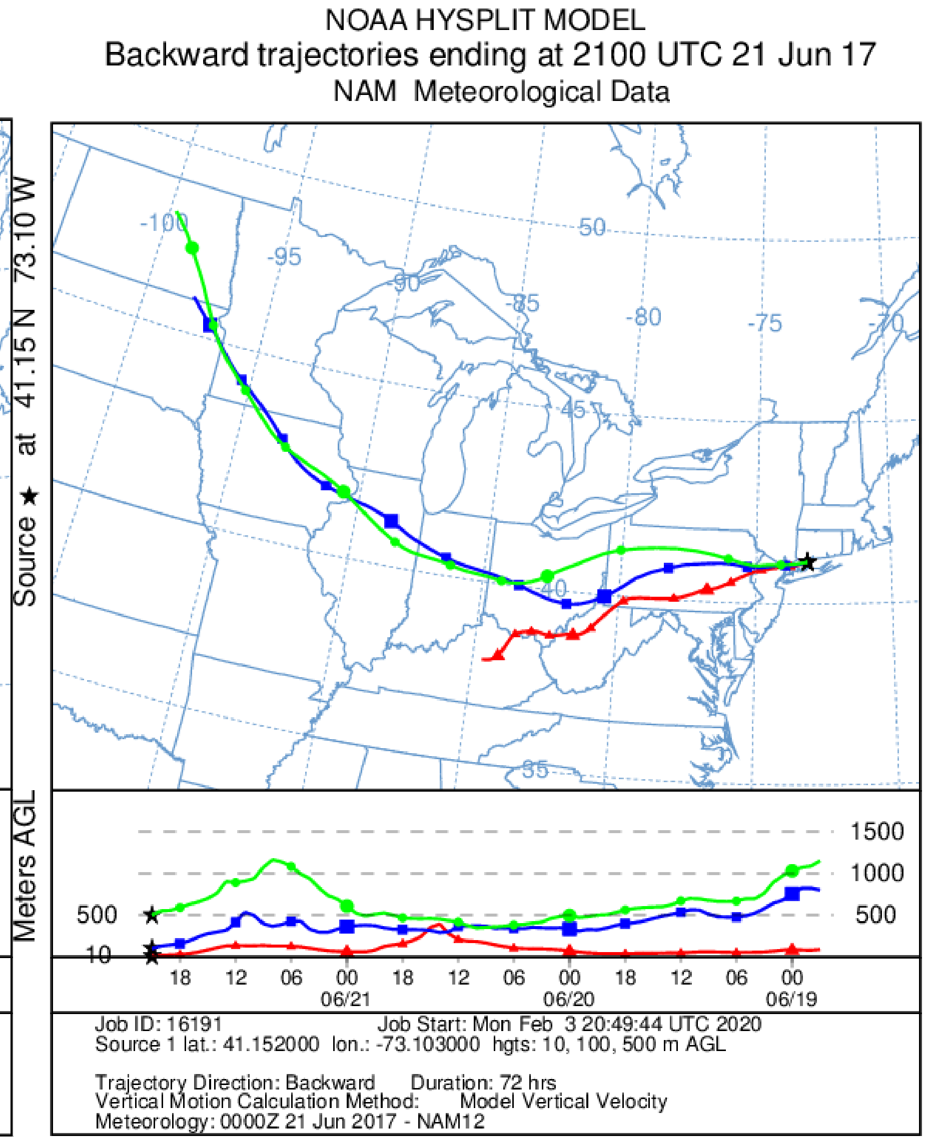

June 13, 2017
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 13 Jun 17
NAM Meteorological Data
Source ★ at multiple locations
Meters AGL
Job ID: 15767 Job Start: Mon Feb 3 20:42:27 UTC 2020
Source 1 lat.: 41.152000 lon.: -73.103000 hgts: 10, 100, 500 m AGL
Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2017 - NAM12


June 13, 2017
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 13 Jun 17
NAM Meteorological Data
Source ★ at multiple locations
Meters AGL
Job ID: 17315 Job Start: Mon Feb 3 21:07:54 UTC 2020
Source 1 lat.: 39.410000 lon.: -76.297000 hgts: 10, 100, 500 m AGL
Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 13 Jun 2017 - NAM12

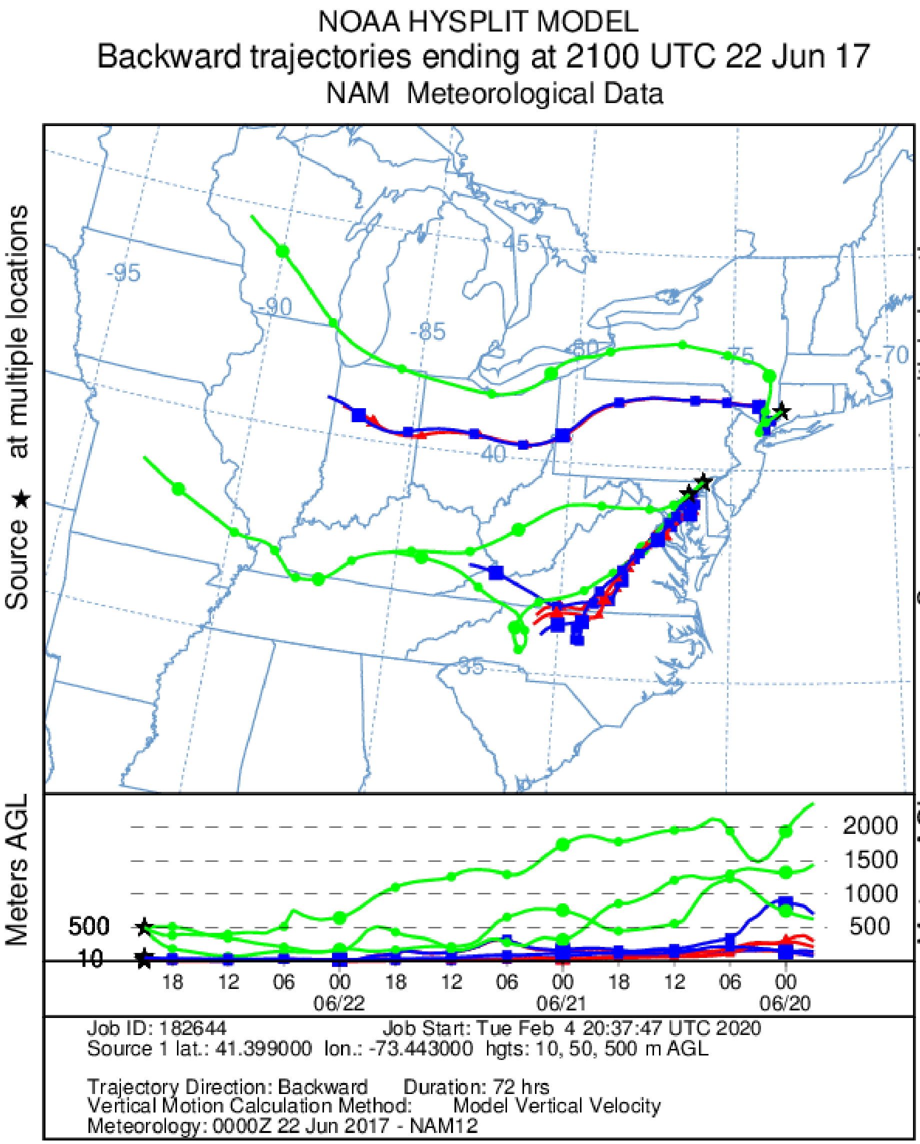
June 14, 2017



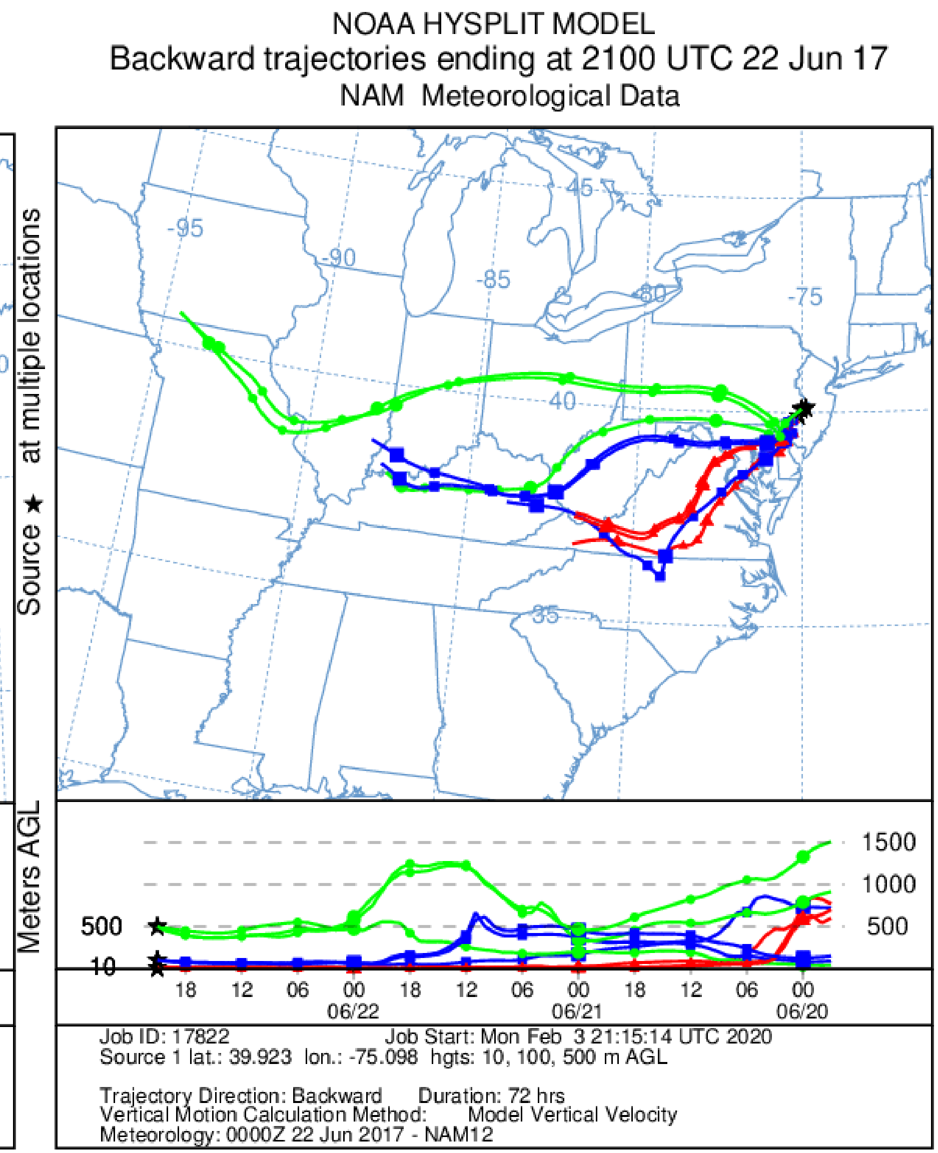
June 21, 2017



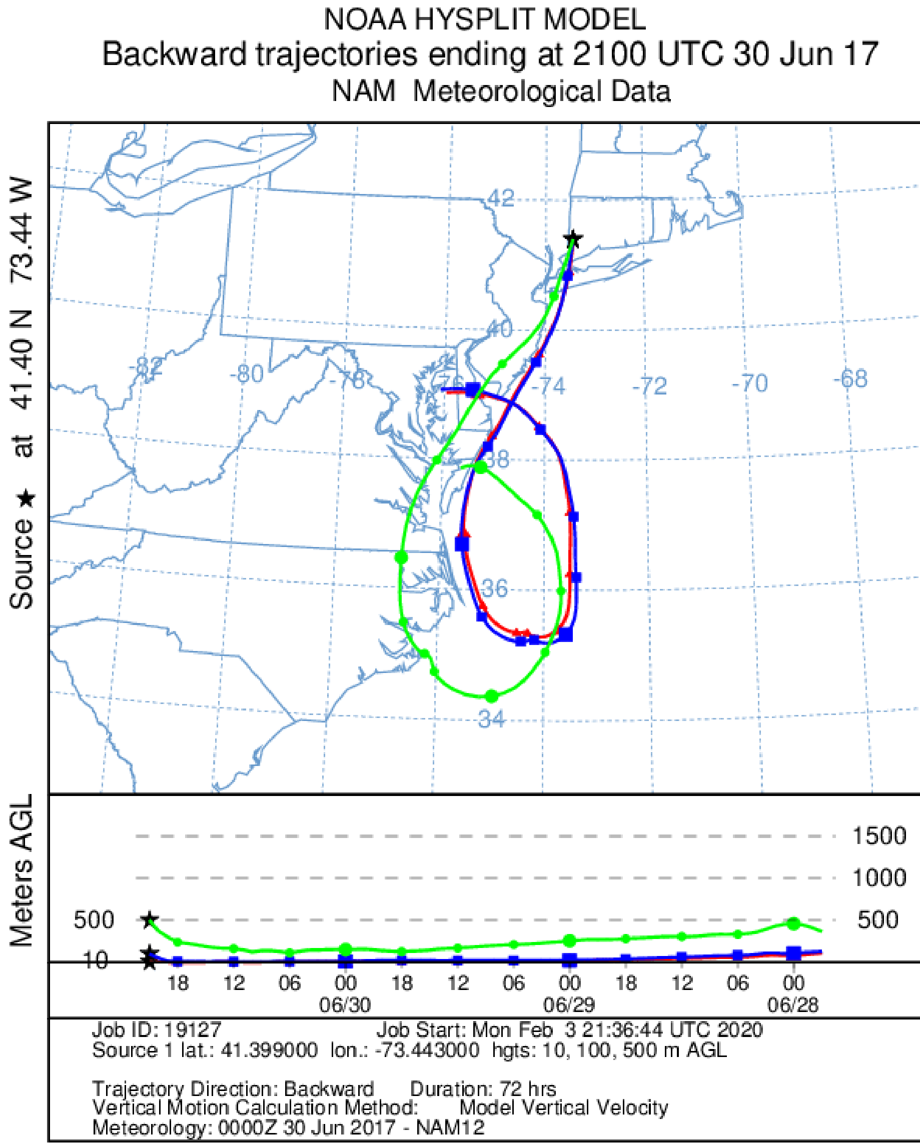
June 22, 2017



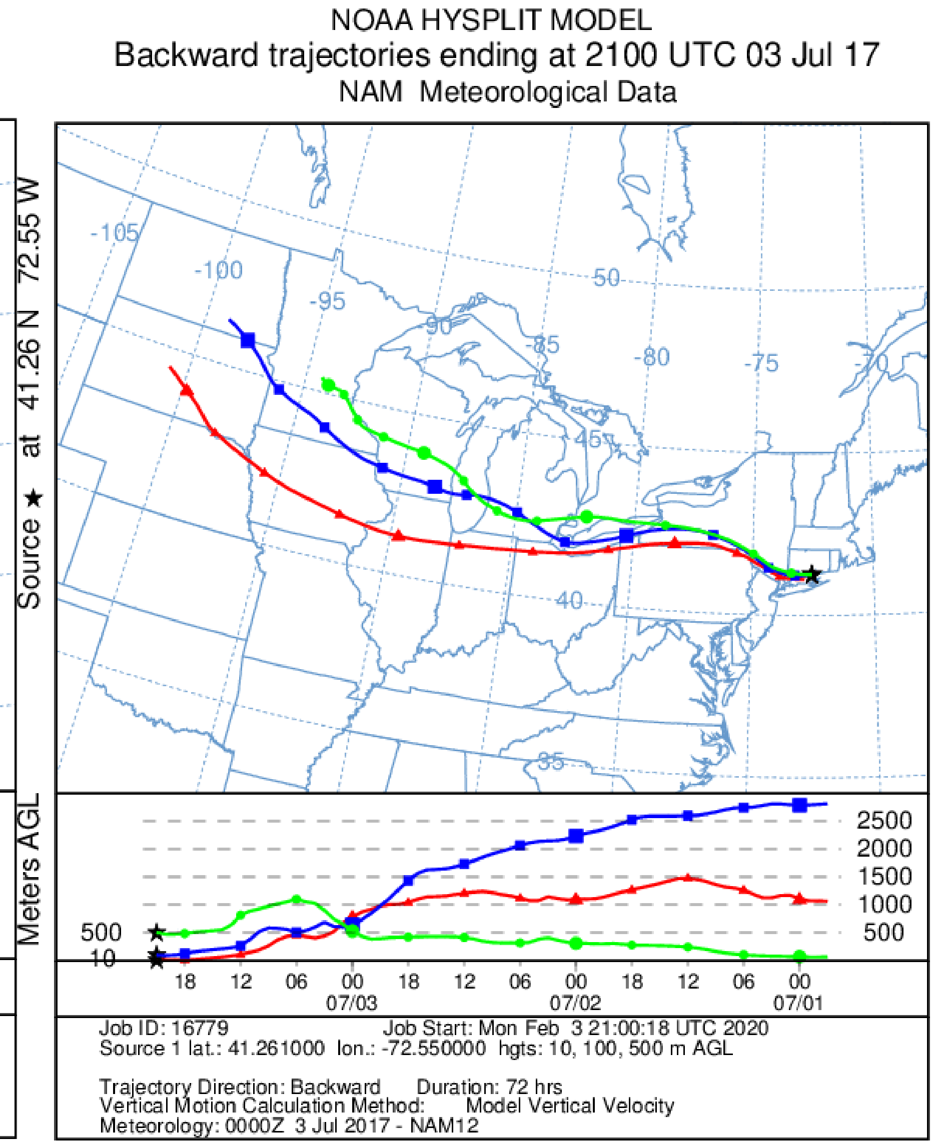
June 22, 2017



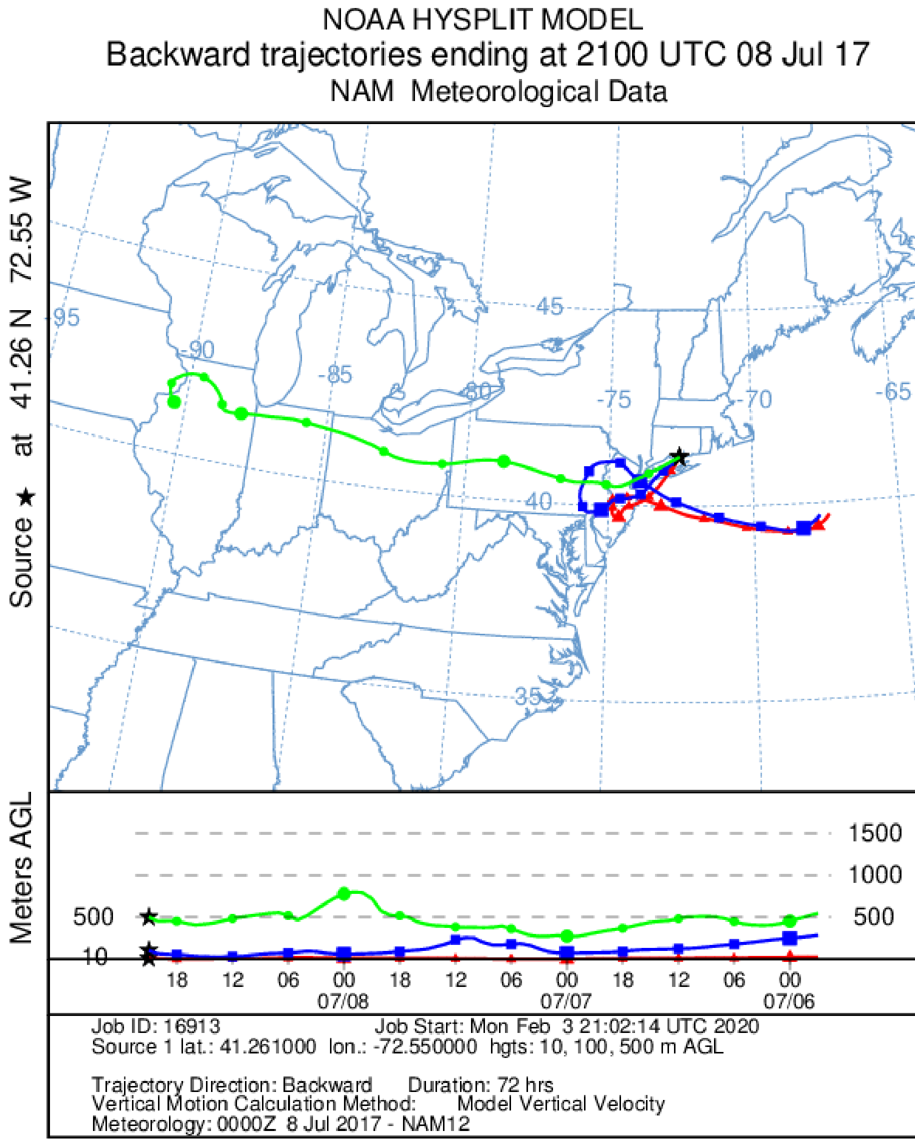
June 30, 2017



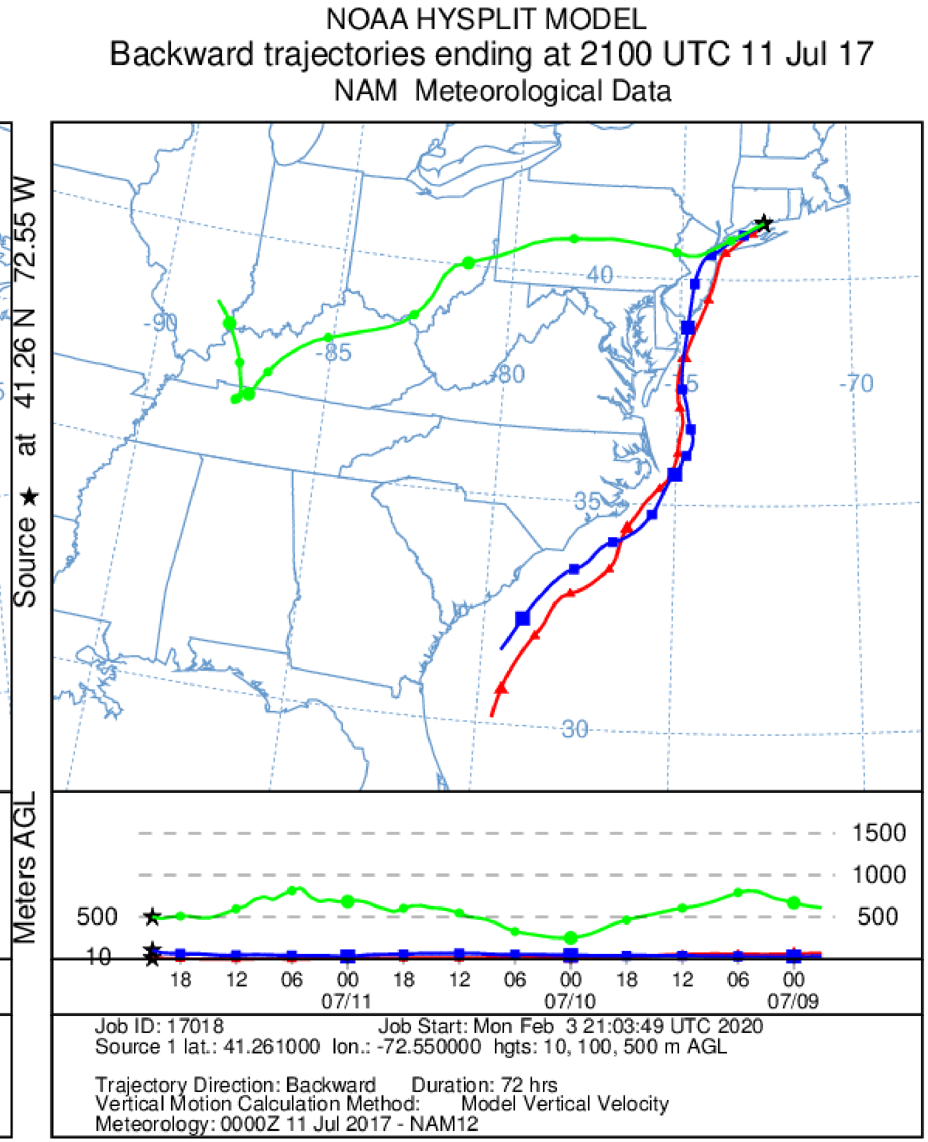
July 3, 2017*



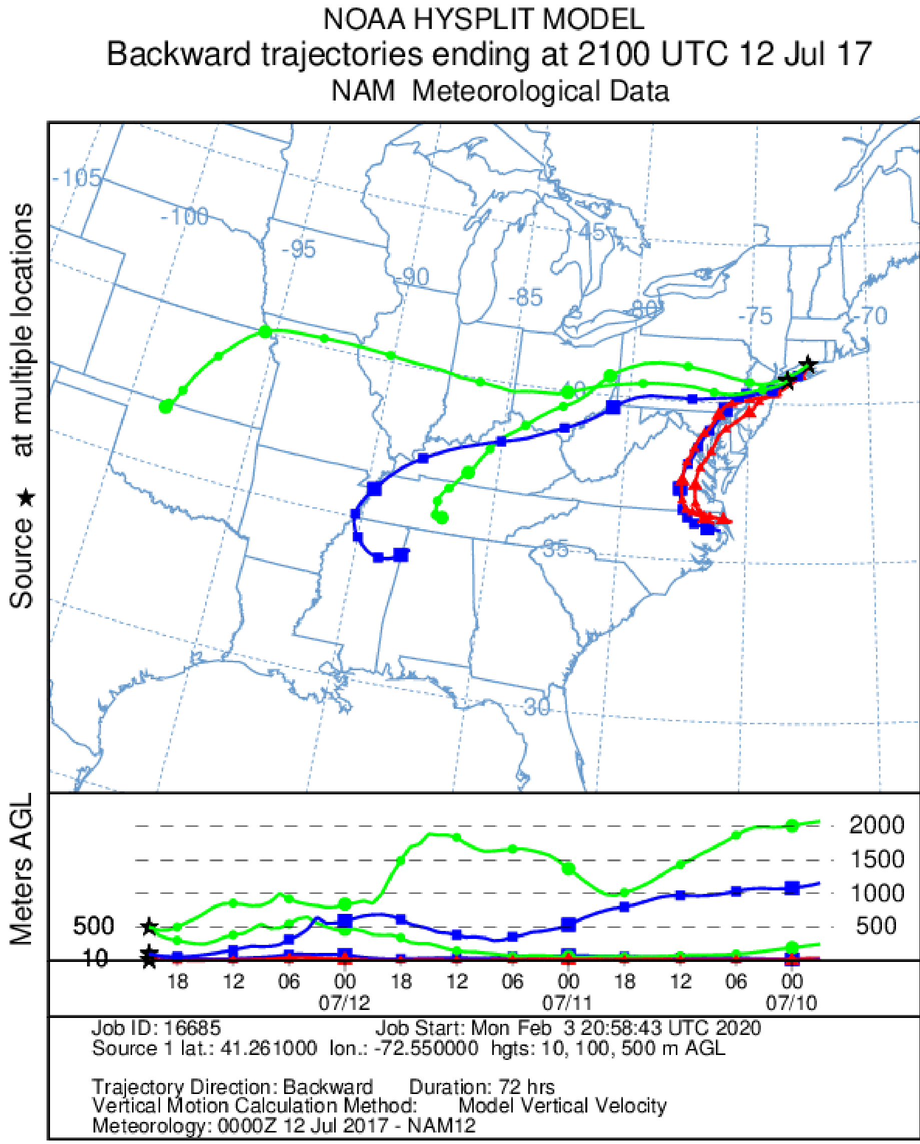
July 8, 2017



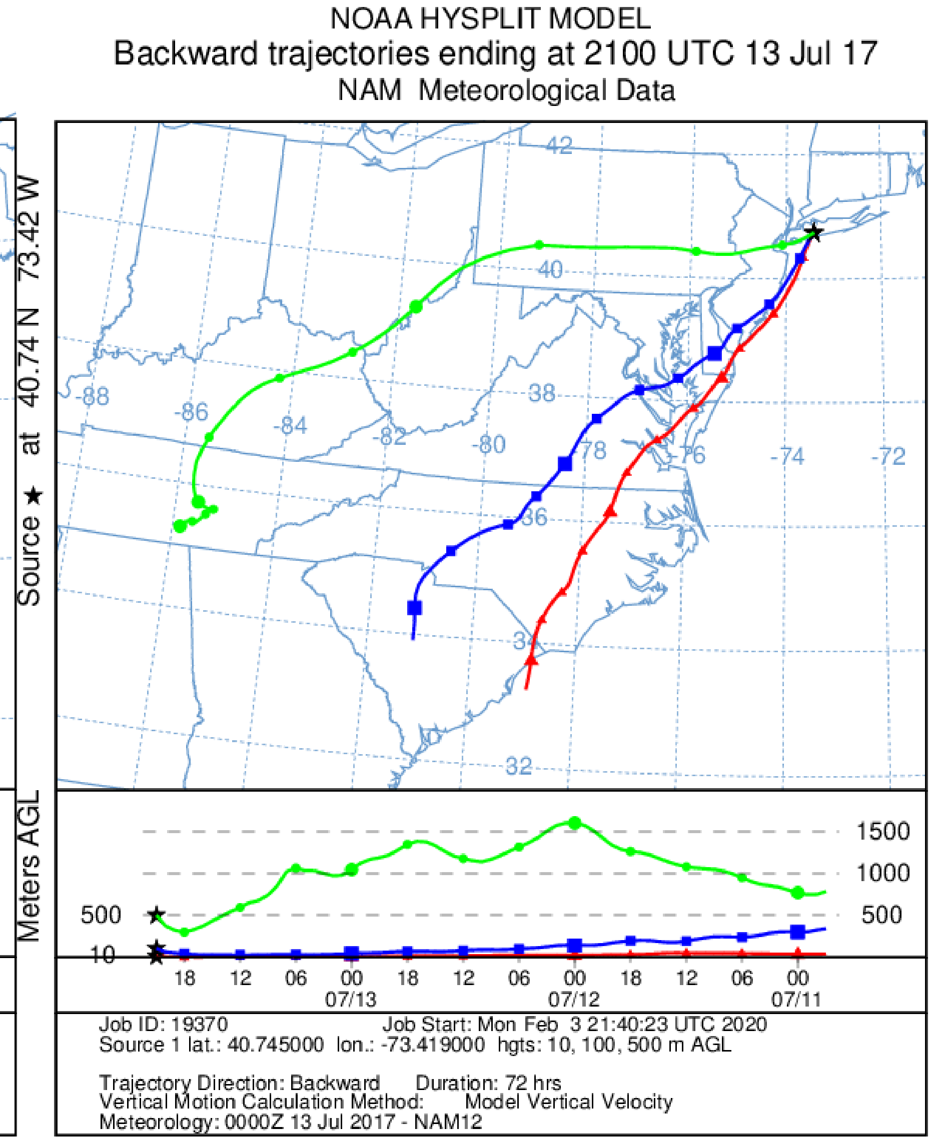
July 11, 2017



July 12, 2017

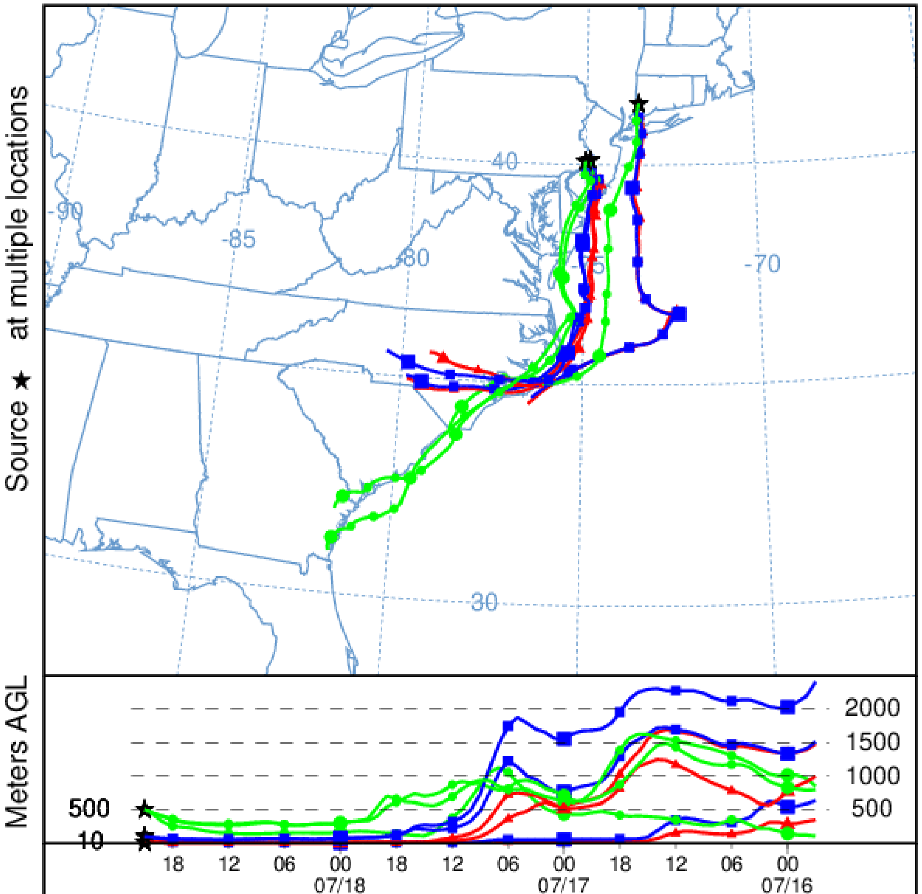


July 13, 2017



July 18, 2017

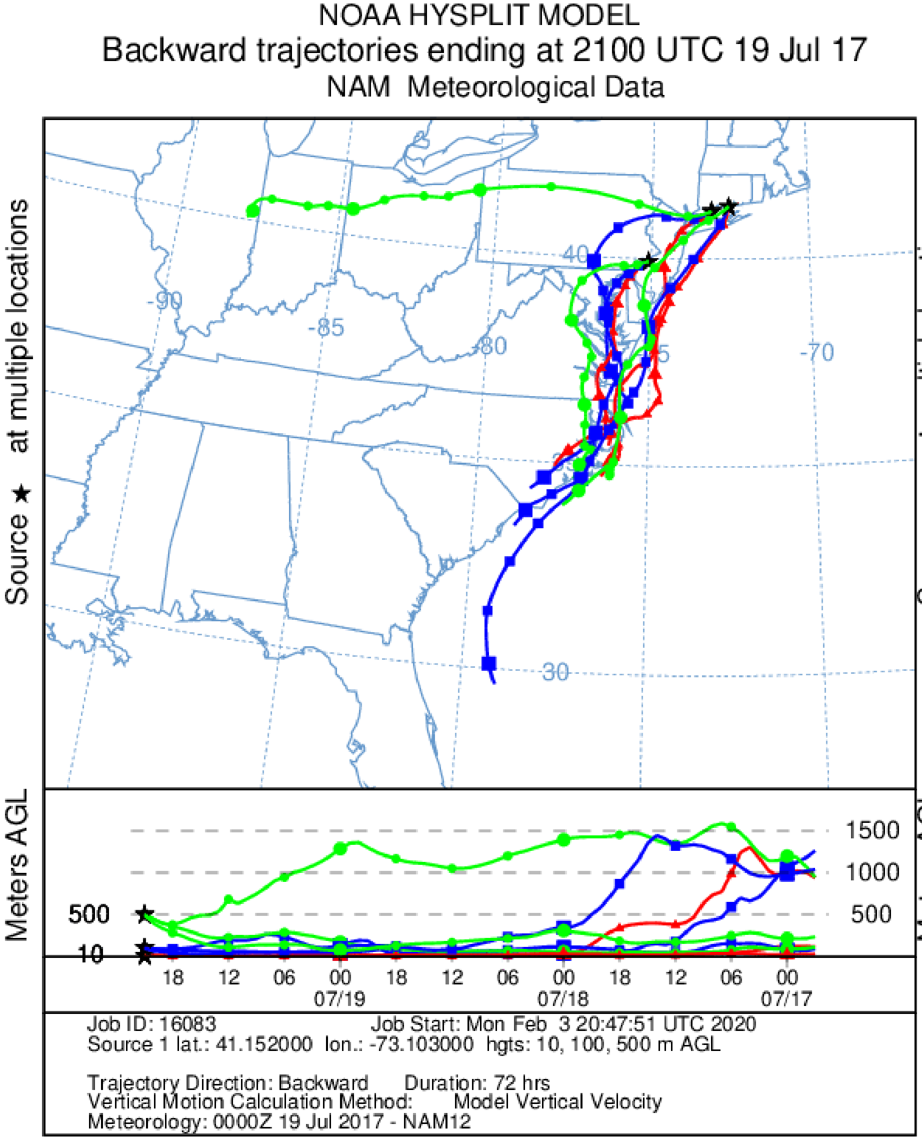
NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 18 Jul 17
NAM Meteorological Data



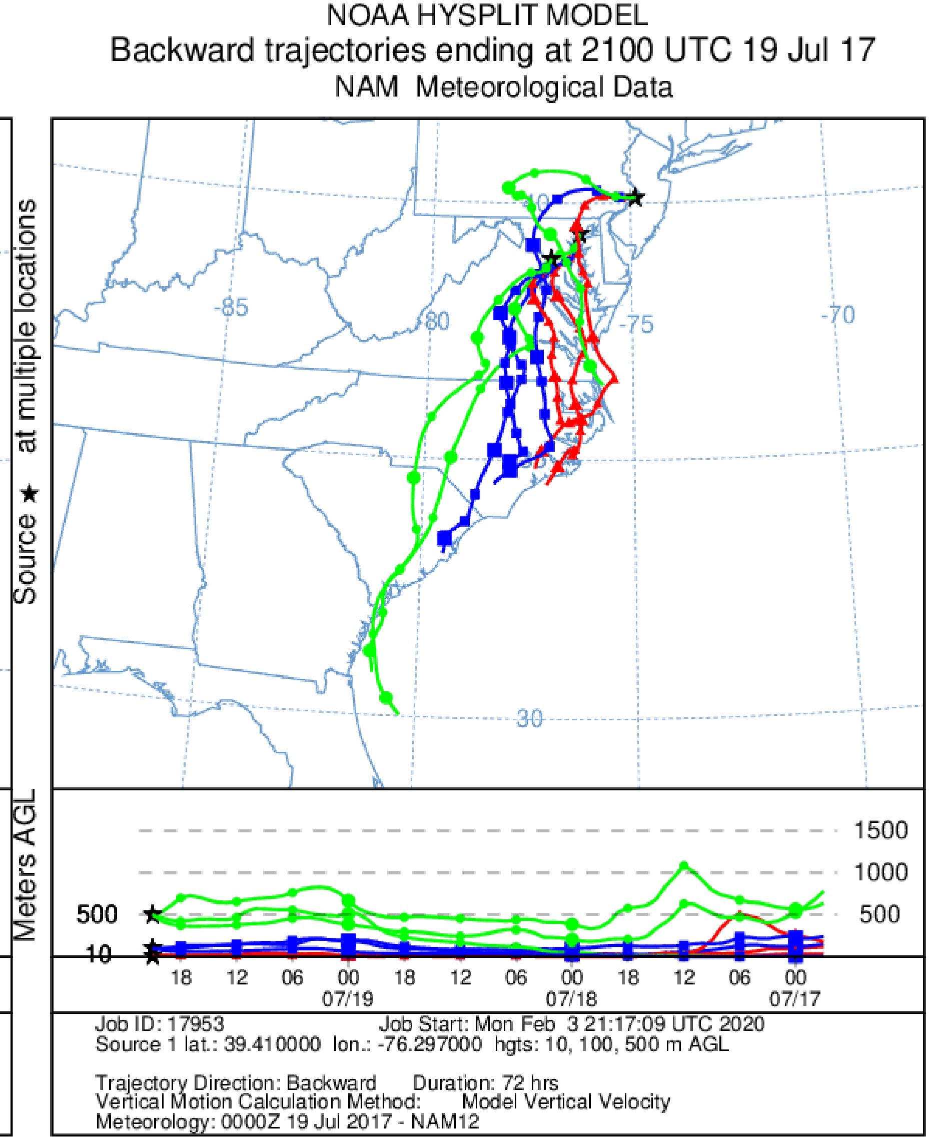
Job ID: 18618 Job Start: Mon Feb 3 21:28:03 UTC 2020
Source 1 lat.: 41.399 lon.: -73.443 hgts: 10, 100, 500 m AGL

Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 18 Jul 2017 - NAM12

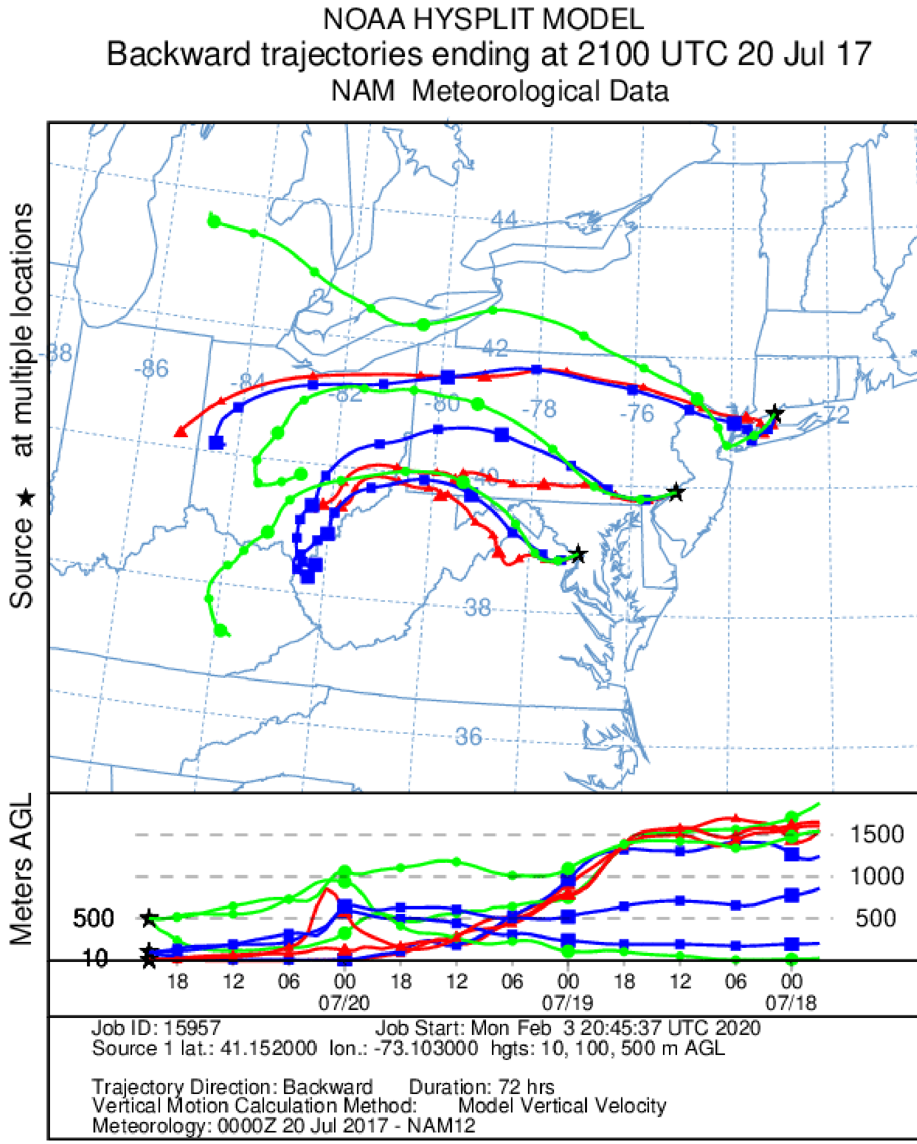
July 19, 2017



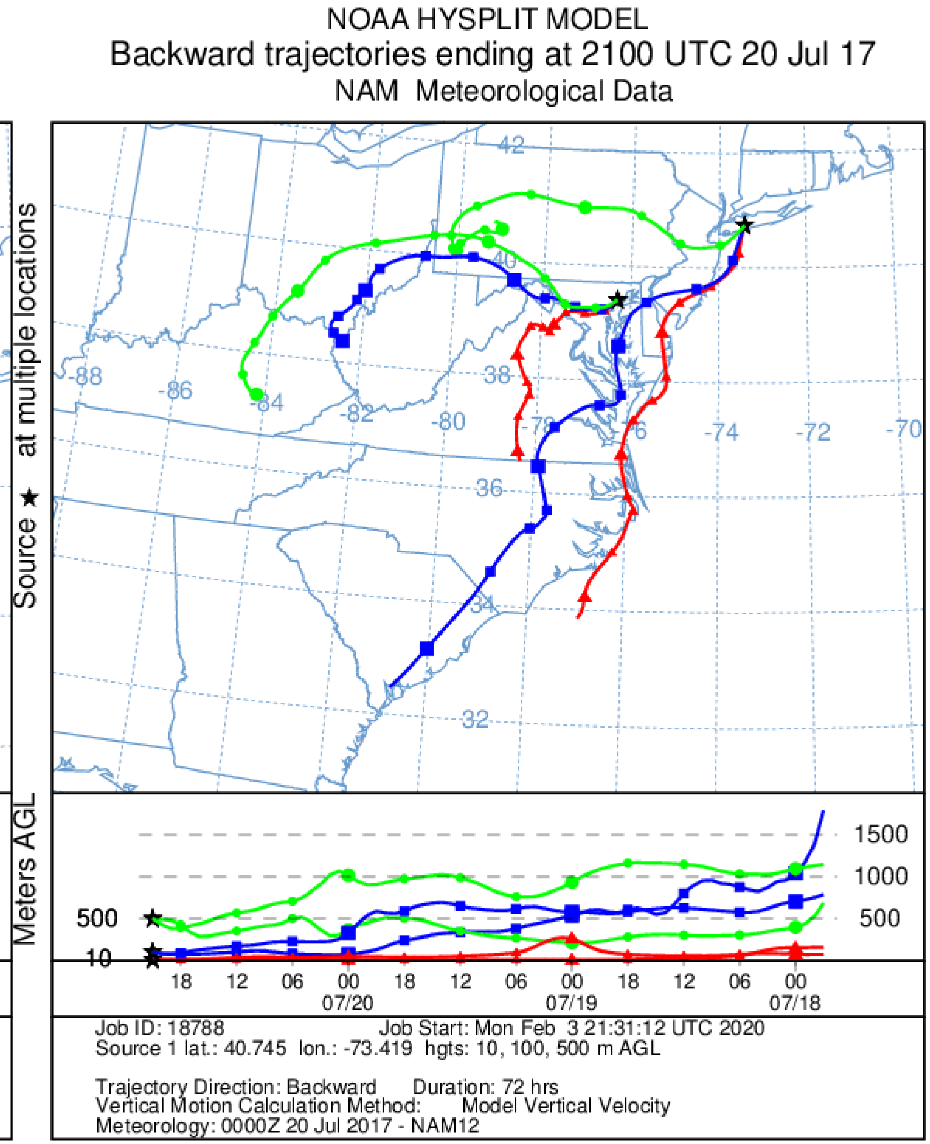
July 19, 2017*



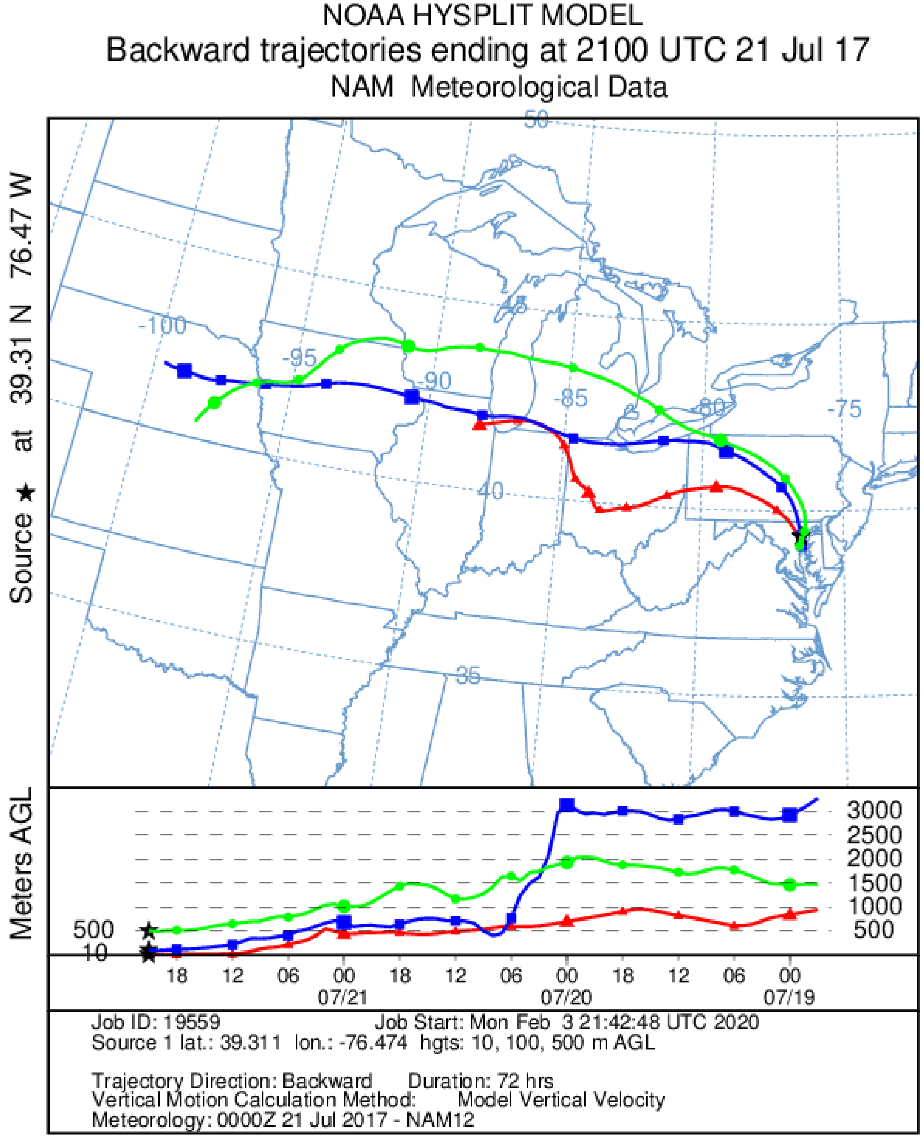
July 20, 2017*



July 20, 2017*

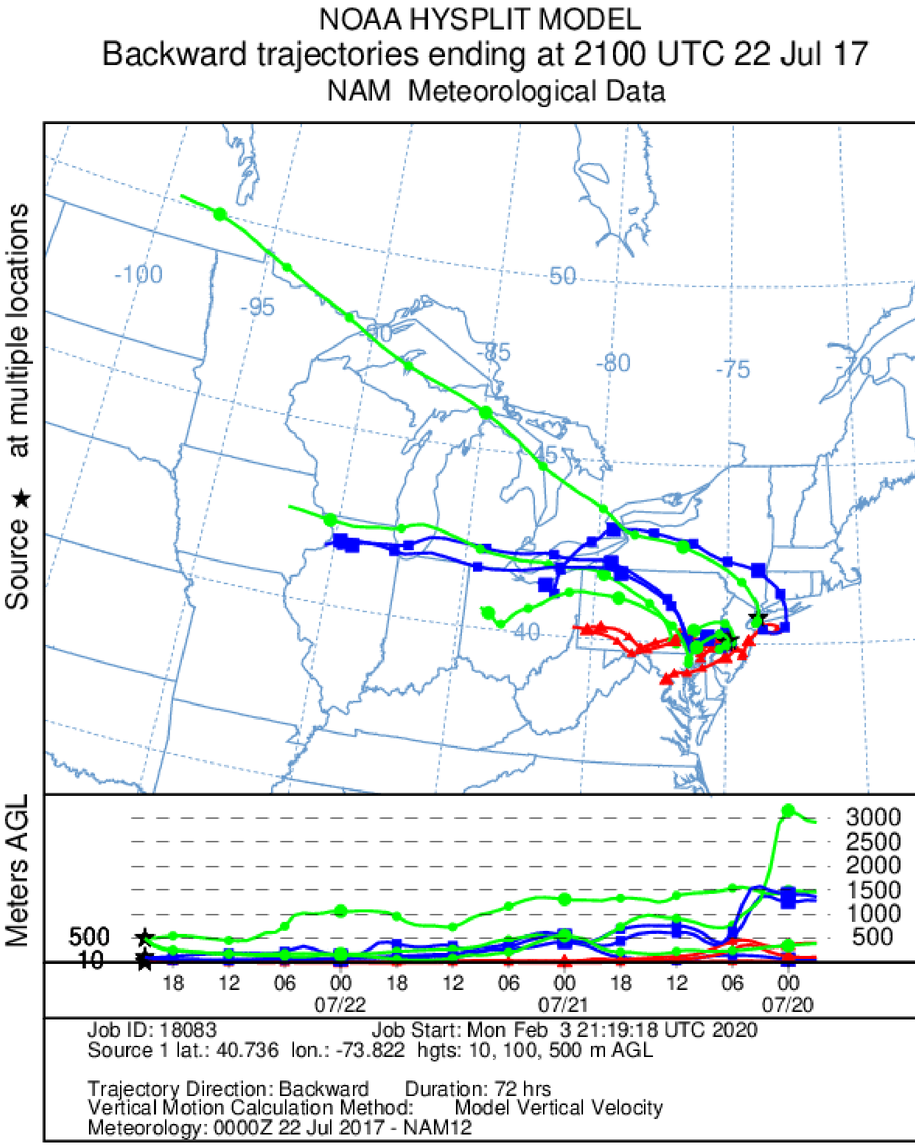


July 21, 2017

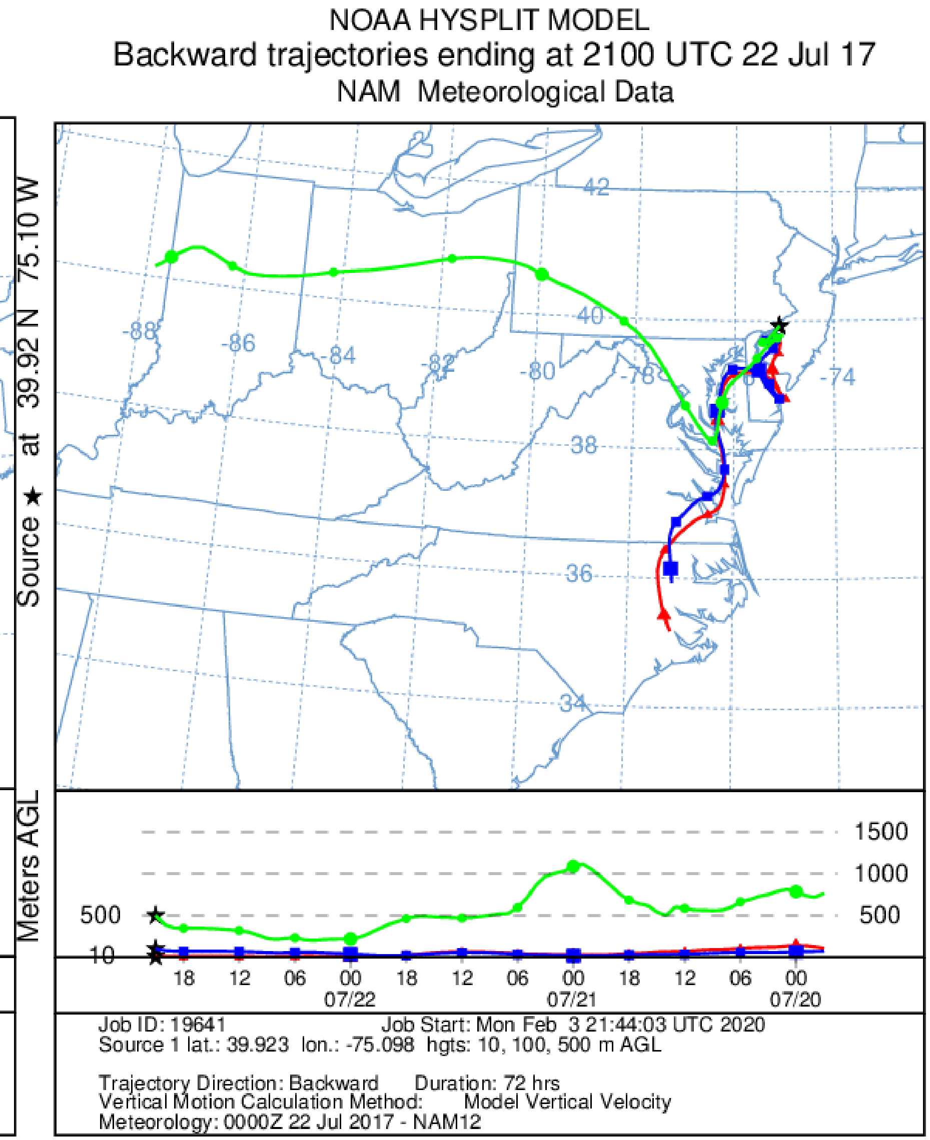


NOAA HYSPLIT MODEL
Backward trajectories ending at 2100 UTC 21 Jul 17
NAM Meteorological Data
Source ★ at 39.31 N 76.47 W
50
-100
-95
-90
-85
-80
-75
45
40
35
Meters AGL
3000
2500
2000
1500
1000
500
500
10
18
12
06
00
07/21
18
12
06
00
07/20
18
12
06
00
07/19
Job ID: 19559 Job Start: Mon Feb 3 21:42:48 UTC 2020
Source 1 lat.: 39.311 lon.: -76.474 hgts: 10, 100, 500 m AGL
Trajectory Direction: Backward Duration: 72 hrs
Vertical Motion Calculation Method: Model Vertical Velocity
Meteorology: 0000Z 21 Jul 2017 - NAM12

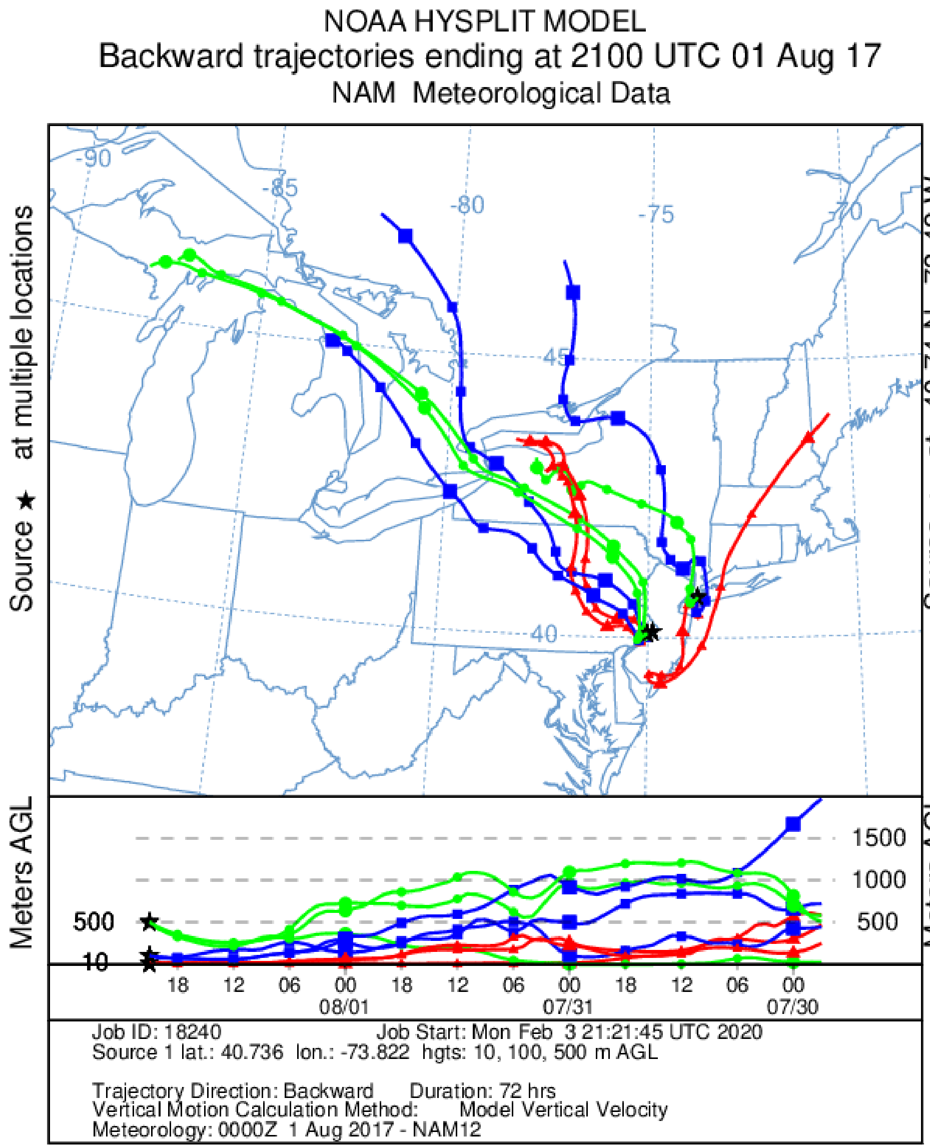
July 22, 2017*



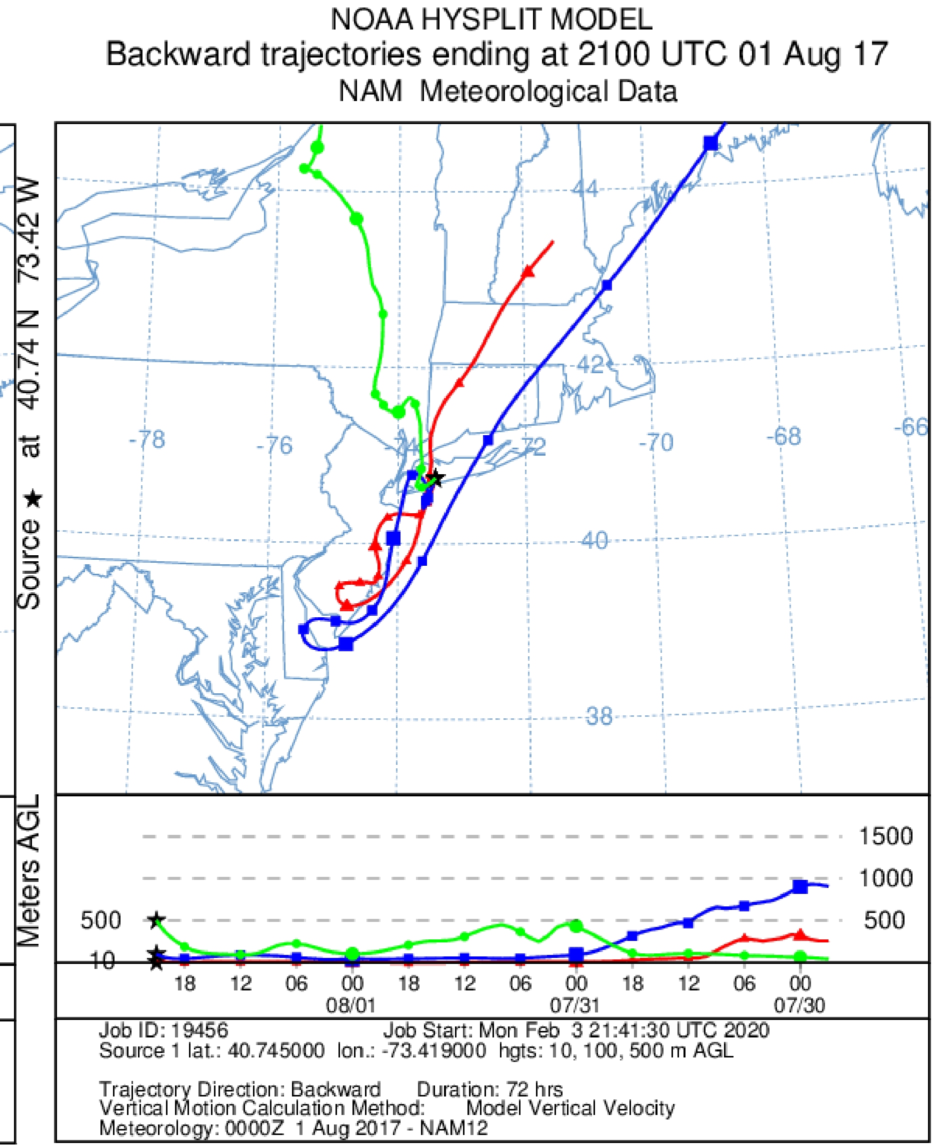
July 22, 2017



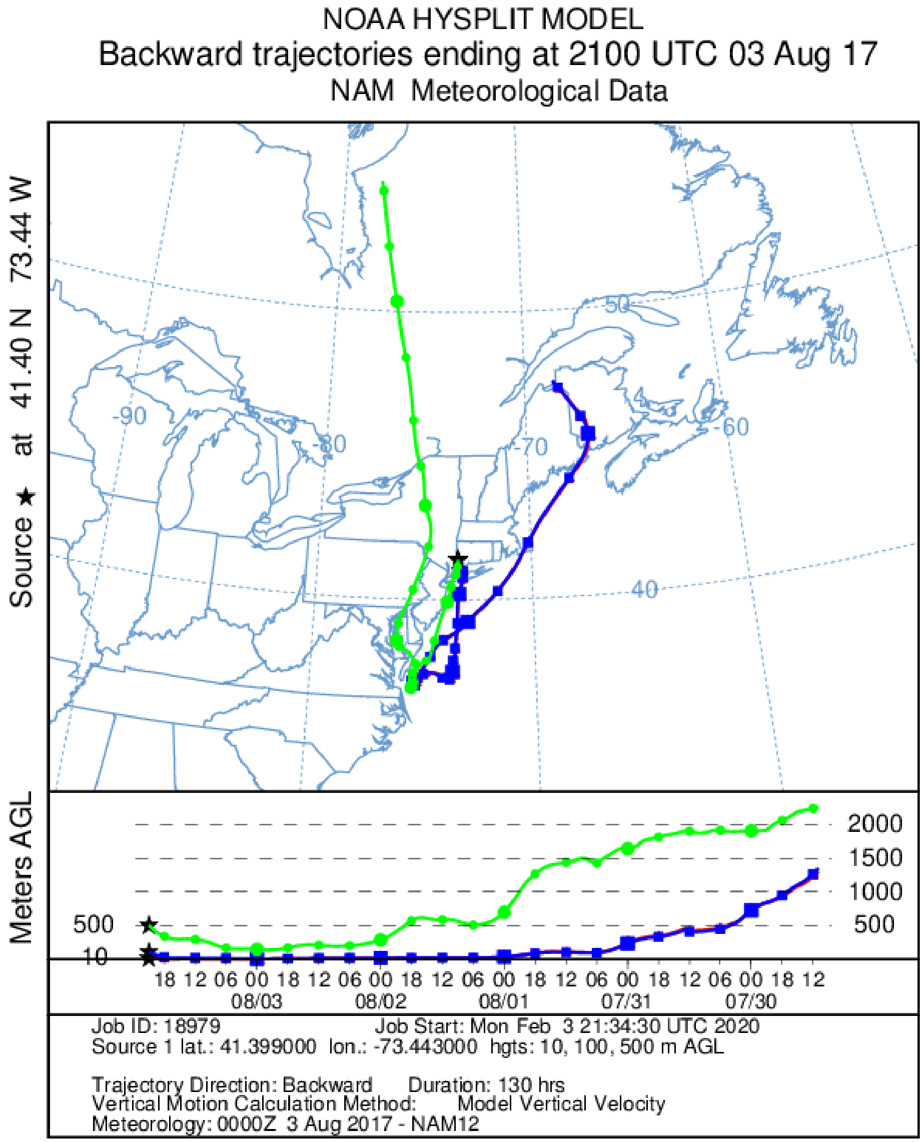
August 1, 2017*



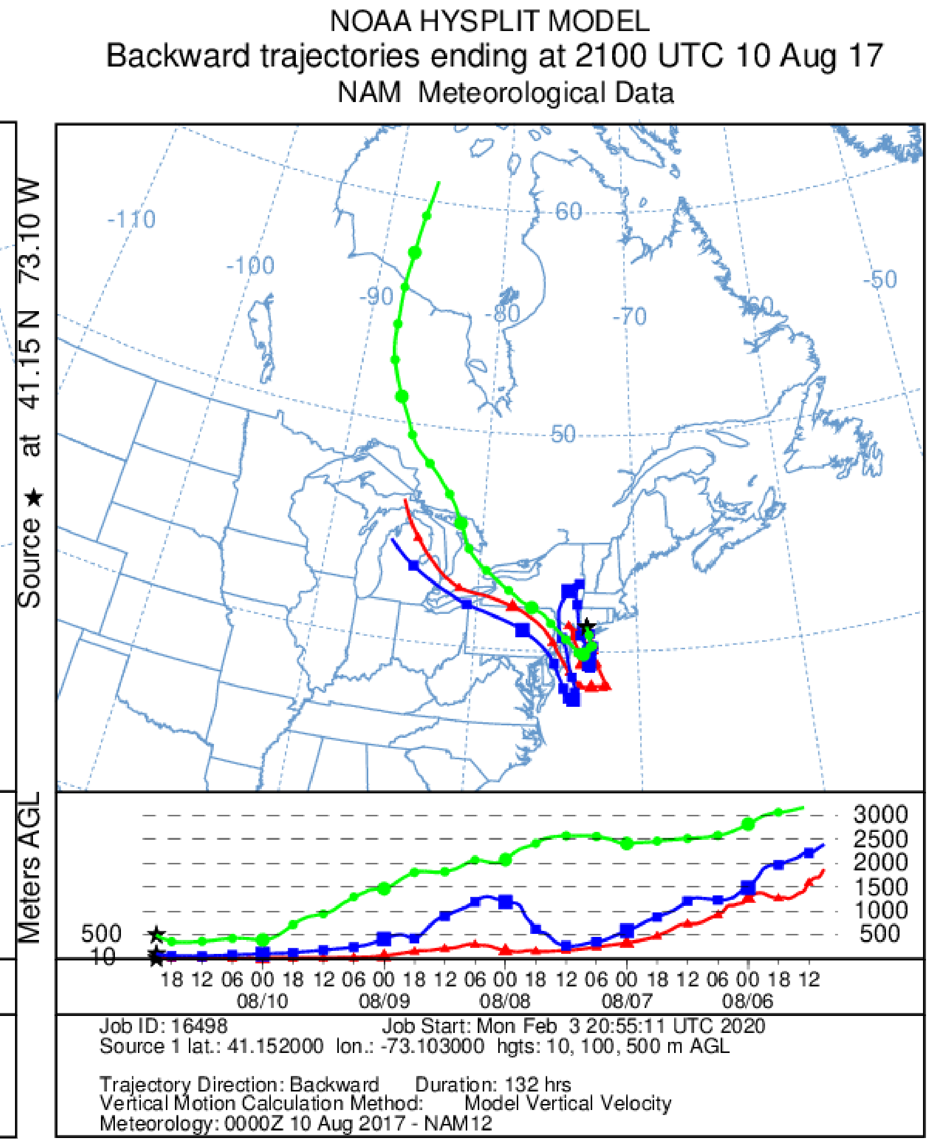
August 1, 2017*



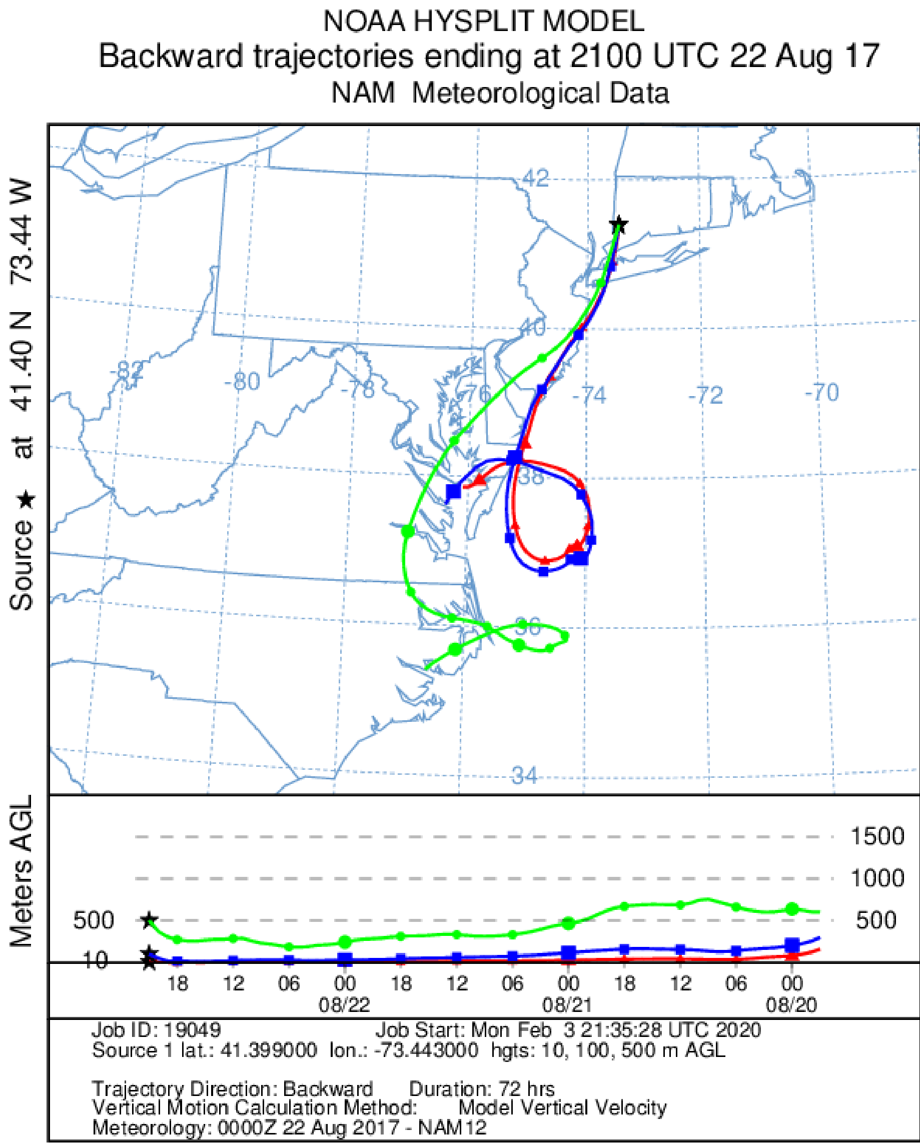
August 3, 2017



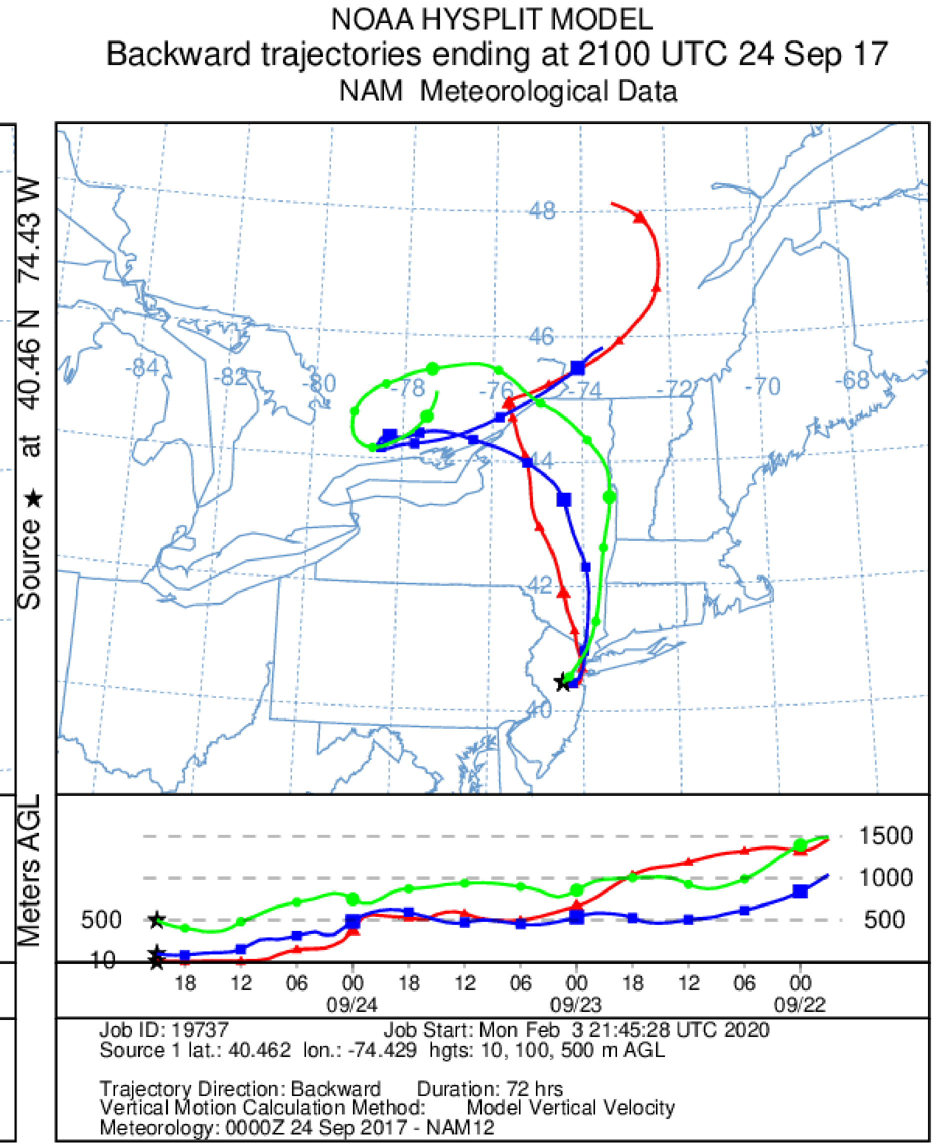
August 10, 2017*



August 22, 2017



September 24, 2017



September 25, 2017