Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Support Document

Ozone Transport Commission

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OZONE
TRANSPORT
COMMISSION

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Executive Summary

The purpose of this Technical Support Document (TSD) is to detail committee work completed by the Ozone Transport Commission (OTC) to develop and operate a photochemical modeling platform needed by member states for their State Implementation Plan (SIP) attainment demonstrations for the 2008 and 2015 Ozone National Ambient Air Quality Standard (NAAQS). The OTC modeling platform is based on the year 2016 with future year emission inventory projections to 2023 and 2028 for platform V1. Modeling results and model performance are presented and analyzed for the base year, 2016. Results and analyses of air quality model projections for 2023 are included in this report while results for 2028 will be included in a later document.

The modeling exercises documented in this TSD demonstrate acceptable performance of the platform as required for federally approvable SIPs. These exercises are committee products primarily related to development and testing of the 2016 modeling platform for the 2016 base and 2023 projected emissions inventories. Specialty screening exercises, such as tagged emissions modeling and episodic modeling, were performed at the request of OTC Air Directors and are also presented in the TSD. OTC's 2016 modeling platform relies on generally accepted conservative assumptions regarding emissions inventories and ozone photochemistry.

Specific committee products described in the TSD include the following:

- The evaluation of modeled meteorological and biogenic emissions inputs.
- A comparison of performance between the Community Multi-scale Air Quality model (CMAQ) and the Comprehensive Air Quality Model with Extensions (CAMx).
- The evaluation of a 4 km subdomain in the highest-ozone portion of the Ozone Transport Region (OTR).
- The evaluation of data handling techniques for near-water monitoring locations.
- Tagged emission modeling for the 2023 projected year.
- The development of an episodic modeling platform that focuses on analyzing approximately one-third of the full ozone season and its application toward high energy demand day screening modeling for electricity generating/peaking units.
- Detailed modeling results for base cases and specialty model runs.

A summary of emissions inventory inputs is provided in the OTC's TSD, but greater detail can be found in the Environmental Protection Agency's (EPA) TSD for their 2016 emissions modeling platform.

This TSD does not contain every modeling exercise performed by individual OTC modeling centers with the 2016 based modeling platform. For example, additional exploratory screening analyses, modeling performed outside of committee efforts, and work performed using a "best science" platform are not presented in this TSD. OTC member states performing additional SIP relevant modeling intend to document those efforts in the supporting documentation for their individual SIPs.

1 Introduction

1.1 Purpose

The purpose of this report is to document the results and technical details of State Implementation Plan (SIP) quality modeling efforts undertaken by the Ozone Transport Commission (OTC)/Mid-Atlantic Northeast Visibility Union (MANE-VU) to support member state SIP submittals for the 2008 and 2015 ozone standards. The OTC platform described here is currently not needed for regional haze modeling purposes. For previous regional haze modeling, please see the OTC/MANE-VU *2011-Based Modeling Platform Support Document.*[1]

1.2 Document Outline

Environmental Protection Agency (EPA) guidance on modeling for ozone (O_3) includes recommendations for documentation of the modeling platform that should be included in SIP submissions.[2] This document addresses EPA recommendations as follows:

- Section 1 (current section) presents:
    - an overview of the air quality issue being considered including historical background,
    - a list of participants in the analysis and their roles,
    - a schedule of key dates relevant to ozone modeling, and
    - a description of the conceptual model of ozone formation in the region.
- Section 2 presents:
    - a description of periods to be modeled, how they comport with the conceptual model, and why they are sufficient,
    - the selected models and emissions inventories, how they are setup and why they are appropriate, and
    - a description and justification of the domain to be modeled (expanse and resolution).
- Sections 3, 4, and 5 discuss:
    - a description of model inputs and their expected sources (e.g., emissions, meteorology, etc.),
    - the methods used in processing emissions for use in the SIP quality modeling platform for the base year,
    - an assessment of the meteorological model used in the platform, and
    - consideration of a more recent biogenic emissions model.

[1] Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2011 Based Modeling Platform Support Document – October 2018 Update, 2nd version (Oct. 18, 2018), *available at* *https://otcair.org/upload/Documents/Reports/OTC%20MANE-VU%202011%20Based%20Modeling%20Platform%20Support%20Document%20October%202018%20-%20Final.pdf*.

[2] https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf

- Sections 6, 7, and 11 cover:
  - the process for evaluating base year model performance (meteorology, emissions, and air quality) and demonstrating that the model is an appropriate tool for the intended use,
  - a methodology for improving model performance using nested gridding and analyzed the results from implementing the methodology, and
  - a methodology for conducting screening analysis using only ozone episodes, evidence for its performance, and its application on high electric demand days.
- Sections 8 and 9 describe:
  - the future years to be modeled,
  - a description of the National Ambient Air Quality Standard (NAAQS) attainment test procedures,
  - methods for calculating future projected ozone design values in instances where the default method may not be warranted, and
  - the projected future year ozone design values.
- Section 10 presents:
  - an overview of the tagged modeling source apportionment project,
  - methodology used to determine tagged sources, and
  - results on the ozone contributions from sources at key monitor locations.
- Section 12 presents:
  - an overview of peak electricity generating units, and goal of analysis,
  - methodology used to develop emissions for screening modeling, and
  - results of targeted unit impacts on daily ozone and ozone design values.
- Section 13 presents:
  - a summary of OTC-produced data visualization work products.

Thus, this document examines all necessary elements recommended for SIP approvable ozone modeling following guidance outlined in EPA 454/R 009 dated November 2018.

1.3 History

The Clean Air Act (CAA) requires EPA to establish, and periodically review, primary and secondary National Ambient Air Quality Standards (NAAQS) for the protection of public health and welfare, respectively. To date, criteria for NAAQS have been established for six pollutants, including ground-level (tropospheric) ozone.

The CAA delegates to states the authority to implement plans (i.e., the SIPs) to attain and maintain air quality that is within the NAAQS. These plans will include rules designed to limit the emissions or ambient concentrations of pollutants that may deteriorate air quality within the state. States evaluate these plans, together with other federally enforceable rules, to determine their effect on air quality. Because ozone is a reaction product of other pollutants, mainly nitrogen oxides (NOx) and volatile organic compounds (VOC), and can be transported long distances, states use national inventories of these pollutants and complex regional scale ozone models to demonstrate the efficacy of their SIPs in attaining and maintaining compliance with the ozone NAAQS. These “attainment demonstrations” are required under the CAA for certain designated nonattainment areas and the modeling included in this report may be used to support those demonstrations.

The following is an overview of the current ozone NAAQS for which the modeling documented in this report is applicable.

1.4 2015 8-hour Ozone NAAQS

In 2015 the primary and secondary ozone NAAQS were set to 0.070 ppm (equivalent to 70 ppb) for the three-year average of the 4th highest 8-hour average ozone concentration (US EPA 2015b). Areas were designated for the 2015 NAAQS as seen in **Table 1-1** (US EPA 2018a). Reclassifications for certain nonattainment areas were published in the Federal Register [87 FR 60897, 07OCT22] with an effective date of November 7,2022. These most recent classifications are also listed in the table.

Areas classified as marginal are not required to include modeling demonstrations with their SIPs. However, areas classified, or re-classified, as moderate or higher are required to submit modeling demonstrations and may rely on this TSD to support their SIP submittals.

Table 1-1 *Nonattainment areas and original/current classifications in the OTR for 2015 Ozone NAAQS.*

2015 NAAQS				
Area Name	**State**	**No. Counties**	**Original Classification**	**Current Classification**
Baltimore, MD	MD	6	Marginal	Moderate*
Greater Connecticut, CT	CT	5	Marginal	Moderate*
NYC-N. NJ-Long Island, NY-NJ-CT	CT	3	Moderate	Moderate
	NJ	12		
	NY	9		
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE	NJ	9	Marginal	Moderate*
	DE	1		
	MD	1		
	PA	5		
Washington, DC-MD-VA	DC	1	Marginal	Moderate*QCD
	MD	5		
	VA	9		

** - Failed to attain by the original attainment date*
QCD- Currently Qualifies for Clean Data

1.5 2008 8-hour Ozone NAAQS

In 2008 the primary and secondary ozone NAAQS were set to 0.075 ppm (equivalent to 75 ppb) for the three-year average of the 4th highest 8-hour average ozone concentration (US EPA, 2008). After some delays in timeframes outlined in the CAA, areas were designated for the 2008 NAAQS as shown in **Table 1-2** (US EPA, 2012). Reclassifications for certain nonattainment areas, effective November 7, 2022 [87 FR 60926], are also listed in this table.

Table 1-2 *Nonattainment areas and original/current classifications in the OTR for 2008 Ozone NAAQS.*

2008 NAAQS				
Area Name	**State**	**No. Counties**	**Original Classification**	**Current Classification**
Baltimore, MD	MD	6	Moderate	Moderate[CD]
Greater Connecticut, CT	CT	5	Marginal	Attainment
NYC-N. NJ-Long Island, NY-NJ-CT	CT	3	Marginal	Severe*
	NJ	12		
	NY	9		
Allentown-Bethlehem-Easton, PA	PA	3	Marginal	Marginal[CD]
Dukes County, MA	MA	1	Marginal	Marginal[CD]
Jamestown, NY	NY	1	Marginal	Marginal[CD]
Lancaster, PA	PA	1	Marginal	Marginal[CD]
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE	NJ	9	Marginal	Marginal[CD]
	DE	1		Marginal[CD]
	MD	1		Marginal[CD]
	PA	5		Marginal[CD]
Pittsburgh-Beaver Valley, PA	PA	7	Marginal	Marginal[CD]
Reading, PA	PA	1	Marginal	Marginal[CD]
Seaford, DE	DE	1	Marginal	Marginal[CD]
Washington, DC-MD-VA	DC	1	Marginal	Maintenance
	MD	5		Maintenance
	VA	9		Maintenance

** - Failed to attain by the original attainment date*

CD- Clean Data

1.6 Geographic Definitions

Throughout this document, several geographic definitions will be used that are based on the boundaries of Regional Planning Organizations (RPOs). **Table 1-3** lists the member states (including DC) of the OTC, MANE-VU, Southeastern Air Pollution Control Agencies (SESARM), Lake Michigan Air Directors Consortium (LADCO), and Central States Air Resource Agencies (CenSARA) RPOs.

Table 1-3 *List of states in geographic areas based on RPOs*

OTC	MANE-VU	SESARM	LADCO	CenSARA
Connecticut	Connecticut	Alabama	Illinois	Arkansas
District of Columbia	District of Columbia	Florida	Indiana	Iowa
Delaware	Delaware	Georgia	Michigan	Kansas
Massachusetts	Massachusetts	Kentucky	Minnesota	Louisiana
Maryland	Maryland	Mississippi	Ohio	Missouri
Maine	Maine	North Carolina	Wisconsin	Nebraska
New Hampshire	New Hampshire	South Carolina		Oklahoma
New Jersey	New Jersey	Tennessee		Texas
New York	New York	Virginia		
Pennsylvania	Pennsylvania	West Virginia		
Rhode Island	Rhode Island			
Virginia – DC Area	Vermont			
Vermont				

1.7 Participants

OTC Air Directors

OTC Air Directors serve as overseers of the work products developed by the OTC Modeling Committee. The OTC Air Directors coordinate the design of control strategies for the Ozone Transport Region (OTR) and make recommendations on policies and strategies which may be implemented to reduce ozone throughout the region. Members of the OTC Modeling Committee keep Air Directors informed of progress in development of the OTC SIP quality modeling platform and Air Directors review all OTC SIP quality modeling platform documentation before it is finalized.

OTC Modeling Committee

The OTC Modeling Committee members serve as first tier reviewers of the work products developed for the SIP quality modeling platform. The OTC Modeling Committee approves technical approaches used in the modeling platform, reviews results, and approves products for review by the Air Directors. Since members of three EPA regions are members of the OTC Modeling Committee, they help provide insights into any issues that may occur involving SIP acceptability of the OTC modeling platform.

OTC Modeling Planning Group

The OTC Modeling Planning Group is made up of members of the modeling centers and the OTC Modeling Committee leadership. The workgroup reviews technical decisions to bring recommendations on approaches to the OTC Modeling Committee.

OTC Technical Support Document Workgroup

The OTC Technical Support Document (TSD) Workgroup, a subgroup of the Modeling Committee, is responsible for compiling drafts of the technical documentation for review by the OTC Modeling Planning Group.

OTC Modeling Centers

The OTC Modeling Centers are the state staff and academics that perform modeling and conduct analyses of modeling results. They include New York State Department of Environmental Conservation (NYSDEC), New Jersey Department of Environmental Protection (NJDEP), Virginia Department of Environmental Quality (VADEQ), University of Maryland College Park (UMCP) via the Maryland Department of the Environment (MDE), and Office of Research Commercialization (ORC) at Rutgers University via New Jersey Department of Environmental Protection (NJDEP).

MANE-VU

MANE-VU's primary focus areas is regional haze for the northeastern and mid-Atlantic states. Regional haze SIPs are due every ten years. The next round of regional haze SIP submittals requiring modeling will not be due until 2028. Therefore, regional haze is not discussed further in this TSD.

MARAMA Emission Inventory Leads Committee

The Mid-Atlantic Regional Air Management Association (MARAMA) coordinated the emission inventory for the states of the OTR through the Emission Inventory Leads Committee, which is made up of state staff who make technical recommendations involving the multi-pollutant emissions inventory, as well as provide quality assurance (QA) of the inventories.

1.8 Schedule

Table 1-4 provides an overview of important dates which guided scheduling modeling referred to in this document. Although the V2 emissions platform had been released, this document reflects modeling conducted using the latest updates of the V1 emissions inventory only.

Table 1-4 *Multi-pollutant modeling dates relevant to the 2016 platform.*

PROCESS POINT	2008 NAAQS TIMEFRAME	2015 NAAQS TIMEFRAME
2016 V1 Inventory for O_3	October 2019	
2016 V2 Inventory for O_3	July 2022	
2016 V2 Base Case Modeling for O_3	August 2022	
2023/2026 V2 Future Case Emissions/Modeling for O_3	September 2022	
NYC NY-NJ-CT Moderate 2015 NAAQS Attainment Deadline	--	August 2024[a]

PA-NJ-MD-DE and Greater CT Moderate 2015 NAAQS Attainment Deadline	--	August 2024[a]
NYC NY-NJ-CT Severe-15 2008 NAAQS Attainment Deadline	July 2027[a]	--

[a] *Attainment based on prior year ozone data.*

1.9 Ozone Conceptual Model

The interaction of meteorology, chemistry, and topography lead to a complex process of ozone formation and transport. Ozone episodes in the OTR often begin with an area of high pressure setting up over the southeast United States. These summertime high-pressure systems can stay in place for days or weeks. This scenario allows for stagnant surface conditions to form in the OTR, and, in turn, the transported pollution mixes with local pollution in the late morning hours as the nocturnal inversion breaks down. With a high-pressure system in place, the air mass, which is characterized by generally sunny and warm conditions, exacerbates ozone concentrations. This meteorological setup promotes ozone formation, as sunlight, warm temperatures, and ozone precursors (nitrogen oxides (NOx) and volatile organic compounds (VOCs)) interact chemically to form ozone. In addition, ozone precursors and ozone are transported into the OTR during the late night and/or early morning hours from the areas to the southwest of the OTR by way of the nocturnal low-level jet (NLLJ), a fast-moving river of air that resides approximately 1,000 meters above the surface. All this local and transported polluted air can, in some instances, accumulate along the coastal OTR areas as the air is kept in place due to onshore bay and sea breezes.

Some ozone is natural, or transported internationally, leading to ozone that is not considered relatable to US human activity. This US background ozone in the eastern United States is estimated to be in the range of 30 to 35 ppb though it can be as high as 50 ppb in the Intermountain West (US EPA 2014).

Another complexity involves the nonlinear relationship between NO_X and VOC concentrations and ozone formation. Areas that have extensive forests that produce high levels of isoprene and other VOCs during the summer months more readily control ozone through reductions in regional NO_X emissions. This is the case in the majority of the landscape in the OTR. Conversely, dense urban areas such as New York City, that have low natural VOC production, may more readily benefit locally from VOC emission reductions. In other cases, excess NO_X is available to destroy already formed ozone. The phenomenon is known as titration and in areas where this occurs, such as New Haven harbor, reductions of NO_X can increase ozone levels.

To address the complexity of ozone formation and transport that occurs in the OTR, the 2016-based modeling year was selected as representative of the conceptual model as described in “The Nature of the Ozone Air Quality Problem in the Ozone Transport Region: A Conceptual Description” (Downs et al. October 2010).

1.10 Model Year Selection

1.10.1 Base Year

The Base Year Selection Workgroup of the 2016 Inventory Collaborative examined several candidate base years, including 2014, 2015, and 2016. In practical terms, 2014 would have been a top choice since it aligns with the triennial National Emissions Inventory (NEI) cycle and the 2014 NEI could have readily served as the basis for the modeling inventories. However, the meteorological conditions during the summer of 2014 were least conducive to ozone formation, making the year 2014 a poor choice as the basis of a modeling platform for ozone formation. Ultimately, the Base Year Selection Workgroup recommended that both 2015 and 2016 be used as base years, but that 2016 should be the focus if time and resource constraints allow for only one. This was decided for simplicity and to keep all portions of the country working with the same period of data. Therefore, 2016 was ultimately selected as the base year due to these restraints. More details can be found in the document "Base Year Selection Workgroup Final Report"[3] produced by the Inventory Collaborative Base Year Selection Workgroup, December 12, 2017.

1.10.2 Future Year

The New York Metropolitan Moderate Nonattainment Area for the 2015 ozone NAAQS, which includes Long Island and parts of Connecticut and New Jersey, has a deadline of August 2024 to attain the 2015 ozone NAAQS. Because attainment is based on the most recent complete ozone season, attainment is based on 2023 design values. It was plausible that marginal nonattainment areas in Connecticut, Delaware, Maryland, New Jersey, Pennsylvania, and perhaps the District of Columbia, would be reclassified to moderate nonattainment and therefore face the same August 2024 deadline for attaining the 2015 O_3 NAAQS. Therefore, a future analysis year of 2023 was selected to best meet the attainment planning needs of these jurisdictions.

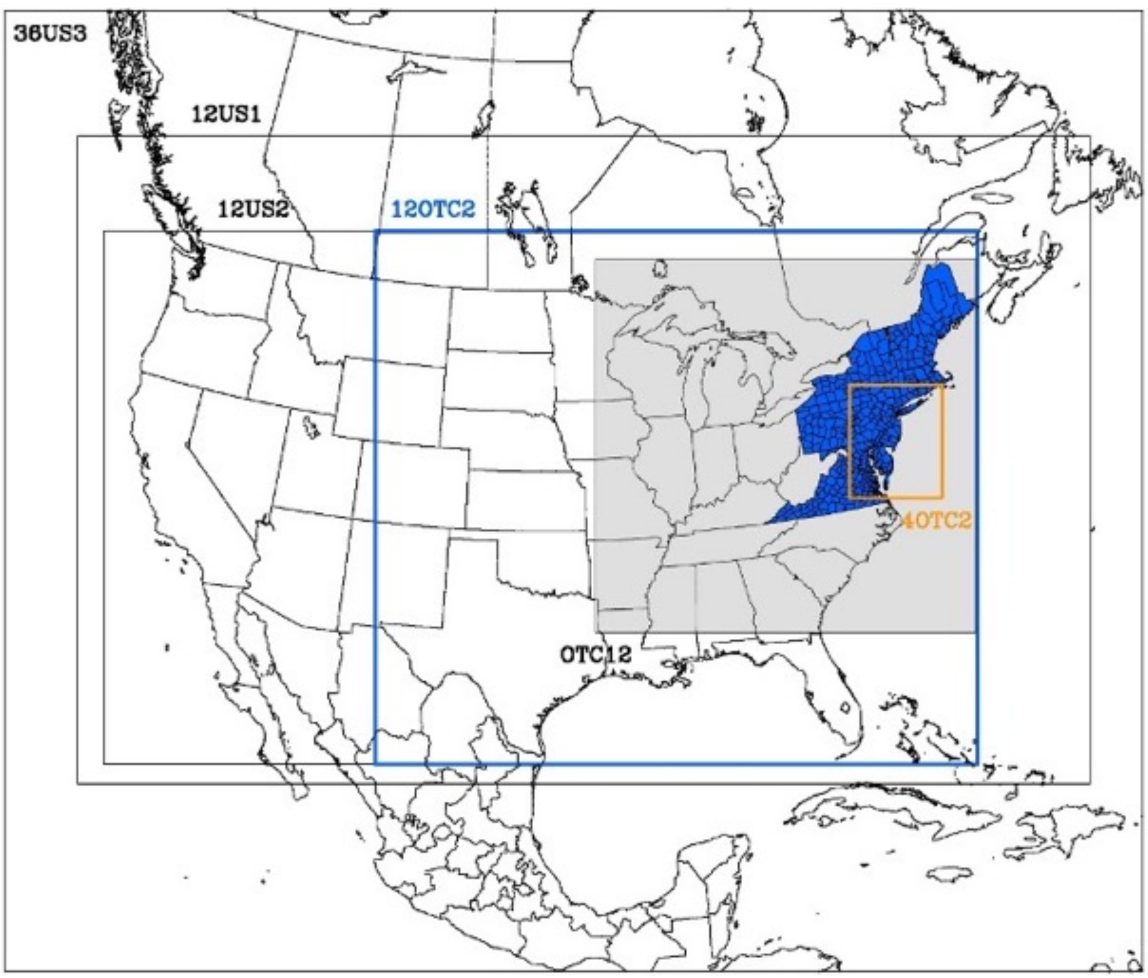
[3] Base Year Selection Workgroup Final Report, www.wrapair2.org/pdf/2017-12-12_Base_Year_Selection_Report_V1.1.pdf

2 8-Hour Ozone Modeling Using the CMAQ and CAMx Modeling Platforms

2.1 Air Quality Modeling Domain

The modeling domain used in this platform represents a subset of the larger EPA continental-modeling domains ("12US1" and "12US2") that cover the contiguous U.S. The OTC modeling domain at 12 km horizontal grid resolution ("12OTC2"), outlined in blue, is displayed in **Figure 2-1**. The 12 km by 12 km domain used in this analysis includes 38 full states (including DC) and four partial states (MT, WY, CO, and NM) from 110.17°W to 65.0931°W and 23.0019°N to 51.8794°N, which includes some portions of southern Canada and northern Mexico. The domain is 273 columns by 246 rows in the horizontal and 35 vertical layers—the same as the Weather Research Forecast (WRF) model—from the surface to 50 mb.

Figure 2-1 *The OTC modeling domains. The outermost 36 km domain ("36US3") from EPA was used to develop boundary conditions for the 12 km OTC V1 platform ("12OTC2"). The 12OTC2 domain is a subset of the EPA 12 km platforms ("12US1" and "12US2"). The smaller 12 km domain ("OTC12") used in the Beta modeling and the innermost 4 km domain ("4OTC2") are also shown.*



The modeling system uses a Lambert conformal projection centered at (97°W, 40°N) and true latitudes 33°N and 45°N. Note that the 12OTC2 domain for the V1 modeling is roughly 2.5 times larger than the domain used for the Beta modeling ("OTC12"; 172 columns by 172 rows). The same domain is used for CMAQ and CAMx modeling. Boundary conditions for the 12OTC2 domain are generated from the larger 36 km by 36 km "36US3" also developed by the EPA. A high-resolution 4 km by 4 km nested grid ("4OTC2"; 126 columns by 156 rows) with the same vertical structure as the 12 km domain was used as further described in **Section 7**.

2.2 Vertical Layers

Table 3-1 shows the values defining the vertical layers used in the photochemical modeling platform and the WRF model. This layer configuration was used in all modeling runs discussed.

2.3 Boundary and Initial Conditions.

2.3.1 Modeling with Beta Emissions

The 3-D boundary and initial conditions for the OTC12 km grid were extracted from National Oceanic and Atmospheric Administration's (NOAA's) 2016 national air quality forecast model at 12 km grid resolution. The CMAQ simulations used a 15-day ramp-up period to wash out the effect of the initial fields. The 12 km boundary and initial conditions for the CMAQ model were then converted into CAMx format.

2.3.2 Modeling with V1 Emissions

For V1 modeling a new set of boundary and initial conditions were created by NYSDEC running CMAQv5.3.1 at the 36US3 domain with "fh" emissions. Boundary and initial conditions for the 36US3 domain were obtained from the EPA's hemispheric 108 km CMAQ (H-CMAQ) platform downloaded from the Intermountain West Data Warehouse.[4] The 3-D fields from the 36US3 simulation provided boundary and intial conditions for the 12OTC2 CMAQ simulation and were also converted to CAMx format. The 12 km CMAQ and CAMx 3-D fields also provided boundary and initial conditions for the corresponding nested 4 km simulations.

2.4 Photochemical Modeling Configurations

2.4.1 CMAQ and CAMx Modeling with Beta Emissions

CMAQ v5.2.1 and CAMx v6.50 were used for the Beta modeling over the OTC12 domain. The CMAQ modeling software was obtained from the Community Modeling and Analysis System (CMAS) modeling center[5] and the CAMx software was obtained from Ramboll[6]. Key model options are listed in **Table 2-1**.

[4] http://views.cira.colostate.edu/iwdw/
[5] httsp://www.cmascenter.org
[6] https://www.camx.com

Table 2-1 *Key model options for the Beta modeling.*

	CMAQ	CAMx
Emissions	2016 Beta (ff) emissions inventory	2016 Beta (ff) emissions inventory
EGU point	IPM	IPM
Meteorology	WRF v3.8, MCIP v4.3 (provided by EPA and NYSDEC cut to OTC12 km domain)	WRF v3.8, wrfcamx v4.6 (provided by EPA and NYSDEC cut to OTC12 km domain)
Boundary conditions	extracted from NOAA's 2016 national air quality forecast modeling (2016)	Converted CMAQ format to CAMx format
Domain	OTC12 domain, 172x172	OTC12 domain, 172x172
Modeling period	May to August, 2016	May to August, 2016
Model layers	35	35
Model version	CMAQ v5.2.1, cb6r3/AERO6	CAMx v6.50, cb6r4
Resolution	12 km	12 km
Biogenic emissions	BEIS v3.61	BEIS v3.61
Science option	Offline BEIS, no Wind Blown Dust model, no lightning NOx, M3dry, NH3 bidi	Chemistry Parameters: CAMx6.5.chemparam.CB6r4_CF_SOAP_ISORROPIA

2.4.2 V1 CMAQ and CAMx Modeling

CMAQ v5.3.1 and CAMx v7.10 were used in the V1 modeling over the 12OTC2 and 4OTC2 domains. The modeling software was obtained from the CMAS modeling center[5] and the CAMx software was obtained from Ramboll.[6] Key model options are listed in **Table 2-2**.

Table 2-2 *Key model options for the V1 modeling.*

	CMAQ	CAMx
Emissions	2016 V1 (fi) emissions inventory	2016 V1 (fi) emissions inventory
EGU point	ERTAC	ERTAC
Meteorology	WRF v3.8 (provided by EPA), MCIP v5.0 (processed by NYSDEC)	WRF v3.8, wrfcamx v4.6 (provided by EPA and NYSDEC cut to 12OTC2 domain)

Boundary conditions	Extracted from 36 km (36US3) CMAQ v5.3.1 model runs using V1(fh) for 2016, 2023 and 2028 (CMV update, no airport update, IPM)	Converted CMAQ format to CAMx format
Domain	12OTC2 domain, 273x246; 4OTC2 domain, 126x156	12OTC2 domain, 273x246; 4OTC2 domain, 126x156
Modeling period	April to October, 2016	April to October, 2016
Model layers	35	35
Model version	CMAQ v5.3.1, cb6r3/AERO7	CAMx v7.10, cb6r5
Resolution	12 km and 4 km	12 km and 4 km
Biogenic emissions	BEIS v3.61	BEIS v3.61
Science option	Offline BEIS, no Wind Blown Dust model, no lightning NOx, M3dry, NH3 bidi (12 km), no NH3 bidi (4 km)	No NH3 bidi Chemistry Parameters: CAMx7.1.chemparam.CB6r5_CF2E

2.5 Source Apportionment Modeling

Source apportionment modeling for the future year 2023 used CAMx v7.10. Details and results of the source apportionment modeling are shown in **Section 10** and **Appendix F**. The CAMx modeling software was obtained from Ramboll. For consistency with the modeling conducted by the EPA, the Anthropogenic Precursor Culpability Assessment (APCA) option was applied instead of Ozone Source Apportionment Technology (OSAT).

3 Evaluation of Meteorological Modeling Using WRF

OTC modeling is conducted using 2016 meteorology for baseline and all projected years. Climatologically, 2016 was a warmer than average year across much of the U.S. including in the OTR. Large regions of the Northeast experienced record warm temperatures during August 2016. Overall, the 2016 O_3 season was drier than average in the OTR states, in spite of higher rainfall than average in upstate New York, western Pennsylvania, northern Vermont, New Hampshire, and Maine in August 2016.

The OTC Modeling Committee used meteorology originally output from the Weather Research and Forecasting (WRF) v3.8 model simulations conducted by EPA members of the 2016 National Emissions Inventory Collaborative. Simulations were performed on the 36 km by 36 km North American domain and the 12 km by 12 km continental U.S. (CONUS) domain (see **Figure 2-1)**. WRF meteorology output was processed to be CMAQ- or CAMx-ready on the 12 km by 12 km OTC domain (12OTC2) using the Meteorology-Chemistry Interface Processor v4.5 (MCIP; Otte and Pleim, 2010). The OTC retained the same 12 km by 12 km horizontal resolution and 35-layer column depth as was used by EPA (WRF model layers described in **Table 3-1**). All OTC modeling centers used the same meteorology inputs.

Modeling physics options used include the Pleim-Xiu land surface model, Asymmetric Convective Model version 2 planetary boundary layer scheme, Kain-Fritsch cumulus parameterization utilizing the moisture-advection trigger (Ma and Tan, 2009), Morrison double moment microphysics, and RRTMG longwave and shortwave radiation schemes (Gilliam and Pleim, 2010). The 12 km by 12 km CONUS WRF simulation was initialized with the 12 km North American Model (12NAM) product from the National Climatic Data Center (NCDC) and the 40 km Eta Data Assimilation System (EDAS) analysis (ds609.2) when the former is not available. Boundary layer nudging was included for temperature, wind, and moisture. Lightning data assimilation into WRF to improve the precipitation estimate was included following Heath et al., (2016). Additional model parameter information can be referenced in the 2016 Collaborative report.[7] This is known as the "16j" version of meteorology.

3.1 Model performance analyzed by EPA/Collaborative

In-depth model evaluation of WRF was performed by the 2016 collaborative and documented in the collaborative report.[5] Meteorological parameters from the model were evaluated against observations and include 2-meter temperature and mixing ratio, 10-meter wind speed and direction, shortwave radiation, and precipitation. Observations at airports for surface temperature, mixing ratio, and wind speed and direction, were obtained from the National Weather Service (NWS) in the U.S. and Environment Canada in Canada. Other observations were obtained from locations in the National Center for Atmospheric Research (NCAR) ds472 network (see Figure 3.1 of the 2016

[7] http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016beta_0311/MET_TSD_2016.pdf

Collaborative Meteorological TSD[7] for observation locations). Shortwave downward radiation observations were taken from the seven sites in SURFRAD[8] and the nine sites in SOLRAD.[9] Precipitation is estimated using the Parameter-elevation Relationships on Independent Slopes Model (PRISM) at a 2 km to 4 km resolution and re-projected to the WRF domain.

Table 3-1 *WRF layers and approximate height above ground level.*

CMAQ/CAMx/WRF Layers	Approximate Height (m AGL)	Pressure (mb)	Sigma Level
35	17,556	50	0.000
34	14,780	97.5	0.050
33	12,822	145	0.100
32	11,282	192.5	0.150
31	10,002	240	0.200
30	8,901	287.5	0.250
29	7,932	335	0.300
28	7,064	382.5	0.350
27	6,275	430	0.400
26	5,553	477.5	0.450
25	4,885	525	0.500
24	4,264	572.5	0.550
23	3,683	620	0.600
22	3,136	667.5	0.650
21	2,619	715	0.700
20	2,226	753	0.740
19	1,941	781.5	0.770
18	1,665	810	0.800
17	1,485	829	0.820
16	1,308	848	0.840
15	1,134	867	0.860
14	964	886	0.880
13	797	905	0.900
12	714	914.5	0.910
11	632	924	0.920
10	551	933.5	0.930
9	470	943	0.940
8	390	952.5	0.950
7	311	962	0.960
6	232	971.5	0.970
5	154	981	0.980
4	115	985.75	0.985
3	77	990.5	0.990
2	38	995.25	0.995
1	19	997.63	0.9975

[8] https://gml.noaa.gov/grad/surfrad/sitepage.html
[9] https://gml.noaa.gov/grad/solrad/solradsites.html

Model performance metrics include mean bias, mean error, fractional bias, and fractional error (Boylan and Russell, 2006) for temperature, wind speed and mixing ratio. Rainfall performance is assessed using monthly total rainfall values.

Performance statistics indicate that modeled wind speeds tend to overpredict in the morning and afternoon and underpredict in the evening and overnight. Across the OTR, monthly average biases remain low during the summer months, with daytime biases trending between -0.5 m/s and +1 m/s in the late spring and early summer and shifting to -1.5 m/s to +0.5 m/s on average. Daily average wind speeds are biased low in springtime by up to -2 m/s, with a shift towards high biases of up to +1 m/s at some locations by late summer. Coastal locations like Long Island and southeastern Massachusetts consistently exhibit modeled high biases of up to +2 m/s (Figures 3.1.8 and 3.1.9 of the 2016 Collaborative Meteorological TSD[7]).

***Table 3-2** Mean observed, mean modeled, mean bias (MB), mean absolute error (MAE), normalized mean bias (NMB), normalized mean error (NME), and root mean square error for wind speed (m/s) from the 2016 Collaborative meteorology TSD.*

Season	Mean Obs (m/s)	Mean Mod (m/s)	MB (m/s)	MAE (m/s)	NMB (%)	NME (%)	RMSE (m/s)
Spring	5.09	5.69	0.6	0.82	11.79	16.12	1.09
Summer	11.95	12.12	0.17	1.05	1.42	8.79	1.45
Fall	7.35	7.54	0.19	0.7	2.57	9.47	0.96
Winter	2.74	3.14	0.4	0.51	14.55	18.50	0.71

***Table 3-3** Mean observed, mean modeled, mean bias (MB), mean absolute error (MAE), normalized mean bias (NMB), normalized mean error (NME), and root mean square error (RMSE) for temperature (K) for the 12US simulation for the northeastern U.S. More data available in **Table 3.2.1** of the 2016 Collaborative Meteorology TSD[7].*

Season	Mean Obs (K)	Mean Mod (K)	MB (K)	MAE (K)	NMB (%)	NME (%)	RMSE (K)
Spring	282.51	282.26	-0.25	1.59	-0.09	0.56	2.13
Summer	295.16	295.46	0.30	1.35	0.19	0.46	1.85
Fall	285.68	285.95	0.27	1.52	0.09	0.53	2.05
Winter	272.41	272.20	-0.21	1.74	-0.08	0.64	2.33

Modeled two-meter temperatures vary in bias compared to observations during the ozone season. In March, April, and May, modeled temperatures are biased low, within -1 K. In June, July, August, and September, modeled temperature biases in the OTR are largely between -0.5 and +0.5 K. Coastal sites in New England exhibit the greatest temperature biases of +/- 1 K or greater. Modeled two-meter daytime temperature biases are low throughout the ozone season, up to -3 K at coastal sites. See figures 3.2.8-9 and 3.2.16-17 in the 2016 Collaborative Meteorology TSD[7] for more detailed information.

Figure 3-1 *Panels from Figure 3.1.19 of the 2016 Collaborative WRF TSD showing diurnal wind speeds on average seasonally for A) spring, B) summer, C) fall, and D) winter in the northeastern U.S. Yellow bars are modeled WRF wind speeds and gray bars are observations from METAR. Other regions can be found in the 2016 Collaborative Meteorological TSD*[7].

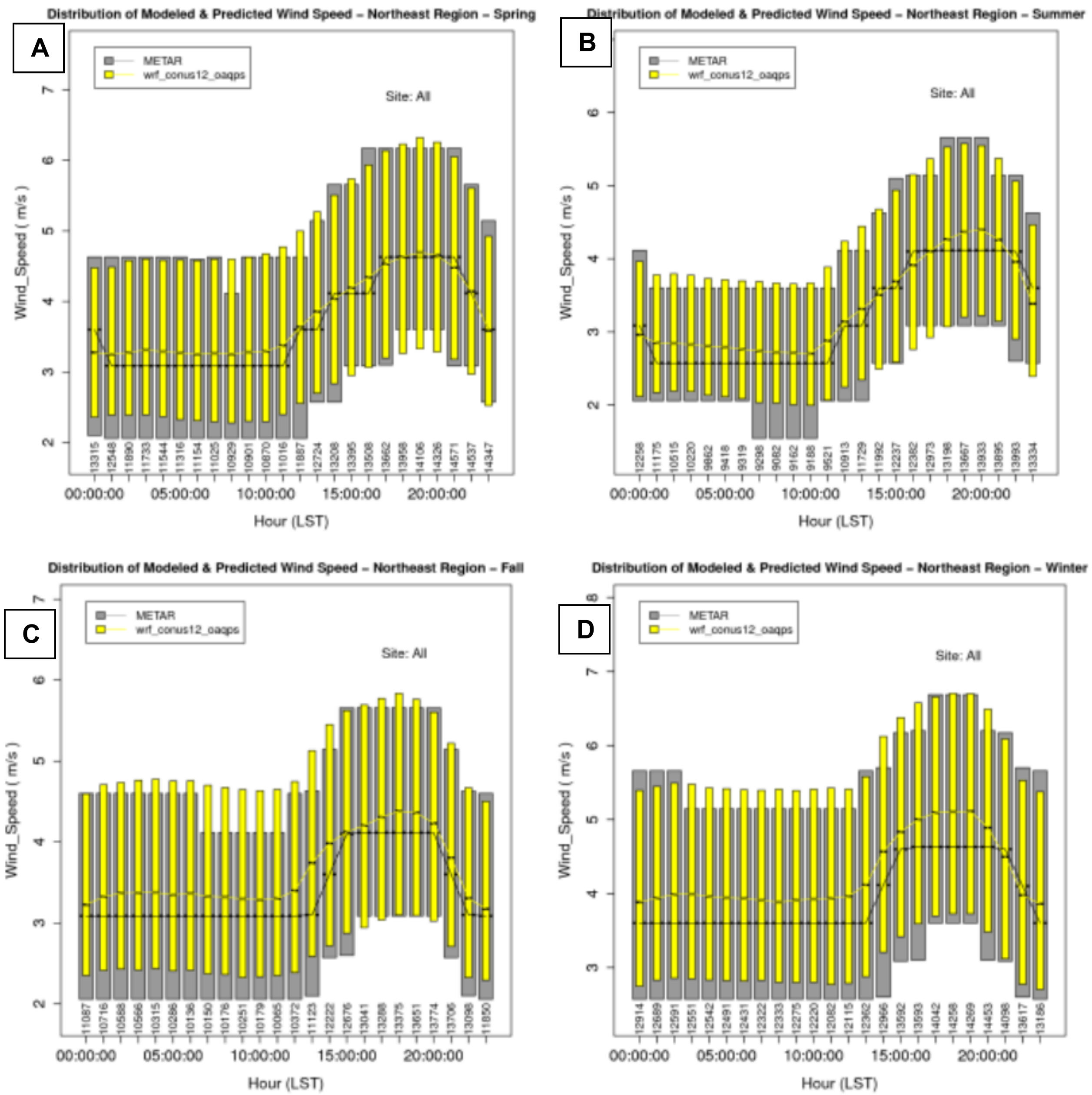


Figure 3-2 *Panels from 2016 Collaborative Meteorology TSD Figure 3.2.19 showing the distribution of modeled and predicted temperatures for A) spring, B) summer, C) fall, and D) winter in the Northeastern U.S.. Additional regions can be found in the 2016 Collaborative Meteorology TSD[7].*

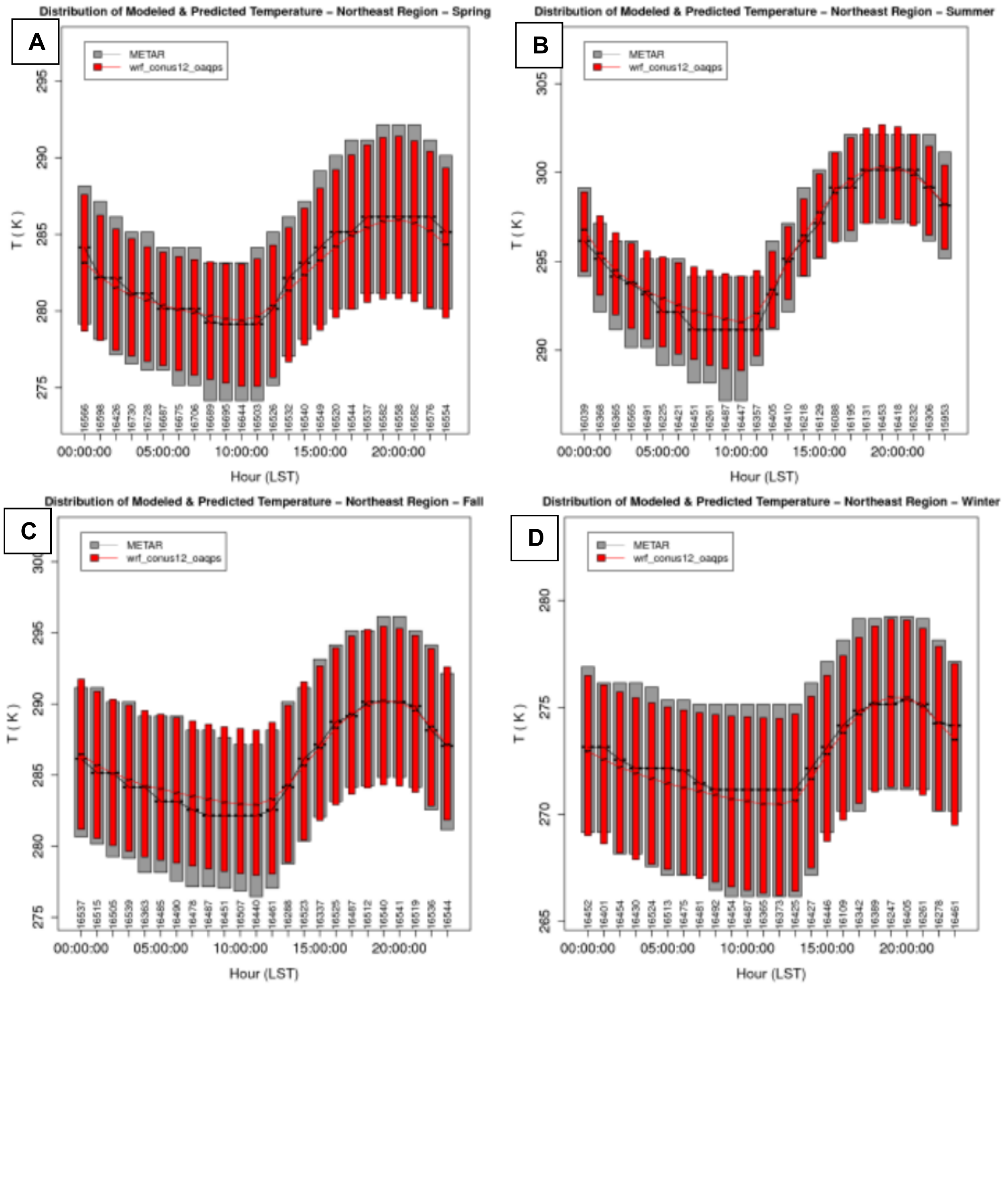


Figure 3-3. *Panel plot of hourly average distributions of observed and modeled water vapor mixing ratio for the northeastern U.S. from Figure 3.3.19 of the 2016 Collaborative Meteorology TSD for A) spring, B) summer, C) fall, and D) winter.*

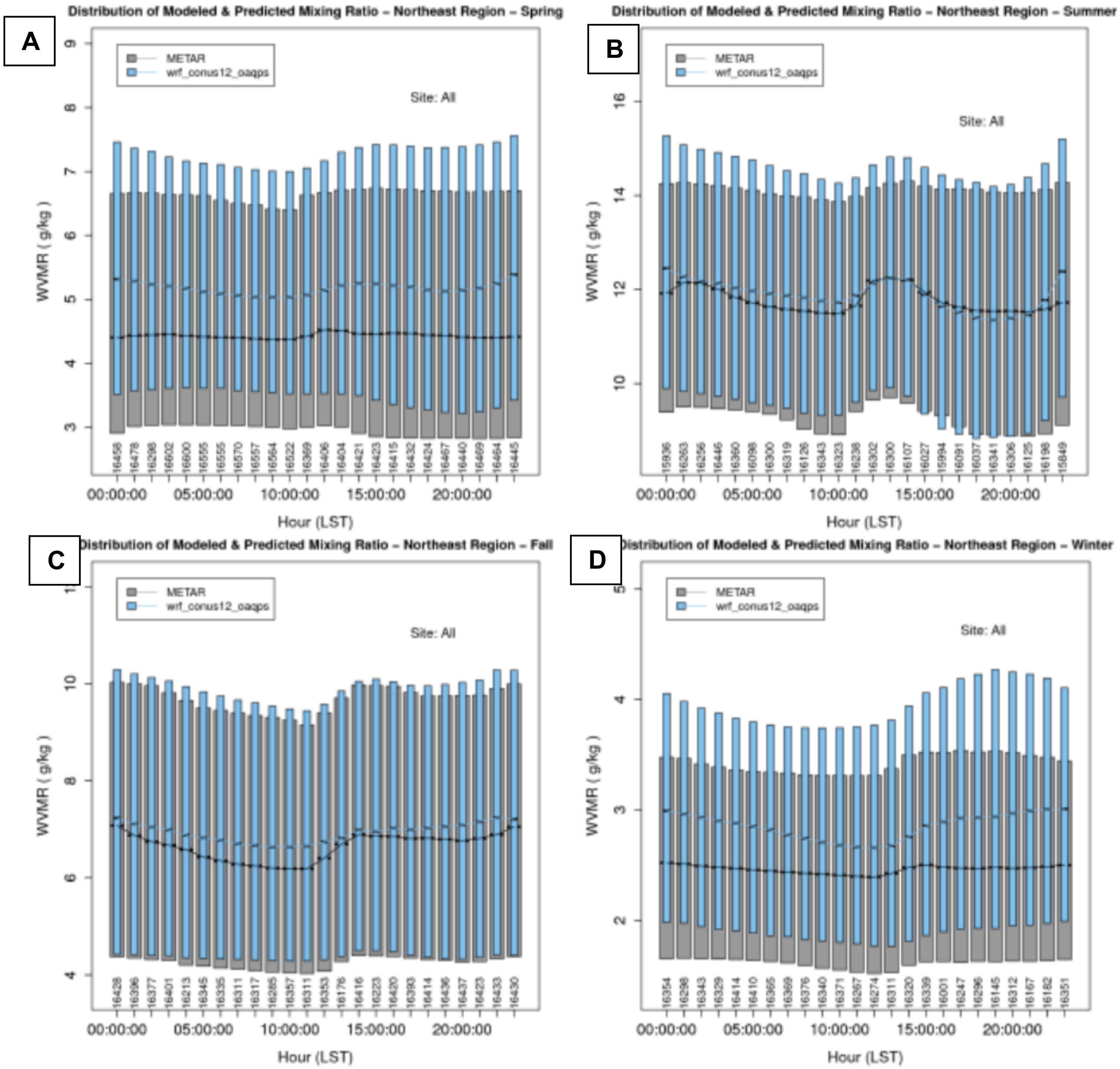


***Table 3-4**. Performance metrics for modeled water vapor mixing ratio in the Northeast from Table 3.3.1 from the 2016 Collaborative Meteorology TSD.*

Season	Mean Obs (g/kg)	Mean Mod (g/kg)	MB (g/kg)	MAE (g/kg)	NMB (%)	NME (%)	RMSE (g/kg)
Spring	4.13	4.10	-0.03	1.26	-0.74	30.43	1.81
Summer	3.57	3.57	0.00	1.11	0.12	31.21	1.63
Fall	3.87	4.00	0.14	1.22	3.56	31.55	1.78
Winter	4.46	4.59	0.13	1.40	2.89	31.42	2.01

Daily average modeled water vapor mixing ratios exhibit slight positive biases in the OTR states of up to +1 g/kg early in the ozone season. In June, July, and August biases across the region remain mixed between -1 g/kg and +1 g/kg, with lower biases along the Atlantic coast. Biases tend to be consistent diurnally as compared to temperature, since water vapor mixing ratio has less temporal variability. Therefore, there is little difference between daytime biases and daily average biases. See Figures 3.3.8-9 and 3.3.16-17 in the 2016 Collaborative Meteorology TSD[7] for more detail.

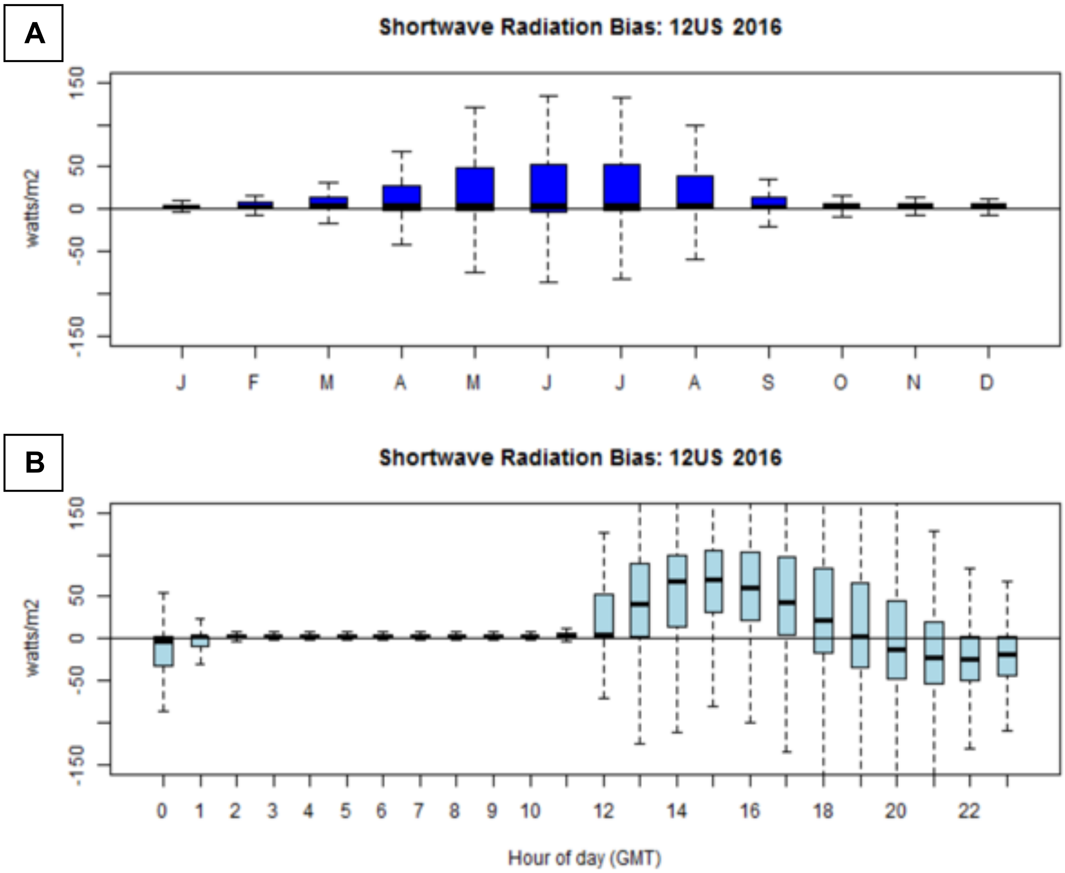
Modeled precipitation in the Northeast performs adequately in terms of spatial pattern and rainfall magnitudes. Yet model performance underpredicts precipitation June to October during periods of high convective activity and overpredicts during spring and fall. Modeled biases remain within plus or minus a few inches of rainfall. Figures 3.4.13 to 3.4.24 in the 2016 Collaborative Meteorology TSD[7] show spatial biases in rainfall amounts for each month for the 12US2 simulation.

Modeled solar radiation biases high against observations (**Figure 3-4**) at the SURFRAD and SOLRAD network monitors with tendency to overpredict in the summer, however overpredictions are less than 100 W/m^2. At the time of greatest incoming solar radiation, the model bias approaches 50 W/m^2. Hourly biases change from underpredictions most of the day to overpredictions during periods of peak solar insolation. Averages are across all observation locations.

3.2 Summary

The 2016 Collaborative performed extensive evaluation of the modeled meteorology used in the 2016v1 modeling. Conditions in the northeastern U.S. during the 2016 ozone season were a bit warmer and drier than average. Modeled meteorology biases exist across the OTR states; however, they are generally small in comparison to observations. Model biases will be consistent in sensitivity simulations and projections and will not impact comparisons of these against the base case. However, meteorology model biases may impact base year 2016 modeled ozone concentrations. Evaluation of modeled ozone concentrations is conducted by members of the OTC Modeling Committee (see **Section 6**).

Figure 3-4. *Hourly bias distribution for shortwave radiation by A) month and B) hour of the day from the 2016 Collaborative Meteorology TSD[7].*



4 Evaluation of Biogenic Model Versions

The modeling platform made available by EPA for 2016 Beta and 2016 V1 relied on the Biogenic Emissions Inventory System (BEIS) v3.61 for biogenic emissions (US EPA, 2021a), and used the "16j" version of the 2016 meteorology as described in **Section 3**. More information about BEIS v3.61 is available in the EPA Technical Support Document for the 2016 emissions platform (US EPA, 2021a). Briefly, BEIS v3.61 outputs gridded hourly emissions of CO, VOCs, and NO from vegetation and soils for the contiguous U.S. and portions of Mexico and Canada. Biogenic emissions are processed within the Sparse Matrix Operator Kernel Emissions (SMOKE) system and are model-ready to be input to CMAQ.

Biogenic emissions were processed in conjunction with a modified v4.1 of the Biogenic Emissions Landuse Database (BELD4). More details about the two-layer canopy model and imported meteorology variables are described in Pouliot and Bash (2015) and US EPA (2021). The BELD4 is based upon the USDA-USFS Forest Inventory and Analysis (FIA) vegetation speciation data for 2001 to 2014 (FIA v5.1), National Land Cover Database product from the Landsat satellite for canopy coverage, NASA's Shuttle Radar Topography Mission for elevation data, and the USDA Cropland Data Layer.

4.1 Comparison Testing

4.1.1 Modeled Isoprene Concentrations

Additional evaluations and comparisons were performed by NYSDEC to understand model performance biases across two chemical transport models (CMAQ and CAMx) and comparing BEIS v3.61 with another biogenic emissions model, the Model for Emissions of Gases and Aerosols from Nature (MEGAN) v3.0. Much of the difference in modeled ozone concentrations when comparing the use of MEGAN versus BEIS comes from the difference in isoprene concentrations simulated by each of the two biogenic models.

Both CMAQ and CAMx air quality models using either biogenic inventory underpredict ozone in May and June and overpredict in July and August. On average, ozone predictions using BEIS are higher than when using MEGAN and this is even more prominent on high ozone days above a 60 ppb threshold. However, site to site and day to day results can be highly variable. For instance, on average during July 2016, isoprene emissions from BEIS are greater than those from MEGAN across much of Appalachia and Canada, while emissions from MEGAN are greater than BEIS for the rest of the northeastern U.S. (**Figure 4-1**). For some areas, like the Great Lakes, the differences in BEIS versus MEGAN emissions are small and may impact predicted ozone minimally.

Simulated isoprene concentrations can be compared with observations to understand model performance. Diurnal patterns in observations (black line), CMAQ modeled with BEIS (red line) and with MEGAN (orange line), and CAMx modeled with BEIS (dark blue line) and with MEGAN (light blue line) are shown in **Figure 4-2** for the Pfizer Laboratory site (New York Botanical Gardens, Bronx, NY). Generally, BEIS performs better with both CAMx and CMAQ at replicating the June to August average diurnal profiles than does MEGAN. With BEIS, isoprene concentrations peak during midday, as observed concentrations do, while with MEGAN, there is a dip in the middle of the day which is replicated at monitors in the southeastern U.S. (not shown).

Figure 4-1. *(BEIS v3.61 - MEGAN v3.0), BEIS > MEGAN warm colors and BEIS < MEGAN cool colors.*

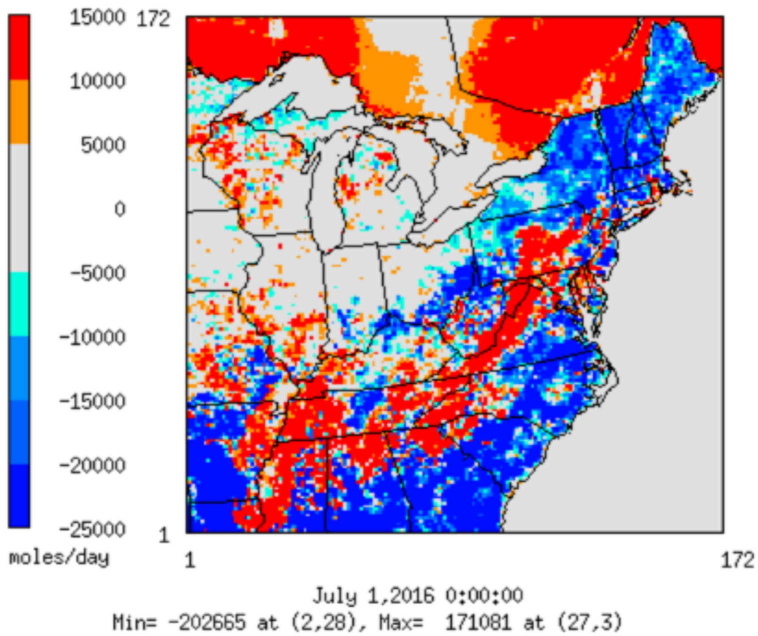
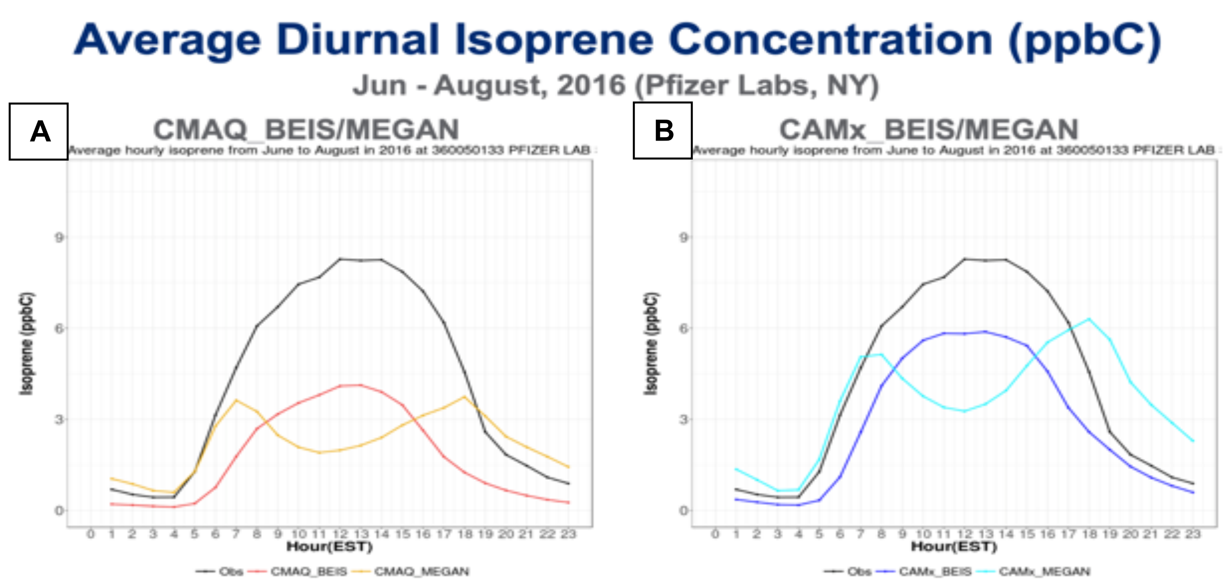


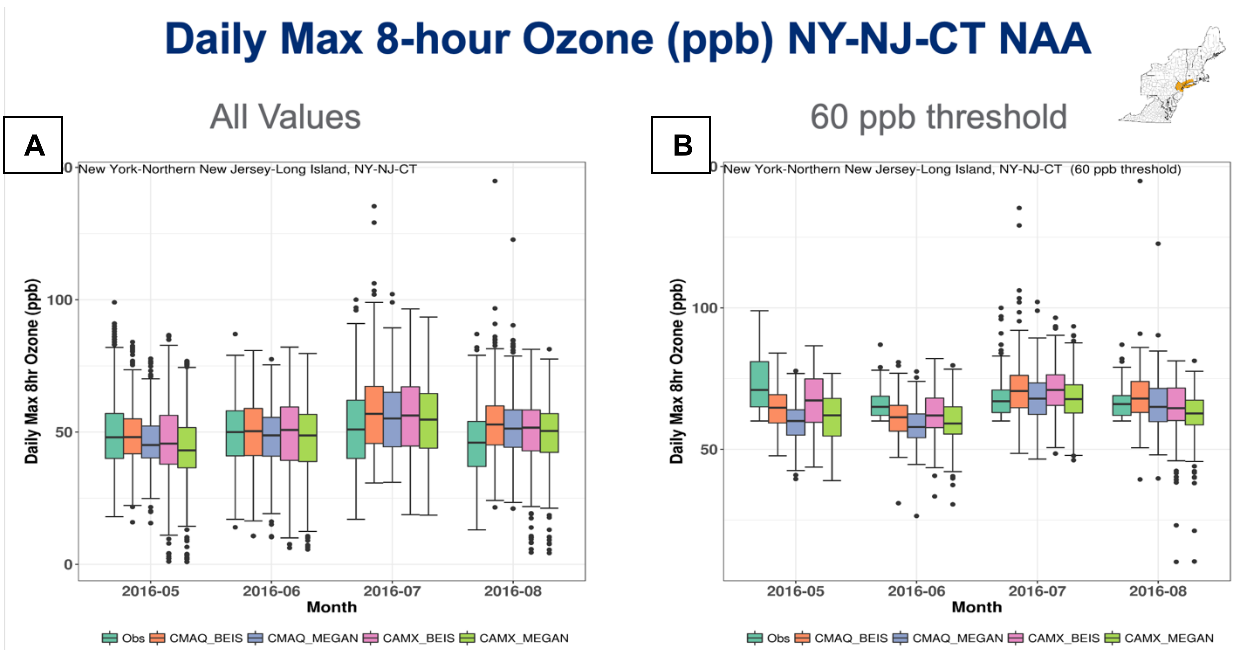
Figure 4-2. *June to August 2016 average diurnal concentrations of isoprene as observed (black) and modeled in CMAQ (left) and CAMx (right) for BEIS (darker lines) and MEGAN (lighter lines).*



4.1.2 Ozone Concentrations

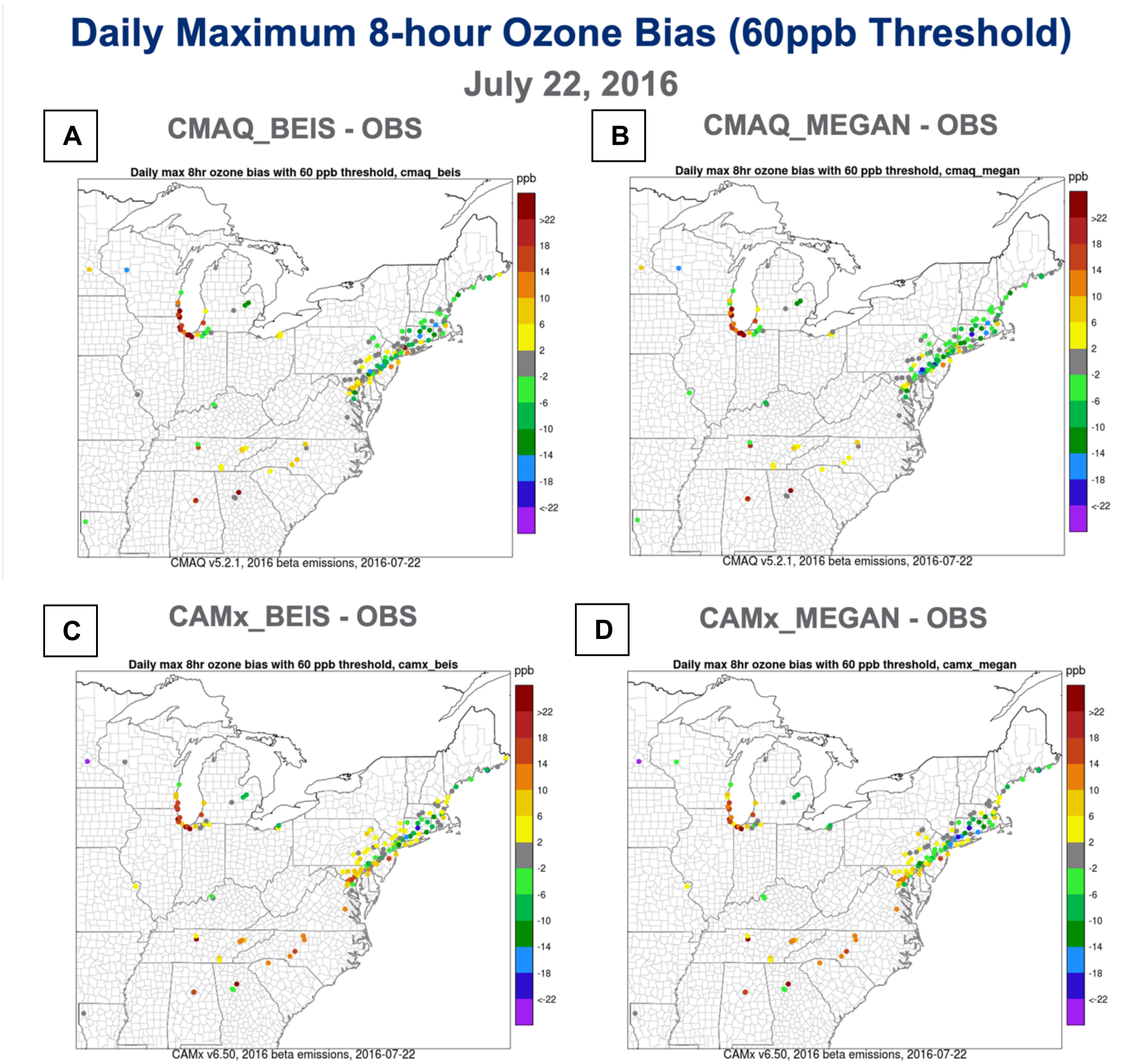
Monthly average daily maximum 8-hour observations and modeled concentrations in the NY-NJ-CT nonattainment area show on average, CMAQ with BEIS, CMAQ with MEGAN, CAMx with BEIS, and CAMx with MEGAN are generally similar to one another (**Figure 4-3**). Additionally, all model combinations perform generally well on average in May and June compared to observations. However, all model iterations overestimate ozone concentrations in July and August, and CMAQ tends to overestimate lower concentrations. At high ozone concentrations above a 60 ppb threshold, results are more mixed. Generally, both CMAQ and CAMx with MEGAN estimate lower concentrations of ozone than do CMAQ and CAMx with BEIS. Modeled concentrations tend to be low in May and June and slightly high in July and August but with larger concentration spread than observed.

Figure 4-3 (A-B). Monthly distributions of Daily Max 8-hour O3 concentrations for observations and each of the four simulations.



To illustrate spatial patterns in model performance, daily maximum 8-hour ozone biases for concentrations above the 60 ppb threshold are shown in **Figure 4-4** on a single day – July 22, 2016. Across all model configurations, model biases fall within +/- 6 ppb of the observed values. CMAQ tends to have more underpredictions through the urban corridor with some notable exceptions in coastal CT and Long Island (LI), which tend to be higher with BEIS than with MEGAN. Contrastingly, CAMx exhibits more overpredictions through the corridor, especially with BEIS.

Figure 4-4. *For July 22, 2016, modeled biases using an observed daily maximum 8-hour 60 ppb threshold for A) CMAQ with BEIS, (top left), B) CMAQ with MEGAN (top right), C) CAMx with BEIS (bottom left), and D) CAMx with MEGAN (bottom right).*

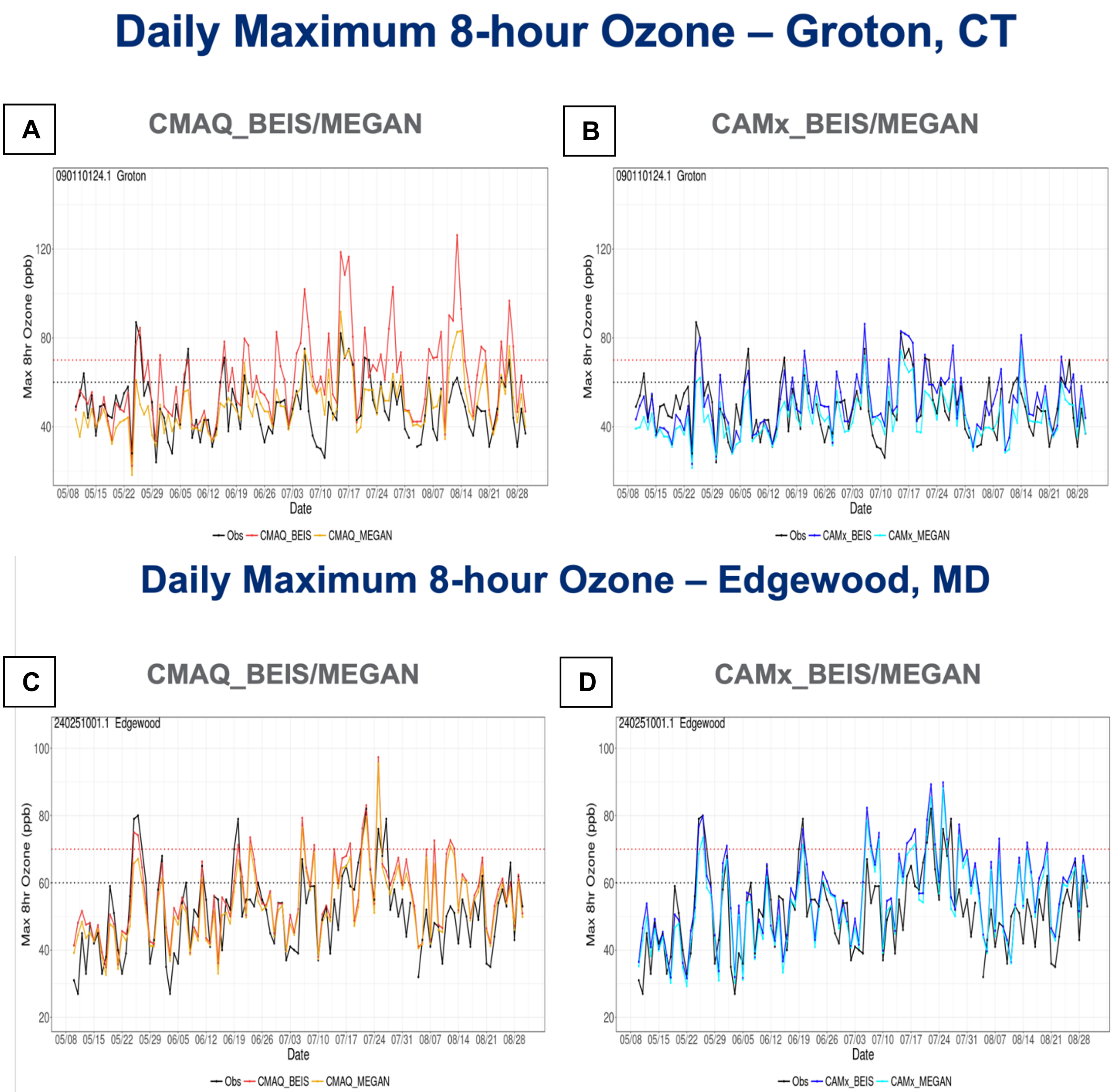


Observed and modeled daily maximum 8-hour ozone (MDA8) concentrations are compared for each model iteration from May through August at two monitor locations, Groton, CT and Edgewood, MD (**Figure 4-5**).[10] Generally, models perform similarly compared to observations (black line) with a few notable exceptions. At Groton, CT, CMAQ with BEIS overpredicts MDA8 ozone for much of the summer, including overestimating ozone by more than 40 ppb in mid-July and mid-August. Observed ozone concentrations are also overestimated in July and August. Comparisons between

[10] Groton, CT and Edgewood, MD are two near-water sites in different NAAs of the OTR and were chosen for this analysis because CMAQ does not always agree with observed values at these locations.

model results and observations tend to be more in-line with each other at the Edgewood, MD site except in August, when CMAQ overestimates MDA8 ozone concentrations. The CAMx performance is more consistent across all model iterations with observations at Groton, CT, but the model overestimated ozone during mid-July and most of August at Edgewood, MD.

Figure 4-5 (A-D): Daily maximum 8-hour O3 at Groton, CT (top A-B) and Edgewood, MD (bottom C-D) for CMAQ and CAMx with BEIS or MEGAN.



4.2 Assessment/Recommendations

Model biases and performance are not consistent spatially or temporally. The models with BEIS or with MEGAN perform better some days than others or predict ozone concentrations better at certain monitors than others. The OTC Modeling Committee chooses to use BEIS because this is more consistent with the EPA's modeling approach.

5 Emissions Inventories and Processing for 2016 12 km Base Year Simulation

The emissions data used in all air quality modeling were developed by the National Emission Inventory Collaborative. The Inventory Collaborative is a partnership between state emissions inventory staff, multi-jurisdictional organizations (MJOs), federal land managers (FLMs), EPA, and others to develop an emissions modeling platform for use in air quality planning and is structured around workgroups organized by emissions inventory sectors. Work began on the 2016 inventory in late 2017 and continues with platform updates and improvements. As of the date of this document, the Collaborative had released three versions of the 2016 modeling platform: Alpha, Beta, and version 1 (V1). In addition, EPA has released V2 and portions of V3. The EPA uses a two-character naming convention in their emissions modeling platforms. The first character represents the base year "f" in the case of the 2016 platform. The second character indicates a version number e.g., "f" for Beta, "h" for version 1. Documentation for the 2016 modeling platform can be found on EPA's website for beta[11] and for version 1.[12]

2016 Beta (ff)

The Beta inventory is largely based on the 2014 National Emissions Inventory (NEI) developed by the EPA (US EPA, 2019). This initial version of the platform only included the 2016 base year inventory and was released on March 2019 via the Intermountain West Data Warehouse (IWDW) website.[13]

2016 V1 (fh)

An approved inventory, 2016 V1, was released in October 2019.[12] It included updates to Commercial Marine Vessels (CMV) sectors as well as complete future year inventories for 2023 and 2028.

Post 2016 v1 Updates (fi)

Several months after the initial release of the V1 inventory, updates and corrections were made to several emission sectors (US EPA, 2021b):

- Commercial Marine Vessels (CMV): December 2019 it was discovered that emissions from hoteling ships were being allocated to a single hour instead of the entire duration of the hoteling period. Additionally, a day of week error was discovered in the emissions for some areas. Because the 2016 emissions were based on 2017 NEI activity data, a remapping of 2016 days to 2017 days to ensure emissions were on the same day of the week was implemented. This affected both the small- and medium-size CMV engines in

[11] US EPA 2016v7.2 (beta and Regional Haze) Platform. https://www.epa.gov/air-emissions-modeling/2016v72-beta-and-regional-haze-platform.
[12] US EPA 2016v1 Platform. https://www.epa.gov/air-emissions-modeling/2016v1-platform.
[13] Intermountain West Data Warehouse. https://views.cira.colostate.edu/iwdw/

Categories 1 and 2 (cmv_c1c2) and large-size CMV engines in Category 3 cmv_c3 sectors.

- Airports: June 2020, it was discovered that airport emissions were overestimated in the 2017 NEI. The 2016 airport emissions were based on the 2017 NEI hence they had to be adjusted.
- EPA EGU point sources: in July 2020, an issue was identified with how SMOKE treated cases when multiple emissions units were mapped to the same CEM unit in the base year. Some CEMS data were dropped in this situation. This affected the 2016 base year. In addition, a new Integrated Planning Model (IPM) run was completed in January 2020, which resulted in updates to the 2023 and 2028 future year EGU inventories.

5.1 Emission Inventory Platforms used in OTC modeling

Table 5.1 summarizes the air quality modeling runs performed by OTC. The "inventory platform" column indicates what version of the emissions inventory was used for each modeling run. The EGU and biogenic emission sectors both have inventory options i.e., IPM/ERTAC for EGU and BEIS/MEGAN for biogenic. OTC is using the ERTAC and BEIS options and this is noted in the inventory platform nomenclature. For example, the inventory platform name fh_ERTAC_BEIS, indicates the V1 (before updates) platform with the ERTAC EGU and BEIS biogenic options were used.

fd_IPM_BEIS

The "fd" indicator is for the 2016 Alpha platform and the"BEIS" indicator refers to using biogenic emissions model. This inventory summary is accessible online.[14] Briefly, the 2016 Alpha platform was based on the 2014 NEI V2. The NEI was compiled using the Emissions Inventory System with quality assurance checks conducted by state, local, and tribal air agencies, and the EPA. There are five data categories of emissions: point, non-point, non-road mobile, on-road mobile, and fire events. Additional emissions are included in the 2016 platform for biogenic sources, Canadian and Mexican inventories, and some other non-NEI sectors. This inventory mostly consists of 2014 NEI V2 components but includes updates for 2016 include point sources, agricultural and wildland fire emissions, CMV updated to reflect a 2015 sulfur rule, fertilizer, oil and gas, and on-road and non-road processed using the MOtor Vehicle Emissions Simulator (MOVES). More detail on each individual sector used in 2016 and as it relates to 2014 NEI V2 can be found in the 2016 alpha platform Technical Support Document.[11]

ff_IPM_BEIS

The "ff" indicator is for the 2016 Beta platform. This platform was developed by the 2016 Inventory Collaborative and released for use in March 2019. A detailed description on the individual emission sectors is available under Documentation on the 2016 Collaborative Wiki page for the 2016 Beta platform.[15] Briefly, the Beta platform includes year-specific updates to electricity generating units

[14] US EPA 2016v7.1 Alpha Platform. https://www.epa.gov/air-emissions-modeling/2016v71-alpha-platform.

[15] Beta IWDW Documentation. http://views.cira.colostate.edu/wiki/wiki/10197#Documentation.

(EGUs), onroad mobile, nonroad mobile, fires, and biogenics. The Beta platform also includes the first set of 2023 and 2028 projected emissions.

ff_IPM_MEGAN
The "MEGAN" indicator refers to using biogenic emissions from the Model for Emissions of Gases and Aerosols from Nature (MEGAN) as opposed to using biogenic emissions from BEIS. This inventory is identical to ff_IPM_BEIS except MEGAN emissions replace those from BEIS.

fh_IPM_BEIS
The "fh" indicator is for the 2016 V1 platform. This platform was developed by the 2016 Inventory Collaborative and released for use in October 2019. A detailed description on the individual emission sectors is available under Documentation on the 2016 Collaborative Wiki page for the 2016 V1 platform[16].

fh_ERTAC_BEIS
The "ERTAC" indicator is for EGU emissions from the Eastern Regional Technical Advisory Committee (ERTAC). This version replaces IPM with ERTAC EGU emissions while all other emission sectors remain the same. fh_ERTAC_BEIS is the standard version employed by the OTC Modeling Centers.

fi_ERTAC_BEIS
This platform is identical to the fh_ERTAC_BEIS except it includes the post V1 updates to the airport and CMV sectors. This inventory is used for the modeling presented throughout the TSD.

5.2 Emission Inventory Sectors

Emission inventories for each model year were developed by sector and are listed below with a brief description. In addition, links to specification sheets that detail the methodologies of how emissions for each sector were calculated are listed. Specific emissions files are listed in **Appendix A**.

1. **Agricultural (ag):** The ag sector includes ammonia (NH_3) emissions from fertilizer and emissions of all pollutants other than $PM_{2.5}$ from livestock in the nonpoint (county-level) data category of the 2017 NEI. The sector now includes VOC and HAP VOC in addition to NH_3.[17]
2. **Airports (airports):** Emissions of all pollutants from aircraft and ground support equipment.[18]
3. **Biogenic**

[16] 2016 V1 IWDW Documentation: http://views.cira.colostate.edu/wiki/wiki/10202#Documentation
[17] National Emissions Inventory Collaborative (2020). Specification Sheet - Agriculture http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_nonpoint-ag_25Feb2020.pdf
[18] National Emissions Inventory Collaborative (2019). Specification Sheet - Airports http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_airports_16Dec2019.pdf

a. **(BEIS):** Non-anthropogenic emissions, including emissions from Canada and Mexico, generated with BEIS v3.61 using BELD v4.1 land use data.[19]

b. **(MEGAN):** Non-anthropogenic emissions, including emissions from Canada and Mexico, generated with MEGAN v3.0.[20]

4. **Fugitive Dust (afdust):** Fugitive dust particulate matter (PM) emissions from the 2014 National Emissions Inventory (NEI) V2 nonpoint source category. Categories included in this sector are paved roads, unpaved roads and airstrips, construction (residential, industrial/commercial/institutional, road and total), agriculture production, and mining and quarrying.[21]
5. **Area Source (nonpt):** Area source emissions not included in other sectors.[22]
6. **Category 1 & 2 Marine Vessels (cmv_c1c2):** Category 1 and category 2 commercial marine vehicle emissions treated as point sources at grid cell resolution.[23]
7. **Category 3 Marine Vessels (cmv_c3):** Category 3 commercial marine vehicle emissions, generally in international waters in the Alpha inventory distributed throughout the Atlantic Ocean, and in the Alpha 2 and Beta inventories distributed to shipping lanes. Sulfur dioxide emissions are reduced by 90% compared to 2014 NEI V2 due to a 2015 rule. Emissions from C3 vessels operating in U.S. and Mexican inland and federal waters are included in this category. C3 vessels operating in Canadian inland waters are not included in this category.[24]
8. **Nonroad (nonroad):** Nonroad equipment emissions, at the county and monthly resolution. Nonroad in Beta was processed using MOVES2014a using NONROAD 2008 version NR08a for all states except California, which submitted their own emissions and included new HAP emissions factor superseding those used in the 2011 NEI and 2014 NEI V2.[25] Nonroad in the V1 platform was processed with MOVES2014b.[26] Nonroad in the 2016 V2 platform was processed with MOVES3 (US EPA, 2022).

[19]National Emissions Inventory Collaborative (2019). Specification Sheet - BEIS
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_biogenic-beis_18Dec2019.pdf

[20]National Emissions Inventory Collaborative (2019). Specification Sheet – MEGAN
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/MEGAN3_Specification_Sheet_v2.pdf

[21]National Emissions Inventory Collaborative (2019). Specification Sheet – Fugitive Dust
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_nonpoint-afdust_16Dec2019.pdf

[22]National Emissions Inventory Collaborative (2020). Specification Sheet – Non-point
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_nonpoint_24Feb2020.pdf

[23]National Emissions Inventory Collaborative (2020). Specification Sheet - CMV C1 & C2
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_mobile-nonroad-cmv-c1c2_20Feb2020.pdf

[24]National Emissions Inventory Collaborative (2020). Specification Sheet - CMV C3
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_mobile-nonroad-cmv-c3_04Mar2020.pdf

[25] National Emissions Inventory Collaborative (2019). Specification Sheet – Non-road
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016beta_0919/National-Emissions-Collaborative_2016beta_mobile-nonroad_06Mar2019.pdf

[26]National Emissions Inventory Collaborative (2019). Specification Sheet – Non-road
http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_mobile-nonroad_24Feb2020.pdf

9. **Non-point oil and gas (np_oilgas):** Onshore and offshore nonpoint emissions from the oil and gas sector at the county and annual resolution. Projected to 2016 from the 2014 NEI V2 inventory using the same methodology as used for projecting emissions from the point oil and gas sector.[27]
10. **Mobile Source (onroad):** Emissions from gasoline and diesel vehicles while moving, idled or parked including evaporative losses and vehicle refueling, at the grid cell and hourly resolution, from on-road vehicles in all states except California processed using MOVES and SMOKE-MOVES. California submitted their on-road emissions separately. Transportation modes included exhaust, extended idle, auxiliary power units, evaporative, permeation, refueling, and brake and tire wear. Emissions were calculated using winter and summer MOVES emissions tables and processed with MOVES2014a for the Beta platform.[28] Onroad in the V1 platform was processed with MOVES2014b[29], and onroad in the 2016 V2 platform was processed with MOVES3 (US EPA, 2022).
11. **Mobile Source Canada (onroad_can):** Onroad mobile source emissions from Canada.[30]
12. **Mobile Source Mexico (onroad_mex):** Onroad mobile source emissions from Mexico.[31] Emissions are processed using MOVES-Mexico emissions for the inventory.
13. **Area Source Fugitive Dust Canada (othafdust):** Particulate emissions from fugitive dust sources in Canada obtained from Environment and Climate Change Canada (ECCC).[32]
14. **Point Source Fugitive Dust Canada (othptdust):** Point source particulate emissions from fugitive dust sources in Canada.[33]
15. **Area Source Canada & Mexico (othar):** Area source emissions from Canada and Mexico, including mobile nonroad.[34]

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[27] National Emissions Inventory Collaborative (2019). Specification Sheet - Non-point Oil & Gas http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_nonpoint-oilgas_18Dec2019.pdf

[28] National Emissions Inventory Collaborative (2019). Specification Sheet – Onroad http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016beta_0919/National-Emissions-Collaborative_2016beta_mobile-onroad_15Sep2019.pdf

[29] National Emissions Inventory Collaborative (2020). Specification Sheet – Onroad http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_mobile-onroad_24Feb2020.pdf

[30] National Emissions Inventory Collaborative (2019). Specification Sheet – On-road Canada http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_canada-onroad-mobile_15Oct2019.pdf

[31] National Emissions Inventory Collaborative (2019). Specification Sheet - Onroad Mexico http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_mexico-onroad-mobile_15Oct2019.pdf

[32] National Emissions Inventory Collaborative (2019). Specification Sheet – Nonpoint- fugitive dust Canada http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_canada-nonpoint-afdust_15Oct2019.pdf

[33] National Emissions Inventory Collaborative (2019). Specification Sheet – Point fugitive dust Canada http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_canada-point-dust_15Oct2019.pdf

[34] National Emissions Inventory Collaborative (2019). Specification Sheet – Nonpoint area, Canada & Mexico http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_canada-mexico-nonpoint_15Oct2019.pdf

16. **Point Source Canada & Mexico (othpt):** Point source emissions from Canada and Mexico. [35]
17. **Point Oil & Gas (pt_oilgas):** Point source emissions from oil and gas production and related processes at an annual resolution. Includes offshore oil and gas platforms in the Gulf of Mexico. Emissions are a combination of updated emissions for 2016 and emissions projected from the 2014 NEI V2 without updates.[36]
18. **Agricultural Burning (ptagfire):** Point source agricultural burning emissions.[37]
19. **Prescribed Burning & Wildfires (ptfire):** Point source emissions from year specific controlled burning and wildfires.[38]
20. **Electric Generating Units**
    a. **EPA IPM (ptegu):** Electricity generating unit source emissions for simulating 2016 and future year U.S. air quality with the Integrated Planning Model.[39]
    b. **ERTAC (ptertac):** Electricity generating unit source emissions for simulating 2016 and future year U.S. air quality with the Eastern Regional Technical Advisory Committee (ERTAC) EGU tool.[40]
21. **Industrial and Commercial Point Sources**
    a. **EPA IPM (ptnonipm):** Emissions from industrial and commercial point sources.[41]
    b. **ERTAC (ptnonertac):** Emissions from industrial and commercial point sources.[40]
22. **Rail Emissions (rail):** Area source emissions from railways.[42]
23. **Residential Wood Combustion (rwc):** Area source emissions from residential wood combustion.[43]

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[35] National Emissions Inventory Collaborative (2019). Specification Sheet - Othpt Canada & Mexico, http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_canada-mexico-point_15Oct2019.pdf

[36] National Emissions Inventory Collaborative (2019). Specification Sheet – Point Oil & Gas http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_point-oilgas_18Dec2019.pdf

[37] National Emissions Inventory Collaborative (2019). Specification Sheet – Agricultural Fires http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_point-agfire_20Dec2019.pdf

[38] National Emissions Inventory Collaborative (2019). Specification Sheet – Prescribed Burning & Wildfies http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_point-fire_20Dec2019.pdf

[39] National Emissions Inventory Collaborative (2019). Specification Sheet – IPM EGUs http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/National-Emissions-Collaborative_2016v1_point-egu-ipm_15Oct2019.pdf

[40] National Emissions Inventory Collaborative (2023). Specification Sheet – ERTAC EGUs http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_ERTAC-EGU_20jan2023.pdf

[41] National Emissions Inventory Collaborative (2020). Specification Sheet – Point non-IPM EGUs http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_point-nonipm_25Feb2020.pdf

[42] National Emissions Inventory Collaborative (2020). Specification Sheet - Rail http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_mobile-nonroad-rail_06May2020.pdf

[43] National Emissions Inventory Collaborative (2020). Specification Sheet – Residential Wood Combustion http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/after_comments/National-Emissions-Collaborative_2016v1_nonpoint-rwc_24Feb2020.pdf

5.3 Speciation

Gaseous chemical speciation of emissions is accomplished through the SMOKE preprocessor based on the selected chemical mechanism. In this case, speciation occurs according to the CB6 mechanism (Yarwood et al., 2010). Specific pollutant species can be found in Table 3.3 of the Collaborative 2016v1 TSD. The chemical speciation approach for total organic gases and $PM_{2.5}$ are based on the SPECIATE 4.5 database[44], which provides a repository of speciation profiles from air pollution sources. More detail on speciation can be found in the Collaborative 2016v1 TSD.[11]

5.4 Spatial Allocation

The spatial surrogates for the 12OTC2 domain for the United States were extracted from the 12US1 U.S. grid surrogates. Spatial factors were applied by county and source classification codes with surrogates from 2014 data when possible. Most U.S. surrogates were generated with the Spatial Allocator and Surrogate Tool.[45]

5.5 Temporal Allocation

Temporal allocation of the annual or monthly emissions found in the inventory to hourly emissions required by the air quality models is performed during SMOKE processing by the application of temporal profiles. Temporal profiles are applied to the emissions at the SCC level for each sector.

Exceptions to this procedure are the EGU sectors (ptegu/ptertac) which make use of hourly Continuous Emission Monitoring Systems (CEM) data. More details on temporal allocation for individual sectors are in the 2016 V1 TSD.[12]

In the case of ERTAC EGU (ptertac), the ERTAC code produces hourly EGU emissions that are grounded in the base year CEM data. v2.1.1 of the ERTAC EGU code was used in all inventories. The input files were from ERTAC EGU v16.0 for the Beta inventories, and from ERTAC EGU v16.1 for the 2016 V1 inventory. In all cases they were post-processed using v1.02 of the ERTAC to SMOKE conversion tool. Given the fine level of detail that ERTAC EGU produces, the hourly ERTAC EGU results are used to temporalize EGUs in the modeling platform. In order to include the temporalization during SMOKE processing, hourly ff10 files were produced by the ERTAC to SMOKE post processor in addition to the annual ff10 files.

[44] US EPA SPECIATE. https://www.epa.gov/air-emissions-modeling/speciate
[45] CMAS Spatial Allocator and Surrogate Tool. https://www.cmascenter.org/sa-tools/documentation/4.2/SurrogateToolUserGuide_4_2.pdf

Table 5-1. *Modeling ledger of runs and emissions inventory used. Description of Inventory platform included below.*

Run ID	Run Name	Year	Domain[a]	Inventory Platform[b]	Modeling Period	AQ Model	Pre-merged Emission Source	Modeling Center	Complete
A	2016 Base	2016	12OTC1	fd_IPM_BEIS	May-Aug	CMAQ5.2.1	EPA	NY	Yes
B1	2016 Base - IPM/BEIS	2016	12OTC1	ff_IPM_BEIS	May-Aug	CMAQ5.2.1	NY	NY	Yes
B2	2016 Base - IPM/MEGAN	2016	12OTC1	ff_IPM_MEGAN	May-Aug	CMAQ5.2.1	NY	NY	Yes
B3	2016 Base - IPM/BEIS	2016	12OTC1	ff_IPM_BEIS	May-Aug	CAMx6.50	NY	NY	Yes
B4	2016 Base - IPM/MEGAN	2016	12OTC1	ff_IPM_MEGAN	May-Aug	CAMx6.50	NY	NY	Yes
C1	2016 Base - IPM/BEIS	2016	12OTC2	fh_IPM_BEIS	Apr-Oct	CMAQ5.3.1	EPA	NY	Yes
C2	2023 FY - IPM/BEIS	2023	12OTC2	fh_IPM_BEIS	Apr-Oct	CMAQ5.3.1	EPA	NY	Yes
C3	2028 FY - IPM/BEIS	2028	12OTC2	fh_IPM_BEIS	Apr-Oct	CMAQ5.3.1	EPA	NY	Yes
C4	2016 Base – ERTAC/BEIS	2016	12OTC2	fh_ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	EPA/NY	NY	Yes
C5	2023 FY – ERTAC/BEIS	2023	12OTC2	fh_ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	EPA/NY	NY	Yes
C6	2028 FY – ERTAC/BEIS	2028	12OTC2	fh_ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	EPA/NY	NY	Yes
C7	2016 Base – ERTAC/BEIS	2016	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	EPA/NY	NY	Yes
C8	2023 FY - ERTAC/BEIS	2023	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	EPA/NY	NY	Yes
C9	2016 Base – ERTAC/BEIS	2016	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CAMx7.00	NY	NY	Yes
C10	2023 FY - ERTAC/BEIS	2023	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CAMx7.00	NY	NY	Yes
C11	2028 FY – ERTAC/BEIS	2028	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CAMx7.00	NY	NY	Yes
C12	2016 Base – ERTAC/BEIS	2016	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CAMx7.10	NY	NY	Yes
C13	2023 FY - ERTAC/BEIS	2023	12OTC2	fi_ ERTAC_BEIS	Apr-Oct	CAMx7.10	NY	NY	Yes

Run ID	Run Name	Year	Domain[a]	Inventory Platform[b]	Modeling Period	AQ Model	Pre-merged Emission Source	Modeling Center	Complete
D1	2016 Base Nest Grid ERTAC/BEIS	2016	4OTC2	fi_ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	NY	NY	Yes
D2	2023 Base Nest Grid ERTAC/BEIS	2023	4OTC2	fi_ERTAC_BEIS	Apr-Oct	CMAQ5.3.1	NY	NY	Yes
D3	2016 Base Nest Grid ERTAC/BEIS	2016	4OTC2 (two-way)	fi_ERTAC_BEIS	Apr-Oct	CAMx7.10	NY	NY	Yes
D4	2023 Base Nest Grid ERTAC/BEIS	2023	4OTC2 (two-way)	fi_ERTAC_BEIS	Apr-Oct	CAMx7.10	NY	NY	Yes
E1	Peak Energy Day 2016 Base	2016	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
E2	Peak Energy Day 2018/19 ReBase	2018/19	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
E3	Peak Energy Day 2018/19 Zero Part-75 P Emissions	2018/19	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
E6	Peak Energy Day 2018/19 Dirtiest Units Dispatched First	2018/19	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
E7	Peak Energy Day 2018/19 Cleanest Units Dispatched First	2018/19	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
E8	Peak Energy Day 2018/19 Most-used Units Dispatched First Base	2018/19	12-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NH/DC/NY	NESCAUM	Yes
H1	VOC Sensitivity All VOC NYC Nonattainment	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
H2	VOC Sensitivity All VOC 4km Portion of CT, NJ, NY	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
H3	VOC Sensitivity All VOC Full 4 km Domain	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No

H4	VOC Sensitivity Consumer Products	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
H5	VOC Sensitivity Paints & Solvents	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
H6	VOC Sensitivity Mobile Sources, Fuels, and fueling	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
H7	VOC Sensitivity Others	2018/19	4-OTC2	fi_ERTAC_BEIS	Jul-Aug	CMAQ5.3.1	NY	NJ	No
	Contributions (source apportionment CAMx modeling)								
K1	2023 FY - ERTAC/BEIS	2023	12OTC2	fi_ ERTAC_BEIS	Apr-Sep	CAMx7.10	NY/NJ	UMD	Yes
K2	2023 FY - ERTAC/BEIS Corrected	2023	12OTC2	fj_ ERTAC_BEIS	Apr-Sep	TBD	NY/NJ	UMD	Yes

a. 12OTC1 - Old OTC modeling Domain 12 km, 172 x 172 x 35
12OTC2 - Expanded OTC modeling Domain 12 km, 273 x 246 x 35
4OTC2 – OTC modeling Domain 4 km, 126 x 156 x 35
b. 2016 Emission Modeling Platform with EPA IPM or ERTAC EGU options and BEIS or MEGAN biogenic options
fd – Alpha; fg – Beta; fh - v1; fi – v1 (fh) update

In the case of non-ERTAC point sources (ptnonertac), some of the units were confirmed to be EGUs <25 MW (Small EGUs) through a research project conducted by the Maryland Department of the Environment (MDE) as outlined in Appendix A of the temporalization documentation (Ozone Transport Commission, 2016). The units were expected to be EGUs based on their Source Classification Code (SCC) and North American Industry Classification System (NAICS) codes, and further refinement to the list of EGUs occurred through a multi-state collaborative effort. These units still function as EGUs but produce too small an amount of power and emissions to be required to report hourly emissions to the EPA Clean Air Markets Division (CAMD) and thus are not temporalized through the ERTAC EGU process. MDE has developed a temporalization profile using hourly data from units that burn the same primary fuel and do report to CAMD. The Emission Modeling Framework (EMF) tool was used to create hourly profiles for these units so that they operate during times when electricity demand is highest rather than at a steady rate throughout the year. In order to develop the hourly ff10 files for the Small EGUs to process in SMOKE a multistep process was implemented. First, default temporal profiles were developed using SMOKE (Temporal Cross Reference [TREF] and Temporal Profile [TPRO]) and then imported into EMF. Next, hourly ff10 files were produced in EMF using the imported profiles. MDE in conjunction with University of Maryland researchers completed this work.

5.6 SMOKE Processed Emission Results

In order to quality assure that the outputs from SMOKE were properly distributed geographically and to develop a better understanding of the geographical and temporalization of emissions, we looked at daily emissions on July 12, 2016. NO_X and VOC emissions were examined with and without including biogenic emissions. Urban areas, interstates in rural areas, and shipping lanes are clearly distinguishable in the maps of NO_X emissions (**Figure 5-1**). Total anthropogenic VOC emissions similarly show high emissions in densely populated areas and lower emissions in between **(Figure 5-2**).

Additionally, summary tables of emissions by RPO, sector, and pollutant were output from SMOKE processing. Portions of RPOs which lie outside the domain are not accounted for in this table. These results are aggregated for the 2016V1 inventory in **Table 5-2**.

Figure 5-2. *2016 total NOx emissions (tons/day) for a typical summer weekday.*

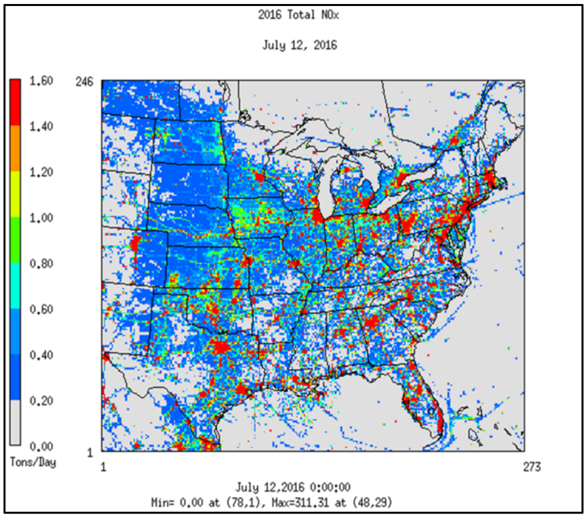

Figure 5-1*. 2016 anthropogenic VOC emissions (tons/day) for a typical summer weekday.*

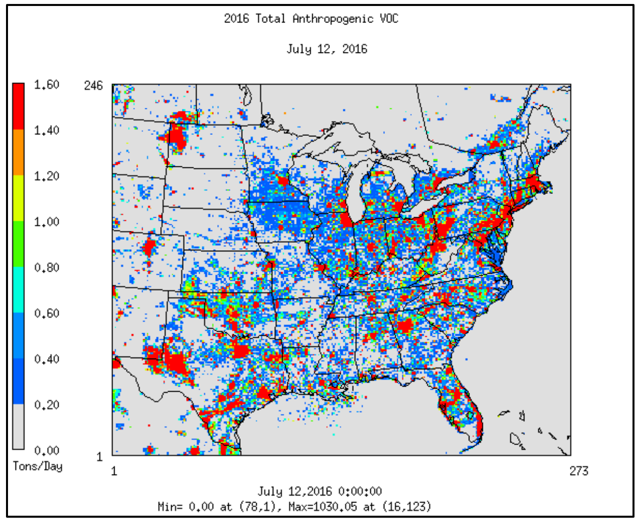

Table 5-2. *2016 V1 base case emissions in tons of each pollutant by RPO and sector from SMOKE processed emission reports (tons/day).*

CO									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			4,001			5,975,688			5,979,689
CENSARA	2,008,649	668,167	1,866,096	520,250	3,813,691	4,341,805	242,650	273,311	13,734,618
LADCO	498,011	1,159,393	2,128,339	55,198	3,697,370	549,425	70,716	511,726	8,670,178
MANE-VU	333,097	964,382	2,216,067	51,199	2,727,861	164,462	81,687	111,452	6,650,207
Mexico						1,200,350			1,200,350
SESARM	1,482,299	1,152,885	2,990,345	110,527	6,046,451	3,048,919	128,717	383,544	15,343,686
US EEZ*			39,229						39,229
WRAP	995,842	126,049	524,350	166,102	960,551	1,735,325	46,828	52,356	4,607,403
CO Total	5,317,898	4,070,876	9,768,427	903,275	17,245,925	17,015,975	570,597	1,332,388	56,225,361

*EEZ Exclusive Economic Zone, largely coastal waterways

NH_3									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			12			388,852			388,864
CENSARA		11,325	530	74	17,884	1,420,784	8,435	23,271	1,482,303
LADCO		24,675	434	74	16,622	546,157	5,489	7,169	600,620
MANE-VU		14,042	312	44	15,029	123,681	4,148	4,105	161,360
Mexico						87,041			87,041
SESARM		10,854	454	2	27,534	571,878	9,035	17,821	637,579
US EEZ									
WRAP		3,151	163	4,046	4,111	415,469	1,254	1,121	429,316
NH_3 Total		64,048	1,906	4,240	81,181	3,553,862	28,362	53,487	3,787,084

NO_X									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**

Canada			36,145			760,556			796,701
CENSARA	363,505	109,019	557,062	490,554	761,921	85,310	327,189	268,183	2,962,744
LADCO	137,121	187,281	366,419	70,100	588,930	6,378	239,631	222,125	1,817,984
MANE-VU	29,470	203,037	267,946	47,647	460,932	2,349	135,599	88,200	1,235,180
Mexico						614,540			614,540
SESARM	126,299	124,391	417,099	120,487	1,020,780	66,352	339,686	246,232	2,461,325
US EEZ			355,591	48,691					404,283
WRAP	207,255	24,661	164,942	154,095	217,036	23,172	159,202	53,293	1,003,657
NO_X Total	863,650	648,388	2,165,204	931,574	3,049,600	1,558,657	1,201,308	878,033	11,296,413

$PM_{2.5}$ Primary									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			635			888,305			888,941
CENSARA		106,476	31,409	13,119	23,288	1,137,586	27,570	57,993	1,397,440
LADCO		194,150	25,827	1,435	19,626	591,570	21,301	59,910	913,820
MANE-VU		154,432	18,718	1,314	16,967	160,610	12,716	21,831	386,588
Mexico						75,109			75,109
SESARM		200,522	28,851	2,724	29,465	744,926	41,284	75,011	1,122,783
US EEZ			10,845	667					11,512
WRAP		20,065	10,030	4,388	6,694	477,827	7,734	16,106	542,844
$PM_{2.5}$ Primary Total		675,646	126,315	23,645	96,039	4,075,934	110,605	230,851	5,339,036

SO_2									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			1,486			730,469			731,955
CENSARA		13,658	6,331	25,187	5,404	38,514	582,918	186,925	858,936
LADCO		23,279	3,998	2,120	3,675	3,769	368,592	160,086	565,520
MANE-VU		49,162	5,004	1,144	5,302	1,269	128,406	56,290	246,577
Mexico						345,538			345,538
SESARM		39,637	9,588	8,195	8,977	28,695	284,289	212,397	591,778
US EEZ			59,663	502					60,165
WRAP		4,933	1,288	14,304	966	12,841	119,466	27,814	181,612
SO_2 Total		130,668	87,359	51,453	24,324	1,161,094	1,483,671	643,512	3,582,082

VOC									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			1,922			1,641,721			1,643,644
CENSARA	11,695,659	750,206	197,589	1,547,740	349,737	1,032,394	7,878	201,799	15,783,002
LADCO	2,651,949	767,885	257,146	114,262	337,263	161,852	5,767	159,266	4,455,390
MANE-VU	2,102,166	762,883	217,025	98,201	242,681	47,382	3,225	45,274	3,518,836
Mexico						404,676			404,676
SESARM	12,656,451	991,935	334,056	198,855	532,189	674,806	11,088	262,466	15,661,845
US EEZ			18,860	48,210					67,069
WRAP	4,272,470	165,153	55,163	867,623	100,655	414,084	2,635	40,278	5,918,061
VOC Total	33,378,694	3,438,062	1,081,761	2,874,892	1,562,523	4,376,915	30,593	709,083	47,452,524

5.7 US Future Year Base Case Emissions Inventories

The Collaborative's documentation includes the growth and control assumptions that were used to derive the future year projections. For point source EGUs, the Inventory Collaborative projected emissions using two methods: EPA's IPM and ERTAC-EGU. For future year projections, OTC continued to use the ERTAC-EGU projections for its 2016 modeling platform. EPA's non-EGU Point source inventories had to be adjusted also to account for differences in what units were included in IPM vs ERTAC. For all other sectors, projected emissions were taken directly from the EPA/Inventory Collaborative projections. Documentation for the projections can be found on EPA's website for beta[11] and for V1[12].

5.7.1 Canadian and Mexican Future Base Case Emissions

The methodologies used to project and develop 2023 and 2028 inventories for Canada and Mexico are provided on the Collaborative's 2016 V1 Emissions Modeling Platform wiki page in the individual Specification Sheets for the Canadian and Mexican source sectors.[27-32]

5.7.2 SMOKE Processed Emission Results

Maps of projected emissions in each model grid cell were produced to quality assure that the outputs from SMOKE were properly distributed to the modeling domain and to gain a better understanding of the geographic distribution of the emissions. These maps present emissions for a typical summer weekday, July 12, for 2023 and 2028 projections. **Figure 5-3** shows total projected 2023 NOx emissions, **Figure 5-4** shows total projected 2023 VOC emissions, and **Figure 5-5** shows projected 2023 anthropogenic-only VOC. **Figures 5-6** to **5-8** show projected total NOx, total VOC, and anthropogenic-only VOC for future year 2028. These sector maps are separated because of the large biogenic contribution to total VOC. Significant emissions decreases can be seen when comparing the 2023 and 2028 emissions maps to those for 2016 (**Figures 5-1 and 5-2**).

Additionally, summary tables of future year emissions by RPO, sector, and pollutant were produced from the SMOKE output and from state summaries provided on the EPA's 2016 V1 modeling emission inventory ftp site.[46] Summaries of projected future year emissions for 2023 and 2028 are shown in **Tables 5-3** and **5-4** respectively.

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[46] US EPA 2016 V1 Emission Inventory Data Download. https://gaftp.epa.gov/Air/emismod/2016/v1/

Figure 5-3. *Projected 2023 total NOx emissions (tons/day) for a typical summer weekday.*

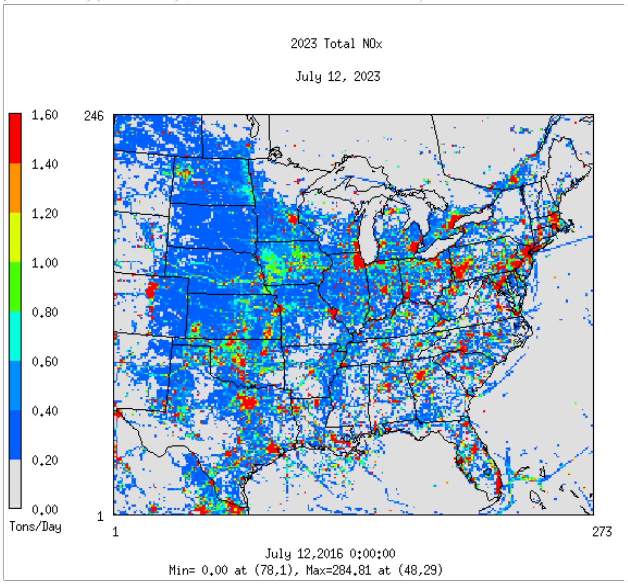

Figure 5-4. *Projected 2023 total VOC emissions (tons/day) for a typical summer weekday.*

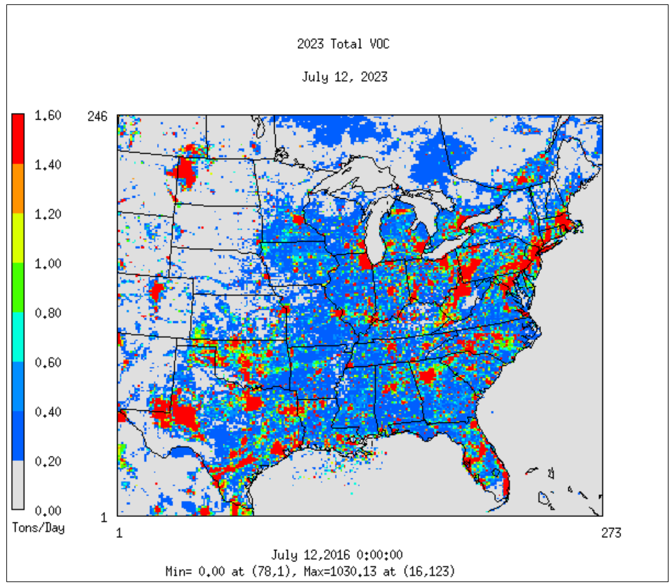

Figure 5-5*. Projected 2023 anthropogenic VOC emissions (tons/day) for a typical summer weekday.*

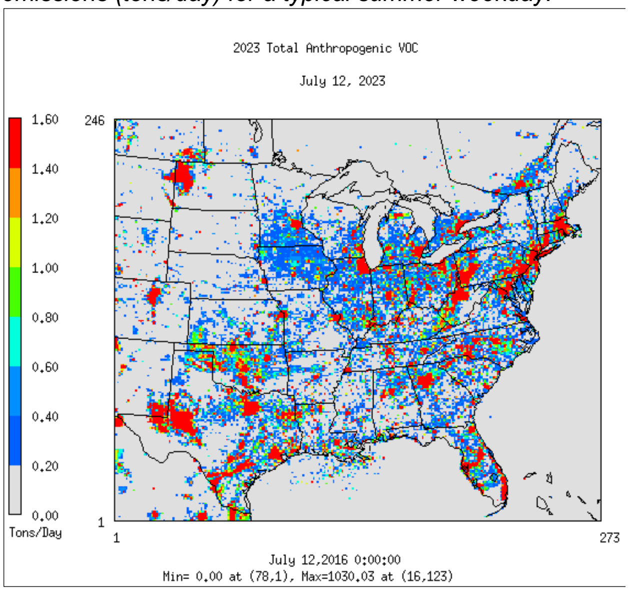

Figure 5-6. *Projected 2028 total NOx emissions (tons/day) for a typical summer weekday.*

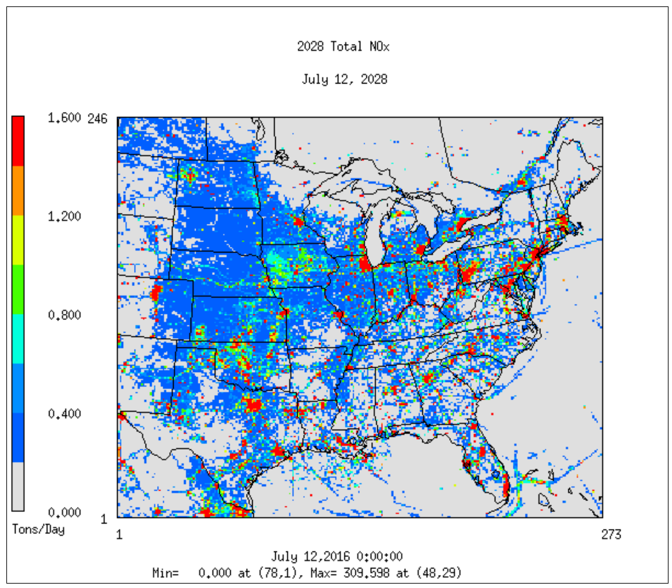

Figure 5-7. *Projected 2028 total VOC emissions (tons/day) for a typical summer weekday.*

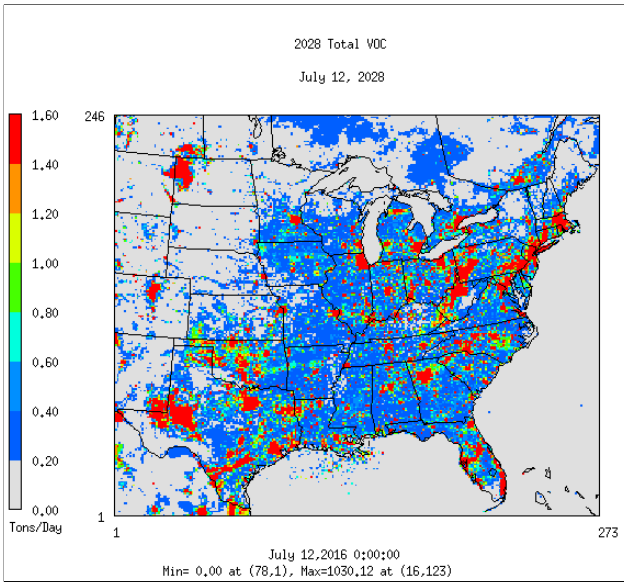

Figure 5-8 *Projected 2028 anthropogenic VOC emissions (tons/day) for a typical summer weekday.*

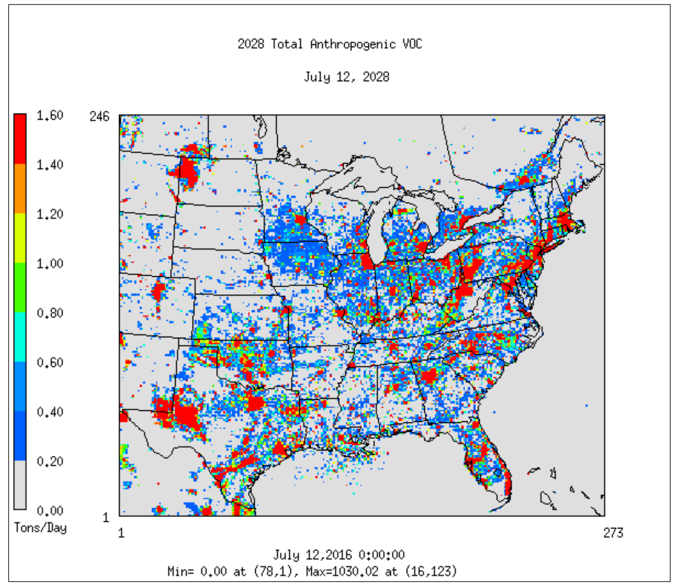

Table 5-3. *Projected 2023 emissions (tons/day) by pollutant and RPO.*

CO									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			4,354			5,856,823			5,860,734
CENSARA	2,008,649	659,559	1,773,076	530,146	2,546,823	4,341,805	240,472	274,839	12,375,368
LADCO	498,011	1,117,684	2,064,892	55,319	2,572,337	549,425	91,448	513,580	7,462,696
MANE-VU	333,097	951,339	2,240,903	54,319	1,902,271	164,462	140,806	112,829	5,900,027
Mexico						1,192,879			1,192,879
SESARM	1,482,299	1,157,828	3,085,208	116,824	4,257,411	3,048,919	159,428	385,842	13,693,758
US EEZ*			47,021						47,021
WRAP	995,842	125,781	538,709	190,965	693,532	1,735,325	29,113	53,128	4,362,395
CO Total	5,317,898	4,012,191	9,754,164	947,572	11,972,374	16,889,195	661,597	1,340,218	50,894,878

NH_3									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			13			462,173			462,186
CENSARA		11,350	556	110	16,404	1,490,566	13,594	23,346	1,556,286
LADCO		24,436	466	83	14,462	576,113	8,533	7,257	631,352
MANE-VU		14,015	348	66	13,471	127,527	9,235	4,131	168,793
Mexico						85,813			85,813
SESARM		11,125	509	3	24,273	591,063	14,262	17,517	658,753
US EEZ*									
WRAP		3,147	172	4,049	3,710	421,384	1,354	1,108	434,923
NH_3 Total		64,072	2,065	4,310	72,321	3,754,639	47,338	53,360	3,998,105

NO_X									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			25,622			598,273			623,894

CENSARA	363,505	107,543	409,135	498,510	364,080	85,310	265,710	265,136	2,358,931
LADCO	137,121	182,534	277,917	74,597	279,240	6,378	174,724	210,708	1,343,219
MANE-VU	29,470	204,614	218,253	52,162	213,216	2,349	103,916	94,767	918,748
Mexico						611,529			611,529
SESARM	126,299	129,743	333,700	129,747	475,013	66,352	244,714	240,289	1,745,856
US EEZ*			315,191	48,691					363,882
WRAP	207,255	24,224	125,410	162,161	117,101	23,172	92,696	54,976	806,994
NO_X Total	863,650	648,658	1,705,229	965,867	1,448,651	1,393,363	881,760	865,876	8,773,053

$PM_{2.5}$									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			693			919,395			920,089
CENSARA		106,702	20,074	15,770	13,326	1,143,189	28,482	58,901	1,386,444
LADCO		188,389	17,545	1,768	11,597	594,750	22,697	60,791	897,536
MANE-VU		151,047	14,023	1,957	10,138	164,893	18,302	22,473	382,833
Mexico						78,642			78,642
SESARM		204,058	21,347	3,410	17,825	753,016	45,506	75,645	1,120,807
US EEZ*			12,873	667					13,539
WRAP		20,106	6,898	4,689	3,891	479,535	7,054	16,160	538,333
$PM_{2.5}$ Total		670,302	93,453	28,260	56,776	4,133,421	122,040	233,970	5,338,223

SO_2									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			1,572			674,491			676,064
CENSARA		14,018	6,905	38,050	2,495	38,514	415,280	175,852	691,114
LADCO		22,604	4,478	2,562	1,957	3,769	239,823	141,940	417,134
MANE-VU		17,902	5,736	1,085	1,782	1,269	86,250	49,294	163,319
Mexico						332,203			332,203
SESARM		38,649	11,101	7,909	3,296	28,695	185,655	177,805	453,110
US EEZ*			73,533	502					74,035
WRAP		4,530	1,430	18,483	553	12,841	77,952	27,610	143,398
SO_2 Total		97,703	104,756	68,591	10,084	1,091,782	1,004,959	572,502	2,950,377

VOC									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			2,081			1,556,676			1,558,757
CENSARA	11,695,659	761,286	151,331	1,755,609	192,340	1,037,976	9,443	201,893	15,805,537
LADCO	2,651,949	769,276	190,836	115,882	197,298	164,249	6,928	159,822	4,256,240
MANE-VU	2,102,166	753,420	171,812	111,907	147,845	47,690	5,506	44,846	3,385,190
Mexico						443,867			443,867
SESARM	12,656,451	1,019,910	262,529	219,712	316,362	676,341	11,184	264,685	15,427,174
US EEZ*			22,500	48,210					70,710
WRAP	4,272,470	167,296	45,806	1,065,150	64,009	414,557	2,305	40,425	6,072,018
VOC Total	33,378,694	3,471,187	846,895	3,316,470	917,854	4,341,355	35,366	711,671	47,019,493

Table 5-4. *Projected 2028 emissions (tons/day) by pollutant and RPO.*

CO									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			4,550			5,803,682			5,808,232
CENSARA	2,008,649	661,524	1,824,676	514,196	1,871,666	4,341,805	245,400	277,561	11,745,477
LADCO	498,011	1,105,065	2,092,269	54,284	1,918,524	549,425	105,368	516,697	6,839,644
MANE-VU	333,097	946,737	2,303,949	53,597	1,438,511	164,462	148,806	113,789	5,502,943
Mexico						1,141,631			1,141,631
SESARM	1,482,299	1,166,039	3,218,636	116,032	3,177,852	3,048,919	184,418	394,613	12,788,807
US EEZ*			53,795						53,795
WRAP	995,842	126,079	562,365	190,065	520,350	1,735,325	25,346	53,745	4,215,089
CO Total	5,317,898	4,005,191	10,060,240	934,144	8,926,902	16,785,249	709,339	1,356,399	48,095,617

NH_3									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			14			519,166			519,180
CENSARA		11,408	576	118	16,315	1,496,903	15,715	23,446	1,564,480
LADCO		24,365	477	85	14,214	584,257	10,699	7,314	641,412
MANE-VU		13,868	362	66	13,275	129,114	9,858	4,173	170,716
Mexico						87,270			87,270
SESARM		11,274	530	3	23,839	597,531	17,109	17,648	667,935
US EEZ*									
WRAP		3,156	176	4,049	3,620	420,141	1,702	1,126	433,968
NH_3 Total		64,071	2,135	4,321	71,263	3,834,382	55,083	53,706	4,084,961

NO_X									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			27,122			534,427			561,549
CENSARA	363,505	108,786	353,833	477,982	257,574	85,310	276,230	264,761	2,187,982
LADCO	137,121	178,963	245,860	72,108	196,686	6,378	168,507	214,619	1,220,241
MANE-VU	29,470	202,471	203,510	50,316	150,344	2,349	104,926	95,670	839,057
Mexico						633,544			633,544
SESARM	126,299	132,510	306,841	126,075	326,819	66,352	250,131	244,132	1,579,158
US EEZ*			295,545	48,691					345,236
WRAP	207,255	24,131	107,910	150,546	83,094	23,172	84,184	56,218	746,509
NO_X Total	863,650	646,861	1,541,621	935,717	1,014,516	1,351,533	883,978	875,400	8,113,276

$PM_{2.5}$									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			725			942,837			943,563
CENSARA		108,799	16,333	16,127	10,282	1,145,811	29,870	59,479	1,386,702
LADCO		187,699	14,433	1,794	9,077	596,072	23,303	60,166	892,543
MANE-VU		150,219	12,580	2,097	7,945	166,000	18,451	22,641	379,932
Mexico						84,550			84,550
SESARM		209,754	18,959	3,528	14,222	756,826	47,346	76,922	1,127,558
US EEZ*			14,655	667					15,322
WRAP		20,311	5,487	4,849	2,940	480,504	7,536	16,234	537,860
$PM_{2.5}$ Total		676,782	83,173	29,061	44,465	4,172,600	126,506	235,442	5,368,029

SO_2									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			1,660			688,263			689,923
CENSARA		14,473	7,727	41,125	2,389	38,514	371,501	175,492	651,221
LADCO		22,583	5,091	2,578	1,817	3,769	235,630	144,207	415,675
MANE-VU		17,598	6,350	1,090	1,628	1,269	88,200	49,641	165,776
Mexico						358,516			358,516
SESARM		38,545	12,131	7,927	3,095	28,695	179,965	177,950	448,308
US EEZ*			85,122	502					85,624
WRAP		4,562	1,607	20,020	540	12,841	71,992	28,302	139,864
SO_2 Total		97,761	119,688	73,241	9,469	1,131,866	947,287	575,593	2,954,906

VOC									
	biogenic	**nonpoint**	**nonroad**	**Oil & gas**	**onroad**	**other**	**ptertac**	**ptnonertac**	**Grand Total**
Canada			2,175			1,587,480			1,589,655
CENSARA	11,695,659	767,048	143,083	1,796,224	142,905	1,038,483	10,468	201,242	15,795,113
LADCO	2,651,949	770,816	177,195	116,417	151,072	164,900	7,639	159,547	4,199,536
MANE-VU	2,102,166	753,565	164,533	117,354	115,128	47,817	5,673	44,966	3,351,201
Mexico						476,275			476,275
SESARM	12,656,451	1,038,672	250,282	218,448	237,967	676,859	11,986	268,433	15,359,099
US EEZ*			25,745	48,210					74,954
WRAP	4,272,470	168,358	44,644	1,143,945	49,036	414,458	2,453	40,495	6,135,858
VOC Total	33,378,694	3,498,459	807,658	3,440,598	696,108	4,406,271	38,219	714,684	46,980,692

6 Model Performance and Assessment of 8-Hour Ozone

6.1 Air quality model evaluation

One of the requirements for demonstrating attainment of the 8-hour NAAQS is the evaluation of the air quality modeling system used to predict future air quality (US EPA, 2018a). To assess attainment of the 2015 O_3 NAAQS, the CMAQ and CAMx photochemical models were first used to simulate air quality with emissions and WRF meteorological fields corresponding to the 2016 base year. Simulated pollutant concentrations were then compared with available measurements to ensure the credibility and overall utility of the modeling system. The comparisons and results presented in this section should serve as an illustration of the performance of the base year simulations with both CMAQ and CAMx. Additional information on model assessment is available and can be requested from the NYSDEC.

6.1.1 Air Quality Simulations

This section focuses on the results for the base year 2016 simulations using the V1 emissions inventory and both CMAQ and CAMx. Consistent WRF meteorological fields were applied for these base year simulations.

6.1.2 Air Quality Measurements

Hourly pollutant concentrations are reported at State and Local Air Monitoring Stations (SLAMS) and National Core (NCore) stations across the US on a routine basis. For overall ozone model performance, hourly data was obtained for 977 stations across the 12OTC2 domain – 200 in the OTR and 777 outside the OTR. Diurnal patterns of nitrogen dioxide (NO_2) and ozone at sites we examined at locations where both pollutants are measured (191 sites across the 12OTC2 domain; 23 of these are within the OTR). These data are available from the US EPA Air Quality System (AQS).[47] In addition, related reactive nitrogen data at two of these sites – one rural and one urban, both in NY – were used to evaluate modeled ozone production efficiency.

Daily NO_2 and HCHO column amounts were obtained from the Ozone Monitoring Instrument (OMI)[48] aboard the Aura satellite. The OMI instrument yields pollutant fields at an approximate horizontal resolution of 0.1°×0.1°. Both NO_2 and formaldehyde (HCHO) are O_3 precursors, and the ratio HCHO/NO_2 has been used to infer regional patterns of VOC-limited versus NOx-limited O_3 production regimes (e.g., Jin et al., 2017). A qualitative comparison with CMAQ and CAMx predictions is presented here.

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[47] US EPA Air Quality System. https://www.epa.gov/aqs
[48] NASA Ozone Monitoring Instrument. https://aura.gsfc.nasa.gov/omi.html

6.2 Daily maximum 8-hour O_3 concentrations

6.2.1 Time Series of Daily Maximum 8-hour O_3

Observed and predicted MDA8 O_3 concentrations were computed at each site across the 12OTC2 domain. Five sites in the OTR region were selected to illustrate the variation of MDA8 O_3 over the entire season. These sites are among those in the OTR that have base year 2014-2018 average design values exceeding 75 ppb. Three of these sites – Westport, CT, Stratford, CT, and Susan Wagner HS, NY – are in the New York-Northern New Jersey-Long Island, NY-NJ-CT non-attainment area, while Bucks County, PA and Camden, NJ are in the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE non-attainment area. Regional background sites are included for Chester, NJ, Piney Run, MD, and State College, PA.

Figures 6-1 through **6-8** show the time series of MDA8 O_3 concentrations at these eight sites from April through October 2016. The observations are shown in black, CMAQ predictions are shown in red, and CAMx predictions are shown in blue. Both models were broadly consistent with each other, generally capturing the day-to-day observed variation in ozone reasonably well, although both models tended to underpredict ozone in the early part of the season and overpredict ozone later in the season. This was typical of many sites across the modeling domain.

Figure 6-1. *Observed and predicted MDA8 O3 concentrations at Westport, CT, April-October 2016 (090019003).*

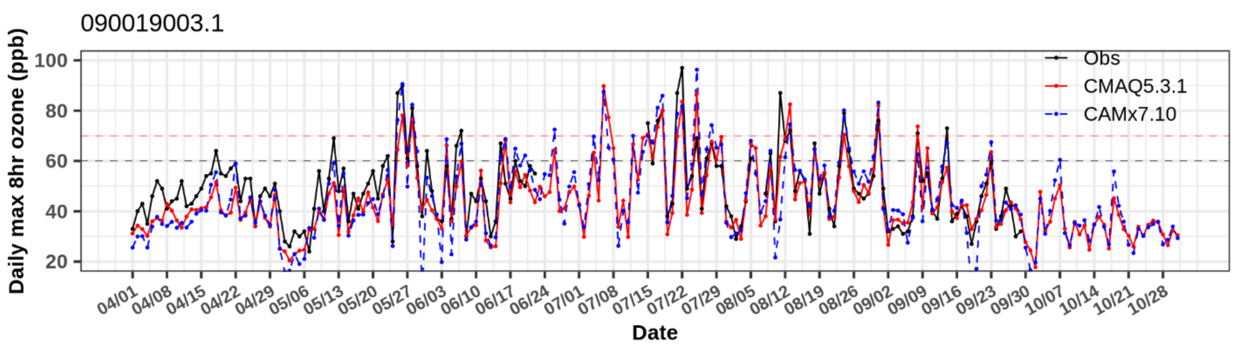


Figure 6-2. *Observed and predicted MDA8 O3 concentrations at Stratford, CT, April-October 2016 (090013007).*

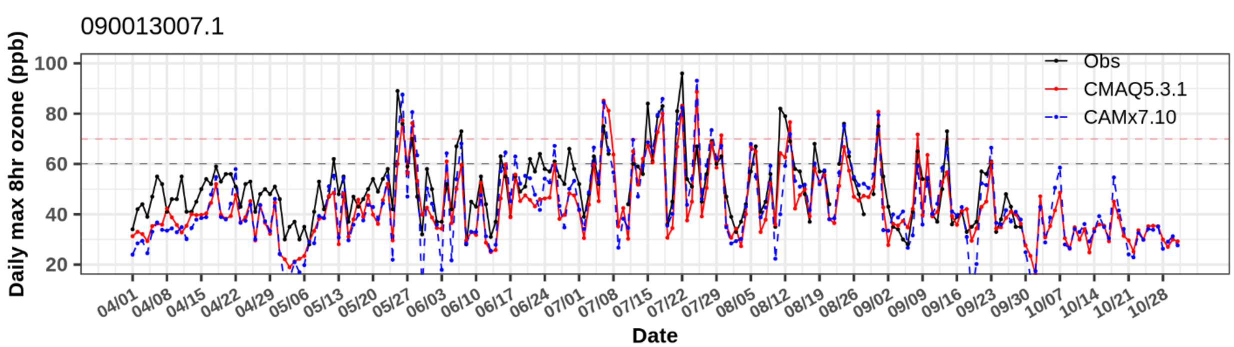


Figure 6-3. *Observed and predicted MDA8 O3 concentrations at Susan Wagner HS, NY, April-October 2016 (360850067).*

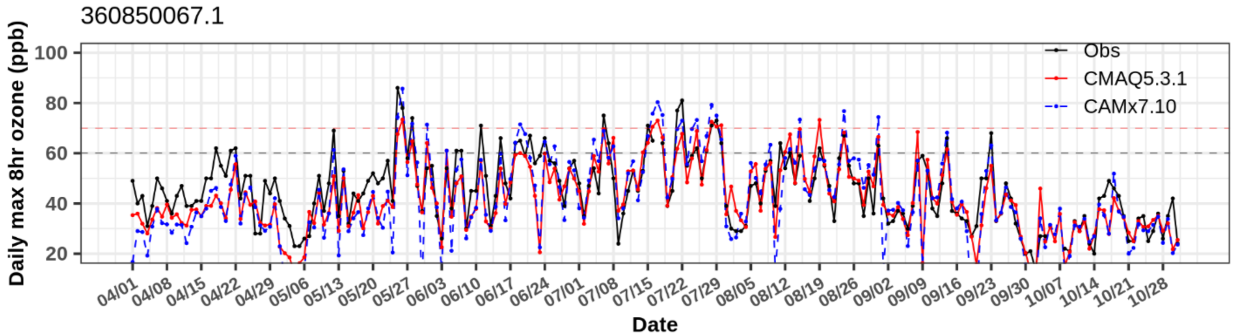


Figure 6-4. *Observed and predicted MDA8 O3 concentrations at Bucks County, PA, April-October 2016 (420170012).*

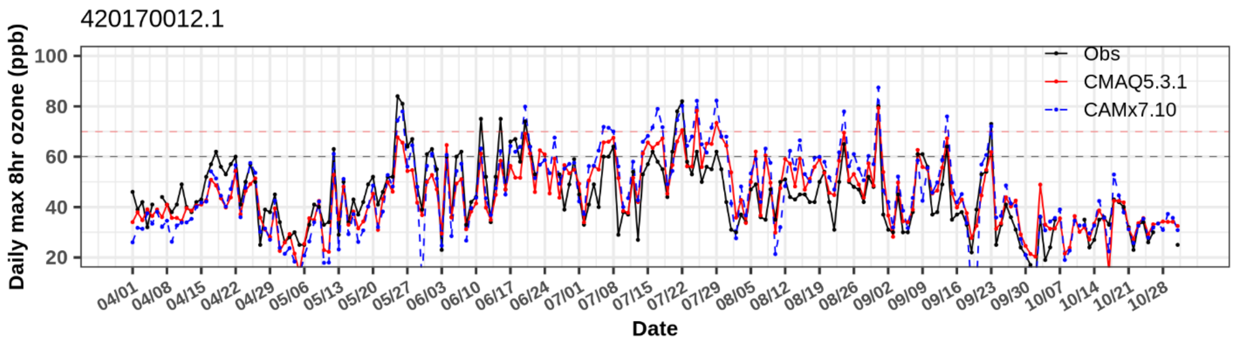


Figure 6-5. *Observed and predicted MDA8 O3 concentrations at Camden, NJ, April-October 2016 (340070002).*

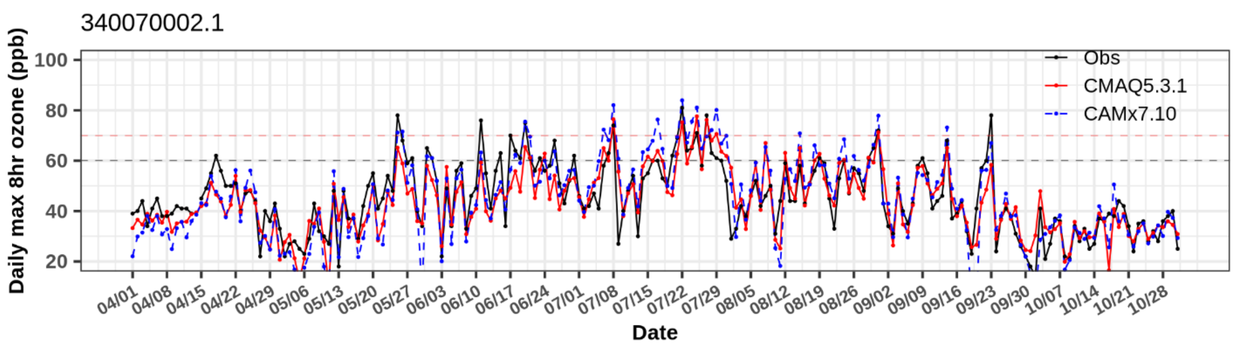


Figure 6-6. *Observed and predicted MDA8 O3 concentrations at Chester, NJ, April-October 2016 (340273001).*

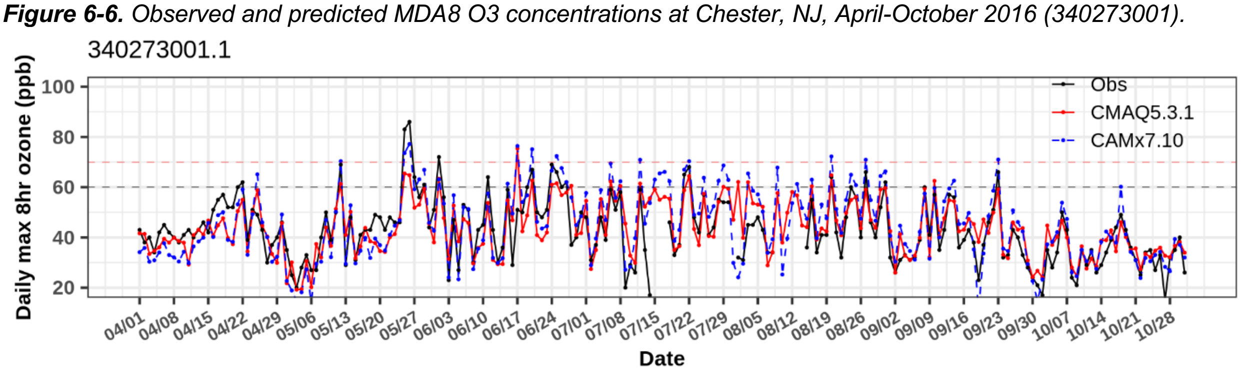


Figure 6-7. *Observed and predicted MDA8 O3 concentrations at Piney Run, MD, April-October 2016 (240230002).*

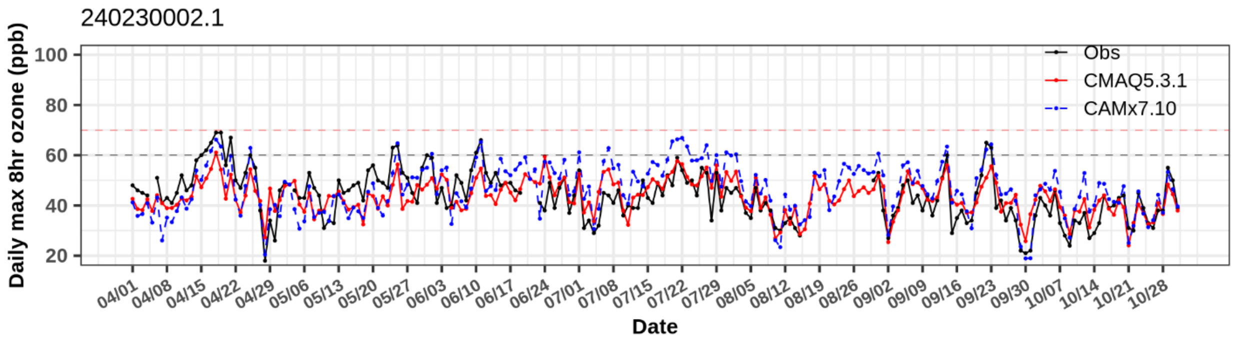
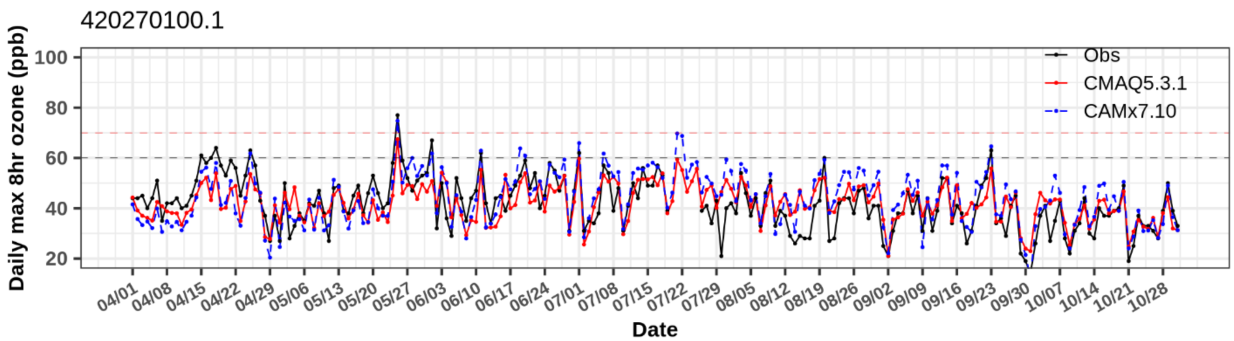


Figure 6-8*. Observed and predicted MDA8 O3 concentrations at State College, PA, April-October 2016 (420270100).*



6.2.2 Comparison of observed and predicted daily maximum 8-hour O_3

Figure 6-9 displays the fourth highest observed and CMAQ-predicted MDA8 O_3 concentrations at OTR (blue) and non-OTR (red) sites across the 12OTC2 domain over the entire simulation, while **Figure 6-10** displays the fourth highest observed and CAMx-predicted MDA8 O_3 concentrations at OTR and non-OTR sites. Least-squares regression equations are displayed, as are the 1:1 (black dashed) line and the 70 ppb NAAQS (red dashed) line. Both models tended to perform better at the OTR sites, as indicated by regression slopes near unity and higher R^2 values. Overall, CMAQ tended to underpredict the fourth highest daily maximum ozone concentrations at a large majority of sites, especially for observed values below 70 ppb. However, there were a few sites where CMAQ exceeded observed values by >10 ppb; six of the highest seven predicted values occurred at sites defined as water cells in the modeling system (1 site in RI and 2 each in CT, OH, and FL), highlighting the difficulty in simulating ozone along coastal regions. This is likely related to model grid resolution, and this issue is explored further in **Section 7**. The results for CAMx were qualitatively similar, although the CAMx overpredictions were more numerous but not quite as extreme at those from CMAQ.

Figure 6-9. *Comparison of 4th highest MDA8 O3 at OTR and non-OTR sites, observed vs CMAQ.*

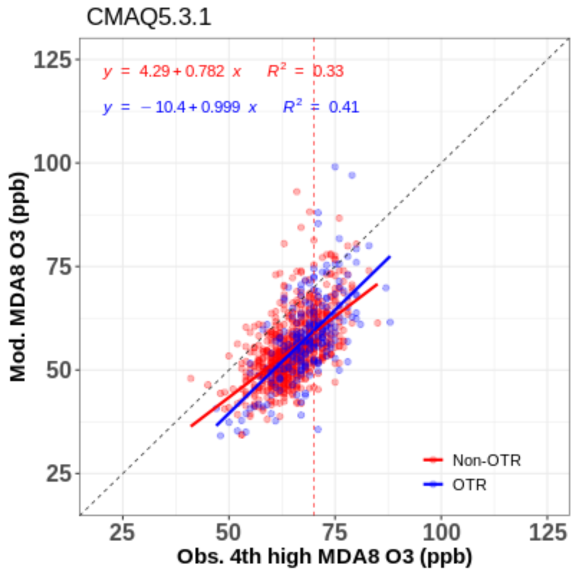
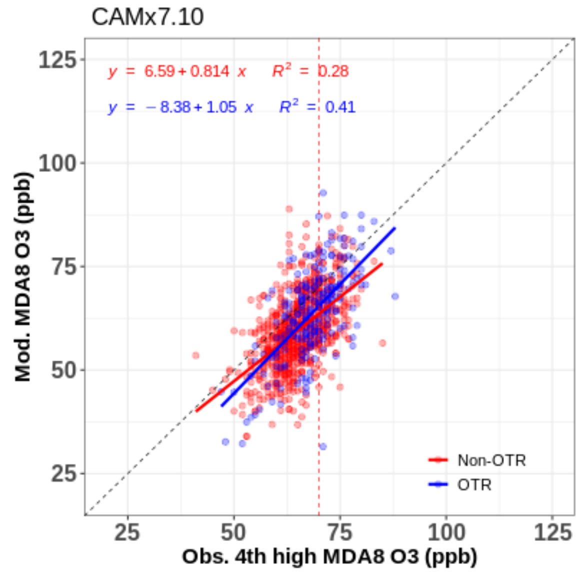


Figure 6-10*. Comparison of 4th highest MDA8 O3 at OTR and non-OTR sites, observed vs CAMx.*



6.2.3 Distributions of Daily Maximum 8-hour O_3

Distributions of MDA8 O_3 concentrations were analyzed for different non-attainment areas across the 12OTC2 domain. **Figures 6-11** through **6-15** illustrate the monthly distributions for the five non-attainment areas in the OTR. In these figures the boxes denote the 25th percentiles, medians, and 75th percentiles; the whiskers denote ±1.5× the interquartile ranges (IQR); and the circles are outliers beyond 1.5×IQR. Observed values are shown in green, CMAQ predictions are shown in orange, and CAMx predictions are shown in blue.

As mentioned earlier both models broadly reproduced the seasonal variation in ozone but tended to underpredict MDA8 O_3 early in the modeling season, especially in April. By July and August, the tendency was for the models to overpredict daily maximum ozone on average. During the peak of the ozone season, CAMx tended to predict higher MDA8 concentrations than CMAQ.

Figure 6-11. *Monthly distributions of MDA8 O3, Greater Connecticut.*

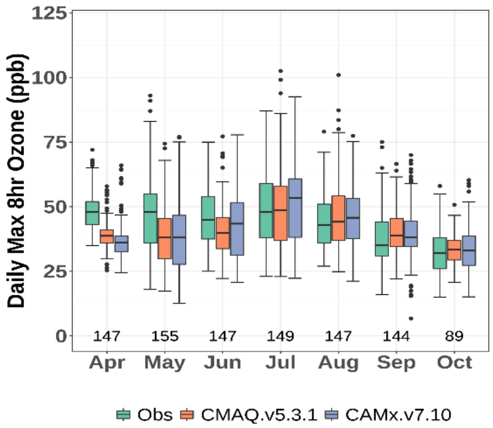


Figure 6-12. *Monthly distributions of MDA8 O3, New York-Northern New Jersey-Long Island, NY-NJ-CT.*

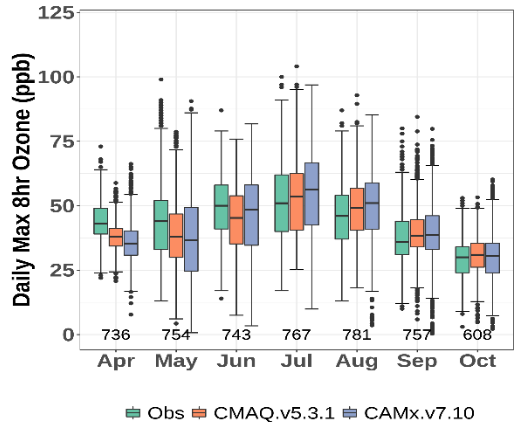


Figure 6-13*. Monthly distributions of MDA8 O3, Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE.*

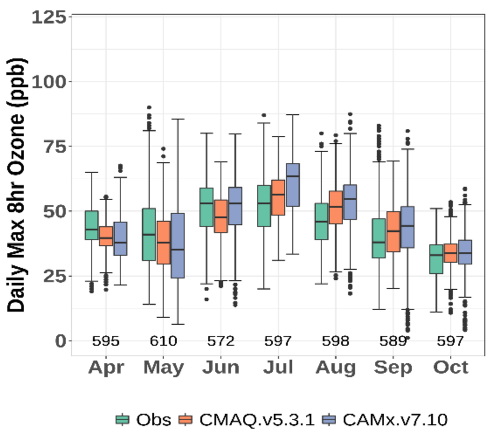


Figure 6-14. *Monthly distributions of MDA8 O3, Baltimore, MD.*

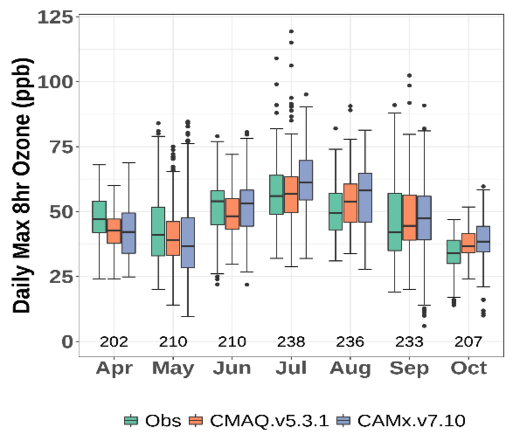
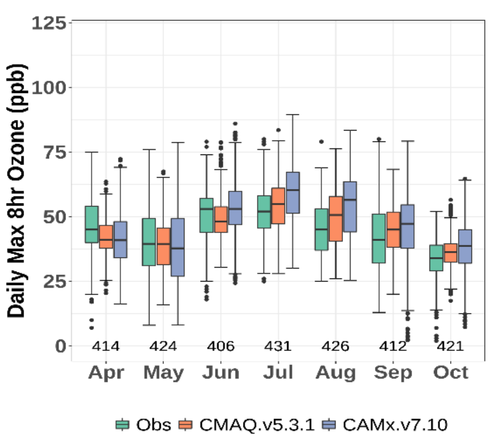


Figure 6-15. *Monthly distributions of MDA8 O3, Washington, DC-MD-VA.*



6.2.4 Statistical Evaluation of Daily Maximum 8-hour O_3

At each site in across the 12OTC2 domain, we computed model evaluation statistics over the entire April-October 2016 period; **Appendix B** lists all the statistical formulae. Here we illustrate overall model performance with two metrics – normalized mean bias (NMB) and normalized mean error (NME), which are commonly used in operational assessments of ozone, fine particulate matter and regional haze model applications (e.g., Emery et al., 2017; Simon et al., 2012).

Emery et al. (2017) recommended NMB and NME benchmarks for ozone and speciated particulate matter based on the concepts of "goals" and "criteria." Goals are statistical thresholds that a third of past model applications have met and are reflective of the best performance that grid models can be expected to achieve. Criteria are statistical thresholds that two-thirds of past model applications have met and are reflective of performance that most grid models should be able to achieve. In the case of MDA8 O_3, with no lower cutoff threshold concentration, Emery et al. (2017) suggested the following: NMB goal <±5%, NMB criteria <±15%; NME goal <15%, and NME criteria <25%.

Table 6-1 lists the numbers and percentages of monitors across the 12OTC2 domain that meet these recommended benchmarks for both CMAQ and CAMx over the entire ozone season, while **Table 6-2** lists the corresponding values for the monitors in the OTR specifically. Overall, CMAQ performed slightly better in terms of achieving the stricter NMB and NME goals, but both models met the corresponding NMB and NME criteria at a vast majority of sites in each respective region.

Table 6-1. *Numbers (and percentages) of monitoring sites that met NMB and NME goals and criteria across the 12OTC2 domain (N=977).*

	CMAQ	**CAMx**
NMB goal <±5%	586 (60%)	479 (49%)
NMB criteria <±15%	948 (97%)	917 (94%)
NME goal <15%	647 (66%)	543 (56%)
NME criteria <25%	965 (99%)	958 (98%)

Table 6-2. *Numbers (and percentages) of monitoring sites that met NMB and NME goals and criteria across the OTR (N=200).*

	CMAQ	**CAMx**
NMB goal <±5%	115 (58%)	115 (58%)
NMB criteria <±15%	196 (98%)	193 (97%)
NME goal <15%	114 (57%)	82 (41%)
NME criteria <25%	198 (99%)	196 (98%)

To focus on high ozone days, **Figures 6-16** and **6-17** display the seasonal NMB across the 12OTC2 domain with CMAQ and CAMx on days with observed daily maximum 8-hour O_3 ≥ 60 ppb, while **Figures 6-18** and **6-19** display the corresponding seasonal NME across the 12OTC2 domain with CMAQ and CAMx. Throughout much of the southeastern portion of the modeling domain, CAMx predictions on average were higher than CMAQ; as a result, on the highest ozone days, CMAQ tended to underpredict observed O_3.

***Figure 6-16**. NMB of MDA8 O_3, April-October 2016, with CMAQ.*

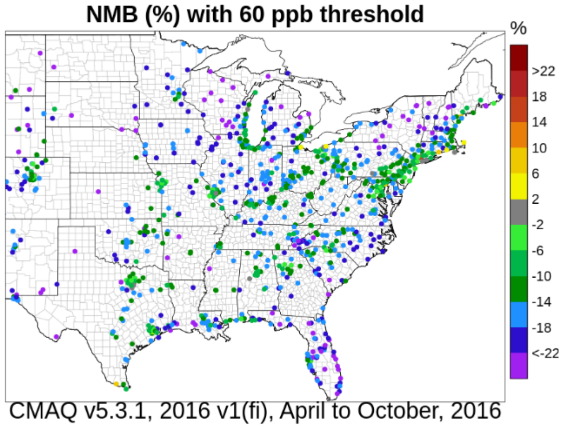


***Figure 6-17.** NMB of MDA8 O_3, April-October 2016, with CAMx.*

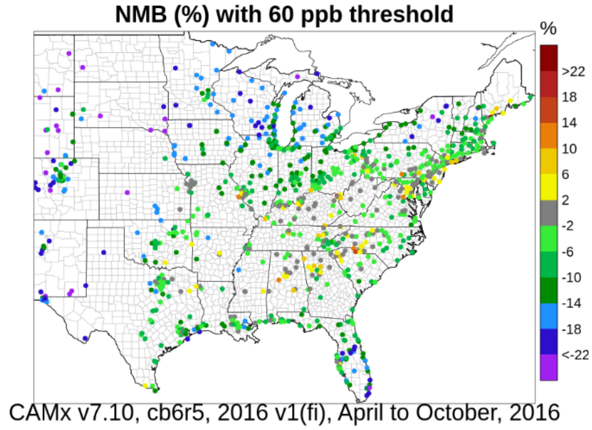


***Figure 6-18**. NME of MDA8 O_3, April-October 2016, with CMAQ.*

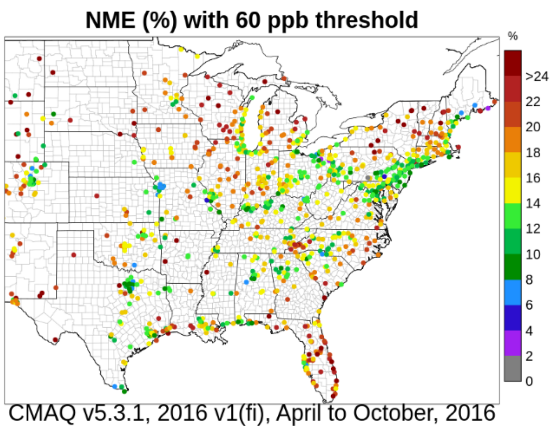
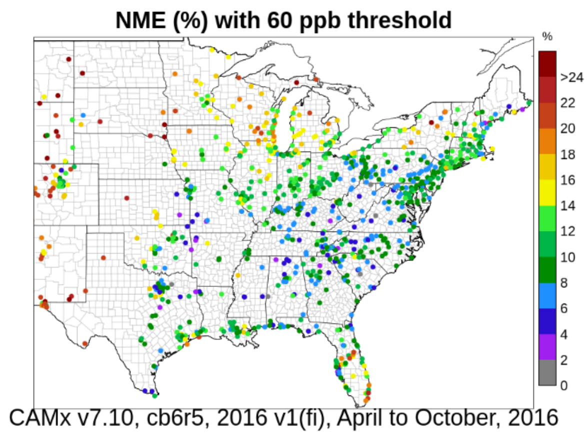


Figure 6-19. NME of MDA8 O_3, April-October 2016, with CAMx.



Model performance varied over the course of the ozone season. **Figures 6-20** and **6-21** display the May-June average NMB for CMAQ and CAMx, respectively, while **Figures 6-22** and **6-23** display the July-August NMB for the two models, using all days. Early in the season (e.g., May and June), both models tended to underpredict ozone in the northern and western portions of the domain. CMAQ tended to underpredict ozone throughout most of the domain, with only a few exceptions in the Southeast, whereas CAMx overpredictions were more widespread throughout the Southeast. Later in the ozone season, both models tended to exhibit higher overpredictions over much of the modeling domain, again with CAMx overpredictions comparable to or higher than CMAQ.

Figure 6-20. *NMB of MDA8 O_3, May-June 2016, with CMAQ.*

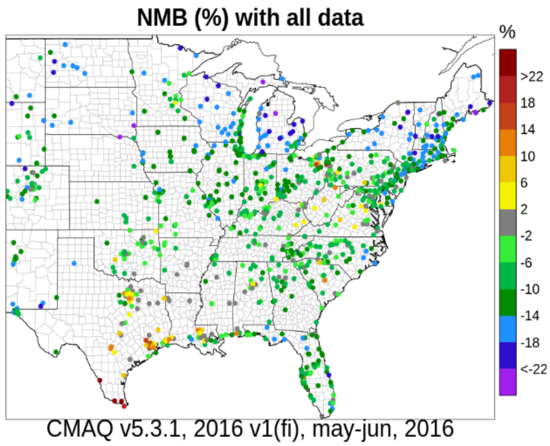


Figure 6-21*. NMB of MDA8 O_3, May-June 2016, with CAMx.*

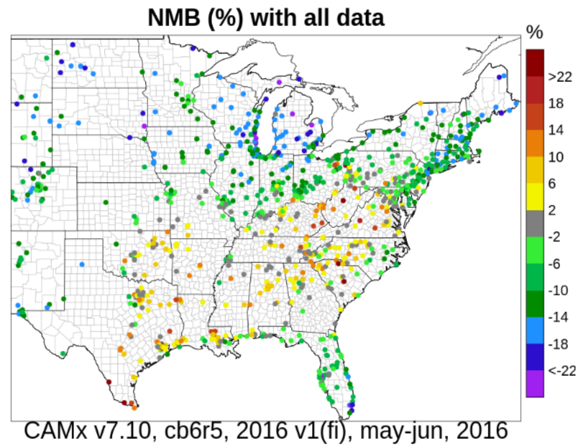


Figure 6-22. *NMB of MDA8 O_3, July-August 2016, with CMAQ.*

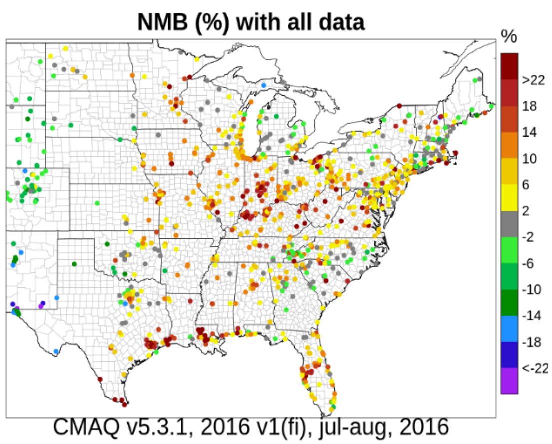
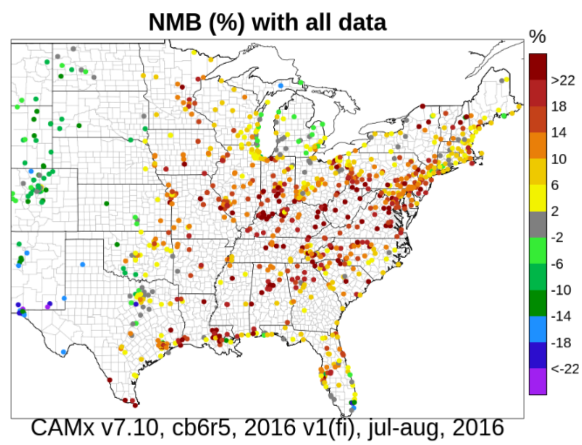


Figure 6-23. *NMB of MDA8 O_3, July-August 2016, with CAMx.*



6.2.5 Diurnal Variations of O_3 and NO_2 at Collocated Monitoring Sites

In order to assess model performance over the course of a day, average diurnal patterns were examined. The results from 191 sites across the 12OTC2 domain were reviewed with collocated O_3 and NO_2 monitors. Observed values are shown in black, CMAQ in blue, and CAMx in red. For this model assessment, we classified sites as "urban" and "rural," based on the gridded 2011 National Land Cover Database categories in the WRF model; sites as those having low, medium, or high density developed land cover were defined as urban (N=76), while all others were classified as rural (N=115).

Figures 6-24 and **6-25**, respectively, display the diurnal average ozone and NO_2 patterns at rural sites across the 12OTC2 domain in May 2016, while **Figures 6-26** and **6-27** display the diurnal patterns at urban sites. Early in the ozone season, both CMAQ and CAMx on average tend to slightly underpredict peak afternoon ozone concentrations at rural and urban sites. Both models tend to predict consistent peak afternoon ozone concentrations, while CAMx tended to predict higher nighttime and early morning ozone concentrations than CMAQ. On average, CMAQ was better able to reproduce the diurnal amplitude in ozone in May. Both models qualitatively were able to reproduce the observed diurnal patterns in NO_2, with maxima in the shallow nocturnal boundary layer and minima during enhanced photochemistry during the afternoon hours. Both models on average overpredict NO_2 during the early morning and nighttime observed peaks, especially CAMx at urban sites.

Figure 6-24. *Observed and predicted O_3 at rural sites, May 2016.*

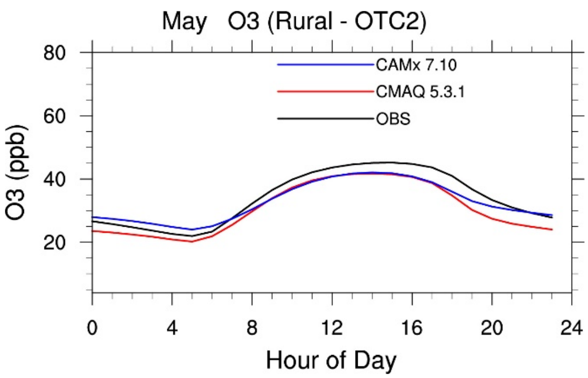


Figure 6-25. *Observed and predicted NO_2 at rural sites, May 2016.*

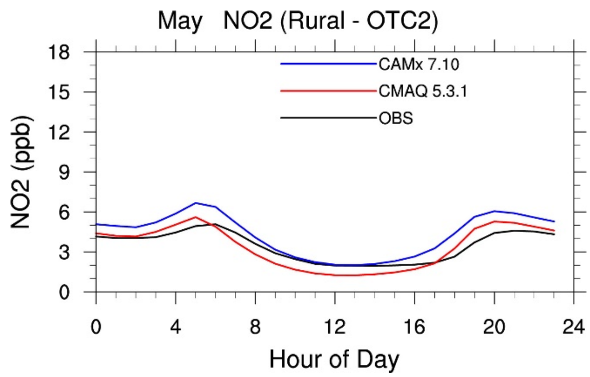


Figure 6-26. *Observed and predicted O_3 at urban sites, May 2016.*

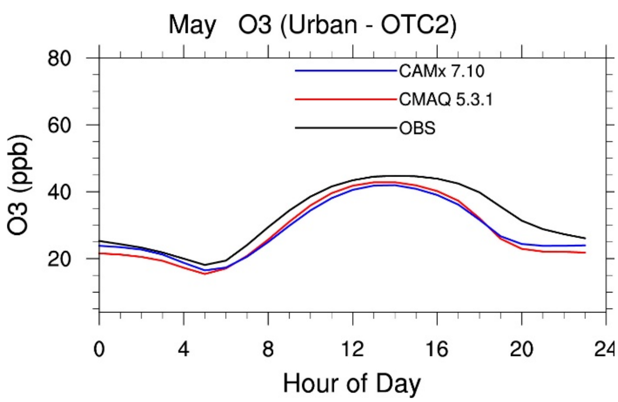
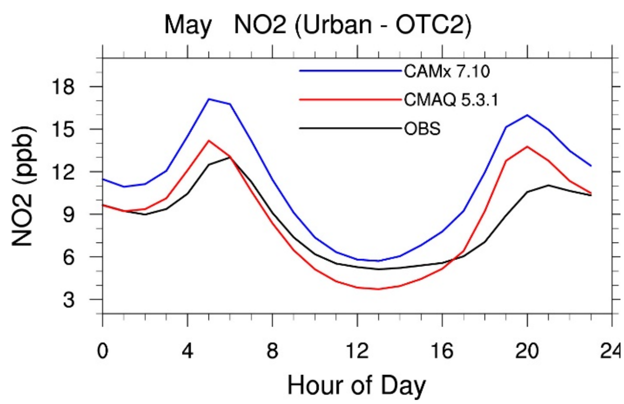


Figure 6-27*. Observed and predicted NO_2 at urban sites, May 2016.*



To illustrate model performance later in the season, the corresponding August average diurnal patterns of ozone and NO_2 at rural and urban monitors are displayed in **Figures 6-28** to **6-31**. Unlike earlier in the season, both models tend to slightly overpredict afternoon ozone concentrations, especially at the urban sites. At both urban and rural sites, CAMx tended to predict higher ozone than CMAQ in the early morning and nighttime hours, whereas CMAQ on average predicted slightly higher afternoon ozone than CAMx at urban sites. Similar to May, both models tended to predict a larger daily amplitude in NO_2 than was observed; however, in August the early morning and nighttime peak overpredictions were considerably larger than in May, with modeled NO_2 concentrations approximately double the observed values.

Figure 6-28. *Observed and predicted O_3 at rural sites, August 2016.*

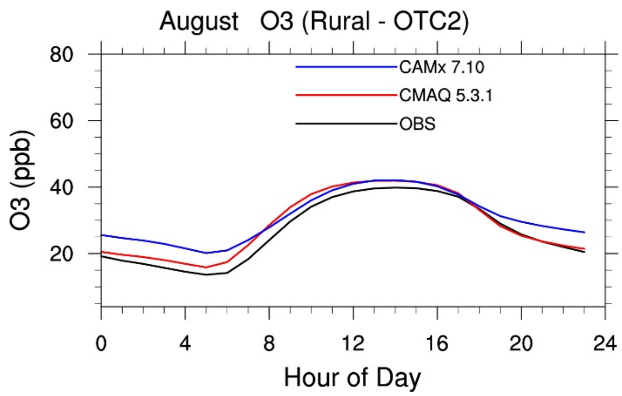


Figure 6-29. *Observed and predicted NO_2 at rural sites, August 2016.*

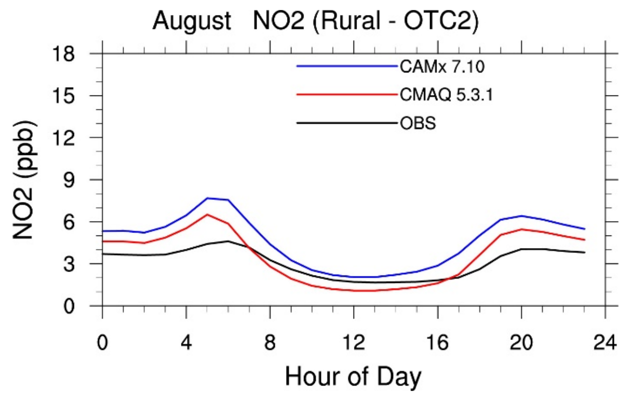


Figure 6-30*. Observed and predicted O_3 at urban sites, August 2016.*

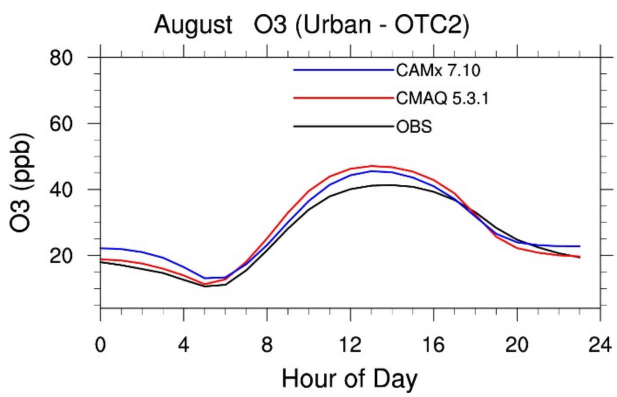
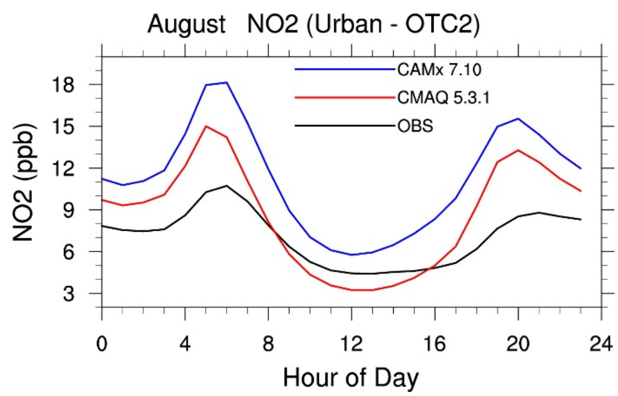


Figure 6-31. *Observed and predicted NO_2 at urban sites, August 2016.*



6.3 Dynamic Model Evaluation

6.3.1 Comparison of Column NO_2 and HCHO with OMI Data

It is well-known that tropospheric ozone formation is the result of the relative abundance of NO_X and VOCs. Ozone formation in relatively low-NOx environments is generally determined by the availability of NO_X ("NO_X -limited"). In contrast ozone formation in urban areas, with large sources of NO_X, may be "VOC-limited" or in a transitional regime. Recent work (e.g., Jin et al., 2017) has demonstrated the utility of satellite-based retrievals of column NO_2 (proxy for total NO_X), column formaldehyde (HCHO, proxy for total VOCs), and the HCHO/NO_2 ratio to examine spatial patterns in ground-level ozone formation chemistry. Comparing similar values from CMAQ and CAMx is an example of dynamic model evaluation, used to *qualitatively* assess the models' ability to predict ozone chemistry regimes across the OTR and beyond.

Retrievals of NO_2 and HCHO were obtained from the OMI aboard NASA's Aura satellite. For NO_2, both daily and monthly averages column amounts were obtained (Lamsal et al., 2021), while for HCHO, daily data were available (Gonzalez Abad and Sun, 2019). The OMI overpass time is approximately 13:30 local time, and the horizontal resolution is about 0.1°×0.1°. Daily OMI data, in particular HCHO, can be very noisy and available data is limited by the presence of clouds, so for this analysis we computed monthly averages to smooth the day-to-day variability. To compare with the OMI data retrievals, we used the **Vertintegral** program[49] to compute corresponding vertical-column integrals over the 35 layers in both CMAQ and CAMx, which were also aggregated to monthly averages.

Figures 6-32 to **6-34** display the July 2016 average NO_2 column concentrations from OMI, CMAQ, and CAMx, respectively. This analysis focused on the northeastern portion of the model domain. For this month, both CMAQ and CAMx tended to underpredict NO_2 in rural regions of the domain but predicted higher NO_2 in the core urban areas – generally consistent with the findings in the previous section. On average, CAMx tended to better reproduce the general spatial patterns observed from OMI, although the CAMx overpredictions were higher than CMAQ in urban areas.

Figures 6-35 to **6-37** display the July 2016 average HCHO column concentrations from OMI, CMAQ, and CAMx, respectively. While both models tended to predict higher HCHO concentrations in the northern portions of the domain, both models were able to qualitatively reproduce the pattern of higher concentrations in the Southeast and lower concentrations at northern latitudes. In general, CMAQ predicted lower HCHO concentrations than CAMx, particularly through the Southeast.

Figures 6-38 to **6-40** display the July 2016 HCHO/NO_2 ratios from OMI, CMAQ, and CAMx, respectively, focusing on the urban corridor. Higher ratios are more reflective of NO_X-limited conditions, intermediate values (~3-4; e.g., Jin et al., 2017) denote a transitional regime, and lower values are more indicative of VOC-limited conditions. Both models qualitatively reproduce the observed NO_X-limited conditions over rural areas, and both models tended to predict small areas of VOC-limited conditions in the core urban centers. The observed values from OMI suggest larger transitional regions over land than predicted by CMAQ and CAMx, which is likely related to the fact that the models underpredicted NO_2 over most of the non-urban areas.

This analysis reflects the difficulties in comparing observed and modeled column concentrations of these pollutants. Not shown here are the seasonal variations in these concentration fields, which can be substantial for both NO_2 and HCHO. Another caveat is that ozone sensitivity to NO_X and VOCs can vary by day and time at the same location, therefore monthly means may not reflect sensitivities on the highest ozone days that are the focus of ozone attainment strategies. As such, monthly means may favor VOC-sensitive conditions. Comparisons with TropOMI columns on the highest ozone days suggest the VOC-limited area in urban cores shrinks in size. However, it should serve as an illustration of how the model performance evaluation can be expanded beyond an operational assessment based primarily on statistical metrics.

[49] More information at https://www.cmascenter.org

Figure 6-32. *July 2016 column NO_2 from OMI.*

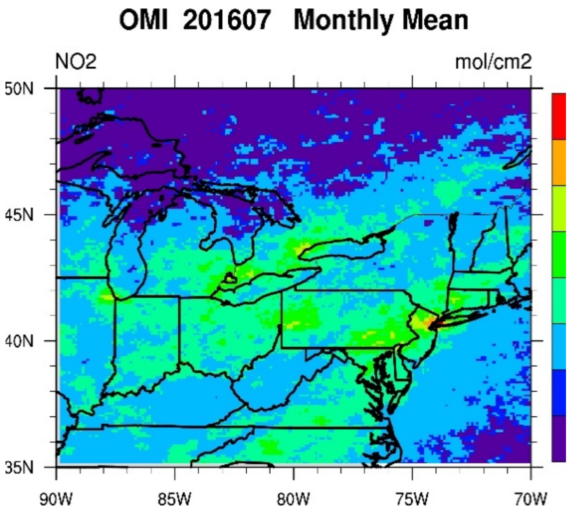


Figure 6-33. *July 2016 column NO_2 from CMAQ.*

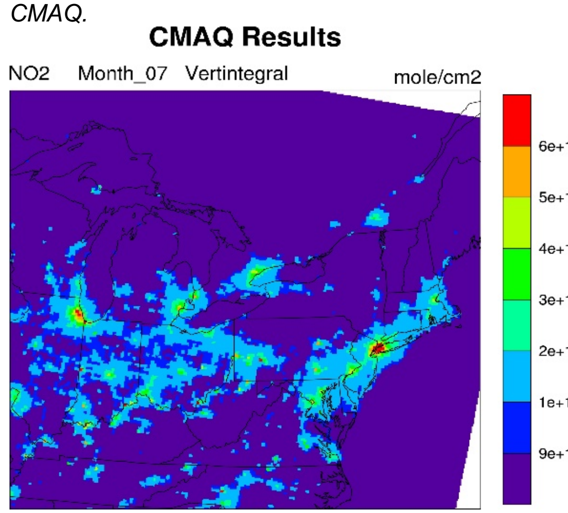


Figure 6-34. *July 2016 column NO_2 from CAMx*

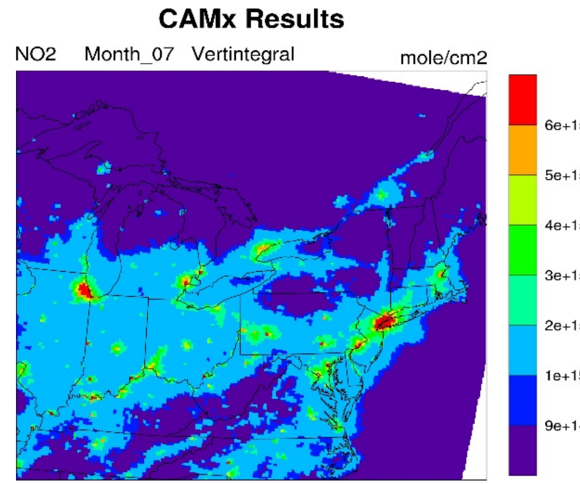


Figure 6-35. *July 2016 column HCHO from OMI.*

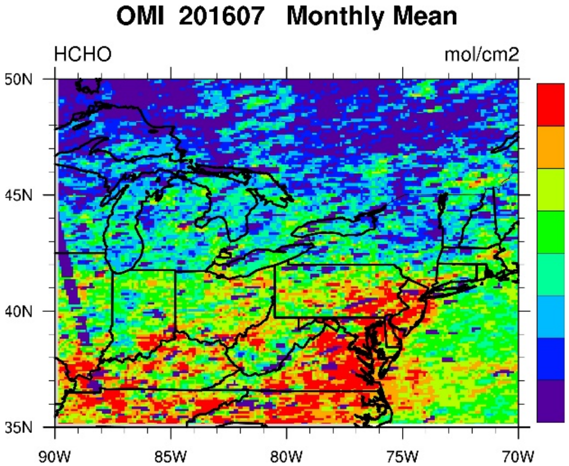


Figure 6-36. *July 2016 column HCHO from CMAQ.*

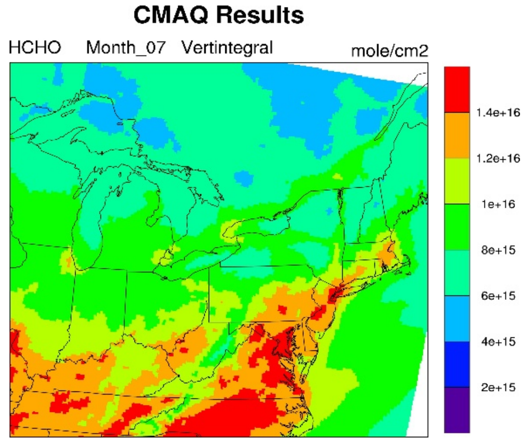


Figure 6-37*. July 2016 column HCHO from CAMx.*

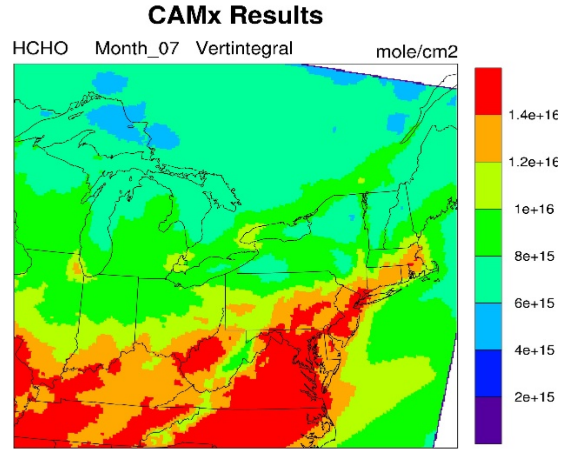


Figure 6-38. July 2016 HCHO/NO_2 ratio from OMI.

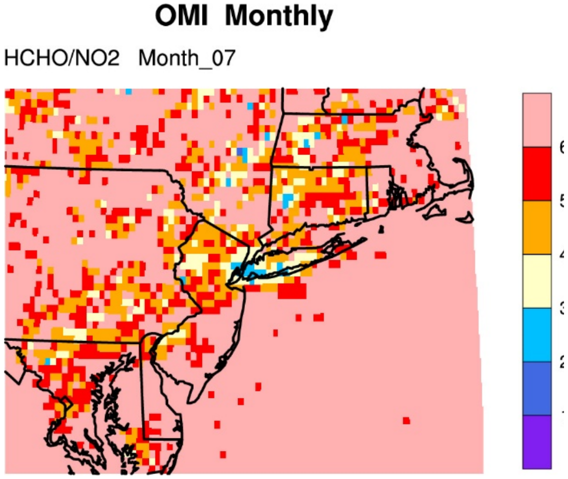


***Figure 6-39.** July 2016 HCHO/NO_2 ratio from CMAQ.*

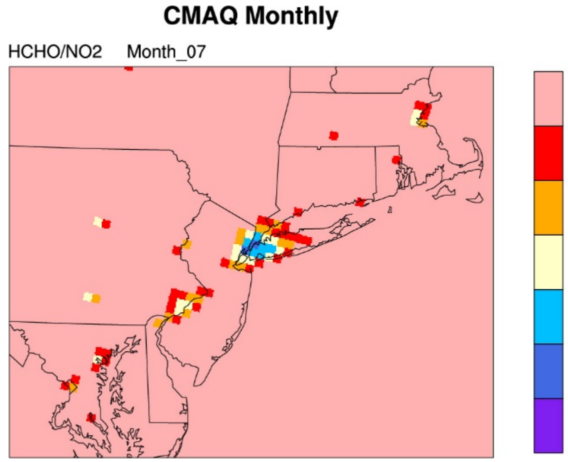
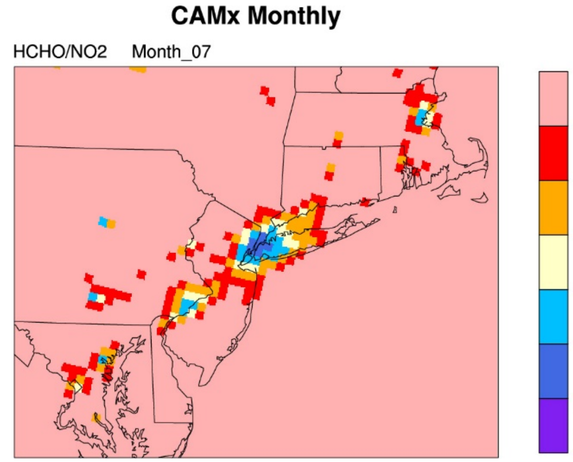


***Figure 6-40.** July 2016 HCHO/NO_2 ratio from CAMx.*



6.3.2 Ozone Production Efficiency

One concept used to characterize the conditions for oxidant formation is the ozone production efficiency (OPE). The OPE is defined as the amount of oxidant formed resulting from the photochemical oxidation of NO_X to more stable end products (e.g., nitric acid (HNO_3), organic nitrates, etc.). The OPE can be expressed as:

$$OPE = \frac{\Delta Ox}{\Delta NOz}$$ **Equation 6-1**

Where Ox = O_3 + NO_2, and NO_Z is the relatively stable portion of total reactive nitrogen (NO_y) and is defined as $NO_Z = NO_y - NO_X$. The OPE can be inferred from the slope in a graph of Ox versus NO_Z, where higher slopes indicate more efficient ozone production.

To begin to examine the models' ability to characterize OPE, hourly air concentration data were obtained for Pinnacle State Park, a rural site in the Southern Tier of New York State, and Queens College in New York City. These two sites are principally operated by the University at Albany's Atmospheric Sciences Research Center,[50] and both had O_3, NO, NO_2, and NOy data during the summer of 2016 to compare model predictions in contrasting environments (e.g., Ninneman et al., 2021). To focus on times of peak photochemistry, only those hours with surface temperatures ≥20°C and incident solar radiation ≥500 W/m^2, as described in Ninneman et al. (2019), were included in this analysis.

Figures 6-38 and **6-41** plot Ox versus NOz during peak photochemical hours at Pinnacle State Park (PSP) and Queens College (QC), respectively, August 2016. Both models were able to reproduce the range in observed daytime Ox concentrations but overpredicted NOz, leading to underpredictions of OPE. At the urban QC site, the modeled OPE values were much closer to the observed value in August.

To examine the variation in OPE over the modeling season, **Figures 6-42** and **6-43** display the monthly observed and modeled values at these two sites. It should be noted that the urban QC site only had NOz and Ox data in August and September. At the rural PSP site, the models underpredicted the observed OPE from June through September, with CAMx predictions were closer to the observed values. This is in part due to the difficulty in trying to model NOy and NOx concentrations in rural regions. At the urban QC site, both models only slightly underpredicted OPE in August and September, again with CAMx predictions being closer to the observed values. Both models did capture the contrasting urban-rural OPE values, generally higher at the rural, low-NOx/NOy/NOz PSP site.

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50 University at Albany's Atmospheric Sciences Research Center. https://www.albany.edu/asrc

***Figure 6-41**. O_X vs. NO_Z at Pinnacle State Park, August 2016.*

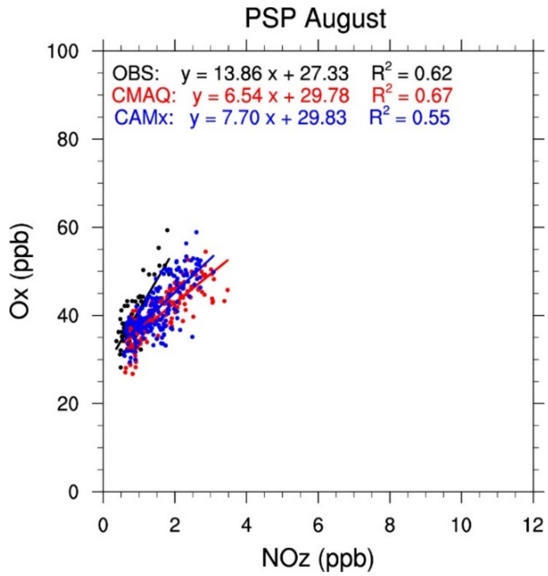


***Figure 6-42.** O_X vs. NO_Z at Queens College, August 2016.*

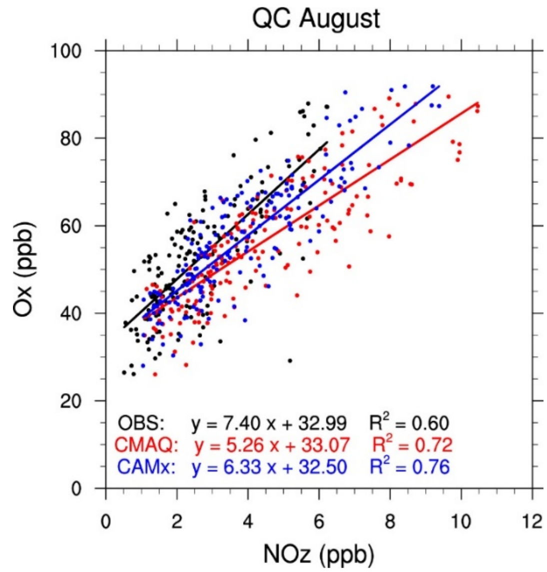


***Figure 6-43.** Monthly OPE at Pinnacle State Park, June-September 2016.*

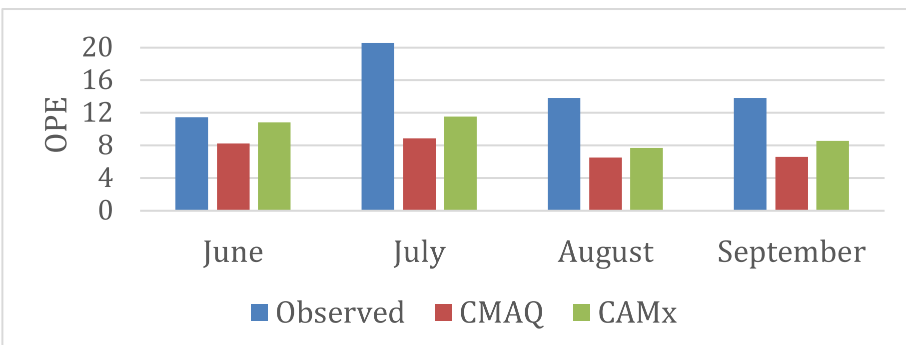
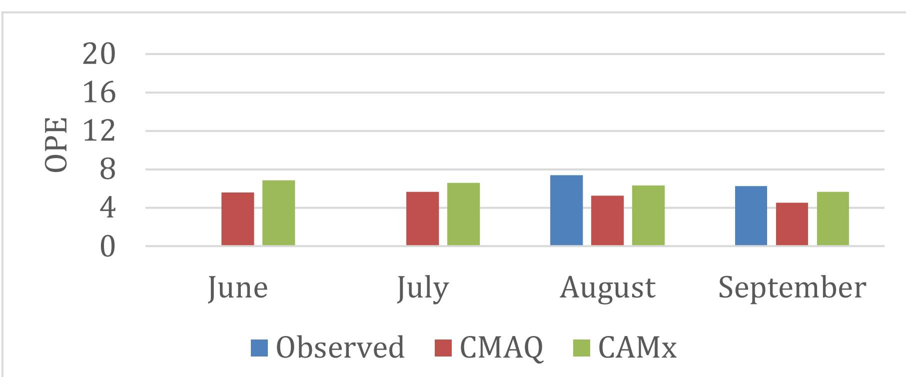


***Figure 6-44.** Monthly OPE at Queens College, June-September 2016.*



6.4 Summary

Various analyses are presented here to assess the predictions of ozone and precursors from both CMAQ and CAMx. Overall, both models' performance meet criteria set out by EPA for SIP Quality Modeling allow the states to use it to support SIPs and estimate future ozone concentrations. Both models generally capture the day-to-day and diurnal variations in ozone, however, they tended to generally underpredict ozone early in the season and overpredict later in the season. Across much of the domain, CAMx generally predicted higher O_3 than CMAQ, except at some coastal sites with substantial overprediction in CMAQ. The performance of the CMAQ model at 12 km resolution decreased along the coastal areas, in particular along the Connecticut (CT) coastline.

7 Evaluation of 4 km Resolution Nested Modeling Domain

One technique to improve model performance in areas with complex meteorology is to conduct photochemical modeling with a finer-resolution nested grid in the areas needing improvement. A finer grid allows emissions, particularly from point sources, to be located more precisely. It may better characterize the complex meteorological processes and their role in O_3 formation. The downside of using a finer grid is the increase in model run time, necessary computing power, and staff resources. In previous SIP modeling using the 2011 OTC modeling platform, it was found that model performance improved at 4 km resolution in many of the high ozone portions of the OTR. The OTC Modeling Committee examined the impact of using a finer, 4 km grid in the core of the OTR, denoted as "4OTC2" in **Figure 2-1**, in order to examine the potential benefits of refined grid modeling.

7.1 Meteorological Data

EPA provided WRF v3.8 4 km results consistent with the 12 km platform. The reader is referred to **Section 3** for details on the WRF set-up.

7.2 Emission Inventory

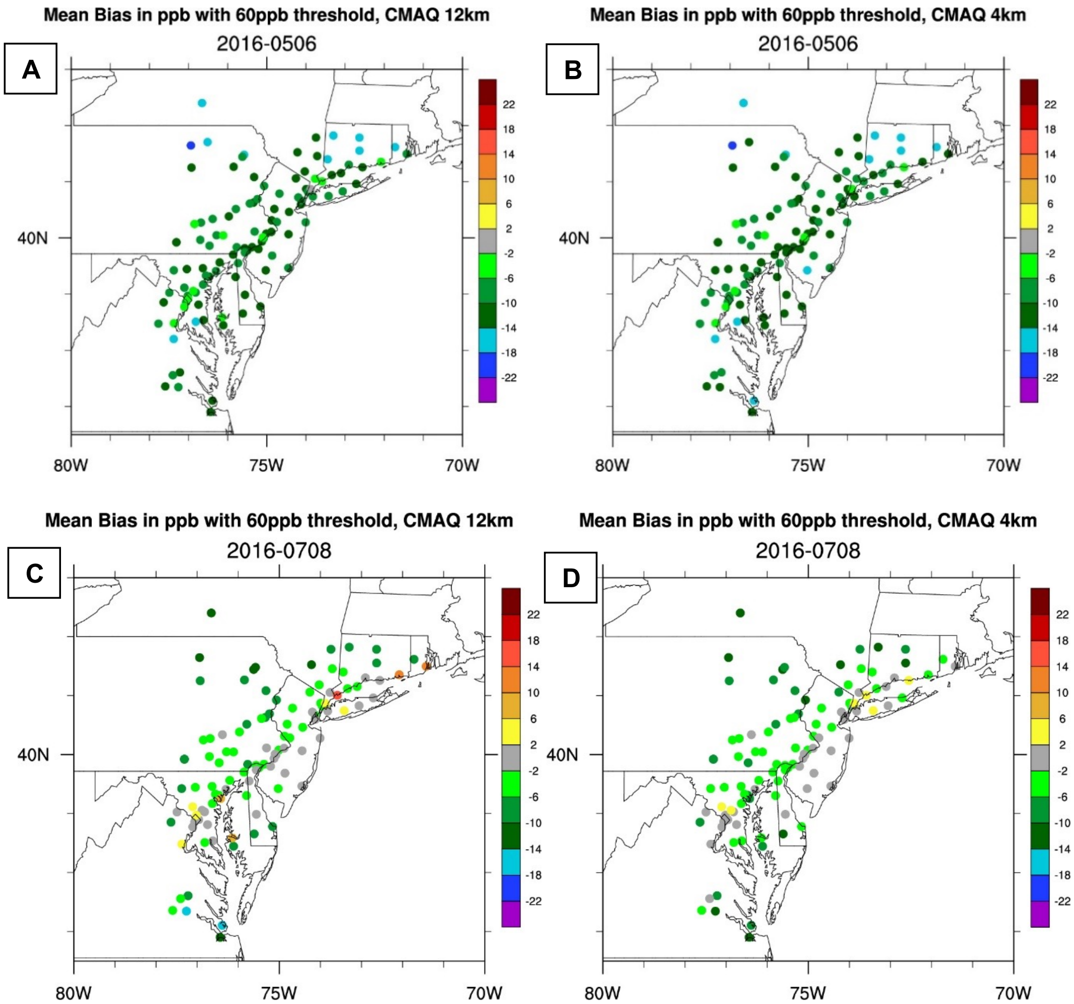
We relied on the latest emissions modeling platform (2016 V1) from the 2016 National Emission Inventory Collaborative for the nested grid modeling work. All sectors used in the 12 km modeling were re-processed through SMOKE to generate emissions for the 4 km domain. Sectors specific to Canada and Mexico (othar, othpt, othafdust, othptdust, onroad_can, onroad_mex, and ptfire_othna) were not used as these areas are outside the 4 km OTC domain. California onroad emissions (onroad_ca_adj) were also not used for the same reason. Inventories for the CMV sectors (cmv_c1c2 and cmv_c3) specific to the grid cell size were provided by the EPA. These were processed through SMOKE to generate the location specific marine emissions.

7.3 Performance Results

7.3.1 Mean Bias Over the 4 km Domain

The MDA8 O_3 mean bias (top two panels of **Figure 7-1**) with a threshold of 60 ppb in the early part of the O_3 season (average of May and June) showed that CMAQ at both 12 km and 4 km underestimated O_3 in these two months. For most of these sites, the two simulations exhibited similar negative biases. The mean bias of MDA8 O_3 in the middle of the O_3 season (average of July and August) showed that both simulations have similar results for most of sites, except along the CT coast, which had very high positive O_3 biases as shown in red (~14-18 ppb) and orange (~ 10-14 ppb) occur in the 12 km simulation. Lower biases were modeled with the 4km platform (gray and green).

Figure 7-1 (A-D). *The mean biases in MDA8 O_3 with a threshold of 60 ppb from CMAQ 12 km (left) and 4 km (right) simulations across the 4 km domain in May/June (top panels) and July/August (bottom panels).*



7.3.2 Root Mean Square Error (RMSE) Over the 4 km Domain

The root mean square error (RMSE) of MDA8 O_3 with a threshold of 60 ppb (**Figure 7-2**) more clearly shows that the 4 km simulations outperformed 12 km simulations for these sites along the CT coastline with smaller RMSE values, in both May-June and July-August. In addition, one site over Upper Chesapeake Bay showed lower RMSE in July/August. However, for most of the other sites, the two simulations still showed similar results.

Figure 7-2 (A-D). *The RMSE in MDA8 O_3 with a threshold of 60 ppb from CMAQ 12 km (left) and 4 km (right) simulations across the 4 km domain in May-June (top panels) and July-August (bottom panels).*

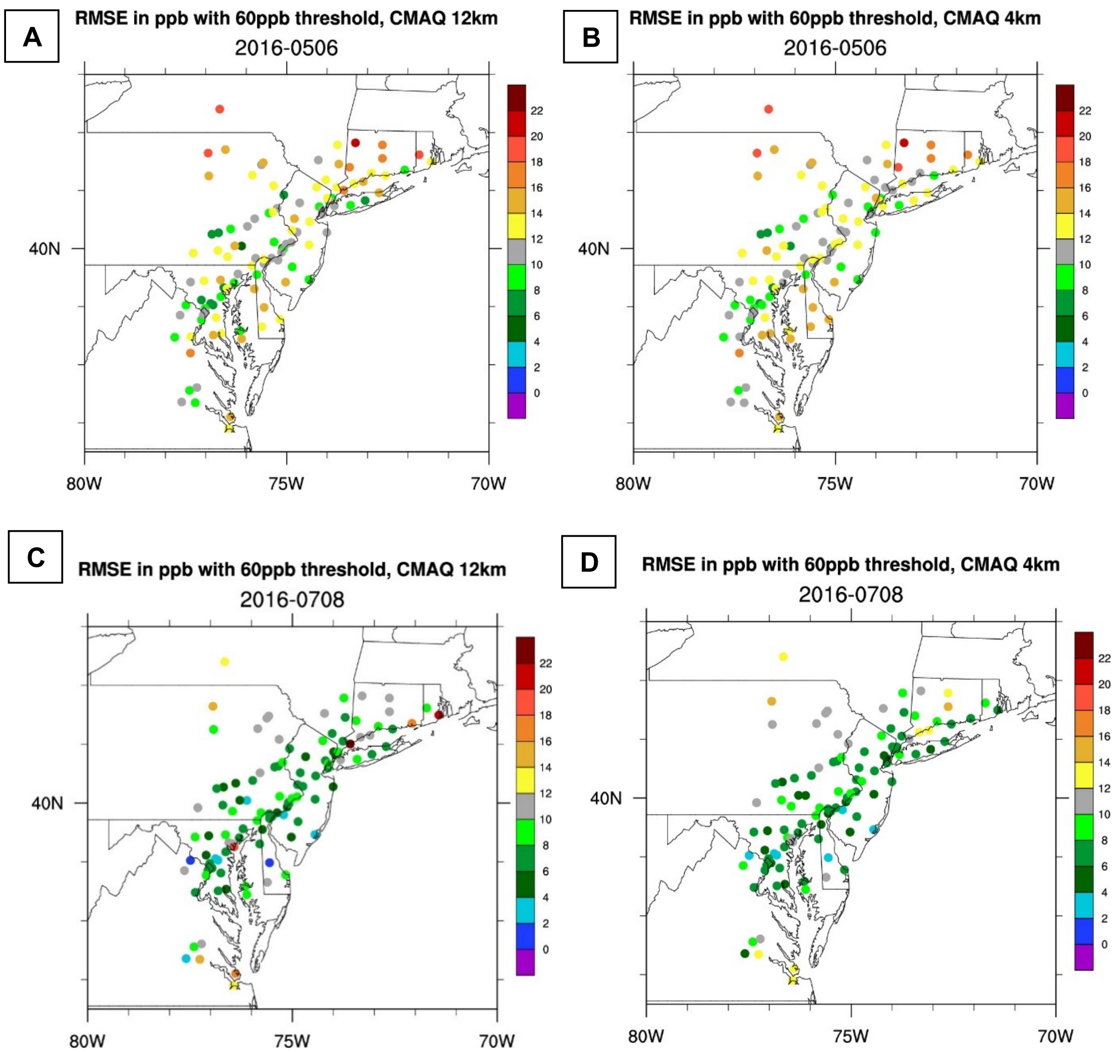


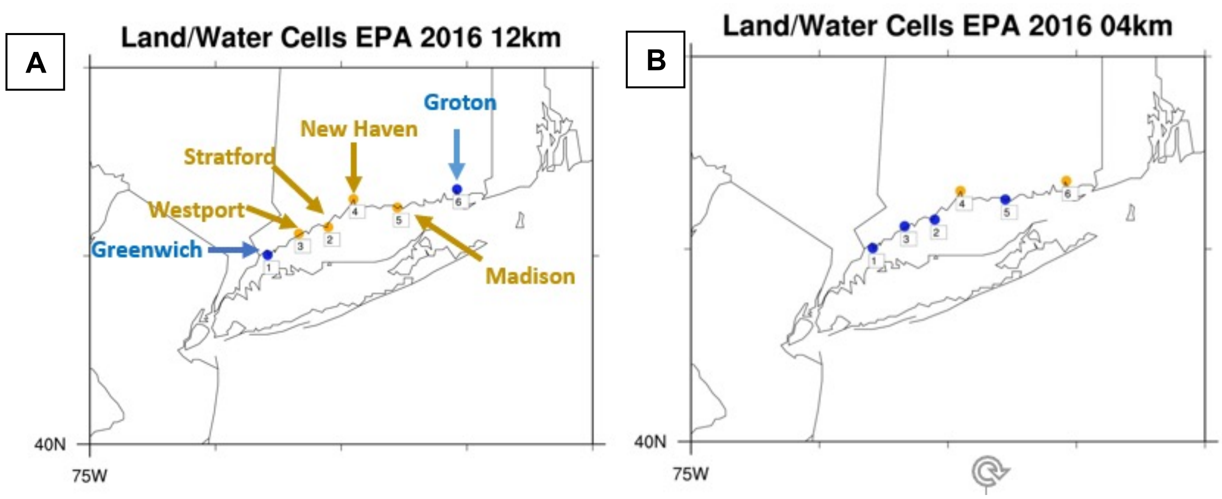
Table 7-1 shows the mean RMSEs for all 113 monitoring sites in the 4 km model domain and for the six CT monitoring sites along the north shore of Long Island Sound. These six monitoring sites are Greenwich, Stratford, Westport, New Haven, Madison, and Groton. **Figure 7-3** shows the locations of the six monitoring sites. At 12 km resolution, ozone concentrations were highly overestimated in some of these coastal grid cells, defined as water (i.e., a water cell is a grid cell where more than 50% of the area is water as classified by the WRF), due to difficulty in characterizing the land/water interface in both the air quality and meteorological models. Special attention was paid here to focus on these six monitoring sites, whose land cover types change (water to land or land to water) depending on the grid resolution.

Greenwich and Groton are defined as water cells at 12 km by the WRF model; the other four are land cells. However, at 4 km resolution, Greenwich, Stratford, Westport, and Madison are labeled as water cells by the WRF model; only New Haven and Groton are land cells. Better performance (lower RMSE) was observed at the six CT sites with about 1-2 ppb RMSE improvement in May-June, and ~3 ppb RMSE improvement in July-August for the 4 km simulation.

Table 7-1. *The mean RMSE (in ppb) for 12 km and 4 km model simulations with 60 ppb and 0 ppb threshold over 4 km domain.*

	May-Jun 60 ppb threshold	Jul-Aug 60 ppb threshold	May-Jun 0 ppb threshold	Jul-Aug 0 ppb threshold
113 Sites				
12 km	11.94	8.34	9.18	8.24
4 km	12.08	7.98	9.10	7.57
6 CT Sites				
12 km	13.71	13.29	10.20	11.22
4 km	11.20	10.10	9.15	8.77

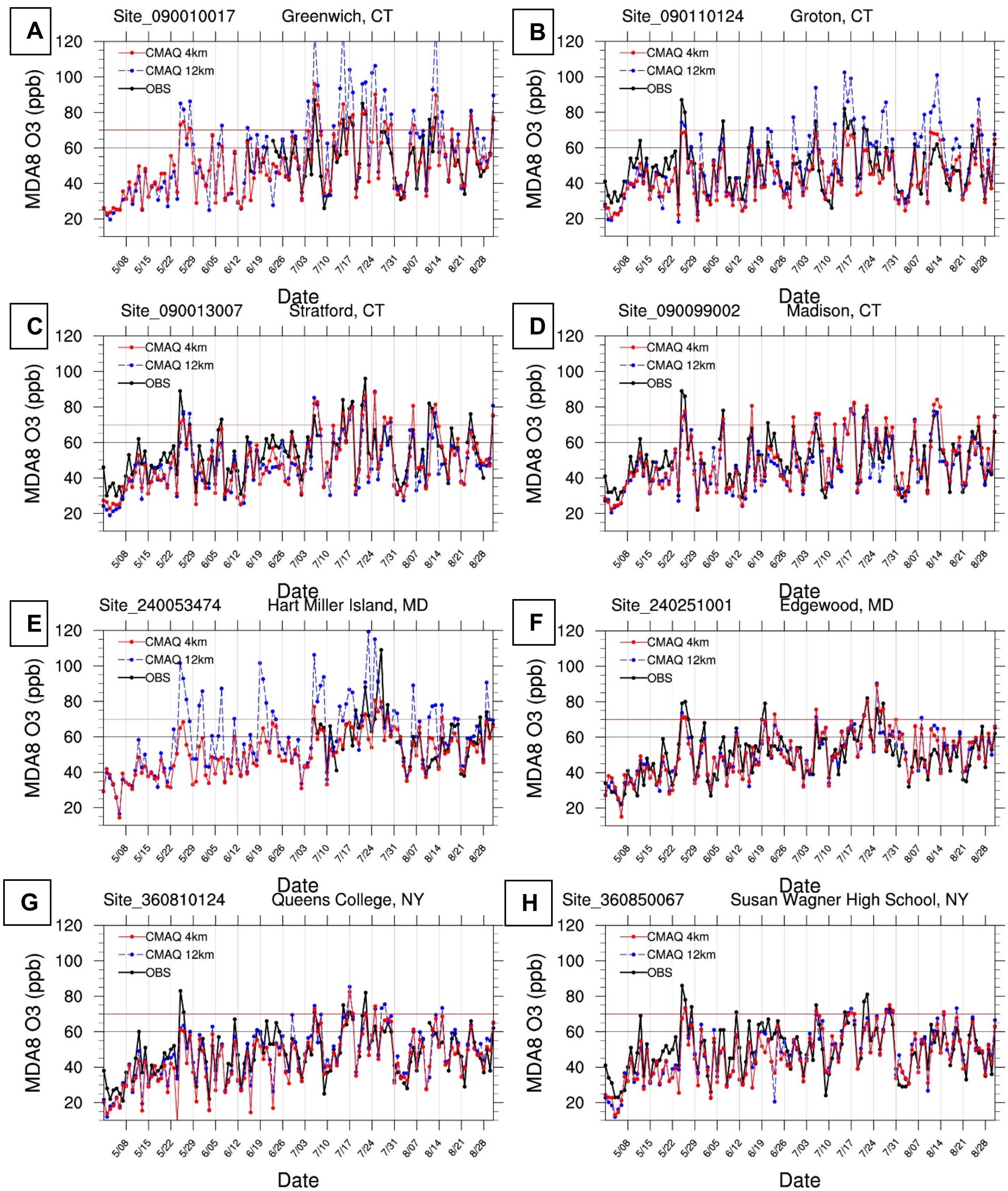
Figure 7-3 (A-B). *The location of the six monitoring sites over CT coastal line and their land cover types at 12 km (left) and 4 km (right) domain. The blue colors represent water cells and the orange colors represent land cells.*



7.3.3 MDA8 O_3 for Individual Sites

Figure 7-4 shows time series of MDA8 O_3 from May 1 to August 31 at eight sites traditionally associated with high ozone in the OTR. Greenwich and Groton are defined as water cells at 12 km by the WRF model. Greenwich is a water cell at 4 km, and Groton is a land cell at 4 km. At 12 km, CMAQ showed very high positive ozone biases in July and August. However, the 4 km model run showed much lower ozone values that were more consistent with observed values.

Figure 7-4 (A-H). *Time series of MDA8 O_3 from May 1 to Aug. 31 for eight monitoring sites. From left to right, top to bottom, site 090010017 is Greenwich, CT; 090110124 is Groton, CT; 090013007 is Stratford, CT; 090099002 is Madison, CT; 240053474 is Hart Miller Island, MD; 240251001 is Edgewood, MD; 360810124 is Queens College, NY; and 360850067 is Susan Wagner High School, NY.*



The Stratford and Madison monitoring locations are defined as land cells at 12 km and water cells at 4 km by the WRF model. Both simulations are similar to observations for most of these days. In July and August, CMAQ at 4 km performed slightly better than the 12 km simulations during the low ozone days, e.g., below 60 ppb. On average, CMAQ simulations at 4 km resolution do not get worse over these two monitoring sites that were defined as water at 4 km resolution, but as land at 12 km resolution.

Hart Miller Island and Edgewood are two high ozone monitor location in Maryland. The Hart Miller Island monitor is located in a water grid cell at 12 km and a land cell at 4 km. Again, CMAQ at 12 km showed very high positive ozone biases in July and August. CMAQ predictions at 4 km were lower and closer to the measured ozone values. For Edgewood, both simulations are similar to observations, except in late July and early August, during which time CMAQ at 4 km displayed lower positive biases than the 12 km simulations.

Queens College and Susan Wagner High School are two monitoring sites in New York City. They are land cells in both grid cell domains. For Queen's College, CMAQ at 4 km performed worse than the 12 km simulations in May and June, with larger underpredictions during these two months. In July and August, ozone values from the 4 km simulations are much closer to observations than these of the 12 km run, i.e., CMAQ at 4 km displayed lower positive biases than the 12 km simulations. For Susan Wagner High School, both simulations are very similar to each other over the entire period.

In a previous section**, Figure 6-6** displayed the fourth highest observed and 12 km CMAQ-predicted MDA8 O_3 concentrations at OTR and non-OTR sites across the 12OTC2 domain over the entire simulations. It showed that there were a few sites where CMAQ exceeded observed values by >10 ppb. In **Table 7-2**, we listed five sites where the 12 km CMAQ exceeded observed values by >5 ppb. The 4 km CMAQ predicted values are also listed to compare the model performance at the 4 km resolution. Three sites are defined as water cells and two are defined as land cells near New York City area. The differences between observations and model predictions are smaller from the 4 km run than from the 12 km CMAQ simulations at each of these five sites.

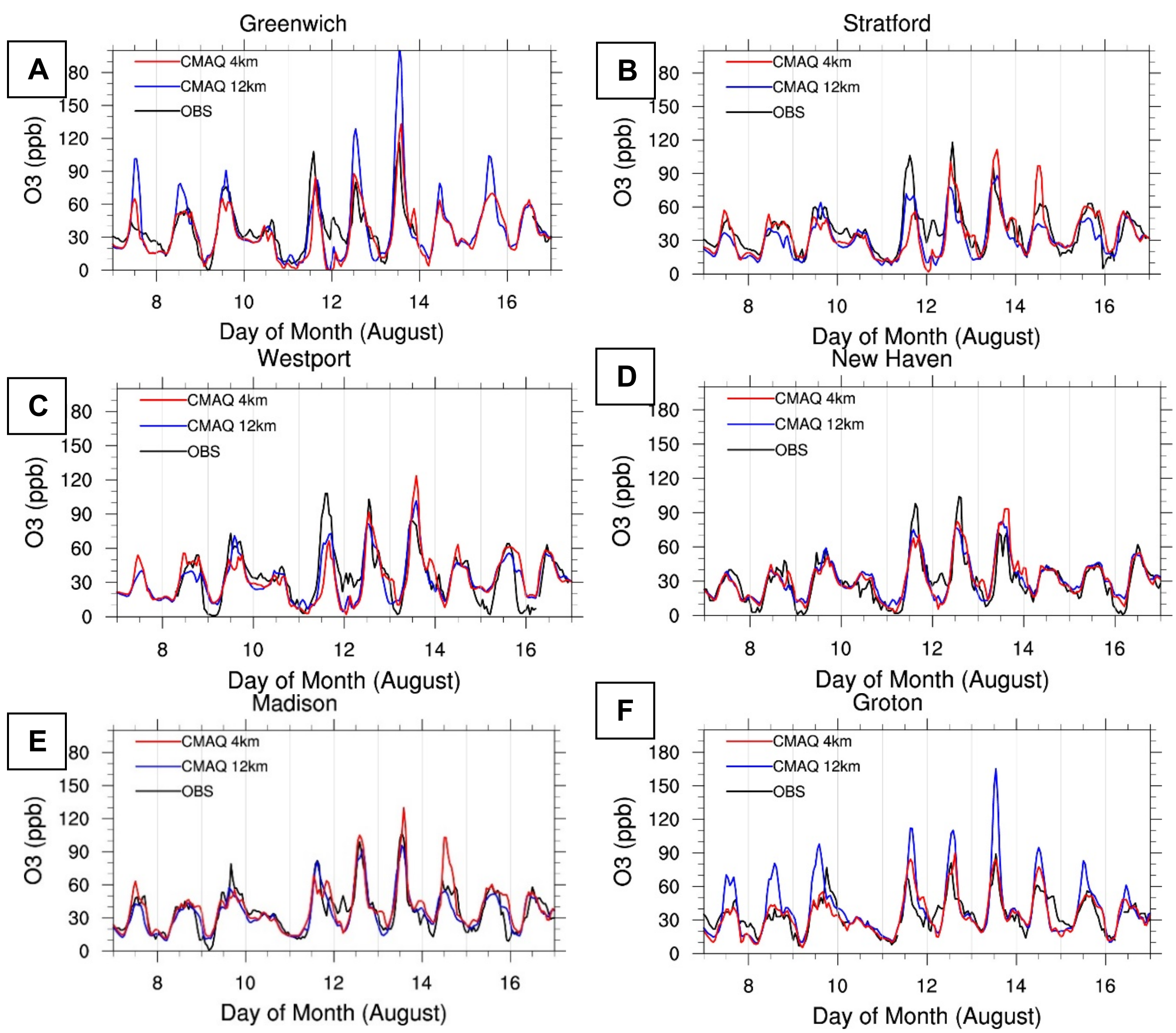
Table 7-2. *Comparison of 4th highest MDA8 O_3 at OTR sites, observed vs modeled from 12 km and 4 km CMAQ. Sites where 12 km CMAQ exceeded observed values by >5 ppb are listed.*

Site	State	County	Date	Obs	CMAQ 12 km	CMAQ 4 km	Land/water at 12 km
90110124	CT	New London (Groton)	7/17/2016	75	99.07	66.99	Water
90010017	CT	Fairfield (Greenwich)	7/22/2016	79	97.03	80.69	Water
440090007	RI	Washington	7/15/2016	71	88.02	82.07	Water
360810124	NY	Queens (Queens College)	7/17/2016	71	85.35	82.49	Land
340230011	NJ	Middlesex	7/29/2016	76	81.73	77.03	Land

7.3.4 Diurnal O_3 Variation for the Six Near-Coastal CT Monitoring Sites During a 10-Day Episode

Figure 7-5 shows the diurnal variation of O_3 for August 7-16, 2016, for the six CT monitoring sites along the Long Island Sound coast. As previously mentioned, the Greenwich ozone monitoring is located in a water cell at both 12 km and 4 km resolutions. Predicted ozone from the 12 km simulations displayed very high positive biases, especially on August 13. The maximum positive bias is about 80 ppb on that day. The results from the 4 km CMAQ are much lower than these from 12 km CMAQ and are very close to observations. Stratford, Westport, and Madison are land cells at 12 km, but water cells at 4 km resolution. The ozone values predictions from 4 km CMAQ are very similar to 12 km CMAQ for most of these days. New Haven is a land cell at both 12 km and 4 km resolutions. The simulated ozone from 4 km CMAQ are close to 12 km CMAQ. Groton is a water cell at 12 km, but it is a land cell at 4 km resolution. Again, ozone values from 4 km CMAQ are much lower than these at 12 km and generally closer to observed values.

Figure 7-5. (A-F). *The diurnal variation of O_3 for the time period of August 7-16, 2016 for the six CT monitoring sites.*



Changes in total emissions or representation of meteorological fields may impact the ozone concentration differences at an individual site. We compared meteorological data and total emissions of NO_2 and VOC from the two grid resolution platforms to examine the model performance at the six coastal CT sites. **Figure 7-6** showed the diurnal variation of PBL heights and emissions of total NO_2, total VOC_BEIS (sum of all biogenic VOCs), and total VOC_INV (sum of all anthropogenic VOCs) during the time period of August 7-16 at Greenwich. August 7, 13 and 14 are weekend days. The emission units are converted to moles/hr/unit area or g/hr/unit area, so that 12 km and 4 km emissions can be compared side by side.

Greenwich is a water cell at both 12 km and 4 km resolutions. Therefore, the PBL heights at 4 km are similar to those at 12 km. However, the total NO_2 and VOC emissions at 4 km are much lower than these at 12 km. The modeled ozone predictions from 4 km CMAQ are much lower than these from 12 km CMAQ and are very similar to observations. The results indicate that land cover type and emission data discrepancies, such as a water cell with large NO_2 and VOC emissions, may cause unrealistic O_3 biases in the CMAQ simulations. However, accurate allocation of emissions can improve the performance of CMAQ simulations, which indicates the importance to use finer and more accurate land cover classification dataset while processing the emission data.

Figure 7-6 (A-D). *The diurnal variation of PBL heights and emissions of total NO_2, total VOC_BEIS and total VOC_INV during the time period of August 7-16, 2016 at Greenwich.*

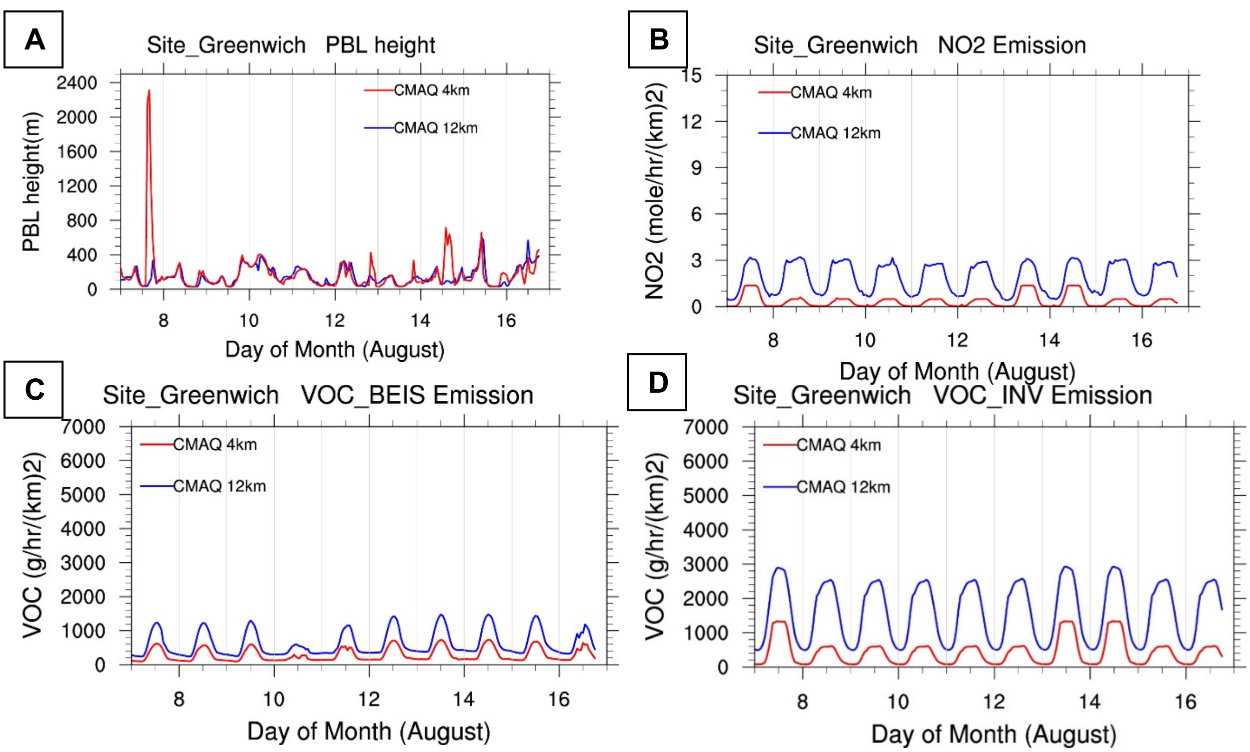
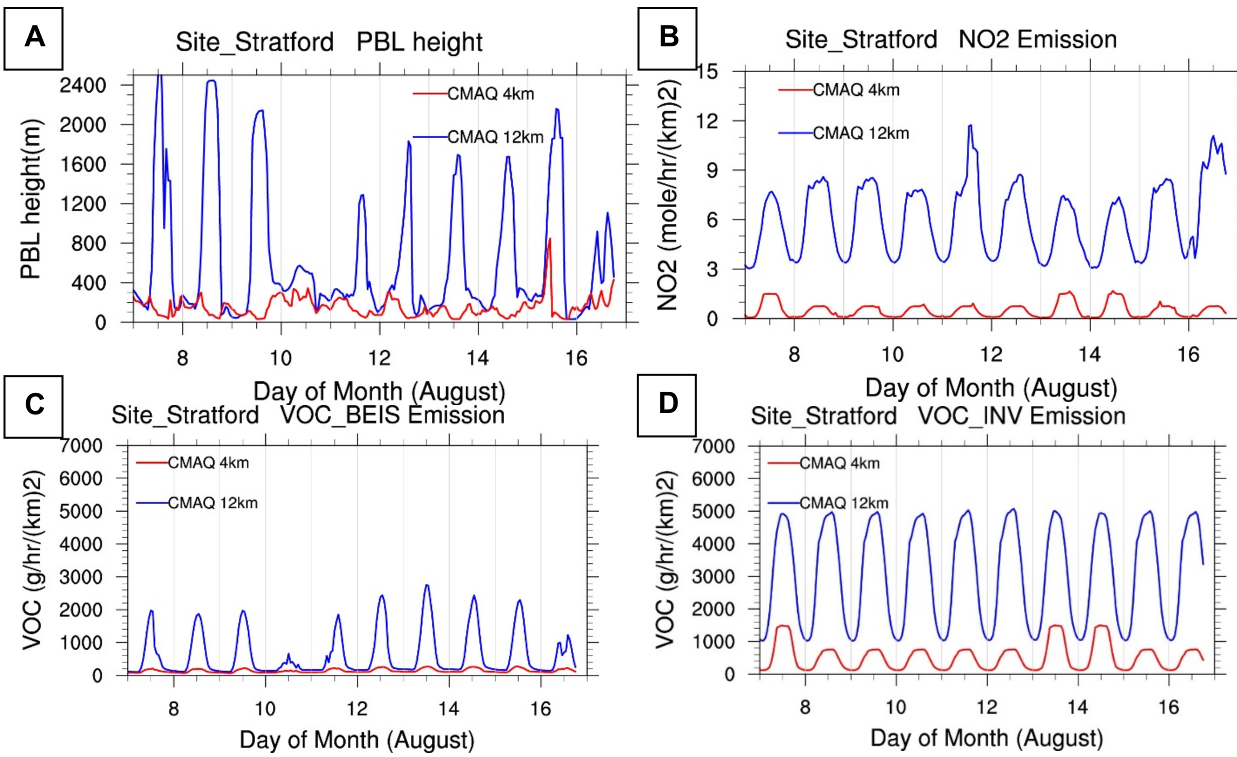


Figure 7-7 shows the results for Stratford. The Stratford monitor is located in a land cell at 12 km, but a water cell at 4 km resolution. Because of this land cover change, the PBL heights decrease

during daytime compared to 12 km WRF simulation. With lower PBL heights, higher ozone values were expected from 4 km CMAQ. However, ozone simulations from 4 km CMAQ are very similar to 12 km CMAQ for most of these days. The NO_2 and VOC emissions at 4 km are much lower than these at 12 km platform, which may explain the reason. Just like Stratford, Westport and Madison (not shown here) are land cells at 12 km, but water cells at 4 km resolution. Because the NO_2 and VOC emissions at 4 km are much lower than these at 12 km, the ozone values don't change much between these two platforms.

Figure 7-7 (A-D). *The diurnal variation of PBL heights and emissions of total NO_2, total VOC_BEIS and total VOC_INV during the time period of August 7-16, 2016 at Stratford.*



Groton (**Figure 7-8**) is located in a water cell at 12 km, but a land cell at 4 km resolution. Due to this land cover change, the PBL heights increase dramatically during daytime compared to those from the 12 km WRF simulation. The total NO_2 and VOC emissions at 4 km are much higher than these at the 12 km resolution. However, the O_3 predictions from 4 km CMAQ are much lower than these at 12 km CMAQ since the PBL heights increase drastically compared to 12 km platform, which may help to disperse the ozone and its precursors more effectively.

Greenwich and Groton were selected to illustrate the monthly average of diurnal ozone variation. There are clear improvements at 4 km resolution with predicting the average diurnal variation ozone at these two monitors in August.

***Figure 7-8 (A-D)**. The diurnal variation of PBL heights and emissions of total NO_2, total VOC_BEIS and total VOC_INV during the time period of August 7-16, 2016 at Groton.*

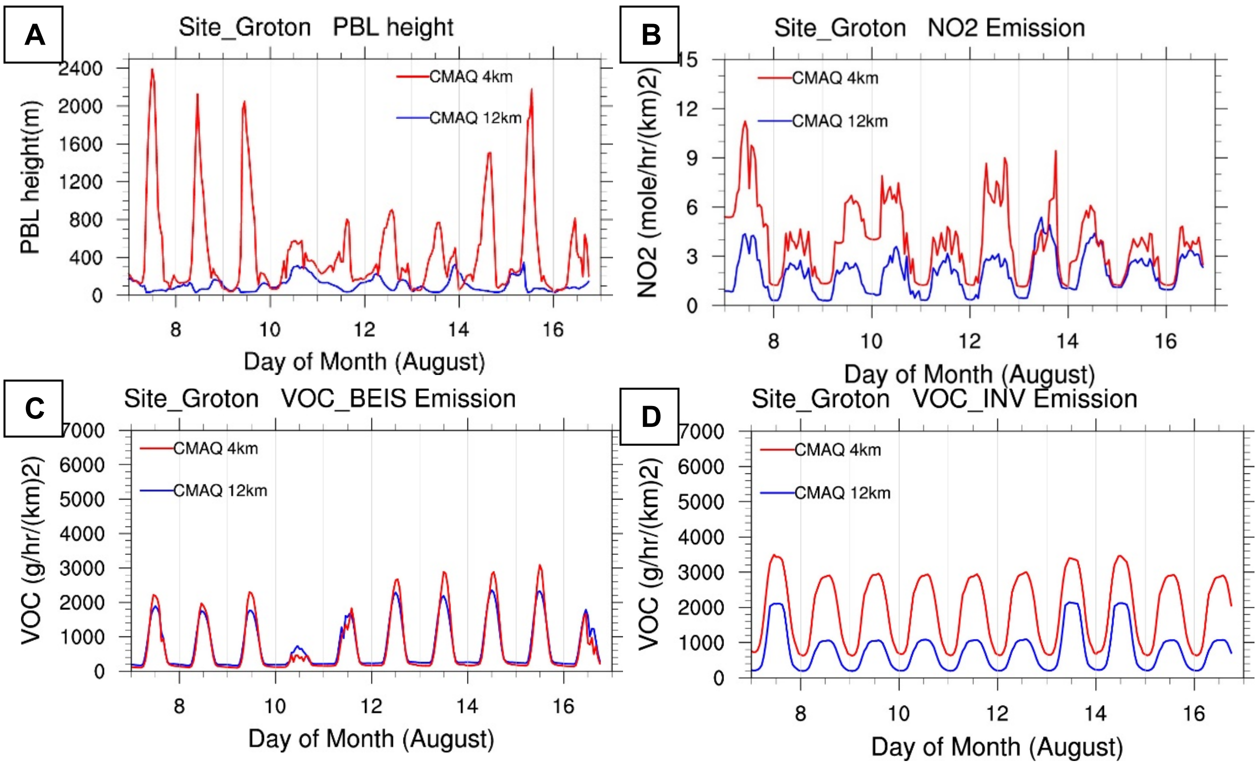
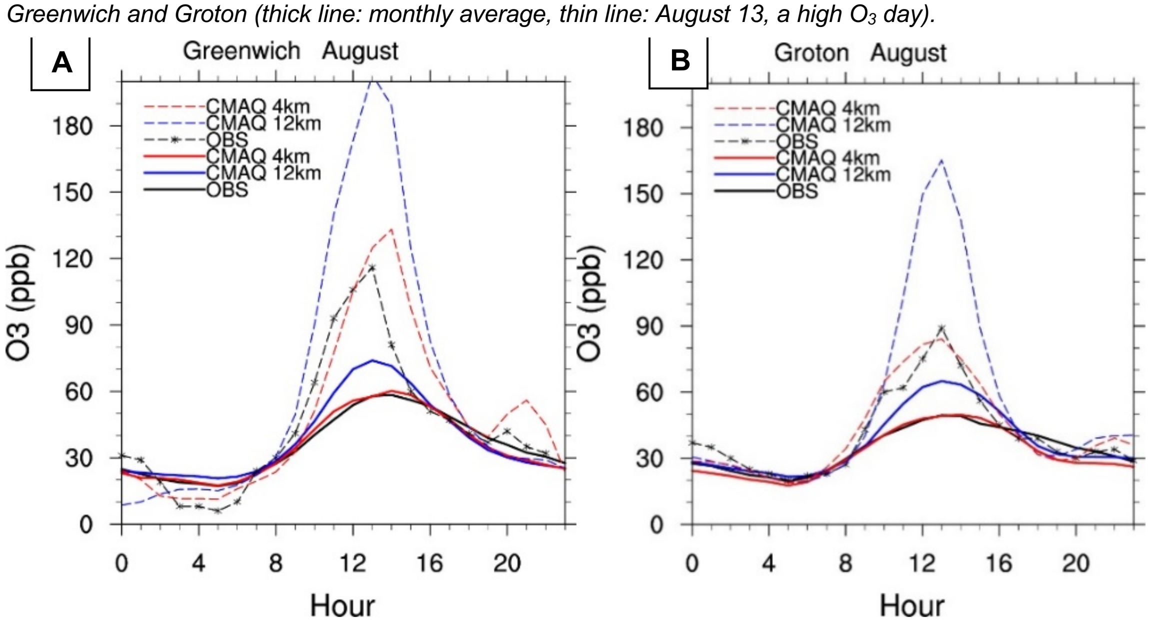


***Figure 7-9 (A-B).** Observed and modeled (12 km/4 km grids) ozone (ppb) for August 2016 at monitoring sites Greenwich and Groton (thick line: monthly average, thin line: August 13, a high O_3 day).*



7.4 Projected Design Values in 2023

Sections 8 and 9 detail the methods for calculating the projected future design values at 12 km. O_3 design values were computed at all monitor locations located within the 4 km domain, using the 2016 base year and 2023 projected V1 inventory. Results are presented based on the standard 3x3 method, as well as a modified 3x3 method in which all grid cells identified as water were excluded (See “3x3 No Water 1 method” in **Section 9**).

The base and future year O_3 design values, both average and maximum, from CMAQ at 4 km and at 12 km domain are shown in **Table 7-3** for the 11 monitors with the highest base year design values across the 4 km domain. Future year values that exceed 70 ppb are indicated in orange, while values that exceed 75 ppb are shown in red.

Overall, future design values across these sites were generally consistent in the 4 km and 12 km simulations. In summary, the future design values from both domains are close to each other, even though 4 km CMAQ shows relatively better base ozone model performance than the 12 km model run. Although model performance improved with higher grid resolution, it did not have a large impact on the future design values. The projected 2023 O_3 design values for all 112 sites across the 4 km domain are available upon request to NYS DEC.

7.5 Conclusions

On average, the performance of CMAQ at 4 km and at 12 km resolution are similar at most monitoring sites in the OTR but were found to be significantly improved with CMAQ modeling at 4 km resolution during July and August at monitoring sites defined as water cells at 12 km resolution. For sites that were defined as land both at 4 km and 12 km resolutions, both platforms have very similar performance. CMAQ simulations at 4 km resolution do not get worse over sites that were defined as water at 4 km resolution and as land cells at 12 km resolution. This NYSDEC work suggests that for CMAQ, finer grid resolution plays a crucial role in modeling O_3 along the land-water interface where more accurate meteorological conditions and allocation of emissions can improve the O_3 estimates.

Table 7-3. *Baseline (2014-2018) and projected 2023 O_3 design values from CMAQ at 4 km and 12 km resolutions for the top 11 monitoring sites, which have highest base year design values, across the 4 km domain, using the standard 3x3 method and the 3x3 No Water 1 method. Future design values that exceed 70 ppb are highlighted in orange, and values that exceed 75 ppb are highlighted in red.*

			2014-2018 DVB		4 km CMAQ v5.3.1				12 km CMAQ v5.3.1			
					3x3		3x3 no water 1		3x3		3x3 no water 1	
Site ID	**State**	**County**	**AVG**	**MAX**	**AVG**	**MAX**	**AVG**	**MAX**	**AVG**	**MAX**	**AVG**	**MAX**
90019003	CT	Fairfield (Westport)	82.7	83	76	76	76	77	80	80	75	75
90013007	CT	Fairfield (Stratford)	82	83	75	76	75	76	74	75	75	76
90099002	CT	New Haven (Madison)	79.7	82	73	76	73	75	71	73	71	73
420170012	PA	Bucks	79.3	81	69	71	69	71	69	70	69	70
90010017	CT	Fairfield (Greenwich)	79.3	80	75	75	74	75	71	72	78	79
90079007	CT	Middlesex	78.7	79	69	69	69	69	69	69	69	69
90011123	CT	Fairfield	77	78	69	70	69	70	69	70	69	70
421010024	PA	Philadelphia	77.7	78	69	69	69	69	68	68	68	68
90090027	CT	New Haven (New Haven)	75.7	77	70	71	69	70	69	70	68	69
340070002	NJ	Camden	75.3	77	67	68	67	68	66	67	66	67
90110124	CT	New London (Groton)	74.3	76	68	70	68	69	67	69	71	73

8 Relative Response Factor and Modeled Attainment Test for Ozone

Air quality models such as CMAQ and CAMx are used to simulate current and future air quality, and model estimates are used in a "relative" rather than "absolute" sense to estimate future year design values. That is, one calculates the ratio of the model's future to current "baseline" predictions at ozone monitors. These ratios, the fractional changes in ozone concentrations, are called relative response factors (RRF). For each existing monitoring site, the future ozone design value is estimated by multiplying the RRF at the location by the observation-based monitor-specific "baseline" ozone design value. The projected future ozone design values are compared to the NAAQS to determine whether attainment will be reached or not.

Equation 8-1 describes the approach as applied to a monitoring site *i*:

$$DVF_i = RRF_i * DVB_i$$ **Equation 8-1**

DVF_i is the projected future design value at monitoring site i; RRF_i is the relative response factor calculated at monitoring site *i*; and DVB_i is the observation-based "baseline" design value at monitoring site *i*. The RRF is the ratio of future MDA8 O_3 concentration to the baseline MDA8 O_3 concentration predicted at the monitor location averaged over the top 10 highest daily maximum 8-hour ozone concentration days, if possible, determined from the base case.

Ozone predictions from the 2016 (base year) and 2023 (future year) CMAQ and CAMx model simulations were used to calculate projected average and maximum MDA8 O_3 DVF for 2023. This section describes the procedures for calculating projected 2023 design values following the EPA's guidance (US EPA 2018a, 2018b). A new method is also introduced and compared to the EPA's methods.

8.1 Projected Design Value Calculation

The Software for Modeled Attainment Test-Community Edition (SMAT-CE) tool[51] was developed by the EPA for the modeled attainment tests for ozone and $PM_{2.5}$, as well as for calculating changes in future year visibility at Class I areas. To discount inaccuracies due to individual grid characteristics, EPA recommends an approach to calculating the DVF_i that considers model values from the 3x3 array of grid cells centered on the grid where the monitor is located. NYSDEC developed an in-house computer program following and building on EPA's approach for the modeled attainment test for ozone to provide additional detail and enhanced methods. The DVF outputs of the 3x3 method from NYDEC's program were compared with EPA's standard SMAT-CE 3x3 method in order to make bsure the results are consistent, and they matched each other.

[51] US EPA Photochemical Modeling Tools. https://www.epa.gov/scram/photochemical-modeling-tools.

Grid cell characteristics such as land use can have a significant effect on modeled ozone concentrations. Coastal monitors particularly may be influenced by whether the land use of the grid in which the monitor is located is characterized as water or land. A water cell is a grid cell where more than 50% of the area is water as classified by the WRF (US EPA, 2018b). **Figure 8-1** shows 36 monitoring sites located in a water cell where 2016 measured DVs are available in the 12OTC2 domain. A list of monitoring sites defined as water cells for each domain is shown in **Table 8-1**. There are eight monitoring sites located in a water cell in the OTR in the 12OTC2 domain.

Figure 8-1. Monitoring sites located in a water cell where 2016 measured DVs are available in the 12OTC2 domain for the 2016 platform.

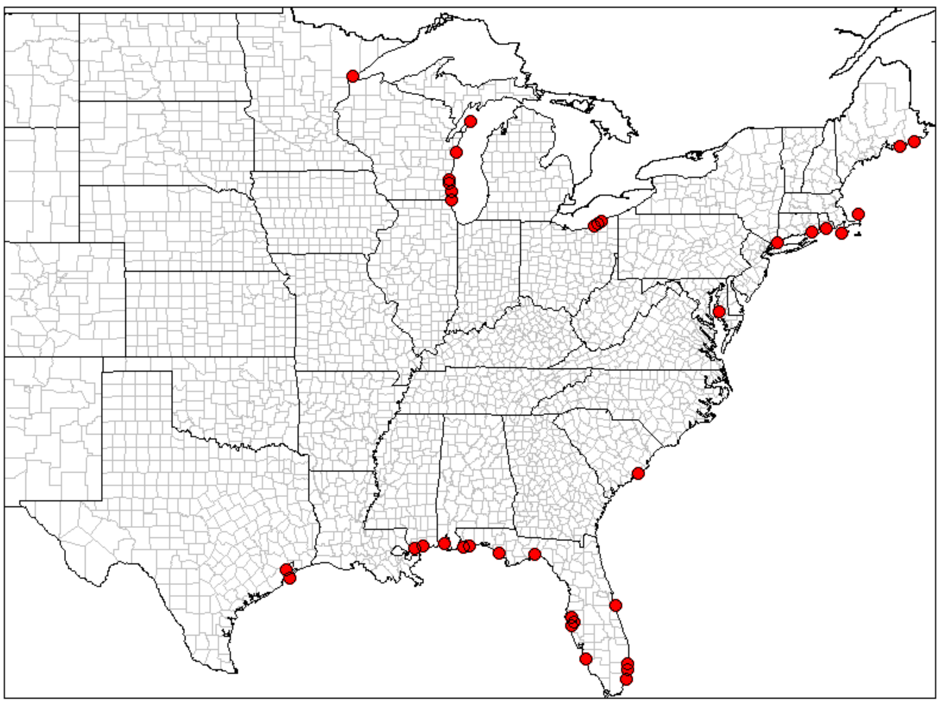


***Table 8-1**. List of Monitoring sites located in a water cell in the OTR in the 12OTC2 domain.*

Site ID	State	County	Location
090010017	Connecticut	Fairfield	Greenwich
090110124	Connecticut	New London	Groton
230090102	Maine	Hancock	Cadillac Mt Summit
230290019	Maine	Washington	Jonesport
240190004	Maryland	Dorchester	Horn Point
250010002	Massachusetts	Barnstable	Truro
250070001	Massachusetts	Dukes	Martha's Vineyard
440090007	Rhode Island	Washington	Narragansett

When one or more grid cells in the 3x3 array occur over a body of water, conditions of overlaying land-based emissions with overwater meteorology at those coastal monitors often cause difficulty in modeling O_3 (Ozone Transport Commission, 2018). For those coastal monitors, the maximum values in the 3x3 grid tend to occur in a grid cell over water where O_3 overpredictions are likely to be more pronounced. For those monitors, it may be appropriate to re-assess the DVB/RRF calculations to reduce that bias. Three methods in addition to the standard 3x3 method are described below which vary in their approach to eliminate or minimize the effect of the water grids in the RRF calculation (Yun et al., 2020).

Thus, the methods are:

1) The EPA's standard 3x3 method (US EPA, 2018b and US EPA, 2021a).
2) The EPA's alternative approach for near-coastal areas: a modified 3x3 method that eliminates the grid cells that are classified as water cells provided that they do not contain the monitoring site (US EPA, 2018b and US EPA, 2021a). This method ("No Water 1") includes a water cell in the RRF calculation only if the monitoring site is located in the water cell.
3) A further modified 3x3 method that excludes all water cells even if the monitoring site is located in a water cell ("No Water 2").
4) A 1x1 method that uses the one grid cell where the monitoring site is located regardless of grid classification.

The following steps describe the calculation of each of the elements in **Equation 8-1** as implemented by the NYSDEC through the in-house computer program. All calculations are performed on a monitor-by-monitor basis.

8.1.1 Step 1 - Calculation of DVB

Design values for monitored data are calculated in accordance with 40 CFR Part 50 Appendix U (2015 NAAQS) and are based on MDA8 O_3 concentrations at each monitoring site. The MDA8 O_3 concentration for a given day is the highest of the 17 consecutive 8-hour averages beginning with the 8-hour period from 7:00 am to 3:00 pm and ending with the 8-hour period from 11:00 pm to 7:00 am the following day. Design values are the average value of three consecutive fourth highest annual MDA8 O_3 concentration at each monitoring site. Monitored design values are labeled with the most recent year of data used in the design value calculation. For example, the 2016 design value for a monitor is the average of the fourth highest MDA8 O_3 values from 2014, 2015 and 2016 at that monitor.

Average DVB is the average of three consecutive design values starting with the design value of the baseline year. **Equation 8-2** shows the average DVB calculation for the 2016 baseline emissions inventory year for each site *i*:

$$average\ DVB_i = \frac{(2016\ DV)_i + (2017\ DV)_i + (2018\ DV)_i}{3}$$ **Equation 8-2**

Here, average DVB is the average of the "2016 DV" (determined from 2014-2016 observations), the "2017 DV" (determined from 2015-2017 observations), and the "2018 DV" (determined from 2016-2018 observations). Consequently, the average DVB is derived from observations covering a five-year period with 2016 observations "weighted" three times, 2015 and 2017 observations weighted twice, and 2014 and 2018 observations weighted once.

A maximum DVB for the 2016 base year is the highest of the three design values (2016 DV, 2017 DV, and 2018 DV) in the period 2014-2018.

The following criteria are applied for calculating average DVB when there are missing DVs:

a) For monitors with only four years of consecutive data, the guidance allows DVB to be computed as the average of two design values within that period.
b) For monitors with only three years of consecutive data, the DVB is equal to the design value calculated for that three-year period.
c) For monitors with less than three years of consecutive data, no DVB can be estimated.

8.1.2 Step 2 - Calculation of RRF

EPA's approach for calculating modeled future year design values deviates from the procedure for calculating design values with monitored data. EPA guidance recommends calculation of RRFs using photochemical air quality model (such as CMAQ or CAMx) output from the grid cell where the monitor is located as well as grid cells immediately surrounding the monitoring site. This is in part due to limitations in the inputs and model physics that can affect model performance at the grid cell level. In addition, possible inappropriate results may occur due to the artificial geometry of the superimposed grid system when monitoring sites and emission sources are located close to the border of a grid cell.

The EPA recommends the use of a 3x3 grid cell array centered on the grid cell containing the monitoring site to calculate the RRF. Following the EPA's approach, for each day, the grid cell with the highest base year MDA8 O_3 value in the 3x3 array is used in the calculation of the RRF. The 10 highest days in the base year modeling are used at each monitoring site. If the base year modeling results do not have 10 days with MDA8 O_3 value >= 60 ppb at a site, but if there are at least 5 days with MDA8 O_3 >= 60 ppb, all of the days >= 60 ppb are used. If there are fewer than 5 days with MDA8 O_3 value >= 60 ppb, RRFs and DVFs are not calculated for that site. Therefore, there are 5 to 10 days used in each site's RRF calculation. A site-specific RRF is calculated as follows:

$$RRF = \frac{\text{average future year MDA8 O3 over selected high O3 days}}{\text{average base year MDA8 O3 over selected high O3 days}}$$

Equation 8-3

The following describes the logic with which NYSDEC implemented these screening criteria into its code in the RRF calculation for each monitor:

a) <u>Selecting O_3 concentrations from grid cells surrounding the monitor</u>
   i. Identify the grid cell in which the monitor is located and include the surrounding eight grid cells to form a 3x3 grid cell array.
   ii. Determine MDA8 O_3 concentrations for each day for each of the 9 grid cells for both the base and future year (control case) simulations.

iii. For each day, identify the grid cell with the highest MDA8 O_3 value out of all nine grid cells in the base year. This is the MDA8 O_3 concentration for that monitor for that day to be used in the RRF calculation (following the screening criteria listed below).

iv. The future year MDA8 O_3 concentration is chosen by pairing to the same grid cell selected in the base year for that day. (Note that this may not result in selection of the highest future year modeled MDA8 O_3 concentration in the 3x3 grid array overlaying the monitor.)

b) Selecting modeling days to be used in the RRF calculation on a monitor-by-monitor basis

i. Identify the 10 highest days with the MDA8 O_3 concentrations ≥ 60 ppb in the base year simulation.

ii. If there are between 5 and 10 days ≥ 60 ppb, then use all days ≥ 60 ppb.

iii. An RRF is not calculated for the monitor if there are fewer than five days with the MDA8 O_3 concentration ≥ 60 ppb. These were recorded with ”-999.9.”

c) RRF calculations: Compute the RRF by averaging the MDA8 O_3 concentrations for the base year and future year determined in step (a) over all days determined in step (b).

8.1.3 Step 3 - Computation of DVF

For each monitor for which an RRF was able to be calculated, compute DVF as the product of DVB from step (1) and RRF from Step 2. The average and maximum DVF are calculated as described in **Equations 8-4** and **8-5**, respectively.

$$average\ DVF = average\ DVB * RRF \quad \textbf{Equation 8-4}$$

$$maximum\ DVF = maximum\ DVB * RRF \quad \textbf{Equation 8-5}$$

Note, the following conventions on numerical precision (i.e., truncation, rounding) were applied:

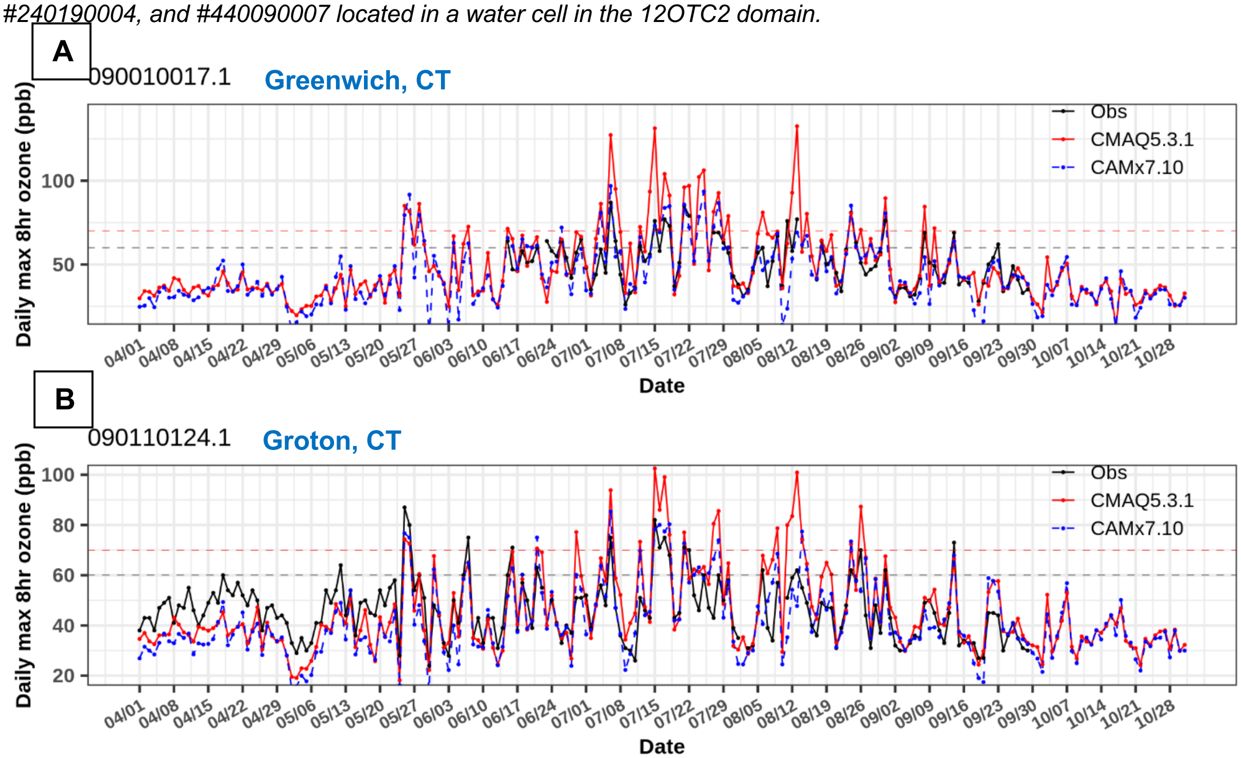
a) DVs are truncated in accordance with 40 CFR Part 50 Appendix U. This applies to the 2016, 2017, and 2018 design values.
b) DVBs are calculated in ppb and rounded to the nearest tenth of a ppb.
c) Model estimates of MDA8 O_3 (in ppb) are calculated to at least four places to the right of the decimal, with the last digit truncated.
d) Multi-day MDA8 O_3 (in ppb) are averaged, maintaining at least four places to the right of the decimal.
e) RRFs are rounded to four places to the right of the decimal.
f) “Pre-truncation” DVFs (ppb) are truncated to one decimal place and the “final” DVFs (ppb) are truncated to integer values.

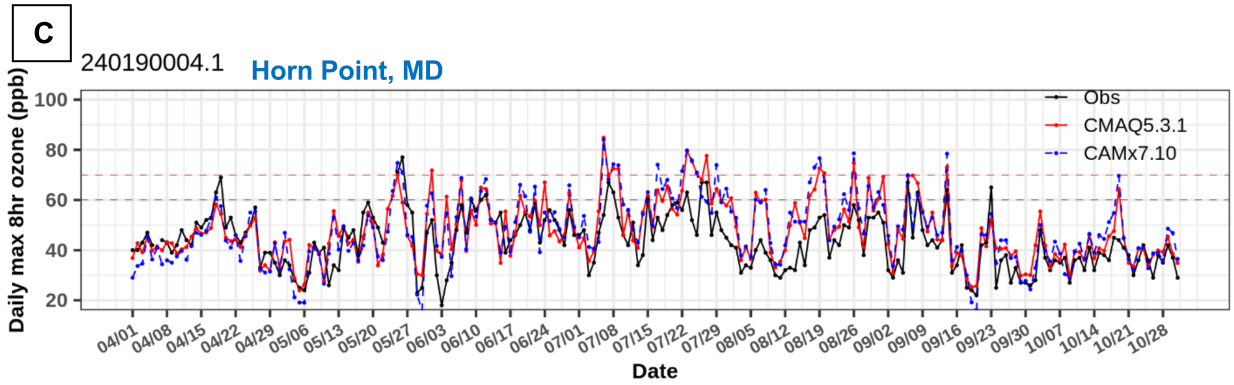
8.2 Model Performance at the Monitoring Sites Located in a Water Cell

These approaches can be applied to assessment of base year model performance. Model performance described in **Section 6** was based on observed values at the monitor compared with predicted values at the grid containing the monitor (i.e., the 1x1 method).

Observed MDA8 O_3 was compared to modeled MDA8 O_3 at those monitoring sites located in a water cell, for the 12OTC2 domain listed in **Table 8-1**. Comparisons at four selected monitoring sites (#090010017 (Greenwich, CT), #090110124 (Groton), #240190004 (Horn Point), #440090007 Narragansett)) are shown in **Figures 8-2** and **8-3**. Both models tend to overpredict O_3 levels at sites located in a water cell especially in July and August. Overprediction of O_3 is more pronounced with the CMAQ model by up to 55 ppb compared to 38 ppb with the CAMx model. Model performance statistics on days with observed MDA8 $O_3 \geq 60$ ppb at each monitoring site located in a water cell in the OTR in the 12OTC2 domain are shown in **Table 8-2**. CMAQ overpredicts O_3 at monitor #090010017 (Greenwich, 16% Normalized Mean Bias (NMB)), #090110124 (Groton, 6.6% NMB), #250010002 (Truro, 2.6% NMB)), and #440090007 (Narragansett, -4.6% NMB) while CAMx underpredicts O_3 at monitors #090010017 (Greenwich, -4.7% NMB), #090110124 (Groton, -5.2% NMB), #250010002 (Truro, -6.7% NMB), and #440090007 (Narragansett, -5.5% NMB). Both models underpredict O_3 at monitor #230090102 (Cadillac Mt Summit) and #250070001 (Martha's Vineyard). Normalized Mean Error (NME) for the seven monitoring sites ranges from 8.7 to 24.8% for CMAQ and from 9.6 to 28% for CAMx.

Figure 8-2 (A-D). *Observed and modeled MDA8 O_3 (ppb) for 2016 at monitors #090010017, #090110124, #240190004, and #440090007 located in a water cell in the 12OTC2 domain.*





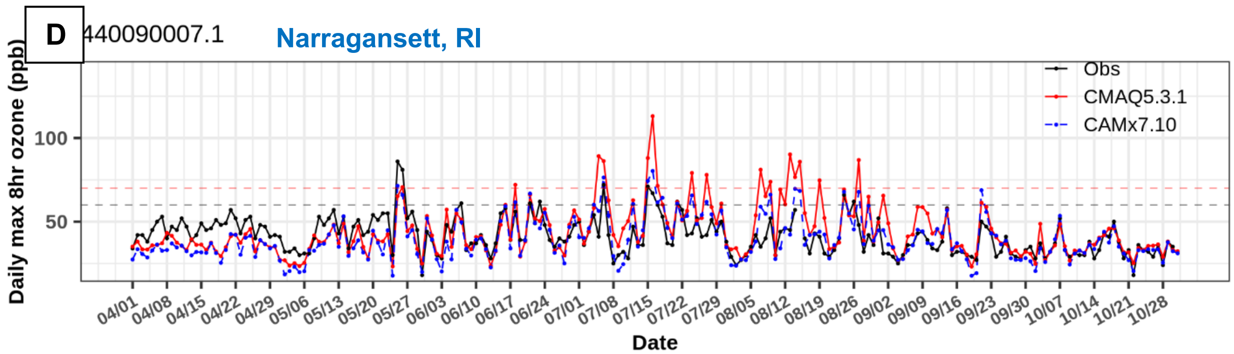


Table 8-2 *Model performance statistics at monitoring sites located in a water cell in the OTR in the 12OTC2 domain (where observed MDA8* O_3 *>= 60 ppb).*

Site ID	Location	# obs	CMAQ v5.3.1				CAMx v7.10			
			MB (ppb)	ME (ppb)	NMB (%)	NME (%)	MB (ppb)	ME (ppb)	NMB (%)	NME (%)
090010017	Greenwich, CT	27	11.2	16.7	16	23.9	-3.2	8.9	-4.6	12.8
090110124	Groton, CT	25	4.5	12	6.6	17.6	-3.6	9.4	-5.2	13.8
230090102	Cadillac MT Summit, ME	12	-16.1	16.1	-24.7	24.8	-18.2	18.2	-28	28
240190004	Horn Point, MD	17	0.4	7	0.6	10.7	1	6.3	1.5	9.6
250010002	Truro, MA	11	1.7	14.5	2.6	22.6	-4.3	9.5	-6.7	14.8
250070001	Martha's Vineyard, MA	7	-1	5.8	-1.4	8.7	-1.1	9.5	-1.7	14.1
440090007	Narragansett, RI	12	2.9	13.2	4.3	19.5	-3.7	8.7	-5.5	12.9

8.3 Comparing Model Performance Using the Four Methods

Model performance for the monitoring sites located near water cell tends to be poor. Here the various approaches, discussed above, to eliminate the influence of water grids on model performance is assessed. **Table 8-2** shows the model performance statistics for the seven monitoring sites located in a water cell in the OTR.

Figure 8-3 (A-D). *Modeled vs. observed MDA8 O_3 (ppb) at monitors #090010017, #090110124, #240190004, and #440090007 in the 12OTC2 domain.*

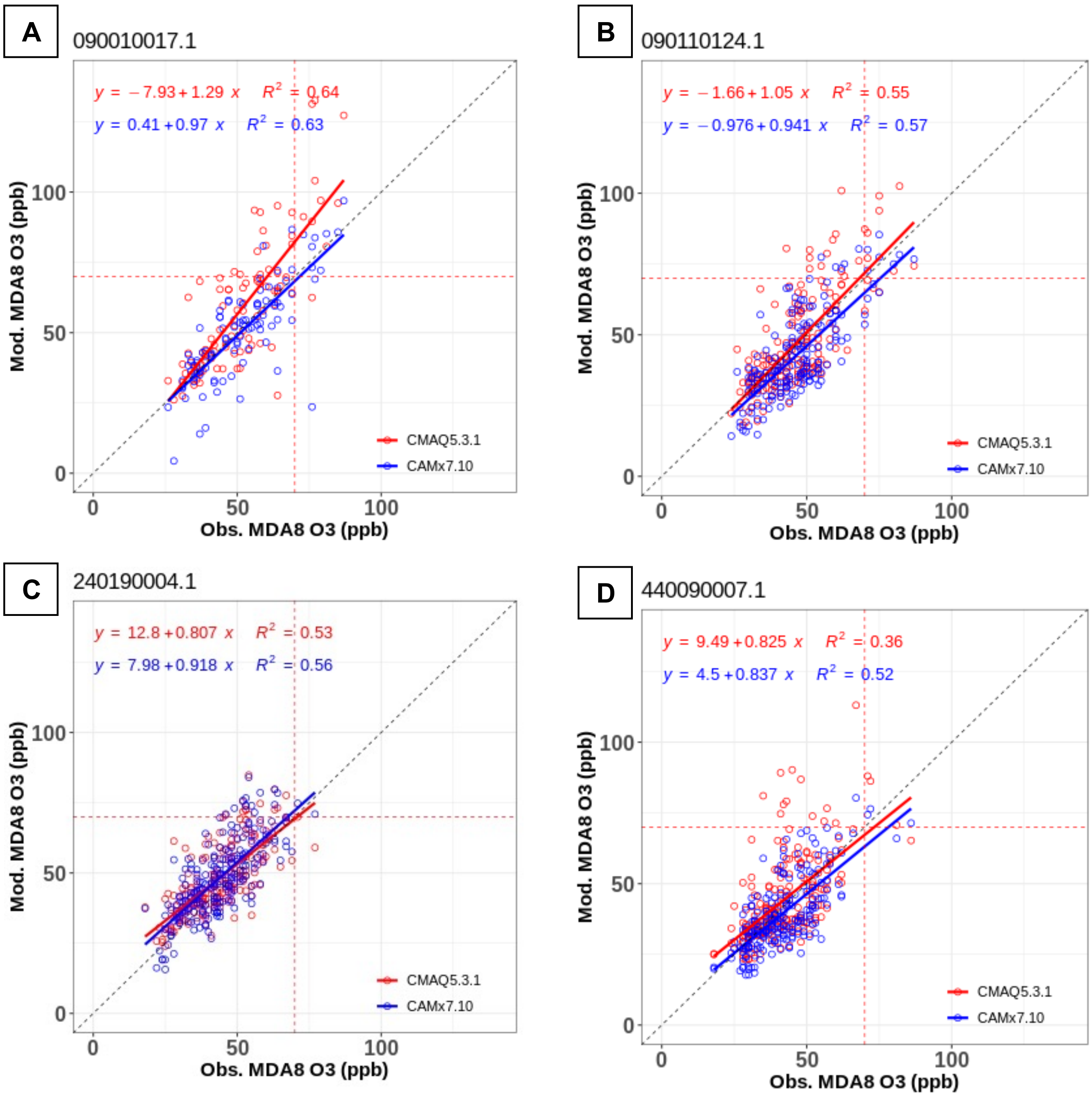


Figure 8-4 illustrates the 3x3 grid cell array centered over each monitoring site located in a water cell. Green shading indicates a grid cell classified as land, while blue shading indicates a grid cell classified as water. The grid cells used in the RRF calculation using the three methods are shown with numbers representing how many times the grid cell was used. If numbers are not shown (e.g., the 3x3 method with CMAQ for #230290019, Jonesport, ME), an RRF was not calculated due to not enough days ≥ 60 ppb MDA8 O_3. With the No Water 1 method, for CMAQ, six out of eight monitors utilize only the centered grid cell containing water for the RRF calculation, which is identical to the 1x1 method (e.g., 10 times used for #090010017 (Greenwich) and 6 times used

for #230090102 (Cadillac MT Summit)). On the other hand, for CAMx, there is one site (Truro, #250010002) that used only the centered grid cell containing water because all nine grid cells are water cells for this site. The No Water 2 method uses only land cells in the RRF calculation as shown in the figure.

Figure 8-5 shows observed and CMAQ modeled MDA8 O_3 (ppb) for 2016 at monitor #090110124 (Groton), respectively, for the days used in the RRF calculation using the four different methods. For each method, MDA8 O_3 values from the water cell where the monitor is located (indicated as Mod_grid_1x1) are compared for each day. The No Water 1 (**Figure 8-5B**) and 1x1 method (**Figure 8-5D**) show identical results because the water cell where the monitor is located is used for all of the top 10 days for the No Water 1 method (see **Figure 8-4**). The No Water 2 method resulted in reducing the overprediction of O_3 for the days used in the RRF calculation (**Figure 8-5C**).

Figure 8-6 illustrates observed and CAMx modeled MDA8 O_3 (ppb) for 2016 at monitor #090110124 (Groton) for the days used in the RRF calculation using the four methods. The differences between the observed and modeled O_3 for each method for CAMx are smaller than for CMAQ. **Table 8-3** shows NMB (%) restricted to those days and grid cells used in the RRF calculation (modeled MDA8 O_3 from the grid cell used in the RRF calculation), as opposed to **Table 8-2**, which shows overall statistics at the grid cell where the site is located on all days with observed MDA8 $O_3 \geq 60$ ppb. For both models, NMB values are the lowest using the No Water 2 method.

8.4 2023 Projected Design Values for monitors located in a grid classified as a water cell (CMAQ vs CAMx)

The pre-truncated projected 2023 design values for monitors located in a water cell in the OTR region are listed in **Table 8-4**. The values exceeding 65 ppb are shown in yellow, while values that exceed 70 ppb (2015 NAAQS) and 75 ppb (2008 NAAQS) are in orange and dark red, respectively. The values based on different methods show a wider range for CMAQ by up to 7 ppb, compared to CAMx which vary by up to 3 ppb as shown in **Figure 8-4**. The values using the 3x3 No Water 1 method are the same as the values using the 1x1 method for most of sites for CMAQ as expected from the grid cells used in the RRF calculation. The values using the 3x3 No Water 2 method are substantially lower than the 3x3 No Water 1 method for monitor 090010017 (Greenwich) and 090110124 (Groton) for CMAQ. However, for CAMx, the difference is not as substantial. For the 3x3 No Water 2 method, monitors #230090102, #230290019 (for CMAQ) and #250010002 (for CMAQ and CAMx) had fewer than 5 days ≥ 60 ppb MDA8 O_3. Therefore, RRFs or DVFs were not calculated.

8.5 Summary

This section described the four different methods to calculate the RRFs for monitors located in a water cell. We compared the performance statistics for the days and grid cells used in the RRF calculation among the four methods. Performance statistics show that the 3x3 No Water 2 method has the lowest bias for most of cases when the RRFs were calculated. Even though there were large differences in NMB between the 3x3 and 3x3 No Water 2, the projected DVFs were similar for most cases. Using the four different methods on different modeling platform may result in different outcomes.

Figure 8-4 *Grid cells used in the RRF calculation for monitors located in a water cell in the OTR in the 12OTC2 domain for CMAQ and CAMx, green for a land cell and blue for a water cell.*

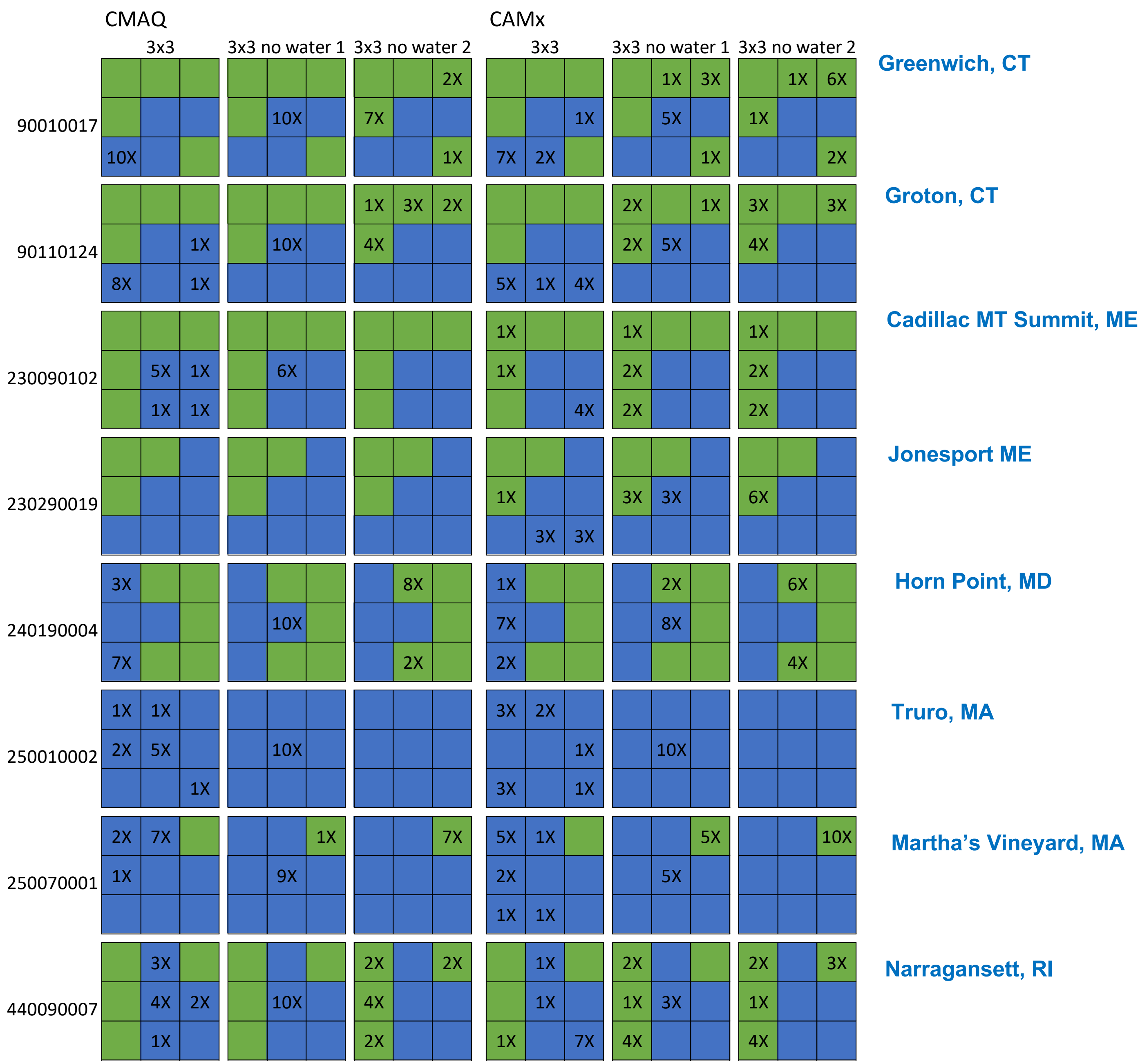


Figure 8-5 *Observed and CMAQ modeled MDA8 O_3 (ppb) for 2016 at the Groton, CT monitor #090110124 using the 3x3 (top left), 3x3 No Water 1 (top right), 3x3 No Water 2 (bottom left), and 1x1 method (bottom right) for 10 selected days used in the RRF calculation and associated observed O_3.*

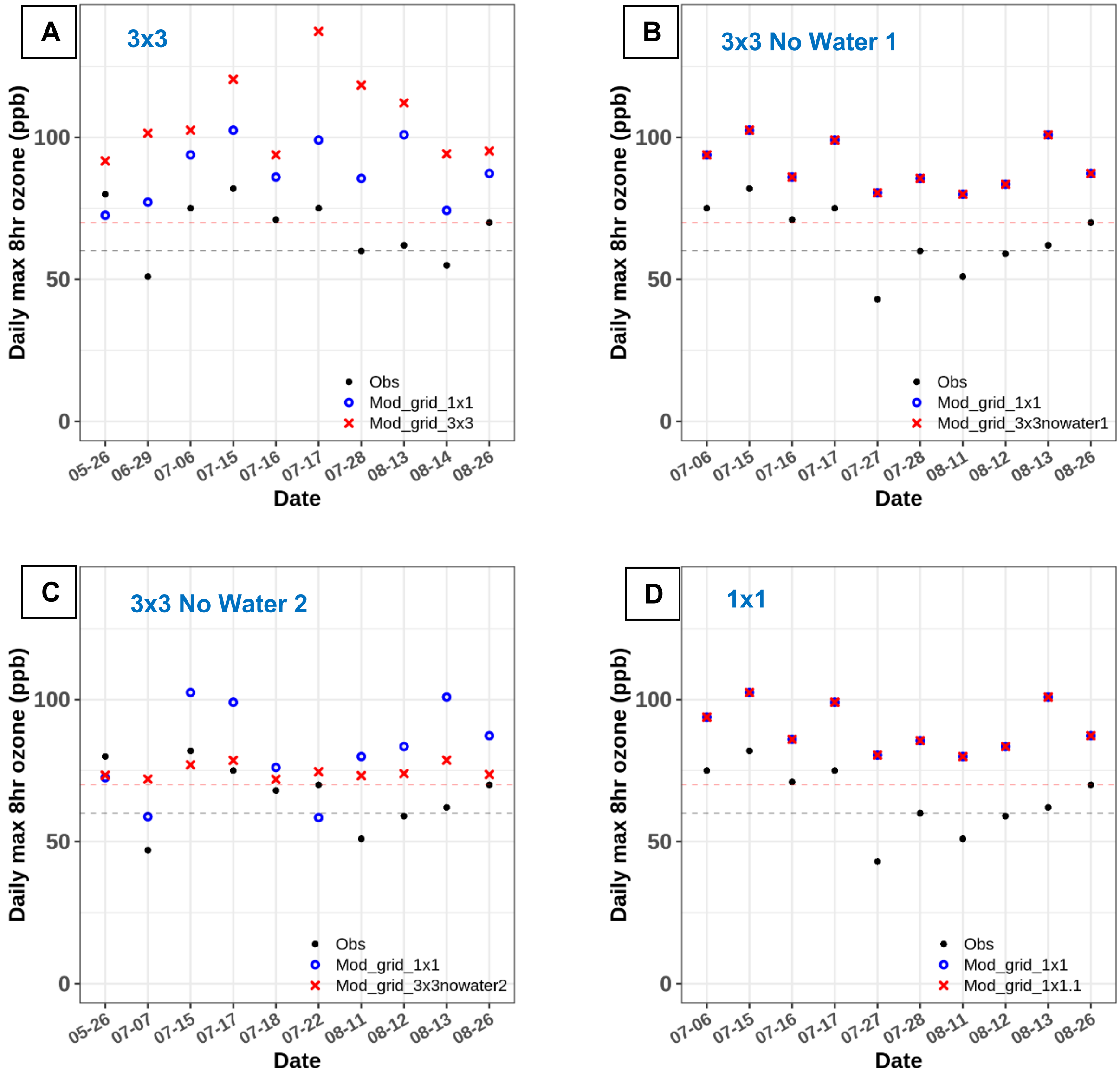


Figure 8-6 (A-D). *Observed and CAMx modeled MDA8 O_3 (ppb) for 2016 at Groton, CT monitor #090110124 using the 3x3 (top left), 3x3 No Water 1 (top right), 3x3 No Water 2 (bottom left), and 1x1 method (bottom right) for 10 selected days used in the RRF calculation and associated observed O_3.*

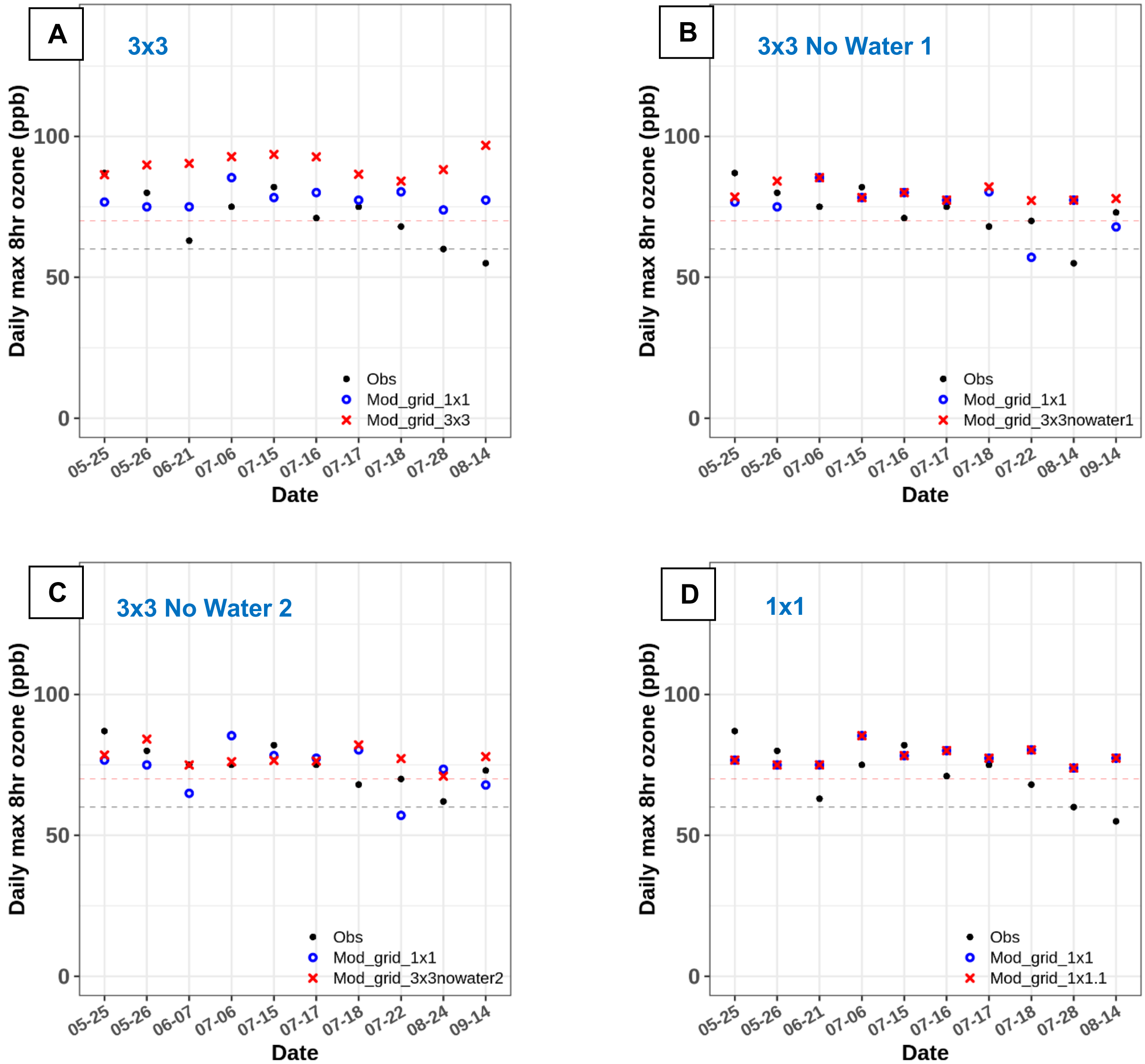


Table 8-3 *NMB (%) for the days and grid cells used in the RRF calculation using the four methods in the OTR.*

Site ID	Location	Projected 2023 DVF (CMAQ v5.3.1)				Projected 2023 DVF (CAMx v7.10)			
		3x3	3x3 No Water 1	3x3 No Water 2	1x1	3x3	3x3 No Water 1	3x3 No Water 2	1x1
090010017	Greenwich, CT	130.4	46	10.5	46	27.3	11.3	7.7	12.8
090110124	Groton, CT	56.6	38.7	12.4	38.7	25.8	8.4	3.6	8.8
230090102	Cadillac MT Summit, ME	30.7	21.7	n/a	21.7	12.1	4	4	n/a
230290019	Jonesport, ME	n/a	n/a	n/a	n/a	37	36	33.5	n/a
240190004	Horn Point, MD	46.8	30.3	10.4	30.3	36.4	26.9	18.8	31.3
250010002	Truro, MA	65	55.2	n/a	55.2	25.9	15.4	n/a	15.4
250070001	Martha's Vineyard, MA	73.1	34.3	10.5	29.7	34.8	29	19.9	27.6
440090007	Narragansett, RI	75.8	70.6	12.5	70.6	25.2	11.4	10	11.2

Table 8-4 *2023 O_3 projected design values (DVF) in ppb for monitors located in a water cell in the OTR in the 12OTC2 domain.*

Site ID	Location	2014-2018 DVB	2023 DVF (CMAQ v5.3.1)				2023 DVF (CAMx v7.10)			
			3x3	3x3 No Water 1	3x3 No Water 2	1x1	3x3	3x3 No Water 1	3x3 No Water 2	1x1
090010017	Greenwich, CT	79.3	71.7	78.5	72.4	78.5	74	74.5	73.5	76.1
090110124	Groton, CT	74.3	67.9	71.3	66.7	71.3	67	68	67	68.8
230090102	Cadillac MT Summit, ME	69	61.5	61.5	n/a	61.5	60.7	60.6	60.6	n/a
230290019	Jonesport, ME	59.3	n/a	n/a	n/a	n/a	52.4	52.2	52.2	n/a
240190004	Horn Point, MD	64.7	58	57.2	56.6	57.2	56.9	57	56.6	57.2
250010002	Truro, MA	69	60.1	59.8	n/a	59.8	61.6	61.4	n/a	61.4
250070001	Martha's Vineyard, MA	70	62.6	62.6	63.8	62.7	63.4	62.8	63.4	62.9
440090007	Narragansett, RI	69.3	66.2	65	61.2	65	63.1	62.1	62	63.1

9 Projected 8-hour Ozone Air Quality over the Ozone Transport Region

EPA guidance recommends the use of the RRF approach to demonstrate attainment of the 8-hour O_3 NAAQS (US EPA 2018b), however occasionally model grid cells code coastal monitors as in water cells which can be problematic for model to observation comparison. The OTC Modeling Committee compared several approaches to assess modeled attainment including two modified approaches that excluded grid cells identified as majority water, as described in **Section 8**. In this section, the results based on the standard 3x3 method, as well as the modified 3x3 no water 1 method, are presented for all ozone monitor location grid cells identified as water that were excluded ("3x3 No Water 1 method"), as per the EPA guidance.

9.1 Projected Design Values

As described in **Section 8**, RRFs and O_3 design values were computed for all monitors across the 12OTC2 domain, using the 2016 base year and 2023 projected V1 inventories. Using the standard 3x3 method, the average future year design values across the 12OTC2 domain using CAMx and CMAQ are displayed in the panels of **Figure 9-1**, whereas the 3x3 No Water 1 method results are displayed in **Figure 9-2**. Similar versions of these plots but focusing on the Northeast are shown in **Figures 9-3** and **9-4**, respectively.

The average projected design values from both CAMx and CMAQ are broadly consistent across the 12OTC2 domain; both models predict the highest design values in the Northeast urban corridor, Lake Michigan region, urban regions in TX (Dallas and Houston), and Denver, CO. Over portions of the Southeast, CMAQ tended to predict lower design values than CAMx, as evidenced by the larger number of sites where future design values could not be computed (fewer than five days with base year MDA8 ≥ 60 ppb). Both the standard 3x3 method and 3x3 No Water 1 approach yielded broadly consistent design values across the entire domain.

Focusing on the Northeast region, CAMx projected six monitors—one each in NY and PA, four in CT—to have average future design values to exceed 70 ppb with the 3x3 method. Similarly, CMAQ projected five monitors to exceed 70 ppb with the regular 3x3 method, and five monitors to exceed 70 ppb with the No Water 1 method.

The base and future year ozone design values from CMAQ and CAMx are shown in **Table 9-1** for the highest ozone monitors in the OTR (a full list is provided in **Appendix C**). Color-shading in **Table 9-1** is consistent with **Figures 9-1** through **9-4**: future year values that exceed 65 ppb are indicated in yellow, while values that exceed 70 ppb are shown in orange; values that exceed 75 ppb are show in red. These projections for any of the monitors listed in **Appendix C** can be made available upon request to the NYSDEC. **Appendix D** lists all monitors available in the 12OTC2 domain used in DVF calculations, and **Appendix E** lists calculated 2023 DVFs for these monitors.

Figure 9-1 *Full model domain projected 2023 V1 (fi) O_3 design values across the 12OTC2 domain, using the standard 3x3 method, with A) CAMx (left) and B) CMAQ*

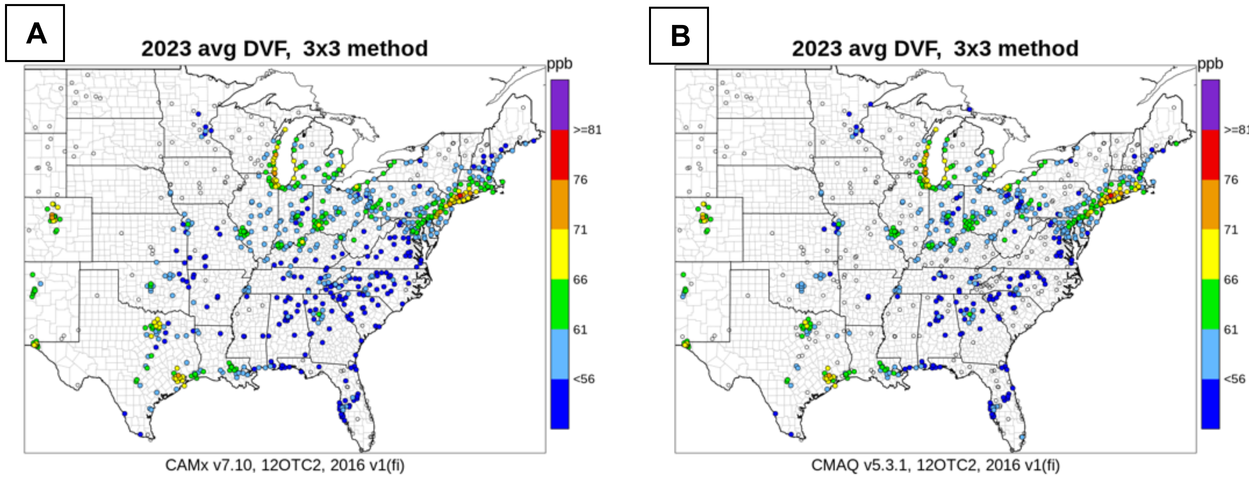


Figure 9-2 *Full model domain projected 2023 V1 (fi) O_3 design values across the 12OTC2 domain, using the 3x3 No Water 1 method, with A) CAMx (left) and B) CMAQ (right).*

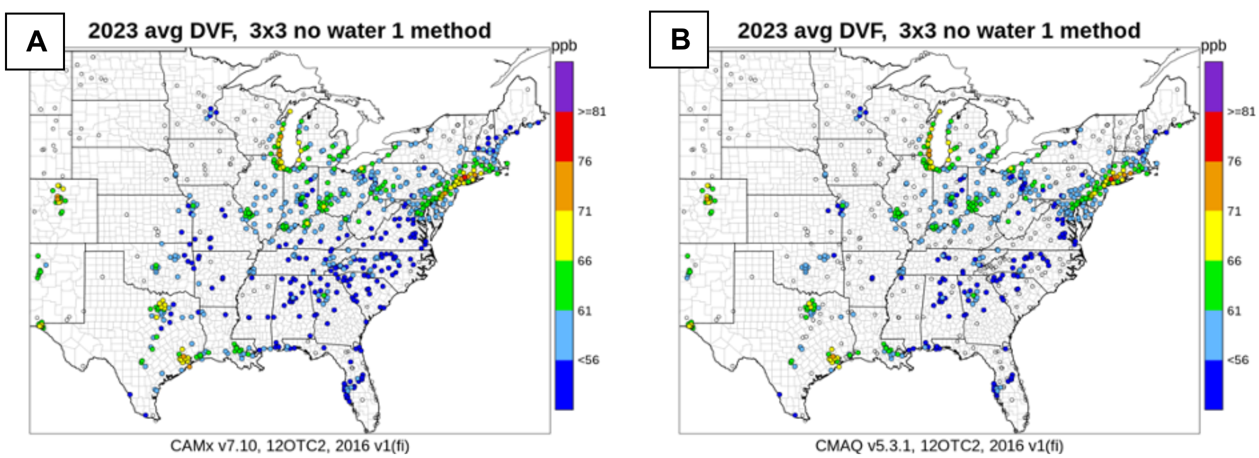


Figure 9-3 *OTR projected 2023 V1 (fi) O_3 design values across the Northeast region, using the standard 3x3 method, with A) CAMx (left) and B) CMAQ (right).*

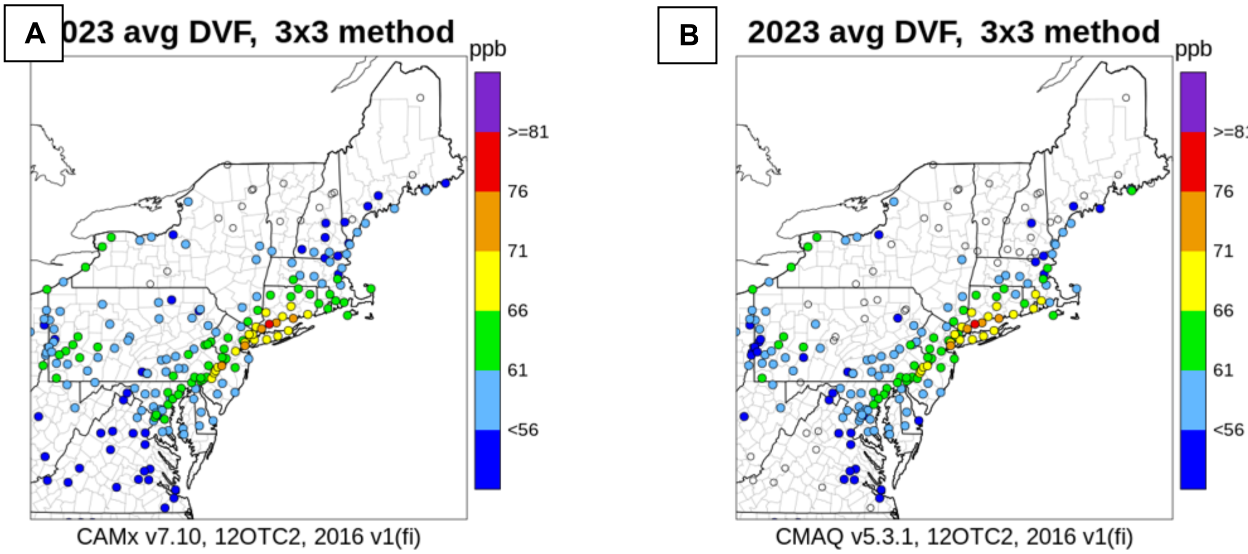


Figure 9-4 *OTR projected 2023 V1 (fi) O_3 design values across the Northeast region, using the 3x3 No Water 1 method, with A) CAMx (left) and B) CMAQ (right).*

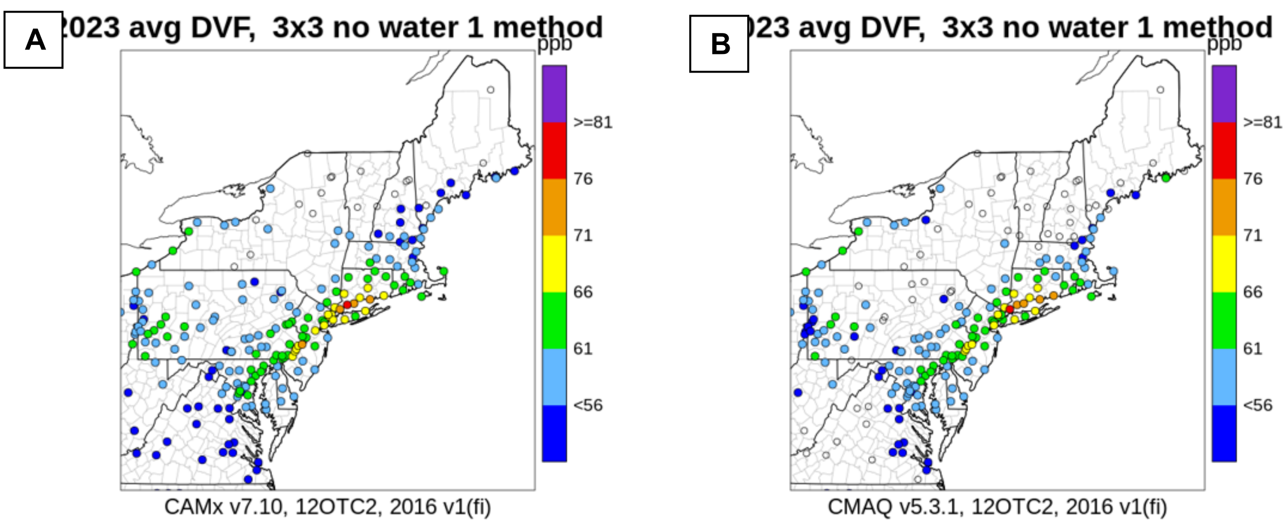


Table 9-1 *Top 22 OTR Ozone Monitors - Baseline (2014-2018) and projected 2023 O_3 design values from CAMx and CMAQ, using the standard 3x3 method and the 3x3 No Water 1 method. Future design values that exceed 65 ppb are highlighted in yellow, values that exceed 70 ppb are highlighted in orange, and values that exceed 75 ppb are highlighted in dark red.*

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	**State**	**County**	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
90019003	CT	Fairfield	**82.7**	**83**	**78**	**78**	**76**	**76**	**80**	**80**	**75**	**75**
90013007	CT	Fairfield	**82**	**83**	**75**	**76**	**75**	**75**	**74**	**75**	**75**	**76**
90099002	CT	New Haven	**79.7**	**82**	**71**	**73**	**72**	**74**	**71**	**73**	**71**	**73**
420170012	PA	Bucks	**79.3**	**81**	**71**	**72**	**71**	**72**	69	70	69	70
90010017	CT	Fairfield	**79.3**	**80**	**74**	**74**	**74**	**75**	**71**	**72**	**78**	**79**
90079007	CT	Middlesex	**78.7**	**79**	70	70	70	70	69	69	69	69
90011123	CT	Fairfield	**77**	**78**	69	70	69	70	69	70	69	70
421010024	PA	Philadelphia	**77.7**	**78**	69	69	69	69	68	68	68	68
90090027	CT	New Haven	75.7	**77**	69	70	68	69	69	70	68	69
340070002	NJ	Camden	75.3	**77**	67	69	67	69	66	67	66	67
90110124	CT	New London	74.3	**76**	67	68	68	69	67	69	**71**	**73**
360850067	NY	Richmond	**76**	**76**	**71**	**71**	70	70	**74**	**74**	70	70
361030002	NY	Suffolk	**74**	**76**	69	**71**	68	70	68	70	67	69
361030004	NY	Suffolk	**74.3**	**76**	68	69	67	68	66	67	66	68
421010048	PA	Philadelphia	**75.3**	**76**	67	68	67	68	66	66	66	66
240251001	MD	Harford	74	75	65	66	64	65	63	64	64	64
340030006	NJ	Bergen	74.3	75	69	69	69	69	68	68	68	68
340230011	NJ	Middlesex	74.7	75	66	66	66	66	65	66	65	66
361192004	NY	Westchester	74	75	70	70	67	68	66	67	68	68
90031003	CT	Hartford	71.7	74	63	65	63	65	62	64	62	64
100031010	DE	New Castle	73.7	74	65	65	65	65	65	65	65	65
240031003	MD	Anne Arundel	74	74	64	64	64	64	65	65	63	63

A table complete with modeling results for all OTR ozone monitors is located in ***Appendix C****.*

10 Tagged Source Apportionment Modeling

10.1 Background and Overview

States are required under § 110(a)(2)(D) of the Clean Air Act to submit SIP revisions that prohibit their state's air pollution emissions from contributing to nonattainment or interfering with maintenance of the NAAQS in a downwind state (*Clean Air Act Amendments of 1990 and 86 FR 60602 (November 2021)*). These SIPs, called Good Neighbor SIPs, are due three years after a NAAQS is updated, which for the 70 ppb 2015 Ozone NAAQS is October 1, 2018, prior to the earliest designated attainment date for that standard.

For the 2008 Ozone NAAQS, multiple states failed to submit timely or approvable Good Neighbor SIPs. This prompted EPA to adopt the "CSAPR Update Rule" as a Federal Implementation Plan (FIP) (US EPA 2016). EPA cautioned that the CSAPR Update was only a "partial remedy," meaning there were still unfulfilled Good Neighbor obligations from upwind states beyond meeting the requirements of the CSAPR Update. On December 6, 2018, EPA issued a rule called the "CSAPR Close-out Rule," which concluded that the "CSAPR Update Rule" was in fact a "full remedy". However, the US Court of Appeals for the DC Circuit vacated the "CSAPR Close-out Rule" and remanded the "CSAPR Update Rule" in separate decisions on September 13, 2019 resulting in the need for EPA to issue a "full remedy" for 2008 Ozone NAAQS Good Neighbor obligations (summary and history available online[52]). This course of events led to EPA issuing the "Revised CSAPR Update Rule"[53] on March 15, 2021, which EPA concludes will resolve transport obligations under the 2008 Ozone NAAQS.

However, states were obligated to submit in parallel sufficient Good Neighbor SIPs under the 2015 Ozone NAAQS by August 3, 2018. EPA is required to submit a completeness finding between 60 days and six months by the due date of a SIP (CAA § 110(k)(1)(B)) and either approve, partially approve, or disprove plans within 12 months of submission of a plan (CAA § 110(k)(2)). Additionally, CAA § 110(c)(1) directs the EPA to promulgate a Federal Implementation Plan (FIP) ''at any time within two years'' of its disapproval or finding of failure to submit." This set of timelines establishes FIP deadline dates for EPA for 2015 ozone NAAQS Good Neighbor obligations as February 3, 2021 for any states with unsubmitted SIPs, and August 3 2021 for any states with disapproved plans. On April 6, 2022, EPA issued a proposed FIP [87 FR 20036] which as of this writing has not been issued as final rule.[54]

To determine contributions from upwind states, regions and individual emission sectors to O_3 formation in the OTR, OTC conducted tagged in-house modeling simulations. OTC sees value in

[52] US EPA Final Cross-State Air Pollution Rule Close-Out Rule History. https://www.epa.gov/airmarkets/final-csapr-close-out#rule-history.
[53] US EPA Revised Cross-State Air Pollution Rule Update. https://www.epa.gov/csapr/revised-cross-state-air-pollution-rule-update.
[54] See https://www.epa.gov/csapr/good-neighbor-plan-2015-ozone-naaqs for updates to the 2015 Good Neighbor FIP.

examining different contribution metrics for assessing contribution bfrom upwind states, given that the current EPA routine can average-out large state contributions over a relatively large number of days. OTC notes that ozone attainment is based on 4th highest values, not ozone season averages. Additionally, OTC sees value in having in-house tagged emission contribution modeling using ERTAC EGU for EGU projections and a more robust tagging schema for emission sectors. As a result, the OTC Modeling Committee (MC) has developed an alternate assessment of state contribution based on the 2023 modeling to inform work related to reducing upwind transport.

10.2 Tagging Methodology

Source category emissions were tagged to allow comparisons at both the state and emission sector level. It is acknowledged that an emission sector in a state that is further away might have a minimal contribution, however having the ability to aggregate sectors to assess different contributions is important when considering the value of a sector-wide emission control strategies.

Selected emission tags were informed from analysis of previous OTC and EPA tagged emission modeling for 2023 (2011-based platform), as well as EPA's preliminary source sector 2023 contribution modeling (2016-based platform). These modeling efforts found results similar to those identified in OTC Section 176A petition (September 10, 2015), helping OTC identify significant contributors to O_3 nonattainment in the OTR. Ultimately, the OTC Modeling Committee applied emission tags to individual and groupings of states for 23 emission source sectors.

Since the OTC modeling includes individual states and sets of emission sectors within most states, a large number of emission tags were initially proposed, potentially as many as 736. Such a large number of emission tags places a strain on modeling and emission preparation resources, so efforts were made to identify efficient ways to group emissions in ways that meaningful information is not sacrificed. According to EPA's NEI emission trend data, the ten highest NO_X and VOC emitting states within the 12OTC2 modeling domain are shown in **Table 10-1**.

Table 10-1. *2017 NEI emissions data by state within the 12OTC2 modeling domain*

Rank	2017 Tons NOx		2017 Tons VOC	
1	TX	1,129,738	TX	1,801,251
2	FL	478,680	FL	735,085
3	IL	379,787	ND	547,427
4	PA	352,942	PA	457,928
5	OH	349,639	LA	432,955
6	LA	327,562	OK	421,383
7	MI	313,695	NY	382,651
8	GA	310,653	AL	367,945
9	IN	306,800	MI	367,848
10	OK	302,185	IL	365,314

Of the highest NO_X emitting states within the 12OTC2 modeling domain, only one is an OTC state (Pennsylvania) and four others are section 176A states (Illinois, Indiana, Michigan, Ohio). Of the remaining top emitting states, Florida, Louisiana, Oklahoma and Texas are included in the top ten for both NOx and anthropogenic VOC emissions. Florida onroad emissions are comparable to those of California (not shown), and Louisiana, Oklahoma and Texas all have oil and gas related emissions that are comparable, or higher than, their onroad emissions. Texas, Florida, Louisiana, and Oklahoma were included in the OTC tagged emission contribution modeling as high emitting states.

Figure 10-1 *12OTC2 modeling domain for projected 2023 emission tagging.*

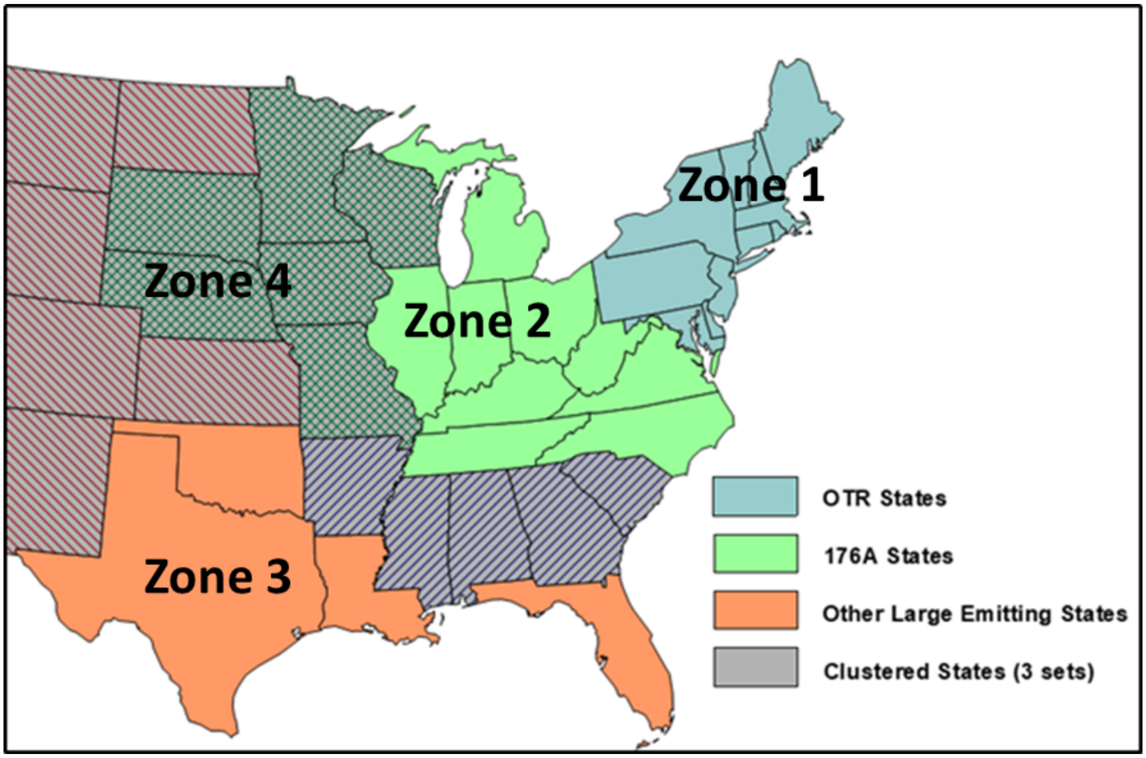


Table 10-2. *Emission sectors for the tagged contribution modeling*

State Emission Sectors	Domain-wide Sectors:
• Area-nonpoint • EGU-ERTAC • EGU-Peaking • NonEGU • NonRoad-diesel • NonRoad-nondiesel • OnRoad-diesel • OnRoad-nondiesel • Oil & Gas-point • Oil & Gas-nonpoint	• Commercial Marine Vehicles • Rail • Airport/Airplane up to 3000' (Corrected) • Agriculture • Offshore CMV • Offshore rigs • Prescribed fire • Biogenic • Canada • Mexico • Boundary conditions • Initial conditions • Other

Table 10-3. *Emission tag summary.*

Sector	Zone 1 MANE-VU + VA	Zone 2 176A states excluding VA	Zone 3 4 large emitting states	Zone 4 Other states by subzone	Zone 5 Canada and Mexico
Area (Nonpoint)	X	X	X	Multi-state	Single tag for each country for all emission sectors
CMV (c1c2c3)	X	X	X	Multi-state	
EGU-ERTAC	X	X	X	Multi-state	
Non-EGU	X	X	X	Multi-state	
Nonroad - Diesel	X	X	X	Multi-state	
Nonroad - Non-diesel	X	X	X	Multi-state	
Oil & gas - Nonpoint	X	Point + NonPoint	Point + NonPoint	Multi-state Point + NonPoint	
Oil & gas - Point	X				
Onroad - Diesel	X	X	X	Multi-state	
Onroad -Non-diesel	X	X	X	Multi-state	
Airport-up to 3000'	X	Multi-state (All Zone 2 Combined)	Multi-state (All Zone 3 and Zone 4 Combined)		
Rail	X	Multi-state (All Zone 2 Combined)	Multi-state (All Zone 3 and Zone 4 Combined)		
EGU - Peakers	X	Multi-state (All Zone 2 Combined)	Multi-state (All Zone 3 and Zone 4 Combined)		
Agriculture	Multi-state (Zones 1 - 4 Combined)				
Offshore CMV	Multi-state (Zones 1 - 4 Combined)				
Offshore Rigs	Multi-state (Zones 1 - 4 Combined)				
Residential Wood	Multi-state (Zones 1 - 4 Combined)				
Ag Fire	Multi-state (Zones 1 - 4 Combined)				
Prescribed/Wildfire	Multi-state (Zones 1 - 4 Combined)				
Other	Multi-state (Zones 1 - 4 Combined)				
Biogenic	Multi-state (Zones 1 - 4 Combined)				
Boundary Condition	Multi-state (Zones 1 - 4 Combined)				
Initial Condition	Multi-state (Zones 1 - 4 Combined)				

The OTC MC proposed doing a full set of emission tags for all states in the OTR and the District of Columbia, all nine Section 176A Petition states, and the four largest NO_X emitting states in the 12OTC2 modeling domain. The remainder of the states were grouped geographically and/or emission sectors were grouped based on commonality. State groupings cover seventeen states and partial states, plus parts of Canada and Mexico that are included in the newly expanded OTC modeling domain (see **Figure 10-1**). The emission sectors selected by OTC for tagging are presented in **Table 10-2**, emission tag aggregation is presented in **Table 10-3** and a summary of NO_X emissions by tag is presented in **Table 10-4**.

Table 10-4. *Total Ozone Season NO_X Emissions by Emission Tag (tons NO_X) for A) OTR + VA and B) Full Domain*

Part A - OTR + VA Detail

Total Projected 2023 Ozone Season NOx Emissions	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT	VA
Onroad-diesel	1,286	763	232	2,218	6,087	4,490	1,220	6,454	13,016	15,668	1,084	571	8,846
Onroad-nondiesel	2,897	1,275	600	1,656	4,919	5,161	1,593	6,522	13,291	13,389	790	769	12,106
Nonroad-diesel	1,875	774	150	1,268	2,459	3,442	1,053	5,375	10,089	8,670	530	1,560	5,056
Nonroad-nondiesel	1,259	1,293	60	1,994	2,260	2,886	915	3,280	7,290	3,878	381	346	3,295
EGU-ertac	2,471	718	1	1,588	4,552	2,792	279	4,278	10,770	23,434	489	10	7,962
Peakers	14	1	0	14	935	97	51	182	2,453	652	1	0	110
NonEGU	397	984	191	2,368	3,842	5,971	454	2,352	7,914	17,770	469	137	8,038
Area-nonpoint	3,491	1,228	586	2,227	3,683	8,068	3,291	6,211	17,073	20,950	931	1,045	6,941
CMV_C1C2C3	807	1,320	64	1,267	3,749	2,246	108	5,657	3,416	1,023	773	0	5,357
Oil&gas-nonpoint	0	0	0	0	0	0	0	0	257	21,286	0	0	4,362
Oil&gas-point	118	9	0	13	103	127	0	149	825	3,329	44	0	1,449
Airport	193	121	0	160	1,166	1,281	182	2,044	3,370	1,589	137	76	2,513
Rail	510	108	89	510	1,195	1,893	158	2,468	5,471	6,090	27	295	4,120

Note: Emissions for all other sectors included in Part B table below.

Part B - Full Domain Detail

Total Projected 2023 Ozone Season NOx Emissions	OTR+VA	IL	IN	KY	MI	NC	OH	TN	WV	FL	LA	OK	TX	AL, AR, GA, MS, SC	IA, MN, MO, NE, SD, WI	CO, KS, MT, NM, ND, WY	Canada	Mexico
Onroad-diesel	61,934	15,224	12,846	9,403	8,027	9,296	11,158	12,646	3,721	20,838	10,318	10,676	42,603	51,775	45,610	29,320	245,467	305,365
Onroad-nondiesel	64,967	13,063	12,521	8,774	14,443	20,915	17,409	12,708	3,257	24,207	6,993	9,449	22,293	52,311	43,501	23,767		
Nonroad-diesel	42,301	13,253	10,146	3,177	6,080	6,826	10,844	4,709	982	16,503	2,742	3,398	26,157	21,705	52,661	27,065		
Nonroad-nondiesel	29,137	4,339	2,514	1,721	4,497	5,012	5,329	2,838	556	11,356	2,435	1,862	6,863	11,943	13,972	4,112		
EGU-ertac	59,344	17,895	22,389	23,397	13,730	7,743	17,679	7,087	20,374	27,364	24,875	12,056	48,877	38,528	53,760	47,042		
Peakers	4,508	5,242								7,733								
NonEGU	50,887	16,595	24,280	9,889	20,877	14,931	18,222	13,312	4,947	11,919	32,778	17,356	47,335	64,823	47,489	25,201		
Area-nonpoint	75,725	15,720	3,815	2,096	12,567	6,571	11,705	7,078	1,966	8,836	3,177	2,844	18,951	19,911	24,059	7,842		
CMV_C1C2C3	25,787	2,196	734	1,712	5,669	1,644	1,327	935	617	6,102	19,694	132	14,658	7,185	2,989	0		
Oil&gas-nonpoint	25,906	11,546	5,372	9,352	11,169	351	7,904	2,889	25,257	3,654	31,149	55,590	115,110	22,715	8,532	90,057		
Oil&gas-point	6,166																	
Airport	12,832	11,954								36,728								
Rail	22,934	44,900								123,723								
AllOthers	7,460,033																	
Biogenic	1,015,910																	
Offshore-CMV	149,007																	
Offshore-Rigs	24,465																	
RWC	4,521																	
Agriculture	0																	
Agricultural burnning	2,880																	
Wildfire and prescribed fire	54,800																	

10.3 Ozone Source Apportionment Modeling

OTC 2023 ozone source apportionment modeling was performed on OTC 2016 SIP modeling platform which was adapted from EPA's 2016v1 modeling platform and described in **Sections 2, 5, and 6**. OTC conducted CAMx v7.10 with APCA (Anthropogenic Precursor Culpability Assessment) model runs on 12OTC2 domain driven by EPA's WRF generated 2016 meteorological field and 2023 emissions projected from EPA's 2016fh emission inventories. CAMx-APCA is one of the ozone source apportionment techniques featured in the CAMx model. While CAMx-APCA tracks tagged ozone precursors and ozone formed via physical and chemical processes, the model re-allocates ozone production to anthropogenic precursors rather than to uncontrollable biogenic source. This enables modeling results to be more relevant to emission control policy making. Additionally, each tag has a NO_X and VOC component. The peer-reviewed CAMx model and its source apportionment technology tool have been extensively used by academic institutions and government agencies for atmospheric research, air quality rule making, and emission control strategy development, and EPA's CSAPR and Revised CSAPR Update were developed based on CAMx-APCA modeling. OTC performed ozone source apportionment modeling on the 2016 modeling platform is consistent with EPA's source apportionment modeling works. OTC modeling centers worked together to complete 2023 ozone source apportionment modeling with 2016 ozone season meteorology (from April 1 to September 30 of 2016). NYDEC performed SMOKE runs, NJDEP prepared tagged emissions, and UMD conducted CAMx-APCA runs.

OTC tagged a total of 320 emission sources plus concentrations from boundary conditions and initial conditions. To accommodate memory resource constraints, OTC divided 320 emission tags into 3 CAMx-APCA runs with 114, 108, and 103 emission tags, respectively. The detail tag list for 3 runs is shown in **Table 10-5**. OTC 12km domain includes 42 US states, Canada, and Mexico. For all 3 runs, biogenic emissions were always grouped as tag #1. Run 1 tagged onroad and nonroad mobile sectors for 42 states with 112 emission tags, with the rest of emissions lumped into tag #114. Run 2 tagged area, cmv, oil & gas, offshore-cmv, offshore-rig, rwc, agriculture, agriculture burning, wildfire and prescribed fire, others (i.e., afdust_adj and seasalt), Canada, and Mexico with 106 emission tags, with the rest of emissions lumped into tag #108. Run 3 tagged ERTAC EGU, nonERTAC EGU, airport, rail, and peakers with 101 emission tags, with the rest of emissions lumped into tag #103. The final two tags for each of the three runs were for boundary and initial condition concentrations, respectively.

OTC's CAMx-APCA runs were conducted with the point source override option, which looks for emission tags in the KCELL variable of point source emission file. The KCELL value is a negative integer, with the negative sign as the override flag and integer is the tag number. Source region map was overridden and set to be one source region for the whole domain. All sectors—except the ocean sea spray file extracted from EPA's 12US1 domain—were converted into one Fortran binary format point source emission file input for each CAMx-APCA run. This approach enables all nonpoint emission sources to be accurately allocated geographically. To run CAMx-APCA correctly, it's critical to set the flags SA_Use_APCA, SA_PT_Override, and most importantly SA_Use_APCA_PTOverride for each simulation.

OTC prepared tagged emissions with 3 different approaches to generate point source emissions depending on emission sectors: running SMOKE, modifying existing inline emission files, and converting 2D emission. For emission sectors tagged by state (area, onroad mobile, nonroad mobile, EGU, NONEGU, peaking units, nonpoint oil & gas, point oil & gas, airports, rail), OTC conducted SMOKE runs over EPA's 12US2 domain for each sector with SMK_SRCGROUP_OUTPUT_YN flag turned on which creates SGINLNTS and SRCGROUPS emission outputs in point source inline mode. The SOURCE_GROUPS file for SMOKE listed state code and corresponding group number for all OTC SMOKE runs. The state group number was assigned to IGROUP variable in the SRCGROUP output file. The SGINLNTS and SRCGROUPS combo outputs were cropped from 12US2 domain to 12OTC2 domain. Next, the sector specific SRCGROUPS file was processed to reset the IGROUP variable value from source state group number to state tag number in Table A. Finally SGINLNTS and SRCGROUPS are merged using CMAQ2UAM to generate Fortran binary format point source emission with KCELL value set as –(tag number).

For emission sectors with EPA's premerged INLN and STACK_GROUPS emission files available (cmv_c1c2 and cmv_c3, point source fire, and point sources in Canada and Mexico), OTC modified in-line emissions to add emission tag number for CAMx_APCA runs. INLN and STACK_GROUPS files were first cropped from 12US2 domain to 12OTC2 domain. The IFIPS variable in STACK_GROUPS has the state and county FIPS code for each point source stack. The 2 digits state code in FIPS was used to locate the source state and corresponding tag number. The variable ISTACK in STACK_GROUPS file was set as the tag number. Then INLN and STACK_GROUPS were merged using CMAQ2UAM to generate Fortran binary format point source emission file with KCELL value set as –(tag number).

For emission sectors with single tag throughout modeling domain (biogenic, residential wood combustion, agriculture, agriculture burning, wildfire and prescribed fire, fugitive dust, seasalt, nonpoint source in Canada and Mexico), OTC used EPA's premerged netCDF 2D emission files to convert ground level nonpoint emission to first layer point source emission using center of emission source residing grid cell for longitude and latitude of point source stack. The process included domain cropping from 12US2 to 12OTC2, and conversion to Fortran binary format point source emission file using CMAQ2UAM.

The final step of OTC tagged emission preparation was to merge all point source files from 23 sectors to generate one Fortran binary format point source emission file for each CAMx-APCA run using PTSMRG. The merge program provides the option to either keep KCELL values of input point source file unchanged or have KCELL value of input point source file assigned to a new value to accommodate emission tagging need for different CAMx-APCA run.

Note that some sectors only need to be SMOKE processed on certain representative days because of representative temporal profiles. Othar, onroad_can, and onroad_mex were processed for 7 days in each month. Airport sector was processed for 7 days each month plus holidays. Othpt was processed for 2 weekdays and 2 weekend days each month. ptnonertac and ptoilgas were processed for 2 weekdays and 2 weekend days plus holidays each month. All other sectors were processed daily throughout modeling period from April 1 to September 30.

10.4 Selection of EGU Peaking Units

The OTC MC modeling includes emission tags for EGUs whose operations can be variable and infrequent. Some of these units are older generating units that produce high rates of NOx emissions per MWh of electricity produced. There is considerable interest in understanding the role that these units play in O_3 production during high O_3 periods in the OTR. Many states have identified these units based on their own methodology, however, for this modeling effort, peaking units must be identified in a uniform way across the modeling domain for consistency in interpretation of proposed modeling. As such, the OTC MC worked with the OTC Stationary and Area Sources (SAS) Committee to develop a standard definition for unit identification for modeling purposes. These include units for electricity generation, heat and electricity cogeneration, and small electric producer units that meet each of the following conditions:

- Operated at least 20% of hours in each 2018 or 2019 O_3 season,
- Average total heat input 2018 or 2019 O_3 seasons was 10% or less the unit's maximum heat input capacity,
- Started operation prior to 1996,
- Unit retirement, if planned, is scheduled to be after the 2023 O_3 season, and
- An operational exception for the unit was not presented.

A full list of Part-75 "Peaking Units" operational during the 2018/19 period throughout the OTC12 modeling domain is included in **Appendix F**. Total emissions from these units are reported and gathered via the Continuous Emissions Monitoring Systems (CEMS) database. **Appendix G** contains non-Part-75 peaking units previously identified for modeling purposes.

Non-Part-75 units were identified through a previous collaborative process including EPA and states located in other regions. The non-Part-75 units were extracted from a modeling file called "*egunoncems_2016version1_ERTAC_Platform_POINT_27oct2019*." Operational information for these units is considerably more complicated to assess because these units do not report CEMS data and they are not regulated by large federal trading programs. The units identified as "peakers" are known to generally respond on peak energy demand days, but inventories carry insufficient information as to the exact days, hours, or magnitude of NO_X is emitted by individual units on peak energy demand days. While these units are tagged for this modeling effort, uncertainty exists regarding their true operations and impacts. Like with the Part-75 CEMS peaking list, non-Part-75 peaking unit list also excludes known unit shutdowns through 2023.

Table 10-5. *Detail list of emission tags for 3 CAMx-APCA runs.*

ST	FIPS	STATE	Biogenic	Onroad-diesel	Onroad-nondiesel	Nonroad-diesel	Nonroad-nondiesel	Area-nonpoint	CMV_C1C2C3	Oil&gas-nonpoint	Oil&gas-point	Offshore-CMV	Offshore-Rigs	RWC	Agriculture	Agricultural burning	wildfire and prescribed fire	Others	EGU-ertac	NonEGU	Airport	Rail	Peakers
CT	9	Connecticut	1	2	30	58	86	2	30	58	86	99	100	101	102	103	104	105	2	30	58	73	88
DE	10	Delaware		3	31	59	87	3	31	59	87								3	31	59	74	89
DC	11	District of Columbia		4	32	60	88	4	32	60	88								4	32	60	75	90
ME	23	Maine		5	33	61	89	5	33	61	89								5	33	61	76	91
MD	24	Maryland		6	34	62	90	6	34	62	90								6	34	62	77	92
MA	25	Massachusetts		7	35	63	91	7	35	63	91								7	35	63	78	93
NH	33	New Hampshire		8	36	64	92	8	36	64	92								8	36	64	79	94
NJ	34	New Jersey		9	37	65	93	9	37	65	93						i		9	37	65	80	95
NY	36	New York		10	38	66	94	10	38	66	94								10	38	66	81	96
PA	42	Pennsylvania		11	39	67	95	11	39	67	95								11	39	67	82	97
RI	44	Rhode Island		12	40	68	96	12	40	68	96								12	40	68	83	98
VT	50	Vermont		13	41	69	97	13	41	69	97								13	41	69	84	99
VA	51	Virginia		14	42	70	98	14	42	70	98								14	42	70	85	100
IL	17	Illinois		15	43	71	99	15	43	71	71								15	43	71	86	101
IN	18	Indiana		16	44	72	100	16	44	72	72								16	44	71	86	101
KY	21	Kentucky		17	45	73	101	17	45	73	73								17	45	71	86	101
MI	26	Michigan		18	46	74	102	18	46	74	74								18	46	71	86	101
NC	37	North Carolina		19	47	75	103	19	47	75	75								19	47	71	86	101
OH	39	Ohio		20	48	76	104	20	48	76	76								20	48	71	86	101
TN	47	Tennessee		21	49	77	105	21	49	77	77								21	49	71	86	101
WV	54	West Virginia		22	50	78	106	22	50	78	78								22	50	71	86	101
FL	12	Florida		23	51	79	107	23	51	79	79								23	51	72	87	102
LA	22	Louisiana		24	52	80	108	24	52	80	80								24	52	72	87	102
OK	40	Oklahoma		25	53	81	109	25	53	81	81								25	53	72	87	102
TX	48	Texas		26	54	82	110	26	54	82	82								26	54	72	87	102
GA	13	Georgia		27	55	83	111	27	55	83	83								27	55	72	87	102
SC	45	South Carolina		27	55	83	111	27	55	83	83								27	55	72	87	102
AL	1	Alabama		27	55	83	111	27	55	83	83								27	55	72	87	102
AR	5	Arkansas		27	55	83	111	27	55	83	83								27	55	72	87	102
MS	28	Mississippi		27	55	83	111	27	55	83	83								27	55	72	87	102
IA	19	Iowa		28	56	84	112	28	56	84	84								28	56	72	87	102
MN	27	Minnesota		28	56	84	112	28	56	84	84								28	56	72	87	102
MO	29	Missouri		28	56	84	112	28	56	84	84								28	56	72	87	102
NE	31	Nebraska		28	56	84	112	28	56	84	84								28	56	72	87	102
SD	46	South Dakota		28	56	84	112	28	56	84	84								28	56	72	87	102
WI	55	Wisconsin		28	56	84	112	28	56	84	84								28	56	72	87	102
CO	8	Colorado		29	57	85	113	29	57	85	85								29	57	72	87	102
KS	20	Kansas		29	57	85	113	29	57	85	85								29	57	72	87	102
MT	30	Montana		29	57	85	113	29	57	85	85								29	57	72	87	102
ND	38	North Dakota		29	57	85	113	29	57	85	85								29	57	72	87	102
NM	35	New Mexico		29	57	85	113	29	57	85	85								29	57	72	87	102
WY	56	Wyoming		29	57	85	113	29	57	85	85								29	57	72	87	102
		Canada		106																			
		Mexico		107																			

10.5 2023 Design Value Results

After applying the relative reduction process and the standard 3x3 grid cell technique, between five and six OTR monitors had modeled projected O_3 design values exceeding the 2015 O_3 NAAQS and one exceeded the 2008 O_3 NAAQS. **Tables 10-6** and **10-7** present monitors in the OTR failing to attain/maintain the O_3 NAAQS. Monitor specific data for other monitors located throughout the 12OTC2 modeling domain is available upon request.

Table 10-6 *OTC 2023 Modeled Violations of the 2008 and 2015 Ozone NAAQS.*

Site ID	State	Location	2019-21 Design Value	2023 CAMx	2023 CMAQ
90010017	CT	Greenwich	79	74.1	71.7
90013007	CT	Stratford	81	75.8	74.6
90019003	CT	Westport Sherwood	80	78.3	80.5
90099002	CT	Madison Hammonasset	82	71.6	71.9
360850067	NY	Susan Wagner H.S.	--	71.3	74.4
420170012	PA	Bristol	71	71.1	68.8

Table 10-7 *OTC 2023 Modeled Failure to Maintain the Ozone NAAQS*

Site ID	State	Location	2019-21 Design Value	2023 CAMx	2023 CMAQ
361030002	NY	Babylon	73	71.6	69.5
361192004	NY	White Plains	69	71.1	67.8
090110124	CT	Groton	73	67	67.9

10.6 Contribution Assessment Results

The following section provides some of the contribution assessment results obtained from the 2023 projections. Because of the large volume of data, only a small portion of it is summarized in this document. Other products are available upon request to the OTC.

This summary focuses on the nine monitors listed in **Tables 10-6 and 10-7** that were found to be projected to violate or not maintain the 2015 NAAQS in 2023. For brevity, graphics for only three of these monitoring locations are included in the main text—Greenwich, CT, Babylon, NY, and Bristol, PA. Additional monitors are included in **Appendix H**.

This section will walk through the first two steps of the four-step process EPA has outlined in previous transport rules to determine which states are projected to contribute to nonattainment or interfere with maintenance using the OTC 2023 CAMx modeling.

10.6.1 Step 1: Identify Downwind Air Quality Problems

The 2023 CAMx modeling identified the nine monitors in the OTR listed in **Tables 10-6** and **Table 10-7** as being projected to be in nonattainment (an average design value greater than or equal to

71 ppb) or maintenance (a maximum design value greater than or equal to 71 ppb) of the 2015 O_3 NAAQS in 2023. Four estimates were used in making this determination, whether CMAQ or CAMx modeled them as being in nonattainment or maintenance and both using and excluding water grid cells from the calculations (see **Section 9** for calculation methods). Using these approaches nine monitors were found to be projected to be in nonattainment or face challenges with maintaining the 2015 O_3 NAAQS in 2023 and will be the primary focus in this CAMx contribution modeling summary. Modeled attainment prediction for these nine monitors is located in **Table 10-8A**.

10.6.2 Step 2: Identify Upwind States

When examining monitoring in this modeling summary, ozone contribution from upwind states was calculated two ways. The first approach uses all days modeled to be an exceedance at each monitor and then averages the contribution from each state across all of those days ("DVF Adjusted Exceedance Average"). The contributions were then adjusted by the ratio of the DVF at the monitor to the MDA8 O_3 modeled by CAMx. The second approach averages the four highest state contribution at each monitor ("DVF Adjusted Four Highest Average"). This value is then adjusted by the ratio of the DVF to the MDA8 O_3 modeled by CAMx. The intention of this second approach is to capture contributions by states that contribute significantly to at least four exceedance days but may not contribute significantly to every exceedance. A summary of state contribution linkages is in **Table 10-8B.** Differences in the two techniques are shown in red.

Table 10-8 (A and B). *1% State Linkages for Monitors Projected to not Attain and Maintain the 2015 NAAQS*

(A) Monitor Name	Monitor ID	CMAQ	CMAQ less Water	CAMx	CAMx less Water
Babylon	361030002	Maintenance	Attainment	Attainment	Attainment
Bristol	420170012	Nonattainment	Nonattainment	Attainment	Attainment
Fort Griswold Park	090110124	Attainment	Attainment	Attainment	Nonattainment
Greenwich Point Park	090010017	Nonattainment	Nonattainment	Nonattainment	Nonattainment
Hammonasset S.P.	090099002	Nonattainment	Nonattainment	Nonattainment	Maintenance
Sherwood Island	090019003	Nonattainment	Nonattainment	Nonattainment	Nonattainment
Stratford	090013007	Nonattainment	Nonattainment	Nonattainment	Nonattainment
Susan Wagner H.S.	360850067	Nonattainment	Attainment	Nonattainment	Attainment
White Plains	361192004	Maintenance	Attainment	Attainment	Attainment

(B) Monitor Name	Monitor ID	Linkages Using All High Ozone Days	Linkages Using Top 4 High Average
Babylon	361030002	IN,MD,MI,NJ,NY,OH,PA,VA,WV (9 states)	IN,**KY**,MD,MI,NJ,NY,OH,PA,VA,WV (10 states)
Bristol	420170012	DE,IN,KY,MD,**MI**,NJ,NY,OH,PA,VA,WV (11 states)	DE,IN,KY,MD,NJ,NY,OH,PA,VA,WV (10 states)
Fort Griswold Park	090110124	CT,**MD**,MI,NJ,NY,OH,PA,VA,WV (9 states)	CT,MI,NJ,NY,OH,PA,VA,WV (8 states)
Greenwich Point Park	090010017	CT,MD,MI,NJ,NY,OH,PA,VA,WV (9 states)	CT,**IN**,MD,MI,NJ,NY,OH,PA,VA,WV (9 states)
Hammonasset S.P.	090099002	CT,IL,IN,KY,MD,MI,NJ,NY,OH,PA,VA,WV (12 states)	CT,IL,IN,KY,MD,MI,NJ,NY,OH,PA,VA,WV (12 states)
Sherwood Island	090019003	CT,IN,MD,**MI**,NJ,NY,OH,PA,VA,WV	CT,**IL**,IN,**KY**,MD,NJ,NY,OH,PA,VA,WV

		(10 states)	(11 states)
Stratford	090013007	CT,IN,KY,MD,MI,NJ,NY,OH,PA,VA,WV (11 states)	CT,**IL**,IN,KY,MD,MI,NJ,NY,OH,PA,**TX**,VA,WV (13 states)
Susan Wagner H.S.	360850067	MD,**MI**,NJ,NY,OH,PA,VA,WV (8 states)	**KY**,MD,NJ,NY,OH,PA,VA,WV (8 states)
White Plains	361192004	**CT**,**MA**,MD,NJ,NY,PA,VA (7 states)	MD,NJ,NY,**OH**,PA,VA,**WV** (7 states)

10.7 Emission Sector Analysis

Figure 10-2 through **Figure 10-4** examine each modeled exceedance day at three of the monitors of interest (Greenwich, CT, Babylon, NY, and Bristol, PA) and the extent that each sector contributes on each day. Exceedance days are ranked highest concentration to smallest according to total future DVF, with contributions from biogenic and international emissions and boundary conditions making up the remaining O_3 not shown.

Percentage contributions from sectors vary across exceedance days, however nonpoint, onroad non-diesel, EGUs, onroad diesel, nonroad diesel and non-diesel, non-EGUs, and oil and gas are consistently the highest contributors.

Figure 10-2. *Emission Sector Contribution on Modeled Ozone Exceedance Day at Greenwich, CT*

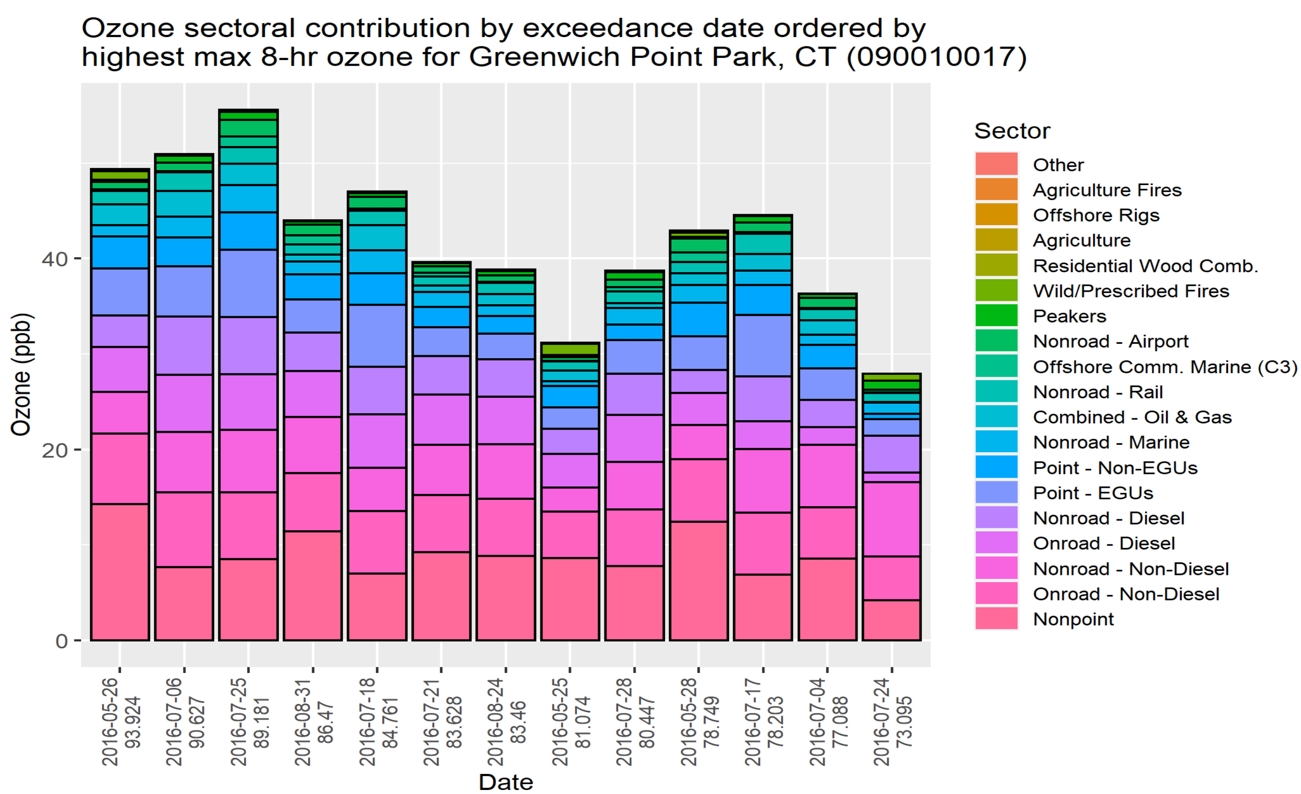


Figure 10-3. *Emission Sector Contribution on Modeled Ozone Exceedance Day at Babylon, NY*

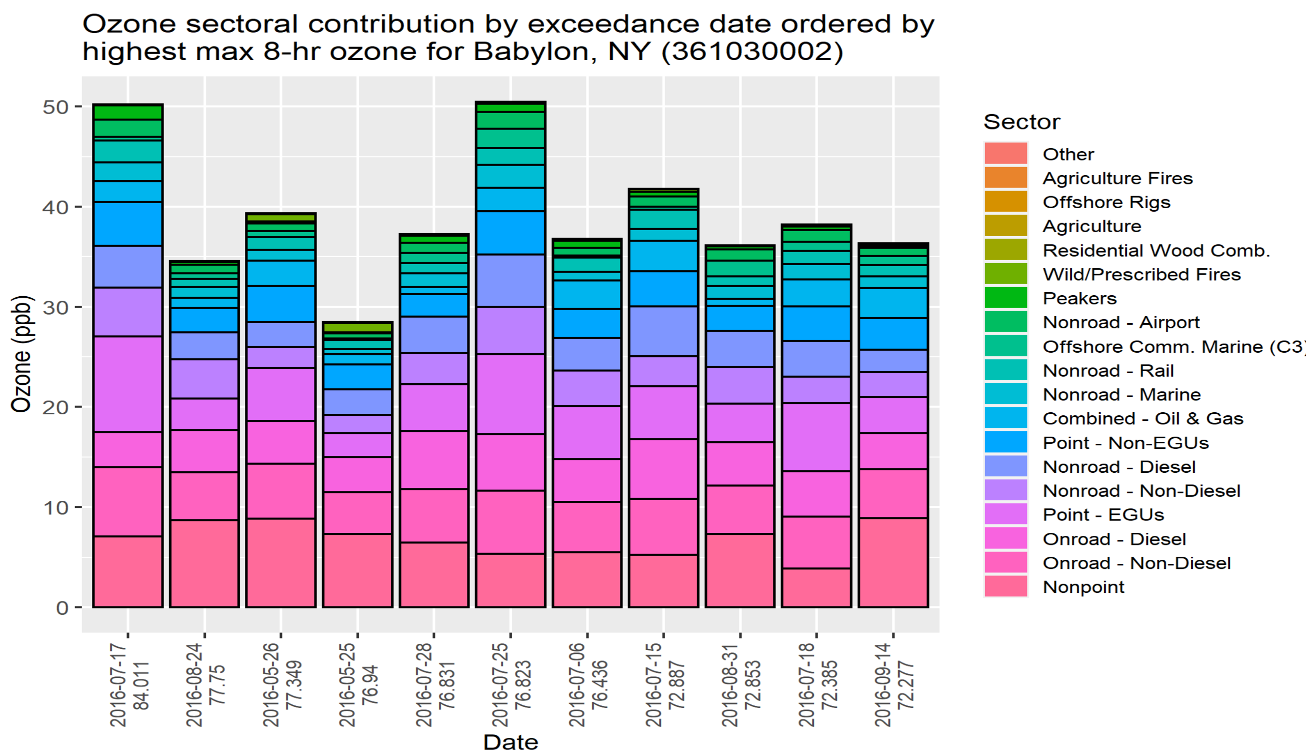


Figure 10-4. Emission Sector Contribution on Modeled Ozone Exceedance Day at Bristol, PA

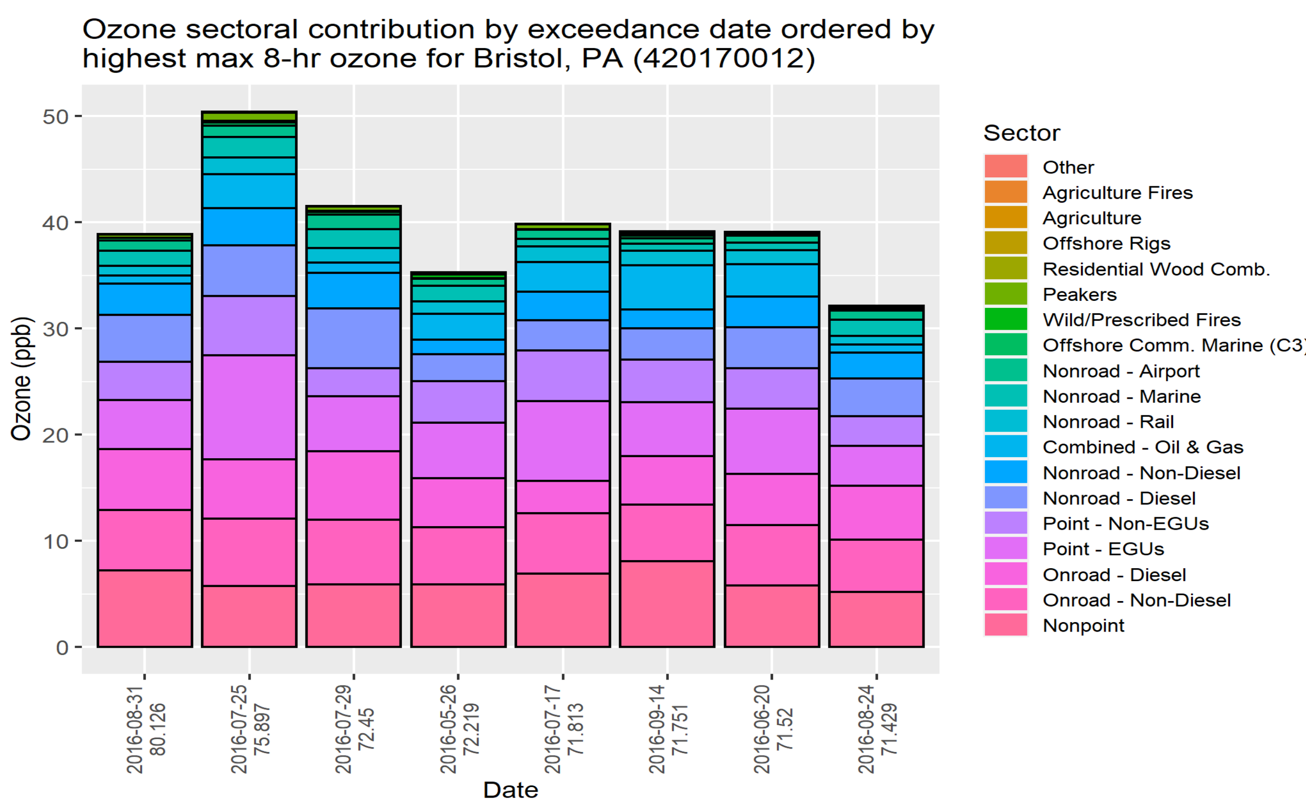


Figure 10-5 though **Figure 10-7** examine the range of contribution for sectors on all exceedance days at three of the monitors of concern (Greenwich, CT, Babylon, NY, and Bristol, PA). Each sector is ordered by the total contribution, the eight most important sectors are displayed for each monitor location followed by the remining sector contributions aggregated as "Other", and the contribution from biogenic emissions, international emissions, and boundary conditions are excluded from display. The boxes are centered on the median, the bottoms and tops of the boxes are the 25th and 75th percentiles respectively, the whiskers are at ±1.5 times the inter-quartile range, and the points are outside that range of the whiskers. Again, there is variation in the percentage contribution from various sectors with nonroad, onroad diesel, ERTAC EGU, and non-point being the highest contributors.

Figure 10-5. *Emission Sector Contribution on 13 Highest Modeled Ozone Days at Greenwich, CT*

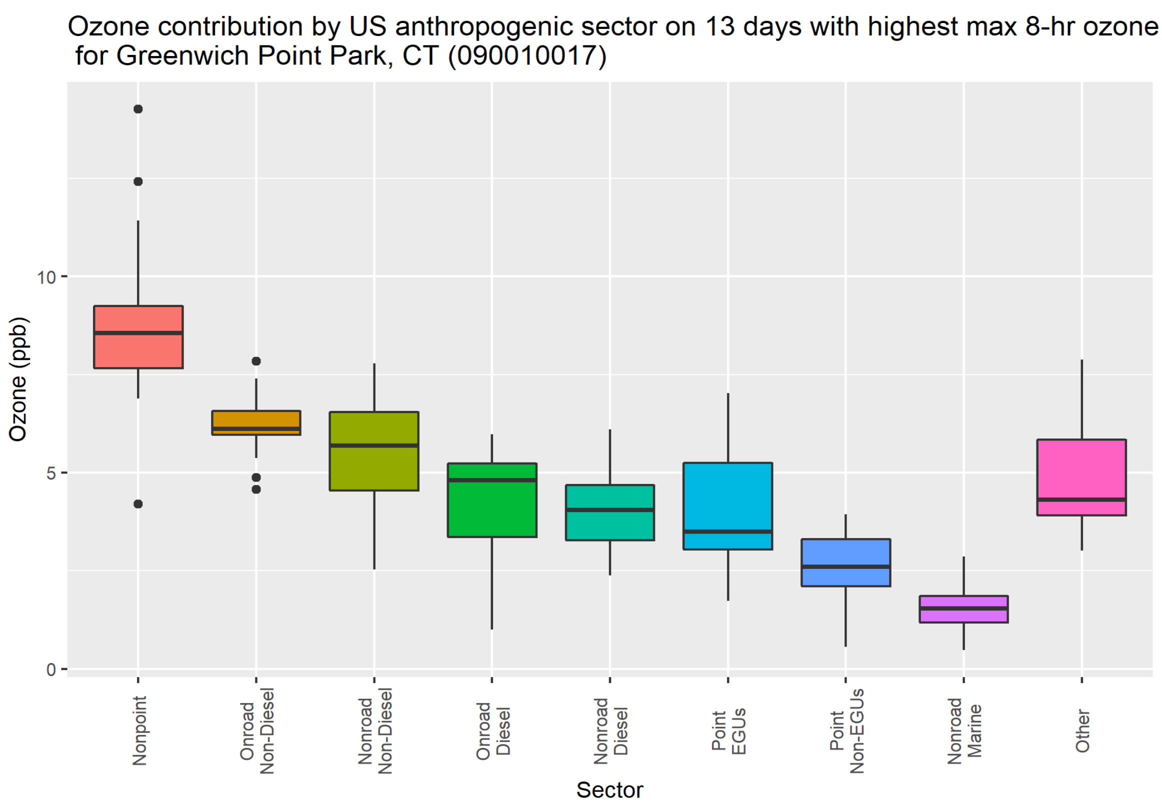


Figure 10-6. *Emission Sector Contribution on 11 Highest Modeled Ozone Days at Babylon, NY*

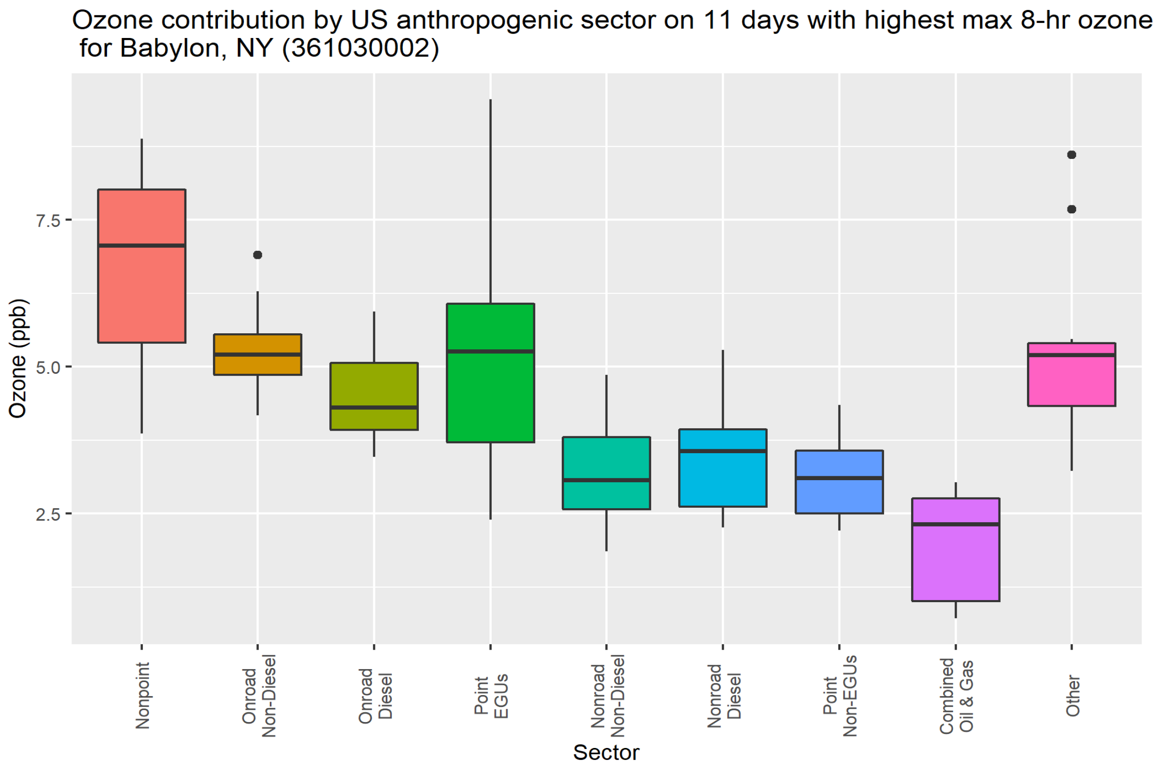
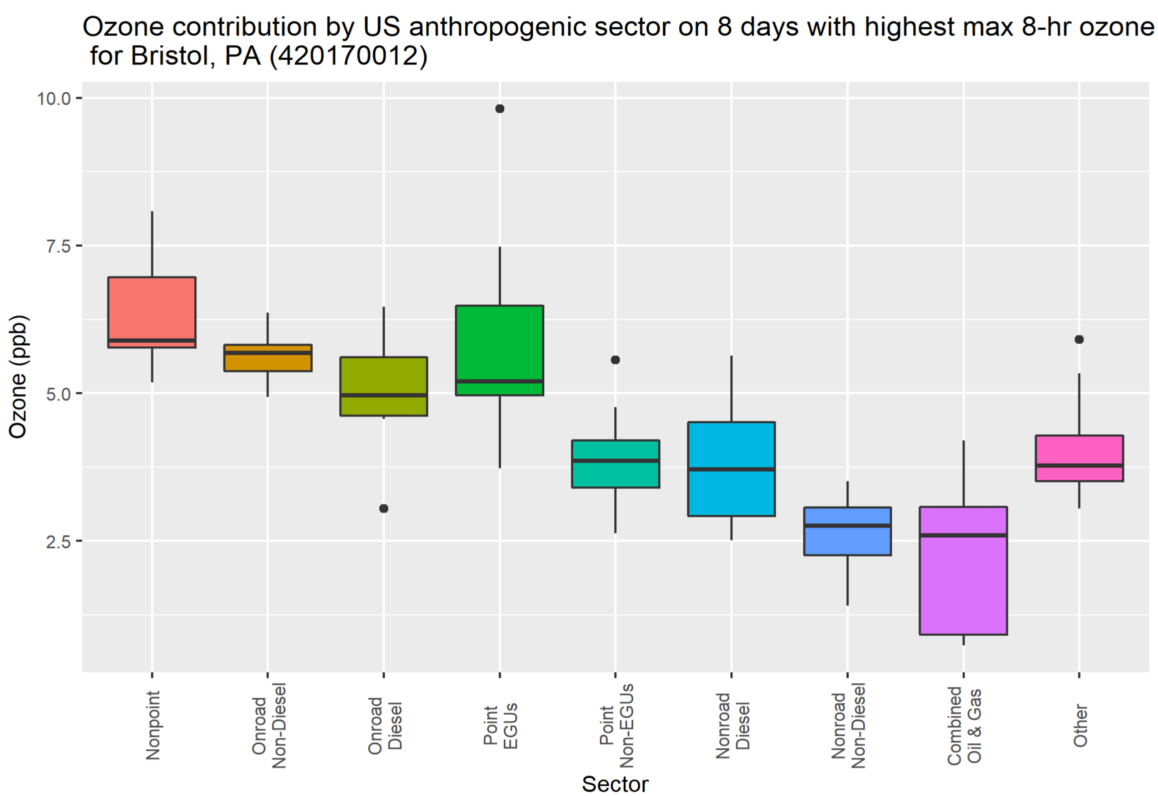


Figure 10-7. Emission Sector Contribution on 8 Highest Modeled Ozone Days at Bristol, PA



10.8 State Analysis

Figures 10-8 through **10-10** examine the range of contribution for each state on all exceedance days at three of the monitors of interest (Greenwich, CT, Babylon, NY, and Bristol, PA). Each state is in order by the total contribution. The contribution from biogenic emissions, international emissions, and boundary conditions are not included. The black bar indicates the 1% threshold for contribution (EPA 40 CFR Parts 52, 75, 78, 97.

For all of the monitors of concern in Connecticut, New York is consistently the most prominent contributor on high O_3 days. At both Sherwood Island and Stratford, CT, New Jersey and Pennsylvania were also consistently high contributors on exceedances days. At those two monitors, even though Connecticut was often the second highest contributor to itself, it typically did not contribute at the same levels as New Jersey and Pennsylvania. At Hammonasset and Greenwich Point, CT, the range of contribution on exceedance days was similar between Connecticut, New Jersey, and Pennsylvania. Fort Griswold Park was the only monitor in Connecticut where New Jersey and Pennsylvania did not play as prominent of a role.

Of the three monitors of concern in New York, Babylon and White Plains were most influenced by New York's own emissions exceedance days. For Susan Wagner, it was more consistently New Jersey. The range of contribution of New York itself to Susan Wagner was stronger or weaker than New Jersey depending on the day. New Jersey also was an important contributor to Babylon and White Plains, and Pennsylvania was an important contributor to all three monitors.

For Bristol, the only monitor in Pennsylvania monitor summarized here, the contribution of Pennsylvania's own emissions dwarfed the contributions from any other states.

Figure 10-8. *State Contribution on 13 Highest Modeled Ozone Days at Greenwich, CT*

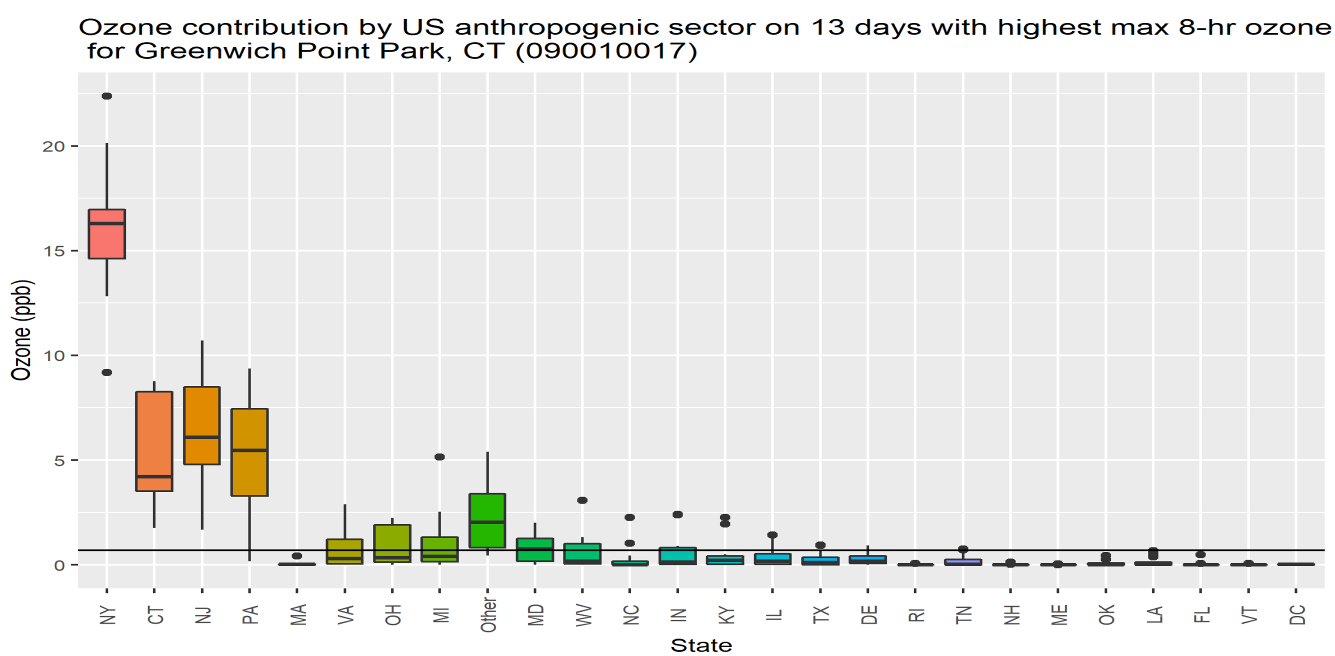


***Figure 10-9** State Contribution on 11 Highest Modeled Ozone Days at Babylon, NY*

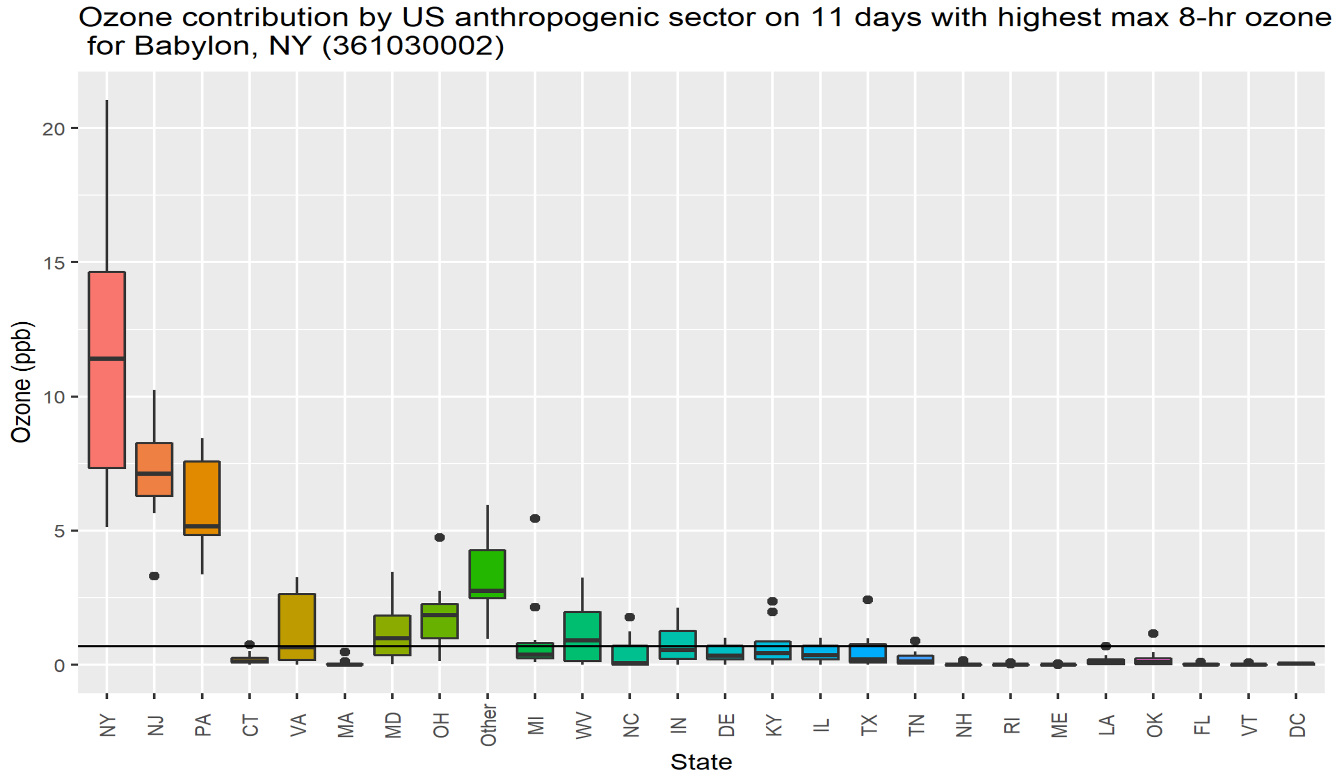
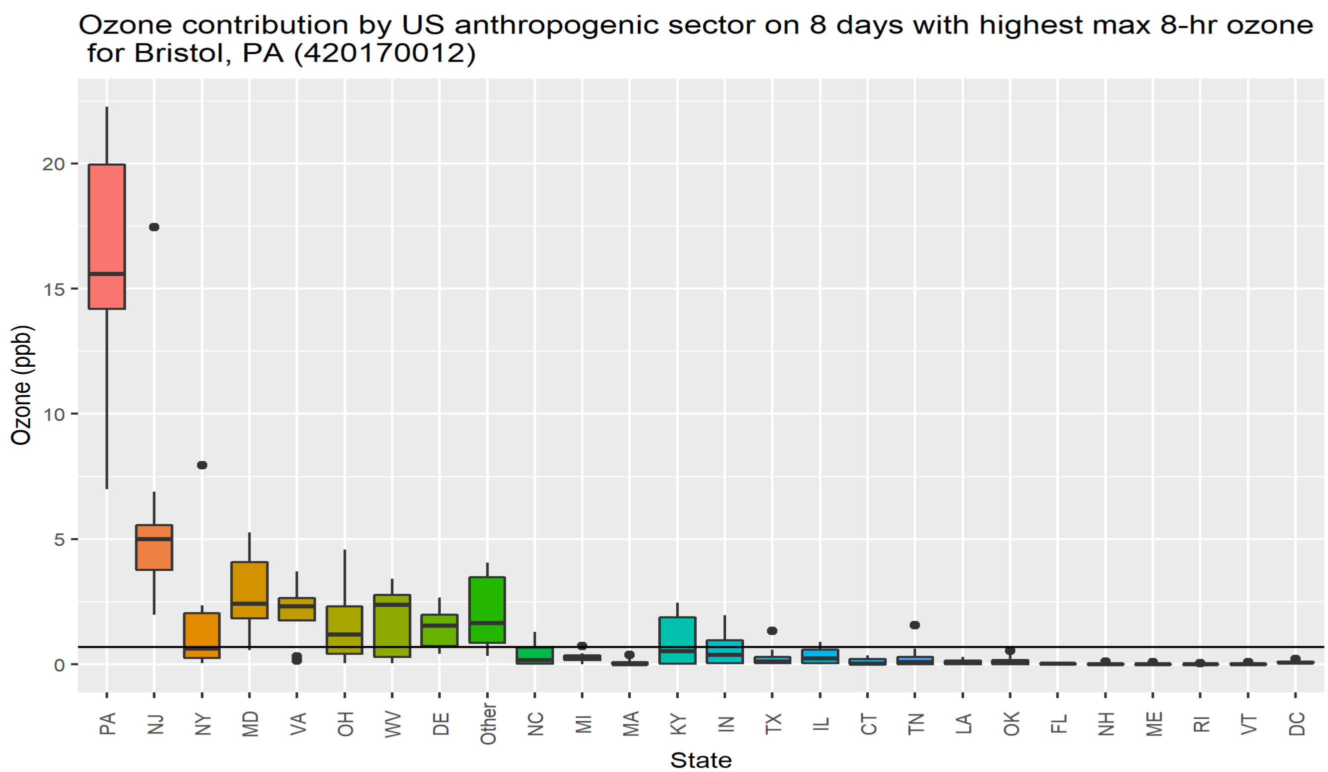


***Figure 10-10.** State Contribution on 8 Highest Modeled Ozone Days at Bristol, PA*



The states listed in **Tables 10-8** through **10-16** are projected to contribute at least 1% to each of the nonattainment and maintenance monitors in 2023 and the top three source categories that make up that contribution. It should be noted that the contribution summary in **Table 10-8** separates diesel and nondiesel for onroad and nonroad emission sources into separate categories, consistent with how they were tagged in the modeling.

Nonroad emissions and the combined diesel and nondiesel onroad emissions are the two top contributing emission sectors for most monitors in the OTR. Nonpoint (i.e. area sources) and EGUs are also important and can dominate some regions. Specifically, area sources are often a primary contributor to O_3 exceedances in the northern portion of the OTR, due largely to emissions from Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, and Virginia.

EGUs are often the top contributor and nearly always one of the top three contributors from states that are not adjacent to the state in which the monitor is located. Every instance of Indiana and Kentucky being a 1% contributor at a monitor lists EGUs as the top contributing category from those states. Most instances of Ohio being a top contributor also have EGU as the top contributor, though two instances have EGU as the second highest contributor. Unexpectedly, EGUs are the third most important contributor from Michigan and Illinois at all monitors of interest. With West Virginia, EGUs are often the most important contributor, though for some monitors the oil & gas sector is the highest and EGUs second (West Virginia is the only state in which oil & gas is consistently a top three contributor). For sector contributions from Maryland, New York, Pennsylvania, and Virginia, EGUs often are a top three contributor. Non-EGU point emissions are often a top three contributor from states outside of the OTR (Indiana, Kentucky, Michigan, Ohio, West Virginia) as well as Pennsylvania.

Table 10-9. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Greenwich Point Park, CT (090010017)*

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Point - EGUs	Nonpoint	Onroad - Non-Diesel	Point - EGUs
2	Nonroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonpoint	Combined - Oil & Gas
3	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Point - Non-EGUs	Point - EGUs	Point - Non-EGUs

Table 10-10. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Stratford, CT (090013007)*

Rank	CT	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Point - EGUs	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Point - EGUs	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Combined - Oil & Gas
3	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Nonroad - Diesel	Point - EGUs	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table 10-11. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Sherwood Island, CT (090019003)*

Rank	CT	IN	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Combined - Oil & Gas
3	Nonroad - Non-Diesel	Point - Non-EGUs	Onroad - Non-Diesel	Point - EGUs	Nonroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Onroad - Diesel	Nonpoint	Point - Non-EGUs

Table 10-12. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Hammonasset S.P., CT (090099002)*

Rank	CT	IL	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Nonroad - Diesel	Point - EGUs	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Combined - Oil & Gas
2	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Point - Non-EGUs	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Point - EGUs
3	Nonroad - Diesel	Point - EGUs	Point - Non-EGUs	Onroad - Non-Diesel	Onroad - Diesel	Point - EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Point - Non-EGUs

Table 10-13. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Fort Griswold Park, CT (090110124)*

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonroad - Marine	Nonroad - Non-Diesel	Nonpoint	Nonpoint	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Nonroad - Non-Diesel	Point - EGUs	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonroad - Diesel	Point - EGUs	Nonpoint	Point - EGUs	Combined - Oil & Gas
3	Nonpoint	Onroad - Non-Diesel	Point - EGUs	Nonroad - Marine	Nonroad - Marine	Point - Non-EGUs	Point - Non-EGUs	Nonroad - Non-Diesel	Point - Non-EGUs

Table 10-14. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Susan Wagner H.S., NY (360850067)*

Rank	MD	MI	NJ	NY	OH	PA	VA	WV
1	Point – EGUs	Point - Non-EGUs	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Onroad – Diesel	Combined - Oil & Gas	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Onroad - Diesel	Combined - Oil & Gas
3	Onroad - Non-Diesel	Point - EGUs	Onroad - Diesel	Nonroad - Non-Diesel	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table 10-15. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Babylon, NY (361030002)*

Rank	IN	MD	MI	NJ	NY	OH	PA	VA	WV
1	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Combined - Oil & Gas
2	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Point - EGUs	Point - EGUs	Point - EGUs
3	Onroad - Non-Diesel	Onroad - Non-Diesel	Point – EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table 10-16. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at White Plains, NY (361192004)*

Rank	CT	MA	MD	NJ	NY	PA	VA
1	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Nonpoint	Nonpoint	Nonpoint	Onroad - Non-Diesel
2	Nonpoint	Nonroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonpoint
3	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonroad - Non-Diesel	Nonroad - Non-Diesel	Point - Non-EGUs	Onroad - Diesel

Table 10-17. *Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Bristol, PA (420170012)*

Rank	DE	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Onroad - Non-Diesel	Point - EGUs	Point - EGUs	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Nonpoint	Onroad - Non-Diesel	Point - EGUs
2	Point - EGUs	Onroad - Non-Diesel	Point - Non-EGUs	Point - EGUs	Onroad - Non-Diesel	Onroad - Diesel	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Combined - Oil & Gas
3	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Nonroad - Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs

Emissions from the Nonpoint and EGUs sectors are often the top contributor on an exceedance day where a state contributed at the 1% level. In the cases of Sherwood Island, Stratford, and Hammonasset they are there only two emission sectors displayed from all states excepting Virginia and West Virginia. White Plains is often dominated by nonpoint sources. Several other monitors (Bristol, Susan Wagner, and Babylon) have a handful of days where states have the most contribution from onroad diesel emissions. Greenwich also has mostly a contribution from nonpoint emissions, with a few instances of both onroad and nonroad non-diesel. Fort Griswold Park is the most varied with Nonpoint, Nonroad - Marine, Nonroad Diesel, and Nonroad Non-Diesel all being the top contributor from different 1% contributing states during exceedance days.

Another way to examine which sectors from each state are projected to contribute to modeled O_3 nonattainment in 2023 is to look individually at each exceedance day. **Figures 10-11** through **10-13** simply count the number of times an emission sector from a particular state contributes greater than one percent of the NAAQS on days modeled as greater than 70 ppb. It should be noted that these charts do include all modeled states even if they did not contribute on any exceedance days.

10.1 Hourly Change to Ozone Contribution

Emissions and meteorology are constantly changing, and this is reflected in state and emission sector contribution. Most summary contribution modeling averages data from shorter periods. For example, hourly data is averaged into a daily 8-hour average, and then those averages can be further averaged into a seasonal or annual summary. When O_3 contribution modeling is presented in annual or season summary formats, detail in hourly and daily variation is heavily muted. Typically, data might only be averaged over a certain number of high ozone days. This section provides some examples of hourly variation that is contained within the averaged data.

Figure 10-14 shows sample back trajectories on four high O_3 days at Edgewood, MD. Trajectories for July 22 and 25 are similar with winds from the southwest, but trajectories for July 29 and September 23 are completely different with winds generally from the north and east, respectively.

Figure 10-15 presents the top contributing states for those four high O_3 days at Edgewood, MD. As the trajectories suggest, the state contributions are similar for July 22 and 25. Ozone contribution for Virginia, West Virginia, Ohio, Indiana, North Carolina, and Texas are much less important on July 29 and September 23, and instead contributions from Pennsylvania, Virginia, and New York are much more prominent. Depending on how the averaging is done for seasonal or annual summaries, locations with larger numbers of high O_3 days could find that states near the edge of significance that contribute significantly on several days could be lost in the summary due to the averaging.

Figure 10-11. *Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Greenwich*

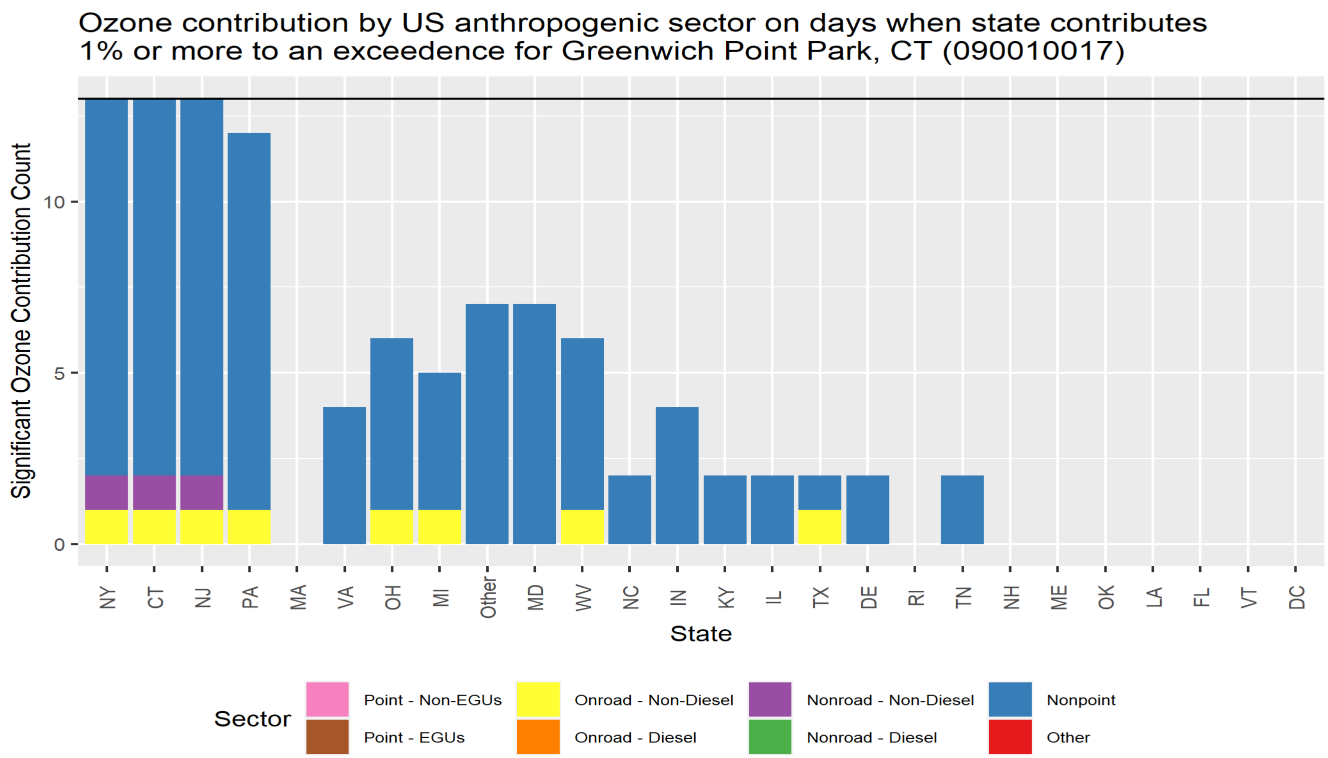


Figure 10-12. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Babylon

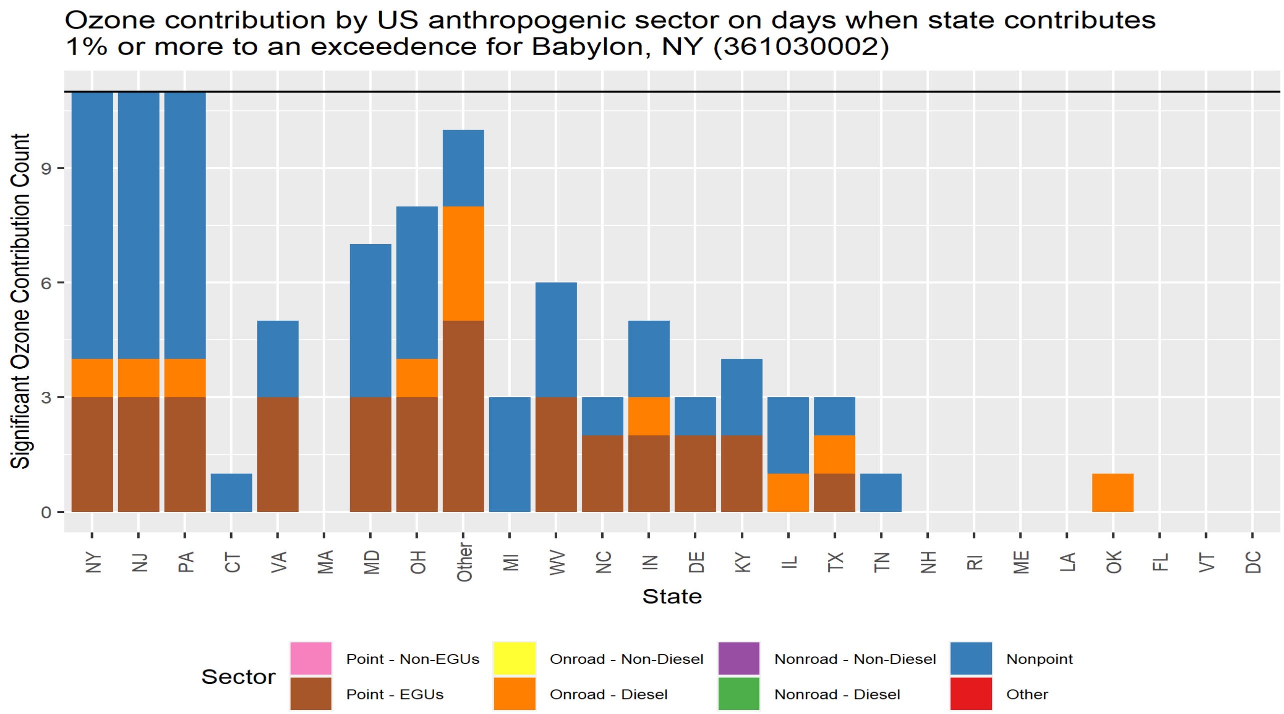


Figure 10-13. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Bristol, PA

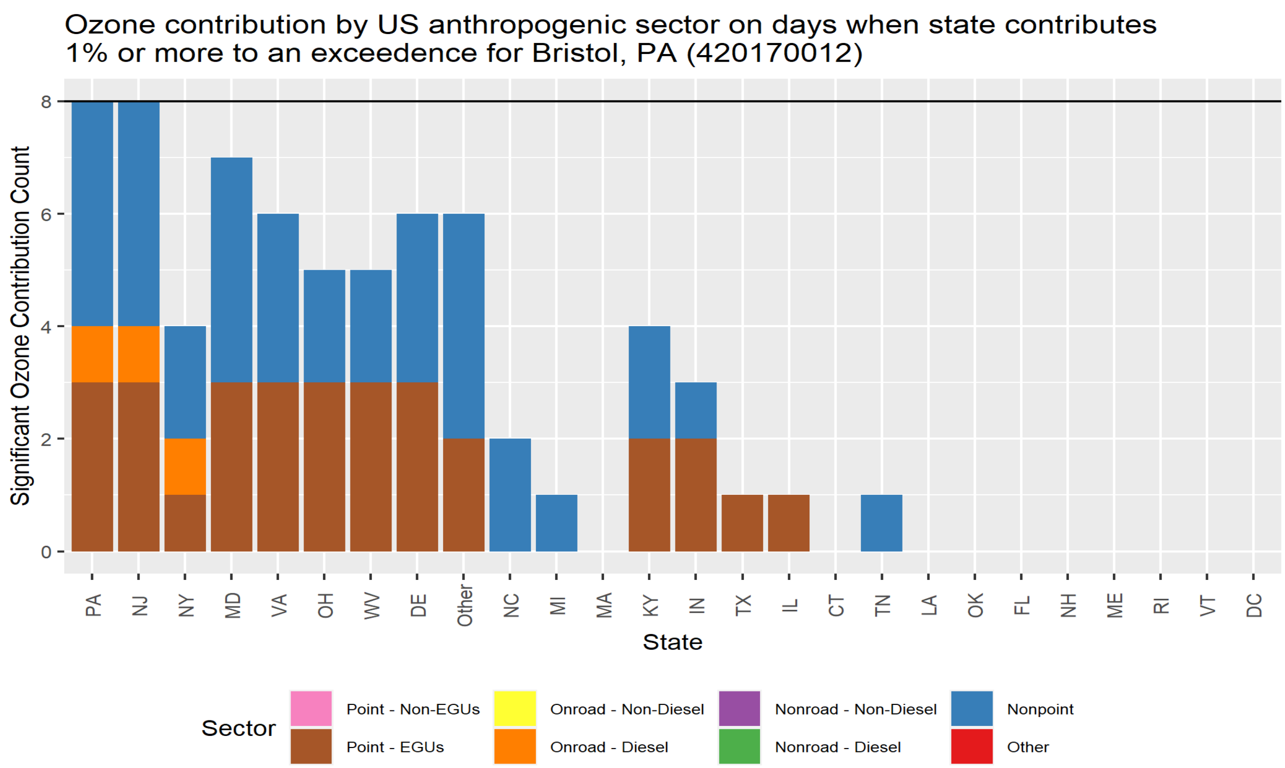


Figure 10-14. *Back Trajectories for Four High O_3 Days at Edgewood, MD*

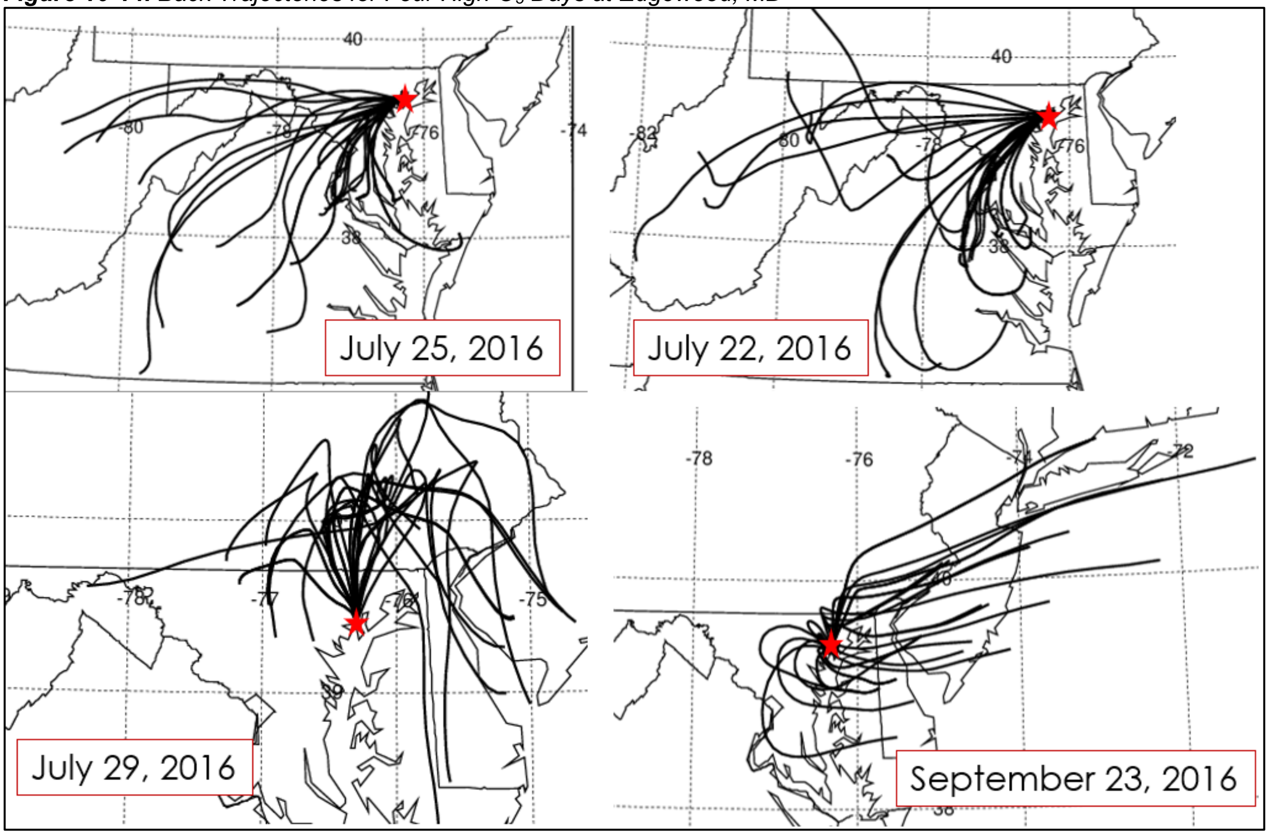
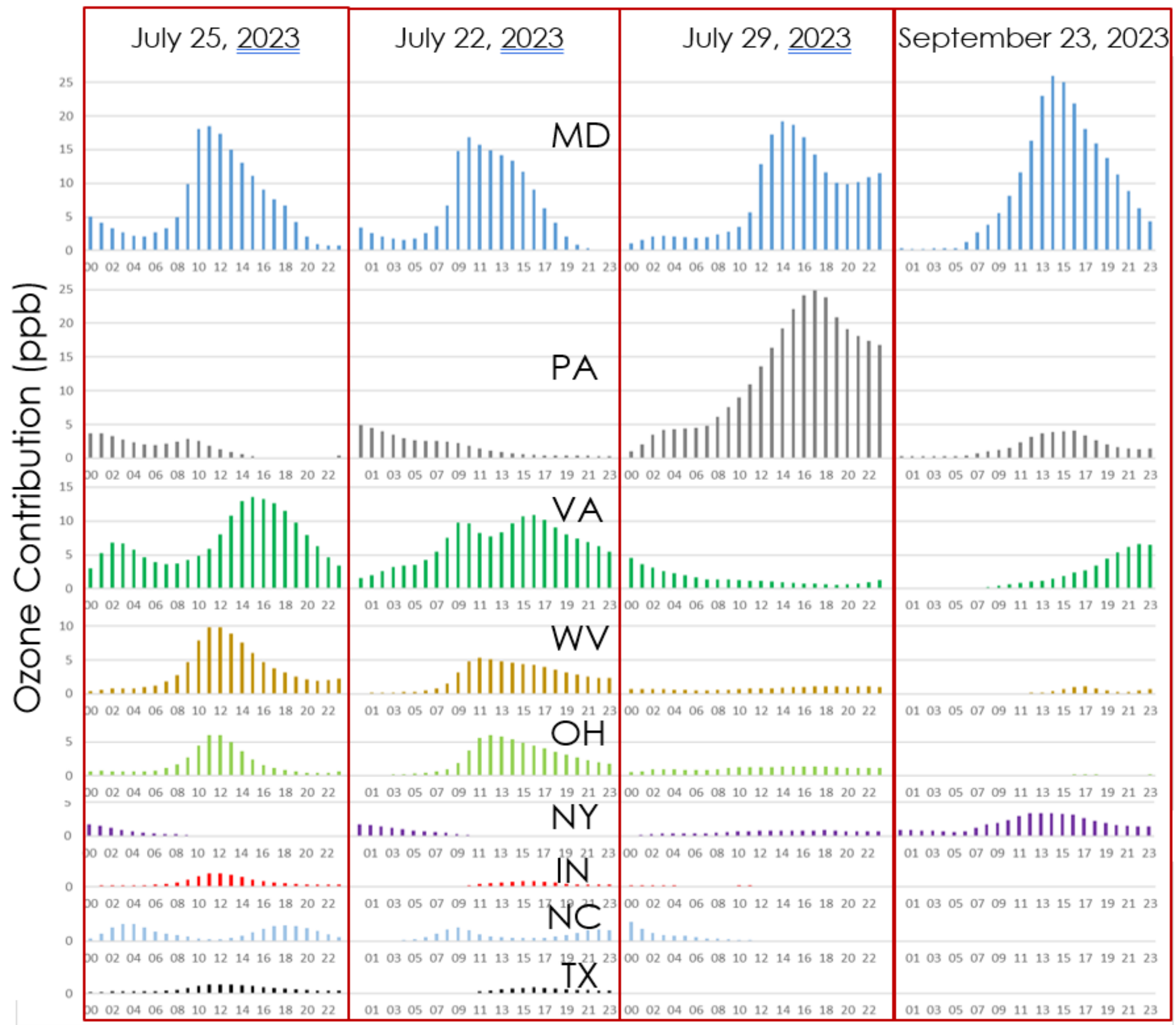


Figure 10-15. *Hourly State Contribution to Modeled O_3 at Edgewood on 4 High Ozone Days*



Similarly, emission sector contribution can show large hourly variations. **Figure 10-16** provides several emission sector ozone contributions to the same four high ozone days at Edgewood, MD. As a function of having different states contributing, emission sector contributions for September 23 are distinctly different from the other three days presented.

Figure 10-16. *Hourly Emission Sector Contribution to Ozone at Edgewood on 4 High Ozone Days*

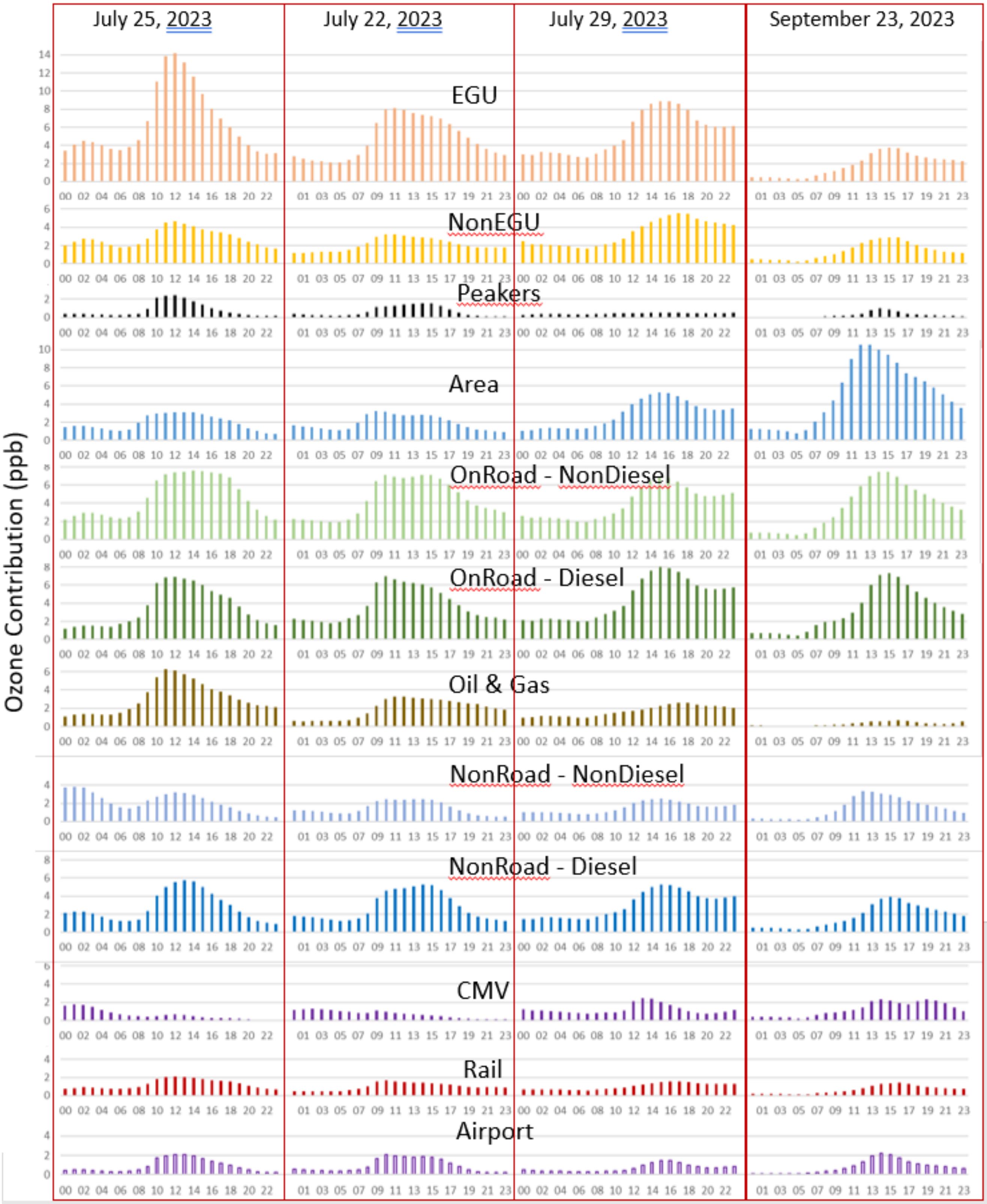
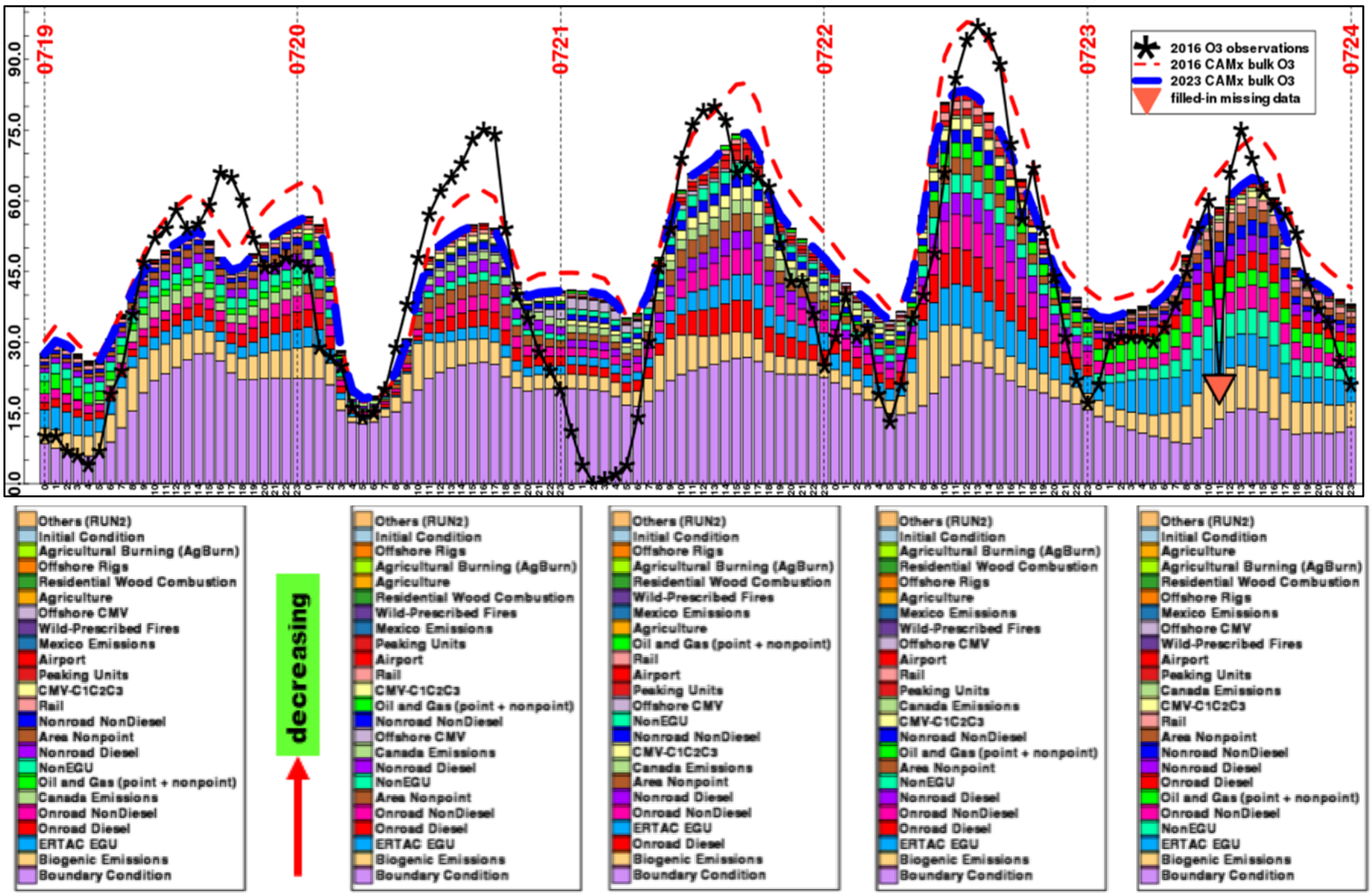


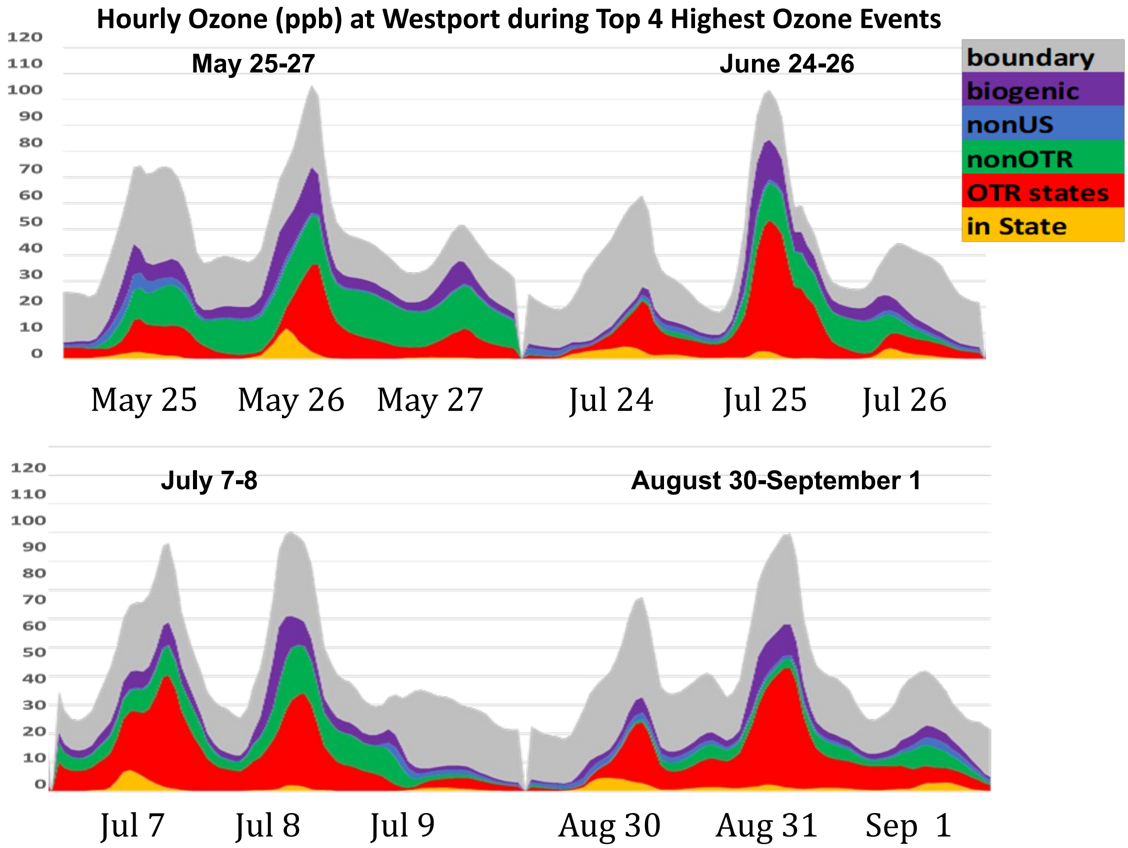
Figure 10-17 looks at hourly contribution in a period of five consecutive days. The different colors show different emission sector contributions. The black line represents monitored data for Edgewood, MD and the light purple bars at the bottom of the chart represents background contribution. Hourly contributions are indicated by individual bars. The five-day period allows for examination of transitions occurring within emission and meteorology changes.

Figure 10-17. *Example of Hourly Changes to Ozone Contribution over Five Consecutive Days (Edgewood, MD July 19-24, 2023)*



This last chart (**Figure 10-18**) simplifies some of the complexities presented in the figures above, showing only general information on geographic contributions to the four highest ozone days at Westport, CT. Each day shows multiple ozone concentration peaks along with constantly changing contributing ozone regions.

Figure 10-18. *Hourly Contribution to Ozone at Westport, CT on the 4 highest Modeled Ozone Days (2023)*



11 Episodic Modeling

Episodic Modeling refers to a modeling technique that focuses on shorter periods of time rather than full ozone seasons or entire years. This is applied by the OTC Modeling Committee on a screening basis to expedite model throughput while minimizing the staff and computer resources invested. Deploying this method allows for more efficient analysis of multiple modeling scenarios.

This section describes methodology the OTC is currently using for episodic model runs with the CMAQ modeling platform. The same methodology can be applied to other photochemical models such as CAMx or with different emission inventory platforms. Episodic modeling conducted by the OTC Modeling Committee provides analyses to assess “what-if” scenarios to guide SIP development for the 8-hour ozone standard. The OTC Commissioners and Air Directors requested that the OTC Modeling Committee apply this tool to produce sensitivity and screening modeling with greater ease and speed than occurred with full ozone season or year photochemical runs.

This portion of the TSD describes how the period was selected, how well it represents the ozone events occurring during the entire ozone season including transport patterns, and how well the modeling results compare between the episodic period and the entire ozone season. **Section 12** describes one application of the episodic modeling tool on high electricity generation demand time periods.

11.1 Selection of Episode

Episodic Modeling serves to reduce the number of days modeled from about 183 to approximately 30-60, saving the associated computer and staff resources. For this tool to be a reliable indicator for full-season modeling, it is important to select an episode with a robust number of representative high ozone areas and transport patterns in a shorter time-period. The OTC Modeling Committee wanted to choose an episode that complies with the primary criteria set forth in EPA’s 8-hour ozone modeling guidance for selecting time periods for attainment demonstration modeling, including:

A. Select periods, preferably during NEI years, for which extensive air quality/meteorological databases exist.
B. Model a sufficient number of days so that the modeled attainment test can be applied at all of the ozone monitoring sites that are in violation of the NAAQS.
C. Model time periods that include pollution concentration episodes to ensure the modeling system appropriately include a mix of high and low periods, and.
D. Selects a mix of episodes reflecting a variety of meteorological conditions that frequently correspond with observed 8-hour daily maximum ozone concentrations greater than the level of the NAAQS at different monitoring sites (US EPA 2014).

11.1.1 Available Data Sets

The summer of 2016 was the primary focus for episodic modeling due to the modeling platform developed and tested by the national collaborative. **Figures 11-1 and 11-2** show a graphic summary of the full 2016 ozone season in the OTR. There was a total of 164 different monitors exceeding 70 ppb within the OTR among 62 days.

Within the 2016 ozone season, two periods were reviewed for episodic modeling including 1) May 22-June 25 (green box) and 2) July 1-August 31 (red box) (**Figure 11-1**). The black line represents the highest 8-hour ozone concentration anywhere in the OTR, the orange bars represent the number of monitors exceeding the 2015 ozone NAAQS of 70 ppb, and the colored shading represents Air Quality Index categories for the concentrations shown by the black line. **Figure 11-2** presents a similar chart that in addition to the maximum concentration in the OTR (black line), the maximum 8-hour ozone concentration for each of the five 2015 ozone NAAQS nonattainment areas are shown by other colored lines. The New York City, Philadelphia, and Baltimore nonattainment areas most frequently track near the OTR maximum, while Greater Connecticut and the District of Columbia track lower.

Each episode includes a period where 8-hour ozone concentrations reached above 90 ppb. A period in late May was particularly strong and widespread, with many monitors throughout most of the OTR exceeding 70 ppb. There were six other periods in the first episode that exceeded 70 ppb somewhere in the OTR. The second episode features two events where 8-hour ozone exceeded 90 ppb and 13 other events that exceeded 70 ppb. Originally the period of July 10 to August 14th was proposed for Episode 2, which would have contained the same two events exceeding 90 ppb along with six other events exceeding 70 ppb. The episode was extended from July 1 to August 31 to contain more events once Episode 2 was selected as the episodic period of choice for the OTC Modeling Committee. A detailed comparison of the two episodes and additional justification for choosing to work with Episode 2 follows.

Figure 11-1. *2016 Ozone Season Summary for the OTR with Monitored Exceedance Counts*

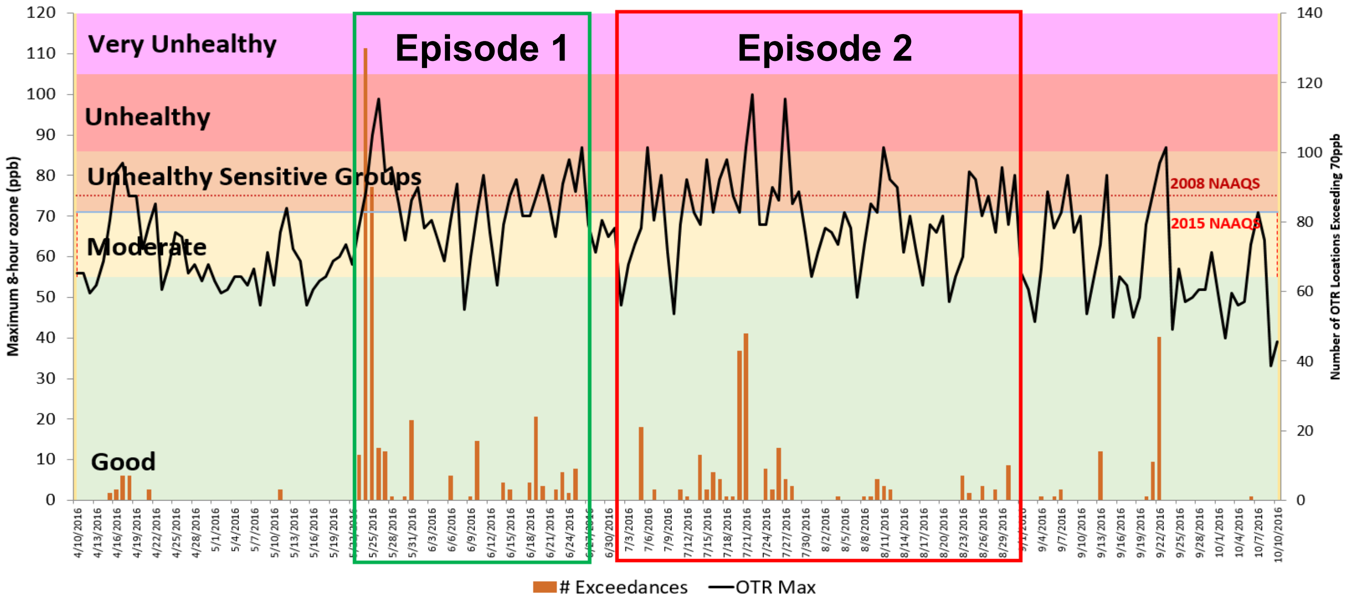
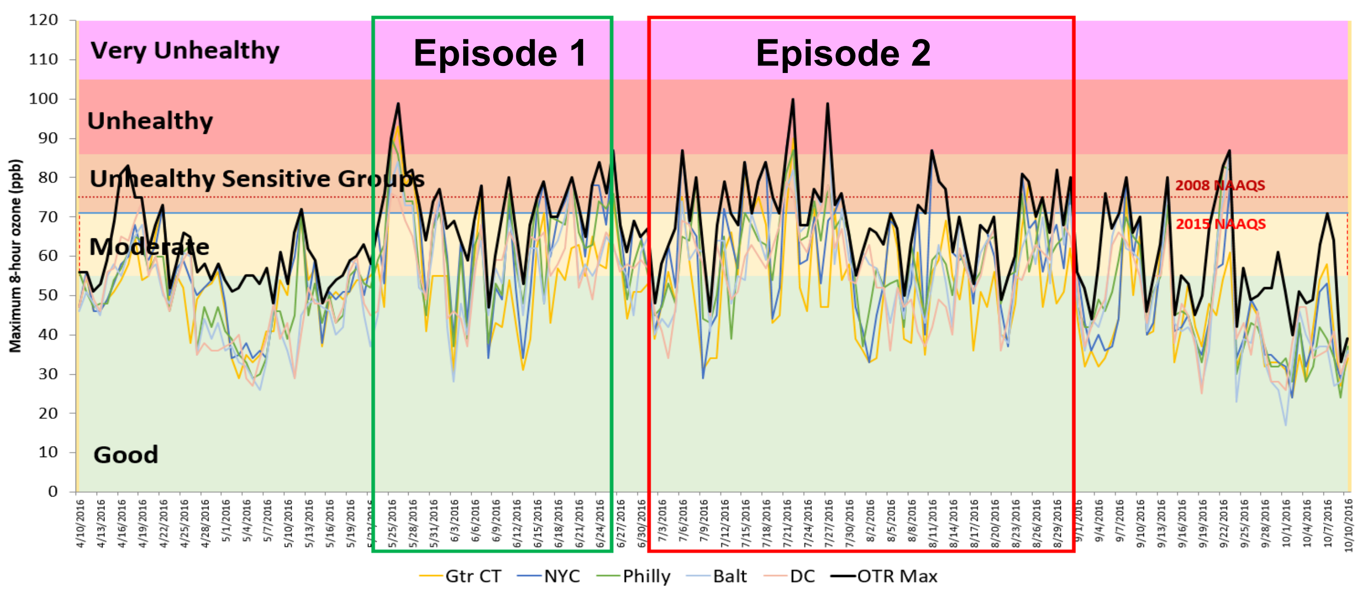


Figure 11-2*. 2016 Ozone Season Summary for the OTR with Nonattainment Area Data*



11.1.2 Discussion of Episode 1 (May 22-June 25, 2016)

11.1.2.1 Analysis of Episode 1

Episode 1 comprises a 28-day period from May 22 to June 25, 2016. This period contains 19 days where the maximum 8-hour ozone concentration in the OTR exceeded 70 ppb, five days of which exceeded 75 ppb, and three days exceeding 80 ppb. The period spanning from May 25 to May 28 was particularly severe with widespread 8-hour concentrations exceeding 80 ppb in the OTR. The most severe day was May 25 where 8-hour concentrations reached 89 ppb at multiple locations and 130 different monitors exceeded 70 ppb in the OTR. The following day, 91 locations exceeded 70 ppb and two locations reached 90 ppb. Additional days exceeding 70 ppb in the OTR were more dispersed throughout June.

Table 11-1. *Episode 1: Number of Days Exceeding High Ozone Thresholds at Key Monitors in the OTR (May 22 – June 25, 2016 vs Entire 2016 Ozone Season)*

		2016	May June	2016	May June	2016	May June	2016	May June	2016	May June
State	**Site Name**	#>64	#>64	#>70	#>70	#>75	#>75	#>84	#>84	#>90	#>90
CT	Greenwich	31	9	14	4	12	3	4	2	1	1
CT	Stratford	25	6	14	3	10	2	2	1	1	0
CT	Westport	29	8	16	4	11	3	5	2	1	0
CT	New Haven	19	4	10	3	3	1	1	0	1	0
CT	Madison	20	6	10	4	7	3	2	2	0	0
DE	BELLFNT2	12	4	9	3	3	1	0	0	0	0
MD	Essex	31	7	18	4	6	2	1	0	1	0
MD	Fair Hill	19	8	10	4	6	3	1	0	0	0
MD	Edgewood	22	7	9	3	8	3	0	0	0	0
MD	Millington	18	7	4	3	2	2	1	1	0	0
NJ	Clarksboro	11	2	6	2	3	1	0	0	0	0
NY	NYC-Queens	16	5	6	2	2	1	0	0	0	0
NY	NYC-Susan Wagner	24	9	10	4	4	2	1	1	0	0
NY	Babylon	11	3	4	3	2	1	1	1	0	0
NY	Riverhead	15	6	7	5	4	3	1	1	0	0

Table 11-1 counts the number of days select high ozone monitors in OTR nonattainment areas exceeded the concentration thresholds of 64, 70, 75, 84, and 90 ppb. Of these monitors, Greenwich, CT and Essex, MD exceeded 64 ppb the most frequently during the 2016 ozone season (31 times), and Westport was close behind with 29 exceedances above 64 ppb (blue columns). These three locations also had some of the highest number of days exceeding 64 ppb during Episode 1 (orange columns).

Table 11-2 presents maximum 8-hour ozone concentrations on high ozone days for several key monitors located in the five nonattainment areas in the OTR. **Table 11-3** totals the number of monitors exceeding 70 ppb in each state of the OTR during the same high ozone days.

Table 11-2. *Episode 1: 8-Hour Ozone by Monitor (May/June Highest Ozone Days)*

State	Site Name	5/24	5/25	5/26	5/27	5/28	5/29	5/31	6/1	6/7	6/10	6/11	6/15	6/16	6/19	6/20	6/21	6/23	6/24	6/25
CT	Greenwich	48	89	91	63	82	59	67	55	73	49	69	64	47	51	52	60	64	58	55
CT	Stratford	42	89	76	59	70	47	58	50	73	43	55	63	55	49	51	62	64	58	57
CT	Westport	28	87	90	61	81	58	64	48	72	44	53	67	51	52	50	58	65	55	52
CT	New Haven	29	63	84	65	73	54	51		55	39	51	58	63	52	43	48	75	54	51
CT	Madison	30	89	86	56	63	48	50	48	78	36	46	62	68	53	41	71	65	52	50
DE	BELLFNT2	59	84	68	54	54	36	61		57	46	74	58	30	59	72	54	57	45	60
MD	Essex	59	78	81	67	61	35	48	61	64	53	69	62	43	57	73	54	51	58	60
MD	Fair Hill	58	83	76	69	60	40	44	62	56	46	71	57	33	58	80	48	59	50	70
MD	Edgewood	56	79	80	70	60	36	58	68	60	50	65	55	40	70	79	50	55	53	60
MD	Millington	59	85	76	63	59	35	67	67	68	52	72	51	44	60	70	62	61	53	
NJ	Clarksboro	55	83				36		61	57	46	74		30			60	62	51	55
NY	NYC-Queens	35	83	71	51	60	37	50	56		41	67	53	38	60	48	66	53	65	61
NY	NYC-Susan Wagner	41	86	78	58	74	47	54	55	61	45	71	66	48	65	59	67	59	66	57
NY	Babylon	42	85	73	54	57	40	46	49	63	43	62	60	48	49	52	73	58	56	54
NY	Riverhead	30	85	79	56	57	44	51	45	75	43	55	57	79	49	47	71	67	54	47

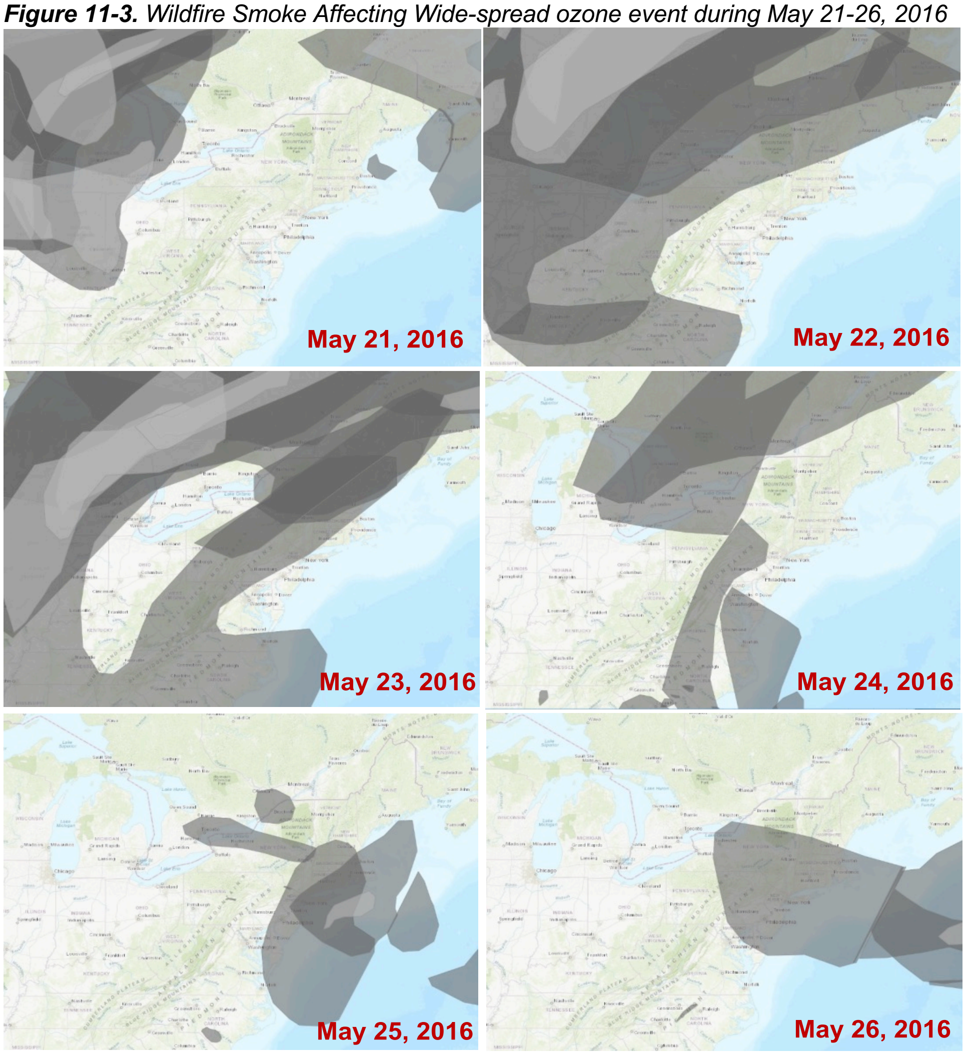
Table 11-3. *Episode 1: Number of Monitors Exceeding 70 ppb by OTR State (May/June Highest Ozone Days)*

	5/24	5/25	5/26	5/27	5/28	5/29	5/31	6/1	6/7	6/10	6/11	6/15	6/16	6/19	6/20	6/21	6/23	6/24	6/25
OTR	13	130	90	15	14	1	1	23	7	1	17	5	3	5	24	4	3	8	2
CT	0	11	12	2	7	1	0	0	5	0	0	0	2	0	0	1	3	0	0
DE	0	6	5	0	0	0	0	0	0	0	4	0	0	0	2	0	0	0	0
DC	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MD	0	13	15	1	1	0	0	5	0	0	2	0	0	0	5	0	0	0	0
MA	0	9	10	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NH	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NJ	0	16	10	3	3	0	0	5	0	0	5	3	0	2	5	0	0	2	0
NY	7	29	16	3	2	0	0	0	1	0	2	0	1	3	4	3	0	0	0
PA	6	37	15	0	0	0	1	11	0	1	4	2	0	0	8	0	0	6	2
RI	0	3	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
VT	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA-OTC	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

11.1.2.2 Episode 1 Meteorological Conditions

From a high concentration and widespread impact perspective, the May 22-June 25, 2016, period would be a good period to use for episodic modeling purposes, however, one overriding factor is that the most severe period, May 24-26 may have been boosted by smoke from western forest fires. While wildfires produce a significant amount of particle smoke, they are also a massive fuel (wood) burning emission source that produces huge amounts of VOC, NOx, and CO, which can further contribute to ozone production. Often if the smoke is too thick, solar radiation necessary for ozone formation is reduced, and ozone production is low, but thinner layers of particles in the plume can allow UV to penetrate, allowing for large amounts of ozone production. When this happens, agencies can consider the ozone event as exceptional, thus not factoring towards official counts affecting ozone attainment determinations. It is also possible that some wildfires burn lower nitrogen fuels, resulting in a smoke plume with a mix of VOCs and NOx to form large amounts of ozone.

Figure 11-3. *Wildfire Smoke Affecting Wide-spread ozone event during May 21-26, 2016*



Source: AirNow Tech Navigator

Figure 11-3 shows a six-day period from May 21 to May 26, 2016. The smoke aerosol maps for the period show a build-up of wildfire smoke worked into the area from the west/northwest over a period of a couple of days. A large number of monitors in CT, DE, MA, NJ, NY, PA, and RI exceeded the 2015 ozone NAAQS, and many of them also exceeded the 2008 NAAQS on May 25 and 26. A fairly concentrated smoke plume covered this area on May 25th, the more severe day of the episode, and persisted to a lesser degree during the 26th. Since the premier ozone period during Episode 1 is the May 24-28 period and it is clearly affected by wildfire smoke, the OTC Modeling Committee concluded this would not be a desirable episode to model.

Several major transport patterns can play an important role in creating the conditions for ozone exceedances to occur in the OTR; 1) over mountain interregional transport from sources in the Midwest, 2) multi-state transport from the nocturnal low level jet (NLLJ), and 3) local stagnation (Hudson et al. October 2006). Ideally the episodic period selected should contain key transport patterns on high ozone days. In this case, since 2016 was selected for modeling in the eastern United States, it is important that the transport regimes included in the episodic period are reflective of those during the full 2016 ozone season. Selection of an episode that was not representative could have the effect of causing strategies needed to reduce ozone originating from a particular region going unrealized or not being sufficient to overcome situations where all three transport patterns are acting in tandem.

In Episode 1, there were nine days exceeding 70ppb 8-hour ozone at an OTR monitor. **Table 11-4** provides a brief summary of the meteorology for those days.

Table 11-4. *Episode 1: Synoptic weather description and maximum ozone concentration for nine days exceeding 70 ppb 8-hour ozone in the OTR.*

Date	Maximum Ozone (ppb)	Synoptic Weather Description Surface	Aloft (850mb)
May 25	89	SW flow	High pressure ridge over Southeast, NW flow
May 26	91	SW flow	High pressure over NC, W to SW flow
May 28	82	SW flow	High pressure off New England coast, WSW flow
June 7	78	S to WNW flow	Low pressure near Hudson Bay, CN, W flow
June 11	74	SW flow, Warm Front near	High pressure over Southeast, W flow
June 16	79	E flow, Low pressure approaching southern OTR	Low pressure over PA, SE flow in northern OTR, NW flow
June 20	80	SSW flow, Low pressure trough	Strong Low pressure over central Canada, NW to W flow
June 21	73	SW flow, Cold front approaching	Strong Low over Quebec, WNW flow
June 23	75	SW flow, Stationary front near Canada, W flow	High Pressure to south, Low over Eastern

To determine the appropriateness of the episodes regarding transport patterns, the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model was employed to conduct back trajectory analyses for four high ozone monitors: Greenwich and Madison, CT; Bristol, PA; and Essex, MD. The trajectory analyses were conducted at 10m height level to account for the Air/Sea interface airflows. **Figures 11-4** and **11-5** show the trajectory analyses for the four monitors for Episode 1 and the entire ozone season excluding Episode 1 respectively. When compared to the entire ozone season, Episode 1 lacks the volume of high ozone days with trajectories from the west, southwest, and south. Further, some of the highest ozone days are related to days also effected by western wildfires.

Figure 11-4. (A-D). *Wind trajectories of ozone (ppb) for Madison, CT A) during Episode 1 (May 22-June 25, 2016), B) during all 2016 except Episode 1 (April 1 - May 21 & June 26 – October 31, 2016), and for Greenwich, CT C) during Episode 1 (May 22-June 25, 2016), and D) during all 2016 except Episode 1 (April 1 - May 21 & June 26 – October 31, 2016).*

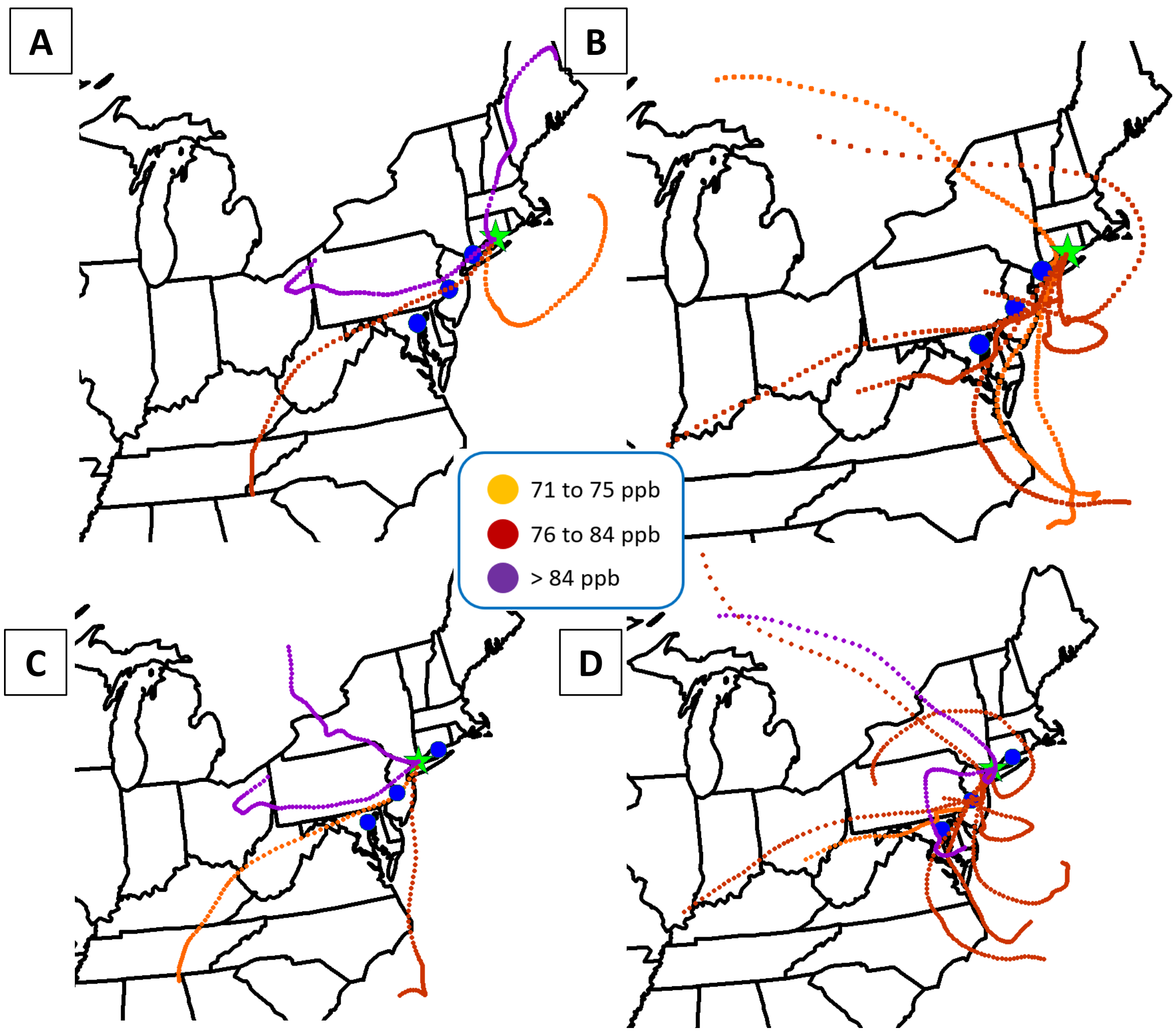
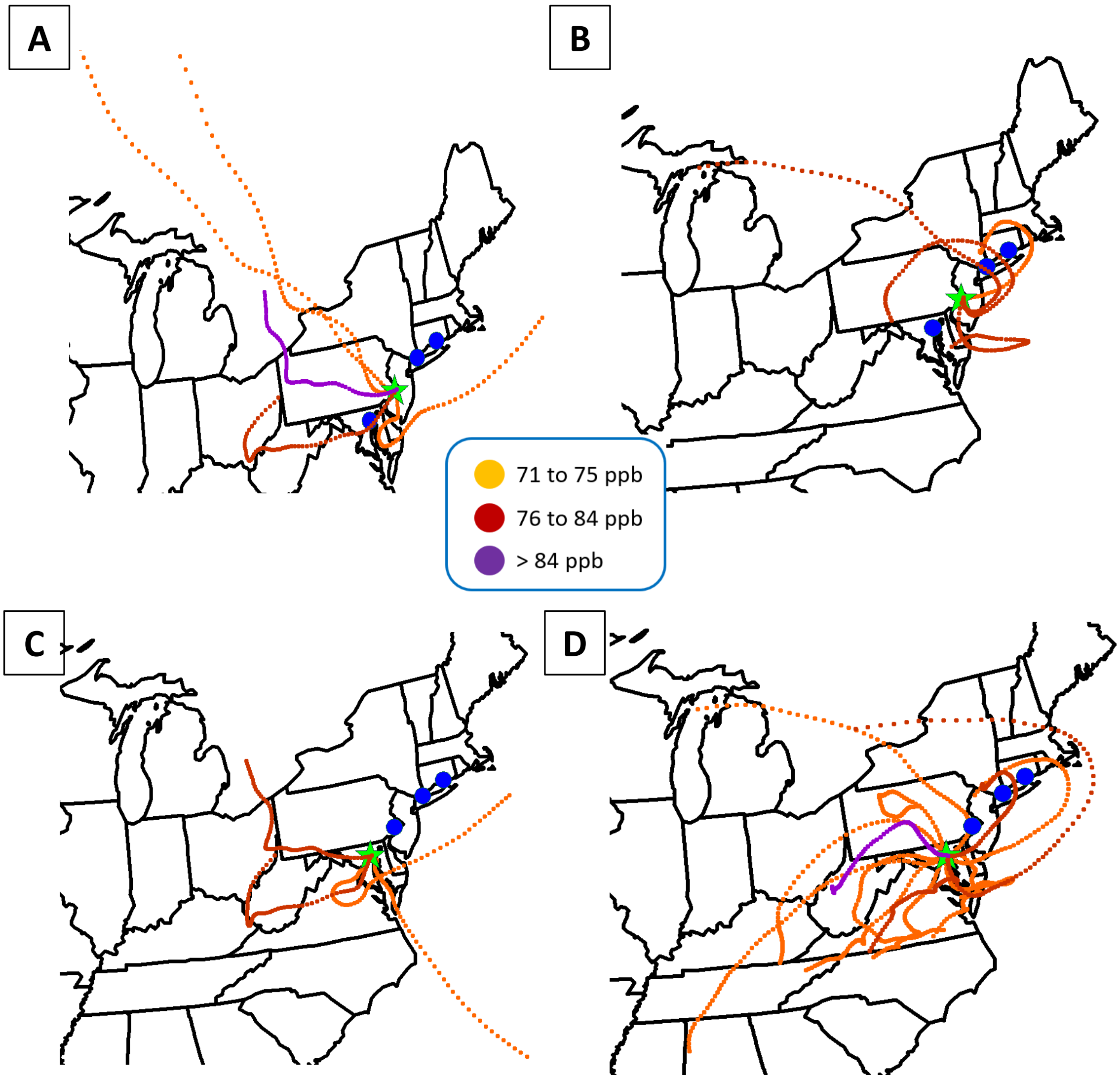


Figure 11-5. *Same as Figure 11-4 for (A-B) Bristol, PA and (C-D) Essex, MD.*



11.1.3 Discussion of Episode 2 (July 1-August 31, 2016)

11.1.3.1 Analysis of Episode 2

Episode 2 comprises a 62-day period from July 1 to August 31, 2016 and contains 27 days where the maximum 8-hour ozone concentration within the OTR exceeded 70 ppb. In addition, 18 days exceeded 75 ppb and nine days exceeded 80 ppb. Episode 2 was originally intended to span a 30-day period from July 15 through August 13, which included two fairly severe ozone events (July 15-27 and August 11-13), but after Episode 2 was selected for modeling, the episode was lengthened to include additional ozone events in early July and late August. Episode 2 includes a particularly severe period during July 21 and 22 where 74 different monitors exceeded 70 ppb in the OTR and a maximum 8-hour ozone concentration of 100 ppb was recorded at Middletown, CT.

Table 11-5 counts the number of days select high ozone monitors in OTR nonattainment areas exceed the thresholds of 64, 70, 75, 84, and 90 ppb. Of these monitors, those that exceeded 64 ppb at least 20 times during the full 2016 ozone season, each exceeded 64 ppb at least ten times during Episode 2 (10 times in Episode/20 times in 2016). Similarly, of the monitors exceeding 70 ppb at least 14 times in the 2016 ozone season, they exceeded 70 ppb ten times in Episode 2. Of the monitors exceeding 75 ppb seven or more times during the 2016 ozone season, three or more days were above 75 ppb during Episode 2.

Table 11-5. *Episode 2: Number of days exceeding high ozone thresholds by OTR state (July 1 – August 31, 2016 vs entire 2016 ozone season)*

		2016	July Aug	2016	July Aug	2016	July Aug	2016	July Aug	2016	July Aug
State	**Site Name**	#>64	#>64	#>70	#>70	#>75	#>75	#>84	#>84	#>90	#>90
CT	Greenwich	31	15	14	10	12	9	4	2	1	0
CT	Stratford	25	16	14	10	10	8	2	1	1	1
CT	Westport	29	16	16	10	11	8	5	3	1	1
CT	New Haven	19	13	10	6	3	2	1	1	1	1
CT	Madison	20	12	10	5	7	3	2	0	0	0
DE	BELLFNT2	12	4	9	3	3	1	0	0	0	0
MD	Essex	31	17	18	11	6	2	1	1	1	1
MD	Fair Hill	19	7	10	3	6	1	1	1	0	0
MD	Edgewood	22	10	9	4	8	3	0	0	0	0
MD	Millington	18	5	4	0	2	0	1	0	0	0
NJ	Clarksboro	11	6	6	2	3	1	0	0	0	0
NY	NYC-Queens	16	11	6	4	2	1	0	0	0	0
NY	NYC-Susan Wagner	24	12	10	6	4	2	1	0	0	0
NY	Babylon	11	7	4	1	2	1	1	0	0	0
NY	Riverhead	15	6	7	2	4	1	1	0	0	0

Table 11-6 presents maximum 8-hour ozone concentrations on high ozone days for several key monitors located in the five nonattainment areas in the OTR. **Table 11-7** totals the number of monitors exceeding 70 ppb in each state of the OTR during the same high ozone days.

Table 11-6. *Episode 2: 8-Hour Ozone by Monitor (July/August Highest Ozone Days)*

State	Site Name	7/6	7/8	7/12	7/13	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/25	7/26	7/27	7/28	7/29	8/9	8/10	8/11	8/12	8/13	8/24	8/25	8/27	8/29	8/31
CT	Greenwich	87	44	61	52	76	58	77	73	37	52	85	79			69	69	63	67	37	76	58	77	81	63	44	49	76
CT	Stratford	75		60	59	84	61	79	83	36	46	81	96	67	45	56	69	60	56	35	82	79	69	76	63	48	44	75
CT	Westport	80	42	61	58	75	59	76	80	38	45	87	97	69	41	61	67	58	63	36	87	68	72	79	64	47	47	76
CT	New Haven	68	36	62	40	70	56	71	75	33	37	80	91	48	38	39	51	55	49	25	72	73	59	66	45	44	43	64
CT	Madison	70	33	62	50				82	37	47	74	78	65	51	49	68	52	58	33	61	75	77	66	62	48	44	66
DE	BELLFNT2	57	62	48	29	57	55	60	58	53	62	59	83	64		71	58	57	50	34	44	57	40	57	52	71	58	62
MD	Essex	74	62	57	41	54	71	64	55	75	71	75	72	77	73	99	56	72	49	39	48	54	53	58	61		74	67
MD	Fair Hill	56	58	53	37	52	52	61	63	53	65	65	87	74	64	64	58	58	49		55		27	54	52	75	57	
MD	Edgewood	67	59	53	39	46	62	65	59	58	66	72	82	76	68	79	52	58	47	36	50	55	51	54	58	66	62	62
MD	Millington	51	61	52	36				46	58	49	62	66	54	62	69	60	61	47	31	34	35	36	51	46	64	57	56
NJ	Clarksboro	65	80		32	59	57	64	54		52	64	74	37	33		61	60	48	29	37	51	39	55	46	55	60	64
NY	NYC-Queens	71	54	50	44	75	64	71	67		46	69	82	63	47	62	60	65	56		65	61	59	66	54	45	50	62
NY	NYC-Susan Wagner	75	50	53	45	71	65		64	39	45	77	81	62		61	71	73	57	39	64	54	60	68	55	48	50	63
NY	Babylon	62	38	42	40	76	70	67	60	39	40	67	70	57	45	55	63	60	52	27	48	56	51	64	54	42	52	60
NY	Riverhead	72	37	49	43	78	65	69	57	40	35	70	62	57	45	43	60	54	56	29	53	53	54	63	55	43	49	60

Table 11-7. *Episode 2: Number of Monitors Exceeding 70 ppb by OTR State (July/August Highest Ozone Days)*

	7/6	7/8	7/12	7/13	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/25	7/26	7/27	7/28	7/29	8/9	8/10	8/11	8/12	8/13	8/24	8/25	8/27	8/29	8/31
OTR	21	3	3	1	13	3	8	6	1	1	43	48	9	3	15	6	4	1	1	6	4	3	7	2	4	3	10
CT	8	0	1	0	5	1	5	6	0	0	7	9	1	0	0	1	0	0	0	5	4	3	4	1	0	0	3
DE	0	1	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0
DC	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
ME	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
MD	1	0	0	0	0	1	0	0	1	1	10	5	5	3	8	0	2	0	0	0	0	0	0	0	1	2	2
MA	2	0	0	1	1	0	0	0	0	0	0	4	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
NH	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NJ	2	2	0	0	1	1	0	0	0	0	3	7	0	0	1	1	1	0	0	0	0	0	3	0	0	0	1
NY	4	0	1	0	5	0	3	0	0	0	1	6	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
PA	0	0	1	0	0	0	0	0	0	0	18	8	0	0	2	2	0	0	0	0	0	0	0	0	1	0	4
RI	3	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VA-OTC	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0

11.1.3.2 Meteorological Conditions

During Episode 2, the OTR was not significantly affected by wildfire smoke or other notable exceptional events, but it contains the majority of the high ozone days in the OTR during the 2016 ozone season and was marked by more typical back trajectories during high ozone days (flows from the northwesterly, westerly, southwesterly and southerly directions) and fewer backflow events (from the east, northeast).

In Episode 2, there were 22 days exceeding 70 ppb 8-hour ozone at an OTR monitor. **Table 11-8** provides a brief summary of the meteorology for those days.

Table 11-8. *Episode 2: Synoptic weather description and maximum ozone concentration for 22 days exceeding 70 ppb 8-hour ozone in the OTR.*

Date	Maximum Ozone (ppb)	Synoptic Weather Description Surface	Aloft (850mb)
July 6	87	WSW flow	W flow, High pressure over Florida
July 8	80	WNW to S flow Southern OTR	WNW flow, Low pressure over Great Lakes
July 15	84	SW flow, trough of Low pressure	WSW flow, Strong Low pressure over Quebec
July 16	71	SSW flow, Cold front stalled	SW flow, High pressure east of Carolina
July 17	79	SW flow	WSW flow, Bermuda High pressure
July 18	83	SW flow, trough of Low pressure	WSW flow, Low pressure trough passing through OTR
July 19	75	SW to NW flow, front passes	NW flow, High pressure moving in
July 20	71	WNW flow	NW flow, East side of High pressure ridge
July 21	87	W to SW flow	WNW flow, High pressure over Southeast
July 22	97	SW flow, trough of Low pressure	WNW flow, Low pressure trough crossing OTR
July 25	77	SW flow, Atlantic High pressure	W flow, Low pressure trough over OTR
July 26	73	SW on east side of trough	NW flow, Advancing High pressure ridge
July 27	99	Light winds, High pressure	WNW flow, High pressure to the south over Florida
July 28	71	Light SW flow, High pressure	W to SW flow, Low pressure develops over Ohio
July 29	73	NW to SE to NNE flow, Front passes	Variable to NNW flow, Low pressure crosses OTR
August 11	87	SSW flow	WSW flow, High pressure east of Carolina
August 12	79	SW flow	SW flow, High pressure east of Carolina
August 13	77	SW flow, Low over Great Lakes	SW flow, High pressure east of Carolina
August 24	81	SSW flow, High pressure	SW flow, High pressure off Atlantic coast
August 27	75	Light winds, High pressure	Variable to NE flow, High pressure crosses OTR
August 29	74	S flow, Front passes	NNE flow, High pressure over Indiana and Illinois
August 31	76	SSW flow, Tropical depression off coast	W flow, Trough to north, High pressure to south

This period is not only the longer episode, but it also contains the majority of the high ozone days in the OTR and was marked by more typical back trajectories during high ozone days (flows from the northwesterly, westerly, southwesterly and southerly directions) (**Figures 11-6** to **11-9**). Episode 2 includes a solid collection of westerly, southwesterly, and southerly trajectories. Some of the highest trajectories excluded from Episode 2 are related to the western wildfires.

Figure 11-6. *Wind trajectories of ozone (ppb) for Madison, CT A) during Episode 2 (July 1 – August 31, 2016) and B) during all 2016 except Episode 2 (April 1 – June 30 and September 1 – October 31, 2016)*

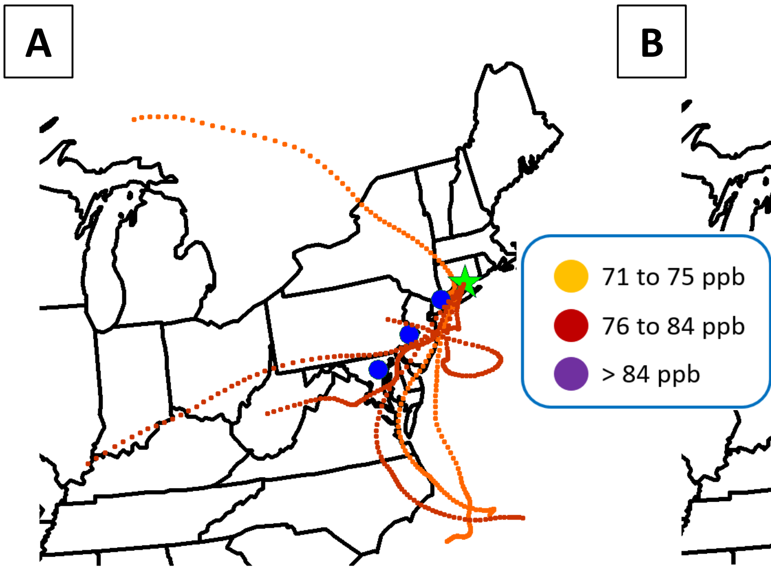


Figure 11-7*. Same as Figure 11-6 except for Greenwich, CT.*

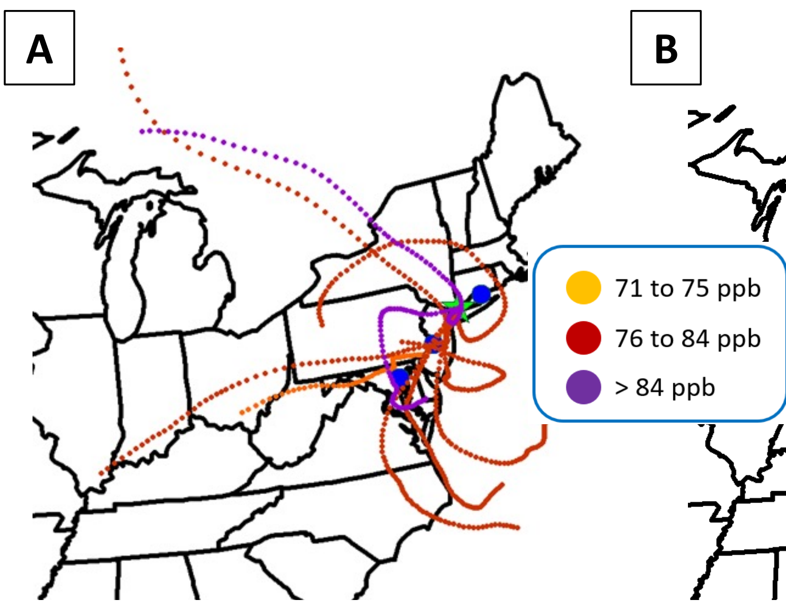


Figure 11-8. *Same as Figure 11-6 except for Bristol, PA.*

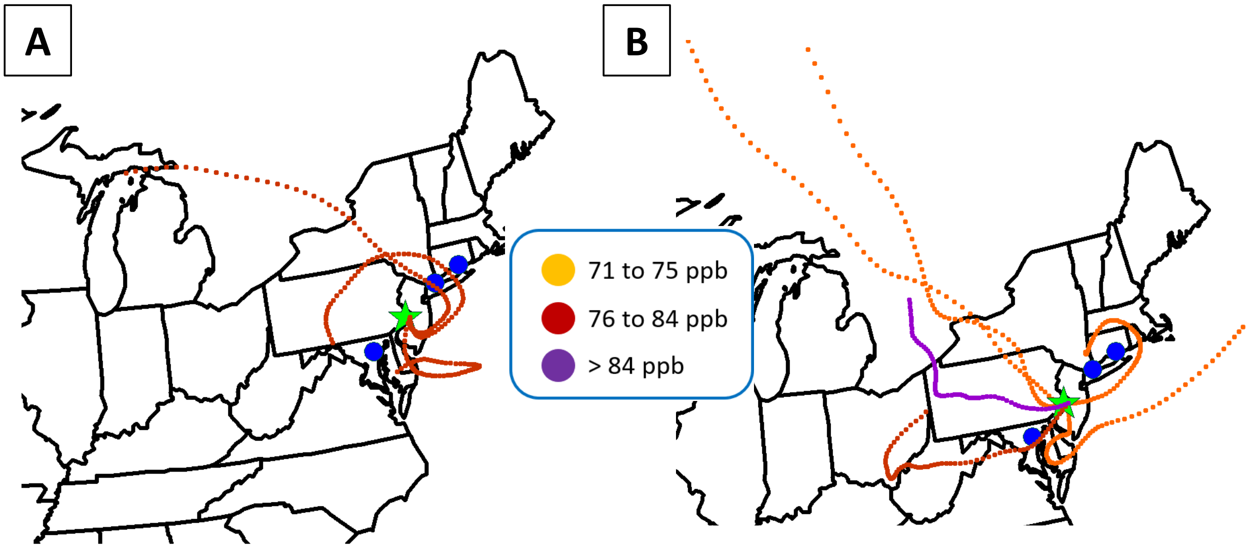
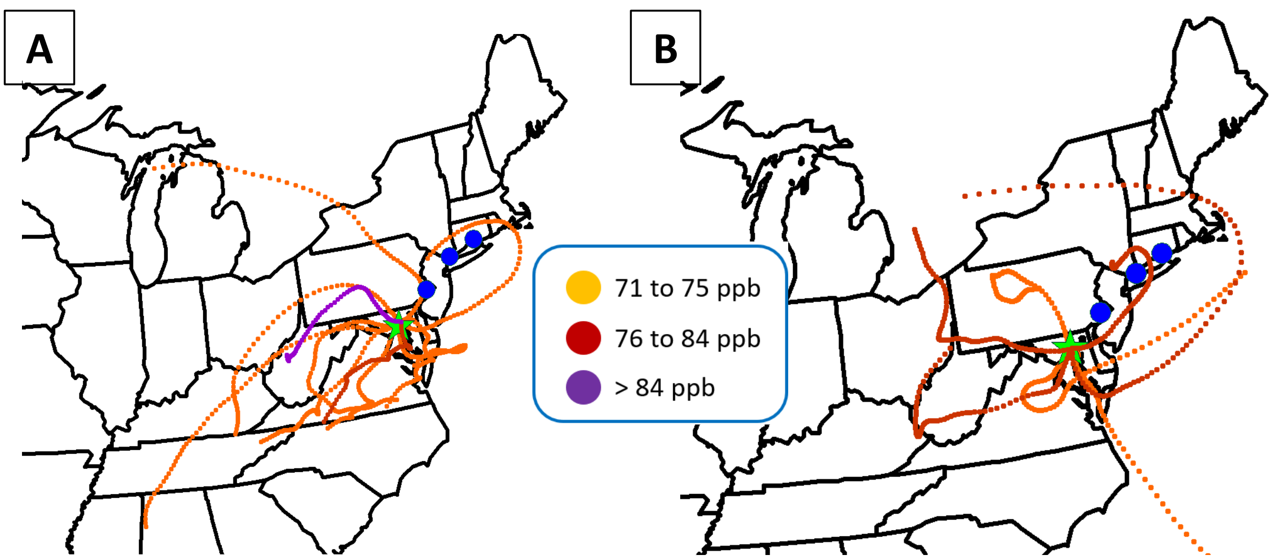


Figure 11-9. *Same as Figure 11-6 but for Essex, MD.*



11.1.4 Episode Selection

The episode selected for OTC episodic modeling is Episode 2, extending from July 1 to August 31, 2016, which captures several periods of high ozone concentrations throughout the OTR, but especially along the nonattainment areas extending from Washington DC to the state of Connecticut. The highest periods of ozone without wildfire influence during the entire 2016 ozone season fell within this episode period as well as a considerable number of other high ozone days.

11.1.5 Modeling Platform

The OTC Modeling Committee chose to use the CMAQ model 12OTC2 domain for full domain modeling purposes, with the potential to use the 4km OTC modeling domain (4OTC2) in future episodic modeling scenarios. Details of their configuration are described in **Tables 11-9** and **Table 11-10**.

The emission inventory used for OTC episodic modeling is the national collaborative based 2016 inventory and the 2023 projection, adjusted to include ERTAC emissions, consistent with the OTC SIP modeling platform (see **Section 5** for more details). Emissions platforms or sectoral updates, including new projection years, are easy to include in the episodic modeling platform at either domain or resolution.

Table 11-9. *Model versions used in OTC 12 km episodic modeling analyses*

	Model and Version
Photochemical Model	CMAQ v5.3.1, cb6r3/AERO7
Meteorological Model	WRF v3.8 (provided by EPA), MCIP v5.0 (processed by NYSDEC)
Emissions Models	SMOKE and ERTAC
Domain	12OTC2 domain, 273x246 12km grid cells with 35 vertical layers
Modeling period	62 days July 1 – August 31, 2016
Resolution	12 km
Boundary conditions	Extracted from 36 km (36US3) CMAQ v5.3.1 model runs using V1(fh) for 2016, 2023 and 2028 (CMV update, no airport update, IPM)
Emissions	2016 V1 (fi) emissions inventory

Table 11-10. *Model versions used in OTC 4 km episodic modeling analyses*

	Model and Version
Photochemical Model	CMAQ v5.3.1, cb6r3/AERO7
Meteorological Model	WRF v3.8 (provided by EPA), MCIP v5.0 (processed by NYSDEC)
Emissions Models	SMOKE and ERTAC
Domain	4OTC2 domain, 126x156 4km grid cells with 35 vertical layers
Modeling period	62 days July 1 – August 31, 2016
Resolution	4 km
Boundary conditions	Extracted from 12OTC2 CMAQ v5.3.1 model runs using V1(fh) for 2016 and 2023
Emissions	2016 V1 (fi) emissions inventory/2016 V2 (fj) biogenic emissions

11.1.6 Episodic Modeling Result Comparison at High Ozone Locations

When conducting episodic modeling, most modeling and analyses procedures follow standard protocol with few exceptions. Given the shorter "episodic" time period, the recommended method of using the "ten highest modeled 8-hour average daily maximum ozone days" to calculate the RRF (US EPA 2014) may not always be appropriate. Because of this, the OTC Modeling Committee used a modified procedure that required at least six modeled days (as opposed to ten) where 8-hour concentrations were modeled to be greater than or equal to 60 ppb for calculating RRF.

Actual SIP quality modeling covers the entire season, while episodic screening modeling considers a shorter, but representative period. In recognition that episodic modeling evaluates a subset of the entire ozone season, OTC uses episodic modeling as a screening tool. This section compares predicted DVFs for key monitoring locations using the selected episodic period and the entire ozone season. The Modeling Committee found that the projected 2023 modeled ozone concentrations obtained from modeling Episode 2 (July 1 – August 31) compared well to the results from modeling the full 2023 ozone season (**Figure 11-10**).

Figure 11-10. *Correlation of Episode 2 (2-Month) and 7-Month 2023 Ozone DVFs*

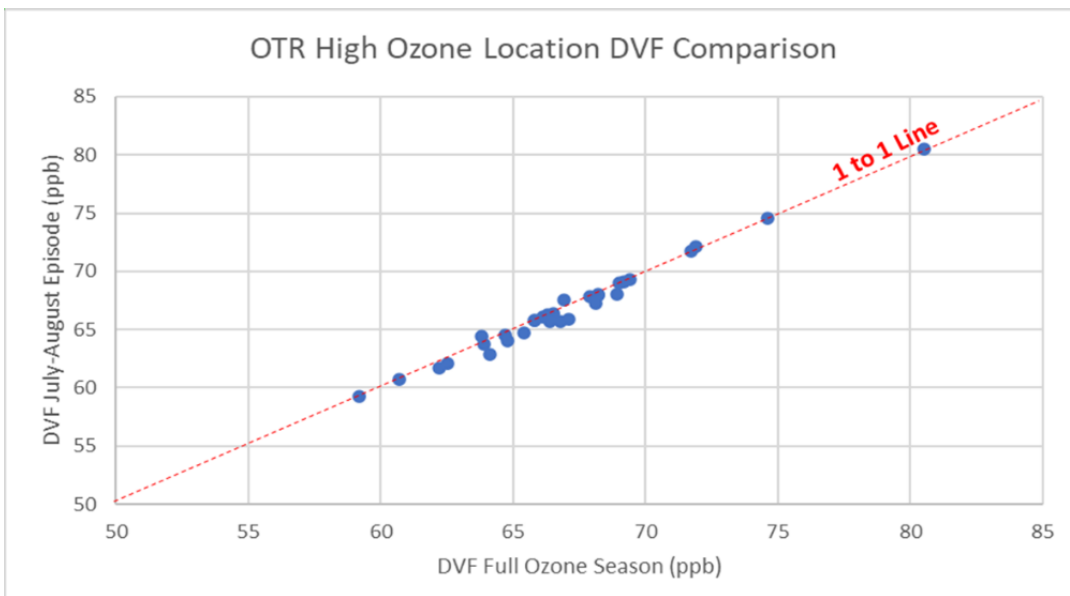


Table 11-11 summarizes modeling comparisons of the number and percentages of monitor locations in the OTR with valid predicted design values for the episodic period and the full ozone season periods. Episode 2 predicted results compare favorably to those produced by modeling the entire ozone season, including design values, counts, and level of agreement in predicted

concentrations, although the counts are a little lower because of the shorter period. **Table 11-12** compares projected 2023 design values using the 3x3 and 3x3 No Water 1 methods for the full season and during Episode 2. We find that the projected 2023 DVFs during Episode 2 are comparable to those calculated for the full ozone season.

Table 11-11. *Evaluation of monitors in the OTR for the 2-month episode vs the 7-month full ozone season*

Statistic	Count	Percent
Number of Monitors in OTR	212	100
Number of Monitors with Future Values - Full Ozone Season	165	78
Number of Monitors with Future Values – Episode 2	151	71
Monitors with > 1% differential of Design Values between Periods	41	19
Monitors with > 3% differential of Design Values between Periods	1	<1
Monitors > 65 ppb with > 1% differential of Design Values between Periods	7	3
Monitors > 65 ppb with > 3% differential of Design Values between Periods	0	0

Based on these results, the OTC Modeling Committee determined that modeling of Episode 2 (July 1- August 31, 2016) produces reasonable estimates of full ozone season DVFs and can be used for sensitivity and screening modeling for locations within the OTR. SIP quality modeling will still be conducted using the standard full ozone season modeling period.

Table 11-12. *OTR high ozone monitor projected 2023 design value comparisons to the full ozone season and Episode 2 (ppb).*

State	Location	AQS ID	2014-18 DVB	Projected 2023 Design Value(3x3)		Projected 2023 Design Value (NoWater 1)	
				Full Season	Episode 2	Full Season	Episode 2
CT	Westport	90019003	82.7	80.5	80.5	75.5	74.8
CT	Stratford	90013007	82	74.6	74.6	75.1	73.7
CT	Madison	90099002	79.7	71.9	72.1	70.9	70.8
CT	Greenwich	90010017	79.3	71.7	71.7	78.6	78.6
PA	Bristol	420170012	79.3	69.2	69.1	69.2	69.1
CT	Middletown	90079007	78.7	69.0	69.0	69.0	69.0
PA	North East Airport (NEA)	421010024	77.7	68.2	68.0	68.2	68.0
CT	Danbury	90011123	77	68.9	68.0	68.9	68.0
NY	NYC-Susan Wagner HS	360850067	76	74.2	74.4	70.2	70.4
CT	New Haven	90090027	75.7	69.4	69.3	68.4	67.7
PA	North East Waste (NEW)	421010048	75.3	66.3	66.3	66.3	66.3
NJ	Camden Spruce Street	340070002	75.3	66.1	66.1	66.1	66.1
NJ	Rutgers University	340230011	74.7	65.8	65.8	65.8	65.8
CT	Groton	90110124	74.3	67.9	67.8	71.3	71.3
NJ	Leonia	340030006	74.3	68.1	67.3	68.1	67.3
NY	Riverhead	361030004	74.3	66.4	65.7	66.8	65.7
NY	Babylon	361030002	74	68.2	67.9	67.5	67.0
NY	White Plains	361192004	74	66.9	67.5	67.8	66.9
MD	Glen Burnie	240031003	74	65.4	64.7	63.4	64.0
MD	Fair Hill	240150003	74	64.0	63.6	64.0	63.6
MD	Edgewood	240251001	74	63.8	64.4	63.9	63.8
NJ	Clarksboro	340150002	73.7	65.8	65.8	65.8	65.8
DE	BCSP	100031010	73.7	65.3	64.9	65.3	64.9
NJ	Wash. Crossing	340219991	73.3	64.8	64.0	64.8	64.0
MD	Aldino	240259001	73	62.5	63.3	63.0	62.6
PA	NEWG	420290100	72.7	63.6	63.3	63.6	63.3
MD	Essex	240053001	72.7	64.1	62.9	62.8	62.6
NJ	Colliers Mills	340290006	72.7	63.9	63.3	63.9	63.3
NY	NYC-Queens	360810124	72.3	66.5	66.4	65.6	65.6
MD	Padonia	240051007	72	61.5	61.6	61.5	61.6
MA	Fall River	250051004	71.7	68.5	67.6	63.4	63.7
CT	McAuliffe Park	90031003	71.7	62.6	61.8	62.6	61.8
CT	Stafford	90131001	71.7	62.2	61.7	62.2	61.7
PA	Chester	420450002	71.3	63.8	63.3	63.8	63.3
NY	Rockland County	360870005	71.3	64.1	62.6	64.1	62.6
PA	Norristown	420910013	71.3	63.8	63.0	63.8	63.0
DE	Wilmington-MLK Blvd	100032004	71.3	62.9	62.7	62.9	62.7
RI	W Greenwich	440030002	71.3	62.9	62.6	62.9	62.6
NJ	Rider University	340210005	71.3	62.5	62.1	62.5	62.1
CT	Mohawk Mt-Cornwall	90050005	71.3	62.8	61.7	62.8	61.7
NJ	Flemington	340190001	71.3	62.5	61.5	62.5	61.5
NJ	Bayonne	340170006	71	68.1	68.3	64.7	64.9
NY	Suffolk County	361030009	71	66.8	65.7	64.3	63.6
DE	BELLFNT2	100031013	71	62.6	62.5	62.6	62.5
DC	McMillan	110010043	71	60.7	60.7	60.7	60.7
VA	Aurora Hills	510130020	71	60.2	60.3	60.2	60.3

12 Peak Electricity Demand Episodic Sensitivity Modeling

OTC performed High Energy Demand Day (HEDD) episodic modeling for a 62-day period covering meteorology from July 1 through August 31. Emission inventories used were based off the projected 2023 V1 fi with ERTAC and MEGAN. More information on the episodic modeling platform can be found in **Section 11** of this TSD. Part-75 electricity producing unit emissions were modified to actual hourly 2018/19 levels to reflect recent actual hourly emissions reflective of real-world operating scenarios and matched to existing 2016 meteorology. This modeling was performed at the request of the OTC Stationary and Area Sources (SAS) Committee to quantify the differences in HEDD demand due to regulatory influences and greater uptake of natural gas since 2016. Detail on emissions substitution and model scenario development can be found in the sections below. Peaking units were defined in the same fashion as described in **Section 10.4**. In this modeling package for HEDD analysis, several "what-if" scenarios have been identified as part of an information matrix where select parameters are varied with each successive run.

12.1 Base Scenario Data Review

A total of 1,049 Part-75 units from the OTR plus VA were included in this HEDD analysis, with hourly data accessed from the EPA Air Markets Program Data portal (**Appendix F**). 947 of these units were categorized as electric providers and 407 of those were classified by OTC as being Peaking Units using the definition above. The remainder of the units were non-electric generating facilities. Actual operations for Part-75 units were derived from the ozone seasons of 2018 and 2019 (spanning 306 cumulative days). The number of electricity generating facilities with measurable NOx emissions during any given hour ranged between 101 and 601 with an average of about 256 (**Figure 12-1**).

The number of peaking units with measurable NOx emissions during any given hour ranged between 0 and 166 with an average of about 20 (represented by the blue line). The areas shaded in pink represent periods when ozone concentrations for at least one monitor in the OTR exceeded 71 ppb. Non-Part-75 peaking units are not included in these unit counts since they do not have actual hourly operation and emission data available. They also do not undergo hourly adjustments in this study at present. The Non-Part-75 peaking units included in this category from the OTR+VA are listed in **Appendix G**.

It is important to understand the actual operational nature of units being identified as peaking units for this modeling analysis. **Figures 12-2** and **12-3** present 2018 and 2019 actual total electrical generation (gross load – MW) and the hourly NOx emissions (lbs/hr) for all electric generation, cogeneration, and small electric providers within the OTR plus Virginia. As mentioned earlier, non-Part-75 units are not included in this analysis because of the lack of hourly data since they do not use CEMS. The blue line in **Figure 12-2** presents hourly total MW generated and the orange line shows the portion of the gross load produced by identified peaking units. Both lines demonstrate pronounced diurnal cycles with daytime maximums and nighttime minimums. Larger scale patterns also appear indicating periods of higher electrical demand, typically occurring during hot weather, which often correspond to periods of high ozone concentrations. Peaking units generally produce little electricity at night and generation appears to increase somewhat during periods of high electricity demand. Overall, during this 2018/2019 period, peaking units produced a small portion of electric generation, which increased in total generation percentage during high electricity demand.

Figure 12-1 *2018/19 Base Hourly Total OTR+VA "Peaking Units" Reporting NOx Emissions*

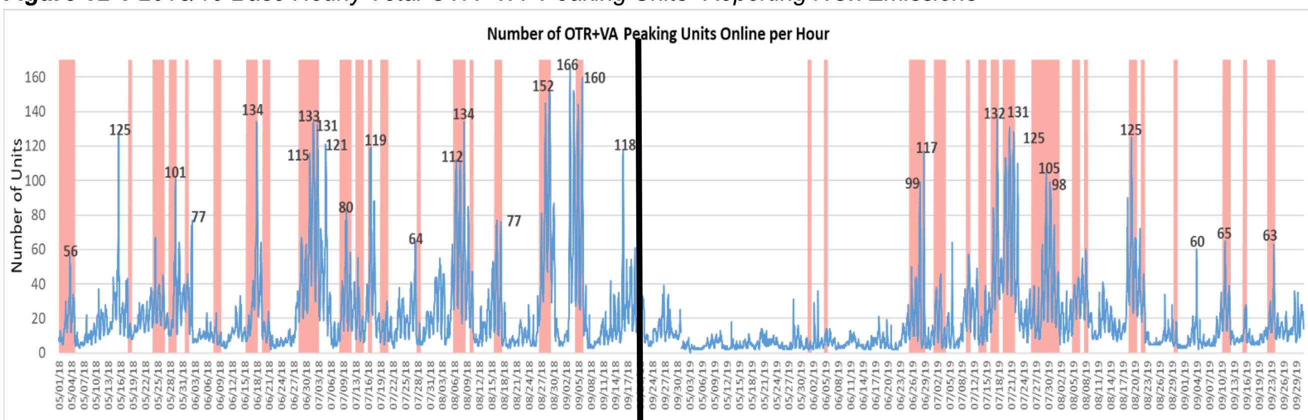


Figure 12-2. *Hourly Total OTR+VA Hourly generation (MW) of Part-75 Listed and Peaking Units During the 2018 and 2019 Ozone Seasons*

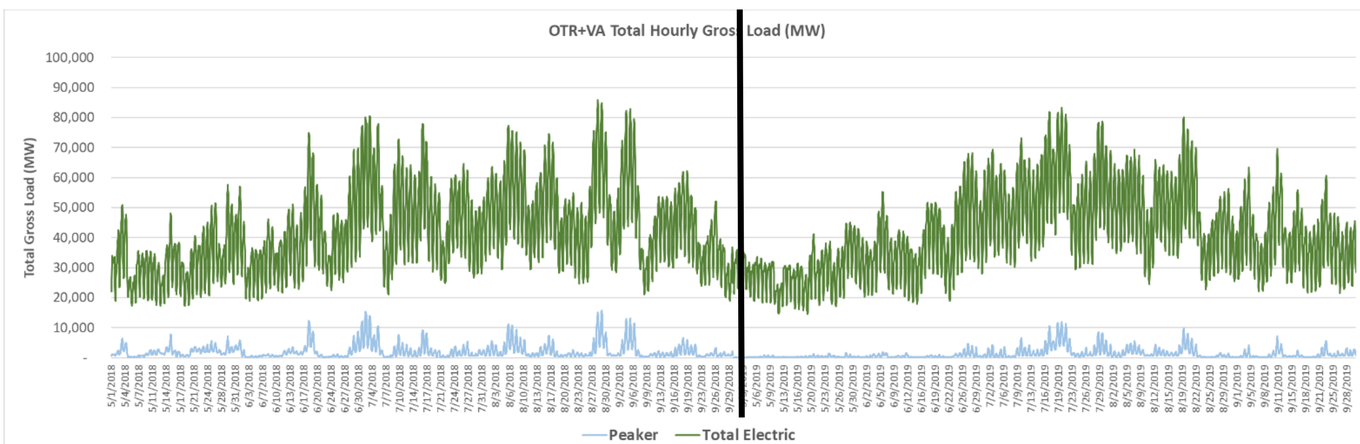
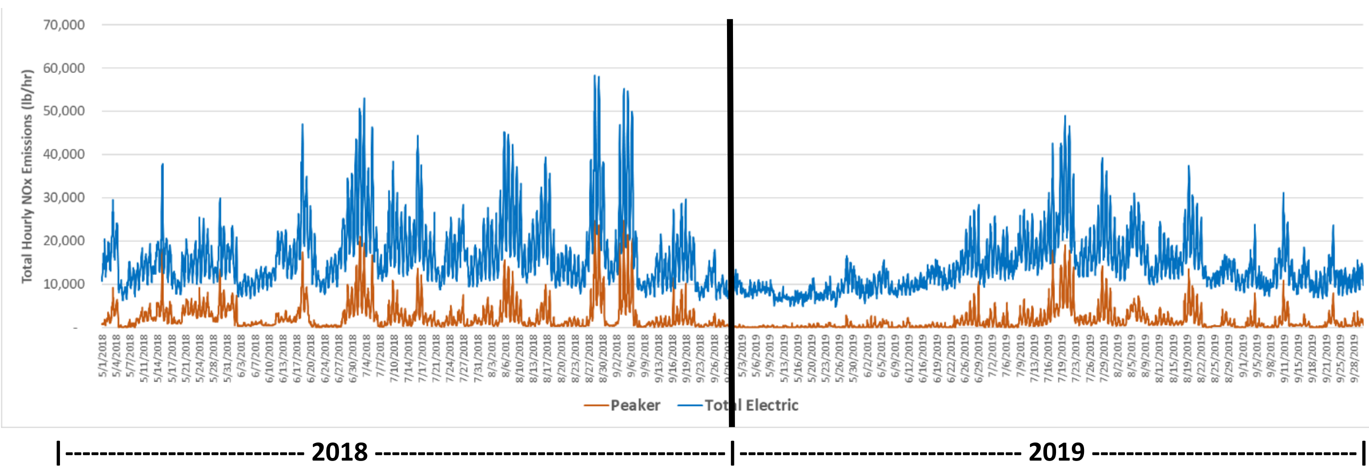


Figure 12-3 presents in green the hourly NOx emissions (lbs NOx/hour) for the same units and periods identified for **Figure 12-2**. Diurnal cycles again are present but the daytime emission peaks are sharper, especially on days with the highest emissions. Peaking unit hourly emissions shown by the orange line follow the same pattern, but while the overall magnitude of NOx emissions from peakers is substantially lower that from the electric sector as a whole, they

comprise a substantially higher percentage (approximately 50-66%) of overall NOx emissions during high emission days.

This dataset served as the source for emission parameters for conducting the episodic sensitivity modeling but since the modeling platform is based on 2016 meteorology, periods of peak energy demand and associated emissions needed to be provided in a way that is consistent for use with the platform. Since this modeling was most focused on analysis of peak energy demand, an OTC SAS Committee workgroup analyzed the electric generation during 2016 and more recent years. They found that high energy periods during the ozone seasons of 2018 and 2019 had similar characteristics to those that occurred during the July 1 – August 31, 2016 modeling platform period. They also determined that at that time, 2018 and 2019 were the most recent years available where emissions data representing current operational trends. 2020 and 2021 emissions were influenced by the COVID-19 pandemic and were therefore deemed not representative of typical operations.

Figure 12-3. *Hourly Total OTR+VA Emissions of NO_X from Part-75 Listed and Peaking Units During the 2018 and 2019 Ozone Seasons*



12.2 Peak Electricity Demand Modeling Matrix

Episodic peak energy sensitivity modeling was performed with the 2016 modeling platform with projected 2023 emissions for all sectors except CEMS reporting Part-75 EGUs, cogeneration units, and small electric providers where 2018/2019 actual operations and emissions were used. Key to this analysis is using actual hourly electric unit emissions rather than modeled or projected emissions which can act to smoothen and average out peak emissions.

Proposed episodic screening model runs include:

- **Run A** (2016 Base): 2016 emission inventory (with 2023 ERTAC outside the OTR+VA)
- **Run B** (2023 Base): 2023 emission inventory
- **Run 1** 2023 emissions inventory replacing all OTR+VA EGUs and non-EGUs hourly emissions with those from year 2016 (initial base). Favorable comparison of these

adjusted emissions to corresponding emissions in the original 2016 modeling platform emissions demonstrates performance of the data.

- **Run 2** (Rebase): 2023 emission inventory replacing all OTR+VA EGUs and non-EGUs hourly emissions with 2018/19. Approximately 1,035 units in the OTR have some degree of hourly operational data for the Rebase exercise. About 933 are electric producers and 384 of these are classified as peaking units (372 are Part-75 units and 6 are not).
- **Run 3** Run 2 base with zero emissions for OTR+VA Part-75 identified peaking electric generating units (372 units). Run 3 minus Run 2 shows the impact of OTR+VA Part-75 peaking unit emissions.
- **Run 4** *Tabled due to lack of data availability.* Run 2 base with **all** OTR+VA non-Part-75 units set to zero (100 units). Run 4 minus Run 2 shows the impact of OTR+VA non-Part-75 unit emissions. (Note: Non-Part-75 units were projected by IPM to 2023).
- **Run 5** *Tabled due to low emission differences*. Run 2 base with **all** OTR+VA non-electric generating units set to zero (86 units). Run 5 minus Run 2 shows the impact of OTR+VA non-EGUs emissions.
- **Run 6** Run 2 base with Part-75 identified peaking units replaced with dirtiest emitting units dispatched to meet actual 2016 hourly MW capacity by zone. Provides high-end bound of capacity equivalent maximum potential impact of Part-75 peaking units. (This adjustment considers only the 372 Part-75 peaking units).
- **Run 7** Run 2 base with Part-75 identified peaking units replaced with cleanest emitting units dispatched to meet actual 2016 hourly MW capacity by zone. Provides low-end bound of capacity equivalent potential impact of Part-75 peaking units. (This adjustment considers only the 372 Part-75 peaking units).
- **Run 8** Run 2 base with Part-75 identified peaking units replaced based with most frequently (2018/19) operated peaking units dispatched to meet actual 2016 hourly MW capacity by zone. Provides a center-point for Part-75 peaking units. (This adjustment considers only the 372 Part-75 peaking units).

In order to prepare an actual emission with 2018 and 2019 data from the 2016 modeling platform, units located in the OTR that came online after 2016, and units that retired after 2019 were identified in **Table 12-13** and **Table 12-4**, respectively. Units added by ERTAC for 2023 and were not online in 2018/19 are listed in **Table 12-5**. The units shaded in orange are defined as peaking units in this analysis.

Table 12-1. *OTR+VA Part-75 Units Included in 2018 and 2019 data but not included in the 2016 Base files*

State	Facility Name	Facility ID (ORISPL)	Unit ID	OTC Peaker?	2019 NOx Emissions
CT	CPV Towantic Energy Center	56047	1	No	49.1
CT	CPV Towantic Energy Center	56047	2	No	27.4
CT	Wallingford Energy, LLC	55517	CT06	No	0.9
CT	Wallingford Energy, LLC	55517	CT07	No	1.0
MA	Blackstone	1594	11	Yes	3.5
MA	Blackstone	1594	12	Yes	10.1
MA	Exelon West Medway II	59882	J4	No	1.6
MA	Exelon West Medway II	59882	J5	No	1.3

MA	Salem Harbor Station NGCC	60903	1	No	7.9
MA	Salem Harbor Station NGCC	60903	2	No	8.1
MD	American Sugar Refining, Inc.	54795	C6	No	8.9
MD	CPV St. Charles Energy Center	56846	GT1	No	28.5
MD	CPV St. Charles Energy Center	56846	GT2	No	31.3
MD	Keys Energy Center	60302	11	No	49.6
MD	Keys Energy Center	60302	12	No	47.4
MD	Perryman	1556	6-2	No	4.1
MD	Wildcat Point Generation Facility	59220	CT1	No	38.6
MD	Wildcat Point Generation Facility	59220	CT2	No	44.7
NJ	Sewaren Generating Station	2411	7	No	73.0
NY	Holtsville Facility	8007	U00019	Yes	5.0
NY	Valley Energy Center	56940	1	No	47.2
NY	Valley Energy Center	56940	2	No	44.8
PA	Lackawanna Energy Center	60357	1	No	62.2
PA	Lackawanna Energy Center	60357	2	No	64.6
PA	Lackawanna Energy Center	60357	3	No	58.4
PA	Moxie Freedom Generation Plant	59906	201	No	72.2
PA	Moxie Freedom Generation Plant	59906	202	No	67.1
PA	Panda Hummel Station	60368	CT1	No	47.8
PA	Panda Hummel Station	60368	CT2	No	44.9
PA	York Energy Center	55524	5	No	31.7
PA	York Energy Center	55524	6	No	31.0
VA	Doswell Limited Partnership	52019	CT2	No	67.3
VA	Doswell Limited Partnership	52019	CT3	No	68.5
VA	Greensville County Power Station	59913	1A	No	55.5
VA	Greensville County Power Station	59913	1B	No	59.0
VA	Greensville County Power Station	59913	1C	No	55.9
VA	Panda Stonewall Power Project	59004	CT1	No	33.1
VA	Panda Stonewall Power Project	59004	CT2	No	32.3

Table 12-2. *Retired Part-75 Units Removed from 2023 ERTAC File for this Modeling*

State	Facility Name	Facility ID (ORISPL)	Unit ID	Offline Date
DE	McKee Run	599	1	5/31/2017
DE	McKee Run	599	2	5/31/2017
MA	Brayton Point	1619	1	6/1/2017
MA	Brayton Point	1619	2	6/1/2017
MA	Brayton Point	1619	3	6/1/2017
MA	Brayton Point	1619	4	6/1/2017
MA	Canal Station	1599	2	1/1/2017
MA	Exelon L Street Generating Station	1587	NBJ-1	1/1/2017
MD	C P Crane	1552	1	1/1/2018
MD	C P Crane	1552	2	1/1/2018
MD	Gould Street	1553	3	9/1/2017
MD	Perryman	1556	CT2	1/1/2017
MD	Riverside	1559	4	1/1/2017
NJ	B L England	2378	2	5/1/2019
NJ	B L England	2378	3	1/31/2018

NJ	Hudson Generating Station	2403	2	12/31/2017
NJ	Mercer Generating Station	2408	1	12/31/2017
NJ	Mercer Generating Station	2408	2	12/31/2017
NJ	Sewaren Generating Station	2411	1	4/30/2018
NJ	Sewaren Generating Station	2411	2	4/30/2018
NJ	Sewaren Generating Station	2411	3	4/30/2018
NJ	Sewaren Generating Station	2411	4	4/30/2018
PA	Bruce Mansfield	6094	1	2/5/2019
PA	Bruce Mansfield	6094	2	2/5/2019
PA	MARCUS HOOK 50, L.P.	50074	1	6/1/2019
PA	Northeastern Power Company	50039	31	10/24/2018
PA	Shawville	3131	1	1/1/2017
PA	Shawville	3131	2	1/1/2017
PA	Shawville	3131	3	1/1/2017
PA	Shawville	3131	4	1/1/2017
VA	Bellemeade Power Station	50966	1	12/31/2018
VA	Bellemeade Power Station	50966	2	12/31/2018
VA	Bremo Power Station	3796	3	12/31/2018
VA	Bremo Power Station	3796	4	12/31/2018
VA	Chesterfield Power Station	3797	3	12/13/2018
VA	Chesterfield Power Station	3797	4	12/13/2018
VA	City Point Energy Center	10377	BLR01A	6/25/2019
VA	City Point Energy Center	10377	BLR01B	6/25/2019
VA	City Point Energy Center	10377	BLR01C	6/25/2019
VA	City Point Energy Center	10377	BLR02A	6/25/2019
VA	City Point Energy Center	10377	BLR02B	6/25/2019
VA	City Point Energy Center	10377	BLR02C	6/25/2019
VA	Mecklenburg Power Station	52007	1	12/31/2018
VA	Mecklenburg Power Station	52007	2	12/31/2018
VA	Possum Point Power Station	3804	3	12/31/2018
VA	Possum Point Power Station	3804	4	12/31/2018
VA	Spruance Genco, LLC	54081	BLR03A	12/31/2018
VA	Spruance Genco, LLC	54081	BLR03B	12/31/2018
VA	Spruance Genco, LLC	54081	BLR04A	12/31/2018
VA	Spruance Genco, LLC	54081	BLR04B	12/31/2018
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01A	1/1/2017
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01B	1/1/2017
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01C	1/1/2017
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02A	1/1/2017
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02B	1/1/2017
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02C	1/1/2017
VA	Yorktown Power Station	3809	1	3/8/2019
VA	Yorktown Power Station	3809	2	3/8/2019

Table 12-3. *New Part-75 Units Removed from 2023 ERTAC File for this Modeling*

State	Facility Name	Facility ID (ORISPL)	Unit ID	Online Date
MD	C P Crane	1552	CT1	1/1/2020
MD	C P Crane	1552	CT2	1/1/2020
MD	C P Crane	1552	CT3	1/1/2020

MD	Chalk Point	1571	G24001	1/1/2023
NJ	Linden Generating Station	2406	G34001	1/1/2023
NJ	Middlesex Energy Center	993401	1	1/1/2021
NY	Athens Generating Company	55405	G36002	1/1/2023
NY	Bethlehem Energy Center (Albany)	2539	G36004	1/1/2023
NY	Empire Generating Company LLC	56259	G36003	1/1/2023
NY	Independence	54547	G36001	1/1/2023
PA	Fairless Energy, LLC	55298	G42001	1/1/2023
VA	Berry Hill Power Station	995122	1	1/1/2021
VA	Bremo Power Station	3796	G51001	1/1/2023
VA	C4GT	995120	1A	1/1/2021
VA	C4GT	995120	1B	1/1/2021
VA	Chickahominy Power, LLC	995121	1	1/1/2021
VA	Chickahominy Power, LLC	995121	2	1/1/2021
VA	Chickahominy Power, LLC	995121	3	1/1/2021

A full list of the OTR Part-75 Emission Units included in this Episodic HEDD modeling analysis are provided in ***Appendix F****.*

12.3 "ReBasing" - Adjustment of Part-75 Electrical Facilities to 2018/19 Operation Levels

A critical yet complex component to this analysis is adapting the 2018/19 actual emissions to the 2016 platform meteorology for Part-75 electric units (with available hourly CEMS data), referred to here as "ReBasing." This criterion was specified by the OTC SAS Committee to better reflect operational and emission changes since 2016 reflecting economic and regulatory influences. During this period, the price of natural gas dropped and units fueled by it were more frequently dispatched into the electricity grid.

Emission processing for the episodic peak energy day modeling follows the methodology described below. Once the emissions were calculated, a Python script was used to translate this data into an ERTAC SMOKE-ready file, and from there, the emissions files were processed normally for modeling with CMAQ.

The emission OTC ReBasing project relies on geographic zones (**Figure 12-4**) to better differentiate regional power pool as well as regional weather and electricity demand variability. NERC/ISO regions were originally proposed for this role but were not reliably reported in the CAMD data file. This could potentially be applied in future modeling efforts. Instead, seven geographic zones roughly approximating New England, Upstate New York, Central/Western Pennsylvania, Western Virginia, New York City, Philadelphia, and Washington/Baltimore.

Within each zone, periods of actual electric demand within 2016 were preserved by matching 2016 electrical generation with periods of similar generation from 2018 and 2019 actual operations on a day-by-day basis. Once generation was matched, emissions and heat input data matching the hourly generation was carried over to complete the configuration. Efforts were made to maintain continuous multi-day 2018-2019 operations together to better account for continuity and unit start-up patterns during the most critical periods. This procedure meets the goal of using actual data emissions and operational conditions rather than the predictive data used in typical emissions projections. Nonetheless, matching electric generation from one year to another results in numerous chronological discontinuities, which, while it meets the needs for the goals of this modeling study, is improbable to be replicated in the real world.

For quality assurance, actual hourly total 2016 electric gross load was matched to 2018/19 ReBase gross load scenario for the entire OTR (**Figure 12-5**) and by region. Hourly gross load data was generally within 3% of the corresponding hour of each scenario, matching better during peak daytime hours and weakest during overnight hours. Each of the seven zones underwent a similar analysis with each of the highest generating zones matching very strongly.

Figure 12-4. *OTR+VA Comparison of 2018/19 Electrical Generation (MW) Matched to 2016 Actual Generation*

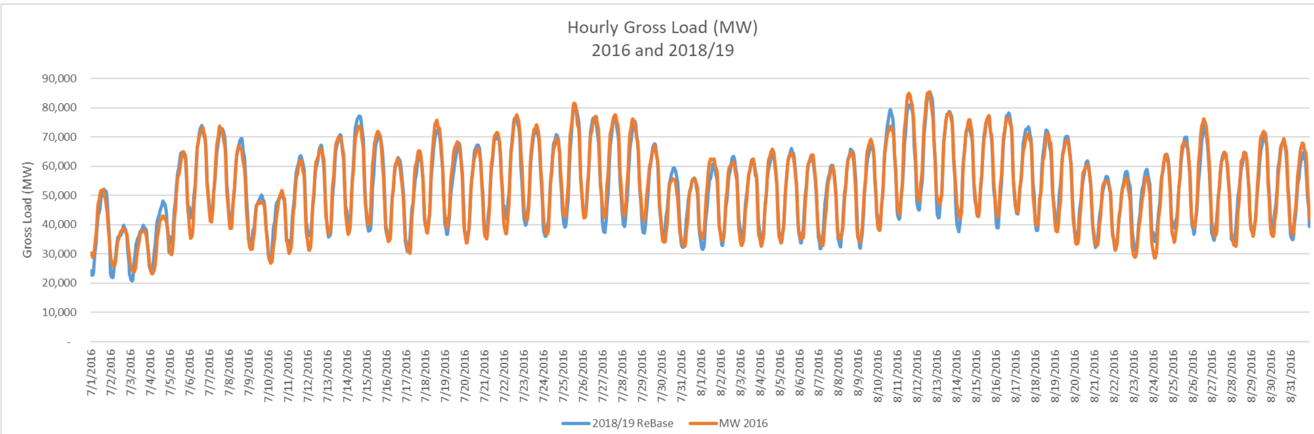
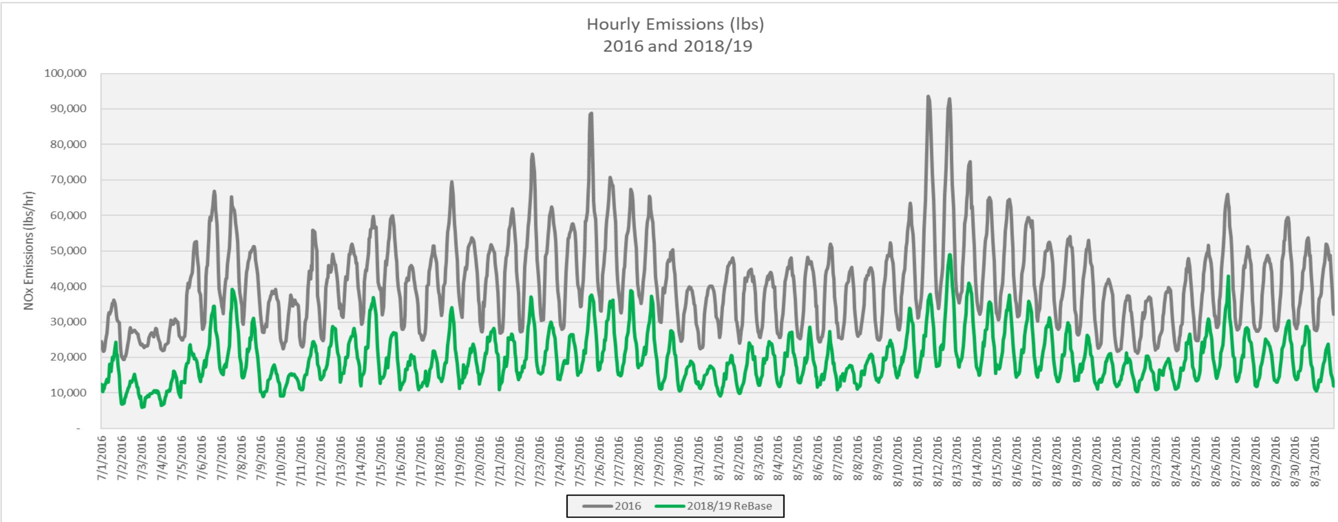


Figure 12-6 presents hourly emissions for 2016 actual compared to the emissions resulting from the 2018/19 ReBasing calculations for the entire OTR. It is clear that overall NOx emissions from electric generation are down considerably from 2016 to 2018/19. The analysis found that emission rates for most units did not change significantly on an individual basis (increase or decrease), but rather most of the change in emissions resulted from different dispatching priorities. Operation of older coal and oil burning units became more expensive than units burning natural gas, and subsequently operated less during 2018/19 than they did in 2016. Again, this is a critical component to the ReBasing analyses.

Figure 12-5. *OTR+VA Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*



While still providing a generally good match, regional zones with lower total generation generally had fewer days in 2018/19 that matched optimally with 2016 generation. Zones 3 (Western/Central PA) and 4 (Western VA) were especially difficult to match due to the lower overall generation needs and the electrical generation in 2018/2019, however because these regions have much lower generation and associated emissions, they are relatively less important to this modeling analysis.

Emissions for Zones 3 (Western/Central PA), 4 (Western VA), and 6 (Philadelphia) show large reductions from 2016 to 2018/19 levels, while 2018/19 emission data for Zones 1 (New England), 2 (Upstate NY), and 5 (NYC) were very similar to 2016 levels. The remaining zone 7 (Washington/Baltimore/Eastern VA) falls in the middle with moderate level emissions reductions. See **Figures 12-7 through 12-13** for detailed emission changes for each of the seven regions).

Figure 12-6*. Zone 1 (New England) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

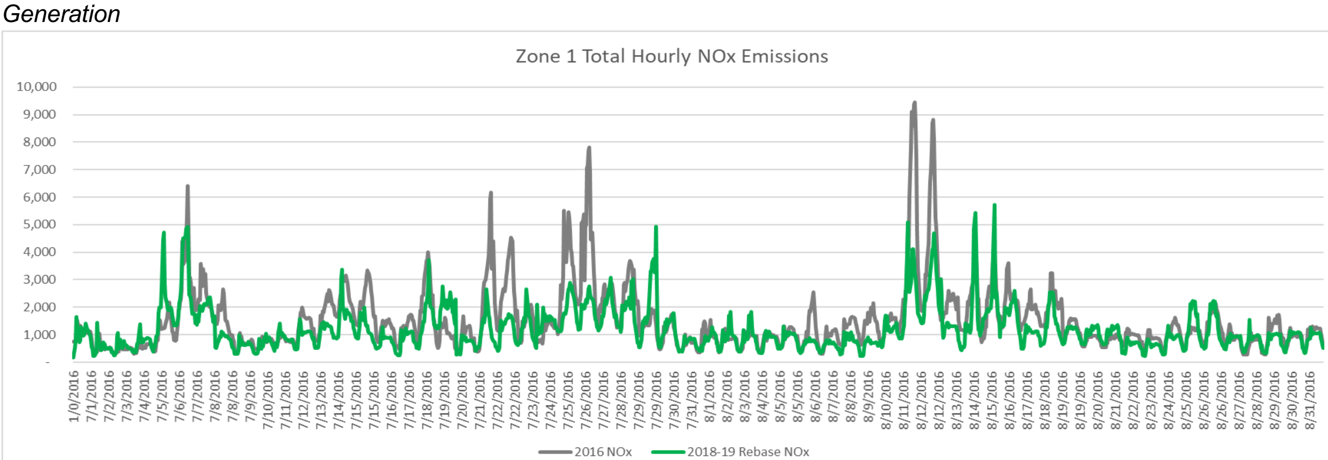


Figure 12-7. *Zone 2 (Upstate New York) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

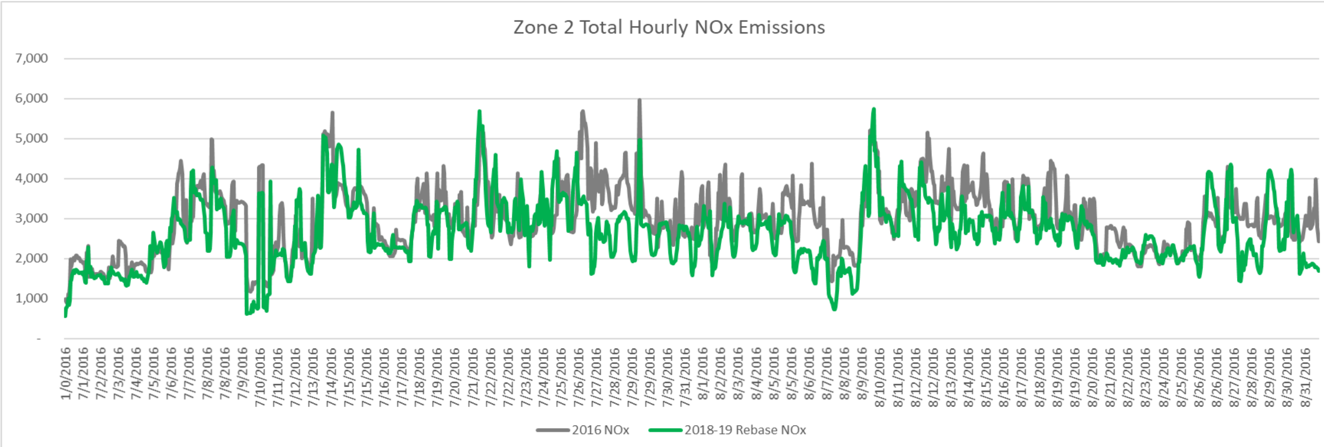


Figure 12-8. *Zone 3 (Western and Central Pennsylvania) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

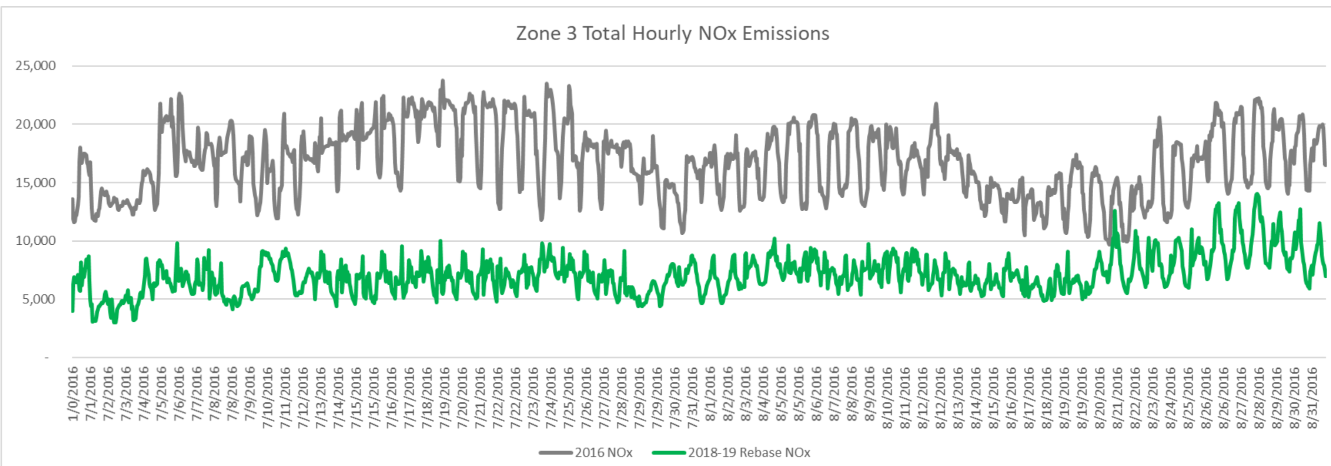


Figure 12-9*. Zone 4 (Western Virginia) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

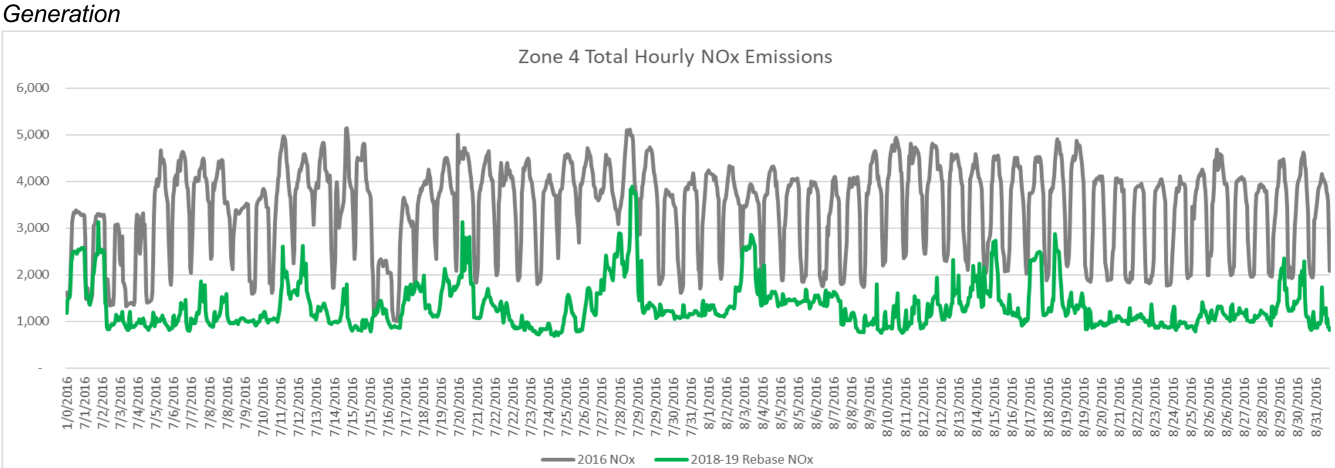


Figure 12-10. *Zone 5 (New York City) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

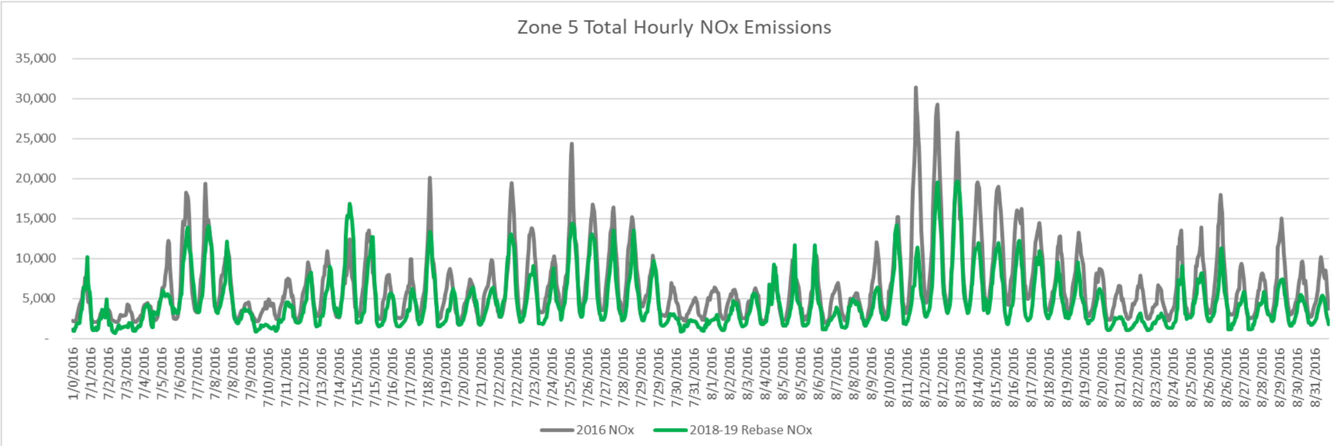


Figure 12-11. *Zone 6 (Philadelphia) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*

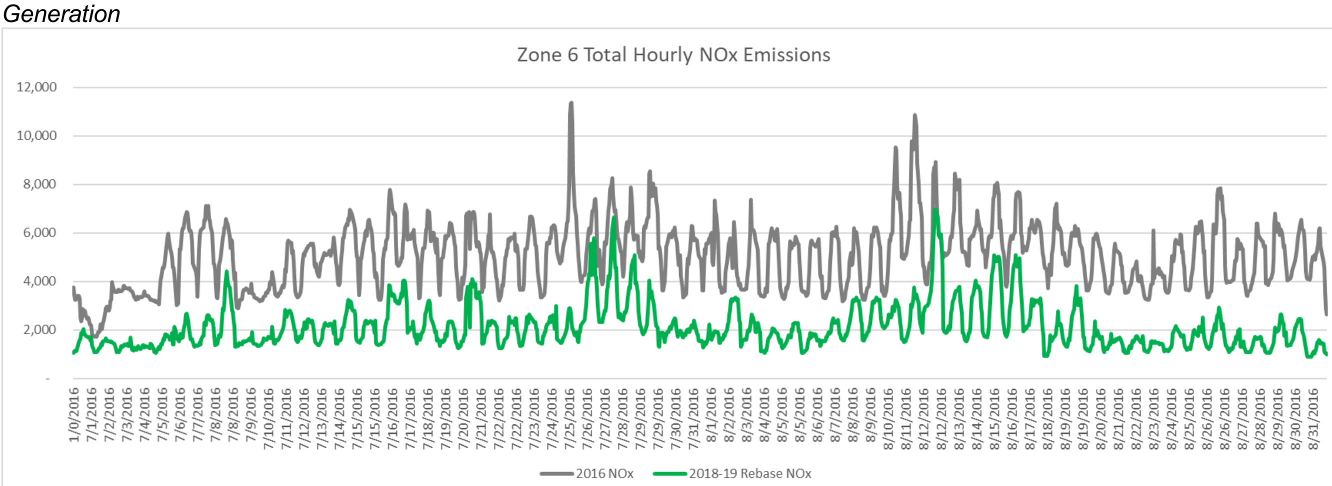
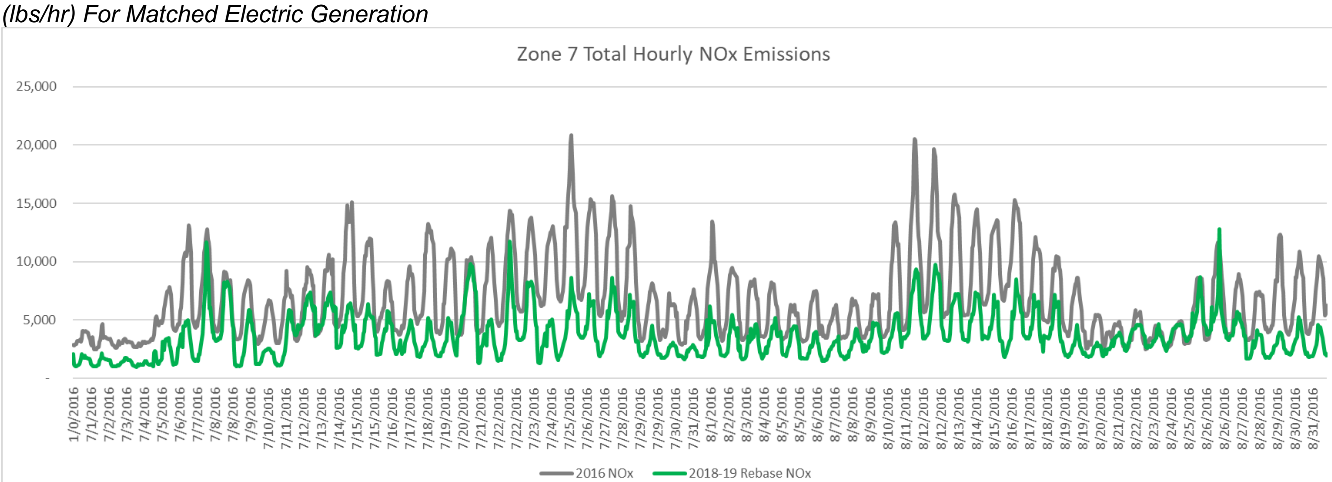


Figure 12-12. *Zone 7 (Washington/Baltimore/Eastern Virginia) Comparison of 2016 to 2018/19 NO_X Emissions (lbs/hr) For Matched Electric Generation*



12.4 Data Review of the 2018/19 ReBase Scenario

Similar to the analysis conducted for actual 2018/19 operations, **Figures 12-14** and **12-15** present the total electrical hourly generation and NOx emissions for the 2018/2019 ReBase (adjusted to 2016) for all electric generation, cogeneration, and small electric providers within the OTR plus Virginia. Non-Part-75 units are not included in these plots because of lack of hourly CEMS data. While such units can and will exhibit peaking behavior, hourly changes are estimated by models based on a standardized emission profile from reported annual emissions. Total electric gross load is shown in blue and the gross load from peaking units is in red. Total electric NOx emissions is shown in gray and the peaker emissions are in blue in **Figure 12-15.** The maximum hourly peaker gross load and NOx emissions are about 17% and 47% of total gross load.

Figure 12-13. *2016 Hourly Total OTR+VA MW generation of Part-75 Listed and Peaking Units During the 2018/19 ReBase Modeling Period*

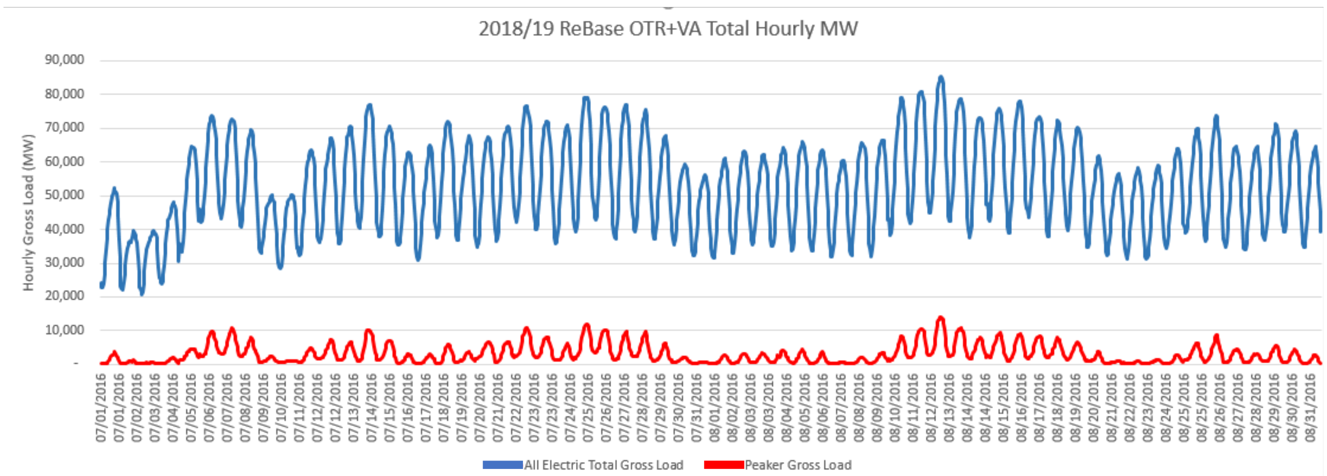
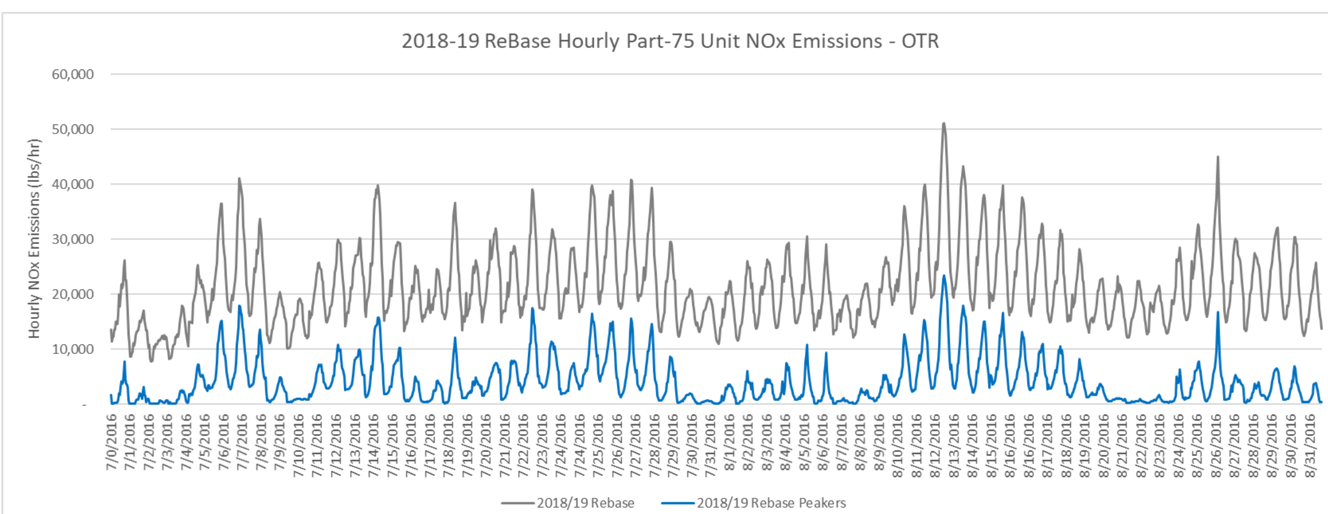


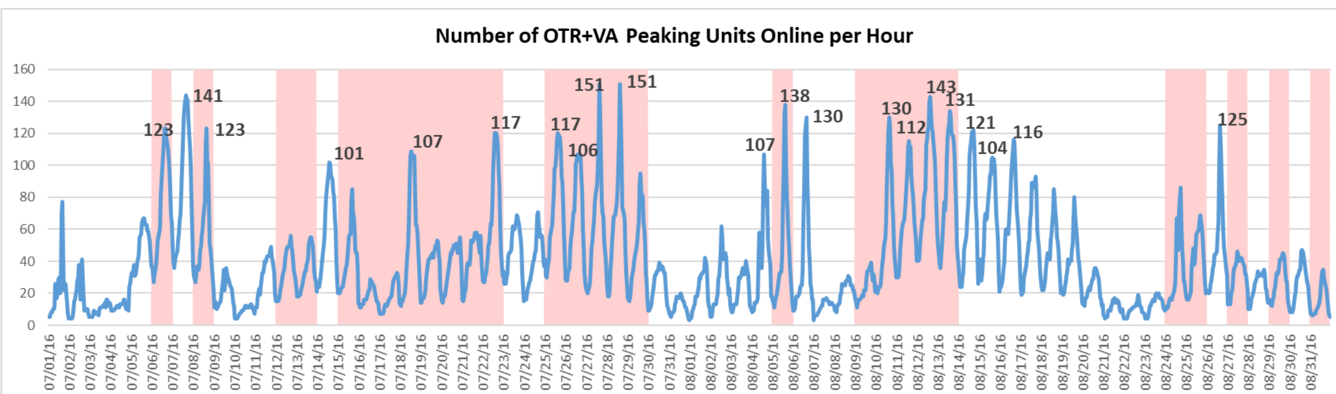
Figure 12-14. *Hourly Total OTR+VA Emissions of NO_X from Part-75 Listed and Peaking Units During the 2018/19 ReBase Modeling Period*



Overall, between 143 and 549 electric providing units were online during any given hour within the 2018/19 ReBased period, with an average of 323 in operation (all Part-75 electric generating units). The number of Electric providing units with measurable NOx emissions during this period ranged between 100 and 589 during any given hour with an average of about 253.

Figure 12-16 shows the 32-day 2018/19 ReBase scenario emissions. The number of peaking units with measurable NOx emissions during the ReBase period ranged between 3 and 151 during any given hour with an average of about 40. This compares with the 2018 and 2019 baseline period for emissions, which ranged from 0 to 166 and averaged 20. The higher number of peaking units operating during the ReBase emission period of July 1-August 31, 2016 was expected because the period was selected as having higher than normal electrical demand. The areas in pink shading represent periods where ozone concentrations for at least one monitor in the OTR exceeded 71ppb. As before, non-Part-75 peaking units are not included in these unit counts since they do not have actual hourly operation and emission data available.

***Figure 12-15**. 2018/19 ReBased Hourly Total OTR+VA "Peaking Units" Reporting NO_X Emissions (lbs/hour)*



12.5 Model Scenario Emissions Processing

Run 1: Part-75 Unit Emission Methodology (2016 Base)

Run 1 extracts actual 2016 reported hourly emissions for each Part-75 listed unit from the CAMD database for the dates and hours matching the episodic modeling period (July 1 – August 31, 2016). Hourly NOx emissions, hourly average emission rates (lbs/mmBTU), gross load (MW), and heat input rates (mmBTU/hr) were prepared into a format for processing with a Python script for conversion into an ERTAC-SMOKE-ready emission file. The file was then prepared for CMAQ modeling through the normal process. While Part-75 non-electric units were included in the adjusted dataset, they were not processed as part of this analysis.

Run 2: Part-75 Unit Emission Methodology (2018/19 ReBase)

Run 2 uses the ReBased 2018/19 dataset described above which matches total actual hourly 2016 electric gross loads by region to actual operations during periods during 2018 and 2019. As with Run 1, the hourly data were prepared into a format for input to a Python script for conversion into an ERTAC-SMOKE emission file. The file was then prepared for SMOKE and CMAQ modeling through the normal process.

Runs 3 and 4: Part-75 Unit Emission Methodology (2018/19 ReBase – Zero Peakers)
Runs 3 and 4 both begin with the ReBased (Run 2) emission file for July 1 – August 31. Run 3 then sets all units identified as being an electric peaking unit to zero for all hourly emissions and operations, without concern for maintaining hourly gross load. Once zeroed, the data is prepared and process into a format for input to a Python script and prepared for CMAQ modeling. Run 4, which was temporarily tabled due to insufficient data, uses the Run 2 file since it seeks to maintain 2018/19 ReBased Part-75 emissions and instead zeroing emissions from the non-Part-75 emission units.

Run 5: Part-75 Unit Emission Methodology (2018/19 ReBase – Zero non-Electric)
Run 5 was tabled due to estimated low impact on emissions. Should it ultimately be processed, it will begin with the ReBased (Run 2) emission file and then all hourly emissions and operations for units listed as being a non-electric unit will be set to zero. Once calculated, the data will be prepared into a format for input to a Python script for conversion into an ERTAC emission file. The file will then be prepared for SMOKE and CMAQ modeling through the normal process.

Runs 6, 7 and 8: Part-75 Unit Emission Methodology (2018/19 ReBase – Differing Dispatch Priorities)
Runs 6, 7, and 8 are designed to be bounding runs representing the highest, lowest, and most frequently operated unit configurations in a way where changing units' dispatch maintains hourly total gross load by region. To do this, regional total gross load was calculated from the rebase scenario and the load generated by dispatched units identified as peakers. This hourly gross load does not and should not match the hourly gross load from peaking units in 2016 for a couple of reasons. First, peaking unit designations were based on the entire 2018/19 ozone seasons and units would not necessarily operate identically during the higher 2018/19 electric demand periods that were matched through ReBasing. In addition, the rebase was set to match total gross load by region, not peaking load. However, units were dispatched in the total load matching exercise determined the new peaking load.

Runs 6 and 7 adjust dispatch priorities to create theoretical high and low bounds of NOx emissions in a way that meets electrical demand in the cleanest and dirtiest emitting operating unit configurations. Run 8 uses 2018/19 full ozone season that prioritizes operation of the actual most frequently operated units. To do this, each unit's hours of operation were calculated from the 2018 and 2019 full ozone season operations. A theoretical scenario was then developed where the most frequently operated units operated first and most frequently in a theoretical most likely emission scenario.

Runs 6, 7, and 8 introduce some addition challenges where unit load may be called-upon in ways that didn't occur during the 2018 or 2019 full ozone seasons. To accomplish this, a special routine was developed to estimate emissions based on 2018 and 2019 actual data based on an emission rate by operational load curve. Unit profiles consisted of 2018/19 actual emission rate averaged by MW range, grouped in 10% total MW ranges. An example of this is provided in **Figure 12-17** where average emission rates for 10% incremental ranges of gross load are marked by red dots and the linear best fit line (blue dots) is calculated for required unit gross loads. This allows for any gross load to have a corresponding emission rate and accounts for unit inefficacies and higher emissions at lower loads. The discontinuity in the lowest end of gross load is caused by an adjustment to account for emissions produced before the unit initiates electrical load. Unit start-ups were calculated starting 12-hours prior to initiation of gross load, where a 6-hour ramp-up from zero to 25% average unit NOx hourly emissions rate corresponded with an increase to 10% of the average unit heat input. The unit was then allowed to idle for 6 hours until load was started. Unit shut-downs were not ramped-down in this model.

Run 6 prioritizes dispatch based on 2018/19 ozone season highest to lowest hourly average NOx emission rates within each region (same as described in the ReBasing discussion above). The dirtiest emitting units will come online first and handle the load until it meets its maximum generation capacity, and then the next dirtiest unit is added. Tiebreakers were based on a lb NOx/mmBTU to maximum MW ratio so that the least efficient units were dispatched first. This adjustment is performed for each hour of the modeling period, matching regional hourly gross load needs. Run 7 is similar to Run 6, however it prioritizes dispatching from lowest to highest average emission rates from the same period and regions. Tiebreakers were based on a lb NOx/mmBTU to maximum MW ratio so that the most efficient units during the 2018 and 19 ozone seasons were dispatched first. Run 8 follows a similar routine, but prioritizes dispatch based on 2018/19 ozone season total hours of operation from highest to lowest by region. The tiebreaker for Run 8 was based on a lb NOx/mmBTU to maximum MW ratio so that the most frequently operated units during the 2018 and 19 ozone seasons would be dispatched first. A comparison of hourly emissions for each model run is summarized in **Figure 12-18**.

Figure 12-16. *Sample Emission Profile and Resulting Data*

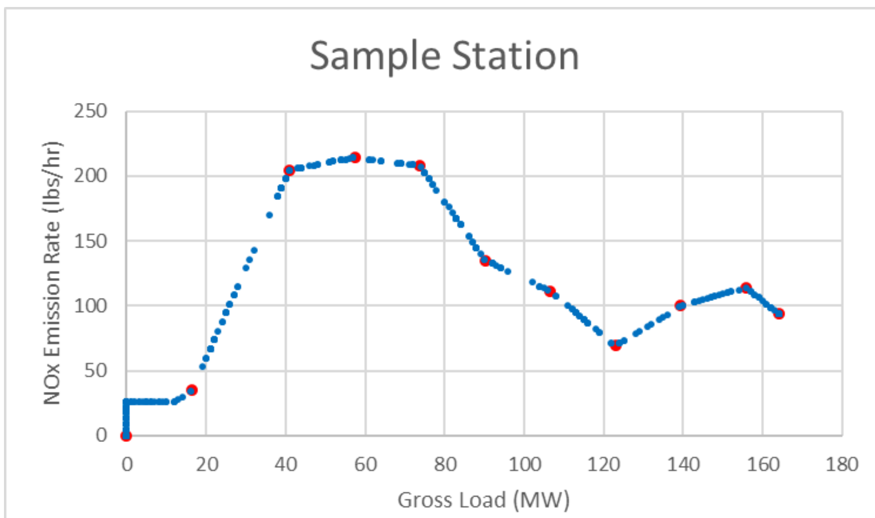
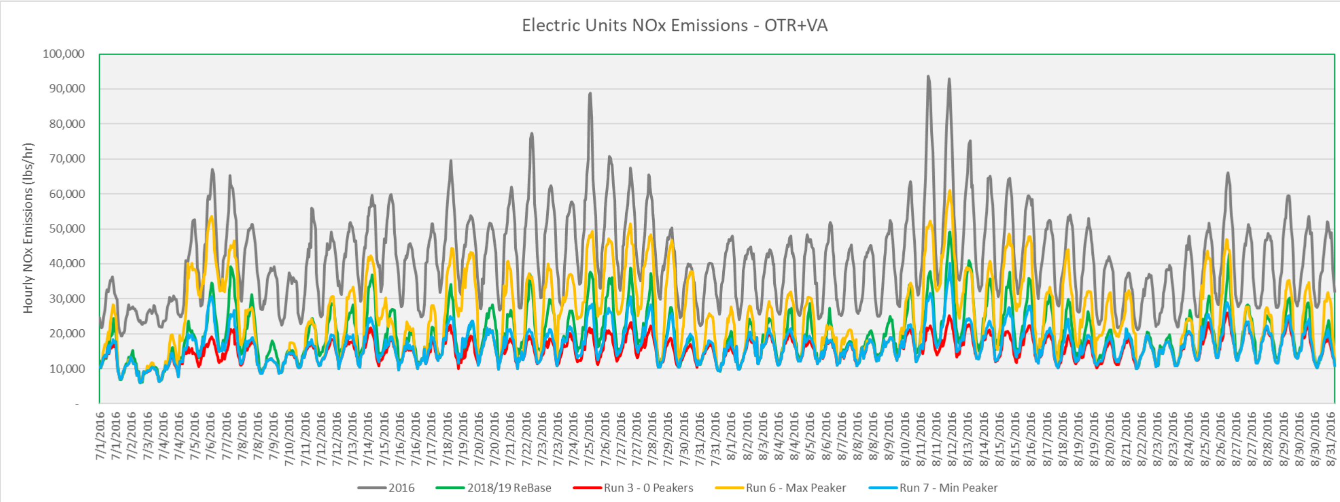


Figure 12-17. *Runs 3, 6, and 7 Hourly Total OTR+VA Emissions of NO_X from Part-75 Listed and Peaking Units During the 2018/19 ReBase Modeling Period*



While the 2018/19 ReBasing routine accounts for units that never operated during that period by keeping them at zero emissions, some units included in Runs 6 through 8 do not benefit from this because they lack 2018/19 operational data. In these cases, operational data could be used from similar units at the same facility, or from 2016 operations if appropriate surrogate operational parameters are not available. However, if no operational data was reported for 2016, 2018, or 2019, then the unit was considered "non-operational" for this study and thus are not dispatched in Runs 6, 7, or 8 (**Table 12-4**). Units that did not operate during summer 2018 or 2019 and thus did not have 2018 or 2019 actual operation data to generate an emission/gross load curve created another challenge. In this case, emissions were estimated based on similar units at the same facility or based on data collected for a different year as indicated in **Table 12-5**.

Table 12-4. *OTR Part-75 "non-operational" electric providing units that are not dispatched for Runs 6, 7, and 8*

State	Facility Name	Facility ID (ORISPL)	Unit ID
NJ	B L England	2378	3
NY	AG – Energy	10803	1
NY	AG – Energy	10803	2
NY	NRG Dunkirk Power	2554	1
NY	NRG Dunkirk Power	2554	2
NY	NRG Dunkirk Power	2554	3
NY	NRG Dunkirk Power	2554	4
PA	North East Cogeneration Plant	54571	001
PA	North East Cogeneration Plant	54571	002
VT	Berlin 5	3734	A
VT	Berlin 5	3734	B
VT	Penny Lane Gas Turbine	3754	CT1
VT	Penny Lane Gas Turbine	3754	CT2

Table 12-5. *OTR Part-75 "non-operational" electric providing units and their corresponding estimated data source(s) for Runs 6, 7, and 8*

State	Facility Name	Facility ID (ORISPL)	Unit ID	Source
NJ	Bayonne Plant Holding, LLC	50497	001001	2016 data
NJ	Bayonne Plant Holding, LLC	50497	002001	2016 data
NJ	Bayonne Plant Holding, LLC	50497	004001	2016 data
NY	Astoria Gas Turbine Power	55243	CT0005	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0007	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0008	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0010	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0011	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0012	CT2-1A
NY	Astoria Gas Turbine Power	55243	CT0013	CT2-1A
NY	Astoria Generating Station	8906	41SH	32SH
NY	Astoria Generating Station	8906	42RH	51RH
NY	Cayuga Operating Company, LLC	2535	2	2016 data
NY	Covanta Niagara	50472	R1B02	R1B01
NY	E F Barrett	2511	U00010	U00011
NY	Hudson Avenue	2496	CT0004	CT0003
NY	Ravenswood Generating Station	2500	CT0004	2016 data
NY	Ravenswood Generating Station	2500	CT0005	2016 data
NY	Ravenswood Generating Station	2500	CT0006	2016 data
NY	Ravenswood Generating Station	2500	CT0007	2016 data
NY	Ravenswood Generating Station	2500	CT0008	2016 data
NY	Ravenswood Generating Station	2500	CT0009	2016 data
NY	Ravenswood Generating Station	2500	CT02-1	2016 data
NY	Ravenswood Generating Station	2500	CT02-2	2016 data
NY	Ravenswood Generating Station	2500	CT02-3	2016 data
NY	Ravenswood Generating Station	2500	CT02-4	2016 data
NY	Ravenswood Generating Station	2500	CT03-1	2016 data
NY	Ravenswood Generating Station	2500	CT03-2	2016 data
NY	Ravenswood Generating Station	2500	CT03-3	2016 CT03-4
NY	Ravenswood Generating Station	2500	CT03-4	2016 data
PA	Mountain	3111	031	032
VA	Mecklenburg Power Station	52007	1	2016 data
VA	Mecklenburg Power Station	52007	2	2016 data

12.6 Episodic HEDD Modeling Results

As discussed above, the OTC Modeling Committee selected six scenarios for high energy demand day analysis with episodic modeling. These scenarios are as follows:

- Run 1 – 2023 emissions with 2016 Part-75 electricity generating units (EGUs) in the OTR,
- Run 2 – 2023 emissions with 2018/19 Part-75 EGUs in the OTR,
- Run 3 – Based on Run 2 with zeroed out OTC identified peaking units,
- Run 6 – Based on Run 2 and redispatches OTC identified peaking unit actual electric capacity based on highest NOx emitting units coming online first,

- Run 7 – Based on Run 2 and redispatches OTC identified peaking unit actual electric capacity based on lowest NOx emitting units coming online first,
- Run 8 – Based on Run 2 and redispatches OTC identified peaking unit actual electric capacity based on the most frequently operated units coming online first.

These scenarios were selected to test the overall impact of peaking unit operation and to explore reasonable upper and lower bounds of potential capacity preserving operations. The difference between Runs 1 and 2 indicate emission changes taking place between the 2018/19 ReBase and the 2016 base year. The difference between Runs 2 and 3 shows the influence of peaking units on ozone in the region. And the differences between Run 2 and Runs 6, 7, and 8 indicate the influences that each of the three strategies would have while maintaining electrical capacity. Assuming that no different technology is introduced to supply electrical capacity, then Runs 6 and 7 produce upper and lower ranges current unit peak electric supplying options. Recall that Run 2 is designed to use actual emissions and Runs 6, 7, and 8 are more theoretical. Run 8 makes an interesting comparison of units most likely operate based on frequency of actual operation with what actually ran during the peak energy demand period (Run 2).

Figure 12-19 shows the emissions associated with each of these screening modeling runs. There is a significant decrease in NOx emissions for both baseload and peaking units between the 2016 base year and the 2018/19 electric and 2023 other sector emissions. The differences between Run 2 and the other screening scenarios are more subtle, but significant. Note that dispatching the dirtiest burning units first increases NOx emissions of peaking units by about 50% and dispatching the cleanest burning peaking units can reduce peaking unit NOx emissions by about 30%. It is interesting that the NOx emissions for dispatching the most frequently used peaking units first produces very similar NOx emissions to dispatching the cleanest peaking units first.

Figure 12-18. *Scenario Changes in EGU NOx Emission*

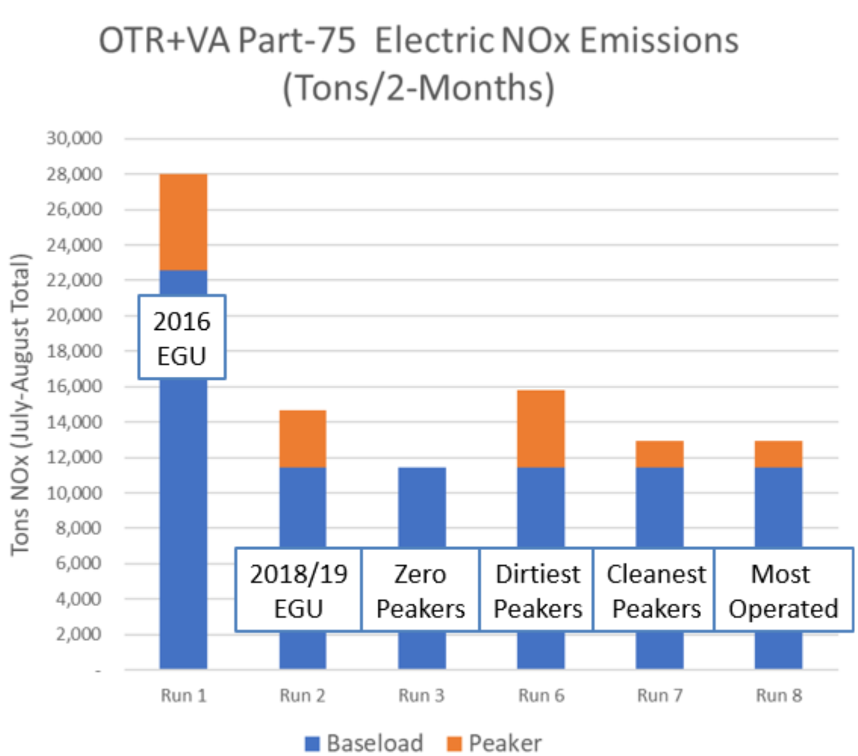


Figure 12-20 Shows three high ozone days (July 24, 25, and August 11) with the modeled total ozone shown on the left and the change in modeled ozone for the day when all peaking units were turned off (e.g. Run 3-Run 2). Ozone changes were

generally localized in areas extending 50-100 miles downwind of the peaking units, with more mild changes extending further downwind. Since it is difficult to predict which peaking unit will operate on what day, the location of peaking unit impact on ozone is similarly difficult to predict. On July 24, ozone changes of up to 6.3 ppb were modeled in Maryland and up to 4.3 ppb in New Jersey. On July 25th, up to 7.1 ppb in Maryland and 2.2 ppb in New Jersey and Delaware were modeled. On August 11, 8-hour ozone changes of 3.2 ppb were modeled in Connecticut and New Jersey, 2.3 ppb was modeled in New York, and 3.7 ppb was modeled in Pennsylvania.

Large areas of higher ozone concentrations can be seen along the coastal areas of the OTR spanning from Virginia into the Gulf of Maine in **Figure 12-21(A)**. This area includes all five ozone nonattainment areas in the OTR. **Figure 12-21(B)** shows the ozone reductions as a result of EGU emissions differences between 2016 and 2018/19. The largest improvement took place throughout Delaware, the District of Columbia, Maryland, New Jersey, Pennsylvania, and the eastern portion of Virginia. The high ozone areas of New York City and Connecticut did not see similar levels of benefit. **Figure 12-21(C)** presents the theoretical scenario where all peaking units are simply turned off. In this scenario, modest ozone improvements occur throughout the region with larger ozone reductions of greater than 1 ppb and up to 5 ppb occurring over the Washington D.C., Baltimore, New York City, and Greater Connecticut nonattainment areas.

Figure 12-22 presents the results of Runs 6 (highest NOx emitting units first), 7(lowest NOx emitting units first), and 8 (Most frequently operated units first) where each scenario preserves electric capacity occurring during the 2016 base period. The plots indicate modeled 8-hour ozone differences between the 2018/19 rebase scenario and each of the other three scenarios. **Figure 12-22(A)** highlights a large area extending from New York City eastward through southern New England where the higher NOx emissions result in increased ozone concentrations of up to 3.3 ppb. This suggests that dispatching of peaking units could have been done in such a way as to increase ozone at some of the highest ozone areas in the OTR by 2-3.3 ppb. **Figure 12-22(B)** shows that dispatching peaking units in the cleanest possible way could further decrease ozone in the New Your City and Greater Connecticut nonattainment areas by 1-2 ppb and some high ozone locations in Maryland by up to 2.5 ppb. Run 8 (**Figure 12-22(C)**) produces ozone benefits very similar in magnitude and location to those seen in Run 7 (Cleanest). This suggests that peaking units that operate the most are generally also the lowest emitting units. While frequently operating units are often some of the cleanest, they are not always the ones that actually get dispatched during high power demand periods. Thus, there is room for improvement that would benefit several high ozone locations in the OTR on some of the highest ozone days of the year.

Tables 12-6 and 12-7 present modeling data for each scenario. **Table 12-6** is a summary of the high ozone locations in the OTR and **Table 12-7** presents monitor-by-monitor design value and daily maximum 8-hour ozone differences. Blank values indicate that too few days had high enough ozone to calculate a design value.

12.7 Conclusion

Peaking unit operation is notoriously difficult to predict ahead of time, including predicting how they might operate in projected future years. This is why this project used actual operations of peaking units for a recent year and fit into the 2016 modeling platform. While not perfect, it produced a more realistic representation of recent operations years after the base modeling platform was created and captured important operating details. Because peaking unit operation is so infrequent and variable, changes in ozone resulting from the units operated are also difficult to predict. Some units create localized impacts, others collectively create regions of reduced ozone that can extend downwind. High NOx emitting units in high NOx areas can cause localized areas of titration (decreased ozone) on some days while causing lower ozone on other days. However, modeling indicates that even with the variable operations and conditions, that ozone will decrease more often than potential increases, and that reductions of ozone would occur in some of the highest ozone areas of the OTR. This is verified by model predicted DVFs showing improvements at all the high ozone locations in the OTR.

Figure 12-19. *Three High Ozone Days and Corresponding Changes in Ozone – All Peaking Units Off*

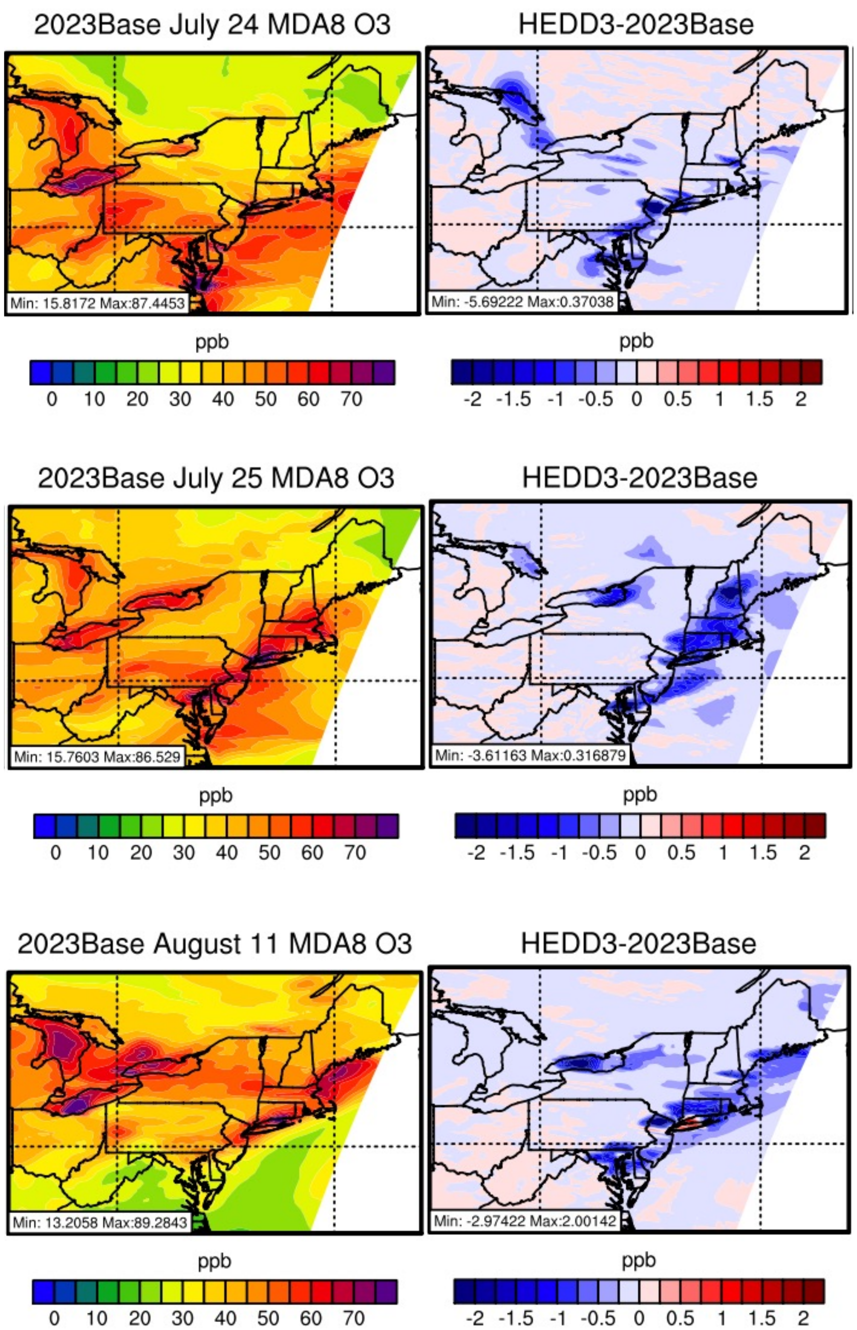


Figure 12-20 *(Left) Predicted 8-hour peak ozone (ppb). (Middle) Predicted average 8-hour ozone differences 2018/19 – 2016. (Right) Predicted average 8-hour ozone differences when peaking units are turned off.*

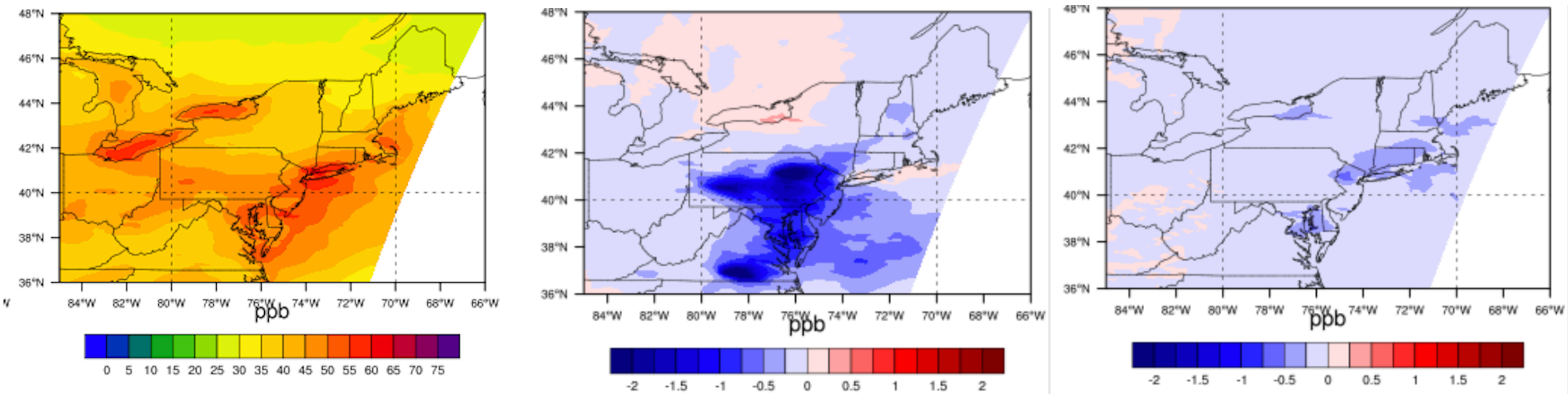


Figure 12-21. *(Left) Predicted average 8-hour ozone difference when highest NO_X emitting units are dispatched first. (Middle) Same as (Left) except when lowest NO_X emitting units are dispatched first. (Right) Same as (Left) except for when typically used units are dispatched first.*

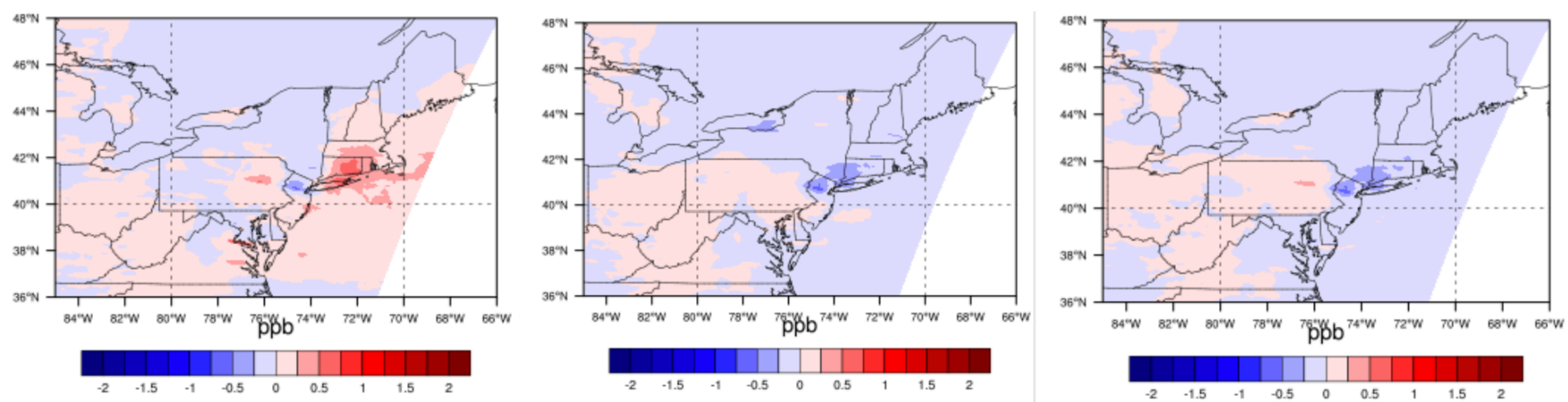


Table 12-6. *Episodic Screening Modeling Maximum 8-Hour Ozone Summary for High Ozone Locations in the OTR*

			DVF				Change in DVF						
siteID	State	Location	2019-21 DV	2023 DVF	2023 with 2016 Part-75 DVF	2023 with 2018/19 Part-75 DVF	2016 to 2018/19	2018/19 to Zero Peaker	2018/19 to Worst Case	2018/19 to Best Cast	2018/19 to Most Frequent	Worst Case to Best Case	Most Frequent to Best Case
90099002	CT	Madison	82	71.5	71.3	71.7	0.4	-0.6	1	-0.5	-0.5	-1.5	0
90013007	CT	Stratford	81	74.4	74.1	74.3	0.2	-0.6	0.2	-0.5	-0.5	-0.7	0
90019003	CT	Westport	80	75.7	75.7	75.5	-0.2	-0.7	-0.2	-0.6	-0.6	-0.4	0
90010017	CT	Greenwich	79	75.3	75.5	75.2	-0.3	-0.3	-0.1	-0.3	-0.3	-0.2	0
90079007	CT	Middletown	74	70.2	70.2	70.4	0.2	-0.8	0.8	-0.6	-0.6	-1.4	0
90110124	CT	Groton Fort Griswold	73	71.3	71.6	71.4	-0.2	-0.3	0	-0.2	-0.2	-0.2	0
361030002	NY	Babylon	73	68.2	68.3	67.8	-0.5	-0.5	0.3	-0.3	-0.3	-0.6	0
90090027	CT	New Haven	72	68.5	68.3	68.5	0.2	-0.5	0.3	-0.4	-0.4	-0.7	0
240251001	MD	Edgewood	72	65.3	65.8	64.7	-1.1	-0.4	0.1	0.2	-0.3	0.1	-0.5
340030006	NJ	Leonia	71	68.1	68.7	68.3	-0.4	-0.2	-0.3	-0.1	-0.1	0.2	0
360810124	NY	NYC-Queens	71	66.9	67	66.7	-0.3	-0.4	0	-0.3	-0.3	-0.3	0
420170012	PA	Bristol	71	70.6	71.1	70.1	-1	-0.2	0.2	0.3	0.1	0.1	-0.2
421010024	PA	NEA	71	69.3	70	69	-1	-0.2	0.1	0.2	0	0.1	-0.2

Table 12-7. *Episodic Ozone Screening Modeling Results for each Modeling Scenario and each Monitor in the OTR*

ID	St	Location	2019-21 DV	Predicted 2023 Design Values						Maximum 8-Hour Concentration Difference					
				Run 1	Run 2	Run 3	Run 6	Run 7	Run 8	Runs 1-2	Runs 2-3	Runs 2-6	Runs 2-7	Runs 2-8	Runs 7-6
90010017	CT	Greenwich	79	72.5	72.1	71.9	72.0	71.9	71.9	1.76	1.99	-2.92	1.99	1.61	3.30
90011123	CT	Danbury	70	69.4	69.1	68.3	68.8	68.4	68.4	2.53	3.23	-1.16	3.05	2.99	1.60
90013007	CT	Stratford	81	79.7	80.0	79.6	80.4	79.7	79.7	1.15	1.76	-2.06	1.76	1.68	2.84
90019003	CT	Westport	80	83.4	82.8	82.3	82.7	82.4	82.4	0.94	1.60	-2.72	1.50	1.58	3.07
90031003	CT	East Hartford	67	63.6	63.3	62.7	64.0	62.8	62.8	1.58	1.27	-3.51	1.25	1.23	3.65
90050005	CT	Mohawk Mt	64	63.1	63.1	62.1	62.8	62.2	62.2	2.46	1.51	-0.75	1.41	1.32	1.11
90079007	CT	Middletown	74	70.9	71.1	70.3	72.0	70.4	70.4	1.39	1.52	-2.83	1.39	1.43	3.29
90090027	CT	New Haven	72	73.9	74.2	73.9	74.8	74.0	73.9	0.91	1.00	-2.04	0.97	0.93	2.61
90099002	CT	Madison	82	77.2	77.3	77.1	77.5	77.2	77.1	1.08	1.74	-3.32	1.63	1.64	4.95
90110124	CT	Groton	73	73.1	73.1	72.9	73.2	73.0	73.0	1.19	1.20	-1.99	1.22	1.25	2.21
90131001	CT	Stafford	67	63.3	63.0	62.4	64.2	62.5	62.5	1.97	1.41	-2.26	1.38	1.36	2.71
90159991	CT	Abington	65	62.3	62.1	61.5	62.9	61.7	61.6	1.37	1.46	-3.07	1.08	1.07	3.18
100010002	DE	Killens	63	62.9	62.1	62.0	62.3	62.3	62.1	2.24	2.25	-0.75	1.61	1.16	0.57
100031007	DE	LUMS2		60.4	59.2	58.9	59.6	59.4	59.1	3.86	2.99	-0.75	2.72	2.72	0.68
100031010	DE	BCSP		66.7	65.2	64.8	65.5	65.5	65.2	3.25	1.62	-1.15	1.27	1.25	0.91
100031013	DE	BELLFNT2	64	64.4	62.9	62.5	63.1	63.2	62.9	3.53	1.89	-1.09	1.69	1.57	0.94
100032004	DE	Wilmington-M		64.6	63.1	62.8	63.4	63.5	63.2	3.53	1.89	-1.09	1.69	1.57	0.94
100051002	DE	Seaford	62	59.4	58.3	58.2	58.6	58.6	58.4	2.94	2.89	-0.74	2.76	2.68	1.29
100051003	DE	Lewes		60.6	59.9	59.7	60.0	59.9	59.9	2.64	1.14	-0.75	1.11	1.08	0.89
110010041	DC	RIVER_Terrace	60	49.8	48.9	48.8	48.9	48.9	48.9	3.54	1.11	-0.86	0.84	0.80	0.76
110010043	DC	McMillan	68	62.0	60.9	60.8	61.0	61.0	60.9	3.54	1.11	-0.86	0.84	0.80	0.76
110010050	DC	TakomaRec	66	60.3	59.2	59.1	59.2	59.3	59.2	3.50	1.29	-0.64	0.96	0.91	0.45
230010014	ME	Durham	53	58.5	58.1	57.8	58.3	58.0	58.0	1.63	4.30	-0.56	3.80	3.77	0.71
230039991	ME	Ashland	52							0.80	0.55	-0.15	0.47	0.44	0.38
230052003	ME	Cape Elizabeth	62	62.7	62.2	61.8	62.4	61.9	62.0	1.10	0.75	-0.66	0.63	0.50	0.85
230090102	ME	Cadillac Summit	67	69.4	69.1	68.8	69.4	69.0	68.9	0.82	0.69	-1.32	0.52	0.49	0.97
230090103	ME	McFarland Hill	60	62.4	62.1	61.8	62.3	62.0	61.9	0.75	1.36	-0.53	0.57	0.51	0.90
230112001	ME	Gardiner								0.97	1.57	-0.53	1.39	1.36	0.76
230130004	ME	Port Clyde	60	62.9	62.4	62.0	62.6	62.1	62.1	1.01	1.57	-0.92	0.85	0.88	1.25
230194008	ME	Holden	57							0.80	0.64	-0.67	0.54	0.57	1.02
230290019	ME	Jonesport	55							0.97	0.93	-1.53	0.45	0.43	1.87
230310038	ME	Hollis/West Buxton								0.92	1.28	-0.45	1.04	0.79	0.43
230310040	ME	Shapleigh	56							1.46	1.16	-0.85	0.92	0.45	0.97
230312002	ME	Kennebunkport	64	64.0	63.7	63.3	63.8	63.5	63.7	0.93	1.44	-0.49	1.42	0.99	0.78
240031003	MD	GLEN BURNIE	70	68.2	66.8	66.7	67.2	67.2	66.7	4.64	1.04	-1.24	0.81	1.04	0.64
240051007	MD	Padonia	69	63.7	61.2	60.8	61.3	61.2	61.0	5.09	1.00	-0.67	0.73	0.96	0.37
240053001	MD	Essex	70	67.1	66.1	65.8	66.2	66.4	65.9	3.43	1.62	-1.14	1.17	1.61	0.50
240090011	MD	CALVERT-B	58	63.4	62.2	61.9	62.1	62.4	62.2	10.68	5.55	-1.56	4.93	4.93	0.83
240130001	MD	South Carroll	64	60.0	58.2	57.6	57.9	58.0	57.7	2.95	1.55	-0.62	1.45	1.55	0.46
240150003	MD	Fair Hill	67	65.7	64.6	64.1	64.8	64.8	64.4	3.95	2.06	-1.41	1.77	1.90	0.88

ID	St	Location	2019-21 DV	Predicted 2023 Design Values						Maximum 8-Hour Concentration Difference					
				Run 1	Run 2	Run 3	Run 6	Run 7	Run 8	Runs 1-2	Runs 2-3	Runs 2-6	Runs 2-7	Runs 2-8	Runs 7-6
240170010	MD	Southern MD	59	60.8	58.5	58.0	58.0	58.4	58.4	5.64	6.29	-1.30	1.90	1.72	1.61
240190004	MD	Horn Point	64	61.9	60.7	59.5	59.9	60.2	60.2	7.29	7.12	-1.58	4.14	3.31	1.06
240199991	MD	Blackwater NWR	62	63.5	61.7	61.6	61.9	61.9	61.7	6.70	3.95	-1.45	3.00	2.91	1.31
240210037	MD	Frederick Co.	65	59.7	57.8	57.3	57.5	57.7	57.5	4.40	1.87	-0.40	1.68	1.87	0.71
240230002	MD	Piney Run	58							3.94	0.14	-0.09	0.11	0.12	0.08
240251001	MD	Edgewood	72	68.7	67.7	67.3	67.9	67.9	67.4	4.01	3.21	-0.68	2.46	2.92	0.42
240259001	MD	Aldino	68	66.9	66.0	65.4	65.9	65.9	65.5	3.51	3.08	-1.83	2.67	2.88	1.54
240290002	MD	Millington	64	61.5	60.6	60.1	60.8	60.7	60.3	4.39	3.10	-1.67	2.87	2.85	1.30
240313001	MD	Rockville	63	58.3	57.7	57.5	57.7	57.7	57.6	3.82	3.40	-1.59	3.40	3.40	1.23
240330030	MD	HU-Beltsville	67	59.7	58.5	58.3	58.5	58.6	58.5	3.93	2.93	-1.59	2.93	2.93	1.21
240338003	MD	Prince Georges	65	61.4	60.7	60.6	60.6	60.7	60.6	5.16	1.54	-0.83	1.55	1.37	0.86
240339991	MD	Beltsville	70	60.4	58.7	58.5	58.9	59.3	58.7	3.99	2.46	-1.60	2.45	2.46	1.18
240430009	MD	Hagerstown	60							3.23	1.00	-0.31	0.99	0.99	0.30
245100054	MD	Furley Rec Cntr		62.9	61.7	61.5	62.0	62.0	61.6	3.55	1.58	-1.23	1.33	1.55	0.47
250010002	MA	Truro	64	65.7	65.6	65.4	65.8	65.5	65.5	2.23	0.85	-1.64	0.67	0.67	1.36
250051004	MA	Fall River		71.2	71.0	70.9	71.4	70.9	70.9	1.17	1.25	-2.63	1.01	1.03	3.29
250051006	MA	Fairhaven2	63	65.9	65.7	65.5	65.9	65.5	65.6	1.64	0.86	-3.07	0.66	0.62	2.68
250070001	MA	Martha's Vineyard	65	69.0	69.0	68.7	69.4	68.7	68.8	2.48	1.13	-2.60	1.01	0.62	2.47
250092006	MA	Lynn	62	65.4	65.0	64.7	65.4	64.9	64.9	1.27	1.05	-1.59	0.78	0.62	1.59
250094005	MA	Newbury-B		61.4	61.1	60.8	61.3	60.9	61.0	1.26	1.56	-0.77	1.60	0.74	1.50
250095005	MA	Haverhill	58	56.6	56.0	55.6	56.5	55.8	55.8	1.50	1.88	-1.73	1.86	0.69	2.16
250112005	MA	Greenfield	55							1.21	1.20	-1.70	1.15	1.16	1.74
250130008	MA	Chicopee	63	61.3	60.7	60.0	62.1	60.3	60.3	1.85	1.14	-2.06	0.91	0.96	2.70
250154002	MA	Ware		60.5	60.0	59.3	61.2	59.5	59.5	1.50	1.28	-2.32	0.77	0.90	2.99
250170009	MA	Chelmsford LAB	58	57.9	57.2	56.8	58.0	57.0	57.0	1.56	1.04	-1.84	0.96	0.95	2.30
250213003	MA	E Milton (Blue Hill)	56	66.8	66.4	66.2	66.9	66.3	66.3	1.27	1.18	-1.95	0.65	0.73	2.19
250230005	MA	Brockton	60	60.4	59.9	59.4	60.5	59.7	59.6	1.09	1.24	-1.63	0.82	0.87	1.63
250250042	MA	Boston-Roxbury	59	58.7	58.3	58.1	58.6	58.2	58.3	1.19	1.50	-2.44	0.71	1.52	2.78
250270015	MA	Worcester	62	57.4	56.8	56.2	57.8	56.4	56.4	1.58	1.25	-2.07	1.17	1.18	2.75
250270024	MA	Uxbridge	60	60.1	59.3	58.8	60.1	59.0	59.0	1.36	1.29	-1.97	1.01	1.02	1.88
330012004	NH	Laconia-B	53	51.7	50.1	49.0	49.9	49.3	49.7	6.82	3.40	-0.35	2.62	1.09	2.23
330050007	NH	Keene	54							1.29	0.84	-0.93	0.78	0.74	1.13
330074001	NH	Mt Washington Smt								1.27	0.34	-0.52	0.32	0.32	0.56
330074002	NH	Mt Washington Bs	53							1.33	0.86	-0.71	0.79	0.34	0.75
330090010	NH	Lebanon	52							1.89	0.54	-0.72	0.52	0.54	0.76
330099991	NH	Woodstock	51							2.11	1.10	-0.63	1.00	0.45	0.89
330111011	NH	Nashua-Gilson	56							1.53	1.03	-1.90	0.77	0.80	2.41
330115001	NH	Peterborough	59							1.88	0.86	-1.44	0.74	0.78	1.45
330131007	NH	Concord-B	56							6.36	3.85	-0.95	3.68	1.39	4.02
330150014	NH	Portsmouth	54	61.9	61.8	61.5	61.9	61.5	61.7	1.43	3.08	-0.64	2.02	0.83	1.85
330150016	NH	Rye-Odiorne	62	65.2	65.1	64.8	65.2	64.9	65.0	1.43	3.08	-0.64	2.02	0.83	1.85
330150018	NH	Londonderry	57							1.51	1.43	-1.69	1.13	0.97	2.22
340010006	NJ	Brigantine	59	61.1	60.5	60.3	60.8	60.5	60.5	2.16	1.01	-1.72	0.85	0.85	1.80
340030006	NJ	Leonia	71	70.2	69.9	69.7	69.6	69.8	69.8	2.38	1.49	-1.03	1.43	1.31	1.22
340070002	NJ	Camden	66	67.4	66.4	66.1	66.7	66.8	66.4	2.37	0.96	-0.76	0.93	0.89	0.51
340071001	NJ	Ancora	62	59.0	58.3	58.0	58.6	58.6	58.2	2.57	1.11	-1.68	0.99	0.96	1.57
340110007	NJ	Millville	65	59.2	58.3	58.0	58.6	58.6	58.2	4.43	2.57	-1.76	2.02	2.02	1.28
340130003	NJ	Newark	65	63.5	63.1	62.9	63.0	62.9	63.0	2.27	1.43	-1.23	1.35	1.22	1.51
340150002	NJ	Clarksboro	66	67.5	66.3	66.1	66.6	66.6	66.3	2.77	1.27	-0.95	5.22	1.16	5.77
340170006	NJ	Bayonne	66	72.8	72.4	72.2	72.2	72.3	72.3	2.93	0.46	-3.28	0.32	0.33	1.32
340190001	NJ	Flemington	63	63.0	61.9	61.8	62.0	62.0	62.0	3.70	3.09	-1.00	3.08	2.99	1.17
340210005	NJ	Rider U	69	63.7	62.5	62.4	62.8	62.9	62.6	2.48	1.74	-0.63	1.74	1.72	0.70
340219991	NJ	Wash Crossing	66	65.6	64.5	64.3	64.6	64.8	64.5	2.49	2.73	-0.66	2.71	2.73	0.72
340230011	NJ	Rutgers U	68	68.1	67.5	67.4	67.7	67.6	67.5	4.08	1.65	-0.99	1.63	1.64	1.31
340250005	NJ	Monmouth U	66	65.6	65.0	64.8	64.9	65.0	64.9	3.55	0.97	-1.61	0.94	0.97	1.86
340273001	NJ	Chester	62	61.3	60.5	60.3	60.6	60.4	60.4	3.73	4.29	-1.25	4.27	4.28	1.37
340290006	NJ	Colliers Mills	66	64.5	63.7	63.5	63.8	63.9	63.7	2.22	0.64	-1.28	0.62	0.61	1.31
340315001	NJ	Ramapo	62	61.6	61.2	61.0	61.3	61.1	61.1	2.87	2.58	-0.91	2.36	2.28	1.13
340410007	NJ	Columbia Site	58	57.2	54.8	54.3	54.5	54.4	54.4	8.30	2.58	-2.70	2.38	2.52	2.80
360010012	NY	Loudonville	57							1.96	0.83	-1.00	0.77	0.73	0.91

ID	St	Location	2019-21 DV	Predicted 2023 Design Values						Maximum 8-Hour Concentration Difference					
				Run 1	Run 2	Run 3	Run 6	Run 7	Run 8	Runs 1-2	Runs 2-3	Runs 2-6	Runs 2-7	Runs 2-8	Runs 7-6
360050110	NY	NYC-IS52	68	63.5	63.5	63.3	63.5	63.4	63.4	4.04	0.87	-3.38	0.87	0.89	1.41
360050133	NY	NYBG-Bronx	70	64.1	63.8	63.6	63.8	63.7	63.7	1.78	1.39	-1.11	1.39	1.39	1.42
360130006	NY	Dunkirk	65	61.2	60.9	60.9	60.9	60.9	60.9	1.51	0.74	-0.02	0.71	0.64	0.10
360270007	NY	Millbrook	60	60.2	60.7	59.7	59.9	59.7	59.7	2.42	1.99	-0.55	1.85	1.89	0.67
360290002	NY	Amherst	65	65.5	65.1	65.1	65.1	65.1	65.1	0.93	7.91	-0.13	7.91	7.91	0.17
360310002	NY	Whiteface Mt Smt	62							1.57	0.37	-0.34	0.37	0.36	0.45
360310003	NY	Whiteface Mt Base	59							1.57	0.37	-0.34	0.37	0.36	0.45
360319991	NY	Huntington	52							1.79	0.40	-0.41	0.40	0.39	0.54
360337003	NY	St Regis Mohawk								1.16	0.67	-0.33	0.67	0.65	0.46
360410005	NY	Piseco Lake	56							1.77	0.45	-0.15	0.40	0.41	0.18
360430005	NY	Nicks Lake								1.33	0.38	-0.28	0.37	0.34	0.46
360450002	NY	Perch River		56.6	56.8	56.4	56.4	56.4	56.4	0.77	1.08	-0.22	1.08	0.97	0.40
360551007	NY	Rochester-B	62	59.0	59.6	58.7	59.1	58.7	59.3	1.11	1.67	-1.19	1.67	1.36	1.12
360610135	NY	NYC-CCNY	70	66.0	65.9	65.8	65.9	65.8	65.8	4.04	0.87	-3.38	0.87	0.89	1.41
360631006	NY	Middleport	63	61.5	62.2	61.4	61.7	61.4	61.8	0.84	3.52	-0.11	3.52	3.52	0.42
360671015	NY	E Syracuse	61							1.63	0.77	-0.19	0.53	0.61	0.28
360715001	NY	Valley Central HS	58							3.76	1.27	-0.94	1.33	1.32	0.80
360750003	NY	Fulton	59	55.0	55.1	54.8	54.9	54.8	54.9	1.88	1.34	-0.28	1.34	1.06	0.99
360790005	NY	Mt Ninham	61	63.3	63.4	62.6	63.0	62.7	62.7	2.80	2.33	-0.64	2.15	2.03	0.68
360810124	NY	NYC-Queens	71	67.9	67.8	67.6	67.8	67.7	67.7	1.80	1.63	-1.39	1.28	1.21	1.80
360850067	NY	NYC-Susan WagHS		77.6	77.3	77.0	77.1	77.1	77.1	2.30	1.09	-1.45	1.09	1.08	1.75
360870005	NY	Rockland County	63	64.0	63.4	63.2	63.4	63.3	63.3	2.98	1.99	-0.74	1.78	1.68	0.93
360910004	NY	Stillwater	56							1.89	0.63	-0.32	0.58	0.55	0.55
361010003	NY	Pinnacle State Park	55							2.21	0.18	-0.28	0.17	0.17	0.27
361030002	NY	Babylon	73	68.8	68.6	67.9	68.3	68.0	68.0	2.08	1.75	-2.56	1.60	1.51	2.97
361030004	NY	Riverhead	69	70.1	70.1	69.9	70.5	70.0	69.9	1.20	2.74	-2.48	2.55	2.59	3.57
361030009	NY	Suffolk County	70	70.1	70.1	69.7	71.1	69.8	69.8	7.89	2.03	-3.09	1.89	1.83	4.98
361099991	NY	Connecticut Hill	58							3.04	1.47	-1.25	1.47	1.47	1.27
361173001	NY	Williamson	61							0.95	2.01	-0.56	2.01	1.69	1.51
361192004	NY	White Plains	69	67.6	67.2	67.0	67.2	67.0	67.0	2.75	1.92	-1.04	1.85	1.82	1.28
420010001	PA	AREN	62							3.27	0.93	-0.54	0.91	0.91	0.23
420019991	PA	Arendtsville	61							3.27	0.93	-0.54	0.91	0.91	0.23
420030008	PA	BAPC	64	60.6	59.4	59.4	59.4	59.5	59.4	5.45	0.17	-0.10	0.20	0.15	0.12
420030067	PA	South Fayette	66	59.4	58.6	58.6	58.6	58.6	58.6	3.65	0.07	-0.06	0.08	0.05	0.05
420031008	PA	Harrison Township	65	62.0	59.2	59.2	59.2	59.2	59.2	6.57	0.15	-0.09	0.12	0.15	0.13
420050001	PA	Kittanning	64	63.1	60.5	60.5	60.5	60.5	60.5	3.37	0.13	-0.10	0.10	0.09	0.15
420070002	PA	HOOK	64	54.9	53.6	53.6	53.6	53.6	53.6	4.83	0.11	-0.02	0.08	0.08	0.04
420070005	PA	BRI1	63	54.0	52.7	52.7	52.7	52.7	52.7	5.87	0.12	-0.03	0.10	0.10	0.06
420070014	PA	Beaver Falls	63	52.8	52.1	52.1	52.1	52.1	52.1	3.97	0.12	-0.03	0.11	0.11	0.05
420110006	PA	KUT2	59	58.3	56.5	56.5	56.7	56.8	56.7	4.73	0.72	-1.01	0.69	0.69	0.88
420110011	PA	REA3		61.8	59.7	59.6	59.8	59.9	59.9	6.00	0.61	-0.44	0.59	0.39	0.73
420130801	PA	Altoona								4.36	0.25	-0.05	0.25	0.23	0.10
420150011	PA	Towanda	56							8.19	0.56	-1.11	0.56	0.56	0.98
420170012	PA	Bristol	71	70.7	69.6	69.3	69.9	70.1	69.6	6.13	1.40	-0.91	1.38	1.36	0.66
420210011	PA	Johnstown	59	58.1	53.5	53.5	53.5	53.5	53.5	7.77	0.17	-0.07	0.11	0.12	0.08
420270100	PA	State College	55							3.24	0.71	-0.23	0.71	0.59	0.13
420279991	PA	Penn State	61							3.99	0.36	-0.23	0.36	0.32	0.14
420290100	PA	NEWG		64.5	63.4	63.1	63.7	63.6	63.4	4.21	1.92	-0.98	1.79	1.87	0.32
420334000	PA	MOSH	53							3.98	0.71	-0.05	0.71	0.64	0.07
420430401	PA	Harrisburg	62	59.9	55.4	55.3	55.5	55.6	55.6	5.73	0.69	-0.68	0.67	0.65	0.66
420431100	PA	Hershey	60	60.5	56.2	56.1	56.3	56.3	56.4	7.34	0.51	-1.12	0.51	0.49	1.04
420450002	PA	Chester	66	64.9	63.6	63.3	63.9	64.3	63.6	2.49	1.52	-0.92	1.35	1.23	1.24
420479991	PA	Kane Exp Forest	57							2.11	0.52	-0.08	0.52	0.45	0.10
420490003	PA	Erie	60	59.2	59.1	59.1	59.1	59.1	59.1	1.88	0.44	-0.06	0.41	0.39	0.11
420550001	PA	METH	56							3.01	0.91	-0.41	0.89	0.90	0.37
420590002	PA	HOLB								1.21	0.08	-0.06	0.06	0.06	0.04
420630004	PA	Strongtown	65	64.6	60.0	60.0	60.1	60.1	60.1	7.02	0.15	-0.05	0.09	0.11	0.08
420690101	PA	PECK	58							5.50	0.30	-0.82	0.21	0.22	0.70
420692006	PA	Scranton	58							5.50	0.30	-0.82	0.21	0.22	0.70
420710007	PA	Lancaster	64	61.9	58.7	58.6	58.8	58.8	58.8	4.51	0.57	-1.03	0.57	0.57	1.01

ID	St	Location	2019-21 DV	Predicted 2023 Design Values						Maximum 8-Hour Concentration Difference					
				Run 1	Run 2	Run 3	Run 6	Run 7	Run 8	Runs 1-2	Runs 2-3	Runs 2-6	Runs 2-7	Runs 2-8	Runs 7-6
420710012	PA	LAN1	63	57.8	55.6	55.5	55.6	55.6	55.6	5.39	0.80	-0.51	0.80	0.80	0.42
420730015	PA	New Castle	59	56.5	55.3	55.3	55.3	55.3	55.3	4.86	0.11	-0.03	0.08	0.08	0.06
420750100	PA	Lebanon		61.4	58.5	58.5	58.6	58.8	58.8	5.46	0.67	-0.98	0.67	0.67	0.98
420770004	PA	Allentown	63	61.9	60.6	60.5	60.7	60.6	60.6	3.66	0.54	-1.44	0.53	0.60	1.11
420791101	PA	Wilkes-Barre								8.39	0.27	-1.51	0.28	0.27	1.28
420810100	PA	Montoursville	57							6.52	0.50	-0.64	0.49	0.37	0.83
420850100	PA	Farrell	63	60.0	59.5	59.5	59.5	59.5	59.5	1.80	0.17	-0.02	0.16	0.12	0.06
420859991	PA	MK Goddard	62							2.59	0.18	-0.05	0.17	0.12	0.06
420890002	PA	Pocono								5.95	1.11	-1.24	1.06	1.09	1.29
420910013	PA	Norristown		64.6	63.6	63.4	63.7	63.7	63.6	3.21	1.14	-0.56	1.13	1.13	0.67
420950025	PA	FREE	64	62.2	61.0	60.9	61.1	61.0	61.0	3.35	0.51	-1.16	0.57	0.49	1.01
420958000	PA	Easton-B		61.2	59.5	59.3	59.5	59.4	59.4	2.98	0.92	-0.80	0.92	0.92	0.86
421010004	PA	LAB		54.8	53.9	53.7	54.1	54.2	53.9	2.36	1.02	-0.92	0.96	0.90	0.50
421010024	PA	NEA	71	69.7	68.6	68.3	68.8	69.0	68.6	2.84	0.98	-0.90	0.94	0.98	0.50
421010048	PA	NEW	70	67.7	66.5	66.3	66.8	67.0	66.5	2.36	1.02	-0.92	0.96	0.90	0.50
421119991	PA	Laurel Hill	59	59.0	57.6	57.5	57.6	57.6	57.6	4.37	0.15	-0.06	0.08	0.11	0.09
421174000	PA	TIOGA	57							5.74	0.27	-0.64	0.27	0.27	0.73
421250005	PA	Charleroi	62	61.1	60.3	60.3	60.3	60.3	60.3	2.05	0.11	-0.09	0.11	0.09	0.08
421250200	PA	Washington		57.7	56.9	56.9	56.9	56.9	56.9	1.73	0.06	-0.07	0.04	0.04	0.05
421255001	PA	FLOR		57.5	56.3	56.3	56.3	56.3	56.3	4.97	0.11	-0.03	0.09	0.09	0.04
421290008	PA	Greensburg	55	61.0	59.2	59.2	59.2	59.2	59.2	4.71	0.09	-0.07	0.09	0.08	0.09
421330008	PA	York	60	60.1	55.3	55.2	55.4	55.4	55.4	9.71	1.08	-0.61	0.87	0.73	0.66
421330011	PA	YOR1		60.8	57.7	57.4	57.8	57.8	57.7	4.59	3.67	-0.54	0.19	3.56	0.44
440030002	RI	W Greenwich	65	65.6	65.4	64.8	66.1	64.9	64.9	1.18	1.65	-2.53	1.43	1.46	3.54
440071010	RI	E Providence	65	68.7	68.5	68.3	68.9	68.4	68.4	1.13	1.09	-2.03	0.62	0.68	2.09
440090007	RI	Narragansett	67	68.7	68.7	68.6	69.1	68.7	68.6	1.45	0.85	-1.55	0.69	0.70	2.06
500030004	VT	Bennington	57							2.13	0.48	-0.48	0.39	0.36	0.78
500070007	VT	Underhill	57							1.14	0.26	-0.07	0.25	0.25	0.15
500210002	VT	Rutland	53							1.92	0.35	-0.29	0.30	0.31	0.29

13 Air Data Visualization Tools

To make data more understandable and easier to use, two interactive maps have been developed with visual elements such as charts and graphs. Both maps are publicly available and allow the user to explore measured or modeled ozone data at a particular monitoring site. One map, titled "O_3 DV Now," calculates and displays the most up-to-date preliminary ozone design values in the current year on a daily basis. The other map, titled "O_3 Source," displays a source apportionment analysis which includes the contribution of states and sectors in the projected year of 2023.

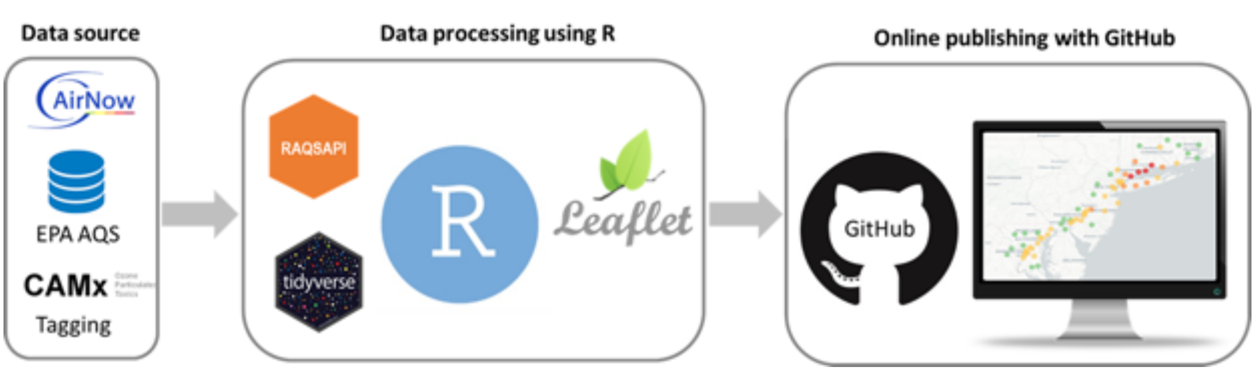
13.1 Data Sources

Data used in the two maps are derived from three main sources: EPA's AirNow, EPA's AQS, and CAMx modeling. Air Now's database provides current measured ozone data that are subject to preliminary quality assessment but are not fully certified. EPA's AQS database provides monitoring site location and hourly ozone monitoring data for previous years with quality assurance. Both the AirNow and AQS databases are publicly available and are the main data sources of the "O_3 DV Now" map. CAMx tagged modeling data were generated from modeling work described in **Section 10**. This source apportionment modeling dataset provides hourly contributions to the projected 2023 ozone concentrations from emissions in each state and sector. The "O_3 Source" map uses site location from the AQS database and maximum daily 8-hour (MDA8) ozone concentrations from the CAMx tagged modeling output.

13.2 Methodology

The general development process for both maps is similar and shown in **Figure 13-1**. The workflow starts with collecting data from the data sources. The data collection, analysis, and mapping were done using R program packages, including but not limited to RAQSAPI, Tidyverse, and Leaflet. The resulting maps were then published online with GitHub or personal ftp server for public access.

Figure 13-1. *Workflow for Creating Interactive Maps*



The "O_3 DV Now" map covers ozone monitoring sites in the entire continental U.S. It reports the 4 highest MDA8 ozone concentrations in the current year from the AirNow database at each monitor. It also calculates the ozone design value of the current year by taking the average of the 4th highest MDA8 ozone concentrations in the most recent three years.

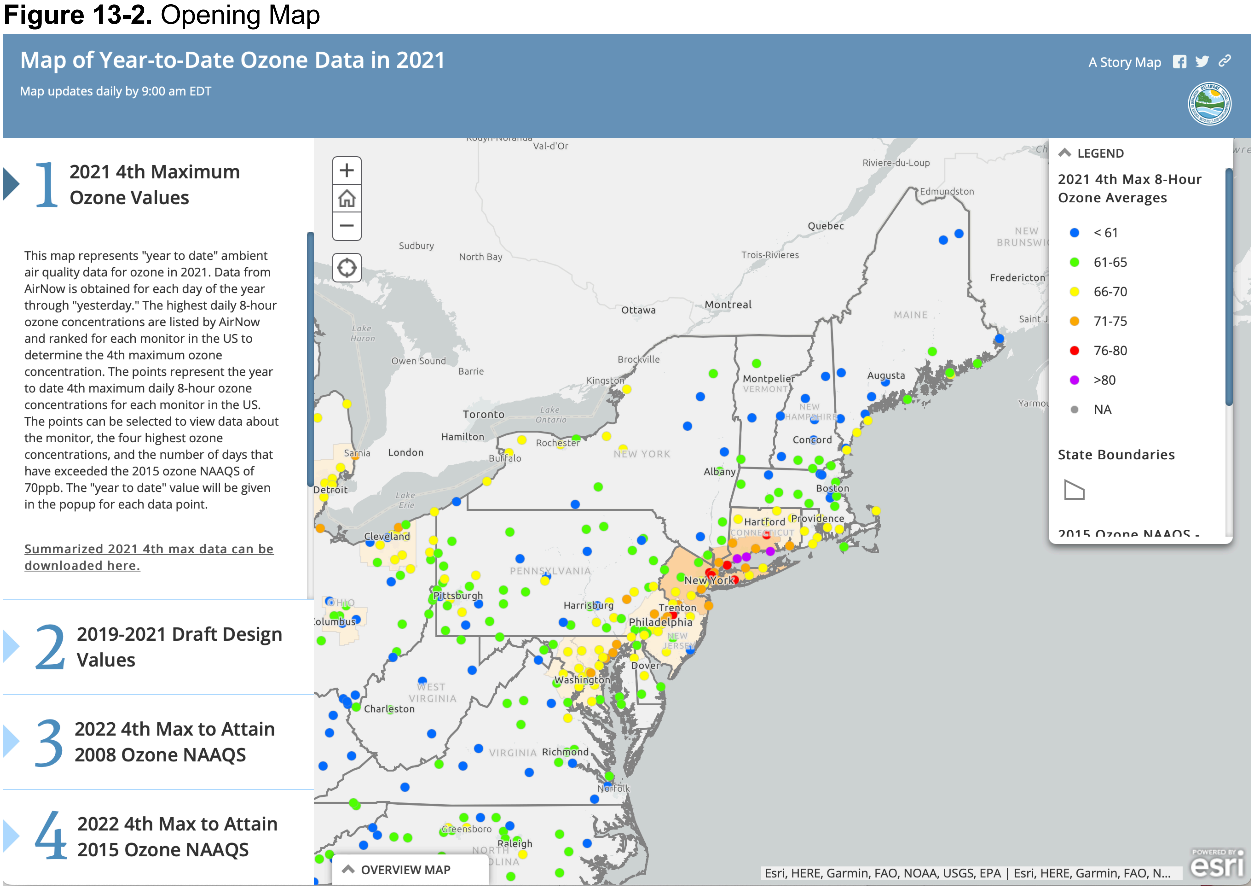
The "O_3 Source" map includes monitors located in the nonattainment areas of the OTC states. It calculates the average ozone contributions of states and sectors to each monitor using three metrics: average top four days, average top ten days, and average exceedance days. The overall calculation procedure is similar for each metric but differs in which days should be included. For average top four or ten days, the days with the four or ten highest MDA8 ozone concentration were selected. For average exceedance days, all days with a MDA8 ozone concentration higher than 70 ppb were included.

13.3 Quick Start Guide

The "Ozone DV Now" Map

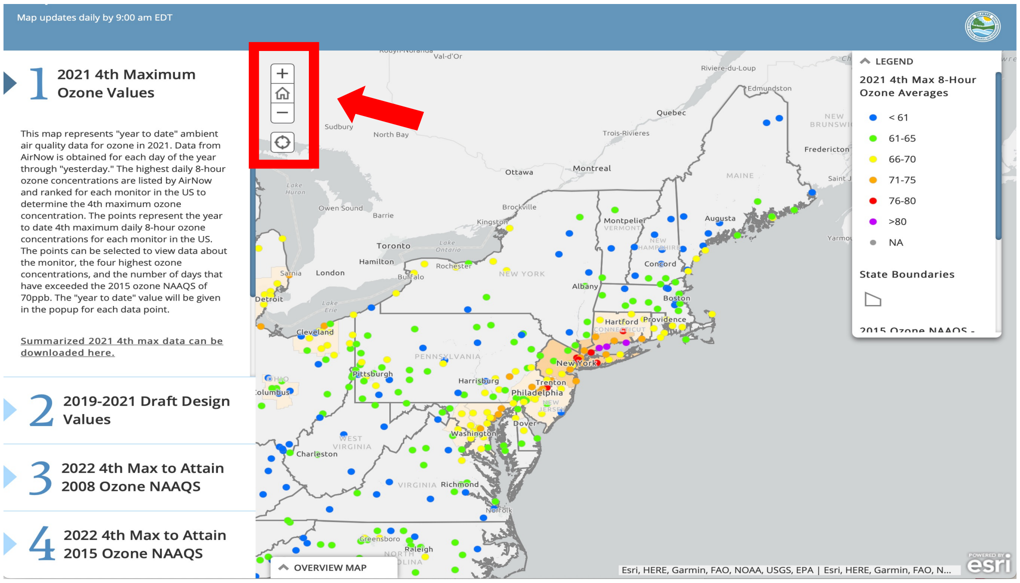
Step 1: Open the map by clicking on the following URL link: https://dnrec.maps.arcgis.com/apps/MapSeries/index.html?appid=38e6bc52a8ad4c06b8cabcca0fa0f66d.

Figure 13-2. Opening Map



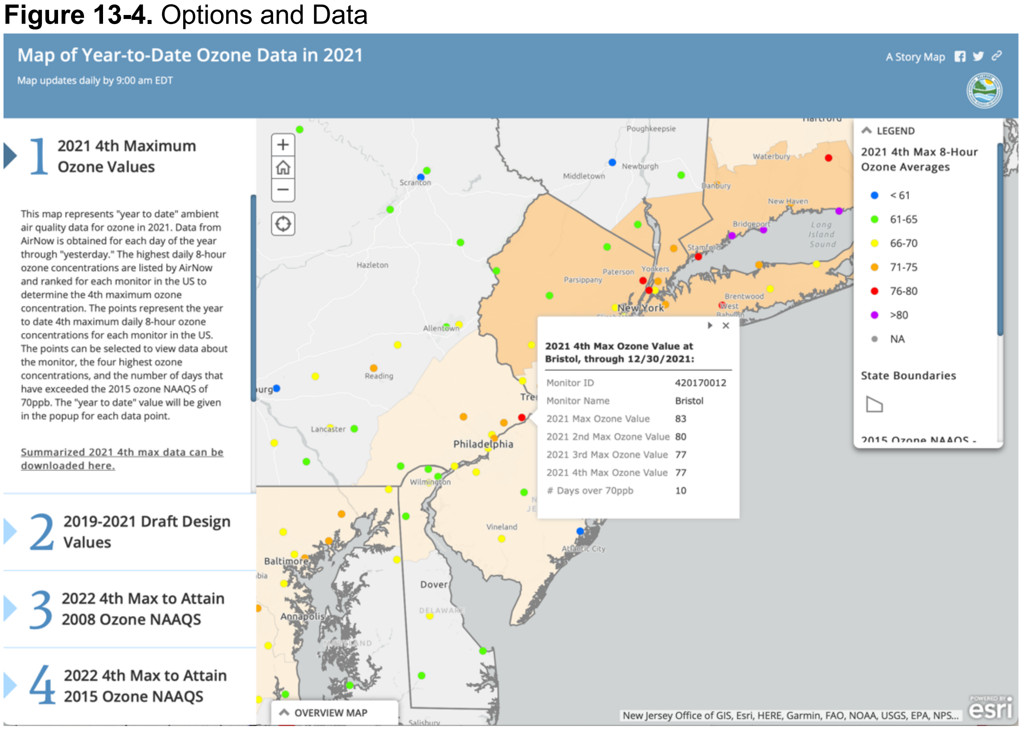
Step 2: Zoom in or out with + or - buttons on the top left corner or move the center wheel on the mouse.

Figure 13-3. Location of Zoom Buttons



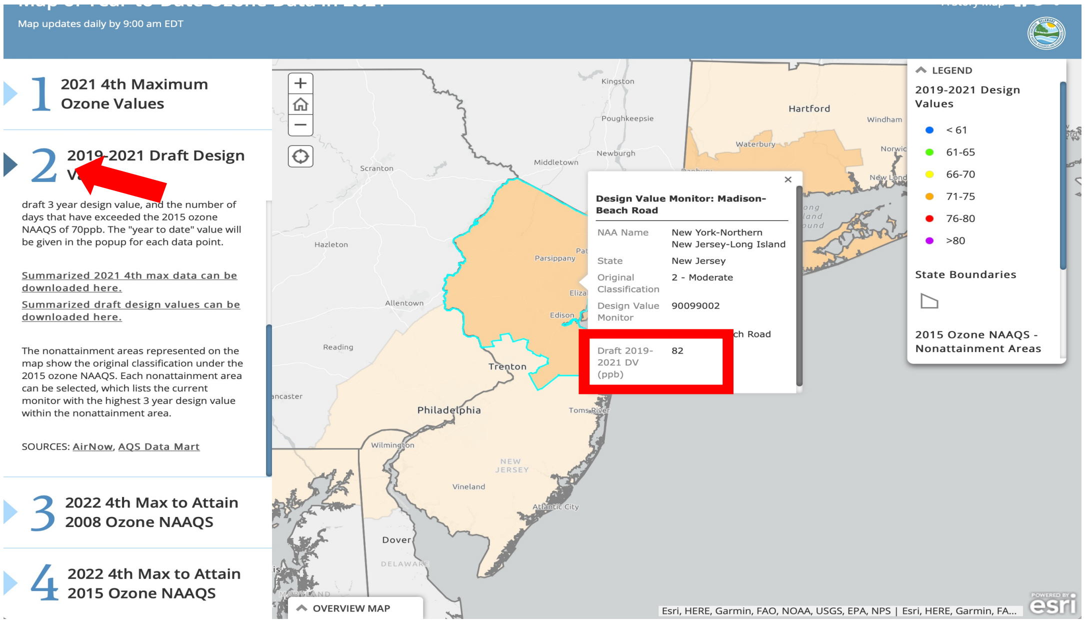
Step 3: View the top four highest ozone concentrations in the current year. The map shows these concentrations by default with the "2021 4th Max" button selected in the top right corner. Click on a dot, which represents an ozone monitoring site, to view the site ID, site name, highest MDA8 ozone concentration, and number of days with a MDA8 ozone concentration higher than 70 ppb.

Figure 13-4. Options and Data



Step 4: View the draft ozone design value of the current year. Navigate to the top right corner, select the ‘2021 DV’ button, and click on a monitoring site to view its preliminary ozone design value. Note, the current iteration of this website selects a representative monitor for each nonattainment area.

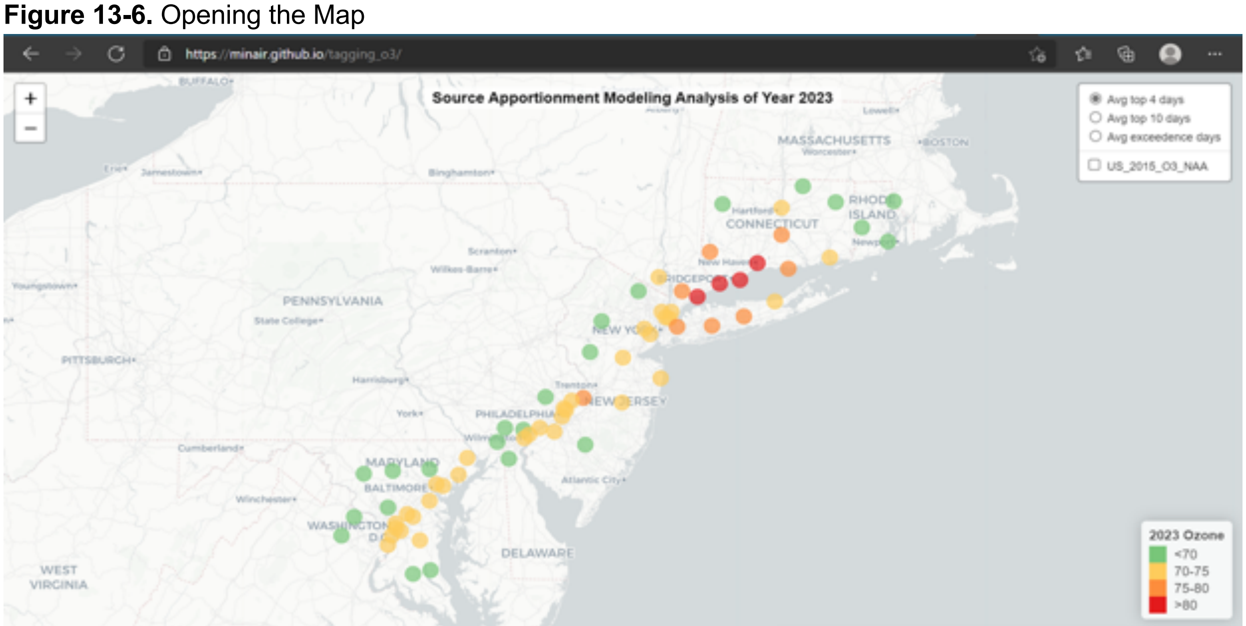
Figure 13-5. Choosing between Design Values and 4th Maximum



The Ozone Source Map

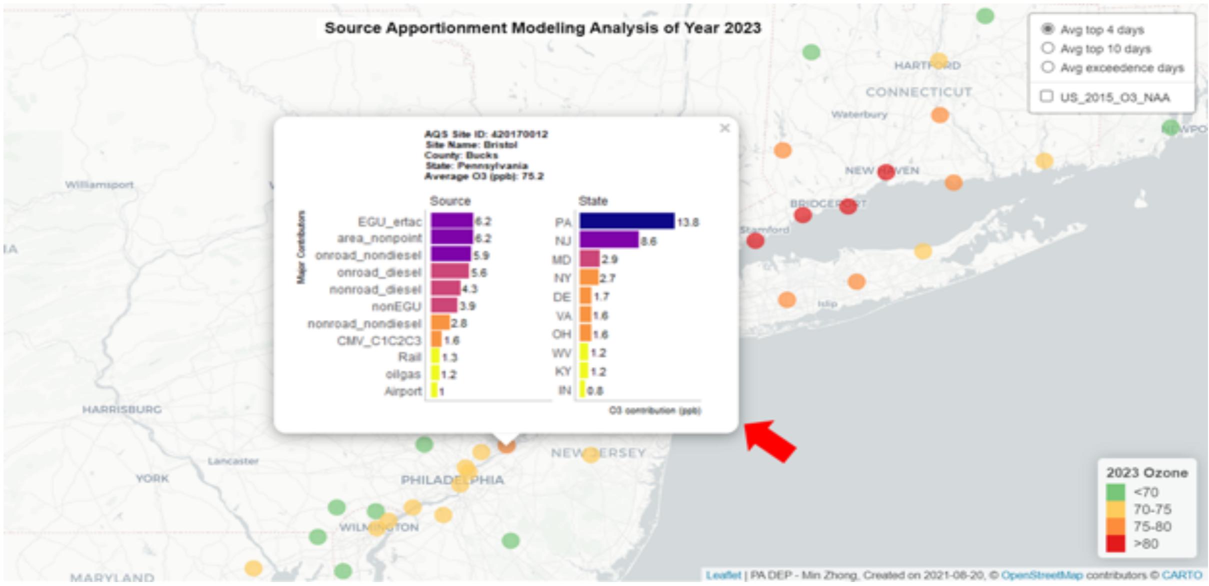
Step 1: Open the map by clicking on the following URL link: [https://minair.github.io/tagging_o3/.](https://minair.github.io/tagging_o3/)

Figure 13-6. Opening the Map



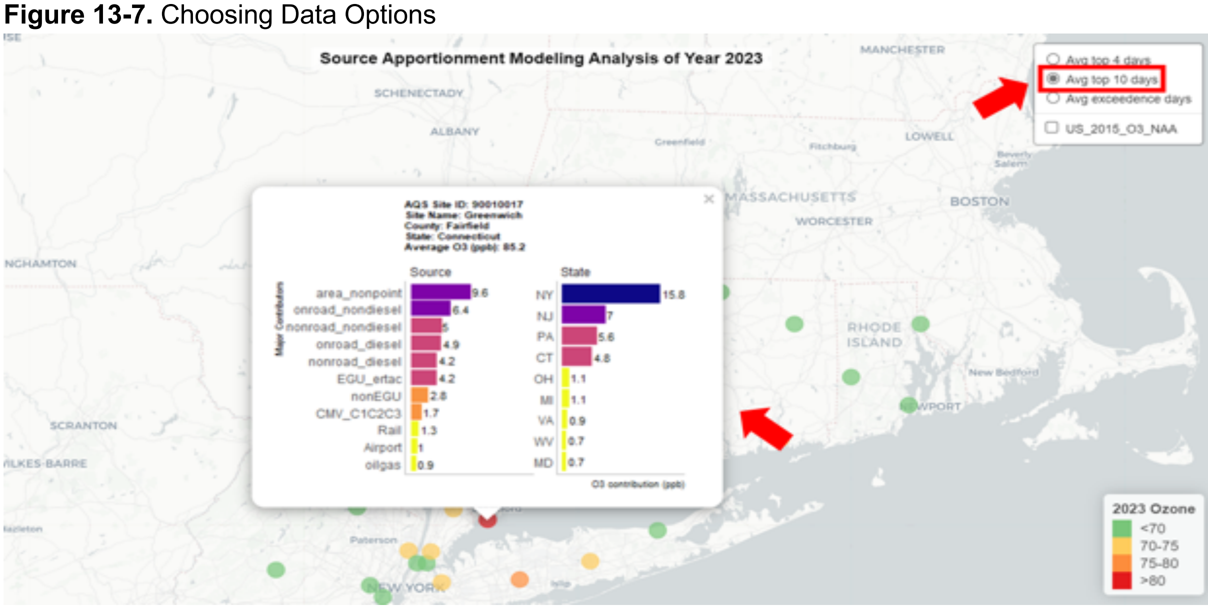
Step 2: View the average ozone contributions to a monitor calculated from the top four days, which the map shows by default as indicated by the button selected in the top right corner. After clicking on a monitoring site, a panel plot will pop up with the site ID, site name, county, state, and average MDA8 ozone concentration of the highest four days. The left bar chart shows sector contributions, and the right bar chart shows state contributions. Only contributions higher than 0.7 ppb are shown.

Figure 13-6. Detailed Data



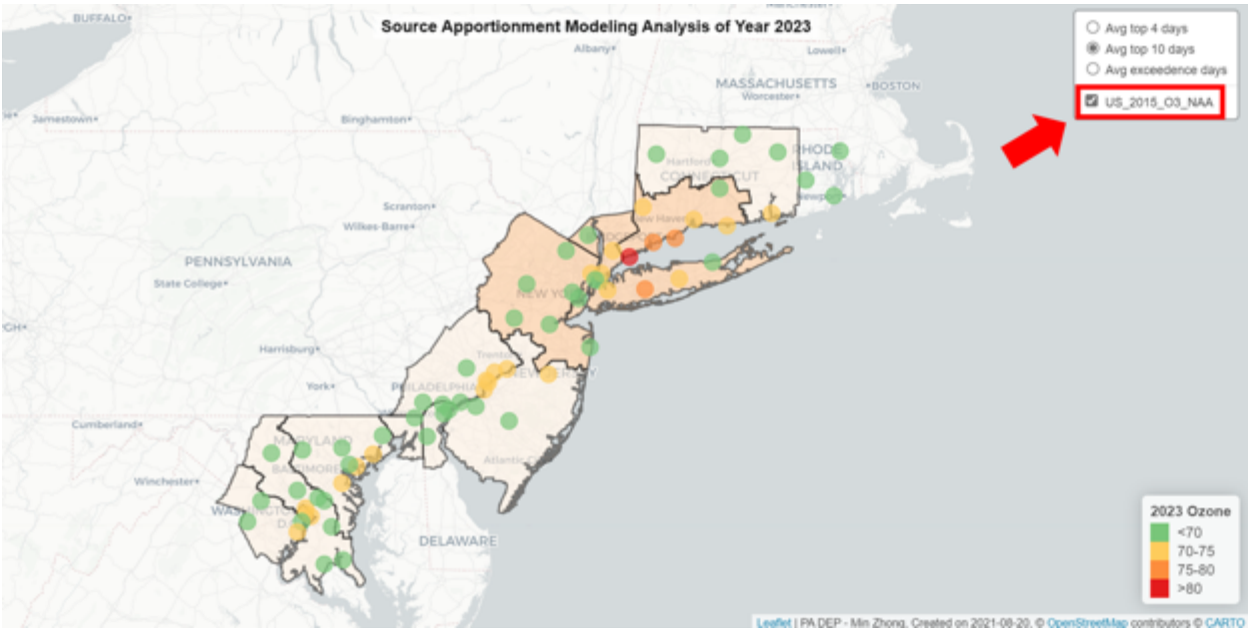
Step 3: View the average ozone contributions to a monitor based on top 10 or exceedance days. In the top right corner, select either the "Avg top 10 days" or "Avg exceedance days" button and click on a monitoring site to bring out the panel plot to view ozone contributions.

Figure 13-7. Choosing Data Options



Step 4: Display 2015 ozone nonattainment areas. In the top right corner, select the "US_2015_O3_NAA" button to show nonattainment areas in the OTC states.

Figure 13-8. Adding Nonattainment Area Overlay



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Appendix A. *Emission Inventory Files*

This section lists the emission inventory sectors with a compilation of all of the SMOKE input files in the EMF system, in FF10 or ORL format, that were used for developing model ready emission files, for the Beta and V1 inventories for the base year of 2016 and the projected years of 2023 and 2028, though not every projected year has a corresponding inventory level developed for it. The categories are based on the ways sectors are combined when processed through SMOKE by New York.

Agricultural (ag)

- 2016
  - Beta:
    2016fc_ag_nh3_fertilizer_monthly_11jul2017_v0.csv
    2016ff_proj_from_ag_nh3_2014NEIv2_NONPOINT_final_20180119_monthly_livestock_05oct2018_v0.csv2016ff_proj_from_ag_not_nh3_2014NEIv2_NONPOINT_final_20180119_monthly_05oct2018_v0.csv
  - Version 1:
    2016version1_ag_nh3_fertilizer_monthly_17jul2019_v0.csv
    2016fh_from_2017NEIdraft_ag_livestock_20190722_05aug2019_v1.csv
- 2023
  - Beta:
  - Version 1:
    2016version1_ag_nh3_fertilizer_monthly_12sep2019_nf_v1.csv
    2023fh_from_2017NEIdraft_ag_livestock_20190722_12sep2019_nf_v1.csv
    2023fh_proj_from_2016fh_ag_livestock_fertilizer_NConly_18sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    2016version1_ag_nh3_fertilizer_monthly_12sep2019_nf_v1.csv
    2028fh_from_2017NEIdraft_ag_livestock_20190722_12sep2019_nf_v1.csv
    2028fh_proj_from_2016fh_ag_livestock_fertilizer_NConly_18sep2019_v0.csv

Airport (airport)

- 2016
  - Beta:
    Included in ptnonipm sector
  - Version 1:
- 2023
  - Beta:
    Included in ptnonipm sector
  - Version 1:
- 2028

  - Beta:
    Included in ptnonipm sector
  - Version 1:

Fugitive Dust (afdust)

- 2016
  - Beta:
    2016ff_proj_from_afdust_pm_2014NEIv2_NONPOINT_penultimate_20171228_05oct2018_v0.csv
  - Version 1:
    2016fh_proj_from_afdust_pm_2014NEIv2_NONPOINT_penultimate_20171228_02aug2019_v0.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_proj_from_afdust_pm_2014NEIv2_NONPOINT_penultimate_20171228_13sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    2028fh_proj_from_afdust_pm_2014NEIv2_NONPOINT_penultimate_20171228_13sep2019_v0.csv

Area Source (nonpt)

- 2016
  - Beta:
    2016ff_proj_from_2014NEIv2_NONPOINT_final_20180119_08oct2018_v0.csv
    2016ff_proj_from_pfc_2014NEIv2_NONPOINT_final_20180119_08oct2018_v0.csv
  - Version 1:
    nonpt_2016_version1_Alaska_additions_08aug2019_nf_v1.csv
    2016fh_proj_from_pfc_2014NEIv2_NONPOINT_final_20180119_06aug2019_v0.csv
    2016fh_proj_from_2014NEIv2_NONPOINT_final_20180119_08aug2019_nf_v1.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_proj_nonpt_2016_version1_Alaska_additions_27sep2019_v0.csv
    2023fh_proj_from_pfc_2014NEIv2_NONPOINT_final_20180119_27sep2019_v0.csv
    2023fh_proj_from_2014NEIv2_NONPOINT_final_20180119_27sep2019_v0.csv
    cellulosic_v1platform_2023fh_nonpt_fromVolpe_25sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:

2028fh_proj_nonpt_2016_version1_Alaska_additions_25sep2019_v0.csv
2028fh_proj_from_pfc_2014NEIv2_NONPOINT_final_20180119_25sep2019_v0.csv
2028fh_proj_from_2014NEIv2_NONPOINT_final_20180119_25sep2019_v0.csv
cellulosic_v1platform_2028fh_nonpt_fromVolpe_17oct2019_v1.csv

Category 1 & 2 Marine Vessels (cmv_c1c2)

- 2016
  - Beta:
    2016ff_proj_from_c1c2_onshore_2014NEIv2_NONPOINT_final_20180119_17oct2018_v0.csv
    2016ff_proj_from_c1c2_offshore_2014NEIv2_NONPOINT_final_20180119_17oct2018_v0.csv
  - Version 1:
    cmv_c1c2_2016_12US1_2017_US_annual_16jan2020_v0.csv
    cmv_c1c2_2016_12US1_2017_CA_annual_16jan2020_v0.csv
    canada_c1c2_point_2015_aisremoved_07aug2019_v0.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_1_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_2_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_3_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_4_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_5_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_6_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_7_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_8_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_9_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_10_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_11_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_12_US_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_12_US_nexthour.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_1_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_2_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_3_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_4_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_5_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_6_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_7_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_8_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_9_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_10_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_11_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_12_CA_hourly.csv
    cmv_c1c2_2016adjust_20200116_12US1_2017_12_CA_nexthour.csv
- 2023
  - Beta:
  - Version 1:

2023fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_US_annual_22jan2020_v0.csv
2023fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
2023fh_proj_canada_c1c2_point_2015_aisremoved_24sep2019_v0.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_1_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_2_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_3_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_4_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_5_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_6_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_7_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_8_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_9_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_10_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_11_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_12_US_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_12_US_nexthour.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_1_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_2_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_3_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_4_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_5_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_6_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_7_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_8_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_9_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_10_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_11_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_12_CA_hourly.csv
cmv_c1c2_2016adjust_2023_20200116_12US1_2017_12_CA_nexthour.csv

- 2028
  - Beta:
  - Version 1:
    2028fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_US_annual_22jan2020_v0.csv
    2028fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
    2028fh_proj_canada_c1c2_point_2015_aisremoved_24sep2019_v0.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_1_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_2_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_3_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_4_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_5_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_6_US_hourly.csv
    cmv_c1c2_2016adjust_2028_20200116_12US1_2017_7_US_hourly.csv

cmv_c1c2_2016adjust_2028_20200116_12US1_2017_8_US_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_9_US_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_10_US_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_11_US_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_12_US_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_12_US_nexthour.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_1_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_2_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_3_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_4_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_5_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_6_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_7_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_8_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_9_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_10_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_11_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_12_CA_hourly.csv
cmv_c1c2_2016adjust_2028_20200116_12US1_2017_12_CA_nexthour.csv

Category 3 Commercial Marine Vessels (cmv_c3)

- 2016
  - Beta:
    2016ff_proj_from_ptinv_c3_cmv_point_2014fd_ff10_18oct2018_v0.csv
    2016ff_proj_from_ptinv_c3_cmv_point_2014fd_akhiprvi_ff10_18oct2018_v0.csv
    2016ff_proj_from_ptinv_c3_cmv_point_2014fd_akhiprvi_ff10_offshore_fips85_18oct2018_v0.csv
    ptinv_2016ff_proj_from_eca_imo_nonUS_nonCANADA_caps_vochaps_2011_18oct2018_v0.csv
  - Version 1:
    cmv_c3_2016adjust_20200116_12US1_2017_US_annual_22jan2020_v0.csv
    cmv_c3_2016adjust_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
    canada_c3_point_2015_aisremoved_05aug2019_v0.csv
    cmv_c3_2016adjust_20200116_12US1_2017_1_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_2_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_3_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_4_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_5_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_6_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_7_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_8_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_9_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_10_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_11_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_12_US_hourly.csv
    cmv_c3_2016adjust_20200116_12US1_2017_12_US_nexthour.csv
    cmv_c3_2016adjust_20200116_12US1_2017_1_CA_hourly.csv

cmv_c3_2016adjust_20200116_12US1_2017_2_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_3_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_4_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_5_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_6_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_7_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_8_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_9_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_10_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_11_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_12_CA_hourly.csv
cmv_c3_2016adjust_20200116_12US1_2017_12_CA_nexthour.csv

- 2023
  - Beta:
  - Version 1:
    2023fh_proj2_cmv_c3_2016adjust_2023_20200116_12US1_2017_US_annual_27jan2020_v0.csv
    2023fh_proj_cmv_c3_2016adjust_2023_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
    2023fh_proj_canada_c3_point_2015_aisremoved_24sep2019_v0.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_1_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_2_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_3_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_4_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_5_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_6_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_7_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_8_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_9_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_10_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_11_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_12_US_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_12_US_nexthour.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_1_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_2_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_3_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_4_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_5_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_6_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_7_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_8_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_9_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_10_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_11_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_12_CA_hourly.csv
    cmv_c3_2016adjust_2023_20200116_12US1_2017_12_CA_nexthour.csv
- 2028

- Beta:
- Version 1:
  2028fh_proj2_cmv_c3_2016adjust_2028_20200116_12US1_2017_US_annual_27jan2020_v0.csv
  2028fh_proj_cmv_c3_2016adjust_2028_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
  2028fh_proj_canada_c3_point_2015_aisremoved_24sep2019_v0.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_1_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_2_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_3_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_4_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_5_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_6_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_7_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_8_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_9_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_10_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_11_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_12_US_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_12_US_nexthour.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_1_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_2_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_3_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_4_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_5_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_6_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_7_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_8_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_9_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_10_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_11_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_12_CA_hourly.csv
  cmv_c3_2016adjust_2028_20200116_12US1_2017_12_CA_nexthour.csv

Nonroad (nonroad)

- 2016
  - Beta:
    2016beta_nonroad_from_MOVES2014b_forAQ_12nov2018_nf_v2.csv
    2016fc_california_nonroad_07jun2017_v1.csv
  - Version 1:
    2016version1_nonroad_from_MOVES2014b_forAQ_aggSCC_03sep2019_nf_v3.csv
    2016v1platform_2016_texas_nonroad_15jul2019_v0.csv
    2016v1platform_2016_california_nonroad_28may2019_v1.csv
- 2023
  - Beta:

  - Version 1:
    2016version1_2023_nonroad_from_MOVES2014b_forAQ_aggSCC_10sep2019_nf_v2.csv
    2016v1platform_2023_texas_nonroad_28aug2019_v0.csv
    2016v1platform_2023_california_nonroad_28may2019_v1.csv
- 2028
  - Beta:
  - Version 1:
    2016version1_2028_nonroad_from_MOVES2014b_forAQ_aggSCC_10sep2019_nf_v3.csv
    2016v1platform_2028_texas_nonroad_09aug2019_v0.csv
    2016v1platform_2028_california_nonroad_28may2019_v1.csv

Non-Point Oil & Gas (np_oilgas)

- 2016
  - Beta:
    2016fd_from_np_oilgas_2014NEIv2_NONPOINT_final_20180119_PAonly_04dec2018_nf_v1.csv
    2016ff_np_oilgas_including_state_inputs_20181116_04dec2018_nf_v2.csv
    2016ff_np_oilgas_Oklahoma_04dec2018_nf_v2.csv
    2016ff_np_oilgas_California_04dec2018_nf_v1.csv
    2016ff_Colorado_from_np_oilgas_2014NEIv2_NONPOINT_final_20180119_29oct2018_v1.csv
  - Version 1
    2016v1_np_oilgas_Illinois_08jun2019_v0.csv
    2016v1_np_oilgas_Pennsylvania_21aug2019_nf_v2.csv
    2016ff_np_oilgas_including_state_inputs_20181116_26jul2019_nf_v5.csv
    2016ff_np_oilgas_including_state_inputs_20181116_WRAPonly_from_v4_26jul2019_nf_v1.csv
    2016ff_np_oilgas_Oklahoma_21dec2018_v2.csv
    2016ff_np_oilgas_California_21dec2018_v1.csv
    2016ff_Colorado_from_np_oilgas_2014NEIv2_NONPOINT_final_20180119_29oct2018_v1.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_proj_2016fh_np_oilgas_CoST_input_no_exploration_noWRAP_noCalif_18sep2019_v0.csv
    2023fh_proj_2016fh_np_oilgas_CoST_input_no_exploration_WRAP_18sep2019_v0.csv
    2023fh_proj_2016v1_np_oilgas_exploration_4yearaverage_16oct2019_nf_v1.csv
    2023fh_proj_2016v1_np_oilgas_exploration_4yearaverage_WRAP_18sep2019_v0.csv
    2023fh_proj_2016ff_np_oilgas_California_18sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    2028fh_proj_2016fh_np_oilgas_CoST_input_no_exploration_noWRAP_noCalif_18sep2019_v0.csv
    2028fh_proj_2016fh_np_oilgas_CoST_input_no_exploration_WRAP_18sep2019_v0.csv
    2028fh_proj_2016v1_np_oilgas_exploration_4yearaverage_16oct2019_nf_v1.csv
    2028fh_proj_2016v1_np_oilgas_exploration_4yearaverage_WRAP_18sep2019_v0.csv

2028fh_proj_2016ff_np_oilgas_California_18sep2019_v0.csv

Mobile Source (onroad)

- 2016
  - Beta:
    VMT_2016_beta_full_18sep2018_v4.csv
    VPOP_2016_beta_full_18sep2018_v3.csv
    SPEED_NEI_v2_2014_from_ERG_20170915_04oct2018_v3.csv
    HOTELLING_2016_beta_05sep2018_v1.csv
  - Version 1:
    VMT_2016_version1_full_26jul2019_nf_v1.csv
    VPOP_2016_version1_full_26jul2019_nf_v1.csv
    SPEED_NEI_v2_2014_from_ERG_20170915_04oct2018_v3.csv
    HOTELLING_2016_version1_26jul2019_nf_v1.csv
- 2023
  - Beta:
  - Version 1:
    VMT_2023fh_version1_projection_03aug2019_nf_v3.csv
    VPOP_2023fh_version1_projection_06sep2019_nf_v4.csv
    SPEED_NEI_v2_2014_from_ERG_20170915_04oct2018_v3.csv
    HOTELLING_2023fh_version1_projection_06sep2019_nf_v2.csv

Mobile Source Canada (onroad_can)

- 2016
  - Beta:
    canada_2015_transport_onroad_refueling_svn70_27nov2018_v0.csv
    canada_2015_transport_onroad_monthly_svn70_27nov2018_v0.csv
  - Version 1:
    canada_2015_transport_onroad_refueling_svn70_27nov2018_v0.csv
    canada_2015_transport_onroad_monthly_svn70_27nov2018_v0.csv
- 2023
  - Beta:
  - Version 1:
    canada_2023proj_transport_onroad_refueling_svn70_09apr2019_v0.csv
    canada_2023proj_transport_onroad_monthly_svn70_09apr2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    canada_2028proj_transport_onroad_refueling_svn70_09apr2019_v0.csv
    canada_2028proj_transport_onroad_monthly_svn70_09apr2019_v0.csv

Mobile Source Mexico (onroad_mex)

- 2016
  - Beta:
    Mexico_2016_onroad_MOVES_interpolated_02mar2018_v0.csv
  - Version 1:
    Mexico_2016_onroad_MOVES_interpolated_02mar2018_v0.csv
- 2023
  - Beta:
  - Version 1:
    Mexico_2023_onroad_MOVES_aggSCC_21sep2016_v1.csv
- 2028
  - Beta:
  - Version 1:
    Mexico_2023_onroad_MOVES_aggSCC_21sep2016_v1.csv

Area Fugitive Dust Canada (othafdust)

- 2016
  - Beta:
    canada_2015_area_afdust_svn70_27nov2018_v0.csv
  - Version 1:
    canada_2015_area_afdust_svn70_adj_construction_02may2019_v0.csv
- 2023
  - Beta:
  - Version 1:
    canada_2023_area_afdust_svn70_adj_construction_19sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    canada_2028_area_afdust_svn70_adj_construction_02may2019_v0.csv
    canada_2023_area_afdust_svn70_adj_construction_19sep2019_v0.csv

Point Source Fugitive Dust Canada (othptdust)

- 2016
  - Beta:
    canada_2015_ag_winderros_svn70_monthly_26nov2018_v0.csv
    canada_2015_ag_havest_svn70_monthly_26nov2018_v0.csv
    canada_2015_ag_tillage_svn70_monthly_26nov2018_v0.csv
  - Version 1:
    canada_2015_ag_havest_svn70_monthly_12km_24apr2019_v0.csv
    canada_2015_ag_tillage_svn70_monthly_12km_24apr2019_v0.csv

- 2023
  - Beta:
  - Version 1:
    canada_2023proj_ag_havest_svn70_monthly_12km_24apr2019_v0.csv
    canada_2023proj_ag_tillage_svn70_monthly_12km_24apr2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    canada_2028proj_ag_havest_svn70_monthly_12km_24apr2019_v0.csv
    canada_2028proj_ag_tillage_svn70_monthly_12km_24apr2019_v0.csv

Area Source – Canada & Mexico (othar)

- 2016
  - Beta:
    canada_2015_transport_rail_svn70_27nov2018_v0.csv
    canada_2015_area_other_svn70_27nov2018_v0.csv
    canada_2015_transport_marine_svn70_07dec2018_v1.csv
    canada_2015_transport_nonroad_monthly_svn70_27nov2018_v0.csv
    Mexico_2016fd_area_interpolated_01mar2018_v0.csv
    Mexico_2016fd_nonroad_interpolated_01mar2018_v0.csv
  - Version 1:
    canada_2015_transport_rail_svn70_27nov2018_v0.csv
    canada_2015_area_other_svn70_27nov2018_v0.csv
    canada_2015_transport_nonroad_monthly_svn70_27nov2018_v0.csv
    Mexico_2016fd_area_interpolated_01mar2018_v0.csv
    Mexico_2016fd_nonroad_interpolated_01mar2018_v0.csv
- 2023
  - Beta:
  - Version 1:
    canada_2023_area_other_svn70_05apr2019_v0.csv
    canada_2023proj_transport_nonroad_monthly_svn70_09apr2019_v0.csv
    canada_2023proj_transport_rail_svn70_09apr2019_v0.csv
    canada_2023_area_EPG_svn70_11apr2019_v1.csv
    Mexico_2023el_area_14sep2016_v1.csv
    Mexico_2023el_nonroad_05feb2019_v1.csv
- 2028
  - Beta:
  - Version 1:
    canada_2028_area_other_svn70_05apr2019_v0.csv
    canada_2028proj_transport_nonroad_monthly_svn70_09apr2019_v0.csv
    canada_2028proj_transport_rail_svn70_09apr2019_v0.csv
    canada_2028_area_EPG_svn70_11apr2019_v1.csv
    Mexico_2028el_area_30nov2016_v1.csv
    Mexico_2028el_nonroad_05feb2019_v1.csv

Point Source – Canada & Mexico (othpt)

- 2016
  - Beta:
    canada_2015_ag_animal_VOC_svn70_monthly_26nov2018_v0.csv
    canada_2015_ag_animal_NH3_svn70_monthly_26nov2018_v0.csv
    canada_2015_ag_synth_fertilizer_NH3_svn70_monthly_26nov2018_v0.csv
    canada_c3_point_2015_07dec2018_v0.csv
    canada_2015_point_airport_LTO_monthly_svn70_27nov2018_v0.csv
    canada_2015_point_VOC_INV_svn70_26nov2018_v0.csv
    canada_2015_point_noVOC_svn70_11dec2018_nf_v1.csv
    canada_2015_point_CB6_svn70_28nov2018_v0.csv
    canada_2015_UOG_svn70_26nov2018_v0.csv
    Mexico_2014v1_CMV_point_27jul2016_v0.csv
    Mexico_2016_point_interpolated_02mar2018_v0.csv
  - Version 1:
    canada_2015_ag_animal_VOC_svn70_monthly_12km_24apr2019_v0.csv
    canada_2015_ag_animal_NH3_svn70_monthly_12km_24apr2019_v0.csv
    canada_2015_ag_synth_fertilizer_NH3_svn70_monthly_12km_24apr2019_v0.csv
    canada_2015_point_airport_LTO_monthly_svn70_27nov2018_v0.csv
    canada_2015_point_VOC_INV_svn70_02apr2019_v0.csv
    canada_2015_point_noVOC_svn70_02apr2019_v0.csv
    canada_2015_point_CB6_svn70_02apr2019_v0.csv
    canada_2015_UOG_svn70_26nov2018_v0.csv
    Mexico_2016_point_interpolated_02mar2018_v0.csv
- 2023
  - Beta:
  - Version 1:
    canada_2023proj_point_airport_LTO_monthly_svn70_09apr2019_v0.csv
    canada_2023_point_plusEPG_VOC_svn70_08apr2019_v0.csv
    canada_2023_point_plusEPG_noVOC_fixPMC_svn70_25apr2019_v0.csv
    canada_2023_point_plusEPG_CB6_svn70_08apr2019_v0.csv
    canada_2023_UOG_svn70_05apr2019_v1.csv
    canada_2023proj_ag_animal_NH3_svn70_monthly_12km_24apr2019_v0.csv
    canada_2023proj_ag_animal_VOC_svn70_monthly_12km_24apr2019_v0.csv
    canada_2023proj_ag_synth_fertilizer_NH3_svn70_monthly_12km_24apr2019_v0.csv
    Mexico_2023el_point_14sep2016_v0.csv
- 2028
  - Beta:
  - Version 1:
    canada_2028proj_point_airport_LTO_monthly_svn70_09apr2019_v0.csv
    canada_2028_point_plusEPG_VOC_svn70_08apr2019_v0.csv
    canada_2028_point_plusEPG_noVOC_fixPMC_svn70_25apr2019_v0.csv
    canada_2028_point_plusEPG_CB6_svn70_08apr2019_v0.csv

canada_2028_UOG_svn70_05apr2019_v1.csv
canada_2028proj_ag_animal_NH3_svn70_monthly_12km_24apr2019_v0.csv
canada_2028proj_ag_animal_VOC_svn70_monthly_12km_24apr2019_v0.csv
canada_2028proj_ag_synth_fertilizer_NH3_svn70_monthly_12km_24apr2019_v0.csv
Mexico_2028el_point_30nov2016_v0.csv

Point Oil & Gas (pt_oilgas)

- 2016
  - Beta:
    2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_19oct2018_v0.csv
    oilgas_2016b_POINT_20180612_19oct2018_v2.csv
  - Version 1:
    2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_06sep2019_nf_v2.csv
    2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_WRAP_26jul2019_v0.csv
    oilgas_2016b_POINT_20180612_calcyear2014_06sep2019_nf_v5.csv
    oilgas_2016b_POINT_20180612_calcyear2014_WRAP_from_v2_26jul2019_v0.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_17sep2019_v0.csv
    2023fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_WRAP_17sep2019_v0.csv
    2023fh_from_oilgas_2016b_POINT_20180612_17sep2019_v0.csv
    2023fh_from_oilgas_2016b_POINT_20180612_WRAP_from_v2_17sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    2028fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_17sep2019_v0.csv
    2028fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_WRAP_17sep2019_v0.csv
    2028fh_from_oilgas_2016b_POINT_20180612_17sep2019_v0.csv
    2028fh_from_oilgas_2016b_POINT_20180612_WRAP_from_v2_17sep2019_v0.csv

Agricultural burning (ptagfire)

- 2016
  - Beta:
    ptinv_2016beta_agburn_conus_caps_14nov2018_v1.csv
    ptinv_2016beta_agburn_ID_caps_17oct2018_v0.csv
    ptinv_agburn_GA_2016_14nov2018_v1.csv
    ptinv_2016beta_agburn_MN_caps_17oct2018_v0.csv

agburn_WA_2016_supplemental_01nov2018_v0.csv
ptday_2016beta_agburn_conus_noID_caps_17oct2018_v0
ptday_2016beta_agburn_ID_caps_17oct2018_v0
ptday_agburn_GA_2016_14nov2018_v1
ptday_2016beta_agburn_MN_caps_17oct2018_v0
ptday_agburn_WA_2016_supplemental_01nov2018_v0
ptday_2016beta_agburn_conus_noID_caps_prevdec_14nov2018_v0
ptday_agburn_GA_2016_prevdec_14nov2018_v0
ptday_agburn_WA_2016_supplemental_prevdec_14nov2018_v0

- Version 1:
  ptinv_agburn_2016_hi_05apr2019_v0.csv
  ptinv_2016v1_agburn_caps_16jul2019_v0.csv
  ptinv_2016v1_agburn_haps_16jul2019_v0.csv
  ptinv_2016beta_agburn_ID_caps_17oct2018_v0.csv
  ptinv_2016_GA_agburn_caps_reapportion_16jul2019_v0.csv
  ptinv_2016_GA_agburn_haps_reapportion_16jul2019_v0.csv
  ptinv_2016beta_agburn_MN_caps_17oct2018_v0.csv
  agburn_WA_2016_supplemental_01nov2018_v0.csv
  ptday_2016v1_agburn_caps_16jul2019_v0
  ptday_2016v1_agburn_haps_16jul2019_v0
  ptday_2016beta_agburn_ID_caps_17oct2018_v0
  ptday_2016_GA_agburn_caps_reapportion_19jul2019_v0
  ptday_2016_GA_agburn_haps_reapportion_19jul2019_v0
  ptday_2016beta_agburn_MN_caps_17oct2018_v0
  ptday_agburn_WA_2016_supplemental_01nov2018_v0
  ptday_2016v1_agburn_caps_prevdec_19jul2019_v0
  ptday_2016v1_agburn_haps_prevdec_19jul2019_v0
  ptday_2016_GA_agburn_caps_reapportion_prevdec_19jul2019_v0
  ptday_2016_GA_agburn_haps_reapportion_prevdec_19jul2019_v0
  ptday_agburn_WA_2016_supplemental_prevdec_14nov2018_v0
  ptday_agburn_2016_hi_05apr2019_v0

- 2023 & 2028
  - Beta:
    Use base year inventory
  - Version 1:
    Use base year inventory

Prescribed Burning & Wildfires (ptfire)

- 2016
  - Beta:
    ptday_2016beta_all_prevdec_20nov2018_v0
    ptday_pfire_2016_ks_flinthills_15nov2018_v0
    ptday_pfire_2016_ks_flinthills_haps_15nov2018_v0
    ptday_ptfire_2016beta_GADNR_caps_02oct2018_v0

ptday_ptfire_2016beta_GADNR_haps_02oct2018_v0
ptday_ptfire_aug_2016ff_16j.lst
ptday_ptfire_jul_2016ff_16j.lst
ptday_ptfire_jun_2016ff_16j.lst
ptday_ptfire_may_2016ff_16j.lst
ptday_sf2_2016beta_20nov2018_v2
ptday_sf2_2016beta_ak_20nov2018_v1
ptday_sf2_2016beta_ak_haps_20nov2018_v1
ptday_sf2_2016beta_haps_20nov2018_v2
ptday_sf2_2016beta_nc_30oct2018_v0
ptday_sf2_2016beta_nc_haps_19nov2018_v0
ptinv_pfire_2016_ks_flinthills_15nov2018_v0.csv
ptinv_pfire_2016_ks_flinthills_haps_15nov2018_v0.csv
ptinv_ptfire_2016beta_GADNR_caps_02oct2018_v0.csv
ptinv_ptfire_2016beta_GADNR_haps_02oct2018_v0.csv
ptinv_ptfire_2016ff_16j.lst
ptinv_sf2_2016beta_27nov2018_v3.csv
ptinv_sf2_2016beta_ak_20nov2018_v1.csv
ptinv_sf2_2016beta_ak_haps_20nov2018_v1.csv
ptinv_sf2_2016beta_haps_20nov2018_v2.csv
ptinv_sf2_2016beta_nc_30oct2018_v0.csv
ptinv_sf2_2016beta_nc_haps_19nov2018_v0.csv

- Version 1:
  ptday_2016v1_ptfire_all_prevdec_19jul2019_v0
  ptday_ptfire_2016beta_GADNR_caps_ff10_reapportion_csv_19apr2019_v0
  ptday_ptfire_2016beta_GADNR_haps_ff10_reapportion_csv_12jul2019_v1
  ptday_ptfire_2016_ks_flinthills_haps_reapportion_ff10_26mar2019_v0
  ptday_ptfire_2016_ks_flinthills_reapportion_ff10_26mar2019_v0
  ptday_sf2_2016v1_22jul2019_nf_v1
  ptday_sf2_2016v1_ak_16jul2019_v0
  ptday_sf2_2016v1_ak_haps_16jul2019_v0
  ptday_sf2_2016v1_split_haps_22jul2019_nf_v2
  ptinv_ptfire_2016beta_GADNR_caps_ff10_reapportion_19apr2019_v0.csv
  ptinv_ptfire_2016beta_GADNR_haps_ff10_reapportion_26apr2019_v1.csv
  ptinv_ptfire_2016_ks_flinthills_haps_reapportion_ff10_26mar2019_v0.csv
  ptinv_ptfire_2016_ks_flinthills_reapportion_ff10_26mar2019_v0.csv
  ptinv_sf2_2016v1_ak_16jul2019_v0.csv
  ptinv_sf2_2016v1_ak_haps_16jul2019_v0.csv
  ptinv_sf2_2016v1_split_22jul2019_nf_v1.csv
  ptinv_sf2_2016v1_split_haps_22jul2019_nf_v2.csv

- 2023 & 2028
  - Beta:
    Use base year inventory
  - Version 1:
    Use base year inventory

Rail (rail)

- 2016
  - Beta:
    2016beta_rail_passenger_ERTAC_10dec2018_v2.csv
    2016beta_rail_class2_class3_ERTAC_05dec2018_nf_v1.csv
    2016beta_rail_class1_ERTAC_19nov2018_nf_v1.csv
  - Version 1:
    2016beta_rail_passenger_ERTAC_15jul2019_v3.csv
    2016beta_rail_class1_ERTAC_15jul2019_v2.csv
    2016v1platform_2016_california_rail_19jul2019_v2.csv
    2016version1_rail_class2_class3_ERTAC_15jul2019_v1.csv
- 2023
  - Beta:
  - Version 1:
    2016v1platform_2023_california_rail_16sep2019_nf_v2.csv
    2016version1_2023_rail_class1_ERTAC_16sep2019_nf_v1.csv
    2016version1_2023_rail_class2_class3_ERTAC_16sep2019_nf_v1.csv
    2016version1_2023_rail_passenger_ERTAC_16sep2019_nf_v1.csv
    2023fh_proj_from_2016version1_2016_rail_allNC_16sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:
    2016v1platform_2028_california_rail_16sep2019_nf_v2.csv
    2016version1_2028_rail_class1_ERTAC_16sep2019_nf_v1.csv
    2016version1_2028_rail_class2_class3_ERTAC_16sep2019_nf_v1.csv
    2016version1_2028_rail_passenger_ERTAC_16sep2019_nf_v1.csv
    2028fh_proj_from_2016version1_2016_rail_allNC_16sep2019_v0.csv

Electric Generating Unit Emissions (ptegu)

- 2016
  - Beta:
    egucems_2016b_POINT_20180612_30nov2018_v3.csv
    egunoncems_2016b_POINT_20180612_03dec2018_v5.csv
    nonconus_egu_2016b_POINT_20180612_27nov2018_v0.csv
    HOUR_UNIT_2015_12_31dec_2016fd.txt
  - Version 1:
    2016fh_proj_from_egunoncems_2016b_POINT_20180612_2016v1_calcyear2014_05aug2019_v0.csv
    egucems_2016b_POINT_20180612_08jul2020_nf_v7.csv
    egunoncems_2016b_POINT_20180612_17sep2019_nf_v11.csv
    HOUR_UNIT_2015_12_31dec_2016fd.txt
    cemsum_2016v1_3_14_2018.txt

- 2023
  - Beta:
  - Version 1:
    egucems_epa617_2023_20200105_summer_26mar2020_v0.csv
    egucems_epa617_2023_20200105_winter_26mar2020_v0.csv
    egunoncems_epa617_2023_20200105_summer_26mar2020_v0.csv
    egunoncems_epa617_2023_20200105_winter_26mar2020_v0.csv
    HOUR_UNIT_2015_12_31dec_2023_adj_final.txt
    cemsum_2023_3_14_2018_final_summer.txt.fh1
    cemsum_2023_3_14_2018_final_winter.txt.fh1
- 2028
  - Beta:
  - Version 1:
    egucems_epa617_2028_20200117_summer_14apr2020_v0.csv
    egucems_epa617_2028_20200117_winter_14apr2020_v0.csv
    egunoncems_epa617_2028_20200117_summer_14apr2020_v0.csv
    egunoncems_epa617_2028_20200117_winter_14apr2020_v0.csv
    HOUR_UNIT_2015_12_31dec_2028_adj_final.txt
    cemsum_2028_3_14_2018_final_summer.txt.fh1
    cemsum_2028_3_14_2018_final_winter.txt.fh1

Electric Generating Unit Emissions (ptertac)

- 2016
  - Beta:
    CONUSv16.0_BYFY_T6_ALL_ff10_future.csv
    CONUSv16.0_BYFY_T6_ALL_ff10_hourly_future.csv
    MARAMA_2016beta_POINT_SMALLEGU_25feb2019.csv
  - Version 1:
    C2.1.1CONUSv16.0_BYFYHRLY_NCD_fs_ff10_future.csv
    C2.1.1CONUSv16.0_BYFYHRLY_NCD_fs_ff10_hourly_future.csv
    egunoncems_2016version1_ERTAC_Platform_POINT_27oct2019.csv
    2016fh_proj_from_egunoncems_2016version1_ERTAC_Platform_POINT_calcyear2014_27oct2019.csv
- 2023
  - Beta:
  - Version 1:
    C2.1.3CONUSv16.1_2023_fs_ff10_future.csv
    C2.1.3CONUSv16.1_2023_fs_ff10_hourly_future.csv
    egunoncems_epa617_2023_20190612_summer_19sep2019_ERTAC_Platform_15feb2020.csv
    egunoncems_epa617_2023_20190612_winter_19sep2019_ERTAC_Platform_15feb2020.csv
- 2028
  - Beta:
  - Version 1:
    C2.1.3CONUSv16.1_2028_fs_ff10_future.csv

C2.1.3CONUSv16.1_2028_fs_ff10_hourly_future.csv
egunoncems_epa617_2030_20190611_summer_13jun2019_ERTAC_Platform_31may2020.csv
egunoncems_epa617_2030_20190611_winter_13jun2019_ERTAC_Platform_31may2020.csv

Industrial Point Sources (ptnonipm)

- 2016
  - Beta:
    nonegu_2016b_POINT_20180612_07dec2018_v3.csv
    point_railyards_2016beta_11dec2018_v0.csv
    airports_nonegu_2016b_POINT_20180612_proj_2016_07dec2018_nf_v2.csv
  - Version 1:
    2016fh_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_22jul2019_v0.csv
    2016fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_09aug2019_nf_v1.csv
    nonegu_2016version1_POINT_20180612_17sep2019_nf_v2.csv
    point_railyards_2016version1_19jul2019_nf_v2.csv
    pt_biorefinery_OTAQ_supplemental_2016version1_12aug2019_nf_v1.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_proj_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_27sep2019_v0.csv
    2023fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_27sep2019_v0.csv
    2023fh_proj_nonegu_2016version1_POINT_20180612_27sep2019_v0.csv
    2023fh_proj_pt_biorefinery_OTAQ_supplemental_2016version1_27sep2019_v0.csv
    point_railyards_2016version1_2023fh_24sep2019_nf_v1.csv
- 2028
  - Beta:
  - Version 1:
    2028fh_proj_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_26sep2019_v0.csv
    2028fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_26sep2019_v0.csv
    2028fh_proj_nonegu_2016version1_POINT_20180612_26sep2019_v0.csv
    2028fh_proj_pt_biorefinery_OTAQ_supplemental_2016version1_26sep2019_v0.csv
    point_railyards_2016version1_2028fh_24sep2019_nf_v1.csv

Industrial Point Sources (ptnonertac)

- 2016
  - Beta:
  - Version 1:

2016fh_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_22jul2019_v0.csv
2016fh_proj_from_nonegu_2016version1_ERTAC_Platform_POINT_calcyear2014_27oct2019.csv
nonegu_2016version1_ERTAC_Platform_POINT_27oct2019.csv
nonEGUs_hourlyCEM_2016_v1.csv
point_railyards_2016version1_19jul2019_nf_v2.csv
pt_biorefinery_OTAQ_supplemental_2016version1_12aug2019_nf_v1.csv

- 2023
  - Beta:
  - Version 1:
    2023fh_proj_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_27sep2019_v0.csv
    2023fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_27sep2019_ERTAC_Platform_07aug2020.csv
    2023fh_proj_nonegu_2016version1_POINT_20180612_27sep2019_ERTAC_PLATFORM_07aug2020.csv
    2023fh_proj_pt_biorefinery_OTAQ_supplemental_2016version1_27sep2019_v0.csv
    point_railyards_2016version1_2023fh_24sep2019_nf_v1.csv
- 2028
  - Beta:
  - Version 1:
    2028fh_proj_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_26sep2019_v0.csv
    2028fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_26sep2019_ERTAC_Platform_31may2020.csv
    2028fh_proj_nonegu_2016version1_POINT_20180612_26sep2019_ERTAC_Platform_31may2020.csv
    2028fh_proj_pt_biorefinery_OTAQ_supplemental_2016version1_26sep2019_v0.csv
    point_railyards_2016version1_2028fh_24sep2019_nf_v1.csv

Residential Wood Combustion (rwc)

- 2016
  - Beta:
    2016ff_proj_from_rwc_2014NEIv2_NONPOINT_penultimate_20171228_30oct2018_v0.csv
  - Version 1:
    2016fh_proj_from_rwc_2014NEIv2_NONPOINT_penultimate_20171228_06aug2019_v0.csv
- 2023
  - Beta:
  - Version 1:
    2023fh_proj_from_rwc_2014NEIv2_NONPOINT_penultimate_20171228_12sep2019_v0.csv
- 2028
  - Beta:
  - Version 1:

2028fh_proj_from_rwc_2014NEIv2_NONPOINT_penultimate_20171228_12sep2019_v0.csv

Appendix B. *Model Evaluation Statistic Formulae*

The statistical formulations that have been computed for each species are as follows:
P_i and O_i are the individual (daily maximum 8-hour ozone or daily average for the other species) predicted and observed concentrations respectively, $\overline{P}$ and $\overline{O}$ are the average concentrations, respectively, and N is the sample size.

Observed average, in ppb:

$$\overline{O} = \frac{1}{N}\sum O_i$$

Predicted average, in ppb (only use P_i when O_i is valid):

$$\overline{P} = \frac{1}{N}\sum P_i$$

Correlation coefficient, R^2:

$$R^2 = \frac{\left[\sum (P_i - \overline{P})(O_i - \overline{O})\right]^2}{\sum (P_i - \overline{P})^2 \sum (O_i - \overline{O})^2}$$

Normalized mean error (NME), in %:

$$NME = \frac{\sum |P_i - O_i|}{\sum O_i} \times 100\%$$

Root mean square error (RMSE), in ppb:

$$RMSE = \left[\frac{1}{N}\sum (P_i - O_i)^2\right]^{1/2}$$

Fractional error (FE), in %:

$$FE = \frac{2}{N}\sum \left|\frac{P_i - O_i}{P_i + O_i}\right| \times 100\%$$

Mean absolute gross error (MAGE), in ppb:

$$MAGE = \frac{1}{N}\sum |P_i - O_i|$$

Mean normalized gross error (MNGE), in %:

$$MNGE = \frac{1}{N}\sum \frac{|P_i - O_i|}{O_i} \times 100\%$$

Mean bias (MB), in ppb:

$$MB = \frac{1}{N}\sum (P_i - O_i)$$

Mean normalized bias (MNB), in %:

$$MNB = \frac{1}{N}\sum \frac{(P_i - O_i)}{O_i} \times 100\%$$

Mean fractionalized bias (MFB), in %:

$$MFB = \frac{2}{N}\sum \left[\frac{P_i - O_i}{P_i + O_i}\right] \times 100\%$$

Normalized mean bias (NMB), in %:

$$NMB = \frac{\sum (P_i - O_i)}{\sum O_i} \times 100\%$$

Appendix C. *Baseline (2014-2018) and projected 2023 O3 design values*

Baseline (2014-2018) and projected 2023 O_3 design values from CAMx and CMAQ, using the standard 3x3 method and the 3x3 No Water 1 method. Future design values that exceed 65 ppb are highlighted in yellow, values that exceed 70 ppb are highlighted in orange, and values that exceed 75 ppb are highlighted in dark red. OTR monitors only.

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	**State**	**County**	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
90019003	CT	Fairfield	82.7	83	78	78	76	76	80	80	75	75
90013007	CT	Fairfield	82	83	75	76	75	75	74	75	75	76
90099002	CT	New Haven	79.7	82	71	73	72	74	71	73	71	73
420170012	PA	Bucks	79.3	81	71	72	71	72	69	70	69	70
90010017	CT	Fairfield	79.3	80	74	74	74	75	71	72	78	79
90079007	CT	Middlesex	78.7	79	70	70	70	70	69	69	69	69
90011123	CT	Fairfield	77	78	69	70	69	70	69	70	69	70
421010024	PA	Philadelphia	77.7	78	69	69	69	69	68	68	68	68
90090027	CT	New Haven	75.7	77	69	70	68	69	69	70	68	69
340070002	NJ	Camden	75.3	77	67	69	67	69	66	67	66	67
90110124	CT	New London	74.3	76	67	68	68	69	67	69	71	73
360850067	NY	Richmond	76	76	71	71	70	70	74	74	70	70
361030002	NY	Suffolk	74	76	69	71	68	70	68	70	67	69
361030004	NY	Suffolk	74.3	76	68	69	67	68	66	67	66	68
421010048	PA	Philadelphia	75.3	76	67	68	67	68	66	66	66	66
240251001	MD	Harford	74	75	65	66	64	65	63	64	64	64
340030006	NJ	Bergen	74.3	75	69	69	69	69	68	68	68	68
340230011	NJ	Middlesex	74.7	75	66	66	66	66	65	66	65	66
361192004	NY	Westchester	74	75	70	70	67	68	66	67	68	68
90031003	CT	Hartford	71.7	74	63	65	63	65	62	64	62	64
100031010	DE	New Castle	73.7	74	65	65	65	65	65	65	65	65
240031003	MD	Anne Arundel	74	74	64	64	64	64	65	65	63	63
240150003	MD	Cecil	74	74	64	64	64	64	64	64	64	64
250051004	MA	Bristol	71.7	74	64	66	64	66	68	70	63	65
340150002	NJ	Gloucester	73.7	74	66	66	66	66	65	66	65	66
340219991	NJ	Mercer	73.3	74	65	66	65	66	65	65	65	65
360810124	NY	Queens	72.3	74	67	69	68	69	66	68	65	67
90131001	CT	Tolland	71.7	73	63	64	63	64	62	63	62	63
240053001	MD	Baltimore	72.7	73	64	64	63	64	64	64	62	63
240259001	MD	Harford	73	73	63	63	63	63	62	62	63	63
340290006	NJ	Ocean	72.7	73	65	65	65	65	64	64	64	64
361030009	NY	Suffolk	71	73	66	67	64	66	66	68	64	66
420290100	PA	Chester	72.7	73	64	64	64	64	63	64	63	64
440030002	RI	Kent	71.3	73	64	65	64	65	62	64	62	64
440071010	RI	Providence	69.7	73	62	65	62	64	67	70	61	63
90050005	CT	Litchfield	71.3	72	63	63	63	63	62	63	62	63
100031013	DE	New Castle	71	72	63	64	63	64	62	63	62	63
100032004	DE	New Castle	71.3	72	63	64	63	64	63	63	63	63
110010043	DC	District of Columbia	71	72	61	62	61	62	60	61	60	61

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	**State**	**County**	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
240051007	MD	Baltimore	72	72	62	62	62	62	61	61	61	61
340170006	NJ	Hudson	71	72	66	66	65	65	68	69	64	65
340190001	NJ	Hunterdon	71.3	72	63	64	63	64	62	63	62	63
340210005	NJ	Mercer	71.3	72	63	64	63	64	62	63	62	63
360050133	NY	Bronx	70.7	72	67	68	66	67	63	65	65	66
360610135	NY	New York	70.3	72	66	67	66	68	64	66	65	67
360870005	NY	Rockland	71.3	72	64	64	64	64	64	64	64	64
420450002	PA	Delaware	71.3	72	64	64	64	64	64	64	64	64
420910013	PA	Montgomery	71.3	72	64	65	64	65	63	64	63	64
510130020	VA	Arlington	71	72	61	62	61	62	60	61	60	61
90159991	CT	Windham	69.7	71	61	62	61	62	60	61	60	61
230090102	ME	Hancock	69	71	60	62	60	62	61	63	61	63
240338003	MD	Prince George's	70.7	71	61	61	61	61	59	60	59	60
240339991	MD	Prince George's	69.3	71	60	61	60	61	59	60	59	60
250130008	MA	Hampden	70	71	61	62	61	62	60	61	60	61
420030067	PA	Allegheny	69.7	71	62	63	62	63	60	61	60	61
420950025	PA	Northampton	70	71	62	63	62	63	60	61	60	61
440090007	RI	Washington	69.3	71	63	64	62	63	66	67	65	66
510590030	VA	Fairfax	70	71	60	60	60	60	59	60	59	60
110010050	DC	District of Columbia	70	70	60	60	60	60	59	59	59	59
240170010	MD	Charles	69.3	70	60	60	60	60	59	60	59	60
240290002	MD	Kent	69.3	70	60	60	60	60	59	60	59	60
240330030	MD	Prince George's	69.3	70	59	60	59	60	58	59	58	59
245100054	MD	Baltimore (City)	68.3	70	60	61	59	61	60	62	59	61
250070001	MA	Dukes	70	70	63	63	62	62	62	62	62	62
250154002	MA	Hampshire	69	70	60	61	60	61	59	60	59	60
250213003	MA	Norfolk	69	70	62	63	60	61	64	64	60	61
340130003	NJ	Essex	68.3	70	61	63	61	63	61	63	61	63
340273001	NJ	Morris	69	70	61	62	61	62	61	62	61	62
360290002	NY	Erie	69.3	70	63	64	63	63	65	66	62	63
360790005	NY	Putnam	69	70	62	63	62	63	62	62	62	62
420031008	PA	Allegheny	69	70	62	63	62	63	61	62	61	62
420050001	PA	Armstrong	69	70	61	62	61	62	61	62	61	62
420070002	PA	Beaver	68.7	70	57	59	57	59	54	56	54	56
420110011	PA	Berks	70	70	62	62	62	62	60	60	60	60
420630004	PA	Indiana	69.7	70	62	63	62	63	61	61	61	61
420710007	PA	Lancaster	69.3	70	60	61	60	61	60	60	60	60
420750100	PA	Lebanon	69	70	60	61	60	61	60	60	60	60
420770004	PA	Lehigh	69.7	70	62	62	62	62	61	61	61	61
421330011	PA	York	69	70	61	61	61	61	59	60	59	60
100031007	DE	New Castle	68	69	59	60	59	60	59	60	59	60
100051003	DE	Sussex	67.7	69	59	60	60	61	55	56	59	60
240090011	MD	Calvert	67.7	69	59	60	59	60	59	60	58	59
240130001	MD	Carroll	68.3	69	58	59	58	59	57	58	57	58
240210037	MD	Frederick	68	69	59	60	59	60	58	59	58	59
250010002	MA	Barnstable	69	69	61	61	61	61	60	60	59	59

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	**State**	**County**	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
250051006	MA	Bristol	67.3	69	61	62	60	62	60	61	59	61
250230005	MA	Plymouth	67	69	59	61	59	61	58	59	58	59
250270024	MA	Worcester	66.3	69	58	61	58	61	58	60	58	60
340250005	NJ	Monmouth	67.3	69	60	62	60	61	61	63	59	60
360050110	NY	Bronx	67.7	69	63	65	63	65	62	63	63	64
420030008	PA	Allegheny	68	69	61	62	61	62	60	61	60	61
420850100	PA	Mercer	68.7	69	60	60	60	60	58	59	58	59
420958000	PA	Northampton	69	69	61	61	61	61	60	60	60	60
240313001	MD	Montgomery	67.7	68	59	59	59	59	57	57	57	57
250092006	MA	Essex	66.3	68	60	62	59	60	61	62	59	60
330074001	NH	Coos	67.3	68								
330115001	NH	Hillsborough	67	68	58	59	58	59				
340071001	NJ	Camden	67.3	68	59	60	59	60	58	59	58	59
340315001	NJ	Passaic	67.7	68	60	60	60	60	60	60	60	60
360130006	NY	Chautauqua	68	68	62	62	61	61	61	61	61	61
360270007	NY	Dutchess	67	68	59	60	59	60	59	60	59	60
360551007	NY	Monroe	65.7	68	59	62	59	62	59	61	59	61
420070005	PA	Beaver	67.3	68	56	57	56	57	51	52	51	52
420590002	PA	Greene	67	68	61	62	61	62	61	62	61	62
420730015	PA	Lawrence	66.3	68	57	58	57	58	56	57	56	57
420890002	PA	Monroe	66.7	68	58	59	58	59	58	59	58	59
421250005	PA	Washington	67	68	60	61	60	61	60	61	60	61
421255001	PA	Washington	68	68	58	58	58	58	55	55	55	55
421290008	PA	Westmoreland	67	68	61	61	61	61	59	60	59	60
511071005	VA	Loudoun	67	68	58	59	58	59	57	58	57	58
100010002	DE	Kent	66.3	67	58	58	57	58	58	59	57	58
230312002	ME	York	66.5	67	58	59	58	58	58	58	57	58
240430009	MD	Washington	66.7	67	58	59	58	59	58	58	58	58
330150016	NH	Rockingham	66.7	67	58	59	58	58	59	60	57	58
340110007	NJ	Cumberland	65.7	67	57	59	57	59	57	58	57	58
360631006	NY	Niagara	66.3	67	61	61	60	61	61	62	60	60
361173001	NY	Wayne	65	67	59	60	59	60	59	61	58	60
420010001	PA	Adams	66.5	67	59	59	59	59	58	59	58	59
420019991	PA	Adams	66.3	67	59	59	59	59	58	59	58	59
420070014	PA	Beaver	65.7	67	55	56	55	56	51	52	51	52
420431100	PA	Dauphin	66	67	58	58	58	58	57	58	57	58
420690101	PA	Lackawanna	66	67	58	59	58	59				
100051002	DE	Sussex	65.3	66	57	58	57	58	57	57	57	57
240190004	MD	Dorchester	64.7	66	56	58	57	58	58	59	57	58
240199991	MD	Dorchester	65.7	66	58	58	57	57	59	59	57	58
240230002	MD	Garrett	65.3	66	59	60	59	60				
250112005	MA	Franklin	64.7	66	56	58	56	58				
250270015	MA	Worcester	65	66	57	57	57	57	56	57	56	57
330150018	NH	Rockingham	65.3	66	57	57	57	57				
360310002	NY	Essex	64	66								
360715001	NY	Orange	64.3	66	57	58	57	58	56	57	56	57
420110006	PA	Berks	65.7	66	58	58	58	58	57	57	57	57
420334000	PA	Clearfield	64.7	66	58	59	58	59	57	58	57	58

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	State	County	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
420430401	PA	Dauphin	65.3	66	62	57	57	57	56	57	56	57
420479991	PA	Elk	65.7	66	61	59	59	59				
420490003	PA	Erie	65	66	61	60	59	59	59	60	57	58
420710012	PA	Lancaster	65	66	61	58	57	58	57	58	57	58
420859991	PA	Mercer	65.3	66	65	58	57	58	56	57	56	57
421330008	PA	York	65.7	66	62	57	57	57	56	56	56	56
510870014	VA	Henrico	65.5	66	60	52	52	52	52	52	52	52
511530009	VA	Prince William	65.3	66	61	58	57	58	56	57	56	57
230052003	ME	Cumberland	64.7	65	59	57	57	57	56	57		
250094005	MA	Essex	64.5	65	60	57	56	57	57	57	56	56
250170009	MA	Middlesex	64	65		56	56	56	55	56	55	56
330150014	NH	Rockingham	63.3	65	59	57	55	57	56	58	54	56
340410007	NJ	Warren	64.3	65	60	57	57	57	56	56	56	56
360310003	NY	Essex	64.7	65	60							
360671015	NY	Onondaga	64.3	65	61	59	58	59				
420279991	PA	Centre	64.7	65	60	58	58	58				
421119991	PA	Somerset	65	65	62	59	59	59	58	58	58	58
421250200	PA	Washington	65	65	57	58	58	58	57	57	57	57
500030004	VT	Bennington	64.3	65	62	57	57	57				
510850003	VA	Hanover	63.3	65	58	53	51	53	49	51	49	51
516500008	VA	Hampton City	64.3	65	59	56	54	55	55	55	53	53
230090103	ME	Hancock	63	64	61	56	55	56	56	57		
230130004	ME	Knox	63.3	64	58	56	55	56	55	56	55	55
250095005	MA	Essex	62.7	64	61	56	55	56	55	56	55	56
250250042	MA	Suffolk	60.3	64	59	58	53	56	55	58	53	56
330111011	NH	Hillsborough	63	64	58	56	55	56				
340010006	NJ	Atlantic	63.7	64	58	57	56	56	57	57	56	56
360010012	NY	Albany	64	64	59	57	57	57	56	56	56	56
360910004	NY	Saratoga	63	64	58	57	56	57				
420130801	PA	Blair	63.5	64	59	57	56	57	56	56	56	56
420692006	PA	Lackawanna	62.5	64	61	56	55	56				
420791101	PA	Luzerne	64	64	60	56	56	56	55	55	55	55
420810100	PA	Lycoming	63.7	64	59	57	56	57				
421174000	PA	Tioga	63.7	64	59	57	56	57				
230112005	ME	Kennebec	61.3	63	56	54	53	54				
330050007	NH	Cheshire	62.3	63	58	54	54	54				
330131007	NH	Merrimack	62	63	59	55	54	55				
360430005	NY	Herkimer	63	63	58							
360450002	NY	Jefferson	63	63	58	57	57	57	57	57	57	57
360750003	NY	Oswego	61	63	57	57			55	57	54	56
361099991	NY	Tompkins	62.7	63	60							
420210011	PA	Cambria	62.3	63	58	56	56	56	54	55	54	55
420270100	PA	Centre	62.3	63	57	56	56	56				
500210002	VT	Rutland	63	63	57							
510360002	VA	Charles	62.3	63		50	50	50	49	49	49	49
511130003	VA	Madison	63	63	58	55	55	55				
511790001	VA	Stafford	62.3	63	58	54	53	54	53	53	53	53
230310040	ME	York	61.3	62	59	53	53	53				

			2014-2018 DVB		CAMx v7.10				CMAQ v5.3.1			
					3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	**State**	**County**	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
360410005	NY	Hamilton	61.3	62								
500070007	VT	Chittenden	61	62								
510410004	VA	Chesterfield	61.3	62	50	50	50	50	49	49	49	49
510690010	VA	Frederick	61.3	62	54	54	54	54	53	54	53	54
510719991	VA	Giles	62	62	55	55	55	55				
511611004	VA	Roanoke	61.3	62	53	54	53	54				
518000004	VA	Suffolk City	61	62	53	54	53	54	53	54	52	53
230290019	ME	Washington	59.3	61	52	53	52	53				
361010003	NY	Steuben	59.7	61								
421010004	PA	Philadelphia	61	61	54	54	54	54	53	53	53	53
510030001	VA	Albemarle	60.5	61	53	54	53	54				
510330001	VA	Caroline	61	61	52	52	52	52	52	52	52	52
511970002	VA	Wythe	60.7	61	54	54	54	54				
518000005	VA	Suffolk City	59.7	61	52	53	52	53				
230010014	ME	Androscoggin	59.3	60	52	52	51	52	52	53	50	51
230194008	ME	Penobscot	58.3	60								
420550001	PA	Franklin	59.3	60	53	53	53	53	52	52	52	52
511479991	VA	Prince Edward	59.3	60	49	49	49	49				
511650003	VA	Rockingham	60	60	53	53	53	53				
230310038	ME	York	58.7	59								
330012004	NH	Belknap	58.7	59	50	50	50	50	49	50		
330074002	NH	Coos	58.3	59								
330090010	NH	Grafton	57.7	59								
420150011	PA	Bradford	57.3	59	50	51	50	51				
510610002	VA	Fauquier	58.7	59	51	51	51	51	50	51	50	51
511630003	VA	Rockbridge	58	59	50	51	50	51				
360319991	NY	Essex	57	58								
360337003	NY	Franklin	58	58								
110010041	DC	District of Columbia	57	57	49	49	49	49	48	48	48	48
330099991	NH	Grafton	54.7	56								
230039991	ME	Aroostook	52	52								

Appendix D. *List of Air Quality Monitors in the OTC Modeling Domain Used for Base Year DV Calculations*

State	County	AQS Code	Site name	Lat	Lon
AL	Baldwin	010030010	FAIRHOPE: Alabama	30.497478	-87.880258
AL	Colbert	010331002	MUSCLE SHOALS	34.762619	-87.638097
AL	DeKalb	010499991	Sand Mountain	34.289001	-85.970065
AL	Etowah	010550011	SOUTHSIDE	33.904039	-86.053867
AL	Houston	010690004	DOTHAN	31.188933	-85.423094
AL	Jefferson	010730023	North Birmingham	33.553056	-86.815
AL	Jefferson	010731003	Fairfield	33.485556	-86.915
AL	Jefferson	010731005	McAdory	33.331111	-87.003611
AL	Jefferson	010731010	Leeds	33.545278	-86.549167
AL	Jefferson	010732006	Hoover	33.386389	-86.816667
AL	Jefferson	010735003	Corner	33.801667	-86.9425
AL	Jefferson	010736002	Tarrant Elementary School	33.578333	-86.773889
AL	Madison	010890014	HUNTSVILLE OLD AIRPORT	34.687761	-86.586362
AL	Madison	010890022	HUNTSVILLE CAPSHAW ROAD	34.772727	-86.756174
AL	Mobile	010970003	CHICKASAW	30.770181	-88.087761
AL	Mobile	010972005	BAY ROAD	30.474305	-88.141022
AL	Montgomery	011011002	MOMS: ADEM	32.412811	-86.263394
AL	Morgan	011030011	DECATUR: Alabama	34.530717	-86.967536
AL	Russell	011130002	LADONIA: PHENIX CITY	32.46735	-85.083447
AL	Shelby	011170004	HELENA	33.317142	-86.825754
AL	Sumter	011190003	Ward: Sumter Co.	32.362606	-88.277992
AL	Tuscaloosa	011250010	DUNCANVILLE: TUSCALOOSA	33.089772	-87.459733
AR	Clark	050199991	Caddo Valley	34.1795	-93.0988
AR	Crittenden	050350005	MARION	35.197288	-90.193141
AR	Newton	051010002	DEER	35.832726	-93.20826
AR	Polk	051130003	EAGLE MOUNTAIN	34.454514	-94.143521
AR	Pulaski	051190007	PARR	34.756189	-92.281296
AR	Pulaski	051191002	NLR AIRPORT	34.835721	-92.260581
AR	Washington	051430005	SPRINGDALE	36.1797	-94.116827
AR	Washington	051430006	Fayetteville Airport	36.011703	-94.167436
CO	Adams	080013001	Welby	39.838119	-104.94984
CO	Arapahoe	080050002	HIGHLAND RESERVOIR	39.567887	-104.957193
CO	Arapahoe	080050006	Aurora East	39.638522	-104.569335
CO	Denver	080310002	DENVER - CAMP	39.751184	-104.987625
CO	Denver	080310026	La Casa	39.77949	-105.00518
CO	Douglas	080350004	Chatfield State Park	39.534488	-105.070358
CO	El Paso	080410013	U.S. AIR FORCE ACADEMY	38.958341	-104.817215
CO	El Paso	080410016	MANITOU SPRINGS	38.853097	-104.901289
CO	Garfield	080450012	Rifle-Health Dept	39.54182	-107.784125
CO	Gunnison	080519991	Gothic	38.9564	-106.9858
CO	Jefferson	080590005	WELCH	39.638781	-105.13948
CO	Jefferson	080590006	ROCKY FLATS-N	39.912799	-105.188587
CO	Jefferson	080590011	NATIONAL RENEWABLE ENERGY LABS - NREL	39.743724	-105.177989
CO	Jefferson	080590013	Aspen Park	39.541515	-105.29841
CO	La Plata	080671004		37.30389	-107.484167
CO	La Plata	080677001	LOCATED IN PINE RIVER VALLEY: THE MOST DENSELY POPULATED AREA.	37.13678	-107.62863
CO	Larimer	080690007	Rocky Mountain NP - Long's Peak	40.27813	-105.54564
CO	Larimer	080690011	FORT COLLINS - WEST	40.592543	-105.141122
CO	Larimer	080691004	Fort Collins - CSU - S. Mason	40.57747	-105.07892
CO	Rio Blanco	081030005		40.038889	-107.8475
CO	Weld	081230009	Greeley - Weld County Tower	40.386368	-104.73744
CT	Fairfield	090010017	Greenwich Point Park - Greenwich	41.004657	-73.585128
CT	Fairfield	090011123	Western Conn State Univ - Danbury	41.399167	-73.443056
CT	Fairfield	090013007	Lighthouse - Stratford	41.1525	-73.103056
CT	Fairfield	090019003	Sherwood Island State Park - Westport	41.118333	-73.336667
CT	Hartford	090031003	McAuliffe Park	41.784722	-72.631667
CT	Litchfield	090050005	Mohawk Mt-Cornwall	41.821342	-73.297257

State	County	AQS Code	Site name	Lat	Lon
CT	Middlesex	090079007	Connecticut Valley Hospital - Middletown	41.55	-72.626
CT	New Haven	090090027	Criscuolo Park-New Haven	41.3014	-72.902871
CT	New Haven	090099002	Hammonasset State Park - Madison	41.256788	-72.55327
CT	New London	090110124	Fort Griswold Park - Groton	41.35362	-72.07882
CT	Tolland	090131001		41.976389	-72.388056
CT	Windham	090159991	Abington	41.84046	-72.010368
DE	Kent	100010002	PROPERTY OF KILLENS POND STATE PARK; BEHIND FARM BUILDINGS	38.986672	-75.5568
DE	New Castle	100031007	Lums Pond	39.5513	-75.732
DE	New Castle	100031010	BCSP	39.817222	-75.563889
DE	New Castle	100031013	BELLEVUE STATE PARK: FIELD IN SE PORTION OF PARK	39.773889	-75.496389
DE	New Castle	100032004	MLK CORNER OF MLK BLVD AND JUSTISON ST	39.739444	-75.558056
DE	Sussex	100051002	Seaford Shipley State Service Center	38.6539	-75.6106
DE	Sussex	100051003	Lewes SPM SITE: NEAR UD ACID RAIN/MERCURY COLLECTORS	38.7791	-75.16323
DC	District of Columbia	110010041	RIVER TERRACE	38.895572	-76.958072
DC	District of Columbia	110010043	MCMILLAN NCore-PAMS	38.921847	-77.013178
DC	District of Columbia	110010050	Takoma Rec Center	38.970092	-77.016715
FL	Baker	120030002	OLUSTEE	30.201111	-82.441111
FL	Bay	120050006	ST.ANDREWS STATE PARK: PANAMA CITY BEACH	30.130433	-85.731517
FL	Brevard	120090007	Melbourne	28.053611	-80.628611
FL	Brevard	120094001	Cocoa Beach	28.310841	-80.61533
FL	Broward	120110033	Vista View Park	26.073536	-80.33845
FL	Broward	120110034	Daniela Banu NCORE	26.053889	-80.256944
FL	Broward	120112003	Pompano Highlands	26.292025	-80.09647
FL	Broward	120118002	Dr. Von Mizell-Eula Johnson State Park (prev. John U Lloyd State Park)	26.088421	-80.111193
FL	Collier	120210004	LAURAL OAKS ELEMENTARY	26.270083	-81.710959
FL	Columbia	120230002	Lake City - Veteran's Domicile	30.178056	-82.619167
FL	Duval	120310077	Sheffield	30.477725	-81.587339
FL	Duval	120310100	Mayo Clinic	30.260278	-81.453611
FL	Duval	120310106	Cisco Drive	30.378217	-81.8409
FL	Escambia	120330004	Ellyson Industrial Park	30.525367	-87.20355
FL	Escambia	120330018	Pensacola NAS	30.36805	-87.270967
FL	Flagler	120350004	Flagler	29.489083	-81.276833
FL	Highlands	120550003	Archbold Biological Station	27.189215	-81.34035
FL	Hillsborough	120570081	Simmons Park	27.740033	-82.465146
FL	Hillsborough	120571035	Davis Island	27.928356	-82.454539
FL	Hillsborough	120571065	USMC Reserve Center (Gandy)	27.892523	-82.538429
FL	Hillsborough	120573002	SYDNEY	27.96565	-82.2304
FL	Holmes	120590004	Bonifay	30.848611	-85.603889
FL	Indian River	120619991	Indian River Lagoon	27.8492	-80.4554
FL	Lake	120690002	Clermont	28.523889	-81.723333
FL	Lee	120712002	Cape Coral - Rotary Park	26.548212	-81.981523
FL	Lee	120713002	Bay Oaks Park	26.449247	-81.939256
FL	Leon	120730012	Tallahassee Community College	30.439722	-84.346389
FL	Liberty	120779991	Sumatra	30.1103	-84.9903
FL	Manatee	120813002	Port Manatee	27.633089	-82.54593
FL	Manatee	120814012	G.T. BRAY PARK	27.480873	-82.618709
FL	Manatee	120814013	39TH STREET SITE	27.449763	-82.522041
FL	Marion	120830003	Ocala YMCA	29.170533	-82.100646
FL	Marion	120830004	Marion County Sheriff	29.192754	-82.173149
FL	Martin	120850007	Stuart	27.172458	-80.240689
FL	Miami-Dade	120860027	Rosenstiel	25.732878	-80.16175
FL	Miami-Dade	120860029	Perdue	25.587327	-80.325922
FL	Okaloosa	120910002	Ft. Walton Beach	30.426533	-86.666217
FL	Orange	120950008	Winegard Elementary School	28.45445	-81.381181
FL	Orange	120952002	WINTER PARK	28.596389	-81.3625
FL	Osceola	120972002	Osceola County Fire Station	28.347509	-81.636464
FL	Pasco	121010005	San Antonio	28.332225	-82.305643
FL	Pasco	121012001	Holiday	28.195574	-82.756264

State	County	AQS Code	Site name	Lat	Lon
FL	Pinellas	121030004	St. Petersburg College	27.946688	-82.731767
FL	Pinellas	121030018	Azalea Park	27.785866	-82.739875
FL	Pinellas	121035002	John Chesnut Sr. Park - East Lake	28.090299	-82.700707
FL	Polk	121056005	Sikes Elementary School	27.939746	-82.000084
FL	Polk	121056006	Baptist Childrens' Home	28.028889	-81.972222
FL	St. Lucie	121110013	Savannas	27.389079	-80.311033
FL	Santa Rosa	121130015	Woodlawn Beach Middle School	30.394133	-87.008033
FL	Sarasota	121151005	Lido Park	27.307268	-82.570376
FL	Sarasota	121151006	Paw Park	27.350278	-82.479722
FL	Sarasota	121152002	Jackson Road	27.089194	-82.362583
FL	Seminole	121171002	Sanford (Seminole Community College)	28.746111	-81.310556
FL	Volusia	121272001	Port Orange	29.109151	-80.993666
FL	Volusia	121275002	DAYTONA BLIND SERVICES	29.206667	-81.0525
FL	Wakulla	121290001	St. Marks Wildlife Refuge	30.0925	-84.161111
GA	Bibb	130210012	Macon-Forestry	32.805264	-83.543493
GA	Chatham	130510021	Savannah-E. President	32.06848	-81.04942
GA	Chattooga	130550001	Summerville	34.474526	-85.408847
GA	Clarke	130590002	Athens	33.918137	-83.344385
GA	Cobb	130670003	Kennesaw	34.015436	-84.607423
GA	Columbia	130730001	Evans	33.582044	-82.131249
GA	Coweta	130770002	Newnan	33.40405	-84.745728
GA	Dawson	130850001	Dawsonville	34.376227	-84.059506
GA	DeKalb	130890002	South DeKalb	33.6878	-84.2905
GA	Douglas	130970004	Douglasville	33.741242	-84.776429
GA	Fulton	131210055	United Avenue	33.720742	-84.357316
GA	Glynn	131270006	Brunswick	31.169805	-81.495035
GA	Gwinnett	131350002	Gwinnett	33.9632	-84.0691
GA	Henry	131510002	McDonough	33.433949	-84.161811
GA	Murray	132130003	Fort Mountain	34.785219	-84.626423
GA	Muscogee	132150008	Columbus-Airport	32.521272	-84.944635
GA	Paulding	132230003	Yorkville: King Farm	33.9285	-85.04534
GA	Pike	132319991	Georgia Station	33.1787	-84.4052
GA	Richmond	132450091	Augusta	33.4339	-82.0224
GA	Rockdale	132470001	Conyers	33.588545	-84.069608
GA	Sumter	132611001	Leslie	31.954286	-84.08101
IL	Adams	170010007	JOHN WOOD COMMUNITY COLLEGE	39.915409	-91.335868
IL	Champaign	170190007	Thomasboro	40.244913	-88.188519
IL	Champaign	170191001	ISWS CLIMATE STATION	40.05278	-88.37251
IL	Clark	170230001	416 S. State St. Hwy 1- West Union	39.210857	-87.668297
IL	Cook	170310001	VILLAGE GARAGE	41.670992	-87.732457
IL	Cook	170310032	SOUTH WATER FILTRATION PLANT	41.755832	-87.54535
IL	Cook	170310076	COM ED MAINTENANCE BLDG	41.7514	-87.713488
IL	Cook	170311003	TAFT HS	41.984332	-87.792002
IL	Cook	170311601	COOK COUNTY TRAILER	41.66812	-87.99057
IL	Cook	170313103	IEPA TRAILER	41.965193	-87.876265
IL	Cook	170314002	COOK COUNTY TRAILER	41.855243	-87.75247
IL	Cook	170314007	REGIONAL OFFICE BUILDING	42.060285	-87.863225
IL	Cook	170314201	NORTHBROOK WATER PLANT	42.139996	-87.799227
IL	Cook	170317002	WATER PLANT	42.062053	-87.675254
IL	DuPage	170436001	MORTON ARBORETUM	41.813049	-88.072827
IL	Effingham	170491001	CENTRAL JR HIGH	39.067159	-88.548934
IL	Hamilton	170650002	TEN MILE CREEK DNR OFFICE	38.082155	-88.624943
IL	Jersey	170831001	ILLINI JR HIGH	39.110539	-90.32408
IL	Jo Daviess	170859991	Stockton	42.2869	-89.9997
IL	Kane	170890005	LARSEN JUNIOR HIGH	42.049148	-88.273029
IL	Lake	170971007	CAMP LOGAN TRAILER	42.467573	-87.810047
IL	McHenry	171110001	CARY GROVE HS	42.221442	-88.242207
IL	McLean	171132003	ISU HARRIS PHYSICAL PLANT	40.518735	-88.996896

State	County	AQS Code	Site name	Lat	Lon
IL	Macon	171150013	IEPA TRAILER	39.866834	-88.925594
IL	Macoupin	171170002	IEPA TRAILER	39.396075	-89.809739
IL	Madison	171190008	CLARA BARTON SCHOOL	38.890186	-90.148031
IL	Madison	171191009	SOUTHWEST CABLE TV	38.726573	-89.959963
IL	Madison	171193007	WATER PLANT	38.860669	-90.105851
IL	Madison	171199991	Alhambra	38.869001	-89.622816
IL	Peoria	171430024	FIRESTATION	40.68742	-89.606943
IL	Peoria	171431001	PEORIA HEIGHTS HS	40.745504	-89.585869
IL	Randolph	171570001	IEPA TRAILER	38.176278	-89.788459
IL	Rock Island	171613002	ROCK ISLAND ARSENAL	41.514727	-90.51735
IL	Saint Clair	171630010	IEPA-RAPS TRAILER	38.612034	-90.160477
IL	Sangamon	171670014	Illinois Building State Fairgrounds	39.831522	-89.640926
IL	Will	171971011	COM ED TRAINING CENTER	41.221537	-88.190967
IL	Winnebago	172012001	MAPLE ELEMENTARY SCHOOL	42.334982	-89.037775
IN	Allen	180030002	Leo High School	41.221418	-85.016821
IN	Allen	180030004	Ft. Wayne- Beacon St.	41.094965	-85.101816
IN	Bartholomew	180050007	Hope- Hauser Jr-Sr High School	39.294322	-85.766816
IN	Boone	180110001	Perry Worth ELEMENTRY SCHOOL: WEST OF WHITESTOWN	39.997732	-86.395394
IN	Carroll	180150002	Flora-Flora Airport	40.540455	-86.553035
IN	Clark	180190008	Charlestown State Park- 1051.8 meters East of SR 62/ Indiana armory	38.393822	-85.664118
IN	Delaware	180350010	Albany- Albany Elem. Sch.	40.300385	-85.245862
IN	Elkhart	180390007	Bristol- Bristol Elem. Sch.	41.716959	-85.824696
IN	Floyd	180431004	New Albany- Green Valley Elem. Sch.	38.307913	-85.834313
IN	Greene	180550001	Plummer: 2500 S. W- Citizens gas Plummer maintenance faciliy	38.985578	-86.99012
IN	Hamilton	180570006	Our Lady of Grace- Noblesville	40.068297	-85.992451
IN	Hendricks	180630004	AVON- 255 S. SR 267 (also 255 S. Avon Ave.) Avon: IN	39.758889	-86.398611
IN	Huntington	180690002	Roanoke- Roanoke Elem. School	40.959604	-85.37961
IN	Jackson	180710001	Brownstown- 225 W & 200 N. Water facility	38.920835	-86.080523
IN	Johnson	180810002	Indian Creek Elementary School in Trafalgar: DUE SOUTH OF INDIANAPOLIS	39.417243	-86.152363
IN	Knox	180839991	Vincennes	38.7408	-87.4853
IN	Lake	180890022	Gary-IITRI/ 1219.5 meters east of Tennessee St.- old ammuntion bunker	41.606667	-87.304722
IN	Lake	180892008	HAMMOND CAAP- Hammond- 141st St.	41.639444	-87.493611
IN	LaPorte	180910010	LAPORTE OZONE SITE AT WATER TREATMENT PLANT	41.629167	-86.684444
IN	Madison	180950010	SCHOOL LOCATED ON THE SW CORNER OF US 36 AND IND 109	40.002511	-85.656391
IN	Marion	180970050	Indpls.- Ft. Harrison	39.858889	-86.021389
IN	Marion	180970057	Indpls- Harding St.	39.749027	-86.186269
IN	Marion	180970073	Indpls.- E. 16th St.	39.789486	-86.06085
IN	Marion	180970078	Indpls- Washington Park/ in parking lot next to police station	39.810833	-86.114444
IN	Marion	180970087	Indpls.- I 70	39.787933	-86.13088
IN	Morgan	181090005	Monrovia- Monrovia HS.	39.575634	-86.477893
IN	Perry	181230009	Leopold- Perry Central HS	38.115152	-86.60325
IN	Porter	181270024	Ogden Dunes- Water Treatment Plant	41.6175	-87.199167
IN	Porter	181270026	VALPARAISO	41.512118	-87.036236
IN	Posey	181290003	ST. PHILLIPS- St. Phillips road CAAP trailer	38.00641	-87.718354
IN	St. Joseph	181410010	Potato Creek State Park	41.551667	-86.370556
IN	St. Joseph	181410015	South Bend-Shields Dr.	41.69666	-86.214722
IN	St. Joseph	181410016	Granger-Beckley St.	41.754722	-86.11
IN	Shelby	181450001	TRITON Middle SCHOOL: NORTH OF FAIRLAND	39.613367	-85.870669
IN	Vanderburgh	181630013	Inglefield/ Scott School	38.113889	-87.536667
IN	Vanderburgh	181630021	Evansville- Buena Vista	38.013333	-87.577222
IN	Vigo	181670018	TERRE HAUTE CAAP/ McLean High School	39.485987	-87.401312
IN	Vigo	181670024	Sandcut/ SITE LOCATED BY HOME BEHIND SHED.	39.558525	-87.312883
IN	Wabash	181699991	Salamonie Reservoir	40.816038	-85.661408
IN	Warrick	181730008	Boonville- Boonville HS	38.051667	-87.278056
IN	Warrick	181730009	Lynnville- Tecumseh HS	38.194501	-87.341396
IN	Warrick	181730011	Dayville	37.954444	-87.321667
IA	Bremer	190170011	WAVERLY AIRPORT SITE	42.743036	-92.513241
IA	Clinton	190450021	CLINTON: RAINBOW PARK	41.874999	-90.177574

State	County	AQS Code	Site name	Lat	Lon
IA	Harrison	190850007		41.832256	-95.928185
IA	Harrison	190851101	PISGAH: HIGHWAY MAINTENANCE	41.780261	-95.948435
IA	Linn	191130028	KIRKWOOD	41.91056	-91.652121
IA	Linn	191130033	COGGON ELEMENTARY SCHOOL BLDG. NORTHERN LIMITS OF LINN COUNTY	42.281013	-91.526879
IA	Linn	191130040	Public Health	41.97677	-91.68766
IA	Montgomery	191370002	VIKING LAKE STATE PARK	40.969112	-95.044951
IA	Palo Alto	191471002	EMMETSBURG: IOWA LAKES COMMUNITY COLL.	43.123704	-94.693518
IA	Polk	191530030	CARPENTER	41.603159	-93.643118
IA	Scott	191630014	SCOTT COUNTY PARK	41.699174	-90.521944
IA	Scott	191630015	DAVENPORT: JEFFERSON SCH.	41.530011	-90.587611
IA	Story	191690011	SLATER CITY HALL	41.882867	-93.6878
IA	Van Buren	191770006	LAKE SUGEMA STATE PARK II	40.695078	-92.006318
IA	Warren	191810022	GRAVEL ROAD IN LAKE AQUABI STATE PARK	41.285533	-93.583983
KS	Johnson	200910010	HERITAGE PARK	38.838575	-94.746424
KS	Leavenworth	201030003	Leavenworth	39.327391	-94.95102
KS	Neosho	201330003	CHANUTE	37.67696	-95.47594
KS	Sedgwick	201730010	WICHITA HD	37.702066	-97.314847
KS	Sedgwick	201730018	Sedgwick Ozone	37.897506	-97.492083
KS	Shawnee	201770013	KNI	39.024265	-95.711275
KS	Sumner	201910002	PECK	37.47689	-97.366399
KS	Trego	201950001	CEDAR BLUFF	38.770081	-99.763424
KS	Wyandotte	202090021	JFK	39.117219	-94.635605
KY	Bell	210130002	MIDDLESBORO	36.60843	-83.73694
KY	Boone	210150003	EAST BEND	38.91833	-84.852637
KY	Boyd	210190017	ASHLAND PRIMARY (FIVCO)	38.45934	-82.64041
KY	Bullitt	210290006	SHEPHERDSVILLE	37.98629	-85.71192
KY	Campbell	210373002	NORTHERN KENTUCKY UNIVERSITY (NKU)	39.021881	-84.47445
KY	Carter	210430500	GRAYSON LAKE	38.23887	-82.9881
KY	Christian	210470006	HOPKINSVILLE	36.91171	-87.323337
KY	Daviess	210590005	OWENSBORO PRIMARY	37.780776	-87.075307
KY	Edmonson	210610501	Mammoth Cave NP - Houchin Meadow	37.13179	-86.142953
KY	Fayette	210670012	LEXINGTON PRIMARY	38.06503	-84.49761
KY	Greenup	210890007	WORTHINGTON	38.548136	-82.731163
KY	Hancock	210910012	LEWISPORT	37.93829	-86.89719
KY	Hardin	210930006	ELIZABETHTOWN	37.705612	-85.852629
KY	Henderson	211010014	BASKETT	37.8712	-87.46375
KY	Jefferson	211110027	Bates	38.13784	-85.57648
KY	Jefferson	211110051	Watson Lane	38.06091	-85.89804
KY	Jefferson	211110067	CANNONS LANE	38.22876	-85.65452
KY	Jessamine	211130001	NICHOLASVILLE	37.89147	-84.58825
KY	Livingston	211390003	SMITHLAND	37.155392	-88.394024
KY	McCracken	211451024	JACKSON PURCHASE (PADUCAH PRIMARY)	37.05822	-88.57251
KY	Morgan	211759991	Crockett	37.9214	-83.0662
KY	Oldham	211850004	BUCKNER	38.4002	-85.44428
KY	Perry	211930003	HAZARD	37.28329	-83.20932
KY	Pike	211950002	PIKEVILLE PRIMARY	37.4826	-82.53532
KY	Pulaski	211990003	SOMERSET	37.09798	-84.61152
KY	Simpson	212130004	FRANKLIN	36.708607	-86.566284
KY	Trigg	212219991	Cadiz	36.7841	-87.8499
KY	Warren	212270009	ED SPEAR PARK (SMITHS GROVE)	37.04926	-86.21487
KY	Washington	212299991	Mackville	37.7046	-85.0485
LA	Ascension	220050004	Dutchtown	30.229653	-90.965628
LA	Bossier	220150008	Shreveport / Airport	32.536273	-93.74894
LA	Caddo	220170001	Dixie	32.68336	-93.861582
LA	Calcasieu	220190002	Carlyss	30.140265	-93.368448
LA	Calcasieu	220190009	Vinton	30.227798	-93.579965
LA	East Baton Rouge	220330003	LSU	30.419805	-91.182016
LA	East Baton Rouge	220330009	Capitol	30.461981	-91.179219

State	County	AQS Code	Site name	Lat	Lon
LA	Iberville	220470009	Bayou Plaquemine	30.221255	-91.315418
LA	Jefferson	220511001	Kenner	30.041238	-90.272826
LA	Lafayette	220550007	Lafayette / USGS	30.22611	-92.042908
LA	Lafourche	220570004	Thibodaux	29.764098	-90.765275
LA	Livingston	220630002	French Settlement	30.315406	-90.811383
LA	Ouachita	220730004	Monroe / Airport	32.509959	-92.046196
LA	Pointe Coupee	220770001	New Roads	30.681718	-91.366247
LA	St. Bernard	220870004	Meraux	29.939614	-89.923883
LA	St. James	220930002	Convent	29.99497	-90.817415
LA	St. John the Baptist	220950002	Garyville	30.057515	-90.619286
LA	St. Martin	220990001	St.Martinville	30.088872	-91.869595
LA	St. Tammany	221030002	Madisonville	30.429381	-90.199678
LA	West Baton Rouge	221210001	Port Allen	30.500642	-91.213556
ME	Androscoggin	230010014	DURHAM FIRE STATION	43.974622	-70.124608
ME	Aroostook	230039991	Ashland	46.6041	-68.4135
ME	Cumberland	230052003	CETL - Cape Elizabeth Two Lights (State Park)	43.561043	-70.207324
ME	Hancock	230090102	TOP OF CADILLAC MTN (FENCED ENCLOSURE)	44.351697	-68.22698
ME	Hancock	230090103	MCFARLAND HILL Air Pollutant Research Site	44.37705	-68.2609
ME	Kennebec	230112005	Gardiner: Pray Street School (GPSS)	44.230622	-69.785
ME	Knox	230130004	Marshall Point Lighthouse	43.917955	-69.26059
ME	Penobscot	230194008	WLBZ TV Transmitter Building - Summit of Rider Bluff	44.735978	-68.670752
ME	Washington	230290019	Harbor Masters Office; Jonesport Public Landing	44.531907	-67.59587
ME	York	230310038	WBFD - West Buxton (Hollis) Fire Department	43.656764	-70.629138
ME	York	230310040	SBP - Shapleigh Ball Park	43.58889	-70.87734
ME	York	230312002	KPW - Kennebunkport Parson'd Way	43.343167	-70.471034
MD	Anne Arundel	240031003	GLEN BURNIE	39.169533	-76.627933
MD	Baltimore	240051007	Padonia	39.460478	-76.633543
MD	Baltimore	240053001	Essex	39.310833	-76.474444
MD	Calvert	240090011	Calvert	38.536722	-76.617194
MD	Carroll	240130001	South Carroll	39.444294	-77.042252
MD	Cecil	240150003	Fair Hill Natural Resource Management Area	39.701444	-75.860051
MD	Charles	240170010	Southern Maryland	38.508547	-76.811864
MD	Dorchester	240190004	Horn Point	38.587525	-76.141006
MD	Dorchester	240199991	Blackwater NWR	38.444971	-76.111274
MD	Frederick	240210037	Frederick Airport	39.42276	-77.37519
MD	Garrett	240230002	Piney Run	39.70595	-79.012
MD	Harford	240251001	Edgewood	39.410191	-76.296946
MD	Harford	240259001	Aldino	39.563333	-76.203889
MD	Kent	240290002	Millington	39.305021	-75.797317
MD	Montgomery	240313001	Rockville	39.114313	-77.106876
MD	Prince George's	240330030	HU-Beltsville	39.055277	-76.878333
MD	Prince George's	240338003	PG Equestrian Center	38.81194	-76.74417
MD	Prince George's	240339991	Beltsville	39.0284	-76.8171
MD	Washington	240430009	Hagerstown	39.564178	-77.720244
MD	Baltimore (City)	245100054	Furley	39.328807	-76.553075
MA	Barnstable	250010002	TRURO NATIONAL SEASHORE	41.975804	-70.023598
MA	Bristol	250051004	FALL RIVER	41.685707	-71.169235
MA	Bristol	250051006	FAIRHAVEN2	41.645381	-70.897504
MA	Dukes	250070001	1 HERRING CREEK RD: AQUINNAH (WAMPANOAG TRIBAL SITE)	41.330469	-70.785225
MA	Essex	250092006	LYNN WATER TREATMENT PLANT	42.474642	-70.970816
MA	Essex	250094005	NEWBURYPORT HARBOR ST PARKING LOT	42.814412	-70.817783
MA	Essex	250095005	CONSENTINO SCHOOL.	42.770837	-71.10229
MA	Franklin	250112005	Greenfield 16 Barr Ave	42.605816	-72.596689
MA	Hampden	250130008	WESTOVER AFB	42.19438	-72.555112
MA	Hampshire	250154002	QUABBIN RES	42.298493	-72.334079
MA	Middlesex	250170009	USEPA REGION 1 LAB	42.62668	-71.362068
MA	Norfolk	250213003	BLUE HILL OBSERVATORY	42.211774	-71.11397
MA	Plymouth	250230005	Brockton Buckley	42.065106	-71.012129

State	County	AQS Code	Site name	Lat	Lon
MA	Suffolk	250250042	DUDLEY SQUARE ROXBURY	42.3295	-71.0826
MA	Worcester	250270015	WORCESTER AIRPORT	42.274319	-71.875511
MA	Worcester	250270024	UXBRIDGE	42.099699	-71.619399
MI	Allegan	260050003	Holland	42.767786	-86.148577
MI	Benzie	260190003		44.616943	-86.109408
MI	Berrien	260210014	Coloma	42.19779	-86.309694
MI	Cass	260270003	Cassopolis	41.89557	-86.001629
MI	Chippewa	260330901	NORTH OF EASTERDAY AVENUE	46.493633	-84.364207
MI	Clinton	260370001	ROSE LAKE: STOLL RD.(8562 E.)	42.798339	-84.393795
MI	Genesee	260490021		43.047224	-83.670159
MI	Genesee	260492001	Otisville	43.168336	-83.461541
MI	Huron	260630007	RURAL THUMB AREA OZONE SITE	43.836388	-82.6429
MI	Ingham	260650012		42.738618	-84.534633
MI	Kalamazoo	260770008	KALAMAZOO FAIRGROUNDS	42.278067	-85.54189
MI	Kent	260810020	GR-Monroe	42.984173	-85.671339
MI	Kent	260810022	APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE RD	43.176672	-85.416608
MI	Lenawee	260910007	6792 RAISIN CENTER HWY: LENAWEE CO.RD.COMM.OWNER: TECUMSEH	41.995568	-83.946559
MI	Macomb	260990009	New Haven	42.731394	-82.793463
MI	Macomb	260991003		42.51334	-83.005971
MI	Manistee	261010922		44.307	-86.242649
MI	Mason	261050007	LOCATED 550 FT NORTH OF US10	43.953334	-86.294415
MI	Missaukee	261130001	LOCATED ABOUT 1/4 MILE WEST OF SITE	44.310555	-84.891865
MI	Muskegon	261210039		43.278061	-86.311083
MI	Oakland	261250001	Oak Park	42.463063	-83.183199
MI	Ottawa	261390005	Jenison	42.894451	-85.852734
MI	St. Clair	261470005	Port Huron	42.953336	-82.456229
MI	Schoolcraft	261530001	Seney	46.288877	-85.950227
MI	Tuscola	261579991	Unionville	43.6138	-83.3591
MI	Washtenaw	261610008	TOWNER ST: SOUTH; 2 LANE RESIDENIAL - HOSPITAL	42.240565	-83.599602
MI	Washtenaw	261619991	Ann Arbor	42.416636	-83.902185
MI	Wayne	261630001	Allen Park	42.22862	-83.2082
MI	Wayne	261630019	East 7 Mile	42.43084	-83.000138
MI	Wexford	261659991	Hoxeyville	44.18089	-85.738985
MN	Anoka	270031001	Cedar Creek	45.40184	-93.20306
MN	Anoka	270031002	Anoka County Airport	45.13768	-93.207615
MN	Becker	270052013	FWS Wetland Management District	46.851811	-95.846272
MN	Carlton	270177417	Fond du Lac Band	46.713694	-92.511722
MN	Crow Wing	270353204	Brainerd Lakes Regional Airport	46.39674	-94.1303
MN	Goodhue	270495302	Stanton Air Field	44.473754	-93.012611
MN	Hennepin	270530962	Near Road I-35/I-94	44.965242	-93.254759
MN	Lake	270750005	Boundary Waters	47.948622	-91.495574
MN	Lyon	270834210	Southwest Minnesota Regional Airport	44.4438	-95.81789
MN	Mille Lacs	270953051	Mille Lacs Band	46.2053	-93.75945
MN	Olmsted	271095008	Ben Franklin School	43.996908	-92.450366
MN	Saint Louis	271370034	Voyageurs NP - Sullivan Bay	48.41252	-92.829225
MN	Saint Louis	271377550	U of M - Duluth	46.81826	-92.08936
MN	Scott	271390505	B.F. Pearson School	44.791437	-93.512534
MN	Stearns	271453052	Talahi School	45.549839	-94.13345
MN	Washington	271636016	St. Croix Watershed Research Station	45.168004	-92.765136
MN	Wright	271713201	St. Michael Elementary School	45.20916	-93.66921
MS	Bolivar	280110001	Cleveland	33.746056	-90.723028
MS	DeSoto	280330002	Hernando	34.82166	-89.98783
MS	Hancock	280450003	Waveland	30.300833	-89.395916
MS	Harrison	280470008	Gulfport Youth Court	30.390369	-89.049778
MS	Hinds	280490020	Jackson NCORE	32.329111	-90.182722
MS	Hinds	280490021	Hinds CC	32.346722	-90.225667
MS	Jackson	280590006	Pascagoula	30.378287	-88.53393
MS	Lauderdale	280750003	Meridian	32.364565	-88.731491

State	County	AQS Code	Site name	Lat	Lon
MS	Lee	280810005	TUPELO AIRPORT NEAR OLD NWS OFFICE	34.264917	-88.766222
MS	Yalobusha	281619991	Coffeeville	34.002747	-89.799183
MO	Andrew	290030001	Savannah	39.9544	-94.849
MO	Boone	290190011	Finger Lakes	39.07807	-92.31626
MO	Callaway	290270002	New Bloomfield	38.70608	-92.09308
MO	Cass	290370003	Richard Gebaur-South	38.75961	-94.57983
MO	Cedar	290390001	El Dorado Springs	37.69	-94.035
MO	Clay	290470003	Watkins Mill State Park	39.407452	-94.265373
MO	Clay	290470005	Liberty	39.303174	-94.377014
MO	Clay	290470006	Rocky Creek	39.331913	-94.580931
MO	Clinton	290490001	Trimble	39.53063	-94.55594
MO	Greene	290770036	Hillcrest High School	37.256137	-93.299894
MO	Greene	290770042	Fellows Lake	37.319186	-93.204411
MO	Jasper	290970004	Alba	37.2385	-94.42468
MO	Jefferson	290990019	Arnold West	38.448572	-90.398704
MO	Lincoln	291130003	Foley	39.04512	-90.86633
MO	Monroe	291370001	MTSP	39.474976	-91.788991
MO	Perry	291570001		37.70264	-89.69864
MO	Saint Charles	291831002	West Alton	38.872546	-90.226488
MO	Saint Charles	291831004	Orchard Farm	38.8994	-90.44917
MO	Sainte Genevieve	291860005	Bonne Terre	37.90084	-90.42388
MO	Saint Louis	291890005	Pacific	38.49015	-90.70509
MO	Saint Louis	291890014	Maryland Heights	38.71085	-90.47606
MO	Taney	292130004	Branson	36.707727	-93.222
MO	St. Louis City	295100085	Blair Street	38.656429	-90.198348
MT	Phillips	300710010	Malta	48.317507	-107.862471
MT	Powder River	300750001	BROADUS	45.440295	-105.370283
MT	Richland	300830001	Sidney Oil Field	47.803392	-104.485552
MT	Rosebud	300870001	Birney - Tongue river	45.366151	-106.48982
NE	Douglas	310550019	4102 Woolworth Ave. on Healthcenter Warehouse	41.247486	-95.973142
NE	Douglas	310550028		41.207958	-95.945897
NE	Douglas	310550053	Whitmore	41.322508	-95.938593
NE	Knox	311079991	Santee Sioux	42.829154	-97.854129
NE	Lancaster	311090016		40.984723	-96.677513
NH	Belknap	330012004	FIELD OFFICE ON THE GROUNDS OF THE FORMER STATE PRISON	43.566122	-71.496335
NH	Cheshire	330050007	WATER STREET	42.930521	-72.272332
NH	Coos	330074001		44.270093	-71.303821
NH	Coos	330074002	CAMP DODGE: GREENS GRANT	44.308132	-71.217639
NH	Grafton	330090010	LEBANON AIRPORT ROAD	43.629605	-72.309499
NH	Grafton	330099991	Woodstock	43.944519	-71.700788
NH	Hillsborough	330111011	GILSON ROAD	42.718653	-71.522416
NH	Hillsborough	330115001	MILLER STATE PARK	42.86183	-71.878626
NH	Merrimack	330131007	HAZEN DRIVE	43.2185	-71.5145
NH	Rockingham	330150014	PORTSMOUTH - PEIRCE ISLAND	43.075371	-70.748017
NH	Rockingham	330150016	SEACOAST SCIENCE CENTER	43.045269	-70.713958
NH	Rockingham	330150018	MOOSEHILL SCHOOL	42.862531	-71.38014
NJ	Atlantic	340010006	Brigantine	39.464872	-74.448736
NJ	Bergen	340030006	Leonia	40.870436	-73.991994
NJ	Camden	340070002	Camden Spruce Street	39.934559	-75.125219
NJ	Camden	340071001	Ancora State Hospital	39.68425	-74.861491
NJ	Cumberland	340110007	Millville	39.422273	-75.025204
NJ	Essex	340130003	Newark Firehouse	40.720989	-74.192892
NJ	Gloucester	340150002	Clarksboro	39.800339	-75.212119
NJ	Hudson	340170006	Bayonne	40.67025	-74.126081
NJ	Hunterdon	340190001	Flemington	40.515262	-74.806671
NJ	Mercer	340210005	Rider University	40.283092	-74.742613
NJ	Mercer	340219991	Wash. Crossing	40.3125	-74.8729
NJ	Middlesex	340230011	Rutgers University	40.462182	-74.429439

State	County	AQS Code	Site name	Lat	Lon
NJ	Monmouth	340250005	Monmouth University	40.277647	-74.0051
NJ	Morris	340273001	Chester	40.787628	-74.676301
NJ	Ocean	340290006	Colliers Mills	40.06483	-74.44405
NJ	Passaic	340315001	Ramapo	41.058617	-74.255544
NJ	Warren	340410007	Columbia	40.92458	-75.067815
NM	Bernalillo	350010023	DEL NORTE HIGH SCHOOL	35.1343	-106.5852
NM	Bernalillo	350010029	SOUTH VALLEY	35.01708	-106.65739
NM	Bernalillo	350011012	Foothills	35.1852	-106.50815
NM	Dona Ana	350130008	6O La Union	31.930659	-106.631103
NM	Dona Ana	350130020	6ZK Chaparral	32.041212	-106.40971
NM	Dona Ana	350130021	6ZM Desert View	31.796218	-106.584434
NM	Dona Ana	350130022	6ZN Santa Teresa	31.787885	-106.683324
NM	Dona Ana	350130023	6ZQ Solano	32.317593	-106.768337
NM	Eddy	350151005	5ZR ON BLM LAND BORDERING RESIDENTIAL AREA OUTSIDE CARLSBAD CITY LIM	32.380118	-104.262726
NM	Eddy	350153001	Carlsbad Caverns NP - Maintenance Area	32.1783	-104.4406
NM	Lea	350250008	5ZS Hobbs Jefferson	32.726656	-103.122917
NM	Rio Arriba	350390026	3CRD Coyote Ranger District	36.187742	-106.698369
NM	Sandoval	350431001		35.299484	-106.548914
NM	Santa Fe	350490021		35.61975	-106.07968
NM	Valencia	350610008		34.8147	-106.7396
NY	Albany	360010012	LOUDONVILLE	42.68075	-73.75733
NY	Bronx	360050110	IS 52	40.816	-73.902
NY	Bronx	360050133	PFIZER LAB SITE	40.8679	-73.87809
NY	Chautauqua	360130006	DUNKIRK	42.49963	-79.31881
NY	Dutchess	360270007	MILLBROOK	41.78555	-73.74136
NY	Erie	360290002	AMHERST	42.99328	-78.77153
NY	Essex	360310002	WHITEFACE SUMMIT	44.36608	-73.90312
NY	Essex	360310003	WHITEFACE BASE	44.39308	-73.8589
NY	Essex	360319991	Huntington Wildlife Forest	43.9731	-74.2232
NY	Franklin	360337003	Y001	44.980577	-74.695005
NY	Hamilton	360410005	PISECO LAKE	43.44957	-74.51625
NY	Herkimer	360430005	NICKS LAKE	43.68578	-74.98538
NY	Jefferson	360450002	PERCH RIVER	44.08747	-75.97316
NY	Monroe	360551007	ROCHESTER 2	43.14618	-77.54817
NY	New York	360610135	CCNY	40.81976	-73.94825
NY	Niagara	360631006	MIDDLEPORT	43.22386	-78.47888
NY	Onondaga	360671015	EAST SYRACUSE	43.05235	-76.05921
NY	Orange	360715001	VALLEY CENTRAL HIGH SCHOOL	41.52375	-74.21534
NY	Oswego	360750003	FULTON	43.28428	-76.46324
NY	Putnam	360790005	MT NINHAM	41.45589	-73.70977
NY	Queens	360810124	QUEENS COLLEGE 2	40.73614	-73.82153
NY	Richmond	360850067	SUSAN WAGNER HS	40.59664	-74.12525
NY	Rockland	360870005	Rockland County	41.18208	-74.02819
NY	Saratoga	360910004	STILLWATER	43.01209	-73.6489
NY	Steuben	361010003	PINNACLE STATE PARK	42.09142	-77.20978
NY	Suffolk	361030002	BABYLON	40.74529	-73.41919
NY	Suffolk	361030004	RIVERHEAD	40.96078	-72.71238
NY	Suffolk	361030009	HOLTSVILLE	40.82799	-73.05754
NY	Tompkins	361099991	Connecticut Hill	42.4006	-76.6538
NY	Wayne	361173001	WILLIAMSON	43.23086	-77.17136
NY	Westchester	361192004	WHITE PLAINS	41.05192	-73.76366
NC	Alexander	370030005	Taylorsville Liledoun	35.9138	-81.191
NC	Avery	370110002	Linville Falls	35.972347	-81.933072
NC	Avery	370119991	Cranberry	36.1058	-82.0454
NC	Buncombe	370210030	Bent Creek	35.500102	-82.59986
NC	Caldwell	370270003	Lenoir (city)	35.9359	-81.5306
NC	Caswell	370330001	Cherry Grove	36.307033	-79.467417

State	County	AQS Code	Site name	Lat	Lon
NC	Cumberland	370510008	Wade	35.158686	-78.728035
NC	Cumberland	370510010	Honeycutt School	35.002304	-78.991692
NC	Durham	370630015	Durham Armory	36.032955	-78.904037
NC	Edgecombe	370650099	Leggett	35.988278	-77.5843
NC	Forsyth	370670022	Hattie Avenue	36.110693	-80.226438
NC	Forsyth	370670030	Clemmons Middle	36.026	-80.342
NC	Forsyth	370671008	Union Cross	36.05097	-80.143657
NC	Graham	370750001	Joanna Bald	35.25793	-83.79562
NC	Granville	370770001	Butner	36.141111	-78.768056
NC	Guilford	370810013	Mendenhall School	36.109006	-79.802314
NC	Haywood	370870008	Waynesville School	35.50716	-82.96337
NC	Haywood	370870035	Frying Pan Mountain	35.379167	-82.7925
NC	Haywood	370870036	Purchase Knob	35.587144	-83.074156
NC	Johnston	371010002	West Johnston Co.	35.59095	-78.4622
NC	Lee	371050002	Blackstone	35.4325	-79.2887
NC	Lenoir	371070004	Lenoir Co. Comm. Coll.	35.231459	-77.568792
NC	Lincoln	371090004	Crouse	35.438556	-81.27675
NC	Macon	371139991	Coweeta	35.0608	-83.4306
NC	Martin	371170001	Jamesville School	35.81066	-76.906249
NC	Mecklenburg	371190041	Garinger High School	35.2401	-80.785683
NC	Mecklenburg	371190046	University Meadows	35.314158	-80.713469
NC	Montgomery	371239991	Candor	35.2632	-79.8365
NC	New Hanover	371290002	Castle Hayne	34.364167	-77.838611
NC	Person	371450003	Bushy Fork	36.306965	-79.09197
NC	Pitt	371470006	Pitt Agri. Center	35.641276	-77.360126
NC	Rockingham	371570099	Bethany sch.	36.308889	-79.859167
NC	Rowan	371590021	Rockwell	35.551868	-80.395039
NC	Swain	371730002	Bryson City	35.434767	-83.442133
NC	Swain	371730007		35.498711	-83.310242
NC	Union	371790003	Monroe School	34.974039	-80.540622
NC	Wake	371830014	Millbrook School	35.856111	-78.574167
NC	Yancey	371990004	Mt. Mitchell	35.765413	-82.264944
ND	Billings	380070002	PAINTED CANYON	46.8943	-103.37853
ND	Burke	380130004	LOSTWOOD NWR	48.64193	-102.4018
ND	Cass	380171004	FARGO NW	46.933754	-96.85535
ND	Dunn	380250003	DUNN CENTER	47.3132	-102.5273
ND	McKenzie	380530002	TRNP-NU	47.5812	-103.2995
ND	Mercer	380570004	BEULAH NORTH	47.298611	-101.766944
ND	Oliver	380650002	HANNOVER	47.185833	-101.428056
ND	Williams	381050003	Williston	48.15278	-103.63951
OH	Allen	390030009	Lima	40.770944	-84.0539
OH	Ashtabula	390071001	Conneaut	41.959695	-80.572808
OH	Butler	390170004	HAMILTON	39.383382	-84.544413
OH	Butler	390170018	Middletown Airport	39.529444	-84.393453
OH	Butler	390179991	Oxford	39.5327	-84.7286
OH	Clark	390230001	Springfield Well Fd	40.00103	-83.80456
OH	Clark	390230003	Mud Run	39.85567	-83.99773
OH	Clermont	390250022	Batavia	39.0828	-84.1441
OH	Clinton	390271002	Wilmington	39.430038	-83.788502
OH	Cuyahoga	390350034	District 6	41.55523	-81.575256
OH	Cuyahoga	390350060	GT Craig NCore	41.492117	-81.678449
OH	Cuyahoga	390350064	Berea BOE	41.361856	-81.86463
OH	Cuyahoga	390355002	Mayfield	41.537069	-81.45879
OH	Delaware	390410002	Delaware	40.356694	-83.063971
OH	Fayette	390479991	Deer Creek	39.6359	-83.2605
OH	Franklin	390490029	New Albany	40.084514	-82.815585
OH	Franklin	390490037	FRANKLIN_PK	39.96523	-82.95549
OH	Franklin	390490081	Maple Canyon	40.0877	-82.959773

State	County	AQS Code	Site name	Lat	Lon
OH	Geauga	390550004	Notre Dame	41.515051	-81.249906
OH	Greene	390570006	Xenia	39.66575	-83.94268
OH	Hamilton	390610006	Sycamore	39.2787	-84.36625
OH	Hamilton	390610010	Colerain	39.21487	-84.69086
OH	Hamilton	390610040	Taft NCore	39.12886	-84.50404
OH	Jefferson	390810017	Stuebenville	40.36644	-80.61558
OH	Knox	390830002	CENTERBURG	40.310025	-82.691724
OH	Lake	390850003	Eastlake	41.673006	-81.422455
OH	Lake	390850007	Painesville	41.726811	-81.242156
OH	Lawrence	390870011	Wilgus	38.62901	-82.45886
OH	Lawrence	390870012	ODOT Ironton	38.508075	-82.659241
OH	Licking	390890005	Heath	40.026037	-82.432996
OH	Lorain	390930018	Sheffield	41.420882	-82.095729
OH	Lucas	390950024	Erie	41.644067	-83.54616
OH	Lucas	390950027	Waterville	41.4942	-83.718949
OH	Madison	390970007	London	39.78819	-83.47606
OH	Mahoning	390990013	Oakhill	41.096188	-80.658867
OH	Medina	391030004	Chippewa	41.0604	-81.9239
OH	Miami	391090005	Miami East HS	40.08502	-84.113808
OH	Montgomery	391130037	Eastwood	39.785644	-84.134412
OH	Noble	391219991	Quaker City	39.9428	-81.3373
OH	Portage	391331001	Lake Rockwell	41.182466	-81.330486
OH	Preble	391351001	Preble NCore	39.83562	-84.720524
OH	Stark	391510016	Malone Univ	40.82812	-81.3785
OH	Stark	391510022	Brewster	40.712778	-81.598333
OH	Stark	391514005	Alliance	40.93133	-81.123519
OH	Summit	391530020	Patterson Park	41.106486	-81.503547
OH	Trumbull	391550011	TCSE	41.240453	-80.66272
OH	Trumbull	391550013	Kinsman Maintenance	41.454597	-80.589612
OH	Warren	391650007	Lebanon	39.42689	-84.20077
OH	Washington	391670004	Marietta WTP	39.432117	-81.460443
OH	Wood	391730003	Bowling Green	41.377685	-83.611104
OK	Adair	400019009	STILWELL	35.750735	-94.669697
OK	Canadian	400170101	OKC WEST-(YUKON)	35.479215	-97.751503
OK	Cherokee	400219002	TAHLEQUAH SHELTER	35.85408	-94.985964
OK	Cleveland	400270049	MOORE WATER TOWER	35.320105	-97.484099
OK	Comanche	400310651	LAWTON NORTH	34.63298	-98.42879
OK	Creek	400370144	MANNFORD	36.105481	-96.361196
OK	Dewey	400430860	SEILING MUNICIPAL AIRPORT	36.158414	-98.931973
OK	Kay	400719010	NEWKIRK IMPROVE	36.956222	-97.03135
OK	McClain	400871073	GOLDSBY	35.159649	-97.473794
OK	Mayes	400979014	CHEROKEE HEIGHTS	36.228408	-95.249943
OK	Oklahoma	401090033	OKC CENTRAL-OSDH	35.477036	-97.494309
OK	Oklahoma	401090096	CHOCTAW	35.477801	-97.303044
OK	Oklahoma	401091037	OKC NORTH	35.614131	-97.475083
OK	Ottawa	401159004	QUAPAW SHELTER	36.922222	-94.838889
OK	Pittsburg	401210415	McALESTER MUNICIPAL AIRPORT	34.885608	-95.78441
OK	Sequoyah	401359021		35.40814	-94.524413
OK	Tulsa	401430174	TULSA SOUTH	35.953708	-96.004975
OK	Tulsa	401430178	TULSA EAST	36.133802	-95.764537
OK	Tulsa	401431127	NORTH TULSA - FIRE STATION#24	36.204902	-95.976537
PA	Adams	420010001	NARSTO SITE ARENDTSVILLE	39.92002	-77.30968
PA	Adams	420019991	Arendtsville	39.9231	-77.3078
PA	Allegheny	420030008	Lawrenceville	40.46542	-79.960757
PA	Allegheny	420030067	South Fayette	40.375644	-80.169943
PA	Allegheny	420031008	Harrison	40.617488	-79.727664
PA	Armstrong	420050001	LAT/LON IS CENTER OF TRAILER	40.814183	-79.56475
PA	Beaver	420070002		40.56252	-80.503948

State	County	AQS Code	Site name	Lat	Lon
PA	Beaver	420070005	DRIVEWAY TO BAKEY RESIDENCE	40.684722	-80.359722
PA	Beaver	420070014		40.747796	-80.316442
PA	Berks	420110006	Kutztown	40.51408	-75.789721
PA	Berks	420110011	Reading Airport	40.38335	-75.9686
PA	Blair	420130801		40.535278	-78.370833
PA	Bradford	420150011	Towanda	41.705226	-76.512726
PA	Bucks	420170012	A420170012LAT/LONG POINT IS OF SAMPLING INLET	40.107222	-74.882222
PA	Cambria	420210011		40.309722	-78.915
PA	Centre	420270100	LAT/LON=POINT SW CORNER OF TRAILER	40.811389	-77.877028
PA	Centre	420279991	Penn State	40.7208	-77.9319
PA	Chester	420290100	CHESTER COUNTY TRANSPORT SITE INTO PHILADELPHIA	39.834461	-75.768242
PA	Clearfield	420334000	MOSHANNON STATE FOREST	41.1175	-78.526194
PA	Dauphin	420430401	A420430401LAT/LON POINT IS AT CORNER OF TRAILER	40.246992	-76.846988
PA	Dauphin	420431100	A420431100LAT/LON POINT IS AT CORNER OF TRAILER	40.272222	-76.681389
PA	Delaware	420450002	A420450002LAT/LON POINT IS OF CORNER OF TRAILER	39.835556	-75.3725
PA	Elk	420479991	Kane Exp. Forest	41.598119	-78.767867
PA	Erie	420490003		42.14175	-80.038611
PA	Franklin	420550001	HIGH ELEVATION OZONE SITE	39.961111	-77.475556
PA	Greene	420590002	75 KM SSW OF PITTSBURGH RURAL SITE ON A KNOLL WITHIN A LARGE CLEARIN	39.80933	-80.26567
PA	Indiana	420630004		40.56333	-78.919972
PA	Lackawanna	420690101	A420690101LAT/LON POINT IS AT CORNER OF TRAILER	41.479116	-75.578186
PA	Lackawanna	420692006	A420692006LAT/LON POINT IS AT CORNER OF TRAILER	41.442778	-75.623056
PA	Lancaster	420710007	A420710007LAT/LON POINT AT CORNER OF TRAILER	40.046667	-76.283333
PA	Lancaster	420710012	Lancaster DW	40.043833	-76.1124
PA	Lawrence	420730015		40.995848	-80.346442
PA	Lebanon	420750100	Lebanon	40.337328	-76.383447
PA	Lehigh	420770004	A420770004LAT/LONG POINT IS OF SAMPLING INLET	40.611944	-75.4325
PA	Luzerne	420791101	A420791101LAT/LON POINT IS AT CORNER OF TRAILER	41.265556	-75.846389
PA	Lycoming	420810100	MONTOURSVILLE	41.2508	-76.9238
PA	Mercer	420850100		41.215014	-80.484779
PA	Mercer	420859991	M.K. Goddard	41.4271	-80.1451
PA	Monroe	420890002	SWIFTWATER	41.08306	-75.32328
PA	Montgomery	420910013	A420910013LAT/LON POINT IS OF CORNER OF TRAILER	40.112222	-75.309167
PA	Northampton	420950025	LAT/LON POINT IS CENTER OF TRAILER	40.628056	-75.341111
PA	Northampton	420958000	COMBINED EASTON SITE (420950100) AND EASTON H2S SPECIAL STUDY SITES	40.692224	-75.237156
PA	Philadelphia	421010004	Air Management Services Laboratory (AMS LAB)	40.008889	-75.09778
PA	Philadelphia	421010024	North East Airport (NEA)	40.076389	-75.011944
PA	Philadelphia	421010048	North East Waste (NEW)	39.991389	-75.080833
PA	Somerset	421119991	Laurel Hill	39.9878	-79.2515
PA	Tioga	421174000	PENN STATE OZONE MONITORING SITE	41.644722	-76.939167
PA	Washington	421250005		40.146667	-79.902222
PA	Washington	421250200		40.170556	-80.261389
PA	Washington	421255001		40.445278	-80.420833
PA	Westmoreland	421290008	LAT/LON POINT IS TRAILER	40.304694	-79.505667
PA	York	421330008	A421330008LAT/LON POINT AT CORNER OF TRAILER	39.965278	-76.699444
PA	York	421330011	York DW	39.86097	-76.462055
RI	Kent	440030002	AJ	41.615237	-71.72
RI	Providence	440071010	FRANCIS SCHOOL East Providence	41.841039	-71.36097
RI	Washington	440090007	US-EPA Laboratory	41.49511	-71.423705
SC	Abbeville	450010001	DUE WEST	34.325318	-82.386376
SC	Aiken	450030003	JACKSON MIDDLE SCHOOL	33.342226	-81.788731
SC	Anderson	450070005	Big Creek	34.623236	-82.532059
SC	Berkeley	450150002	BUSHY PARK PUMP STATION	32.987252	-79.9367
SC	Charleston	450190046	CAPE ROMAIN	32.941023	-79.657187
SC	Chesterfield	450250001	CHESTERFIELD	34.615367	-80.198787
SC	Colleton	450290002	ASHTON	33.007866	-80.965038
SC	Darlington	450310003	Pee Dee Experimental Station	34.285696	-79.744859

State	County	AQS Code	Site name	Lat	Lon
SC	Edgefield	450370001	TRENTON	33.739963	-81.853635
SC	Greenville	450450016	Hillcrest Middle School	34.751848	-82.256701
SC	Oconee	450730001	LONG CREEK	34.805261	-83.2377
SC	Pickens	450770002	CLEMSON CMS	34.653606	-82.838659
SC	Pickens	450770003	Wolf Creek	34.851537	-82.744576
SC	Richland	450790007	PARKLANE	34.093959	-80.962304
SC	Richland	450790021	CONGAREE BLUFF	33.81468	-80.781135
SC	Richland	450791001	SANDHILL EXPERIMENTAL STATION	34.131262	-80.868318
SC	Spartanburg	450830009	NORTH SPARTANBURG FIRE STATION #2	34.988706	-82.075802
SC	York	450910008	YORK (LANDFILL)	34.977	-81.207
SC	York	450918801		34.9127	-80.8745
SD	Brookings	460110003	Research Farm	44.348604	-96.807299
SD	Custer	460330132	Wind Cave NP - Visitor Center	43.55764	-103.48386
SD	Jackson	460710001	SOUTH OF BADLANDS NP HEADQUARTERS	43.74561	-101.941218
SD	Meade	460930001	BLACK HAWK ELEMENTARY SCHOOL GROUNDS	44.155636	-103.315765
SD	Minnehaha	460990008	SD School for the Deaf	43.54792	-96.700769
SD	Union	461270001	Union County #1 Jensen	42.751518	-96.707208
TN	Anderson	470010101	Freel's Bend O3 and SO2 monitoring	35.964969	-84.22317
TN	Blount	470090101	Great Smoky Mountains NP - Look Rock	35.63348	-83.941606
TN	Blount	470090102	Great Smoky Mountains NP - Cade's Cove	35.603056	-83.783611
TN	Claiborne	470259991	Speedwell	36.46983	-83.826511
TN	Davidson	470370011	East Health	36.205055	-86.74472
TN	Davidson	470370026	Percy Priest Dam	36.150799	-86.623297
TN	DeKalb	470419991	Edgar Evans	36.0388	-85.7331
TN	Hamilton	470651011	Soddy-Daisy High School	35.233476	-85.181581
TN	Hamilton	470654003	Eastside Utility	35.102638	-85.162194
TN	Jefferson	470890002	New Market ozone monitor	36.105629	-83.602077
TN	Knox	470930021	East Knox Elementary School	36.085508	-83.764806
TN	Knox	470931020	Spring Hill Elementary School	36.019186	-83.87381
TN	Loudon	471050109	Loudon Middle School ozone monitor	35.721095	-84.343035
TN	Sevier	471550101	Great Smoky Mountains NP - Cove Mountain	35.696758	-83.609612
TN	Shelby	471570021	Frayser Ozone Monitor	35.217501	-90.019707
TN	Shelby	471570075	Memphis NCORE site	35.151699	-89.850249
TN	Shelby	471571004	Edmund Orgill Park Ozone	35.378153	-89.83447
TN	Sullivan	471632002	Blountville Ozone Monitor	36.541365	-82.424555
TN	Sullivan	471632003	Kingsport ozone monitor	36.58211	-82.485742
TN	Sumner	471650007	Hendersonville Ozone Site at Old Hickory Dam	36.29756	-86.653137
TN	Williamson	471870106	FAIRVIEW MIDDLE SCHOOL ozone monitor	35.949765	-87.138246
TN	Wilson	471890103	Cedars of Lebanon Ozone Monitor	36.060895	-86.286291
TX	Bell	480271045	Temple Georgia	31.122419	-97.431052
TX	Bell	480271047	Killeen Skylark Field	31.088002	-97.679734
TX	Bexar	480290032	San Antonio Northwest	29.51509	-98.620166
TX	Bexar	480290052	Camp Bullis	29.632058	-98.564936
TX	Bexar	480290059	Calaveras Lake	29.275381	-98.311692
TX	Brazoria	480391004	Manvel Croix Park	29.520443	-95.392509
TX	Brazoria	480391016	Lake Jackson	29.043759	-95.472946
TX	Brewster	480430101	Big Bend NP - K-Bar Ranch Road	29.30265	-103.17781
TX	Cameron	480610006	Brownsville	25.892518	-97.49383
TX	Cameron	480611023	Harlingen Teege	26.200335	-97.712684
TX	Collin	480850005	Frisco	33.1324	-96.786419
TX	Dallas	481130069	Dallas Hinton	32.820061	-96.860117
TX	Dallas	481130075	Dallas North #2	32.919206	-96.808498
TX	Dallas	481130087	Dallas Redbird Airport Executive	32.676451	-96.87206
TX	Denton	481210034	Denton Airport South	33.219069	-97.196284
TX	Denton	481211032	Pilot Point	33.410648	-96.94459
TX	Ellis	481390016	Midlothian OFW	32.482083	-97.026899
TX	Ellis	481391044	Italy	32.175417	-96.870189
TX	El Paso	481410029	Ivanhoe	31.785769	-106.323578

State	County	AQS Code	Site name	Lat	Lon
TX	El Paso	481410037	El Paso UTEP	31.768291	-106.50126
TX	El Paso	481410044	El Paso Chamizal	31.765685	-106.455227
TX	El Paso	481410055	Ascarate Park SE	31.746775	-106.402806
TX	El Paso	481410057	Socorro Hueco	31.6675	-106.288
TX	El Paso	481410058	Skyline Park	31.893913	-106.425827
TX	Galveston	481671034	Galveston 99th Street	29.254474	-94.861289
TX	Gregg	481830001	Longview	32.378682	-94.711811
TX	Harris	482010024	Houston Aldine	29.901036	-95.326137
TX	Harris	482010026	Channelview	29.802707	-95.125495
TX	Harris	482010029	Northwest Harris County	30.039524	-95.673951
TX	Harris	482010046	Houston North Wayside	29.828086	-95.284096
TX	Harris	482010047	Lang	29.834167	-95.489167
TX	Harris	482010051	Houston Croquet	29.623889	-95.474167
TX	Harris	482010055	Houston Bayland Park	29.695729	-95.499219
TX	Harris	482010062	Houston Monroe	29.625556	-95.267222
TX	Harris	482010066	Houston Westhollow	29.723333	-95.635833
TX	Harris	482010416	Park Place	29.686389	-95.294722
TX	Harris	482011015	Lynchburg Ferry	29.758889	-95.079444
TX	Harris	482011017	Baytown Garth	29.823319	-94.983786
TX	Harris	482011034	Houston East	29.767997	-95.220582
TX	Harris	482011035	Clinton	29.733726	-95.257593
TX	Harris	482011039	Houston Deer Park #2	29.670025	-95.128508
TX	Harris	482011050	Seabrook Friendship Park	29.583047	-95.015544
TX	Harrison	482030002	Karnack	32.668987	-94.167457
TX	Hidalgo	482150043	Mission	26.22621	-98.291069
TX	Hood	482210001	Granbury	32.442304	-97.803529
TX	Hunt	482311006	Greenville	33.153088	-96.115572
TX	Jefferson	482450009	Beaumont Downtown	30.036422	-94.071061
TX	Jefferson	482450011	Port Arthur West	29.897516	-93.991084
TX	Jefferson	482450022	Hamshire	29.863957	-94.317802
TX	Jefferson	482450101	SETRPC 40 Sabine Pass	29.727931	-93.894081
TX	Jefferson	482450102	SETRPC 43 Jefferson Co Airport	29.9425	-94.000556
TX	Jefferson	482451035	Nederland High School	29.978926	-94.010872
TX	Johnson	482510003	Cleburne Airport	32.353595	-97.436742
TX	Kaufman	482570005	Kaufman	32.564968	-96.317687
TX	McLennan	483091037	Waco Mazanec	31.653074	-97.070698
TX	Montgomery	483390078	Conroe Relocated	30.350302	-95.425128
TX	Navarro	483491051	Corsicana Airport	32.031934	-96.399141
TX	Nueces	483550025	Corpus Christi West	27.76534	-97.434262
TX	Nueces	483550026	Corpus Christi Tuloso	27.832409	-97.55538
TX	Orange	483611001	West Orange	30.085263	-93.761341
TX	Parker	483670081	Parker County	32.868773	-97.905931
TX	Polk	483739991	Alabama-Coushatta	30.7017	-94.6742
TX	Randall	483819991	Palo Duro	34.8803	-101.6649
TX	Rockwall	483970001	Rockwall Heath	32.936523	-96.459211
TX	Smith	484230007	Tyler Airport Relocated	32.344008	-95.415752
TX	Tarrant	484390075	Eagle Mountain Lake	32.987891	-97.477175
TX	Tarrant	484391002	Fort Worth Northwest	32.805818	-97.356568
TX	Tarrant	484392003	Keller	32.922474	-97.282088
TX	Tarrant	484393009	Grapevine Fairway	32.98426	-97.063721
TX	Tarrant	484393011	Arlington Municipal Airport	32.656357	-97.088585
TX	Travis	484530014	Austin Northwest	30.354436	-97.760255
TX	Travis	484530020	Austin Audubon Society	30.483168	-97.872301
TX	Victoria	484690003	Victoria	28.83617	-97.00553
TX	Webb	484790016	Laredo Vidaurri	27.517456	-99.515222
VT	Bennington	500030004	Morse Airport - State of Vermont Property	42.88759	-73.24984
VT	Chittenden	500070007	PROCTOR MAPLE RESEARCH CTR	44.52839	-72.86884
VT	Rutland	500210002	State of Vermont District Court Parking Lot	43.608056	-72.982778

State	County	AQS Code	Site name	Lat	Lon
VA	Albemarle	510030001	Albemarle High School	38.07657	-78.50397
VA	Arlington	510130020	Aurora Hills Visitors Center	38.8577	-77.05922
VA	Caroline	510330001	USGS Geomagnetic Center: Corbin	38.20087	-77.37742
VA	Charles	510360002	Shirley Plantation	37.34438	-77.25925
VA	Chesterfield	510410004	VDOT Chesterfield Residency Shop	37.35748	-77.59355
VA	Fairfax	510590030	Lee District Park	38.77335	-77.10468
VA	Fauquier	510610002	Chester Phelps Wildlife Management Area: Sumerduck	38.47367	-77.76772
VA	Frederick	510690010	Rest	39.28102	-78.08157
VA	Giles	510719991	Horton Station	37.3297	-80.5578
VA	Hanover	510850003	Turner Property: Old Church	37.60613	-77.2188
VA	Henrico	510870014	MathScience Innovation Center	37.55652	-77.40027
VA	Loudoun	511071005	Broad Run High School: Ashburn	39.02473	-77.48925
VA	Madison	511130003	Shenandoah NP - Big Meadows	38.5231	-78.43471
VA	Prince Edward	511479991	Prince Edward	37.1655	-78.3069
VA	Prince William	511530009	James S. Long Park	38.85287	-77.63462
VA	Roanoke	511611004	East Vinton Elementary School	37.28342	-79.88452
VA	Rockbridge	511630003	Natural Bridge Ranger Station	37.62668	-79.51257
VA	Rockingham	511650003	ROCKINGHAM CO. VDOT	38.47753	-78.81952
VA	Stafford	511790001	Widewater Elementary School	38.48123	-77.3704
VA	Wythe	511970002	Rural Retreat Sewage Treatment Plant	36.89117	-81.25423
VA	Hampton City	516500008	NASA Langley Research Center	37.103733	-76.387017
VA	Suffolk City	518000004	Tidewater Community College	36.90118	-76.43808
VA	Suffolk City	518000005	VA Tech Agricultural Research Station: Holland	36.66525	-76.73078
WV	Berkeley	540030003	MARTINSBURG BALL FIELD	39.448105	-77.963845
WV	Cabell	540110006	HENDERSON CENTER/MARSHALL UNIVERSITY - MOVED FROM WATER CO. 5/98	38.424133	-82.4259
WV	Gilmer	540219991	Cedar Creek	38.8795	-80.8477
WV	Greenbrier	540250003	SAM BLACK CHURCH - DOH GARAGE - GREENBRIER COUNTY	37.908533	-80.632633
WV	Hancock	540290009		40.427372	-80.592318
WV	Kanawha	540390020		38.346258	-81.621161
WV	Monongalia	540610003		39.649367	-79.920867
WV	Ohio	540690010		40.114876	-80.700972
WV	Tucker	540939991	Parsons	39.0905	-79.6617
WV	Wood	541071002	Neale Elementary School	39.323533	-81.552367
WI	Ashland	550030010	BAD RIVER TRIBAL SCHOOL - ODANAH	46.602248	-90.656141
WI	Brown	550090026	GREEN BAY - UW	44.53098	-87.90799
WI	Columbia	550210015	COLUMBUS	43.3156	-89.1089
WI	Dane	550250041	MADISON EAST	43.100838	-89.357298
WI	Dodge	550270001	HORICON WILDLIFE AREA	43.466111	-88.621111
WI	Door	550290004	NEWPORT PARK	45.2384	-86.994
WI	Eau Claire	550350014	EAU CLAIRE - DOT SIGN SHOP	44.7614	-91.143
WI	Fond du Lac	550390006	FOND DU LAC	43.687402	-88.422045
WI	Forest	550410007	POTAWATOMI	45.565	-88.8086
WI	Jefferson	550550009	JEFFERSON - LAATSCH	43.0034	-88.8283
WI	Kenosha	550590019	CHIWAUKEE PRAIRIE STATELINE	42.504722	-87.8093
WI	Kenosha	550590025	KENOSHA - WATER TOWER	42.5958	-87.8858
WI	Kewaunee	550610002	KEWAUNEE	44.44312	-87.50524
WI	La Crosse	550630012	LACROSSE - DOT BUILDING	43.7775	-91.2269
WI	Manitowoc	550710007	MANITOWOC - WDLND DUNES	44.138619	-87.6161
WI	Marathon	550730012	LAKE DUBAY	44.70735	-89.77183
WI	Milwaukee	550790010	MILWAUKEE - SIXTEENTH ST. HEALTH CENTER	43.016667	-87.933333
WI	Milwaukee	550790026	MILWAUKEE - SER DNR HDQRS	43.060975	-87.913504
WI	Milwaukee	550790085	BAYSIDE	43.1818	-87.901
WI	Outagamie	550870009	APPLETON - AAL	44.30738	-88.395178
WI	Ozaukee	550890008	GRAFTON	43.343	-87.92
WI	Ozaukee	550890009	HARRINGTON BEACH PARK	43.4981	-87.81
WI	Racine	551010020	RACINE - PAYNE AND DOLAN	42.773677	-87.796306
WI	Rock	551050030	BELOIT - CONVERSE	42.51831	-89.06347

State	County	AQS Code	Site name	Lat	Lon
WI	Sauk	551110007	DEVILS LAKE PARK	43.4351	-89.6797
WI	Sheboygan	551170006	SHEBOYGAN - KOHLER ANDRAE	43.667418	-87.716213
WI	Sheboygan	551170009	SHEBOYGAN - HAVEN	43.815596	-87.792235
WI	Taylor	551199991	Perkinstown	45.2066	-90.5969
WI	Vilas	551250001	TROUT LAKE	46.0519	-89.654
WI	Walworth	551270005	LAKE GENEVA	42.580009	-88.499046
WI	Waukesha	551330027	WAUKESHA - CLEVELAND AVE	43.020075	-88.21507
WY	Albany	560019991	Centennial	41.3642	-106.2399
WY	Campbell	560050123	Thunder Basin	44.6522	-105.2903
WY	Campbell	560050456	Campbell County	44.146964	-105.529994
WY	Carbon	560070100	Atlantic Rim Sun Dog	41.386944	-107.616667
WY	Converse	560090008	Tallgrass Energy Partners - Gaseous	42.796372	-105.361822
WY	Converse	560090010	Converse County Long-Term	43.101281	-105.498931
WY	Fremont	560130232	Spring Creek	43.081667	-107.549444
WY	Laramie	560210100	Cheyenne NCore	41.182227	-104.778334
WY	Natrona	560250100	Casper Gaseous	42.82231	-106.36501
WY	Natrona	560252601		42.8608	-106.23586
WY	Sweetwater	560370200	Wamsutter	41.677667	-108.024835
WY	Weston	560450003		43.873056	-104.191944

Appendix E. *DVFs for all 12OTC2 monitors*

Baseline (2014-2018) and projected 2023 O_3 design values from CAMx and CMAQ, using the standard 3x3 method and the 3x3 No Water 1 method. Table includes DVBs and DVFs for all monitors in 12OTC2 domain (see Section 2.1).

						2014-18 DVB		CAMx v7.10		CMAQ v5.3.1	
								3x3 DVF	No Water 1	3x3 DVF	No Water 1
Site ID	**State**	**County**	**Site name**	**Lat**	**Lon**	**AVG**	**MAX**	**AVG**	**AVG**	**AVG**	**AVG**
90010017	Connecticut	Fairfield	Greenwich Point Park - Greenwich	41.00	-73.59	79.3	80	74	74	71	78
90011123	Connecticut	Fairfield	Western Conn State Univ - Danbury	41.40	-73.44	77	78	69	69	69	69
90013007	Connecticut	Fairfield	Lighthouse - Stratford	41.15	-73.10	82	83	75	75	74	75
90019003	Connecticut	Fairfield	Sherwood Island State Park - Westport	41.12	-73.34	82.7	83	78	76	80	75
90031003	Connecticut	Hartford	McAuliffe Park	41.78	-72.63	71.7	74	63	63	62	62
90050005	Connecticut	Litchfield	Mohawk Mt-Cornwall	41.82	-73.30	71.3	72	63	63	62	62
90079007	Connecticut	Middlesex	Connecticut Valley Hospital - Middletown	41.55	-72.63	78.7	79	70	70	69	69
90090027	Connecticut	New Haven	Criscuolo Park-New Haven	41.30	-72.90	75.7	77	69	68	69	68
90099002	Connecticut	New Haven	Hammonasset State Park - Madison	41.26	-72.55	79.7	82	71	72	71	71
90110124	Connecticut	New London	Fort Griswold Park - Groton	41.35	-72.08	74.3	76	67	68	67	71
90131001	Connecticut	Tolland		41.98	-72.39	71.7	73	63	63	62	62
90159991	Connecticut	Windham	Abington	41.84	-72.01	69.7	71	61	61	60	60
100010002	Delaware	Kent	PROPERTY OF KILLENS POND STATE PARK; BEHIND FARM BUILDINGS	38.99	-75.56	66.3	67	58	57	58	57
100031007	Delaware	New Castle	Lums Pond	39.55	-75.73	68	69	59	59	59	59
100031010	Delaware	New Castle	BCSP	39.82	-75.56	73.7	74	65	65	65	65

100031013	Delaware	New Castle	BELLEVUE STATE PARK: FIELD IN SE PORTION OF PARK	39.77	-75.50	71	72	63	63	62	62
100032004	Delaware	New Castle	MLK CORNER OF MLK BLVD AND JUSTISON ST	39.74	-75.56	71.3	72	63	63	63	63
100051002	Delaware	Sussex	Seaford Shipley State Service Center	38.65	-75.61	65.3	66	57	57	57	57
100051003	Delaware	Sussex	Lewes SPM SITE: NEAR UD ACID RAIN/MERCURY COLLECTORS	38.78	-75.16	67.7	69	59	60	55	59
110010041	District Of Columbia	District of Columbia	RIVER TERRACE	38.90	-76.96	57	57	49	49	48	48
110010043	District Of Columbia	District of Columbia	MCMILLAN NCore-PAMS	38.92	-77.01	71	72	61	61	60	60
110010050	District Of Columbia	District of Columbia	Takoma Rec Center	38.97	-77.02	70	70	60	60	59	59
230010014	Maine	Androscoggin	DURHAM FIRE STATION	43.97	-70.12	59.3	60	52	51	52	50
230039991	Maine	Aroostook	Ashland	46.60	-68.41	52	52				
230052003	Maine	Cumberland	CETL - Cape Elizabeth Two Lights (State Park)	43.56	-70.21	64.7	65	57	57	56	
230090102	Maine	Hancock	TOP OF CADILLAC MTN (FENCED ENCLOSURE)	44.35	-68.23	69	71	60	60	61	61
230090103	Maine	Hancock	MCFARLAND HILL Air Pollutant Research Site	44.38	-68.26	63	64	55	55	56	
230112005	Maine	Kennebec	Gardiner: Pray Street School (GPSS)	44.23	-69.79	61.3	63	53	53		
230130004	Maine	Knox	Marshall Point Lighthouse	43.92	-69.26	63.3	64	56	55	55	55
230194008	Maine	Penobscot	WLBZ TV Transmitter Building - Summit of Rider Bluff	44.74	-68.67	58.3	60				
230290019	Maine	Washington	Harbor Masters Office; Jonesport Public Landing	44.53	-67.60	59.3	61	52	52		
230310038	Maine	York	WBFD - West Buxton (Hollis) Fire Department	43.66	-70.63	58.7	59				
230310040	Maine	York	SBP - Shapleigh Ball Park	43.59	-70.88	61.3	62	53	53		
230312002	Maine	York	KPW - Kennebunkport Parson'd Way	43.34	-70.47	66.5	67	58	58	58	57

240031003	Maryland	Anne Arundel	GLEN BURNIE	39.17	-76.63	74	74	64	64	65	63
240051007	Maryland	Baltimore	Padonia	39.46	-76.63	72	72	62	62	61	61
240053001	Maryland	Baltimore	Essex	39.31	-76.47	72.7	73	64	63	64	62
240090011	Maryland	Calvert	Calvert	38.54	-76.62	67.7	69	59	59	59	58
240130001	Maryland	Carroll	South Carroll	39.44	-77.04	68.3	69	58	58	57	57
240150003	Maryland	Cecil	Fair Hill Natural Resource Management Area	39.70	-75.86	74	74	64	64	64	64
240170010	Maryland	Charles	Southern Maryland	38.51	-76.81	69.3	70	60	60	59	59
240190004	Maryland	Dorchester	Horn Point	38.59	-76.14	64.7	66	56	57	58	57
240199991	Maryland	Dorchester	Blackwater NWR	38.44	-76.11	65.7	66	58	57	59	57
240210037	Maryland	Frederick	Frederick Airport	39.42	-77.38	68	69	59	59	58	58
240230002	Maryland	Garrett	Piney Run	39.71	-79.01	65.3	66	59	59		
240251001	Maryland	Harford	Edgewood	39.41	-76.30	74	75	65	64	63	64
240259001	Maryland	Harford	Aldino	39.56	-76.20	73	73	63	63	62	63
240290002	Maryland	Kent	Millington	39.31	-75.80	69.3	70	60	60	59	59
240313001	Maryland	Montgomery	Rockville	39.11	-77.11	67.7	68	59	59	57	57
240330030	Maryland	Prince George's	HU-Beltsville	39.06	-76.88	69.3	70	59	59	58	58
240338003	Maryland	Prince George's	PG Equestrian Center	38.81	-76.74	70.7	71	61	61	59	59
240339991	Maryland	Prince George's	Beltsville	39.03	-76.82	69.3	71	60	60	59	59
240430009	Maryland	Washington	Hagerstown	39.56	-77.72	66.7	67	58	58	58	58
245100054	Maryland	Baltimore (City)	Furley	39.33	-76.55	68.3	70	60	59	60	59
250010002	Massachusetts	Barnstable	TRURO NATIONAL SEASHORE	41.98	-70.02	69	69	61	61	60	59
250051004	Massachusetts	Bristol	FALL RIVER	41.69	-71.17	71.7	74	64	64	68	63
250051006	Massachusetts	Bristol	FAIRHAVEN2	41.65	-70.90	67.3	69	61	60	60	59

250070001	Massachusetts	Dukes	1 HERRING CREEK RD: AQUINNAH (WAMPANOAG TRIBAL SITE)	41.33	-70.79	70	70	63	62	62	62
250092006	Massachusetts	Essex	LYNN WATER TREATMENT PLANT	42.47	-70.97	66.3	68	60	59	61	59
250094005	Massachusetts	Essex	NEWBURYPORT HARBOR ST PARKING LOT	42.81	-70.82	64.5	65	57	56	57	56
250095005	Massachusetts	Essex	CONSENTINO SCHOOL.	42.77	-71.10	62.7	64	55	55	55	55
250112005	Massachusetts	Franklin	Greenfield 16 Barr Ave	42.61	-72.60	64.7	66	56	56		
250130008	Massachusetts	Hampden	WESTOVER AFB	42.19	-72.56	70	71	61	61	60	60
250154002	Massachusetts	Hampshire	QUABBIN RES	42.30	-72.33	69	70	60	60	59	59
250170009	Massachusetts	Middlesex	USEPA REGION 1 LAB	42.63	-71.36	64	65	56	56	55	55
250213003	Massachusetts	Norfolk	BLUE HILL OBSERVATORY	42.21	-71.11	69	70	62	60	64	60
250230005	Massachusetts	Plymouth	Brockton Buckley	42.07	-71.01	67	69	59	59	58	58
250250042	Massachusetts	Suffolk	DUDLEY SQUARE ROXBURY	42.33	-71.08	60.3	64	54	53	55	53
250270015	Massachusetts	Worcester	WORCESTER AIRPORT	42.27	-71.88	65	66	57	57	56	56
250270024	Massachusetts	Worcester	UXBRIDGE	42.10	-71.62	66.3	69	58	58	58	58
330012004	New Hampshire	Belknap	FIELD OFFICE ON THE GROUNDS OF THE FORMER STATE PRISON	43.57	-71.50	58.7	59	50	50	49	
330050007	New Hampshire	Cheshire	WATER STREET	42.93	-72.27	62.3	63	54	54		
330074001	New Hampshire	Coos		44.27	-71.30	67.3	68				
330074002	New Hampshire	Coos	CAMP DODGE: GREENS GRANT	44.31	-71.22	58.3	59				
330090010	New Hampshire	Grafton	LEBANON AIRPORT ROAD	43.63	-72.31	57.7	59				

330099991	New Hampshire	Grafton	Woodstock	43.94	-71.70	54.7	56				
330111011	New Hampshire	Hillsborough	GILSON ROAD	42.72	-71.52	63	64	55	55		
330115001	New Hampshire	Hillsborough	MILLER STATE PARK	42.86	-71.88	67	68	58	58		
330131007	New Hampshire	Merrimack	HAZEN DRIVE	43.22	-71.51	62	63	54	54		
330150014	New Hampshire	Rockingham	PORTSMOUTH - PEIRCE ISLAND	43.08	-70.75	63.3	65	55	55	56	54
330150016	New Hampshire	Rockingham	SEACOAST SCIENCE CENTER	43.05	-70.71	66.7	67	58	58	59	57
330150018	New Hampshire	Rockingham	MOOSEHILL SCHOOL	42.86	-71.38	65.3	66	57	57		
340010006	New Jersey	Atlantic	Brigantine	39.46	-74.45	63.7	64	57	56	57	56
340030006	New Jersey	Bergen	Leonia	40.87	-73.99	74.3	75	69	69	68	68
340070002	New Jersey	Camden	Camden Spruce Street	39.93	-75.13	75.3	77	67	67	66	66
340071001	New Jersey	Camden	Ancora State Hospital	39.68	-74.86	67.3	68	59	59	58	58
340110007	New Jersey	Cumberland	Millville	39.42	-75.03	65.7	67	57	57	57	57
340130003	New Jersey	Essex	Newark Firehouse	40.72	-74.19	68.3	70	61	61	61	61
340150002	New Jersey	Gloucester	Clarksboro	39.80	-75.21	73.7	74	66	66	65	65
340170006	New Jersey	Hudson	Bayonne	40.67	-74.13	71	72	66	65	68	64
340190001	New Jersey	Hunterdon	Flemington	40.52	-74.81	71.3	72	63	63	62	62
340210005	New Jersey	Mercer	Rider University	40.28	-74.74	71.3	72	63	63	62	62
340219991	New Jersey	Mercer	Wash. Crossing	40.31	-74.87	73.3	74	65	65	65	65
340230011	New Jersey	Middlesex	Rutgers University	40.46	-74.43	74.7	75	66	66	65	65
340250005	New Jersey	Monmouth	Monmouth University	40.28	-74.01	67.3	69	60	60	61	59
340273001	New Jersey	Morris	Chester	40.79	-74.68	69	70	61	61	61	61
340290006	New Jersey	Ocean	Colliers Mills	40.06	-74.44	72.7	73	65	65	64	64
340315001	New Jersey	Passaic	Ramapo	41.06	-74.26	67.7	68	60	60	60	60
340410007	New Jersey	Warren	Columbia	40.92	-75.07	64.3	65	57	57	56	56

360010012	New York	Albany	LOUDONVILLE	42.68	-73.76	64	64	57	57	56	56
360050110	New York	Bronx	IS 52	40.82	-73.90	67.7	69	63	63	62	63
360050133	New York	Bronx	PFIZER LAB SITE	40.87	-73.88	70.7	72	67	66	63	65
360130006	New York	Chautauqua	DUNKIRK	42.50	-79.32	68	68	62	61	61	61
360270007	New York	Dutchess	MILLBROOK	41.79	-73.74	67	68	59	59	59	59
360290002	New York	Erie	AMHERST	42.99	-78.77	69.3	70	63	63	65	62
360310002	New York	Essex	WHITEFACE SUMMIT	44.37	-73.90	64	66				
360310003	New York	Essex	WHITEFACE BASE	44.39	-73.86	64.7	65				
360319991	New York	Essex	Huntington Wildlife Forest	43.97	-74.22	57	58				
360337003	New York	Franklin	Y001	44.98	-74.70	58	58				
360410005	New York	Hamilton	PISECO LAKE	43.45	-74.52	61.3	62				
360430005	New York	Herkimer	NICKS LAKE	43.69	-74.99	63	63				
360450002	New York	Jefferson	PERCH RIVER	44.09	-75.97	63	63	57	57	57	57
360551007	New York	Monroe	ROCHESTER 2	43.15	-77.55	65.7	68	59	59	59	59
360610135	New York	New York	CCNY	40.82	-73.95	70.3	72	66	66	64	65
360631006	New York	Niagara	MIDDLEPORT	43.22	-78.48	66.3	67	61	60	61	60
360671015	New York	Onondaga	EAST SYRACUSE	43.05	-76.06	64.3	65	58	58		
360715001	New York	Orange	VALLEY CENTRAL HIGH SCHOOL	41.52	-74.22	64.3	66	57	57	56	56
360750003	New York	Oswego	FULTON	43.28	-76.46	61	63	55		55	54
360790005	New York	Putnam	MT NINHAM	41.46	-73.71	69	70	62	62	62	62
360810124	New York	Queens	QUEENS COLLEGE 2	40.74	-73.82	72.3	74	67	68	66	65
360850067	New York	Richmond	SUSAN WAGNER HS	40.60	-74.13	76	76	71	70	74	70
360870005	New York	Rockland	Rockland County	41.18	-74.03	71.3	72	64	64	64	64
360910004	New York	Saratoga	STILLWATER	43.01	-73.65	63	64	56	56		
361010003	New York	Steuben	PINNACLE STATE PARK	42.09	-77.21	59.7	61				
361030002	New York	Suffolk	BABYLON	40.75	-73.42	74	76	69	68	68	67

361030004	New York	Suffolk	RIVERHEAD	40.96	-72.71	74.3	76	68	67	66	66
361030009	New York	Suffolk	HOLTSVILLE	40.83	-73.06	71	73	66	64	66	64
361099991	New York	Tompkins	Connecticut Hill	42.40	-76.65	62.7	63				
361173001	New York	Wayne	WILLIAMSON	43.23	-77.17	65	67	59	59	59	58
361192004	New York	Westchester	WHITE PLAINS	41.05	-73.76	74	75	70	67	66	68
420010001	Pennsylvania	Adams	NARSTO SITE ARENDTSVILLE	39.92	-77.31	66.5	67	59	59	58	58
420019991	Pennsylvania	Adams	Arendtsville	39.92	-77.31	66.3	67	59	59	58	58
420030008	Pennsylvania	Allegheny	Lawrenceville	40.47	-79.96	68	69	61	61	60	60
420030067	Pennsylvania	Allegheny	South Fayette	40.38	-80.17	69.7	71	62	62	60	60
420031008	Pennsylvania	Allegheny	Harrison	40.62	-79.73	69	70	62	62	61	61
420050001	Pennsylvania	Armstrong	LAT/LON IS CENTER OF TRAILER	40.81	-79.56	69	70	61	61	61	61
420070002	Pennsylvania	Beaver		40.56	-80.50	68.7	70	57	57	54	54
420070005	Pennsylvania	Beaver	DRIVEWAY TO BAKEY RESIDENCE	40.68	-80.36	67.3	68	56	56	51	51
420070014	Pennsylvania	Beaver		40.75	-80.32	65.7	67	55	55	51	51
420110006	Pennsylvania	Berks	Kutztown	40.51	-75.79	65.7	66	58	58	57	57
420110011	Pennsylvania	Berks	Reading Airport	40.38	-75.97	70	70	62	62	60	60
420130801	Pennsylvania	Blair		40.54	-78.37	63.5	64	56	56	56	56
420150011	Pennsylvania	Bradford	Towanda	41.71	-76.51	57.3	59	50	50		
420170012	Pennsylvania	Bucks	A420170012LAT/LONG POINT IS OF SAMPLING INLET	40.11	-74.88	79.3	81	71	71	69	69
420210011	Pennsylvania	Cambria		40.31	-78.92	62.3	63	56	56	54	54
420270100	Pennsylvania	Centre	LAT/LON=POINT SW CORNER OF TRAILER	40.81	-77.88	62.3	63	56	56		
420279991	Pennsylvania	Centre	Penn State	40.72	-77.93	64.7	65	58	58		
420290100	Pennsylvania	Chester	CHESTER COUNTY TRANSPORT SITE INTO PHILADELPHIA	39.83	-75.77	72.7	73	64	64	63	63

420334000	Pennsylvania	Clearfield	MOSHANNON STATE FOREST	41.12	-78.53	64.7	66	58	58	57	57
420430401	Pennsylvania	Dauphin	A420430401LAT/LON POINT IS AT CORNER OF TRAILER	40.25	-76.85	65.3	66	57	57	56	56
420431100	Pennsylvania	Dauphin	A420431100LAT/LON POINT IS AT CORNER OF TRAILER	40.27	-76.68	66	67	58	58	57	57
420450002	Pennsylvania	Delaware	A420450002LAT/LON POINT IS OF CORNER OF TRAILER	39.84	-75.37	71.3	72	64	64	64	64
420479991	Pennsylvania	Elk	Kane Exp. Forest	41.60	-78.77	65.7	66	59	59		
420490003	Pennsylvania	Erie		42.14	-80.04	65	66	59	59	59	57
420550001	Pennsylvania	Franklin	HIGH ELEVATION OZONE SITE	39.96	-77.48	59.3	60	53	53	52	52
420590002	Pennsylvania	Greene	75 KM SSW OF PITTSBURGH RURAL SITE ON A KNOLL WITHIN A LARGE CLEARIN	39.81	-80.27	67	68	61	61	61	61
420630004	Pennsylvania	Indiana		40.56	-78.92	69.7	70	62	62	61	61
420690101	Pennsylvania	Lackawanna	A420690101LAT/LON POINT IS AT CORNER OF TRAILER	41.48	-75.58	66	67	58	58		
420692006	Pennsylvania	Lackawanna	A420692006LAT/LON POINT IS AT CORNER OF TRAILER	41.44	-75.62	62.5	64	55	55		
420710007	Pennsylvania	Lancaster	A420710007LAT/LON POINT AT CORNER OF TRAILER	40.05	-76.28	69.3	70	60	60	60	60
420710012	Pennsylvania	Lancaster	Lancaster DW	40.04	-76.11	65	66	57	57	57	57
420730015	Pennsylvania	Lawrence		41.00	-80.35	66.3	68	57	57	56	56
420750100	Pennsylvania	Lebanon	Lebanon	40.34	-76.38	69	70	60	60	60	60
420770004	Pennsylvania	Lehigh	A420770004LAT/LONG POINT IS OF SAMPLING INLET	40.61	-75.43	69.7	70	62	62	61	61

420791101	Pennsylvania	Luzerne	A420791101LAT/LON POINT IS AT CORNER OF TRAILER	41.27	-75.85	64	64	56	56	55	55
420810100	Pennsylvania	Lycoming	MONTOURSVILLE	41.25	-76.92	63.7	64	56	56		
420850100	Pennsylvania	Mercer		41.22	-80.48	68.7	69	60	60	58	58
420859991	Pennsylvania	Mercer	M.K. Goddard	41.43	-80.15	65.3	66	57	57	56	56
420890002	Pennsylvania	Monroe	SWIFTWATER	41.08	-75.32	66.7	68	58	58	58	58
420910013	Pennsylvania	Montgomery	A420910013LAT/LON POINT IS OF CORNER OF TRAILER	40.11	-75.31	71.3	72	64	64	63	63
420950025	Pennsylvania	Northampton	LAT/LON POINT IS CENTER OF TRAILER	40.63	-75.34	70	71	62	62	60	60
420958000	Pennsylvania	Northampton	COMBINED EASTON SITE (420950100) AND EASTON H2S SPECIAL STUDY SITES	40.69	-75.24	69	69	61	61	60	60
421010004	Pennsylvania	Philadelphia	Air Management Services Laboratory (AMS LAB)	40.01	-75.10	61	61	54	54	53	53
421010024	Pennsylvania	Philadelphia	North East Airport (NEA)	40.08	-75.01	77.7	78	69	69	68	68
421010048	Pennsylvania	Philadelphia	North East Waste (NEW)	39.99	-75.08	75.3	76	67	67	66	66
421119991	Pennsylvania	Somerset	Laurel Hill	39.99	-79.25	65	65	59	59	58	58
421174000	Pennsylvania	Tioga	PENN STATE OZONE MONITORING SITE	41.64	-76.94	63.7	64	56	56		
421250005	Pennsylvania	Washington		40.15	-79.90	67	68	60	60	60	60
421250200	Pennsylvania	Washington		40.17	-80.26	65	65	58	58	57	57
421255001	Pennsylvania	Washington		40.45	-80.42	68	68	58	58	55	55
421290008	Pennsylvania	Westmoreland	LAT/LON POINT IS TRAILER	40.30	-79.51	67	68	61	61	59	59
421330008	Pennsylvania	York	A421330008LAT/LON POINT AT CORNER OF TRAILER	39.97	-76.70	65.7	66	57	57	56	56
421330011	Pennsylvania	York	York DW	39.86	-76.46	69	70	61	61	59	59
440030002	Rhode Island	Kent	AJ	41.62	-71.72	71.3	73	64	64	62	62

440071010	Rhode Island	Providence	FRANCIS SCHOOL East Providence	41.84	-71.36	69.7	73	62	62	67	61
440090007	Rhode Island	Washington	US-EPA Laboratory	41.50	-71.42	69.3	71	63	62	66	65
500030004	Vermont	Bennington	Morse Airport - State of Vermont Property	42.89	-73.25	64.3	65	57	57		
500070007	Vermont	Chittenden	PROCTOR MAPLE RESEARCH CTR	44.53	-72.87	61	62				
500210002	Vermont	Rutland	State of Vermont District Court Parking Lot	43.61	-72.98	63	63				
510030001	Virginia	Albemarle	Albemarle High School	38.08	-78.50	60.5	61	53	53		
510130020	Virginia	Arlington	Aurora Hills Visitors Center	38.86	-77.06	71	72	61	61	60	60
510330001	Virginia	Caroline	USGS Geomagnetic Center: Corbin	38.20	-77.38	61	61	52	52	52	52
510360002	Virginia	Charles	Shirley Plantation	37.34	-77.26	62.3	63	50	50	49	49
510410004	Virginia	Chesterfield	VDOT Chesterfield Residency Shop	37.36	-77.59	61.3	62	50	50	49	49
510590030	Virginia	Fairfax	Lee District Park	38.77	-77.10	70	71	60	60	59	59
510610002	Virginia	Fauquier	Chester Phelps Wildlife Management Area: Sumerduck	38.47	-77.77	58.7	59	51	51	50	50
510690010	Virginia	Frederick	Rest	39.28	-78.08	61.3	62	54	54	53	53
510719991	Virginia	Giles	Horton Station	37.33	-80.56	62	62	55	55		
510850003	Virginia	Hanover	Turner Property: Old Church	37.61	-77.22	63.3	65	51	51	49	49
510870014	Virginia	Henrico	MathScience Innovation Center	37.56	-77.40	65.5	66	52	52	52	52
511071005	Virginia	Loudoun	Broad Run High School: Ashburn	39.02	-77.49	67	68	58	58	57	57
511130003	Virginia	Madison	Shenandoah NP - Big Meadows	38.52	-78.43	63	63	55	55		
511479991	Virginia	Prince Edward	Prince Edward	37.17	-78.31	59.3	60	49	49		
511530009	Virginia	Prince William	James S. Long Park	38.85	-77.63	65.3	66	57	57	56	56

511611004	Virginia	Roanoke	East Vinton Elementary School	37.28	-79.88	61.3	62	53	53		
511630003	Virginia	Rockbridge	Natural Bridge Ranger Station	37.63	-79.51	58	59	50	50		
511650003	Virginia	Rockingham	ROCKINGHAM CO. VDOT	38.48	-78.82	60	60	53	53		
511790001	Virginia	Stafford	Widewater Elementary School	38.48	-77.37	62.3	63	53	53	53	53
511970002	Virginia	Wythe	Rural Retreat Sewage Treatment Plant	36.89	-81.25	60.7	61	54	54		
516500008	Virginia	Hampton City	NASA Langley Research Center	37.10	-76.39	64.3	65	55	54	55	53
518000004	Virginia	Suffolk City	Tidewater Community College	36.90	-76.44	61	62	53	53	53	52
518000005	Virginia	Suffolk City	VA Tech Agricultural Research Station: Holland	36.67	-76.73	59.7	61	52	52		
10030010	Alabama	Baldwin	FAIRHOPE: Alabama	30.50	-87.88	63.7	65	55	55	54	55
10331002	Alabama	Colbert	MUSCLE SHOALS	34.76	-87.64	58.7	59	50	50		
10499991	Alabama	DeKalb	Sand Mountain	34.29	-85.97	62.3	63	54	54		
10550011	Alabama	Etowah	SOUTHSIDE	33.90	-86.05	61.7	63	54	54		
10690004	Alabama	Houston	DOTHAN	31.19	-85.42	58.3	59	50	50		
10730023	Alabama	Jefferson	North Birmingham	33.55	-86.82	66.3	68	55	55	54	54
10731003	Alabama	Jefferson	Fairfield	33.49	-86.92	65.7	66	55	55	55	55
10731005	Alabama	Jefferson	McAdory	33.33	-87.00	65	65	55	55	53	53
10731010	Alabama	Jefferson	Leeds	33.55	-86.55	64.3	66	54	54	53	53
10732006	Alabama	Jefferson	Hoover	33.39	-86.82	66	66	54	54	53	53
10735003	Alabama	Jefferson	Corner	33.80	-86.94	63.5	64	55	55	55	55
10736002	Alabama	Jefferson	Tarrant Elementary School	33.58	-86.77	67.7	68	56	56	56	56
10890014	Alabama	Madison	HUNTSVILLE OLD AIRPORT	34.69	-86.59	64	64	54	54	53	53
10890022	Alabama	Madison	HUNTSVILLE CAPSHAW ROAD	34.77	-86.76	62	62	53	53	51	51
10970003	Alabama	Mobile	CHICKASAW	30.77	-88.09	63	64	55	55	54	54

10972005	Alabama	Mobile	BAY ROAD	30.47	-88.14	63.7	65	56	55	56	56
11011002	Alabama	Montgomery	MOMS: ADEM	32.41	-86.26	61	62	52	52	50	50
11030011	Alabama	Morgan	DECATUR: Alabama	34.53	-86.97	63.7	64	55	55	55	55
11130002	Alabama	Russell	LADONIA: PHENIX CITY	32.47	-85.08	62	62	52	52	51	51
11170004	Alabama	Shelby	HELENA	33.32	-86.83	66.7	67	55	55	54	54
11190003	Alabama	Sumter	Ward: Sumter Co.	32.36	-88.28	57	57	51	51		
11250010	Alabama	Tuscaloosa	DUNCANVILLE: TUSCALOOSA	33.09	-87.46	60	60	51	51	49	49
50199991	Arkansas	Clark	Caddo Valley	34.18	-93.10	57.7	58	50	50		
50350005	Arkansas	Crittenden	MARION	35.20	-90.19	67	68	59	59	58	58
51010002	Arkansas	Newton	DEER	35.83	-93.21	58	59				
51130003	Arkansas	Polk	EAGLE MOUNTAIN	34.45	-94.14	61.7	62	56	56		
51190007	Arkansas	Pulaski	PARR	34.76	-92.28	62.3	64	53	53	52	52
51191002	Arkansas	Pulaski	NLR AIRPORT	34.84	-92.26	63.7	64	54	54	53	53
51430005	Arkansas	Washington	SPRINGDALE	36.18	-94.12	59.7	60	51	51		
51430006	Arkansas	Washington	Fayetteville Airport	36.01	-94.17	59.7	60	52	52		
80013001	Colorado	Adams	Welby	39.84	-104.95	67	67	62	62	61	61
80050002	Colorado	Arapahoe	HIGHLAND RESERVOIR	39.57	-104.96	73	73	67	67	66	66
80050006	Colorado	Arapahoe	Aurora East	39.64	-104.57	67.7	69	63	63	62	62
80310002	Colorado	Denver	DENVER - CAMP	39.75	-104.99	67.7	69	63	63	61	61
80310026	Colorado	Denver	La Casa	39.78	-105.01	68.7	69	64	64	62	62
80350004	Colorado	Douglas	Chatfield State Park	39.53	-105.07	77.3	78	70	70	69	69
80410013	Colorado	El Paso	U.S. AIR FORCE ACADEMY	38.96	-104.82	68	70	63	63	63	63
80410016	Colorado	El Paso	MANITOU SPRINGS	38.85	-104.90	66.7	69	63	63	61	61
80450012	Colorado	Garfield	Rifle-Health Dept	39.54	-107.78	62	63				
80519991	Colorado	Gunnison	Gothic	38.96	-106.99	64.7	65				
80590005	Colorado	Jefferson	WELCH	39.64	-105.14	73	75	67	67	65	65

80590006	Colorado	Jefferson	ROCKY FLATS-N	39.91	-105.19	77.3	78	71	71	70	70
80590011	Colorado	Jefferson	NATIONAL RENEWABLE ENERGY LABS - NREL	39.74	-105.18	79.3	80	73	73	72	72
80590013	Colorado	Jefferson	Aspen Park	39.54	-105.30	70	70	63	63	62	62
80671004	Colorado	La Plata		37.30	-107.48	67	67				
80677001	Colorado	La Plata	LOCATED IN PINE RIVER VALLEY: THE MOST DENSELY POPULATED AREA.	37.14	-107.63	68.7	69				
80690007	Colorado	Larimer	Rocky Mountain NP - Long's Peak	40.28	-105.55	69	70	64	64	63	63
80690011	Colorado	Larimer	FORT COLLINS - WEST	40.59	-105.14	75.7	77	70	70	70	70
80691004	Colorado	Larimer	Fort Collins - CSU - S. Mason	40.58	-105.08	69	70	64	64	63	63
81030005	Colorado	Rio Blanco		40.04	-107.85	60.3	61				
81230009	Colorado	Weld	Greeley - Weld County Tower	40.39	-104.74	70	70	66	66	65	65
120013012	Florida	Alachua	Paynes Prairie Farm	29.57	-82.27	59.3	61	51	51		
120030002	Florida	Baker	OLUSTEE	30.20	-82.44	60	61				
120050006	Florida	Bay	ST.ANDREWS STATE PARK: PANAMA CITY BEACH	30.13	-85.73	60.7	62	54			
120090007	Florida	Brevard	Melbourne	28.05	-80.63	58.3	59				
120094001	Florida	Brevard	Cocoa Beach	28.31	-80.62	61	62				
120110033	Florida	Broward	Vista View Park	26.07	-80.34	59	59				
120110034	Florida	Broward	Daniela Banu NCORE	26.05	-80.26	63	63			57	
120112003	Florida	Broward	Pompano Highlands	26.29	-80.10	61	62				
120118002	Florida	Broward	Dr. Von Mizell-Eula Johnson State Park (prev. John U Lloyd State Park)	26.09	-80.11	62.3	63				
120210004	Florida	Collier	LAURAL OAKS ELEMENTARY	26.27	-81.71	58.7	60				
120230002	Florida	Columbia	Lake City - Veteran's Domicile	30.18	-82.62	60.3	62				

120310077	Florida	Duval	Sheffield	30.48	-81.59	58	58	48	49	44	
120310100	Florida	Duval	Mayo Clinic	30.26	-81.45	60	60	51	51	49	
120310106	Florida	Duval	Cisco Drive	30.38	-81.84	61	61	53	53	50	50
120330004	Florida	Escambia	Ellyson Industrial Park	30.53	-87.20	64	65	55	56	53	55
120330018	Florida	Escambia	Pensacola NAS	30.37	-87.27	63	64	54	56	52	53
120350004	Florida	Flagler	Flagler	29.49	-81.28	59.3	60				
120550003	Florida	Highlands	Archbold Biological Station	27.19	-81.34	60.3	61				
120570081	Florida	Hillsborough	Simmons Park	27.74	-82.47	67.7	68	60	60	59	59
120571035	Florida	Hillsborough	Davis Island	27.93	-82.45	65.7	67	58	57	57	55
120571065	Florida	Hillsborough	USMC Reserve Center (Gandy)	27.89	-82.54	66.3	67	59	58	58	57
120573002	Florida	Hillsborough	SYDNEY	27.97	-82.23	66.3	67	57	57	56	56
120590004	Florida	Holmes	Bonifay	30.85	-85.60	58.7	60				
120619991	Florida	Indian River	Indian River Lagoon	27.85	-80.46	62	63				
120690002	Florida	Lake	Clermont	28.52	-81.72	63.7	65	56	56	55	
120712002	Florida	Lee	Cape Coral - Rotary Park	26.55	-81.98	60.3	62				
120713002	Florida	Lee	Bay Oaks Park	26.45	-81.94	60.3	62				
120730012	Florida	Leon	Tallahassee Community College	30.44	-84.35	60.7	61	51	51		
120779991	Florida	Liberty	Sumatra	30.11	-84.99	56.3	57				
120813002	Florida	Manatee	Port Manatee	27.63	-82.55	61	63	54	53	52	52
120814012	Florida	Manatee	G.T. BRAY PARK	27.48	-82.62	63	64	55	55	54	
120814013	Florida	Manatee	39TH STREET SITE	27.45	-82.52	61	62	53	53	51	49
120830003	Florida	Marion	Ocala YMCA	29.17	-82.10	61.3	62				
120830004	Florida	Marion	Marion County Sheriff	29.19	-82.17	58.7	60				
120850007	Florida	Martin	Stuart	27.17	-80.24	61.7	63				
120860027	Florida	Miami-Dade	Rosenstiel	25.73	-80.16	63	64				

120860029	Florida	Miami-Dade	Perdue	25.59	-80.33	61.5	62				
120910002	Florida	Okaloosa	Ft. Walton Beach	30.43	-86.67	61	62	53	53	52	
120950008	Florida	Orange	Winegard Elementary School	28.45	-81.38	63	64	55	55	53	53
120952002	Florida	Orange	WINTER PARK	28.60	-81.36	63	64	55	55	53	53
120972002	Florida	Osceola	Osceola County Fire Station	28.35	-81.64	64.3	66	55	55	53	53
121010005	Florida	Pasco	San Antonio	28.33	-82.31	61.3	62	53	53		
121012001	Florida	Pasco	Holiday	28.20	-82.76	62	63	54	54	54	53
121030004	Florida	Pinellas	St. Petersburg College	27.95	-82.73	62.7	65	55	55	54	54
121030018	Florida	Pinellas	Azalea Park	27.79	-82.74	60.7	61	55	55	53	53
121035002	Florida	Pinellas	John Chesnut Sr. Park - East Lake	28.09	-82.70	59.7	61	52	52	53	51
121056005	Florida	Polk	Sikes Elementary School	27.94	-82.00	65.3	67	55	55		
121056006	Florida	Polk	Baptist Childrens' Home	28.03	-81.97	64.3	66	54	54		
121110013	Florida	St. Lucie	Savannas	27.39	-80.31	61.3	62				
121130015	Florida	Santa Rosa	Woodlawn Beach Middle School	30.39	-87.01	62	64	54	54	52	51
121151005	Florida	Sarasota	Lido Park	27.31	-82.57	62.7	63	54	54	53	
121151006	Florida	Sarasota	Paw Park	27.35	-82.48	63	64	55	55	53	
121152002	Florida	Sarasota	Jackson Road	27.09	-82.36	61	61	53	53		
121171002	Florida	Seminole	Sanford (Seminole Community College)	28.75	-81.31	62.7	64	53	53	52	52
121272001	Florida	Volusia	Port Orange	29.11	-80.99	59	59			49	
121275002	Florida	Volusia	DAYTONA BLIND SERVICES	29.21	-81.05	59.7	61				
121290001	Florida	Wakulla	St. Marks Wildlife Refuge	30.09	-84.16	59	59				
130210012	Georgia	Bibb	Macon-Forestry	32.81	-83.54	65	65	55	55	53	53
130510021	Georgia	Chatham	Savannah-E. President	32.07	-81.05	57	57	50	50		
130550001	Georgia	Chattooga	Summerville	34.47	-85.41	61	62	52	52	52	52
130590002	Georgia	Clarke	Athens	33.92	-83.34	64.3	65	53	53	53	53

130670003	Georgia	Cobb	Kennesaw	34.02	-84.61	66.5	67	55	55	54	54
130730001	Georgia	Columbia	Evans	33.58	-82.13	60	61	51	51	50	50
130770002	Georgia	Coweta	Newnan	33.40	-84.75	64.5	66	54	54	53	53
130850001	Georgia	Dawson	Dawsonville	34.38	-84.06	65	65	53	53	51	51
130890002	Georgia	DeKalb	South DeKalb	33.69	-84.29	70.3	71	59	59	58	58
130970004	Georgia	Douglas	Douglasville	33.74	-84.78	68	69	57	57	57	57
131210055	Georgia	Fulton	United Avenue	33.72	-84.36	74.3	75	64	64	62	62
131270006	Georgia	Glynn	Brunswick	31.17	-81.50	56.3	57	47			
131350002	Georgia	Gwinnett	Gwinnett	33.96	-84.07	70.7	72	58	58	56	56
131510002	Georgia	Henry	McDonough	33.43	-84.16	72	74	60	60	59	59
132130003	Georgia	Murray	Fort Mountain	34.79	-84.63	65	65	55	55		
132150008	Georgia	Muscogee	Columbus-Airport	32.52	-84.94	61	62	51	51	50	50
132230003	Georgia	Paulding	Yorkville: King Farm	33.93	-85.05	63	63	53	53	52	52
132319991	Georgia	Pike	Georgia Station	33.18	-84.41	67.5	68	57	57	57	57
132450091	Georgia	Richmond	Augusta	33.43	-82.02	61.7	62	53	53	53	53
132470001	Georgia	Rockdale	Conyers	33.59	-84.07	71	74	60	60	59	59
132611001	Georgia	Sumter	Leslie	31.95	-84.08	60.3	61	53	53		
170010007	Illinois	Adams	JOHN WOOD COMMUNITY COLLEGE	39.92	-91.34	62.7	63				
170190007	Illinois	Champaign	Thomasboro	40.24	-88.19	65.3	68	59	59	58	58
170191001	Illinois	Champaign	ISWS CLIMATE STATION	40.05	-88.37	65.7	66	59	59	58	58
170230001	Illinois	Clark	416 S. State St. Hwy 1-West Union	39.21	-87.67	65	66	58	58	57	57
170310001	Illinois	Cook	VILLAGE GARAGE	41.67	-87.73	73	77	69	69	67	67
170310032	Illinois	Cook	SOUTH WATER FILTRATION PLANT	41.76	-87.55	72.3	75	68	69	69	67
170310076	Illinois	Cook	COM ED MAINTENANCE BLDG	41.75	-87.71	72	75	68	68	67	67
170311003	Illinois	Cook	TAFT HS	41.98	-87.79	68.3	69	65	64	64	63

170311601	Illinois	Cook	COOK COUNTY TRAILER	41.67	-87.99	69.3	70	64	64	63	63
170313103	Illinois	Cook	IEPA TRAILER	41.97	-87.88	62.7	64	59	59	57	57
170314002	Illinois	Cook	COOK COUNTY TRAILER	41.86	-87.75	68.7	72	66	65	65	64
170314007	Illinois	Cook	REGIONAL OFFICE BUILDING	42.06	-87.86	72	74	67	67	66	65
170314201	Illinois	Cook	NORTHBROOK WATER PLANT	42.14	-87.80	73.3	77	68	68	67	67
170317002	Illinois	Cook	WATER PLANT	42.06	-87.68	74	77	69	69	69	68
170436001	Illinois	DuPage	MORTON ARBORETUM	41.81	-88.07	69.7	71	64	64	63	63
170491001	Illinois	Effingham	CENTRAL JR HIGH	39.07	-88.55	65.7	67	59	59		
170650002	Illinois	Hamilton	TEN MILE CREEK DNR OFFICE	38.08	-88.62	65.7	67	59	59		
170831001	Illinois	Jersey	ILLINI JR HIGH	39.11	-90.32	68	68	61	61	61	61
170859991	Illinois	Jo Daviess	Stockton	42.29	-90.00	64.7	65				
170890005	Illinois	Kane	LARSEN JUNIOR HIGH	42.05	-88.27	69.3	71	63	63	62	62
170971007	Illinois	Lake	CAMP LOGAN TRAILER	42.47	-87.81	73.7	75	68	68	69	67
171110001	Illinois	McHenry	CARY GROVE HS	42.22	-88.24	69.7	72	63	63	62	62
171132003	Illinois	McLean	ISU HARRIS PHYSICAL PLANT	40.52	-89.00	64.3	65	59	59		
171150013	Illinois	Macon	IEPA TRAILER	39.87	-88.93	66.3	67	60	60		
171170002	Illinois	Macoupin	IEPA TRAILER	39.40	-89.81	65	66	57	57		
171190008	Illinois	Madison	CLARA BARTON SCHOOL	38.89	-90.15	70	71	63	63	63	63
171191009	Illinois	Madison	SOUTHWEST CABLE TV	38.73	-89.96	69	72	61	61	61	61
171193007	Illinois	Madison	WATER PLANT	38.86	-90.11	70.7	71	63	63	63	63
171199991	Illinois	Madison	Alhambra	38.87	-89.62	67.3	68	60	60	59	59
171430024	Illinois	Peoria	FIRESTATION	40.69	-89.61	65	67	60	60	59	59
171431001	Illinois	Peoria	PEORIA HEIGHTS HS	40.75	-89.59	66	67	60	60	60	60
171570001	Illinois	Randolph	IEPA TRAILER	38.18	-89.79	66.3	67	59	59	60	60
171613002	Illinois	Rock Island	ROCK ISLAND ARSENAL	41.51	-90.52	63.3	65				

171630010	Illinois	Saint Clair	IEPA-RAPS TRAILER	38.61	-90.16	69	71	61	61	61	61
171670014	Illinois	Sangamon	Illinois Building State Fairgrounds	39.83	-89.64	66	68	59	59		
171971011	Illinois	Will	COM ED TRAINING CENTER	41.22	-88.19	65.3	67	60	60		
172012001	Illinois	Winnebago	MAPLE ELEMENTARY SCHOOL	42.33	-89.04	67.3	68	60	60		
180030002	Indiana	Allen	Leo High School	41.22	-85.02	64.7	67	58	58	56	56
180030004	Indiana	Allen	Ft. Wayne- Beacon St.	41.09	-85.10	64	66	57	57	55	55
180050007	Indiana	Bartholomew	Hope- Hauser Jr-Sr High School	39.29	-85.77	67.7	68	61	61	60	60
180110001	Indiana	Boone	Perry Worth ELEMENTRY SCHOOL: WEST OF WHITESTOWN	40.00	-86.40	67	69	60	60	59	59
180150002	Indiana	Carroll	Flora-Flora Airport	40.54	-86.55	63.7	64	57	57	56	56
180190008	Indiana	Clark	Charlestown State Park- 1051.8 meters East of SR 62/ Indiana armory	38.39	-85.66	70.3	71	62	62	61	61
180350010	Indiana	Delaware	Albany- Albany Elem. Sch.	40.30	-85.25	62.3	66	55	55	54	54
180390007	Indiana	Elkhart	Bristol- Bristol Elem. Sch.	41.72	-85.82	64.3	68	58	58	57	57
180431004	Indiana	Floyd	New Albany- Green Valley Elem. Sch.	38.31	-85.83	71	73	63	63	62	62
180550001	Indiana	Greene	Plummer: 2500 S. W- Citizens gas Plummer maintenance faciliy	38.99	-86.99	66.7	67	58	58	57	57
180570006	Indiana	Hamilton	Our Lady of Grace- Noblesville	40.07	-85.99	66.3	69	60	60	57	57
180630004	Indiana	Hendricks	AVON- 255 S. SR 267 (also 255 S. Avon Ave.) Avon: IN	39.76	-86.40	63.3	67	58	58	56	56
180690002	Indiana	Huntington	Roanoke- Roanoke Elem. School	40.96	-85.38	60.7	64	54	54	53	53
180710001	Indiana	Jackson	Brownstown- 225 W & 200 N. Water facility	38.92	-86.08	65.7	66	58	58	57	57
180810002	Indiana	Johnson	Indian Creek Elementary School in Trafalgar: DUE SOUTH OF INDIANAPOLIS	39.42	-86.15	61	62	55	55	53	53

180839991	Indiana	Knox	Vincennes	38.74	-87.49	66.7	69	58	58	58	58
180890022	Indiana	Lake	Gary-IITRI/ 1219.5 meters east of Tennessee St.- old ammuntion bunker	41.61	-87.30	68.3	70	64	64	63	63
180892008	Indiana	Lake	HAMMOND CAAP- Hammond- 141st St.	41.64	-87.49	65.5	66	61	62	61	61
180910010	Indiana	LaPorte	LAPORTE OZONE SITE AT WATER TREATMENT PLANT	41.63	-86.68	65	67	60	59	60	59
180950010	Indiana	Madison	SCHOOL LOCATED ON THE SW CORNER OF US 36 AND IND 109	40.00	-85.66	62.3	68	55	55	53	53
180970050	Indiana	Marion	Indpls.- Ft. Harrison	39.86	-86.02	70.3	72	64	64	61	61
180970057	Indiana	Marion	Indpls- Harding St.	39.75	-86.19	66	69	61	61	59	59
180970073	Indiana	Marion	Indpls.- E. 16th St.	39.79	-86.06	65.5	66	60	60	57	57
180970078	Indiana	Marion	Indpls- Washington Park/ in parking lot next to police station	39.81	-86.11	68.5	69	64	64	61	61
180970087	Indiana	Marion	Indpls.- I 70	39.79	-86.13	65.3	67	61	61	58	58
181090005	Indiana	Morgan	Monrovia- Monrovia HS.	39.58	-86.48	63	64	57	57	56	56
181230009	Indiana	Perry	Leopold- Perry Central HS	38.12	-86.60	66.7	67	59	59	58	58
181270024	Indiana	Porter	Ogden Dunes- Water Treatment Plant	41.62	-87.20	69.7	71	64	64	64	64
181270026	Indiana	Porter	VALPARAISO	41.51	-87.04	69.3	73	64	64	63	63
181290003	Indiana	Posey	ST. PHILLIPS- St. Phillips road CAAP trailer	38.01	-87.72	66.7	67	60	60	59	59
181410010	Indiana	St. Joseph	Potato Creek State Park	41.55	-86.37	65	68	59	59	58	58
181410015	Indiana	St. Joseph	South Bend-Shields Dr.	41.70	-86.21	70	72	63	63	63	63
181410016	Indiana	St. Joseph	Granger-Beckley St.	41.75	-86.11	67.3	69	61	61	60	60
181450001	Indiana	Shelby	TRITON Middle SCHOOL: NORTH OF FAIRLAND	39.61	-85.87	64.7	68	59	59	56	56
181630013	Indiana	Vanderburgh	Inglefield/ Scott School	38.11	-87.54	68.3	69	61	61	60	60
181630021	Indiana	Vanderburgh	Evansville- Buena Vista	38.01	-87.58	69	70	62	62	62	62

181670018	Indiana	Vigo	TERRE HAUTE CAAP/ McLean High School	39.49	-87.40	66.7	68	59	59	58	58
181670024	Indiana	Vigo	Sandcut/ SITE LOCATED BY HOME BEHIND SHED.	39.56	-87.31	64.3	67	57	57	56	56
181699991	Indiana	Wabash	Salamonie Reservoir	40.82	-85.66	68.7	70	61	61		
181730008	Indiana	Warrick	Boonville- Boonville HS	38.05	-87.28	68.7	69	62	62	61	61
181730009	Indiana	Warrick	Lynnville- Tecumseh HS	38.19	-87.34	66	66	58	58	58	58
181730011	Indiana	Warrick	Dayville	37.95	-87.32	67.7	68	61	61	61	61
190170011	Iowa	Bremer	WAVERLY AIRPORT SITE	42.74	-92.51	61	63				
190450021	Iowa	Clinton	CLINTON: RAINBOW PARK	41.87	-90.18	63	64				
190850007	Iowa	Harrison		41.83	-95.93	62.7	64				
190851101	Iowa	Harrison	PISGAH: HIGHWAY MAINTENANCE	41.78	-95.95	62	62				
191130028	Iowa	Linn	KIRKWOOD	41.91	-91.65	61	61				
191130033	Iowa	Linn	COGGON ELEMENTARY SCHOOL BLDG. NORTHERN LIMITS OF LINN COUNTY	42.28	-91.53	62.3	65				
191130040	Iowa	Linn	Public Health	41.98	-91.69	61.7	63				
191370002	Iowa	Montgomery	VIKING LAKE STATE PARK	40.97	-95.04	60.3	61				
191471002	Iowa	Palo Alto	EMMETSBURG: IOWA LAKES COMMUNITY COLL.	43.12	-94.69	61.3	62				
191530030	Iowa	Polk	CARPENTER	41.60	-93.64	60	61				
191630014	Iowa	Scott	SCOTT COUNTY PARK	41.70	-90.52	63.3	65				
191630015	Iowa	Scott	DAVENPORT: JEFFERSON SCH.	41.53	-90.59	61.3	63				
191690011	Iowa	Story	SLATER CITY HALL	41.88	-93.69	60	60				
191770006	Iowa	Van Buren	LAKE SUGEMA STATE PARK II	40.70	-92.01	60	61				
191810022	Iowa	Warren	GRAVEL ROAD IN LAKE AQUABI STATE PARK	41.29	-93.58	58	58				
200910010	Kansas	Johnson	HERITAGE PARK	38.84	-94.75	60	61	55	55	53	53
201030003	Kansas	Leavenworth	Leavenworth	39.33	-94.95	61.3	63	54	54	53	53

201330003	Kansas	Neosho	CHANUTE	37.68	-95.48	61	61	55	55		
201730010	Kansas	Sedgwick	WICHITA HD	37.70	-97.31	63.7	65				
201730018	Kansas	Sedgwick	Sedgwick Ozone	37.90	-97.49	64	65				
201770013	Kansas	Shawnee	KNI	39.02	-95.71	62.3	63	56	56	55	55
201910002	Kansas	Sumner	PECK	37.48	-97.37	63.7	64				
201950001	Kansas	Trego	CEDAR BLUFF	38.77	-99.76	61.7	63				
202090021	Kansas	Wyandotte	JFK	39.12	-94.64	63	64	57	57	55	55
210130002	Kentucky	Bell	MIDDLESBORO	36.61	-83.74	60.7	61	53	53		
210150003	Kentucky	Boone	EAST BEND	38.92	-84.85	63	64	57	57	57	57
210190017	Kentucky	Boyd	ASHLAND PRIMARY (FIVCO)	38.46	-82.64	65	66	61	61	60	60
210290006	Kentucky	Bullitt	SHEPHERDSVILLE	37.99	-85.71	65.7	66	60	60	59	59
210373002	Kentucky	Campbell	NORTHERN KENTUCKY UNIVERSITY (NKU)	39.02	-84.47	68.7	70	61	61	61	61
210430500	Kentucky	Carter	GRAYSON LAKE	38.24	-82.99	62	63	56	56	56	56
210470006	Kentucky	Christian	HOPKINSVILLE	36.91	-87.32	61	62	54	54		
210590005	Kentucky	Daviess	OWENSBORO PRIMARY	37.78	-87.08	65	65	56	56	56	56
210610501	Kentucky	Edmonson	Mammoth Cave NP - Houchin Meadow	37.13	-86.14	63.7	64	55	55		
210670012	Kentucky	Fayette	LEXINGTON PRIMARY	38.07	-84.50	65.7	67	58	58	56	56
210890007	Kentucky	Greenup	WORTHINGTON	38.55	-82.73	61.7	63	57	57	56	56
210910012	Kentucky	Hancock	LEWISPORT	37.94	-86.90	67.5	68	59	59	58	58
210930006	Kentucky	Hardin	ELIZABETHTOWN	37.71	-85.85	64.7	65	57	57	58	58
211010014	Kentucky	Henderson	BASKETT	37.87	-87.46	68.3	69	61	61	61	61
211110027	Kentucky	Jefferson	Bates	38.14	-85.58	69	69	61	61	61	61
211110051	Kentucky	Jefferson	Watson Lane	38.06	-85.90	68.3	69	62	62	60	60
211110067	Kentucky	Jefferson	CANNONS LANE	38.23	-85.65	74.3	75	66	66	64	64
211130001	Kentucky	Jessamine	NICHOLASVILLE	37.89	-84.59	64	65	57	57	56	56

211390003	Kentucky	Livingston	SMITHLAND	37.16	-88.39	65	66	58	58	58	58
211451024	Kentucky	McCracken	JACKSON PURCHASE (PADUCAH PRIMARY)	37.06	-88.57	62.7	63	57	57	57	57
211759991	Kentucky	Morgan	Crockett	37.92	-83.07	64	64	58	58		
211850004	Kentucky	Oldham	BUCKNER	38.40	-85.44	68.3	70	60	60	60	60
211930003	Kentucky	Perry	HAZARD	37.28	-83.21	58	58	52	52		
211950002	Kentucky	Pike	PIKEVILLE PRIMARY	37.48	-82.54	59.3	60	54	54		
211990003	Kentucky	Pulaski	SOMERSET	37.10	-84.61	61	62	54	54		
212130004	Kentucky	Simpson	FRANKLIN	36.71	-86.57	63.7	64	56	56		
212219991	Kentucky	Trigg	Cadiz	36.78	-87.85	62	63	55	55		
212270009	Kentucky	Warren	ED SPEAR PARK (SMITHS GROVE)	37.05	-86.21	61.3	62	53	53		
212299991	Kentucky	Washington	Mackville	37.70	-85.05	64	64	57	57	57	57
220050004	Louisiana	Ascension	Dutchtown	30.23	-90.97	70	71	64	64	64	64
220150008	Louisiana	Bossier	Shreveport / Airport	32.54	-93.75	65.3	66	58	58	57	57
220170001	Louisiana	Caddo	Dixie	32.68	-93.86	63.3	64	57	57		
220190002	Louisiana	Calcasieu	Carlyss	30.14	-93.37	66.3	68	62	62	62	62
220190009	Louisiana	Calcasieu	Vinton	30.23	-93.58	64	64	59	59		
220330003	Louisiana	East Baton Rouge	LSU	30.42	-91.18	71	72	65	65	65	65
220330009	Louisiana	East Baton Rouge	Capitol	30.46	-91.18	67.3	69	61	61	60	60
220470009	Louisiana	Iberville	Bayou Plaquemine	30.22	-91.32	66	66	61	61	60	60
220511001	Louisiana	Jefferson	Kenner	30.04	-90.27	66.7	68	60	62	61	61
220550007	Louisiana	Lafayette	Lafayette / USGS	30.23	-92.04	65	66	59	59		
220570004	Louisiana	Lafourche	Thibodaux	29.76	-90.77	63.7	65	59	59	58	58
220630002	Louisiana	Livingston	French Settlement	30.32	-90.81	68	70	62	62	61	61
220730004	Louisiana	Ouachita	Monroe / Airport	32.51	-92.05	59	59	54	54		

220770001	Louisiana	Pointe Coupee	New Roads	30.68	-91.37	67	68	62	62	62	62
220870004	Louisiana	St. Bernard	Meraux	29.94	-89.92	65.3	66	59	59	59	59
220930002	Louisiana	St. James	Convent	29.99	-90.82	63.3	65	58	58	58	58
220950002	Louisiana	St. John the Baptist	Garyville	30.06	-90.62	65	66	60	60	59	59
220990001	Louisiana	St. Martin	St.Martinville	30.09	-91.87	65	65	59	59		
221030002	Louisiana	St. Tammany	Madisonville	30.43	-90.20	66	68	58	59	57	
221210001	Louisiana	West Baton Rouge	Port Allen	30.50	-91.21	67	68	61	61	60	60
260050003	Michigan	Allegan	Holland	42.77	-86.15	73.7	75	67	67	68	67
260190003	Michigan	Benzie		44.62	-86.11	68.3	69	62	62	62	61
260210014	Michigan	Berrien	Coloma	42.20	-86.31	73.3	74	67	67	68	66
260270003	Michigan	Cass	Cassopolis	41.90	-86.00	72	74	64	64	64	64
260330901	Michigan	Chippewa	NORTH OF EASTERDAY AVENUE	46.49	-84.36	58	59			52	
260370001	Michigan	Clinton	ROSE LAKE: STOLL RD.(8562 E.)	42.80	-84.39	67	67	59	59	57	57
260490021	Michigan	Genesee		43.05	-83.67	67.7	68	61	61	59	59
260492001	Michigan	Genesee	Otisville	43.17	-83.46	68	69	60	60	59	59
260630007	Michigan	Huron	RURAL THUMB AREA OZONE SITE	43.84	-82.64	67.7	68	62		63	
260650012	Michigan	Ingham		42.74	-84.53	67	67	59	59	57	57
260770008	Michigan	Kalamazoo	KALAMAZOO FAIRGROUNDS	42.28	-85.54	69.7	71	62	62	61	61
260810020	Michigan	Kent	GR-Monroe	42.98	-85.67	69	70	62	62	62	62
260810022	Michigan	Kent	APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE RD	43.18	-85.42	67.3	68	60	60		
260910007	Michigan	Lenawee	6792 RAISIN CENTER HWY: LENAWEE CO.RD.COMM.OWNER: TECUMSEH	42.00	-83.95	67	68	60	60	59	59

260990009	Michigan	Macomb	New Haven	42.73	-82.79	71.7	72	64	64	64	63
260991003	Michigan	Macomb		42.51	-83.01	67.3	69	60	60	59	59
261010922	Michigan	Manistee		44.31	-86.24	67	68	60	60	60	60
261050007	Michigan	Mason	LOCATED 550 FT NORTH OF US10	43.95	-86.29	68.7	70	62	62	61	61
261130001	Michigan	Missaukee	LOCATED ABOUT 1/4 MILE WEST OF SITE	44.31	-84.89	66.7	67				
261210039	Michigan	Muskegon		43.28	-86.31	75	76	68	68	68	68
261250001	Michigan	Oakland	Oak Park	42.46	-83.18	70.7	73	64	64	61	61
261390005	Michigan	Ottawa	Jenison	42.89	-85.85	69.3	70	63	63	63	63
261470005	Michigan	St. Clair	Port Huron	42.95	-82.46	72	73	66	65	66	65
261530001	Michigan	Schoolcraft	Seney	46.29	-85.95	67	70				
261579991	Michigan	Tuscola	Unionville	43.61	-83.36	65.7	66	59		59	
261610008	Michigan	Washtenaw	TOWNER ST: SOUTH; 2 LANE RESIDENIAL - HOSPITAL	42.24	-83.60	67.7	69	61	61	60	60
261619991	Michigan	Washtenaw	Ann Arbor	42.42	-83.90	69.3	71	62	62	60	60
261630001	Michigan	Wayne	Allen Park	42.23	-83.21	66.3	68	60	60	59	59
261630019	Michigan	Wayne	East 7 Mile	42.43	-83.00	73	74	64	64	63	63
261659991	Michigan	Wexford	Hoxeyville	44.18	-85.74	66.7	67	60	60		
270031001	Minnesota	Anoka	Cedar Creek	45.40	-93.20	60	61	54	54	54	54
270031002	Minnesota	Anoka	Anoka County Airport	45.14	-93.21	62.7	63	59	59	59	59
270052013	Minnesota	Becker	FWS Wetland Management District	46.85	-95.85	58.7	59				
270177417	Minnesota	Carlton	Fond du Lac Band	46.71	-92.51	59	59				
270353204	Minnesota	Crow Wing	Brainerd Lakes Regional Airport	46.40	-94.13	59	59				
270495302	Minnesota	Goodhue	Stanton Air Field	44.47	-93.01	60.7	61				
270530962	Minnesota	Hennepin	Near Road I-35/I-94	44.97	-93.25	55.7	56	52	52	52	52
270750005	Minnesota	Lake	Boundary Waters	47.95	-91.50	55.7	56				

270834210	Minnesota	Lyon	Southwest Minnesota Regional Airport	44.44	-95.82	59.3	60				
270953051	Minnesota	Mille Lacs	Mille Lacs Band	46.21	-93.76	60	60	53		52	
271095008	Minnesota	Olmsted	Ben Franklin School	44.00	-92.45	60.7	61				
271370034	Minnesota	Saint Louis	Voyageurs NP - Sullivan Bay	48.41	-92.83	54.7	55				
271377550	Minnesota	Saint Louis	U of M - Duluth	46.82	-92.09	53	53			47	
271390505	Minnesota	Scott	B.F. Pearson School	44.79	-93.51	61.3	63	57	57	56	56
271453052	Minnesota	Stearns	Talahi School	45.55	-94.13	60	61				
271636016	Minnesota	Washington	St. Croix Watershed Research Station	45.17	-92.77	60	61	54	54	54	54
271713201	Minnesota	Wright	St. Michael Elementary School	45.21	-93.67	61.3	63				
280110001	Mississippi	Bolivar	Cleveland	33.75	-90.72	62	62				
280330002	Mississippi	DeSoto	Hernando	34.82	-89.99	63.7	65	55	55	55	55
280450003	Mississippi	Hancock	Waveland	30.30	-89.40	61.7	63	53	53	52	52
280470008	Mississippi	Harrison	Gulfport Youth Court	30.39	-89.05	65.3	67	56	57	55	54
280490020	Mississippi	Hinds	Jackson NCORE	32.33	-90.18	60.3	61	49	49		
280490021	Mississippi	Hinds	Hinds CC	32.35	-90.23	62	63	50	50		
280590006	Mississippi	Jackson	Pascagoula	30.38	-88.53	64.7	67	57	57	56	
280750003	Mississippi	Lauderdale	Meridian	32.36	-88.73	57	58	50	50		
280810005	Mississippi	Lee	TUPELO AIRPORT NEAR OLD NWS OFFICE	34.26	-88.77	58.3	59				
281619991	Mississippi	Yalobusha	Coffeeville	34.00	-89.80	55.7	57				
290030001	Missouri	Andrew	Savannah	39.95	-94.85	62.7	63	56	56		
290190011	Missouri	Boone	Finger Lakes	39.08	-92.32	63.3	64	55	55		
290270002	Missouri	Callaway	New Bloomfield	38.71	-92.09	62.7	64	55	55		
290370003	Missouri	Cass	Richard Gebaur-South	38.76	-94.58	63	63	57	57	56	56
290390001	Missouri	Cedar	El Dorado Springs	37.69	-94.04	60.7	61				
290470003	Missouri	Clay	Watkins Mill State Park	39.41	-94.27	66.7	69	59	59	59	59

290470005	Missouri	Clay	Liberty	39.30	-94.38	66	69	59	59	59	59
290470006	Missouri	Clay	Rocky Creek	39.33	-94.58	68.7	70	62	62	62	62
290490001	Missouri	Clinton	Trimble	39.53	-94.56	67.3	68	60	60	59	59
290770036	Missouri	Greene	Hillcrest High School	37.26	-93.30	60	61	52	52		
290770042	Missouri	Greene	Fellows Lake	37.32	-93.20	60.3	61	53	53		
290970004	Missouri	Jasper	Alba	37.24	-94.42	60.7	61	53	53		
290990019	Missouri	Jefferson	Arnold West	38.45	-90.40	69	70	60	60	59	59
291130003	Missouri	Lincoln	Foley	39.05	-90.87	65	65	57	57	57	57
291370001	Missouri	Monroe	MTSP	39.47	-91.79	59.3	60				
291570001	Missouri	Perry		37.70	-89.70	67	67	59	59		
291831002	Missouri	Saint Charles	West Alton	38.87	-90.23	72.7	74	65	65	64	64
291831004	Missouri	Saint Charles	Orchard Farm	38.90	-90.45	71	72	63	63	62	62
291860005	Missouri	Sainte Genevieve	Bonne Terre	37.90	-90.42	65.3	66	59	59	60	60
291890005	Missouri	Saint Louis	Pacific	38.49	-90.71	65	66	57	57	57	57
291890014	Missouri	Saint Louis	Maryland Heights	38.71	-90.48	70	71	62	62	61	61
292130004	Missouri	Taney	Branson	36.71	-93.22	57	57	50	50		
295100085	Missouri	St. Louis City	Blair Street	38.66	-90.20	67.3	71	60	60	59	59
300710010	Montana	Phillips	Malta	48.32	-107.86	55.3	56				
300750001	Montana	Powder River	BROADUS	45.44	-105.37	58.5	60				
300830001	Montana	Richland	Sidney Oil Field	47.80	-104.49	55	55				
300870001	Montana	Rosebud	Birney - Tongue river	45.37	-106.49	57	58				
310550019	Nebraska	Douglas	4102 Woolworth Ave. on Healthcenter Warehouse	41.25	-95.97	62.7	64	59	59	58	58
310550028	Nebraska	Douglas		41.21	-95.95	60	62	57	57	56	56
310550053	Nebraska	Douglas	Whitmore	41.32	-95.94	63.5	64	60	60	59	59
311079991	Nebraska	Knox	Santee Sioux	42.83	-97.85	64	65				

311090016	Nebraska	Lancaster		40.98	-96.68	60	60				
350010023	New Mexico	Bernalillo	DEL NORTE HIGH SCHOOL	35.13	-106.59	67.3	70	63	63	62	62
350010029	New Mexico	Bernalillo	SOUTH VALLEY	35.02	-106.66	65.3	66	61	61	60	60
350011012	New Mexico	Bernalillo	Foothills	35.19	-106.51	66.7	69	63	63	62	62
350130008	New Mexico	Dona Ana	6O La Union	31.93	-106.63	67.3	68	64	64	63	63
350130020	New Mexico	Dona Ana	6ZK Chaparral	32.04	-106.41	68.3	71	65	65	64	64
350130021	New Mexico	Dona Ana	6ZM Desert View	31.80	-106.58	72.7	74	69	69	69	69
350130022	New Mexico	Dona Ana	6ZN Santa Teresa	31.79	-106.68	71.3	74				
350130023	New Mexico	Dona Ana	6ZQ Solano	32.32	-106.77	66	67				
350151005	New Mexico	Eddy	5ZR ON BLM LAND BORDERING RESIDENTIAL AREA OUTSIDE CARLSBAD CITY LIM	32.38	-104.26	69.7	74				
350153001	New Mexico	Eddy	Carlsbad Caverns NP - Maintenance Area	32.18	-104.44	71	71				
350250008	New Mexico	Lea	5ZS Hobbs Jefferson	32.73	-103.12	67.7	70				
350390026	New Mexico	Rio Arriba	3CRD Coyote Ranger District	36.19	-106.70	65.3	67	61	61	61	61
350431001	New Mexico	Sandoval		35.30	-106.55	65.7	68	61	61	61	61
350490021	New Mexico	Santa Fe		35.62	-106.08	64	66	60	60		
350610008	New Mexico	Valencia		34.81	-106.74	65.3	67	61	61	60	60
370030005	North Carolina	Alexander	Taylorsville Liledoun	35.91	-81.19	64.3	65	52	52	51	51
370110002	North Carolina	Avery	Linville Falls	35.97	-81.93	61.7	62	53	53		
370119991	North Carolina	Avery	Cranberry	36.11	-82.05	64	64	56	56		
370210030	North Carolina	Buncombe	Bent Creek	35.50	-82.60	62	63	54	54		
370270003	North Carolina	Caldwell	Lenoir (city)	35.94	-81.53	64	64	53	53		

370330001	North Carolina	Caswell	Cherry Grove	36.31	-79.47	62	63	52	52		
370510008	North Carolina	Cumberland	Wade	35.16	-78.73	62	63	54	54		
370510010	North Carolina	Cumberland	Honeycutt School	35.00	-78.99	63.3	64	55	55		
370630015	North Carolina	Durham	Durham Armory	36.03	-78.90	61.7	62	52	52	51	51
370650099	North Carolina	Edgecombe	Leggett	35.99	-77.58	62	62	52	52		
370670022	North Carolina	Forsyth	Hattie Avenue	36.11	-80.23	66.7	67	56	56	54	54
370670030	North Carolina	Forsyth	Clemmons Middle	36.03	-80.34	67.3	68	56	56	55	55
370671008	North Carolina	Forsyth	Union Cross	36.05	-80.14	66.3	67	56	56	54	54
370750001	North Carolina	Graham	Joanna Bald	35.26	-83.80	63.5	64	55	55		
370770001	North Carolina	Granville	Butner	36.14	-78.77	64.3	65	54	54		
370810013	North Carolina	Guilford	Mendenhall School	36.11	-79.80	65.3	66	55	55	52	52
370870008	North Carolina	Haywood	Waynesville School	35.51	-82.96	61.3	62	54	54		
370870035	North Carolina	Haywood	Frying Pan Mountain	35.38	-82.79	64.3	66	56	56		
370870036	North Carolina	Haywood	Purchase Knob	35.59	-83.07	64.3	65	56	56		
371010002	North Carolina	Johnston	West Johnston Co.	35.59	-78.46	63.7	65	54	54	53	53
371050002	North Carolina	Lee	Blackstone	35.43	-79.29	61.5	62	53	53		
371070004	North Carolina	Lenoir	Lenoir Co. Comm. Coll.	35.23	-77.57	62.7	63				
371090004	North Carolina	Lincoln	Crouse	35.44	-81.28	66.3	67	55	55	53	53
371139991	North Carolina	Macon	Coweeta	35.06	-83.43	61.3	62	52	52		

371170001	North Carolina	Martin	Jamesville School	35.81	-76.91	60	60				
371190041	North Carolina	Mecklenburg	Garinger High School	35.24	-80.79	68.7	69	59	59	57	57
371190046	North Carolina	Mecklenburg	University Meadows	35.31	-80.71	70	70	59	59	57	57
371239991	North Carolina	Montgomery	Candor	35.26	-79.84	61	61	51	51		
371290002	North Carolina	New Hanover	Castle Hayne	34.36	-77.84	59	60	51			
371450003	North Carolina	Person	Bushy Fork	36.31	-79.09	62	63	51	51	49	49
371470006	North Carolina	Pitt	Pitt Agri. Center	35.64	-77.36	62.7	64	54	54		
371570099	North Carolina	Rockingham	Bethany sch.	36.31	-79.86	65.3	66	54	54	51	51
371590021	North Carolina	Rowan	Rockwell	35.55	-80.40	63.7	65	53	53	51	51
371730002	North Carolina	Swain	Bryson City	35.43	-83.44	60	60	52	52		
371730007	North Carolina	Swain		35.50	-83.31	59	61	51	51		
371790003	North Carolina	Union	Monroe School	34.97	-80.54	67.7	68	59	59	58	58
371830014	North Carolina	Wake	Millbrook School	35.86	-78.57	65.7	66	56	56	54	54
371990004	North Carolina	Yancey	Mt. Mitchell	35.77	-82.26	65	65	56	56		
380070002	North Dakota	Billings	PAINTED CANYON	46.89	-103.38	59	60				
380130004	North Dakota	Burke	LOSTWOOD NWR	48.64	-102.40	58.3	59				
380171004	North Dakota	Cass	FARGO NW	46.93	-96.86	58	59				
380250003	North Dakota	Dunn	DUNN CENTER	47.31	-102.53	58	58				
380530002	North Dakota	McKenzie	TRNP-NU	47.58	-103.30	57.7	58				
380570004	North Dakota	Mercer	BEULAH NORTH	47.30	-101.77	57	58				
380650002	North Dakota	Oliver	HANNOVER	47.19	-101.43	59.3	60				

381050003	North Dakota	Williams	Williston	48.15	-103.64	57	58				
390030009	Ohio	Allen	Lima	40.77	-84.05	67.7	70	61	61	60	60
390071001	Ohio	Ashtabula	Conneaut	41.96	-80.57	70	70	64	63	64	62
390170004	Ohio	Butler	HAMILTON	39.38	-84.54	72	72	65	65	63	63
390170018	Ohio	Butler	Middletown Airport	39.53	-84.39	71.3	73	64	64	62	62
390179991	Ohio	Butler	Oxford	39.53	-84.73	69.3	70	62	62	61	61
390230001	Ohio	Clark	Springfield Well Fd	40.00	-83.80	69.3	70	62	62	60	60
390230003	Ohio	Clark	Mud Run	39.86	-84.00	68.3	69	61	61	59	59
390250022	Ohio	Clermont	Batavia	39.08	-84.14	70	70	62	62	61	61
390271002	Ohio	Clinton	Wilmington	39.43	-83.79	69.7	70	62	62	61	61
390350034	Ohio	Cuyahoga	District 6	41.56	-81.58	69	70	63	63	66	64
390350060	Ohio	Cuyahoga	GT Craig NCore	41.49	-81.68	62.7	64	57	56	60	56
390350064	Ohio	Cuyahoga	Berea BOE	41.36	-81.86	65.3	66	59	59	59	59
390355002	Ohio	Cuyahoga	Mayfield	41.54	-81.46	69.3	71	63	62	64	61
390410002	Ohio	Delaware	Delaware	40.36	-83.06	65.3	67	57	57	56	56
390479991	Ohio	Fayette	Deer Creek	39.64	-83.26	66.7	68	60	60	58	58
390490029	Ohio	Franklin	New Albany	40.08	-82.82	70.3	71	63	63	61	61
390490037	Ohio	Franklin	FRANKLIN_PK	39.97	-82.96	65.5	66	59	59	56	56
390490081	Ohio	Franklin	Maple Canyon	40.09	-82.96	66.3	67	59	59	57	57
390550004	Ohio	Geauga	Notre Dame	41.52	-81.25	71.3	72	63	63	63	63
390570006	Ohio	Greene	Xenia	39.67	-83.94	67.3	68	60	60	59	59
390610006	Ohio	Hamilton	Sycamore	39.28	-84.37	73.3	75	66	66	65	65
390610010	Ohio	Hamilton	Colerain	39.21	-84.69	71.3	72	64	64	63	63
390610040	Ohio	Hamilton	Taft NCore	39.13	-84.50	71.3	72	64	64	63	63
390810017	Ohio	Jefferson	Stuebenville	40.37	-80.62	63	65	56	56	55	55
390830002	Ohio	Knox	CENTERBURG	40.31	-82.69	66.5	67	58	58	56	56

390850003	Ohio	Lake	Eastlake	41.67	-81.42	73.7	74	67	67	68	69
390850007	Ohio	Lake	Painesville	41.73	-81.24	69	70	63	63	63	64
390870011	Ohio	Lawrence	Wilgus	38.63	-82.46	63.7	64	58	58	59	59
390870012	Ohio	Lawrence	ODOT Ironton	38.51	-82.66	66	67	61	61	60	60
390890005	Ohio	Licking	Heath	40.03	-82.43	65.7	67	57	57	56	56
390930018	Ohio	Lorain	Sheffield	41.42	-82.10	65.7	67	60	60	58	58
390950024	Ohio	Lucas	Erie	41.64	-83.55	67.5	69	60	61	59	60
390950027	Ohio	Lucas	Waterville	41.49	-83.72	64.7	66	59	59	58	58
390970007	Ohio	Madison	London	39.79	-83.48	67.3	68	60	60	59	59
390990013	Ohio	Mahoning	Oakhill	41.10	-80.66	59.7	63	52	52	51	51
391030004	Ohio	Medina	Chippewa	41.06	-81.92	64.3	65	58	58	56	56
391090005	Ohio	Miami	Miami East HS	40.09	-84.11	67.7	68	60	60	59	59
391130037	Ohio	Montgomery	Eastwood	39.79	-84.13	70.3	71	63	63	61	61
391219991	Ohio	Noble	Quaker City	39.94	-81.34	64.7	66	58	58		
391331001	Ohio	Portage	Lake Rockwell	41.18	-81.33	62	63	55	55	54	54
391351001	Ohio	Preble	Preble NCore	39.84	-84.72	67	67	60	60	60	60
391510016	Ohio	Stark	Malone Univ	40.83	-81.38	68.3	69	60	60	59	59
391510022	Ohio	Stark	Brewster	40.71	-81.60	65	66	57	57	56	56
391514005	Ohio	Stark	Alliance	40.93	-81.12	68.3	70	60	60	59	59
391530020	Ohio	Summit	Patterson Park	41.11	-81.50	63.3	65	56	56	55	55
391550011	Ohio	Trumbull	TCSE	41.24	-80.66	68.3	69	60	60	58	58
391550013	Ohio	Trumbull	Kinsman Maintenance	41.45	-80.59	66	66	58	58	57	57
391650007	Ohio	Warren	Lebanon	39.43	-84.20	71.7	72	64	64	62	62
391670004	Ohio	Washington	Marietta WTP	39.43	-81.46	64.3	65	58	58	58	58
391730003	Ohio	Wood	Bowling Green	41.38	-83.61	64.3	66	58	58	58	58
400019009	Oklahoma	Adair	STILWELL	35.75	-94.67	59.7	61	53	53		

400170101	Oklahoma	Canadian	OKC WEST-(YUKON)	35.48	-97.75	66.3	69	59	59	57	57
400219002	Oklahoma	Cherokee	TAHLEQUAH SHELTER	35.85	-94.99	59.5	60	54	54		
400270049	Oklahoma	Cleveland	MOORE WATER TOWER	35.32	-97.48	66.7	68	60	60	59	59
400310651	Oklahoma	Comanche	LAWTON NORTH	34.63	-98.43	65	66				
400370144	Oklahoma	Creek	MANNFORD	36.11	-96.36	64	65	57	57	56	56
400430860	Oklahoma	Dewey	SEILING MUNICIPAL AIRPORT	36.16	-98.93	66	68				
400719010	Oklahoma	Kay	NEWKIRK IMPROVE	36.96	-97.03	62	63	56	56		
400871073	Oklahoma	McClain	GOLDSBY	35.16	-97.47	66.3	67	60	60	58	58
400979014	Oklahoma	Mayes	CHEROKEE HEIGHTS	36.23	-95.25	62	62	55	55	54	54
401090033	Oklahoma	Oklahoma	OKC CENTRAL-OSDH	35.48	-97.49	67.3	68	61	61	59	59
401090096	Oklahoma	Oklahoma	CHOCTAW	35.48	-97.30	66.3	67	60	60	58	58
401091037	Oklahoma	Oklahoma	OKC NORTH	35.61	-97.48	69	70	62	62	60	60
401159004	Oklahoma	Ottawa	QUAPAW SHELTER	36.92	-94.84	55.7	57	49	49		
401210415	Oklahoma	Pittsburg	McALESTER MUNICIPAL AIRPORT	34.89	-95.78	61	63	56	56		
401359021	Oklahoma	Sequoyah		35.41	-94.52	59.3	60	52	52		
401430174	Oklahoma	Tulsa	TULSA SOUTH	35.95	-96.00	65	65	59	59	58	58
401430178	Oklahoma	Tulsa	TULSA EAST	36.13	-95.76	64	65	58	58	58	58
401431127	Oklahoma	Tulsa	NORTH TULSA - FIRE STATION#24	36.20	-95.98	65	65	59	59	59	59
450010001	South Carolina	Abbeville	DUE WEST	34.33	-82.39	58	58	49	49		
450030003	South Carolina	Aiken	JACKSON MIDDLE SCHOOL	33.34	-81.79	60.3	62	52	52		
450070005	South Carolina	Anderson	Big Creek	34.62	-82.53	58.7	60	50	50	49	49
450150002	South Carolina	Berkeley	BUSHY PARK PUMP STATION	32.99	-79.94	57.3	58	49	49		
450190046	South Carolina	Charleston	CAPE ROMAIN	32.94	-79.66	59	61	52	51		

450250001	South Carolina	Chesterfield	CHESTERFIELD	34.62	-80.20	60	60	52	52		
450290002	South Carolina	Colleton	ASHTON	33.01	-80.97	56.3	57				
450310003	South Carolina	Darlington	Pee Dee Experimental Station	34.29	-79.74	61	62	52	52		
450370001	South Carolina	Edgefield	TRENTON	33.74	-81.85	59.7	61	51	51		
450450016	South Carolina	Greenville	Hillcrest Middle School	34.75	-82.26	63.3	65	54	54	53	53
450730001	South Carolina	Oconee	LONG CREEK	34.81	-83.24	63	63	54	54		
450770002	South Carolina	Pickens	CLEMSON CMS	34.65	-82.84	62.7	63	54	54	53	53
450770003	South Carolina	Pickens	Wolf Creek	34.85	-82.74	61	62	52	52	51	51
450790007	South Carolina	Richland	PARKLANE	34.09	-80.96	60	61	50	50	49	49
450790021	South Carolina	Richland	CONGAREE BLUFF	33.81	-80.78	55	55	47	47		
450791001	South Carolina	Richland	SANDHILL EXPERIMENTAL STATION	34.13	-80.87	64.3	65	54	54	52	52
450830009	South Carolina	Spartanburg	NORTH SPARTANBURG FIRE STATION #2	34.99	-82.08	66	67	56	56	55	55
450910008	South Carolina	York	YORK (LANDFILL)	34.98	-81.21	61.3	63	52	52	50	50
450918801	South Carolina	York		34.91	-80.87	64	64	55	55	54	54
460110003	South Dakota	Brookings	Research Farm	44.35	-96.81	62	63				
460330132	South Dakota	Custer	Wind Cave NP - Visitor Center	43.56	-103.48	60.3	62				
460710001	South Dakota	Jackson	SOUTH OF BADLANDS NP HEADQUARTERS	43.75	-101.94	60.7	63				
460930001	South Dakota	Meade	BLACK HAWK ELEMENTARY SCHOOL GROUNDS	44.16	-103.32	53.3	57				
460990008	South Dakota	Minnehaha	SD School for the Deaf	43.55	-96.70	65	67				
461270001	South Dakota	Union	Union County #1 Jensen	42.75	-96.71	62.3	64				

470010101	Tennessee	Anderson	Freel's Bend O3 and SO2 monitoring	35.96	-84.22	63.7	64	55	55	53	53
470090101	Tennessee	Blount	Great Smoky Mountains NP - Look Rock	35.63	-83.94	67	67	57	57	56	56
470090102	Tennessee	Blount	Great Smoky Mountains NP - Cade's Cove	35.60	-83.78	61	62	52	52	51	51
470259991	Tennessee	Claiborne	Speedwell	36.47	-83.83	62.7	63	54	54		
470370011	Tennessee	Davidson	East Health	36.21	-86.74	66	66	57	57	56	56
470370026	Tennessee	Davidson	Percy Priest Dam	36.15	-86.62	66	67	56	56	55	55
470419991	Tennessee	DeKalb	Edgar Evans	36.04	-85.73	61.3	62	53	53		
470651011	Tennessee	Hamilton	Soddy-Daisy High School	35.23	-85.18	64.7	65	55	55	54	54
470654003	Tennessee	Hamilton	Eastside Utility	35.10	-85.16	67	68	56	56	55	55
470890002	Tennessee	Jefferson	New Market ozone monitor	36.11	-83.60	67	68	58	58	57	57
470930021	Tennessee	Knox	East Knox Elementary School	36.09	-83.76	64.3	65	55	55	54	54
470931020	Tennessee	Knox	Spring Hill Elementary School	36.02	-83.87	66.7	67	57	57	56	56
471050109	Tennessee	Loudon	Loudon Middle School ozone monitor	35.72	-84.34	68	69	59	59	59	59
471550101	Tennessee	Sevier	Great Smoky Mountains NP - Cove Mountain	35.70	-83.61	67.3	68	58	58		
471570021	Tennessee	Shelby	Frayser Ozone Monitor	35.22	-90.02	66.7	67	59	59	58	58
471570075	Tennessee	Shelby	Memphis NCORE site	35.15	-89.85	67.3	69	60	60	59	59
471571004	Tennessee	Shelby	Edmund Orgill Park Ozone	35.38	-89.83	65.7	66	57	57	56	56
471632002	Tennessee	Sullivan	Blountville Ozone Monitor	36.54	-82.42	66	66	60	60	59	59
471632003	Tennessee	Sullivan	Kingsport ozone monitor	36.58	-82.49	64.7	65	58	58	58	58
471650007	Tennessee	Sumner	Hendersonville Ozone Site at Old Hickory Dam	36.30	-86.65	66.3	67	56	56	55	55
471870106	Tennessee	Williamson	FAIRVIEW MIDDLE SCHOOL ozone monitor	35.95	-87.14	60.3	61	51	51	51	51
471890103	Tennessee	Wilson	Cedars of Lebanon Ozone Monitor	36.06	-86.29	63.5	64	53	53	53	53

480271045	Texas	Bell	Temple Georgia	31.12	-97.43	68	69	61	61		
480271047	Texas	Bell	Killeen Skylark Field	31.09	-97.68	67.3	68	60	60		
480290032	Texas	Bexar	San Antonio Northwest	29.52	-98.62	73	74	65	65	64	64
480290052	Texas	Bexar	Camp Bullis	29.63	-98.56	72.3	73	65	65	64	64
480290059	Texas	Bexar	Calaveras Lake	29.28	-98.31	65	66	58	58	57	57
480391004	Texas	Brazoria	Manvel Croix Park	29.52	-95.39	74.7	77	70	70	67	67
480391016	Texas	Brazoria	Lake Jackson	29.04	-95.47	65	66	59	59	57	57
480430101	Texas	Brewster	Big Bend NP - K-Bar Ranch Road	29.30	-103.18	62.3	63				
480610006	Texas	Cameron	Brownsville	25.89	-97.49	56.5	57				
480611023	Texas	Cameron	Harlingen Teege	26.20	-97.71	57	57				
480850005	Texas	Collin	Frisco	33.13	-96.79	74.3	75	66	66	63	63
481130069	Texas	Dallas	Dallas Hinton	32.82	-96.86	73	74	65	65	63	63
481130075	Texas	Dallas	Dallas North #2	32.92	-96.81	73.7	75	66	66	63	63
481130087	Texas	Dallas	Dallas Redbird Airport Executive	32.68	-96.87	64.7	66	57	57	57	57
481210034	Texas	Denton	Denton Airport South	33.22	-97.20	78	80	69	69	68	68
481211032	Texas	Denton	Pilot Point	33.41	-96.94	74	76	66	66	64	64
481390016	Texas	Ellis	Midlothian OFW	32.48	-97.03	64.3	65	57	57	56	56
481391044	Texas	Ellis	Italy	32.18	-96.87	63.7	65	56	56		
481410029	Texas	El Paso	Ivanhoe	31.79	-106.32	63.7	66	62	62	61	61
481410037	Texas	El Paso	El Paso UTEP	31.77	-106.50	71.3	73	69	69	68	68
481410044	Texas	El Paso	El Paso Chamizal	31.77	-106.46	69	71	66	66	66	66
481410055	Texas	El Paso	Ascarate Park SE	31.75	-106.40	66	69	63	63	63	63
481410057	Texas	El Paso	Socorro Hueco	31.67	-106.29	65.3	66	63	63	63	63
481410058	Texas	El Paso	Skyline Park	31.89	-106.43	70	72	67	67	66	66
481671034	Texas	Galveston	Galveston 99th Street	29.25	-94.86	75.7	77	70	71	70	69

481830001	Texas	Gregg	Longview	32.38	-94.71	65.3	66	59	59	59	59
482010024	Texas	Harris	Houston Aldine	29.90	-95.33	79.3	81	75	75	72	72
482010026	Texas	Harris	Channelview	29.80	-95.13	68.3	69	65	65	63	64
482010029	Texas	Harris	Northwest Harris County	30.04	-95.67	71.3	73	64	64	62	62
482010046	Texas	Harris	Houston North Wayside	29.83	-95.28	67	69	63	63	61	61
482010047	Texas	Harris	Lang	29.83	-95.49	73.7	76	69	69	66	66
482010051	Texas	Harris	Houston Croquet	29.62	-95.47	70	71	65	65	62	62
482010055	Texas	Harris	Houston Bayland Park	29.70	-95.50	76	77	70	70	68	68
482010062	Texas	Harris	Houston Monroe	29.63	-95.27	63	65	60	60	58	58
482010066	Texas	Harris	Houston Westhollow	29.72	-95.64	75	76	68	68	66	66
482010416	Texas	Harris	Park Place	29.69	-95.29	72.3	74	69	69	65	65
482011015	Texas	Harris	Lynchburg Ferry	29.76	-95.08	65	65	61	61	60	60
482011017	Texas	Harris	Baytown Garth	29.82	-94.98	71	73	66	66	67	67
482011034	Texas	Harris	Houston East	29.77	-95.22	73.7	75	70	70	69	69
482011035	Texas	Harris	Clinton	29.73	-95.26	71.3	75	68	68	66	66
482011039	Texas	Harris	Houston Deer Park #2	29.67	-95.13	68.7	71	65	65	64	64
482011050	Texas	Harris	Seabrook Friendship Park	29.58	-95.02	70.7	71	66	66	65	65
482030002	Texas	Harrison	Karnack	32.67	-94.17	61.3	62	55	55		
482150043	Texas	Hidalgo	Mission	26.23	-98.29	55	55	53	53	54	54
482210001	Texas	Hood	Granbury	32.44	-97.80	67.3	69	59	59		
482311006	Texas	Hunt	Greenville	33.15	-96.12	62.3	65	54	54		
482450009	Texas	Jefferson	Beaumont Downtown	30.04	-94.07	64.7	65	59	59	59	59
482450011	Texas	Jefferson	Port Arthur West	29.90	-93.99	66.7	67	62	61	64	
482450022	Texas	Jefferson	Hamshire	29.86	-94.32	67	68	61	61		
482450101	Texas	Jefferson	SETRPC 40 Sabine Pass	29.73	-93.89	65.7	67	61	60	61	
482450102	Texas	Jefferson	SETRPC 43 Jefferson Co Airport	29.94	-94.00	63	65	59	59	61	59

482451035	Texas	Jefferson	Nederland High School	29.98	-94.01	66.7	68	62	62	64	62
482510003	Texas	Johnson	Cleburne Airport	32.35	-97.44	73.7	76	66	66	64	64
482570005	Texas	Kaufman	Kaufman	32.56	-96.32	61	61	54	54		
483091037	Texas	McLennan	Waco Mazanec	31.65	-97.07	63	63	55	55		
483390078	Texas	Montgomery	Conroe Relocated	30.35	-95.43	73.7	75	67	67	67	67
483491051	Texas	Navarro	Corsicana Airport	32.03	-96.40	62.7	64	55	55		
483550025	Texas	Nueces	Corpus Christi West	27.77	-97.43	62.3	64	58	58		
483550026	Texas	Nueces	Corpus Christi Tuloso	27.83	-97.56	61.3	63	57	57		
483611001	Texas	Orange	West Orange	30.09	-93.76	61.7	64	57	57	61	
483670081	Texas	Parker	Parker County	32.87	-97.91	70.7	73	62	62		
483739991	Texas	Polk	Alabama-Coushatta	30.70	-94.67	60.3	61	56	56		
483819991	Texas	Randall	Palo Duro	34.88	-101.66	65.7	68				
483970001	Texas	Rockwall	Rockwall Heath	32.94	-96.46	66	66	59	59	58	58
484230007	Texas	Smith	Tyler Airport Relocated	32.34	-95.42	64.7	65	58	58		
484390075	Texas	Tarrant	Eagle Mountain Lake	32.99	-97.48	71	72	63	63	62	62
484391002	Texas	Tarrant	Fort Worth Northwest	32.81	-97.36	72.3	74	64	64	63	63
484392003	Texas	Tarrant	Keller	32.92	-97.28	73.3	74	65	65	64	64
484393009	Texas	Tarrant	Grapevine Fairway	32.98	-97.06	75.3	76	67	67	66	66
484393011	Texas	Tarrant	Arlington Municipal Airport	32.66	-97.09	67	69	59	59	59	59
484530014	Texas	Travis	Austin Northwest	30.35	-97.76	67.7	69	61	61	60	60
484530020	Texas	Travis	Austin Audubon Society	30.48	-97.87	66.3	67	59	59	58	58
484690003	Texas	Victoria	Victoria	28.84	-97.01	65	65	59	59		
484790016	Texas	Webb	Laredo Vidaurri	27.52	-99.52	54	54	52	52	52	52
540030003	West Virginia	Berkeley	MARTINSBURG BALL FIELD	39.45	-77.96	62	63	54	54	54	54
540110006	West Virginia	Cabell	HENDERSON CENTER/MARSHALL	38.42	-82.43	64	64	60	60	59	59

			UNIVERSITY - MOVED FROM WATER CO. 5/98								
540219991	West Virginia	Gilmer	Cedar Creek	38.88	-80.85	58	59	54	54	54	54
540250003	West Virginia	Greenbrier	SAM BLACK CHURCH - DOH GARAGE - GREENBRIER COUNTY	37.91	-80.63	59.7	60	55	55		
540290009	West Virginia	Hancock		40.43	-80.59	65.5	66	56	56	53	53
540390020	West Virginia	Kanawha		38.35	-81.62	67	67	62	62	63	63
540610003	West Virginia	Monongalia		39.65	-79.92	62.3	64	58	58	57	57
540690010	West Virginia	Ohio		40.11	-80.70	67	68	61	61	60	60
540939991	West Virginia	Tucker	Parsons	39.09	-79.66	61.7	62	57	57	56	56
541071002	West Virginia	Wood	Neale Elementary School	39.32	-81.55	65	68	59	59	59	59
550030010	Wisconsin	Ashland	BAD RIVER TRIBAL SCHOOL - ODANAH	46.60	-90.66	58.3	59				
550090026	Wisconsin	Brown	GREEN BAY - UW	44.53	-87.91	65.3	66	59	59	58	
550210015	Wisconsin	Columbia	COLUMBUS	43.32	-89.11	66	67				
550250041	Wisconsin	Dane	MADISON EAST	43.10	-89.36	65	65				
550270001	Wisconsin	Dodge	HORICON WILDLIFE AREA	43.47	-88.62	66.3	68	60	60	60	60
550290004	Wisconsin	Door	NEWPORT PARK	45.24	-86.99	72.7	73	66	66	66	66
550350014	Wisconsin	Eau Claire	EAU CLAIRE - DOT SIGN SHOP	44.76	-91.14	62	64				
550390006	Wisconsin	Fond du Lac	FOND DU LAC	43.69	-88.42	64.7	66	59	59		
550410007	Wisconsin	Forest	POTAWATOMI	45.57	-88.81	62.7	63				
550550009	Wisconsin	Jefferson	JEFFERSON - LAATSCH	43.00	-88.83	68	69				
550590019	Wisconsin	Kenosha	CHIWAUKEE PRAIRIE STATELINE	42.50	-87.81	78	79	72	72	72	73
550590025	Wisconsin	Kenosha	KENOSHA - WATER TOWER	42.60	-87.89	73.7	77	68	68	70	66
550610002	Wisconsin	Kewaunee	KEWAUNEE	44.44	-87.51	69.3	70	63	63	64	63
550630012	Wisconsin	La Crosse	LACROSSE - DOT BUILDING	43.78	-91.23	62	62				

550710007	Wisconsin	Manitowoc	MANITOWOC - WDLND DUNES	44.14	-87.62	73	74	67	67	67	66
550730012	Wisconsin	Marathon	LAKE DUBAY	44.71	-89.77	64	65				
550790010	Wisconsin	Milwaukee	MILWAUKEE - SIXTEENTH ST. HEALTH CENTER	43.02	-87.93	65.3	67	60	60	61	60
550790026	Wisconsin	Milwaukee	MILWAUKEE - SER DNR HDQRS	43.06	-87.91	68	69	63	63	64	64
550790085	Wisconsin	Milwaukee	BAYSIDE	43.18	-87.90	71.7	73	66	68	66	68
550870009	Wisconsin	Outagamie	APPLETON - AAL	44.31	-88.40	65.7	67				
550890008	Wisconsin	Ozaukee	GRAFTON	43.34	-87.92	71.3	72	66	66	67	65
550890009	Wisconsin	Ozaukee	HARRINGTON BEACH PARK	43.50	-87.81	73.3	74	68	68	68	67
551010020	Wisconsin	Racine	RACINE - PAYNE AND DOLAN	42.77	-87.80	76	78	70	71	71	71
551050030	Wisconsin	Rock	BELOIT - CONVERSE	42.52	-89.06	67.7	69				
551110007	Wisconsin	Sauk	DEVILS LAKE PARK	43.44	-89.68	63.7	64				
551170006	Wisconsin	Sheboygan	SHEBOYGAN - KOHLER ANDRAE	43.67	-87.72	80	81	74	73	73	73
551170009	Wisconsin	Sheboygan	SHEBOYGAN - HAVEN	43.82	-87.79	70	71	64	64	64	64
551199991	Wisconsin	Taylor	Perkinstown	45.21	-90.60	61	62				
551250001	Wisconsin	Vilas	TROUT LAKE	46.05	-89.65	61.3	62				
551270005	Wisconsin	Walworth	LAKE GENEVA	42.58	-88.50	69	70	62	62	62	62
551330027	Wisconsin	Waukesha	WAUKESHA - CLEVELAND AVE	43.02	-88.22	65.7	66	61	61	61	61
560019991	Wyoming	Albany	Centennial	41.36	-106.24	64.7	66				
560050123	Wyoming	Campbell	Thunder Basin	44.65	-105.29	59.7	61				
560050456	Wyoming	Campbell	Campbell County	44.15	-105.53	61.5	63				
560070100	Wyoming	Carbon	Atlantic Rim Sun Dog	41.39	-107.62	60.7	62				
560090008	Wyoming	Converse	Tallgrass Energy Partners - Gaseous	42.80	-105.36	59	59				
560090010	Wyoming	Converse	Converse County Long-Term	43.10	-105.50	62	63				

560130232	Wyoming	Fremont	Spring Creek	43.08	-107.55	61.7	62				
560210100	Wyoming	Laramie	Cheyenne NCore	41.18	-104.78	63.3	64				
560250100	Wyoming	Natrona	Casper Gaseous	42.82	-106.37	61.3	63				
560252601	Wyoming	Natrona		42.86	-106.24	58	59				
560370200	Wyoming	Sweetwater	Wamsutter	41.68	-108.02	52.7	55				
560450003	Wyoming	Weston		43.87	-104.19	60.5	61				

Appendix F. *Part-75 CEMS-Based Units Identified by OTC as Peaking Units for HEDD Episodic Modeling Purposes*

Peaker determination based on definition detailed at the beginning of this paper. Electric determination separates electric providing units from industrial/institutional units. Hour counts are based on July 1 – August 31 for 2016 (1488 hour max), April 1 – September 30 for combined 2018 and 2019 (7344 max), and July 1 – August 31 for Run 2 ReBase (1488 max).

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
CT	Alfred L Pierce Generating Station	6635	AP-1	Electric Utility	No	Yes	19	48	8	0.0491
CT	Algonquin Power Windsor Locks, LLC	10567	GT1	Cogeneration	Yes	Yes	402	536	320	0.1386
CT	Branford	540	10	Electric Utility	Yes	Yes	24	34	8	0.6780
CT	Bridgeport Energy	55042	BE1	Electric Utility	No	Yes	1427	5489	1322	0.0184
CT	Bridgeport Energy	55042	BE2	Electric Utility	No	Yes	1439	5549	1417	0.0187
CT	Bridgeport Harbor Station	568	BHB3	Electric Utility	No	Yes	238	277	173	0.1271
CT	Bridgeport Harbor Station	568	BHB4	Electric Utility	Yes	Yes	6	15	8	0.6987
CT	Capitol District Energy Center	50498	GT	Cogeneration	Yes	Yes	1209	566	335	0.0964
CT	Cos Cob	542	10	Electric Utility	Yes	Yes	13	28	0	0.1520
CT	Cos Cob	542	11	Electric Utility	Yes	Yes	9	21	3	0.1730
CT	Cos Cob	542	12	Electric Utility	Yes	Yes	10	17	3	0.1880
CT	Cos Cob	542	13	Electric Utility	No	Yes	16	24	7	0.1530
CT	Cos Cob	542	14	Electric Utility	No	Yes	22	23	5	0.1880
CT	CPV Towantic Energy Center	56047	1	Electric Utility	No	Yes		6112	1472	0.0070
CT	CPV Towantic Energy Center	56047	2	Electric Utility	No	Yes		3444	625	0.0072
CT	Devon	544	10	Electric Utility	Yes	Yes	8	18	2	0.7120
CT	Devon	544	11	Electric Utility	No	Yes	7	71	55	0.1022
CT	Devon	544	12	Electric Utility	No	Yes	10	77	62	0.0938
CT	Devon	544	13	Electric Utility	No	Yes	14	69	35	0.0910
CT	Devon	544	14	Electric Utility	No	Yes	9	62	25	0.1061
CT	Devon	544	15	Electric Utility	No	Yes	42	53	16	0.0174
CT	Devon	544	16	Electric Utility	No	Yes	41	53	15	0.0166
CT	Devon	544	17	Electric Utility	No	Yes	41	59	15	0.0216
CT	Devon	544	18	Electric Utility	No	Yes	37	49	8	0.0188
CT	EmpireCo Sterling Energy Facility	50736	B1	Electric Utility	No	Yes	0	0	0	0.0000
CT	EmpireCo Sterling Energy Facility	50736	B2	Electric Utility	No	Yes	0	0	0	0.0000
CT	Franklin Drive	561	10	Electric Utility	Yes	Yes	7	22	11	0.6590
CT	Kleen Energy Systems Project	56798	U1	Electric Utility	No	Yes	1382	5022	1383	0.0103
CT	Kleen Energy Systems Project	56798	U2	Electric Utility	No	Yes	1393	5083	1383	0.0100
CT	Lake Road Generating Company	55149	LRG1	Electric Utility	No	Yes	1431	7217	1473	0.0071
CT	Lake Road Generating Company	55149	LRG2	Electric Utility	No	Yes	1488	7059	1488	0.0064

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
CT	Lake Road Generating Company	55149	LRG3	Electric Utility	No	Yes	1433	6915	1482	0.0059
CT	Middletown	562	10	Electric Utility	Yes	Yes	17	36	4	0.6470
CT	Middletown	562	12	Electric Utility	No	Yes	26	49	15	0.0079
CT	Middletown	562	13	Electric Utility	No	Yes	16	49	15	0.0099
CT	Middletown	562	14	Electric Utility	No	Yes	27	58	21	0.0108
CT	Middletown	562	15	Electric Utility	No	Yes	29	40	12	0.0067
CT	Middletown	562	2	Electric Utility	No	Yes	781	2349	1188	0.0825
CT	Middletown	562	3	Electric Utility	No	Yes	676	2390	1035	0.1402
CT	Middletown	562	4	Electric Utility	Yes	Yes	20	47	47	0.1269
CT	Milford Power Company LLC	55126	CT01	Electric Utility	No	Yes	1302	6827	1437	0.0154
CT	Milford Power Company LLC	55126	CT02	Electric Utility	No	Yes	1220	6236	1352	0.0133
CT	Montville	546	5	Electric Utility	Yes	Yes	25	453	385	0.0682
CT	Montville	546	6	Electric Utility	Yes	Yes	69	93	50	0.1397
CT	New Haven Harbor	6156	NHB1	Electric Utility	Yes	Yes	315	447	308	0.0468
CT	New Haven Harbor	6156	NHHS2	Electric Utility	No	Yes	27	34	3	0.0402
CT	New Haven Harbor	6156	NHHS3	Electric Utility	No	Yes	24	60	8	0.0463
CT	New Haven Harbor	6156	NHHS4	Electric Utility	No	Yes	13	40	3	0.0342
CT	Norwich	581	TRBINE	Electric Utility	Yes	Yes	20	42	10	0.4997
CT	Pratt & Whitney, East Hartford	54605	001	Cogeneration	No	Yes	150	6452	1423	0.0233
CT	South Meadow Station	563	11A	Electric Utility	Yes	Yes	11	18	2	0.7895
CT	South Meadow Station	563	11B	Electric Utility	Yes	Yes	11	19	3	0.7502
CT	South Meadow Station	563	12A	Electric Utility	Yes	Yes	3	21	11	0.7921
CT	South Meadow Station	563	12B	Electric Utility	Yes	Yes	3	21	11	0.7288
CT	South Meadow Station	563	13A	Electric Utility	Yes	Yes	5	21	13	0.8572
CT	South Meadow Station	563	13B	Electric Utility	Yes	Yes	5	21	13	0.8151
CT	South Meadow Station	563	14A	Electric Utility	Yes	Yes	6	17	11	0.7902
CT	South Meadow Station	563	14B	Electric Utility	Yes	Yes	6	17	11	0.8074
CT	Torrington Terminal	565	10	Electric Utility	Yes	Yes	3	17	5	0.7210
CT	Tunnel	557	10	Electric Utility	Yes	Yes	7	26	8	0.6685
CT	Wallingford Energy, LLC	55517	CT01	Electric Utility	No	Yes	265	586	211	0.0167
CT	Wallingford Energy, LLC	55517	CT02	Electric Utility	No	Yes	283	660	241	0.0160
CT	Wallingford Energy, LLC	55517	CT03	Electric Utility	No	Yes	291	636	197	0.0137
CT	Wallingford Energy, LLC	55517	CT04	Electric Utility	No	Yes	269	597	230	0.0123
CT	Wallingford Energy, LLC	55517	CT05	Electric Utility	No	Yes	269	691	275	0.0151
CT	Wallingford Energy, LLC	55517	CT06	Electric Utility	No	Yes		820	277	0.0282
CT	Wallingford Energy, LLC	55517	CT07	Electric Utility	No	Yes		807	288	0.0204
CT	Waterbury Generation	56629	10	Electric Utility	No	Yes	225	265	68	0.0310
CT	Waterside Power, LLC	56189	4	Electric Utility	No	Yes	20	55	14	0.1439
CT	Waterside Power, LLC	56189	5	Electric Utility	No	Yes	20	53	10	0.2018
CT	Waterside Power, LLC	56189	7	Electric Utility	No	Yes	21	65	10	0.1583
DC	GSA Central Heating	880004	3	Industrial Boiler	No	No	0	8	0	0.2760
DC	GSA Central Heating	880004	4	Industrial Boiler	No	No	0	0	0	0.0000
DC	GSA Central Heating	880004	5C	Cogeneration	No	No	1478	5974	1201	0.0902
DE	Christiana Substation	591	11	Electric Utility	Yes	Yes	2	11	5	0.3079

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DE	Christiana Substation	591	14	Electric Utility	Yes	Yes	3	5	1	0.3082
DE	Delaware City Refinery	52193	DCPP4	Petroleum Refinery	No	No	1488	7266	0	0.0383
DE	Delaware City	592	10	Electric Utility	Yes	Yes	3	17	5	0.2718
DE	Edge Moor	593	10	Electric Utility	Yes	Yes	2	19	5	0.2375
DE	Edge Moor	593	3	Electric Utility	No	Yes	1283	1263	358	0.0626
DE	Edge Moor	593	4	Electric Utility	No	Yes	1434	1176	404	0.0484
DE	Edge Moor	593	5	Electric Utility	No	Yes	1371	1433	356	0.0608
DE	Garrison Energy Center	57349	1	Electric Utility	No	Yes	1470	4781	1424	0.0081
DE	Hay Road	7153	**3	Electric Utility	Yes	Yes	1157	3304	934	0.0553
DE	Hay Road	7153	1	Electric Utility	No	Yes	1163	3472	926	0.0559
DE	Hay Road	7153	2	Electric Utility	No	Yes	1090	3405	914	0.0609
DE	Hay Road	7153	5	Electric Utility	No	Yes	1136	3296	1005	0.0288
DE	Hay Road	7153	6	Electric Utility	Yes	Yes	1155	3262	1014	0.0286
DE	Hay Road	7153	7	Electric Utility	No	Yes	1098	3275	982	0.0288
DE	Indian River	594	10	Electric Utility	No	Yes	2	23	2	0.2244
DE	Indian River	594	4	Electric Utility	Yes	Yes	941	1717	646	0.0899
DE	McKee Run	599	1	Electric Utility	No	Yes	15	0	0	0.0000
DE	McKee Run	599	2	Electric Utility	No	Yes	20	0	0	0.0000
DE	McKee Run	599	3	Electric Utility	No	Yes	676	534	42	0.1654
DE	NRG Energy Center Dover	10030	2	Electric Utility	No	Yes	1169	2216	706	0.0116
DE	NRG Energy Center Dover	10030	3	Electric Utility	No	Yes	502	865	457	0.0837
DE	Van Sant	7318	**11	Electric Utility	Yes	Yes	4	332	131	0.1509
DE	Warren F. Sam Beasley Pwr Station	7962	1	Electric Utility	No	Yes	609	709	362	0.0181
DE	Warren F. Sam Beasley Pwr Station	7962	2	Electric Utility	Yes	Yes	527	605	318	0.0437
DE	West Substation	597	10	Electric Utility	Yes	Yes	25	14	1	0.2464
MA	ANP Bellingham Energy Company, LLC	55211	1	Electric Utility	No	Yes	1450	5174	1138	0.0363
MA	ANP Bellingham Energy Company, LLC	55211	2	Electric Utility	No	Yes	1375	4843	1345	0.0318
MA	ANP Blackstone Energy Company, LLC	55212	1	Electric Utility	No	Yes	1461	4718	1275	0.0329
MA	ANP Blackstone Energy Company, LLC	55212	2	Electric Utility	No	Yes	1426	4679	1320	0.0268
MA	Bellingham	10307	1	Electric Utility	Yes	Yes	1185	498	400	0.0937
MA	Bellingham	10307	2	Electric Utility	Yes	Yes	1218	637	492	0.1034
MA	Berkshire Power	55041	1	Electric Utility	No	Yes	765	3253	1314	0.0193
MA	Blackstone	1594	11	Cogeneration	Yes	Yes		40	0	0.0791
MA	Blackstone	1594	12	Cogeneration	Yes	Yes		53	5	0.0651
MA	Brayton Point	1619	1	Electric Utility	No	Yes	1163		0	
MA	Brayton Point	1619	2	Electric Utility	No	Yes	230		0	
MA	Brayton Point	1619	3	Electric Utility	No	Yes	242		0	
MA	Brayton Point	1619	4	Electric Utility	No	Yes	242		0	
MA	Canal Station	1599	1	Electric Utility	Yes	Yes		78	40	0.0974
MA	Canal Station	1599	2	Electric Utility	Yes	Yes	174	74	66	0.0808
MA	Cleary Flood	1682	8	Electric Utility	Yes	Yes	39	60	20	0.2457
MA	Cleary Flood	1682	9	Electric Utility	Yes	Yes	521	1322	592	0.1380
MA	Dartmouth Power	52026	1	Electric Utility	Yes	Yes	795	1565	699	0.0327
MA	Dartmouth Power	52026	2	Electric Utility	No	Yes	425	892	398	0.0102

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MA	Deer Island Treatment	10823	S42	Industrial Turbine	No	No	36	362	14	0.6086
MA	Deer Island Treatment	10823	S43	Industrial Turbine	No	No	29	350	13	0.2803
MA	Dighton	55026	1	Electric Utility	No	Yes	1361	2970	1114	0.0201
MA	Doreen	1631	10	Electric Utility	Yes	Yes	17	33	16	1.2006
MA	Exelon L Street Generating Station	1587	NBJ-1	Electric Utility	No	Yes	23		0	
MA	Exelon West Medway II	59882	J4	Electric Utility	No	Yes		206	22	0.0124
MA	Exelon West Medway II	59882	J5	Electric Utility	No	Yes		134	28	0.0143
MA	Fore River Energy Center	55317	11	Electric Utility	No	Yes	1419	6410	1488	0.0072
MA	Fore River Energy Center	55317	12	Electric Utility	No	Yes	1488	5053	1400	0.0086
MA	Framingham Station	1586	FJ-1	Electric Utility	Yes	Yes	17	38	16	0.5518
MA	Framingham Station	1586	FJ-2	Electric Utility	Yes	Yes	21	39	8	0.4847
MA	Framingham Station	1586	FJ-3	Electric Utility	Yes	Yes	20	52	19	0.5950
MA	General Electric Aircraft	10029	3	Industrial Boiler	No	No	1461	3512	0	0.0999
MA	Kendall Green Energy LLC	1595	2	Electric Utility	Yes	Yes		573	85	0.0713
MA	Kendall Green Energy LLC	1595	3	Electric Utility	Yes	Yes		1996	239	0.0631
MA	Kendall Green Energy LLC	1595	4	Electric Utility	No	Yes			16	
MA	Kendall Green Energy LLC	1595	S6	Electric Utility	Yes	Yes		108	24	0.3887
MA	Kneeland Station	880023	K1	Industrial Boiler	No	No	370	1688	370	0.1024
MA	Kneeland Station	880023	K2	Industrial Boiler	No	No	612	2557	612	0.0944
MA	Kneeland Station	880023	K3	Industrial Boiler	No	No	0	1241	0	0.0975
MA	Kneeland Station	880023	K4	Industrial Boiler	No	No	179	583	179	0.0815
MA	MASSPOWER	10726	1	Cogeneration	No	Yes	1037	2921	1126	0.0356
MA	MASSPOWER	10726	2	Cogeneration	No	Yes	983	2598	1014	0.0356
MA	MBTA South Boston Power Facility	10176	A	Electric Utility	Yes	Yes	15	24	16	0.2138
MA	MBTA South Boston Power Facility	10176	B	Electric Utility	Yes	Yes	0	35	19	0.1855
MA	Medway Station	1592	J1T1	Electric Utility	Yes	Yes	15	74	30	0.5305
MA	Medway Station	1592	J1T2	Electric Utility	Yes	Yes	15	50	19	0.5597
MA	Medway Station	1592	J2T1	Electric Utility	Yes	Yes	27	43	12	0.5097
MA	Medway Station	1592	J2T2	Electric Utility	Yes	Yes	26	34	10	0.5151
MA	Medway Station	1592	J3T1	Electric Utility	Yes	Yes	21	53	24	0.5160
MA	Medway Station	1592	J3T2	Electric Utility	Yes	Yes	20	43	15	0.4750
MA	Milford Power, LLC	54805	1	Electric Utility	No	Yes	418	2719	1080	0.0405
MA	Millennium Power Partners	55079	1	Electric Utility	No	Yes	1423	4586	1483	0.0147
MA	MIT Central Utility Plant	54907	1	Cogeneration	No	Yes	1346	7194	1488	0.0588
MA	Mystic	1588	7	Electric Utility	Yes	Yes	317	330	191	0.0787
MA	Mystic	1588	81	Electric Utility	No	Yes	1358	2260	613	0.0119
MA	Mystic	1588	82	Electric Utility	No	Yes	1359	2669	778	0.0119
MA	Mystic	1588	93	Electric Utility	No	Yes	1384	2207	933	0.0115
MA	Mystic	1588	94	Electric Utility	No	Yes	1437	2003	911	0.0121
MA	Mystic	1588	MJ-1	Electric Utility	Yes	Yes	38	59	28	0.4838

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MA	Pittsfield Generating	50002	1	Electric Utility	Yes	Yes	774	1158	557	0.0238
MA	Pittsfield Generating	50002	2	Electric Utility	Yes	Yes	801	1250	594	0.0242
MA	Pittsfield Generating	50002	3	Electric Utility	Yes	Yes	793	1222	580	0.0260
MA	Potter	1660	3	Electric Utility	Yes	Yes	99	96	68	0.2642
MA	Potter	1660	4	Electric Utility	No	Yes	166	339	140	0.0149
MA	Potter	1660	5	Electric Utility	No	Yes	144	349	146	0.0151
MA	Salem Harbor Station NGCC	60903	1	Electric Utility	No	Yes		2257	698	0.0259
MA	Salem Harbor Station NGCC	60903	2	Electric Utility	No	Yes		1729	794	0.0225
MA	Stony Brook Energy Center	6081	001	Electric Utility	Yes	Yes	532	570	321	0.2141
MA	Stony Brook Energy Center	6081	002	Electric Utility	Yes	Yes	31	79	36	0.1502
MA	Stony Brook Energy Center	6081	003	Electric Utility	Yes	Yes	470	603	387	0.1393
MA	Stony Brook Energy Center	6081	004	Electric Utility	Yes	Yes	6	39	15	0.3000
MA	Stony Brook Energy Center	6081	005	Electric Utility	Yes	Yes	12	36	12	0.3000
MA	Tanner Street Generation, LLC	54586	2	Cogeneration	No	Yes	696	771	476	0.0568
MA	Waters River	1678	1	Electric Utility	Yes	Yes	228	220	93	0.4630
MA	Waters River	1678	2	Electric Utility	Yes	Yes	0	125	37	0.4925
MA	West Springfield	1642	10	Electric Utility	Yes	Yes	39	24	9	0.4000
MA	West Springfield	1642	3	Electric Utility	Yes	Yes	207	116	103	0.0601
MA	West Springfield	1642	CTG1	Electric Utility	No	Yes	179		0	
MA	West Springfield	1642	CTG2	Electric Utility	No	Yes	181	196	73	0.0491
MA	Woodland Road	1643	10	Electric Utility	Yes	Yes	26	32	13	0.5976
MD	AES Warrior Run	10678	001	Cogeneration	No	Yes	1358	6926	1338	0.0698
MD	American Sugar Refining, Inc.	54795	C6	Cogeneration	No	No		1583	721	0.0324
MD	Brandon Shores	602	1	Electric Utility	No	Yes	1429	4564	1213	0.0671
MD	Brandon Shores	602	2	Electric Utility	No	Yes	1488	5510	1296	0.0693
MD	Brandywine Power Facility	54832	1	Cogeneration	No	Yes	1318	5106	972	0.0282
MD	Brandywine Power Facility	54832	2	Cogeneration	No	Yes	1320	5216	959	0.0310
MD	C P Crane	1552	1	Electric Utility	No	Yes	504	138	0	0.2770
MD	C P Crane	1552	2	Electric Utility	No	Yes	977	106	0	0.4397
MD	Chalk Point	1571	**GT3	Electric Utility	Yes	Yes	10	21	23	0.1010
MD	Chalk Point	1571	**GT4	Electric Utility	Yes	Yes	19	15	19	0.1038
MD	Chalk Point	1571	**GT5	Electric Utility	Yes	Yes	43	28	19	0.0877
MD	Chalk Point	1571	**GT6	Electric Utility	Yes	Yes	134	23	19	0.0874
MD	Chalk Point	1571	1	Electric Utility	No	Yes	1138	1837	495	0.1229
MD	Chalk Point	1571	2	Electric Utility	Yes	Yes	1351	1398	563	0.1661
MD	Chalk Point	1571	3	Electric Utility	Yes	Yes	857	669	224	0.1064
MD	Chalk Point	1571	4	Electric Utility	Yes	Yes	1085	744	267	0.1113
MD	Chalk Point	1571	GT2	Electric Utility	Yes	Yes	12	6	0	1.2002
MD	Chalk Point	1571	SMECO	Electric Utility	Yes	Yes	25	36	24	0.1183
MD	Cove Point LNG Terminal	59073	214JA	Industrial Turbine	No	No		4949	1373	0.0218
MD	Cove Point LNG Terminal	59073	214JB	Industrial Turbine	No	No		5767	1480	0.0171
MD	Cove Point LNG Terminal	59073	B921A	Industrial Boiler	No	No		6622	1488	0.0074
MD	Cove Point LNG Terminal	59073	B921B	Industrial Boiler	No	No		6615	1488	0.0071
MD	Cove Point LNG Terminal	59073	GT501A	Industrial Turbine	No	No		6412	1482	0.0077

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MD	Cove Point LNG Terminal	59073	GT501B	Industrial Turbine	No	No		6597	1488	0.0083
MD	CPV St. Charles Energy Center	56846	GT1	Electric Utility	No	Yes		5514	1294	0.0052
MD	CPV St. Charles Energy Center	56846	GT2	Electric Utility	No	Yes		5618	1273	0.0052
MD	Dickerson	1572	1	Electric Utility	Yes	Yes	730	432	201	0.1971
MD	Dickerson	1572	2	Electric Utility	Yes	Yes	871	553	206	0.1804
MD	Dickerson	1572	3	Electric Utility	Yes	Yes	866	631	205	0.1850
MD	Dickerson	1572	GT2	Electric Utility	Yes	Yes	638	725	289	0.1042
MD	Dickerson	1572	GT3	Electric Utility	Yes	Yes	642	561	342	0.0812
MD	Gould Street	1553	3	Electric Utility	No	Yes	302	494	22	0.1104
MD	Herbert A Wagner	1554	1	Electric Utility	Yes	Yes	492	642	202	0.0629
MD	Herbert A Wagner	1554	2	Electric Utility	Yes	Yes	125	670	163	0.0987
MD	Herbert A Wagner	1554	3	Electric Utility	Yes	Yes	1488	1558	251	0.0737
MD	Herbert A Wagner	1554	4	Electric Utility	Yes	Yes	87	146	21	0.0965
MD	Keys Energy Center	60302	11	Electric Utility	No	Yes		3702	1349	0.0058
MD	Keys Energy Center	60302	12	Electric Utility	No	Yes		3923	1323	0.0058
MD	Luke Paper Company	50282	PR003	Pulp & Paper Mill	No	No	1390	4324	0	0.0000
MD	Luke Paper Company	50282	PR004	Pulp & Paper Mill	No	No	1372	4222	0	0.0000
MD	Luke Paper Company	50282	PR005	Pulp & Paper Mill	No	No	112	695	0	0.0000
MD	Morgantown	1573	1	Electric Utility	No	Yes	1388	2782	1135	0.0492
MD	Morgantown	1573	2	Electric Utility	No	Yes	1415	3633	1046	0.0472
MD	Morgantown	1573	GT3	Electric Utility	Yes	Yes	24	48	40	0.5417
MD	Morgantown	1573	GT4	Electric Utility	Yes	Yes	22	32	25	0.5418
MD	Morgantown	1573	GT5	Electric Utility	Yes	Yes	25	23	18	0.5414
MD	Morgantown	1573	GT6	Electric Utility	Yes	Yes	23	11	7	0.5420
MD	Perryman	1556	**51	Electric Utility	Yes	Yes	715	990	311	0.0683
MD	Perryman	1556	6-1	Electric Utility	No	Yes		2204	594	0.0170
MD	Perryman	1556	6-2	Electric Utility	No	Yes		2155	594	0.0169
MD	Perryman	1556	CT1	Electric Utility	Yes	Yes	31	26	9	0.6389
MD	Perryman	1556	CT2	Electric Utility	No	Yes	0		0	
MD	Perryman	1556	CT3	Electric Utility	Yes	Yes	26	34	19	0.7311
MD	Perryman	1556	CT4	Electric Utility	Yes	Yes	24	20	15	0.7457
MD	Riverside	1559	4	Electric Utility	No	Yes	0		0	
MD	Rock Springs Generating Facility	7835	1	Electric Utility	No	Yes	874	784	232	0.0380
MD	Rock Springs Generating Facility	7835	2	Electric Utility	No	Yes	712	676	184	0.0413
MD	Rock Springs Generating Facility	7835	3	Electric Utility	No	Yes	963	682	217	0.0391
MD	Rock Springs Generating Facility	7835	4	Electric Utility	No	Yes	947	664	210	0.0436
MD	Vienna	1564	8	Electric Utility	Yes	Yes	11	116	85	0.1823
MD	Westport	1560	CT5	Electric Utility	Yes	Yes	300	685	267	0.3810
MD	Wildcat Point Generation Facility	59220	CT1	Electric Utility	No	Yes		4889	1228	0.0084
MD	Wildcat Point Generation Facility	59220	CT2	Electric Utility	No	Yes		5190	1255	0.0086

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ME	Androscoggin Energy	55031	CT01	Cogeneration	No	Yes	447	2647	799	0.0179
ME	Androscoggin Energy	55031	CT02	Cogeneration	No	Yes	163	1439	233	0.0177
ME	Androscoggin Energy	55031	CT03	Cogeneration	No	Yes	354	2443	633	0.0207
ME	Bucksport Generation LLC	50243	GEN4	Cogeneration	No	Yes	53	74	42	0.1205
ME	Maine Independence Station	55068	1	Electric Utility	No	Yes	695	1156	648	0.0332
ME	Maine Independence Station	55068	2	Electric Utility	No	Yes	853	1065	561	0.0313
ME	Rumford Power	55100	1	Electric Utility	No	Yes	1019	925	578	0.0525
ME	Westbrook Energy Center	55294	1	Electric Utility	No	Yes	1236	3284	895	0.0367
ME	Westbrook Energy Center	55294	2	Electric Utility	No	Yes	1163	3138	897	0.0342
ME	William F Wyman	1507	1	Electric Utility	Yes	Yes	40	9	0	0.2140
ME	William F Wyman	1507	2	Electric Utility	Yes	Yes	362	9	0	0.1720
ME	William F Wyman	1507	3	Electric Utility	Yes	Yes	47	296	158	0.1416
ME	William F Wyman	1507	4	Electric Utility	Yes	Yes	72	132	107	0.1360
NH	Burgess BioPower	58054	ST01	Electric Utility	No	Yes	1436	7100	1410	0.0603
NH	Granite Ridge Energy	55170	0001	Electric Utility	No	Yes	1365	5068	1381	0.0088
NH	Granite Ridge Energy	55170	0002	Electric Utility	No	Yes	1406	5274	1396	0.0087
NH	Merrimack	2364	1	Electric Utility	Yes	Yes	402	448	295	0.3286
NH	Merrimack	2364	2	Electric Utility	Yes	Yes	361	796	414	0.3234
NH	Newington Energy	55661	1	Electric Utility	No	Yes	849	2082	820	0.0223
NH	Newington Energy	55661	2	Electric Utility	No	Yes	864	2190	865	0.0229
NH	Newington	8002	1	Electric Utility	Yes	Yes	226	375	242	0.0773
NH	Schiller	2367	4	Electric Utility	Yes	Yes	228	964	371	0.1903
NH	Schiller	2367	5	Electric Utility	No	Yes	1488	5854	1353	0.0664
NH	Schiller	2367	6	Electric Utility	Yes	Yes	190	1200	467	0.1912
NJ	B L England	2378	2	Electric Utility	No	Yes	440	106	0	0.3616
NJ	B L England	2378	3	Electric Utility	No	Yes	36	0	0	0.0000
NJ	Bayonne Energy Center	56964	GT1	Electric Utility	No	Yes	835		0	
NJ	Bayonne Energy Center	56964	GT2	Electric Utility	No	Yes	849		0	
NJ	Bayonne Energy Center	56964	GT3	Electric Utility	No	Yes	930		0	
NJ	Bayonne Energy Center	56964	GT4	Electric Utility	No	Yes	819		0	
NJ	Bayonne Energy Center	56964	GT5	Electric Utility	No	Yes	893		0	
NJ	Bayonne Energy Center	56964	GT6	Electric Utility	No	Yes	792		0	
NJ	Bayonne Energy Center	56964	GT7	Electric Utility	No	Yes	798		0	
NJ	Bayonne Energy Center	56964	GT8	Electric Utility	No	Yes	798		0	
NJ	Bayonne Plant Holding, LLC	50497	001001	Cogeneration	Yes	Yes	754	0	0	0.0000
NJ	Bayonne Plant Holding, LLC	50497	002001	Cogeneration	Yes	Yes	781	0	0	0.0000
NJ	Bayonne Plant Holding, LLC	50497	004001	Cogeneration	Yes	Yes	750	0	0	0.0000
NJ	Bergen Generating Station	2398	1101	Electric Utility	No	Yes	1345	3091	1053	0.0361
NJ	Bergen Generating Station	2398	1201	Electric Utility	No	Yes	1211	2959	1025	0.0359
NJ	Bergen Generating Station	2398	1301	Electric Utility	No	Yes	1268	3576	1127	0.0319
NJ	Bergen Generating Station	2398	1401	Electric Utility	No	Yes	1410	2909	1125	0.0347
NJ	Bergen Generating Station	2398	2101	Electric Utility	No	Yes	1402	5728	1341	0.0119
NJ	Bergen Generating Station	2398	2201	Electric Utility	No	Yes	1407	4719	1214	0.0179
NJ	Burlington Generating Station	2399	121	Electric Utility	No	Yes	377	447	145	0.1505

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NJ	Burlington Generating Station	2399	122	Electric Utility	No	Yes	378	441	123	0.1472
NJ	Burlington Generating Station	2399	123	Electric Utility	No	Yes	335	453	128	0.1463
NJ	Burlington Generating Station	2399	124	Electric Utility	No	Yes	335	440	109	0.1623
NJ	Camden Plant Holding, LLC	10751	002001	Cogeneration	Yes	Yes	765	863	459	0.0618
NJ	Carlls Corner Energy Center	2379	002001	Electric Utility	Yes	Yes	148	276	45	0.7109
NJ	Carlls Corner Energy Center	2379	003001	Electric Utility	Yes	Yes	145	98	80	0.7255
NJ	Carneys Point	10566	1001	Electric Utility	No	Yes	1385	6781	1459	0.1061
NJ	Carneys Point	10566	1002	Electric Utility	No	Yes	1488	6983	1461	0.1048
NJ	Clayville	58235	U1	Electric Utility	No	Yes	812		0	
NJ	Cumberland Energy Center	5083	004001	Electric Utility	Yes	Yes	207	725	309	0.0783
NJ	Cumberland Energy Center	5083	05001	Electric Utility	No	Yes	104	1533	554	0.0130
NJ	E F Kenilworth, Inc.	10805	002001	Cogeneration	No	Yes	1484	7222	1472	0.1446
NJ	Eagle Point Power Generation	50561	0001	Electric Utility	No	Yes	1366	4135	1364	0.0279
NJ	Eagle Point Power Generation	50561	0002	Electric Utility	No	Yes	1466	4050	1381	0.0268
NJ	EFS Parlin Holdings, LLC	50799	001001	Cogeneration	Yes	Yes	329	274	182	0.0700
NJ	EFS Parlin Holdings, LLC	50799	003001	Cogeneration	Yes	Yes	300	313	200	0.0708
NJ	Elmwood Park Power - LLC	50852	002001	Cogeneration	Yes	Yes	316	89	43	0.0794
NJ	Essex	2401	35001	Electric Utility	Yes	Yes	218	54	9	0.0888
NJ	Forked River Power	7138	002001	Electric Utility	Yes	Yes	143	250	115	0.2794
NJ	Forked River Power	7138	003001	Electric Utility	Yes	Yes	155	199	78	0.2760
NJ	Gilbert Generating Station	2393	04	Electric Utility	Yes	Yes	147	84	46	0.0508
NJ	Gilbert Generating Station	2393	05	Electric Utility	Yes	Yes	151	57	44	0.0446
NJ	Gilbert Generating Station	2393	06	Electric Utility	Yes	Yes	175	60	55	0.0359
NJ	Gilbert Generating Station	2393	07	Electric Utility	Yes	Yes	151	58	49	0.0493
NJ	Gilbert Generating Station	2393	9	Electric Utility	No	Yes	69	127	66	0.3112
NJ	Howard M Down	2434	U11	Electric Utility	No	Yes	852	1850	634	0.0221
NJ	Hudson Generating Station	2403	2	Electric Utility	No	Yes	704		0	
NJ	Kearny Generating Station	2404	121	Electric Utility	No	Yes	525	787	279	0.1155
NJ	Kearny Generating Station	2404	122	Electric Utility	No	Yes	608	833	271	0.1196
NJ	Kearny Generating Station	2404	123	Electric Utility	No	Yes	516	876	311	0.1107
NJ	Kearny Generating Station	2404	124	Electric Utility	No	Yes	607	856	302	0.1123
NJ	Kearny Generating Station	2404	131	Electric Utility	No	Yes	677	920	303	0.0113
NJ	Kearny Generating Station	2404	132	Electric Utility	No	Yes	673	953	279	0.0091
NJ	Kearny Generating Station	2404	133	Electric Utility	No	Yes	683	887	266	0.0093
NJ	Kearny Generating Station	2404	134	Electric Utility	No	Yes	675	956	307	0.0096
NJ	Kearny Generating Station	2404	141	Electric Utility	No	Yes	698	995	394	0.0090
NJ	Kearny Generating Station	2404	142	Electric Utility	No	Yes	695	984	372	0.0080
NJ	Lakewood	54640	001001	Cogeneration	No	Yes	1394	3474	1035	0.0192
NJ	Lakewood	54640	002001	Cogeneration	No	Yes	1397	3520	1058	0.0234
NJ	Linden Cogeneration Facility	50006	004001	Cogeneration	No	Yes	1488	7092	1488	0.0062
NJ	Linden Cogeneration Facility	50006	005001	Cogeneration	No	Yes	1113	6500	1374	0.0254

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NJ	Linden Cogeneration Facility	50006	006001	Cogeneration	No	Yes	1283	6096	1298	0.0262
NJ	Linden Cogeneration Facility	50006	007001	Cogeneration	No	Yes	1203	6836	1463	0.0253
NJ	Linden Cogeneration Facility	50006	008001	Cogeneration	No	Yes	1135	6113	1469	0.0257
NJ	Linden Cogeneration Facility	50006	009001	Cogeneration	No	Yes	1225	6541	1474	0.0248
NJ	Linden Generating Station	2406	1101	Electric Utility	No	Yes	1488	6244	1363	0.0102
NJ	Linden Generating Station	2406	1201	Electric Utility	No	Yes	1413	4658	1238	0.0170
NJ	Linden Generating Station	2406	2101	Electric Utility	No	Yes	1432	5167	1344	0.0121
NJ	Linden Generating Station	2406	2201	Electric Utility	No	Yes	1472	5039	1370	0.0131
NJ	Linden Generating Station	2406	5	Electric Utility	No	Yes	186	183	84	0.0535
NJ	Linden Generating Station	2406	6	Electric Utility	No	Yes	224	237	102	0.0625
NJ	Linden Generating Station	2406	7	Electric Utility	Yes	Yes	178	221	84	0.0656
NJ	Linden Generating Station	2406	8	Electric Utility	Yes	Yes	161	195	88	0.0682
NJ	Logan Generating Plant	10043	1001	Electric Utility	No	Yes	1488	7077	1453	0.1147
NJ	Mercer Generating Station	2408	1	Electric Utility	No	Yes	140		0	
NJ	Mercer Generating Station	2408	2	Electric Utility	No	Yes	255		0	
NJ	Mickleton Energy Center	8008	001001	Electric Utility	Yes	Yes	70	65	7	1.1100
NJ	Newark Bay Cogen	50385	1001	Cogeneration	Yes	Yes	986	498	205	0.0609
NJ	Newark Bay Cogen	50385	2001	Cogeneration	Yes	Yes	980	484	204	0.0635
NJ	Newark Energy Center	58079	U001	Electric Utility	No	Yes	1470	6881	1488	0.0064
NJ	Newark Energy Center	58079	U002	Electric Utility	No	Yes	1467	6680	1475	0.0063
NJ	North Jersey Energy Associates	10308	1001	Cogeneration	No	Yes	1279	3318	1272	0.0835
NJ	North Jersey Energy Associates	10308	1002	Cogeneration	No	Yes	1292	3217	1237	0.0864
NJ	Ocean Peaking Power	55938	OPP3	Electric Utility	No	Yes	627	940	284	0.0389
NJ	Ocean Peaking Power	55938	OPP4	Electric Utility	No	Yes	647	880	276	0.0392
NJ	Pedricktown Cogeneration Plant	10099	001001	Electric Utility	Yes	Yes	832	495	162	0.0458
NJ	Red Oak Power, LLC	55239	1	Electric Utility	No	Yes	1486	6979	1488	0.0102
NJ	Red Oak Power, LLC	55239	2	Electric Utility	No	Yes	1488	6571	1479	0.0104
NJ	Red Oak Power, LLC	55239	3	Electric Utility	No	Yes	1480	6916	1488	0.0102
NJ	Salem Generating Station	2410	2001	Electric Utility	Yes	Yes	3	8	1	1.1998
NJ	Sayreville	2390	012001	Electric Utility	Yes	Yes	20	21	2	0.1499
NJ	Sayreville	2390	014001	Electric Utility	Yes	Yes	31	17	3	0.1504
NJ	Sayreville	2390	015001	Electric Utility	Yes	Yes	40	14	8	0.1499
NJ	Sayreville	2390	016001	Electric Utility	Yes	Yes	32	9	5	0.1500
NJ	Sewaren Generating Station	2411	1	Electric Utility	No	Yes	307	0	0	0.0000
NJ	Sewaren Generating Station	2411	2	Electric Utility	No	Yes	421	0	0	0.0000
NJ	Sewaren Generating Station	2411	3	Electric Utility	No	Yes	305	0	0	0.0000
NJ	Sewaren Generating Station	2411	4	Electric Utility	No	Yes	308	0	0	0.0000
NJ	Sewaren Generating Station	2411	7	Electric Utility	No	Yes		5426	1216	0.0064
NJ	Sherman Avenue	7288	1	Electric Utility	Yes	Yes	256	683	288	0.0727

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NJ	West Deptford Energy Station	56963	E101	Electric Utility	No	Yes	1448	6629	1482	0.0061
NJ	West Deptford Energy Station	56963	E102	Electric Utility	No	Yes	1434	6681	1487	0.0062
NJ	West Station	6776	002001	Electric Utility	Yes	Yes	6	4	0	0.4125
NJ	Woodbridge Energy Center	57839	0001	Electric Utility	No	Yes	1483	6536	1439	0.0057
NJ	Woodbridge Energy Center	57839	0002	Electric Utility	No	Yes	1481	6500	1442	0.0057
NY	23rd and 3rd	7910	2301	Electric Utility	No	Yes	789	2489	962	0.0145
NY	23rd and 3rd	7910	2302	Electric Utility	No	Yes	783	1968	799	0.0175
NY	59th Street	2503	BLR114	Electric Utility	No	No	118	366	110	0.0661
NY	59th Street	2503	BLR115	Electric Utility	No	No	364	1191	458	0.0744
NY	59th Street	2503	BLR116	Electric Utility	No	No	691	2340	829	0.0574
NY	59th Street	2503	BLR117	Electric Utility	No	No	766	2410	839	0.0573
NY	59th Street	2503	BLR118	Electric Utility	No	No	742	2179	826	0.0578
NY	59th Street	2503	CT0001	Electric Utility	No	No	6	7	0	1.5000
NY	74th Street	2504	120	Electric Utility	No	No	0	747	114	0.0733
NY	74th Street	2504	121	Electric Utility	No	No	0	221	90	0.0746
NY	74th Street	2504	122	Electric Utility	No	No	0	713	76	0.0633
NY	74th Street	2504	CT0001	Electric Utility	No	No	3	13	0	1.5000
NY	74th Street	2504	CT0002	Electric Utility	No	No	0	27	4	1.5000
NY	AG - Energy	10803	1	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	AG - Energy	10803	2	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Allegany Station No. 133	10619	00001	Electric Utility	No	Yes	586	683	491	0.0323
NY	Arthur Kill	2490	20	Electric Utility	No	Yes	1387	6026	1435	0.0560
NY	Arthur Kill	2490	30	Electric Utility	No	Yes	1026	3063	1026	0.0653
NY	Arthur Kill	2490	CT0001	Electric Utility	Yes	Yes	18	96	43	0.3230
NY	Astoria Energy	55375	CT1	Electric Utility	No	Yes	1446	7122	1482	0.0072
NY	Astoria Energy	55375	CT2	Electric Utility	No	Yes	1333	6793	1446	0.0064
NY	Astoria Energy	55375	CT3	Electric Utility	No	Yes	1366	6428	1467	0.0096
NY	Astoria Energy	55375	CT4	Electric Utility	No	Yes	1385	6512	1453	0.0109
NY	Astoria Gas Turbine Power	55243	CT0005	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0007	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0008	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0010	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0011	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0012	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT0013	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Gas Turbine Power	55243	CT2-1A	Electric Utility	Yes	Yes	81	220	80	0.4915
NY	Astoria Gas Turbine Power	55243	CT2-1B	Electric Utility	Yes	Yes	81	220	80	0.4884
NY	Astoria Gas Turbine Power	55243	CT2-2A	Electric Utility	Yes	Yes	102	114	56	0.4880
NY	Astoria Gas Turbine Power	55243	CT2-2B	Electric Utility	Yes	Yes	102	114	56	0.4850
NY	Astoria Gas Turbine Power	55243	CT2-3A	Electric Utility	Yes	Yes	60	160	67	0.4903
NY	Astoria Gas Turbine Power	55243	CT2-3B	Electric Utility	Yes	Yes	60	160	67	0.4873
NY	Astoria Gas Turbine Power	55243	CT2-4A	Electric Utility	Yes	Yes	69	174	61	0.4910
NY	Astoria Gas Turbine Power	55243	CT2-4B	Electric Utility	Yes	Yes	69	174	61	0.4878
NY	Astoria Gas Turbine Power	55243	CT3-1A	Electric Utility	Yes	Yes	104	106	44	0.4848
NY	Astoria Gas Turbine Power	55243	CT3-1B	Electric Utility	Yes	Yes	104	106	44	0.4878
NY	Astoria Gas Turbine Power	55243	CT3-2A	Electric Utility	Yes	Yes	97	99	48	0.4916
NY	Astoria Gas Turbine Power	55243	CT3-2B	Electric Utility	Yes	Yes	97	99	48	0.4821
NY	Astoria Gas Turbine Power	55243	CT3-3A	Electric Utility	Yes	Yes	70	57	28	0.4921
NY	Astoria Gas Turbine Power	55243	CT3-3B	Electric Utility	Yes	Yes	70	57	28	0.4889

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NY	Astoria Gas Turbine Power	55243	CT3-4A	Electric Utility	Yes	Yes	53	83	46	0.4915
NY	Astoria Gas Turbine Power	55243	CT3-4B	Electric Utility	Yes	Yes	53	88	49	0.4833
NY	Astoria Gas Turbine Power	55243	CT4-1A	Electric Utility	Yes	Yes	81	178	61	0.4670
NY	Astoria Gas Turbine Power	55243	CT4-1B	Electric Utility	Yes	Yes	81	181	61	0.4640
NY	Astoria Gas Turbine Power	55243	CT4-2A	Electric Utility	Yes	Yes	93	232	89	0.4362
NY	Astoria Gas Turbine Power	55243	CT4-2B	Electric Utility	Yes	Yes	93	232	89	0.4556
NY	Astoria Gas Turbine Power	55243	CT4-3A	Electric Utility	Yes	Yes	107	125	50	0.4903
NY	Astoria Gas Turbine Power	55243	CT4-3B	Electric Utility	Yes	Yes	107	126	50	0.4878
NY	Astoria Gas Turbine Power	55243	CT4-4A	Electric Utility	Yes	Yes	85	144	47	0.4918
NY	Astoria Gas Turbine Power	55243	CT4-4B	Electric Utility	Yes	Yes	85	144	47	0.4888
NY	Astoria Generating Station	8906	20	Electric Utility	Yes	Yes	71	268	176	0.0814
NY	Astoria Generating Station	8906	31RH	Electric Utility	Yes	Yes	1141	4967	1111	0.0414
NY	Astoria Generating Station	8906	32SH	Electric Utility	Yes	Yes	1141	4967	1111	0.0446
NY	Astoria Generating Station	8906	41SH	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Generating Station	8906	42RH	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Astoria Generating Station	8906	51RH	Electric Utility	Yes	Yes	945	4070	1118	0.0473
NY	Astoria Generating Station	8906	52SH	Electric Utility	Yes	Yes	943	4039	1106	0.0473
NY	Astoria Generating Station	8906	CT0001	Electric Utility	Yes	Yes	55	125	40	0.4557
NY	Athens Generating Company	55405	1	Electric Utility	No	Yes	1191	4621	1476	0.0091
NY	Athens Generating Company	55405	2	Electric Utility	No	Yes	1304	3430	1327	0.0128
NY	Athens Generating Company	55405	3	Electric Utility	No	Yes	1179	5093	1416	0.0098
NY	Batavia Energy	54593	1	Cogeneration	Yes	Yes	673	832	660	0.1340
NY	Bayswater Peaking Facility	55699	1	Electric Utility	No	Yes	1257	3202	1046	0.0099
NY	Bayswater Peaking Facility	55699	2	Electric Utility	No	Yes	151	256	147	0.0313
NY	Beaver Falls, LLC	10617	1	Cogeneration	Yes	Yes	17	198	224	0.1048
NY	Bethlehem Energy Center (Albany)	2539	10001	Electric Utility	No	Yes	1371	6212	1385	0.0145
NY	Bethlehem Energy Center (Albany)	2539	10002	Electric Utility	No	Yes	1440	5958	1457	0.0116
NY	Bethlehem Energy Center (Albany)	2539	10003	Electric Utility	No	Yes	1474	7025	1454	0.0077
NY	Bethpage Energy Center	50292	GT1	Electric Utility	No	Yes	1414	4587	1064	0.1204
NY	Bethpage Energy Center	50292	GT2	Electric Utility	No	Yes	1449	4034	1007	0.1325
NY	Bethpage Energy Center	50292	GT3	Electric Utility	No	Yes	1026	1922	695	0.0096
NY	Bethpage Energy Center	50292	GT4	Electric Utility	No	Yes	1399	2057	774	0.0071
NY	Binghamton Cogen Plant	55600	1	Cogeneration	No	Yes	507		0	
NY	Black River Generation, LLC	10464	E0001	Electric Utility	No	Yes	1481	6886	1414	0.1376
NY	Black River Generation, LLC	10464	E0002	Electric Utility	No	Yes	1365	6882	1440	0.1382
NY	Black River Generation, LLC	10464	E0003	Electric Utility	No	Yes	1317	7104	1459	0.1378
NY	Bowline Generating Station	2625	1	Electric Utility	Yes	Yes	0	974	372	0.0819
NY	Bowline Generating Station	2625	2	Electric Utility	Yes	Yes	887	1354	727	0.0842
NY	Brentwood	7912	BW01	Electric Utility	No	Yes	556	2037	701	0.0206
NY	Brooklyn Navy Yard Cogeneration	54914	1	Cogeneration	No	Yes	1488	7165	1487	0.0062

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NY	Brooklyn Navy Yard Cogeneration	54914	2	Cogeneration	No	Yes	1470	6682	1488	0.0064
NY	Caithness Long Island Energy Center	56234	0001	Electric Utility	No	Yes	1488	7143	1488	0.0065
NY	Carr Street Generating Station	50978	A	Electric Utility	No	Yes	1121	1967	846	0.0289
NY	Carr Street Generating Station	50978	B	Electric Utility	No	Yes	690	1951	832	0.0302
NY	Carthage Energy	10620	1	Cogeneration	Yes	Yes	232	573	468	0.1412
NY	Castleton Power, LLC	10190	1	Electric Utility	No	Yes	1352	1678	1034	0.0631
NY	Cayuga Operating Company, LLC	2535	1	Electric Utility	Yes	Yes	1348	1491	798	0.2637
NY	Cayuga Operating Company, LLC	2535	2	Electric Utility	Yes	Yes	95	0	0	0.0000
NY	Cornell University Ithaca Campus	50368	CT1	Institutional	No	No	1474	7008	1	0.0072
NY	Cornell University Ithaca Campus	50368	CT2	Institutional	No	No	1471	6387	1	0.0077
NY	Covanta Niagara	50472	BLR05	Industrial Boiler	No	No	818	4403	818	0.0293
NY	Covanta Niagara	50472	R1B01	Cogeneration	Yes	Yes	625	1866	345	0.0504
NY	Covanta Niagara	50472	R1B02	Cogeneration	Yes	Yes	0	0	0	0.0000
NY	Danskammer Generating Station	2480	1	Electric Utility	Yes	Yes	96	105	0	0.0589
NY	Danskammer Generating Station	2480	2	Electric Utility	Yes	Yes	62	70	0	0.0822
NY	Danskammer Generating Station	2480	3	Electric Utility	Yes	Yes	89	275	74	0.1651
NY	Danskammer Generating Station	2480	4	Electric Utility	Yes	Yes	126	132	64	0.0736
NY	E F Barrett	2511	10	Electric Utility	No	Yes	1488	5977	1435	0.0761
NY	E F Barrett	2511	20	Electric Utility	No	Yes	1488	6015	1473	0.0467
NY	E F Barrett	2511	U00004	Electric Utility	Yes	Yes	271	608	209	0.2948
NY	E F Barrett	2511	U00005	Electric Utility	Yes	Yes	227	586	268	0.2967
NY	E F Barrett	2511	U00006	Electric Utility	Yes	Yes	259	771	299	0.2976
NY	E F Barrett	2511	U00007	Electric Utility	Yes	Yes	309	980	441	0.2980
NY	E F Barrett	2511	U00008	Electric Utility	Yes	Yes	181	721	284	0.2987
NY	E F Barrett	2511	U00009	Electric Utility	Yes	Yes	260	603	291	0.2975
NY	E F Barrett	2511	U00010	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	E F Barrett	2511	U00011	Electric Utility	Yes	Yes	240	582	283	0.2975
NY	E F Barrett	2511	U00012	Electric Utility	Yes	Yes	368	963	391	0.4356
NY	E F Barrett	2511	U00013	Electric Utility	Yes	Yes	368	963	391	0.4356
NY	E F Barrett	2511	U00014	Electric Utility	Yes	Yes	347	800	310	0.4368
NY	E F Barrett	2511	U00015	Electric Utility	Yes	Yes	347	800	310	0.4368
NY	E F Barrett	2511	U00016	Electric Utility	No	Yes	465	1499	547	0.4349
NY	E F Barrett	2511	U00017	Electric Utility	No	Yes	465	1499	547	0.4349
NY	E F Barrett	2511	U00018	Electric Utility	Yes	Yes	428	1069	394	0.4379
NY	E F Barrett	2511	U00019	Electric Utility	Yes	Yes	428	1069	394	0.4379
NY	East Hampton Facility	2512	UGT001	Electric Utility	No	Yes	546	1541	725	0.4787
NY	East River	2493	1	Cogeneration	No	Yes	1396	6496	1418	0.0077
NY	East River	2493	2	Cogeneration	No	Yes	1486	6362	1318	0.0080
NY	East River	2493	60	Cogeneration	No	Yes	1487	5855	1395	0.1114

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NY	East River	2493	70	Electric Utility	No	Yes	1210	3912	953	0.0936
NY	Edgewood Energy	55786	CT01	Electric Utility	No	Yes	609	1689	656	0.0200
NY	Edgewood Energy	55786	CT02	Electric Utility	No	Yes	627	1569	611	0.0186
NY	Empire Generating Co, LLC	56259	CT-1	Electric Utility	No	Yes	1386	6740	1483	0.0095
NY	Empire Generating Co, LLC	56259	CT-2	Electric Utility	No	Yes	1263	5028	1161	0.0131
NY	Equus Power I	56032	0001	Electric Utility	No	Yes	904	1283	417	0.0241
NY	Fortistar North Tonawanda Inc	54131	NTCT1	Cogeneration	Yes	Yes	1293	422	458	0.0901
NY	Freeport Power Plant No. 2	2679	5	Electric Utility	No	Yes	567	805	376	0.0647
NY	Glenwood Landing Energy Center	7869	UGT011	Electric Utility	Yes	Yes	10	33	32	1.1999
NY	Glenwood Landing Energy Center	7869	UGT012	Electric Utility	No	Yes	947	1566	592	0.0393
NY	Glenwood Landing Energy Center	7869	UGT013	Electric Utility	No	Yes	961	1695	616	0.0445
NY	Glenwood	2514	U00020	Electric Utility	Yes	Yes	36	22	9	0.5746
NY	Glenwood	2514	U00021	Electric Utility	Yes	Yes	22	36	9	0.5586
NY	Gowanus Generating Station	2494	CT01-1	Electric Utility	Yes	Yes	0	11	2	0.5719
NY	Gowanus Generating Station	2494	CT01-2	Electric Utility	Yes	Yes	6	14	0	0.5715
NY	Gowanus Generating Station	2494	CT01-3	Electric Utility	Yes	Yes	4	6	0	0.5720
NY	Gowanus Generating Station	2494	CT01-4	Electric Utility	Yes	Yes	0	12	0	0.5720
NY	Gowanus Generating Station	2494	CT01-5	Electric Utility	Yes	Yes	0	6	0	0.5720
NY	Gowanus Generating Station	2494	CT01-6	Electric Utility	Yes	Yes	3	6	0	0.5720
NY	Gowanus Generating Station	2494	CT01-7	Electric Utility	Yes	Yes	0	8	6	0.5720
NY	Gowanus Generating Station	2494	CT01-8	Electric Utility	Yes	Yes	8	6	6	0.5720
NY	Gowanus Generating Station	2494	CT02-1	Electric Utility	Yes	Yes	38	182	117	0.3210
NY	Gowanus Generating Station	2494	CT02-2	Electric Utility	Yes	Yes	69	156	99	0.3210
NY	Gowanus Generating Station	2494	CT02-3	Electric Utility	Yes	Yes	62	114	86	0.3210
NY	Gowanus Generating Station	2494	CT02-4	Electric Utility	Yes	Yes	51	100	64	0.3210
NY	Gowanus Generating Station	2494	CT02-5	Electric Utility	Yes	Yes	85	71	27	0.3210
NY	Gowanus Generating Station	2494	CT02-6	Electric Utility	Yes	Yes	49	89	38	0.3210
NY	Gowanus Generating Station	2494	CT02-7	Electric Utility	Yes	Yes	101	101	58	0.3211
NY	Gowanus Generating Station	2494	CT02-8	Electric Utility	Yes	Yes	49	51	23	0.3210
NY	Gowanus Generating Station	2494	CT03-1	Electric Utility	Yes	Yes	55	103	44	0.3210

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
NY	Gowanus Generating Station	2494	CT03-2	Electric Utility	Yes	Yes	76	59	23	0.3209
NY	Gowanus Generating Station	2494	CT03-3	Electric Utility	Yes	Yes	43	69	29	0.3209
NY	Gowanus Generating Station	2494	CT03-4	Electric Utility	Yes	Yes	43	100	48	0.3209
NY	Gowanus Generating Station	2494	CT03-5	Electric Utility	Yes	Yes	53	150	96	0.3210
NY	Gowanus Generating Station	2494	CT03-6	Electric Utility	Yes	Yes	29	93	40	0.3209
NY	Gowanus Generating Station	2494	CT03-7	Electric Utility	Yes	Yes	55	51	23	0.3210
NY	Gowanus Generating Station	2494	CT03-8	Electric Utility	Yes	Yes	55	49	20	0.3210
NY	Gowanus Generating Station	2494	CT04-1	Electric Utility	Yes	Yes	4	13	6	0.6902
NY	Gowanus Generating Station	2494	CT04-2	Electric Utility	Yes	Yes	0	12	0	0.6902
NY	Gowanus Generating Station	2494	CT04-3	Electric Utility	Yes	Yes	3	12	0	0.6898
NY	Gowanus Generating Station	2494	CT04-4	Electric Utility	Yes	Yes	2	8	0	0.6903
NY	Gowanus Generating Station	2494	CT04-5	Electric Utility	Yes	Yes	3	12	3	0.6900
NY	Gowanus Generating Station	2494	CT04-6	Electric Utility	Yes	Yes	3	14	0	0.6901
NY	Gowanus Generating Station	2494	CT04-7	Electric Utility	Yes	Yes	0	8	0	0.6898
NY	Gowanus Generating Station	2494	CT04-8	Electric Utility	Yes	Yes	3	5	0	0.6900
NY	Greenidge Generation LLC	2527	6	Electric Utility	No	Yes	0	2478	1199	0.0986
NY	Harlem River Yard	7914	HR01	Electric Utility	No	Yes	247	1155	525	0.0157
NY	Harlem River Yard	7914	HR02	Electric Utility	No	Yes	294	737	401	0.0211
NY	Hawkeye Energy Greenport, LLC	55969	U-01	Electric Utility	No	Yes	291	1086	561	0.0385
NY	Hell Gate	7913	HG01	Electric Utility	No	Yes	308	1170	553	0.0181
NY	Hell Gate	7913	HG02	Electric Utility	No	Yes	235	691	401	0.0213
NY	Hillburn	2628	001	Electric Utility	Yes	Yes	10	30	13	0.3100
NY	Holtsville Facility	8007	U00001	Electric Utility	Yes	Yes	54	54	31	0.4153
NY	Holtsville Facility	8007	U00002	Electric Utility	Yes	Yes	54	54	31	0.4153
NY	Holtsville Facility	8007	U00003	Electric Utility	Yes	Yes	46	35	30	0.5314
NY	Holtsville Facility	8007	U00004	Electric Utility	Yes	Yes	46	36	30	0.5335
NY	Holtsville Facility	8007	U00005	Electric Utility	Yes	Yes	90	86	44	0.4761
NY	Holtsville Facility	8007	U00006	Electric Utility	Yes	Yes	90	86	44	0.5065
NY	Holtsville Facility	8007	U00007	Electric Utility	Yes	Yes	111	66	33	0.4782
NY	Holtsville Facility	8007	U00008	Electric Utility	Yes	Yes	111	66	33	0.4907
NY	Holtsville Facility	8007	U00009	Electric Utility	Yes	Yes	48	65	23	0.5954
NY	Holtsville Facility	8007	U00010	Electric Utility	Yes	Yes	48	65	23	0.5649
NY	Holtsville Facility	8007	U00011	Electric Utility	Yes	Yes	152	285	160	0.5888
NY	Holtsville Facility	8007	U00012	Electric Utility	Yes	Yes	152	285	160	0.6216
NY	Holtsville Facility	8007	U00013	Electric Utility	Yes	Yes	85	153	137	0.6160
NY	Holtsville Facility	8007	U00014	Electric Utility	Yes	Yes	85	153	137	0.6048

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NY	Holtsville Facility	8007	U00015	Electric Utility	Yes	Yes	101	157	83	0.5081
NY	Holtsville Facility	8007	U00016	Electric Utility	Yes	Yes	101	157	83	0.4425
NY	Holtsville Facility	8007	U00017	Electric Utility	Yes	Yes	65	118	86	0.4362
NY	Holtsville Facility	8007	U00018	Electric Utility	Yes	Yes	65	118	86	0.4940
NY	Holtsville Facility	8007	U00019	Electric Utility	Yes	Yes		196	117	0.6147
NY	Holtsville Facility	8007	U00020	Electric Utility	Yes	Yes	140	196	117	0.5906
NY	Hudson Avenue	2496	CT0003	Electric Utility	Yes	Yes	12	27	0	1.5000
NY	Hudson Avenue	2496	CT0004	Electric Utility	Yes	Yes	2	0	0	0.0000
NY	Hudson Avenue	2496	CT0005	Electric Utility	Yes	Yes	6	60	31	1.5000
NY	Huntley Power	2549	67	Electric Utility	No	Yes	0		0	
NY	Huntley Power	2549	68	Electric Utility	No	Yes	0		0	
NY	Indeck-Corinth Energy Center	50458	1	Cogeneration	No	Yes	1324	3716	1313	0.0256
NY	Indeck-Olean Energy Center	54076	1	Cogeneration	No	Yes	685	2240	864	0.0428
NY	Indeck-Oswego Energy Center	50450	1	Cogeneration	Yes	Yes	818	1518	694	0.1265
NY	Indeck-Silver Springs Energy Center	50449	1	Cogeneration	No	Yes	886	2103	949	0.1004
NY	Indeck-Yerkes Energy Center	50451	1	Cogeneration	Yes	Yes	891	1759	763	0.1581
NY	Independence	54547	1	Cogeneration	No	Yes	1463	5036	1401	0.0238
NY	Independence	54547	2	Cogeneration	No	Yes	1488	4875	1352	0.0260
NY	Independence	54547	3	Cogeneration	No	Yes	1486	4898	1292	0.0272
NY	Independence	54547	4	Cogeneration	No	Yes	1472	5172	1309	0.0252
NY	KIAC Cogeneration	54114	GT1	Cogeneration	No	Yes	1254	4729	1135	0.0273
NY	KIAC Cogeneration	54114	GT2	Cogeneration	No	Yes	1469	5773	1244	0.0274
NY	Lehigh Northeast Cement Company	880052	01070	Cement Manufacturing	No	No	1358	2821	0	0.0000
NY	Lockport	54041	011854	Cogeneration	Yes	Yes	1329	2760	1025	0.1160
NY	Lockport	54041	011855	Cogeneration	Yes	Yes	1418	2960	1217	0.2497
NY	Lockport	54041	011856	Cogeneration	Yes	Yes	1318	2701	1054	0.1014
NY	Massena Energy Facility	54592	001	Cogeneration	Yes	Yes	54	52	5	0.4999
NY	Momentive Performance Materials	880024	U28006	Industrial Boiler	No	No	1392	2997	1389	0.0514
NY	Narrows Generating Station	2499	CT01-1	Electric Utility	Yes	Yes	200	549	345	0.3350
NY	Narrows Generating Station	2499	CT01-2	Electric Utility	Yes	Yes	278	357	244	0.3351
NY	Narrows Generating Station	2499	CT01-3	Electric Utility	Yes	Yes	356	458	303	0.3351
NY	Narrows Generating Station	2499	CT01-4	Electric Utility	Yes	Yes	238	303	198	0.3351
NY	Narrows Generating Station	2499	CT01-5	Electric Utility	Yes	Yes	200	400	270	0.3350
NY	Narrows Generating Station	2499	CT01-6	Electric Utility	Yes	Yes	183	387	271	0.3351
NY	Narrows Generating Station	2499	CT01-7	Electric Utility	Yes	Yes	148	530	336	0.3351
NY	Narrows Generating Station	2499	CT01-8	Electric Utility	Yes	Yes	307	436	285	0.3351

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NY	Narrows Generating Station	2499	CT02-1	Electric Utility	Yes	Yes	196	354	248	0.3351
NY	Narrows Generating Station	2499	CT02-2	Electric Utility	Yes	Yes	276	351	244	0.3351
NY	Narrows Generating Station	2499	CT02-3	Electric Utility	Yes	Yes	323	439	289	0.3351
NY	Narrows Generating Station	2499	CT02-4	Electric Utility	Yes	Yes	160	644	422	0.3351
NY	Narrows Generating Station	2499	CT02-5	Electric Utility	Yes	Yes	340	429	270	0.3351
NY	Narrows Generating Station	2499	CT02-6	Electric Utility	Yes	Yes	109	271	175	0.3351
NY	Narrows Generating Station	2499	CT02-7	Electric Utility	Yes	Yes	408	621	407	0.3351
NY	Narrows Generating Station	2499	CT02-8	Electric Utility	Yes	Yes	172	660	393	0.3351
NY	Nassau Energy Corporation	52056	00004	Cogeneration	No	Yes	1461	6374	1265	0.1369
NY	Niagara Generation, LLC	50202	1	Electric Utility	No	Yes	0	0	0	0.0000
NY	Nissequogue Energy Center	54149	1	Cogeneration	No	Yes	1448	6555	1394	0.0772
NY	North 1st	7915	NO1	Electric Utility	No	Yes	521	1827	750	0.0146
NY	Northport	2516	1	Electric Utility	No	Yes	1189	2130	1001	0.0477
NY	Northport	2516	2	Electric Utility	No	Yes	1134	3420	1190	0.0479
NY	Northport	2516	3	Electric Utility	No	Yes	833	3828	1306	0.0575
NY	Northport	2516	4	Electric Utility	No	Yes	1420	4232	1171	0.0472
NY	Northport	2516	UGT001	Electric Utility	Yes	Yes	14	24	10	1.2002
NY	NRG Dunkirk Power	2554	1	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	NRG Dunkirk Power	2554	2	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	NRG Dunkirk Power	2554	3	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	NRG Dunkirk Power	2554	4	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Oswego Harbor Power	2594	5	Electric Utility	Yes	Yes	41	145	89	0.1053
NY	Oswego Harbor Power	2594	6	Electric Utility	Yes	Yes	68	254	237	0.0681
NY	Pinelawn Power	56188	00001	Electric Utility	No	Yes	791	2327	619	0.0158
NY	Poletti 500 MW CC	56196	CTG7A	Electric Utility	No	Yes	1260	5994	1431	0.0100
NY	Poletti 500 MW CC	56196	CTG7B	Electric Utility	No	Yes	1354	6088	1407	0.0116
NY	Port Jefferson Energy Center	2517	3	Electric Utility	Yes	Yes	1293	1750	795	0.0543
NY	Port Jefferson Energy Center	2517	4	Electric Utility	No	Yes	894	2230	970	0.0457
NY	Port Jefferson Energy Center	2517	UGT001	Electric Utility	Yes	Yes	28	29	15	1.1999
NY	Port Jefferson Energy Center	2517	UGT002	Electric Utility	No	Yes	560	1151	481	0.0325
NY	Port Jefferson Energy Center	2517	UGT003	Electric Utility	No	Yes	582	1192	459	0.0346
NY	Pouch Terminal	8053	PT01	Electric Utility	No	Yes	802	2455	926	0.0126
NY	Ravenswood Generating Station	2500	10	Electric Utility	No	Yes	1347	3358	1245	0.0628
NY	Ravenswood Generating Station	2500	20	Electric Utility	No	Yes	1488	3851	1325	0.0625
NY	Ravenswood Generating Station	2500	30	Electric Utility	Yes	Yes	1488	2405	790	0.0638

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NY	Ravenswood Generating Station	2500	CT0001	Electric Utility	Yes	Yes	33	43	5	0.7000
NY	Ravenswood Generating Station	2500	CT0004	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0005	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0006	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0007	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0008	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0009	Electric Utility	Yes	Yes	100	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT0010	Electric Utility	Yes	Yes	93	172	79	0.4300
NY	Ravenswood Generating Station	2500	CT0011	Electric Utility	Yes	Yes	86	215	82	0.4300
NY	Ravenswood Generating Station	2500	CT02-1	Electric Utility	Yes	Yes	53	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT02-2	Electric Utility	Yes	Yes	59	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT02-3	Electric Utility	Yes	Yes	53	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT02-4	Electric Utility	Yes	Yes	57	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT03-1	Electric Utility	Yes	Yes	50	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT03-2	Electric Utility	Yes	Yes	16	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT03-3	Electric Utility	Yes	Yes	0	0	0	0.0000
NY	Ravenswood Generating Station	2500	CT03-4	Electric Utility	Yes	Yes	64	0	0	0.0000
NY	Ravenswood Generating Station	2500	UCC001	Electric Utility	No	Yes	1422	7067	1467	0.0067
NY	Ravenswood Steam Plant	880100	BLR001	Industrial Boiler	No	No	17	112	16	0.1075
NY	Ravenswood Steam Plant	880100	BLR002	Industrial Boiler	No	No	0	0	0	0.0000
NY	Ravenswood Steam Plant	880100	BLR003	Industrial Boiler	No	No	19	56	19	0.0828
NY	Ravenswood Steam Plant	880100	BLR004	Industrial Boiler	No	No	0	100	0	0.1024
NY	RED-Rochester, LLC-Eastman Business Park	10025	3B	Industrial Boiler	No	No	1488	0	0	0.0000
NY	RED-Rochester, LLC-Eastman Business Park	10025	4A	Industrial Boiler	No	No	0	0	0	0.0000
NY	RED-Rochester, LLC-Eastman Business Park	10025	4B	Industrial Boiler	No	No	1488	6848	1470	0.0980
NY	Rensselaer Cogen	54034	1GTDBS	Electric Utility	Yes	Yes	365	75	172	0.0607
NY	Richard M Flynn (Holtsville)	7314	001	Electric Utility	No	Yes	1461	4442	1333	0.0368

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NY	Riverbay Corp. - Co-Op City	52168	0003HP	Cogeneration	No	Yes	1451	6766	1461	0.0418
NY	Riverbay Corp. - Co-Op City	52168	00001	Institutional	No	No	1488	5883	1488	0.0895
NY	Riverbay Corp. - Co-Op City	52168	00004	Cogeneration	No	Yes	758	2706	254	0.0117
NY	Riverbay Corp. - Co-Op City	52168	00006	Cogeneration	No	Yes	743	4452	1146	0.2194
NY	Roseton Generating LLC	8006	1	Electric Utility	Yes	Yes	372	846	384	0.0912
NY	Roseton Generating LLC	8006	2	Electric Utility	Yes	Yes	591	1039	595	0.0607
NY	S A Carlson	2682	10	Electric Utility	Yes	Yes	589	116	96	0.0506
NY	S A Carlson	2682	20	Electric Utility	No	Yes	1484	3027	1146	0.1247
NY	S A Carlson	2682	9	Electric Utility	Yes	Yes	47	54	35	0.0582
NY	Saranac Power Partners, LP	54574	00001	Cogeneration	Yes	Yes	179	264	85	0.0502
NY	Saranac Power Partners, LP	54574	00002	Cogeneration	Yes	Yes	204	149	69	0.0404
NY	Selkirk Cogen Partners	10725	CTG101	Cogeneration	Yes	Yes	741	467	388	0.0815
NY	Selkirk Cogen Partners	10725	CTG201	Cogeneration	No	Yes	904	2129	1043	0.0282
NY	Selkirk Cogen Partners	10725	CTG301	Cogeneration	No	Yes	861	1984	969	0.0284
NY	Shoemaker	2632	1	Electric Utility	Yes	Yes	19	36	28	0.5144
NY	Shoreham Energy	55787	CT01	Electric Utility	No	Yes	59	130	83	0.1081
NY	Shoreham Energy	55787	CT02	Electric Utility	No	Yes	61	154	96	0.0897
NY	Somerset Operating Company (Kintigh)	6082	1	Electric Utility	Yes	Yes	1208	601	815	0.1921
NY	Sterling Power Plant	50744	00001	Cogeneration	Yes	Yes	218	663	655	0.1254
NY	Syracuse, LLC	10621	1	Electric Utility	Yes	Yes	306	637	463	0.1518
NY	Ticonderoga Mill	54099	000044	Pulp & Paper Mill	No	No	1488	6672	1485	0.1711
NY	Valley Energy Center	56940	1	Electric Utility	No	Yes		3208	816	0.0123
NY	Valley Energy Center	56940	2	Electric Utility	No	Yes		3196	829	0.0078
NY	Vernon Boulevard	7909	VB01	Electric Utility	No	Yes	275	1007	485	0.0255
NY	Vernon Boulevard	7909	VB02	Electric Utility	No	Yes	338	1523	626	0.0256
NY	Wading River Facility	7146	UGT007	Electric Utility	Yes	Yes	99	73	40	0.1867
NY	Wading River Facility	7146	UGT008	Electric Utility	Yes	Yes	125	92	25	0.2060
NY	Wading River Facility	7146	UGT009	Electric Utility	Yes	Yes	109	102	52	0.2181
NY	Wading River Facility	7146	UGT013	Electric Utility	Yes	Yes	100	34	9	0.8381
NY	Wading River Facility	7146	UGT014	Electric Utility	Yes	Yes	108	55	19	0.7890
NY	West Babylon Facility	2521	UGT001	Electric Utility	Yes	Yes	122	74	52	0.9024
PA	AdvanSix Resins & Chemicals LLC	880007	052	Industrial Boiler	No	Yes	1369		0	
PA	Armagh Compressor Station	880071	31301	Industrial Turbine	No	No	0	0	0	0.0000
PA	Armstrong Power, LLC	55347	1	Electric Utility	No	Yes	969	1124	337	0.0373
PA	Armstrong Power, LLC	55347	2	Electric Utility	No	Yes	915	1273	346	0.0351
PA	Armstrong Power, LLC	55347	3	Electric Utility	No	Yes	898	1437	453	0.0373
PA	Armstrong Power, LLC	55347	4	Electric Utility	No	Yes	941	1355	419	0.0357
PA	Bernville Station	880049	32001	Industrial Turbine	No	No	0	1	0	0.7000
PA	Bethlehem Power Plant	55690	1	Electric Utility	No	Yes	1439	5221	1199	0.0055
PA	Bethlehem Power Plant	55690	2	Electric Utility	No	Yes	1402	5483	1190	0.0062
PA	Bethlehem Power Plant	55690	3	Electric Utility	No	Yes	1422	5619	1223	0.0047
PA	Bethlehem Power Plant	55690	5	Electric Utility	No	Yes	1409	4661	1232	0.0058
PA	Bethlehem Power Plant	55690	6	Electric Utility	No	Yes	1411	5257	1248	0.0052
PA	Bethlehem Power Plant	55690	7	Electric Utility	No	Yes	1404	5104	1215	0.0057

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PA	Bruce Mansfield	6094	1	Electric Utility	No	Yes	1276	201	0	0.1749
PA	Bruce Mansfield	6094	2	Electric Utility	No	Yes	1164	150	38	0.1023
PA	Bruce Mansfield	6094	3	Electric Utility	No	Yes	1361	3288	675	0.0942
PA	Brunner Island, LLC	3140	1	Electric Utility	No	Yes	104	2755	1021	0.1370
PA	Brunner Island, LLC	3140	2	Electric Utility	No	Yes	1488	2086	748	0.1383
PA	Brunner Island, LLC	3140	3	Electric Utility	No	Yes	1484	2013	746	0.0912
PA	Brunot Island Power Station	3096	2A	Electric Utility	Yes	Yes	256	576	141	0.0540
PA	Brunot Island Power Station	3096	2B	Electric Utility	Yes	Yes	248	571	140	0.0513
PA	Brunot Island Power Station	3096	3	Electric Utility	Yes	Yes	266	536	109	0.0473
PA	Cambria Cogen	10641	1	Cogeneration	No	Yes	1486	3705	624	0.1505
PA	Cambria Cogen	10641	2	Cogeneration	No	Yes	1485	3618	624	0.1527
PA	Chambersburg Units 12 & 13	55654	12	Electric Utility	No	Yes	813	2824	697	0.0819
PA	Chambersburg Units 12 & 13	55654	13	Electric Utility	No	Yes	825	3062	726	0.0805
PA	Cheswick	8226	1	Electric Utility	No	Yes	1239	3262	790	0.2042
PA	Colver Green Energy	10143	AAB01	Electric Utility	No	Yes	1318	6473	1332	0.1559
PA	Conemaugh	3118	1	Electric Utility	No	Yes	1164	5973	1458	0.1104
PA	Conemaugh	3118	2	Electric Utility	No	Yes	1488	6993	1488	0.1139
PA	Croydon Generating Station	8012	11	Electric Utility	Yes	Yes	9	6	0	0.5900
PA	Croydon Generating Station	8012	12	Electric Utility	Yes	Yes	25	7	0	0.5901
PA	Croydon Generating Station	8012	21	Electric Utility	Yes	Yes	24	14	5	0.5907
PA	Croydon Generating Station	8012	22	Electric Utility	Yes	Yes	14	4	4	0.5900
PA	Croydon Generating Station	8012	31	Electric Utility	Yes	Yes	17	17	8	0.5966
PA	Croydon Generating Station	8012	32	Electric Utility	Yes	Yes	23	9	5	0.5901
PA	Croydon Generating Station	8012	41	Electric Utility	Yes	Yes	5	6	3	0.5900
PA	Croydon Generating Station	8012	42	Electric Utility	Yes	Yes	13	8	2	0.5899
PA	Domtar Paper Company, LLC	54638	040	Pulp & Paper Mill	No	No	1488	6919	1488	0.0682
PA	Domtar Paper Company, LLC	54638	041	Pulp & Paper Mill	No	No	1488	7258	1486	0.0697
PA	Dynegy Fayette II, LLC	55516	CTG1	Electric Utility	No	Yes	1488	7319	1481	0.0069
PA	Dynegy Fayette II, LLC	55516	CTG2	Electric Utility	No	Yes	1486	7300	1480	0.0069
PA	Ebensburg Power Company	10603	031	Cogeneration	No	Yes	1415	6726	1480	0.0929
PA	Eddystone Generating Station	3161	3	Electric Utility	Yes	Yes	805	213	102	0.0489
PA	Eddystone Generating Station	3161	4	Electric Utility	Yes	Yes	677	272	138	0.0514
PA	Entriken Compressor Station	880072	31601	Industrial Turbine	No	No	0	0	0	0.0000

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
PA	Fairless Energy Center	55298	1A	Electric Utility	No	Yes	1488	6762	1298	0.0073
PA	Fairless Energy Center	55298	1B	Electric Utility	No	Yes	1488	5786	1136	0.0071
PA	Fairless Energy Center	55298	2A	Electric Utility	No	Yes	1481	5997	1473	0.0085
PA	Fairless Energy Center	55298	2B	Electric Utility	No	Yes	1480	6415	1472	0.0080
PA	Fairless Hills Generating Station	7701	PHBLR4	Electric Utility	No	Yes	1448	5490	1327	0.0462
PA	Fairless Hills Generating Station	7701	PHBLR5	Electric Utility	No	Yes	1293	2824	670	0.0566
PA	Gans Generating Facility	55377	8	Electric Utility	No	Yes	337	2362	638	0.0814
PA	Gans Generating Facility	55377	9	Electric Utility	No	Yes	304	2393	638	0.0742
PA	Gilberton Power Company	10113	031	Cogeneration	No	Yes	1478	7045	1378	0.0748
PA	Gilberton Power Company	10113	032	Cogeneration	No	Yes	1481	7120	1410	0.0748
PA	Grays Ferry Cogen Partnership	54785	2	Cogeneration	No	Yes	1283	6543	1299	0.0305
PA	Grays Ferry Cogen Partnership	54785	25	Cogeneration	No	Yes	1484	6717	1488	0.0580
PA	Hamilton Liberty Generation Plant	58420	CT1	Electric Utility	No	Yes	1429	5952	1415	0.0064
PA	Hamilton Liberty Generation Plant	58420	CT2	Electric Utility	No	Yes	744	5808	1327	0.0064
PA	Hamilton Patriot Generation Plant	58426	CT1	Electric Utility	No	Yes	605	6202	1406	0.0078
PA	Hamilton Patriot Generation Plant	58426	CT2	Electric Utility	No	Yes	647	5749	1412	0.0077
PA	Handsome Lake Energy	55233	EU-1A	Electric Utility	No	Yes	349	1179	447	0.4795
PA	Handsome Lake Energy	55233	EU-1B	Electric Utility	No	Yes	349	1199	447	0.4699
PA	Handsome Lake Energy	55233	EU-2A	Electric Utility	No	Yes	498	667	250	0.5741
PA	Handsome Lake Energy	55233	EU-2B	Electric Utility	No	Yes	495	667	251	0.4901
PA	Handsome Lake Energy	55233	EU-3A	Electric Utility	No	Yes	83	649	246	0.4094
PA	Handsome Lake Energy	55233	EU-3B	Electric Utility	No	Yes	508	645	242	0.4851
PA	Handsome Lake Energy	55233	EU-4A	Electric Utility	No	Yes	833	647	259	0.4575
PA	Handsome Lake Energy	55233	EU-4B	Electric Utility	No	Yes	828	610	260	0.5008
PA	Handsome Lake Energy	55233	EU-5A	Electric Utility	No	Yes	132	1192	447	0.5114
PA	Handsome Lake Energy	55233	EU-5B	Electric Utility	No	Yes	133	1211	447	0.5344
PA	Hazleton Generation	10870	TURB2	Cogeneration	No	Yes	4	72	11	0.0827
PA	Hazleton Generation	10870	TURB3	Cogeneration	No	Yes	4	46	11	0.0832
PA	Hazleton Generation	10870	TURB4	Cogeneration	No	Yes	4	46	2	0.0846
PA	Hazleton Generation	10870	TURBIN	Cogeneration	Yes	Yes	10	39	20	0.2409
PA	Helix Ironwood LLC	55337	0001	Electric Utility	No	Yes	1488	6544	1482	0.0128
PA	Helix Ironwood LLC	55337	0002	Electric Utility	No	Yes	1488	7011	1481	0.0129
PA	Homer City	3122	1	Electric Utility	No	Yes	996	5172	1033	0.1401
PA	Homer City	3122	2	Electric Utility	No	Yes	1358	4579	1295	0.1549
PA	Homer City	3122	3	Electric Utility	No	Yes	1399	4376	1262	0.0966
PA	Hunlock Creek Energy Center	3176	CT5	Electric Utility	No	Yes	1325	3309	788	0.0188
PA	Hunlock Creek Energy Center	3176	CT6	Electric Utility	No	Yes	1314	3363	788	0.0212
PA	Hunlock Unit 4	56397	4	Electric Utility	No	Yes	63	602	250	0.0954
PA	Hunterstown Combined Cycle	55976	CT101	Electric Utility	No	Yes	1382	6672	1488	0.0060
PA	Hunterstown Combined Cycle	55976	CT201	Electric Utility	No	Yes	1391	6588	1488	0.0054

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PA	Hunterstown Combined Cycle	55976	CT301	Electric Utility	No	Yes	1310	6746	1488	0.0037
PA	Keystone	3136	1	Electric Utility	No	Yes	1488	7086	1429	0.1259
PA	Keystone	3136	2	Electric Utility	No	Yes	1485	6035	1390	0.1292
PA	Kimberly-Clark Tissue Company	50410	034	Pulp & Paper Mill	No	No	69	808	64	1.5264
PA	Kimberly-Clark Tissue Company	50410	035	Cogeneration	No	No	1488	6427	1413	0.0866
PA	Lackawanna Energy Center	60357	1	Electric Utility	No	Yes		6574	1424	0.0052
PA	Lackawanna Energy Center	60357	2	Electric Utility	No	Yes		3842	864	0.0057
PA	Lackawanna Energy Center	60357	3	Electric Utility	No	Yes		2365	744	0.0054
PA	Liberty Electric Power Plant	55231	0001	Electric Utility	No	Yes	1452	7143	1470	0.0108
PA	Liberty Electric Power Plant	55231	0002	Electric Utility	No	Yes	1485	7213	1470	0.0108
PA	Lower Mount Bethel Energy, LLC	55667	CT01	Electric Utility	No	Yes	1472	5569	1478	0.0098
PA	Lower Mount Bethel Energy, LLC	55667	CT02	Electric Utility	No	Yes	1486	6093	1488	0.0096
PA	Marcus Hook 50, L.P.	50074	001	Cogeneration	No	Yes	8	22	0	0.4178
PA	Marcus Hook Energy, LP	55801	0001	Cogeneration	No	Yes	1482	5740	1425	0.0200
PA	Marcus Hook Energy, LP	55801	0002	Cogeneration	No	Yes	1484	5744	1340	0.0202
PA	Marcus Hook Energy, LP	55801	0003	Cogeneration	No	Yes	1482	5866	1344	0.0193
PA	Martins Creek, LLC	3148	3	Electric Utility	Yes	Yes	1484	1476	641	0.0725
PA	Martins Creek, LLC	3148	4	Electric Utility	Yes	Yes	950	1312	433	0.0928
PA	Merck & Company - West Point	52149	039	Industrial Turbine	No	No	555	1021	555	0.0820
PA	Merck & Company - West Point	52149	040	Industrial Turbine	No	No	1488	7010	1200	0.0259
PA	Montour, LLC	3149	1	Electric Utility	No	Yes	1439	2088	567	0.1236
PA	Montour, LLC	3149	2	Electric Utility	Yes	Yes	943	1246	144	0.1283
PA	Mountain	3111	031	Electric Utility	Yes	Yes	60	0	0	0.0000
PA	Mountain	3111	032	Electric Utility	Yes	Yes	52	58	8	0.6928
PA	Moxie Freedom Generation Plant	59906	201	Electric Utility	No	Yes		5042	1128	0.0063
PA	Moxie Freedom Generation Plant	59906	202	Electric Utility	No	Yes		4649	1002	0.0207
PA	Mt. Carmel Cogeneration	10343	SG-101	Cogeneration	No	Yes	1295	4267	765	0.0641
PA	New Castle	3138	3	Electric Utility	No	Yes	1011	2914	871	0.0669
PA	New Castle	3138	4	Electric Utility	No	Yes	1311	2504	810	0.0508
PA	New Castle	3138	5	Electric Utility	No	Yes	1348	3005	912	0.0480
PA	North East Cogeneration Plant	54571	001	Electric Utility	Yes	Yes	0	0	0	0.0000
PA	North East Cogeneration Plant	54571	002	Electric Utility	Yes	Yes	0	0	0	0.0000
PA	Northampton Generating Plant	50888	NGC01	Cogeneration	Yes	Yes	1220	463	354	0.0648
PA	Northeastern Power Company	50039	031	Electric Utility	No	Yes	1488	2592	550	0.0700
PA	Ontelaunee Energy Center	55193	CT1	Electric Utility	No	Yes	1467	7180	1472	0.0068
PA	Ontelaunee Energy Center	55193	CT2	Electric Utility	No	Yes	1467	7051	1478	0.0070
PA	Panda Hummel Station	60368	CT1	Electric Utility	No	Yes		6483	1416	0.0074

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
PA	Panda Hummel Station	60368	CT2	Electric Utility	No	Yes		5952	1348	0.0077
PA	Panther Creek Energy Facility	50776	1	Small Power Producer	Yes	Yes	742	273	91	0.1153
PA	Panther Creek Energy Facility	50776	2	Small Power Producer	Yes	Yes	750	373	32	0.1099
PA	PEI Power Corporation	50279	2	Electric Utility	No	Yes	0	1556	513	0.0840
PA	Philadelphia Refinery	52106	150137	Petroleum Refinery	No	No	1485	6537	1485	0.0340
PA	Philadelphia Refinery	52106	150138	Petroleum Refinery	No	No	0	0	0	0.0000
PA	Philadelphia Refinery	52106	150139	Petroleum Refinery	No	No	1488	6807	1488	0.0338
PA	Philadelphia Refinery	52106	150140	Petroleum Refinery	No	No	1488	4479	732	0.0344
PA	Philadelphia Refinery	52106	150145	Petroleum Refinery	No	No	1488	5868	1436	0.0056
PA	Pixelle Specialty Solutions	50397	034	Pulp & Paper Mill	No	No	1488	0	0	0.0000
PA	Pixelle Specialty Solutions	50397	035	Pulp & Paper Mill	No	No	903	0	0	0.0000
PA	Pixelle Specialty Solutions	50397	036	Pulp & Paper Mill	No	No	1488	6850	1477	0.1569
PA	Pixelle Specialty Solutions	50397	038	Pulp & Paper Mill	No	No		6895	1488	0.0283
PA	Pixelle Specialty Solutions	50397	039	Pulp & Paper Mill	No	No		6811	1488	0.0287
PA	Portland	3113	5	Electric Utility	Yes	Yes	16	8	6	1.2065
PA	Procter & Gamble Paper Products	50463	328001	Cogeneration	No	Yes	1488	7279	1488	0.1196
PA	Procter & Gamble Paper Products	50463	328002	Cogeneration	No	Yes	1462	7156	1484	0.0087
PA	Richmond	3168	91	Electric Utility	Yes	Yes	4	6	0	0.5897
PA	Richmond	3168	92	Electric Utility	Yes	Yes	2	4	0	0.5900
PA	Scrubgrass Generating Plant	50974	1	Small Power Producer	No	Yes	1485	5135	1166	0.1275
PA	Scrubgrass Generating Plant	50974	2	Small Power Producer	No	Yes	1477	5122	1328	0.1371
PA	Seward	3130	1	Electric Utility	No	Yes	1414	3955	622	0.0937
PA	Seward	3130	2	Electric Utility	No	Yes	1486	3657	697	0.0910
PA	Shawville	3131	1	Electric Utility	Yes	Yes	0	762	184	0.0566
PA	Shawville	3131	2	Electric Utility	Yes	Yes	0	1516	275	0.0688
PA	Shawville	3131	3	Electric Utility	Yes	Yes	0	1288	221	0.0525
PA	Shawville	3131	4	Electric Utility	Yes	Yes	0	1221	128	0.0503
PA	Shermans Dale Station	880050	31801	Industrial Turbine	No	No	0	1	0	0.7000
PA	SPMT Marcus Hook Industrial Complex	880107	AB01	Industrial Boiler	No	No	1184	5115	1184	0.0256
PA	SPMT Marcus Hook Industrial Complex	880107	AB02	Industrial Boiler	No	No	0	0	0	0.0000
PA	SPMT Marcus Hook Industrial Complex	880107	AB03	Industrial Boiler	No	No	749	3777	598	0.0235

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
PA	SPMT Marcus Hook Industrial Complex	880107	AB04	Industrial Boiler	No	No	1014	5483	975	0.0174
PA	Springdale Generating Station (55196)	55196	1	Electric Utility	No	Yes	616	2057	604	0.0793
PA	Springdale Generating Station (55196)	55196	2	Electric Utility	No	Yes	617	2088	600	0.0842
PA	Springdale Generating Station (55710)	55710	3	Electric Utility	No	Yes	1472	6970	1358	0.0088
PA	Springdale Generating Station (55710)	55710	4	Electric Utility	No	Yes	1453	7202	1452	0.0085
PA	St. Nicholas Cogeneration Project	54634	1	Small Power Producer	No	Yes	1432	6775	1440	0.0516
PA	Tolna	3116	031	Electric Utility	Yes	Yes	5	59	33	0.6928
PA	Tolna	3116	032	Electric Utility	Yes	Yes	7	60	32	0.6927
PA	Trainer Refinery	880025	034	Industrial Boiler	No	No	1488	7035	0	0.0043
PA	Trainer Refinery	880025	035	Industrial Boiler	No	No	1488	6597	0	0.0045
PA	Trainer Refinery	880025	053	Petroleum Refinery	No	No		6455	1486	0.0029
PA	US Steel (Clairton Coke)	50729	CLBLR1	Iron & Steel	No	No	1488	5484	1486	0.2117
PA	US Steel (Clairton Coke)	50729	CLBLR2	Iron & Steel	No	No	1488	6375	1438	0.1382
PA	US Steel (Edgar Thomson)	50732	ETBLR1	Iron & Steel	No	No	1484	5333	1484	0.0299
PA	US Steel (Edgar Thomson)	50732	ETBLR2	Iron & Steel	No	No	1070	6417	1069	0.0320
PA	US Steel (Edgar Thomson)	50732	ETBLR3	Iron & Steel	No	No	1488	7185	1476	0.0289
PA	Veolia Energy Philadelphia - Edison Sta	880006	1	Industrial Boiler	No	No	0	6	0	0.3097
PA	Veolia Energy Philadelphia - Edison Sta	880006	2	Industrial Boiler	No	No	1	2	0	0.3890
PA	Veolia Energy Philadelphia - Edison Sta	880006	3	Industrial Boiler	No	No	1	273	0	0.2547
PA	Veolia Energy Philadelphia - Edison Sta	880006	4	Industrial Boiler	No	No	0	168	0	0.3559
PA	Veolia Energy Philadelphia - Schuylkill	50607	23	Industrial Boiler	No	No	0	0	0	0.0000
PA	Veolia Energy Philadelphia - Schuylkill	50607	24	Industrial Boiler	No	No	0	0	0	0.0000
PA	Veolia Energy Philadelphia - Schuylkill	50607	26	Industrial Boiler	No	No	0	1193	0	0.0790
PA	Veolia Energy Philadelphia - Schuylkill	50607	RSB1	Industrial Boiler	No	No	125	801	122	0.0089
PA	Veolia Energy Philadelphia - Schuylkill	50607	RSB2	Electric Utility	No	No	128	1028	119	0.0112
PA	Warren	3132	005	Electric Utility	No	Yes	12	111	25	0.4305
PA	Wheelabrator Frackville Energy	50879	GEN1	Cogeneration	No	Yes	1488	6830	1488	0.1395
PA	WPS Westwood Generation, LLC	50611	031	Electric Utility	No	Yes	751	4395	917	0.1205
PA	York Energy Center	55524	1	Electric Utility	No	Yes	1247	4235	1048	0.0115
PA	York Energy Center	55524	2	Electric Utility	No	Yes	1218	4086	1015	0.0114
PA	York Energy Center	55524	3	Electric Utility	No	Yes	1205	4090	1010	0.0101
PA	York Energy Center	55524	5	Electric Utility	No	Yes		3115	1032	0.0056

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
PA	York Energy Center	55524	6	Electric Utility	No	Yes		2998	984	0.0057
RI	Manchester Street Station	3236	10	Electric Utility	No	Yes	1083	5315	1186	0.0336
RI	Manchester Street Station	3236	11	Electric Utility	No	Yes	1073	4749	697	0.0350
RI	Manchester Street Station	3236	9	Electric Utility	No	Yes	1032	5142	1159	0.0417
RI	Ocean State Power II	54324	3	Electric Utility	No	Yes	442	4218	1166	0.0265
RI	Ocean State Power II	54324	4	Electric Utility	No	Yes	437	4311	1128	0.0309
RI	Ocean State Power	51030	1	Electric Utility	No	Yes	910	3556	1039	0.0231
RI	Ocean State Power	51030	2	Electric Utility	No	Yes	886	3476	1077	0.0238
RI	Pawtucket Power Associates, LP	54056	1	Electric Utility	Yes	Yes	257	220	152	0.0546
RI	Rhode Island State Energy Center	55107	RISEP1	Electric Utility	No	Yes	1234	5792	1364	0.0092
RI	Rhode Island State Energy Center	55107	RISEP2	Electric Utility	No	Yes	1232	5791	1377	0.0090
RI	Tiverton Power, LLC	55048	1	Electric Utility	No	Yes	1338	5813	1397	0.0140
VA	AdvanSix Resins and Chemicals - Hopewell	88009 3	10D	Industrial Boiler	No	No		1593	801	0.0380
VA	Altavista Power Station	10773	1	Electric Utility	No	Yes	1026	5960	1131	0.1164
VA	Altavista Power Station	10773	2	Electric Utility	No	Yes	1110	6080	1131	0.1163
VA	Bear Garden Generating Station	56807	1A	Electric Utility	No	Yes	1487	6560	1297	0.0083
VA	Bear Garden Generating Station	56807	1B	Electric Utility	No	Yes	1487	6502	1287	0.0069
VA	Bellemeade Power Station	50966	1	Electric Utility	No	Yes	1021	0	0	0.0000
VA	Bellemeade Power Station	50966	2	Electric Utility	No	Yes	1232	0	0	0.0000
VA	Birchwood Power Facility	54304	001	Electric Utility	No	Yes	1111	2398	122	0.1253
VA	Bremo Power Station	3796	3	Electric Utility	No	Yes	301	0	0	0.0000
VA	Bremo Power Station	3796	4	Electric Utility	No	Yes	876	0	0	0.0000
VA	Brunswick County Power Station	58260	1A	Electric Utility	No	Yes	1439	7081	1488	0.0067
VA	Brunswick County Power Station	58260	1B	Electric Utility	No	Yes	1386	7084	1488	0.0064
VA	Brunswick County Power Station	58260	1C	Electric Utility	No	Yes	1447	7139	1488	0.0062
VA	Buchanan Units 1 & 2	55738	1	Electric Utility	No	Yes	662	3397	558	0.0768
VA	Buchanan Units 1 & 2	55738	2	Electric Utility	No	Yes	651	3129	559	0.0731
VA	Celanese Acetate LLC	52089	BLR010	Industrial Boiler	No	No	1301	6806	1300	0.0301
VA	Celanese Acetate LLC	52089	BLR011	Industrial Boiler	No	No	1335	5499	1334	0.0290
VA	Celanese Acetate LLC	52089	BLR012	Industrial Boiler	No	No	975	6844	974	0.0300
VA	Celanese Acetate LLC	52089	BLR013	Industrial Boiler	No	No	963	6699	961	0.0320
VA	Celanese Acetate LLC	52089	BLR014	Industrial Boiler	No	No	1288	6009	1287	0.0310
VA	Chesterfield Power Station	3797	**8A	Electric Utility	No	Yes	1434		0	
VA	Chesterfield Power Station	3797	3	Electric Utility	No	Yes	644	23	0	0.1872
VA	Chesterfield Power Station	3797	4	Electric Utility	No	Yes	1408	462	0	0.0850
VA	Chesterfield Power Station	3797	5	Electric Utility	No	Yes	1195	3002	567	0.0680
VA	Chesterfield Power Station	3797	6	Electric Utility	No	Yes	1381	2992	1020	0.0657
VA	Chesterfield Power Station	3797	7	Electric Utility	No	Yes	1454	6128	1229	0.1196

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VA	City Point Energy Center	10377	BLR01A	Cogeneration	No	Yes	1464	4303	235	0.3808
VA	City Point Energy Center	10377	BLR01B	Cogeneration	No	Yes	1360	4143	335	0.3808
VA	City Point Energy Center	10377	BLR01C	Cogeneration	No	Yes	1372	4434	231	0.3825
VA	City Point Energy Center	10377	BLR02A	Cogeneration	No	Yes	472	2261	77	0.3764
VA	City Point Energy Center	10377	BLR02B	Cogeneration	No	Yes	315	1435	60	0.3638
VA	City Point Energy Center	10377	BLR02C	Cogeneration	No	Yes	256	1481	32	0.3820
VA	Clinch River	3775	1	Electric Utility	No	Yes	196	2715	272	0.1173
VA	Clinch River	3775	2	Electric Utility	No	Yes	486	3088	348	0.1209
VA	Clover Power Station	7213	1	Electric Utility	No	Yes	1488	3336	145	0.2560
VA	Clover Power Station	7213	2	Electric Utility	No	Yes	1473	3642	288	0.2575
VA	Commonwealth Chesapeake	55381	CT-001	Electric Utility	No	Yes	143	245	80	0.1232
VA	Commonwealth Chesapeake	55381	CT-002	Electric Utility	No	Yes	103	154	50	0.4649
VA	Commonwealth Chesapeake	55381	CT-003	Electric Utility	No	Yes	79	118	44	0.1195
VA	Commonwealth Chesapeake	55381	CT-004	Electric Utility	No	Yes	120	247	81	0.3471
VA	Commonwealth Chesapeake	55381	CT-005	Electric Utility	No	Yes	124	239	60	0.0981
VA	Commonwealth Chesapeake	55381	CT-006	Electric Utility	No	Yes	93	189	69	0.1052
VA	Commonwealth Chesapeake	55381	CT-007	Electric Utility	No	Yes	94	171	49	0.0937
VA	Darbytown Combustion Turbine	7212	1	Electric Utility	Yes	Yes	68	81	17	0.3187
VA	Darbytown Combustion Turbine	7212	2	Electric Utility	Yes	Yes	62	176	14	0.2172
VA	Darbytown Combustion Turbine	7212	3	Electric Utility	Yes	Yes	57	250	20	0.2130
VA	Darbytown Combustion Turbine	7212	4	Electric Utility	Yes	Yes	76	414	136	0.2073
VA	Doswell Limited Partnership	52019	501	Electric Utility	No	Yes	1458	6642	1482	0.0315
VA	Doswell Limited Partnership	52019	502	Electric Utility	No	Yes	1441	6612	1473	0.0328
VA	Doswell Limited Partnership	52019	601	Electric Utility	No	Yes	1470	5923	1473	0.0310
VA	Doswell Limited Partnership	52019	602	Electric Utility	No	Yes	1469	5885	1406	0.0280
VA	Doswell Limited Partnership	52019	CT1	Electric Utility	No	Yes	806	2584	699	0.0380
VA	Doswell Limited Partnership	52019	CT2	Electric Utility	No	Yes		2900	799	0.0417
VA	Doswell Limited Partnership	52019	CT3	Electric Utility	No	Yes		2813	782	0.0398
VA	Elizabeth River Combustion Turbine Sta	52087	CT-1	Electric Utility	Yes	Yes	121	814	363	0.2019
VA	Elizabeth River Combustion Turbine Sta	52087	CT-2	Electric Utility	Yes	Yes	276	824	359	0.2002
VA	Elizabeth River Combustion Turbine Sta	52087	CT-3	Electric Utility	Yes	Yes	305	723	204	0.2061

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VA	Gordonsville Power Station	54844	1	Electric Utility	No	Yes	1061	5121	1148	0.0277
VA	Gordonsville Power Station	54844	2	Electric Utility	No	Yes	1063	5895	1211	0.0271
VA	GP Big Island, LLC	50479	6	Pulp & Paper Mill	No	No	1480	7324	1480	0.0252
VA	Gravel Neck Combustion Turbine	7032	3	Electric Utility	Yes	Yes	297	658	361	0.2060
VA	Gravel Neck Combustion Turbine	7032	4	Electric Utility	Yes	Yes	285	39	8	0.2805
VA	Gravel Neck Combustion Turbine	7032	5	Electric Utility	Yes	Yes	264	565	338	0.2115
VA	Gravel Neck Combustion Turbine	7032	6	Electric Utility	Yes	Yes	186	299	97	0.2085
VA	Greensville County Power Station	59913	1A	Electric Utility	No	Yes		3089	1292	0.0061
VA	Greensville County Power Station	59913	1B	Electric Utility	No	Yes		3077	1296	0.0056
VA	Greensville County Power Station	59913	1C	Electric Utility	No	Yes		3075	1295	0.0061
VA	Hopewell Cogeneration Facility	10633	1	Cogeneration	No	Yes	1372	5130	1339	0.1080
VA	Hopewell Cogeneration Facility	10633	2	Cogeneration	No	Yes	1378	5230	1334	0.1105
VA	Hopewell Cogeneration Facility	10633	3	Cogeneration	No	Yes	1343	5210	1325	0.1040
VA	Hopewell Power Station	10771	1	Electric Utility	No	Yes	1488	6617	1390	0.1160
VA	Hopewell Power Station	10771	2	Electric Utility	No	Yes	1439	6741	1419	0.1158
VA	International Paper-Franklin Mill	52152	029	Cogeneration	No	Yes	17		0	
VA	Ladysmith Combustion Turbine Sta	7839	1	Electric Utility	No	Yes	521	1685	584	0.0360
VA	Ladysmith Combustion Turbine Sta	7839	2	Electric Utility	No	Yes	765	1582	393	0.0365
VA	Ladysmith Combustion Turbine Sta	7839	3	Electric Utility	No	Yes	494	1512	753	0.0334
VA	Ladysmith Combustion Turbine Sta	7839	4	Electric Utility	No	Yes	717	825	391	0.0338
VA	Ladysmith Combustion Turbine Sta	7839	5	Electric Utility	No	Yes	721	268	181	0.0417
VA	Louisa Generation Facility	7837	EU1	Electric Utility	No	Yes	213	1431	138	0.0279
VA	Louisa Generation Facility	7837	EU2	Electric Utility	No	Yes	223	1649	187	0.0315
VA	Louisa Generation Facility	7837	EU3	Electric Utility	No	Yes	212	1539	164	0.0257
VA	Louisa Generation Facility	7837	EU4	Electric Utility	No	Yes	214	1634	202	0.0238
VA	Louisa Generation Facility	7837	EU5	Electric Utility	No	Yes	458	1401	144	0.0383
VA	Marsh Run Generation Facility	7836	EU1	Electric Utility	No	Yes	570	1784	653	0.0389
VA	Marsh Run Generation Facility	7836	EU2	Electric Utility	No	Yes	558	1608	638	0.0388
VA	Marsh Run Generation Facility	7836	EU3	Electric Utility	No	Yes	577	1817	708	0.0412
VA	Mecklenburg Power Station	52007	1	Electric Utility	Yes	Yes	1224	0	0	0.0000

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
VA	Mecklenburg Power Station	52007	2	Electric Utility	Yes	Yes	1300	0	0	0.0000
VA	Panda Stonewall Power Project	59004	CT1	Electric Utility	No	Yes		5331	1270	0.0046
VA	Panda Stonewall Power Project	59004	CT2	Electric Utility	No	Yes		4974	1196	0.0050
VA	Possum Point Power Station	3804	3	Electric Utility	No	Yes	317		0	
VA	Possum Point Power Station	3804	4	Electric Utility	No	Yes	529		0	
VA	Possum Point Power Station	3804	5	Electric Utility	No	Yes	182	189	86	0.1515
VA	Possum Point Power Station	3804	6A	Electric Utility	No	Yes	1399	6265	1320	0.0103
VA	Possum Point Power Station	3804	6B	Electric Utility	No	Yes	1443	6190	1320	0.0107
VA	Remington Combustion Turbine Station	7838	1	Electric Utility	No	Yes	430	1621	494	0.0395
VA	Remington Combustion Turbine Station	7838	2	Electric Utility	No	Yes	433	1291	342	0.0385
VA	Remington Combustion Turbine Station	7838	3	Electric Utility	No	Yes	391	1664	595	0.0322
VA	Remington Combustion Turbine Station	7838	4	Electric Utility	No	Yes	427	1457	418	0.0368
VA	RockTenn West Point Mill	10017	002	Pulp & Paper Mill	No	No	1488	7341	1488	0.1796
VA	Southampton Power Station	10774	1	Electric Utility	No	Yes	1342	5761	1319	0.1162
VA	Southampton Power Station	10774	2	Electric Utility	No	Yes	1420	5871	1377	0.1162
VA	Spruance Genco, LLC	54081	BLR01A	Cogeneration	No	Yes	1082	5254	1086	0.2905
VA	Spruance Genco, LLC	54081	BLR01B	Cogeneration	No	Yes	902	5280	1208	0.2876
VA	Spruance Genco, LLC	54081	BLR02A	Cogeneration	No	Yes	946	5465	1255	0.2918
VA	Spruance Genco, LLC	54081	BLR02B	Cogeneration	No	Yes	858	5702	1205	0.2925
VA	Spruance Genco, LLC	54081	BLR03A	Cogeneration	Yes	Yes	783	1356	227	0.1526
VA	Spruance Genco, LLC	54081	BLR03B	Cogeneration	Yes	Yes	1064	1558	250	0.1480
VA	Spruance Genco, LLC	54081	BLR04A	Cogeneration	Yes	Yes	865	1409	558	0.1213
VA	Spruance Genco, LLC	54081	BLR04B	Cogeneration	Yes	Yes	792	1446	703	0.1203
VA	Tasley Energy Center	3785	TA10	Electric Utility	Yes	Yes	10	15	0	1.2000
VA	Tenaska Virginia Generating Station	55439	CTGDB1	Electric Utility	No	Yes	1488	6798	1223	0.0092
VA	Tenaska Virginia Generating Station	55439	CTGDB2	Electric Utility	No	Yes	1488	6826	1211	0.0093
VA	Tenaska Virginia Generating Station	55439	CTGDB3	Electric Utility	No	Yes	1488	6821	1232	0.0106
VA	Virginia City Hybrid Energy Center	56808	1	Electric Utility	No	Yes	1293	3339	611	0.0720
VA	Virginia City Hybrid Energy Center	56808	2	Electric Utility	No	Yes	1488	4924	622	0.0700
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01A	Cogeneration	No	Yes	0	0	0	0.0000

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01B	Cogeneration	No	Yes	0	0	0	0.0000
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01C	Cogeneration	No	Yes	0	0	0	0.0000
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02A	Cogeneration	No	Yes	0	0	0	0.0000
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02B	Cogeneration	No	Yes	0	0	0	0.0000
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02C	Cogeneration	No	Yes	0	0	0	0.0000
VA	Warren County Power Station	55939	1A	Electric Utility	No	Yes	1488	6554	1440	0.0056
VA	Warren County Power Station	55939	1B	Electric Utility	No	Yes	1440	6320	1418	0.0067
VA	Warren County Power Station	55939	1C	Electric Utility	No	Yes	1488	6496	1414	0.0058
VA	WestRock Virginia Corp Covington Ops	50900	001	Industrial Boiler	No	No	1343	6901	1343	0.2847
VA	WestRock Virginia Corp Covington Ops	50900	011	Industrial Boiler	No	No	1327	5356	1327	0.0335
VA	WestRock Virginia Corp Covington Ops	50900	002	Industrial Boiler	No	No	0	0	0	0.0000
VA	WestRock Virginia Corp Covington Ops	50900	003	Industrial Boiler	No	No	0	0	0	0.0000
VA	WestRock Virginia Corp Covington Ops	50900	004	Industrial Boiler	No	No	1488	6886	1484	0.2804
VA	WestRock Virginia Corp Covington Ops	50900	005	Industrial Boiler	No	No	1488	6002	1486	0.1256
VA	Wolf Hills Energy	55285	WH01	Electric Utility	No	Yes	239	1188	146	0.3184
VA	Wolf Hills Energy	55285	WH02	Electric Utility	No	Yes	239	1167	139	0.3151
VA	Wolf Hills Energy	55285	WH03	Electric Utility	No	Yes	257	1187	152	0.3151
VA	Wolf Hills Energy	55285	WH04	Electric Utility	No	Yes	258	1171	148	0.3230
VA	Wolf Hills Energy	55285	WH05	Electric Utility	No	Yes	236	1174	146	0.3240
VA	Wolf Hills Energy	55285	WH06	Electric Utility	No	Yes	235	1161	149	0.3199
VA	Wolf Hills Energy	55285	WH07	Electric Utility	No	Yes	244	1000	113	0.3340
VA	Wolf Hills Energy	55285	WH08	Electric Utility	No	Yes	245	988	110	0.3396
VA	Wolf Hills Energy	55285	WH09	Electric Utility	No	Yes	166	952	85	0.3249
VA	Wolf Hills Energy	55285	WH10	Electric Utility	No	Yes	167	903	75	0.3019
VA	Yorktown Power Station	3809	1	Electric Utility	No	Yes	205	647	116	0.4978
VA	Yorktown Power Station	3809	2	Electric Utility	No	Yes	405	1664	192	0.4510
VA	Yorktown Power Station	3809	3	Electric Utility	Yes	Yes	181	834	241	0.1234
VT	Berlin 5	3734	A	Electric Utility	Yes	Yes	0	0	0	0.0000
VT	Berlin 5	3734	B	Electric Utility	Yes	Yes	0	0	0	0.0000
VT	J C McNeil	589	1	Electric Utility	No	Yes	1301	3815	1239	0.0673
VT	Penny Lane Gas Turbine	3754	CT1	Electric Utility	Yes	Yes	0	0	0	0.0000
VT	Penny Lane Gas Turbine	3754	CT2	Electric Utility	Yes	Yes	0	0	0	0.0000
VA	Spruance Genco, LLC	54081	BLR01B	Cogeneration	No	Yes	902	5280	1208	0.0491
VA	Spruance Genco, LLC	54081	BLR02A	Cogeneration	No	Yes	946	5465	1255	0.1386
VA	Spruance Genco, LLC	54081	BLR02B	Cogeneration	No	Yes	858	5702	1205	0.6780
VA	Spruance Genco, LLC	54081	BLR03A	Cogeneration	Yes	Yes	783	1356	227	0.0184
VA	Spruance Genco, LLC	54081	BLR03B	Cogeneration	Yes	Yes	1064	1558	250	0.0187
VA	Spruance Genco, LLC	54081	BLR04A	Cogeneration	Yes	Yes	865	1409	558	0.1271

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
VA	Spruance Genco, LLC	54081	BLR04B	Cogeneration	Yes	Yes	792	1446	703	0.6987
VA	Tasley Energy Center	3785	TA10	Electric Utility	Yes	Yes	10	15	0	0.0964
VA	Tenaska Virginia Generating Station	55439	CTGDB1	Electric Utility	No	Yes	1488	6798	1223	0.1520
VA	Tenaska Virginia Generating Station	55439	CTGDB2	Electric Utility	No	Yes	1488	6826	1211	0.1730
VA	Tenaska Virginia Generating Station	55439	CTGDB3	Electric Utility	No	Yes	1488	6821	1232	0.1880
VA	Virginia City Hybrid Energy Center	56808	1	Electric Utility	No	Yes	1293	3339	611	0.1530
VA	Virginia City Hybrid Energy Center	56808	2	Electric Utility	No	Yes	1488	4924	622	0.1880
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01A	Cogeneration	No	Yes	0	0	0	0.0070
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01B	Cogeneration	No	Yes	0	0	0	0.0072
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR01C	Cogeneration	No	Yes	0	0	0	0.7120
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02A	Cogeneration	No	Yes	0	0	0	0.1022
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02B	Cogeneration	No	Yes	0	0	0	0.0938
VA	Virginia Renewable Power-Portsmouth LLC	10071	BLR02C	Cogeneration	No	Yes	0	0	0	0.0910
VA	Warren County Power Station	55939	1A	Electric Utility	No	Yes	1488	6554	1440	0.1061
VA	Warren County Power Station	55939	1B	Electric Utility	No	Yes	1440	6320	1418	0.0174
VA	Warren County Power Station	55939	1C	Electric Utility	No	Yes	1488	6496	1414	0.0166
VA	WestRock Virginia Corp Covington Ops	50900	001	Industrial Boiler	No	No	1343	6901	1343	0.0216
VA	WestRock Virginia Corp Covington Ops	50900	011	Industrial Boiler	No	No	1327	5356	1327	0.0188
VA	WestRock Virginia Corp Covington Ops	50900	002	Industrial Boiler	No	No	0	0	0	0.0000
VA	WestRock Virginia Corp Covington Ops	50900	003	Industrial Boiler	No	No	0	0	0	0.0000
VA	WestRock Virginia Corp Covington Ops	50900	004	Industrial Boiler	No	No	1488	6886	1484	0.6590
VA	WestRock Virginia Corp Covington Ops	50900	005	Industrial Boiler	No	No	1488	6002	1486	0.0103
VA	Wolf Hills Energy	55285	WH01	Electric Utility	No	Yes	239	1188	146	0.0100
VA	Wolf Hills Energy	55285	WH02	Electric Utility	No	Yes	239	1167	139	0.0071
VA	Wolf Hills Energy	55285	WH03	Electric Utility	No	Yes	257	1187	152	0.0064
VA	Wolf Hills Energy	55285	WH04	Electric Utility	No	Yes	258	1171	148	0.0059
VA	Wolf Hills Energy	55285	WH05	Electric Utility	No	Yes	236	1174	146	0.6470
VA	Wolf Hills Energy	55285	WH06	Electric Utility	No	Yes	235	1161	149	0.0079
VA	Wolf Hills Energy	55285	WH07	Electric Utility	No	Yes	244	1000	113	0.0099
VA	Wolf Hills Energy	55285	WH08	Electric Utility	No	Yes	245	988	110	0.0108
VA	Wolf Hills Energy	55285	WH09	Electric Utility	No	Yes	166	952	85	0.0067
VA	Wolf Hills Energy	55285	WH10	Electric Utility	No	Yes	167	903	75	0.0825

St	Facility Name	Oris	Unit ID	Category	Peaker ?	Electric ?	Hr Count 2016	Hr Count 2018 /19	Hr Count Run 2 R	Avg Rate 2018/ 19
VA	Yorktown Power Station	3809	1	Electric Utility	No	Yes	205	647	116	0.1402
VA	Yorktown Power Station	3809	2	Electric Utility	No	Yes	405	1664	192	0.1269
VA	Yorktown Power Station	3809	3	Electric Utility	Yes	Yes	181	834	241	0.0154
VT	Berlin 5	3734	A	Electric Utility	Yes	Yes	0	0	0	0.0133
VT	Berlin 5	3734	B	Electric Utility	Yes	Yes	0	0	0	0.0682
VT	J C McNeil	589	1	Electric Utility	No	Yes	1301	3815	1239	0.1397
VT	Penny Lane Gas Turbine	3754	CT1	Electric Utility	Yes	Yes	0	0	0	0.0468
VT	Penny Lane Gas Turbine	3754	CT2	Electric Utility	Yes	Yes	0	0	0	0.0402

Appendix G. *Non-Part-75 Units Tagged as Peaking Units for Tagged Modeling*

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
AL	Ala Power - Theodore Cogen			1062911	47282413	SESARM Gas Peaking
AL	Alabama Power Company	26	GT4	949211	47874713	SESARM Oil Peaking
AR	Entergy Arkansas, Inc. - Hot Spring Energy Facility	55418	ST1	1119311	46771413	South Gas Peaking
AR	ENTERGY ARK-MABELVALE			863611	47485613	South Gas Peaking
AR	ENTERGY ARK-MABELVALE			863611	47485713	South Oil Peaking
AR	ENTERGY ARK-MABELVALE			863611	47485913	South Gas Peaking
AR	JONESBORO CITY WATER AND LIGHT-NW SUBSTA	56505	SN01	976311	112831113	South Gas Peaking
AR	JONESBORO CITY WATER AND LIGHT-NW SUBSTA	56505	SN02	976311	112830913	South Oil Peaking
CO	ALTAGAS BRUSH ENERGY - 1500 S CLAYTON ST	10682	GT1	3936111	36928213	Southwest Gas Peaking
CO	BLACK HILLS ELECTRIC- AIRPORT INDUSTRIAL	7995	IC4	4295211	36355913	Southwest Composite Peaking
CO	BLACK HILLS ELECTRIC- PUEBLO POWER PLANT	460	IC5	4368111	36419413	Southwest Composite Peaking
CO	COLO SPRINGS UTILITIES - BIRDSALL PLANT	493	1	4391611	36145613	Southwest Gas Peaking
CO	COLO SPRINGS UTILITIES - BIRDSALL PLANT	493	2	4391611	36145713	Southwest Gas Peaking
CO	COLO SPRINGS UTILITIES - BIRDSALL PLANT	493	3	4391611	36145813	Southwest Gas Peaking
CO	LAMAR LIGHT & POWER/ARKANSAS RIVER POWER			4229911	36114313	Southwest Gas Peaking
CO	PLAINS END, LLC	55650	GE20	3834311	36962913	Southwest Gas Peaking
CO	PLAINS END, LLC	56516	2G14	3834311	96071213	Southwest Gas Peaking
CO	PUBLIC SERV - ROCKY MOUNTAIN ENERGY	55835	STG1	12868211	68880013	Southwest Gas Peaking
CO	PUBLIC SERVICE CO - FT LUPTON STATION	8067	1	3551311	36795313	Southwest Gas Peaking
CO	PUBLIC SERVICE CO - FT LUPTON STATION	8067	2	3551311	36795213	Southwest Gas Peaking
CO	PUBLIC SERVICE CO - VALMONT STATION	477	6	778211	45916213	Southwest Gas Peaking
CO	PUBLIC SERVICE CO ALAMOSA PLT	464	CT1	2136511	43024113	Southwest Gas Peaking
CO	PUBLIC SERVICE CO ALAMOSA PLT	464	CT2	2136511	43024213	Southwest Gas Peaking
CO	PUBLIC SERVICE CO FRUITA STA	471	1	4456711	36379513	Southwest Gas Peaking
CO	THERMO POWER & ELEC (SEE ALSO 123/0321)			2568111	40903213	Southwest Gas Peaking
CO	THERMO POWER & ELEC (SEE ALSO 123/0321)			2568111	40903313	Southwest Gas Peaking
CO	TRI STATE GENERATION BURLINGTON	6619	1	2761411	40836613	Southwest Composite Peaking
CO	TRI STATE GENERATION BURLINGTON	6619	2	2761411	40836513	Southwest Composite Peaking
CT	MONTVILLE POWER, LLC	546	10	552611	48259413	MANE-VU Oil Peaking
CT	MONTVILLE POWER, LLC	546	11	552611	48259213	MANE-VU Oil Peaking
FL	CITY OF LAKE WORTH UTILITIES	673	GT2	919411	46529013	SESARM Oil Peaking
FL	CITY OF LAKE WORTH UTILITIES	673	MU1	919411	46529513	SESARM Oil Peaking
FL	CITY OF LAKE WORTH UTILITIES	673	MU2	919411	46529813	SESARM Oil Peaking
FL	CITY OF LAKE WORTH UTILITIES	673	MU3	919411	46529213	SESARM Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
FL	CITY OF LAKE WORTH UTILITIES	673	MU4	919411	46529413	SESARM Oil Peaking
FL	CITY OF LAKE WORTH UTILITIES	673	MU5	919411	46529313	SESARM Oil Peaking
GA	Ga Power Company - Plant Boulevard	732	1	15504311	97066413	SESARM Gas Peaking
IA	CEDAR FALLS MUNICIPAL ELECTRIC UTILITY	1131	6	12806211	67676513	West North Central Composite Peaking
IA	CEDAR FALLS MUNICIPAL ELECTRIC UTILITY			12806211	67677213	West North Central Gas Peaking
IA	CEDAR FALLS MUNICIPAL ELECTRIC UTILITY			12806211	67677913	West North Central Gas Peaking
IA	INDIANOLA MUNICIPAL UTILITIES	1150	8	15474111	98111513	West North Central Oil Peaking
IA	IPL - BURLINGTON GENERATING STATION			5511811	27179313	West North Central Gas Peaking
IA	IPL - BURLINGTON GENERATING STATION			5511811	27179513	West North Central Gas Peaking
IA	IPL - BURLINGTON GENERATING STATION			5511811	27179713	West North Central Gas Peaking
IA	IPL - BURLINGTON GENERATING STATION			5511811	27181713	West North Central Gas Peaking
IA	IPL - CENTERVILLE COMBUSTION TURBINES AND DIESELS			5523711	27493213	West North Central Oil Peaking
IA	IPL - CENTERVILLE COMBUSTION TURBINES AND DIESELS			5523711	27493313	West North Central Oil Peaking
IA	IPL - CENTERVILLE COMBUSTION TURBINES AND DIESELS			5523711	27493413	West North Central Oil Peaking
IA	IPL - MARSHALLTOWN GENERATING STATION			3779111	124117513	West North Central Gas Peaking
IA	IPL - MARSHALLTOWN GENERATING STATION			3779111	124118013	West North Central Gas Peaking
IA	IPL - PRAIRIE CREEK GENERATING STATION			3940211	37605213	West North Central Gas Peaking
IA	IPL - PRAIRIE CREEK GENERATING STATION			3940211	37605713	West North Central Composite Peaking
IA	MIDAMERICAN ENERGY CO - CORALVILLE TURBINES	1079	1	3925111	37692113	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - CORALVILLE TURBINES	1079	2	3925111	37692213	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - CORALVILLE TURBINES	1079	3	3925111	37692313	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - CORALVILLE TURBINES	1079	4	3925111	37692413	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	1	3163711	38794513	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	2	3163711	38794613	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	3	3163711	38794713	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	4	3163711	38794813	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	5	3163711	38794913	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	6	3163711	38795013	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	7	3163711	38795113	West North Central Gas Peaking
IA	MIDAMERICAN ENERGY CO - RIVER HILLS TURBINES	1084	8	3163711	38794213	West North Central Gas Peaking
IA	MUSCATINE POWER & WATER	1167	7	7892811	2592713	West North Central Composite Peaking
IL	Breese Municipal Power Plant	934	2	1946811	41583313	LADCO Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
IL	Breese Municipal Power Plant	934	6	1946811	41583713	LADCO Oil Peaking
IL	Breese Municipal Power Plant	934	IC3	1946811	41583513	LADCO Oil Peaking
IL	Bushnell Municipal Electric Light & Power	935	1	4702711	27765013	LADCO Oil Peaking
IL	Bushnell Municipal Electric Light & Power	935	7	4702711	27765113	LADCO Oil Peaking
IL	Carlyle Municipal Electric Plant	936	1	2612711	40726313	LADCO Oil Peaking
IL	Carlyle Municipal Electric Plant	936	7	2612711	40726413	LADCO Oil Peaking
IL	Carlyle Municipal Electric Plant	936	8	2612711	40726113	LADCO Oil Peaking
IL	Carlyle Municipal Electric Plant	936	9	2612711	40726213	LADCO Oil Peaking
IL	City of Casey	56053	2	1929611	41598513	LADCO Oil Peaking
IL	City of Flora	56117	1	1944811	41588513	LADCO Oil Peaking
IL	City of Flora	56117	2	1944811	41588313	LADCO Oil Peaking
IL	City of Flora	56117	3	1944811	41588413	LADCO Oil Peaking
IL	City of Flora	56118	4	1944811	41588613	LADCO Oil Peaking
IL	City of Flora	56118	5	1944811	41588213	LADCO Oil Peaking
IL	City Of Peru Generating Station			5431911	27563313	LADCO Oil Peaking
IL	Cordova Energy Co LLC	55188	PT31	4594711	28237413	LADCO Gas Peaking
IL	Corn Belt Energy Corp			4907511	31538013	LADCO Oil Peaking
IL	Dynegy Midwest Generation LLC Havana Power Station			7337411	8279913	LADCO Oil Peaking
IL	Fairfield Municipal Light	940	IC6	5573711	26943813	LADCO Oil Peaking
IL	Fisk Electric Generating Station			1731811	41553513	LADCO Coal Peaking
IL	Geneva Generating Plant	56462	GEN 1	9731711	53868813	LADCO Gas Peaking
IL	Geneva Generating Plant	56462	GEN 2	9731711	53868913	LADCO Gas Peaking
IL	Geneva Generating Plant	56462	GEN 3	9731711	53869013	LADCO Gas Peaking
IL	Geneva Generating Plant	56462	GEN 4	9731711	53869113	LADCO Gas Peaking
IL	Geneva Generating Plant	56462	GEN 5	9731711	53869213	LADCO Gas Peaking
IL	Highland Electric Light Plant	946	IC5	3955311	33702813	LADCO Oil Peaking
IL	Illinois Municipal Electric Agency	56116	8	1944711	41588713	LADCO Oil Peaking
IL	Illinois Power Resources Generating LLC			5422711	26814513	LADCO Coal Peaking
IL	Marshall Municipal Utilities	949	10	1845411	41691713	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	11	1845411	41692113	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	5	1845411	41692313	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	6	1845411	41692013	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	7	1845411	41692213	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	8	1845411	41692413	LADCO Oil Peaking
IL	Marshall Municipal Utilities	949	9	1845411	41692513	LADCO Oil Peaking
IL	McLeansboro Power Plant	948	7	3351111	38897713	LADCO Oil Peaking
IL	Moline Combustion Turbines	899	GT1	4574611	28253113	LADCO Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
IL	Moline Combustion Turbines	899	GT2	4574611	28253313	LADCO Gas Peaking
IL	Moline Combustion Turbines	899	GT3	4574611	28253213	LADCO Gas Peaking
IL	Moline Combustion Turbines	899	GT4	4574611	28253413	LADCO Gas Peaking
IL	Morris Cogeneration LLC			3348811	38906313	LADCO Gas Peaking
IL	Morris Cogeneration LLC			3348811	91319813	LADCO Gas Peaking
IL	Prairie Power Inc	6238	GT1	7807411	2246613	LADCO Oil Peaking
IL	Prairie Power Inc	7818	3	5457411	27026613	LADCO Gas Peaking
IL	Prairie Power Inc	7818	4	5457411	27026513	LADCO Gas Peaking
IL	Prairie Power Inc	7818	6	5457411	123323613	LADCO Oil Peaking
IL	Prairie Power Inc			7807411	2246313	LADCO Coal Peaking
IL	Princeton Muncipal Electric Utility	957	8	2363611	40498313	LADCO Gas Peaking
IL	Rochelle Municipal Diesel Plant	960	10	5039111	29822513	LADCO Oil Peaking
IL	Rochelle Municipal Diesel Plant	960	3	5039111	29822313	LADCO Gas Peaking
IL	Rochelle Municipal Diesel Plant	960	4	5039111	29822013	LADCO Oil Peaking
IL	Rochelle Municipal Diesel Plant	960	7	5039111	29822613	LADCO Gas Peaking
IL	Rochelle Municipal Diesel Plant	960	8	5039111	29821813	LADCO Oil Peaking
IL	Rochelle Municipal Diesel Plant	960	9	5039111	29822213	LADCO Oil Peaking
IL	Sullivan Power Plant	969	1	4657211	28182813	LADCO Oil Peaking
IL	Sullivan Power Plant	969	10	4657211	28182513	LADCO Oil Peaking
IL	Sullivan Power Plant	969	12	4657211	28182313	LADCO Oil Peaking
IL	Sullivan Power Plant	969	2	4657211	28183113	LADCO Oil Peaking
IL	Sullivan Power Plant	969	3	4657211	28183013	LADCO Oil Peaking
IL	Sullivan Power Plant	969	4	4657211	28182913	LADCO Oil Peaking
IL	Sullivan Power Plant	969	5	4657211	28182213	LADCO Oil Peaking
IL	Sullivan Power Plant	969	6	4657211	28182413	LADCO Oil Peaking
IL	Sullivan Power Plant	969	9	4657211	28182713	LADCO Oil Peaking
IL	Union Electric Co			7338011	8266713	LADCO Oil Peaking
IL	Village of Freeburg	943	1	4909511	31529213	LADCO Oil Peaking
IL	Village of Freeburg	943	2	4909511	31529313	LADCO Oil Peaking
IL	Village of Freeburg	943	3	4909511	31529613	LADCO Oil Peaking
IL	Village of Freeburg	943	4	4909511	31529513	LADCO Oil Peaking
IL	Village of Freeburg	943	6	4909511	31529113	LADCO Oil Peaking
IL	Village of Freeburg	943	8	4909511	31529413	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	1	5546111	27442013	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	2	5546111	27441413	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	3	5546111	27441913	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	4	5546111	27441813	LADCO Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
IL	Waterloo City Light Plant	971	5	5546111	27441713	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	6	5546111	27442213	LADCO Gas Peaking
IL	Waterloo City Light Plant	971	7	5546111	27441613	LADCO Oil Peaking
IL	Waterloo City Light Plant	971	8	5546111	27441513	LADCO Oil Peaking
IL	Winnetka Electric Plant	972	5	2701711	41212413	LADCO Gas Peaking
IL	Wood River			7791011	2330513	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash	1006	1	8181711	5862913	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash	1006	2	8181711	5862813	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash	1006	3	8181711	5862513	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash	1006	5	8181711	5863013	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash	1006	6	8181711	5862713	LADCO Oil Peaking
IN	Duke Energy Indiana LLC - Miami Wabash			8181711	5862413	LADCO Oil Peaking
IN	Indianapolis Power & Light AES Eagle Valley			8225111	4234313	LADCO Oil Peaking
IN	Indianapolis Power & Light AES Eagle Valley			8225111	4234513	LADCO Oil Peaking
IN	INDIANAPOLIS POWER & LIGHT CO HARDIN	990	GT1	7255211	91608213	LADCO Oil Peaking
IN	INDIANAPOLIS POWER & LIGHT CO HARDIN	990	GT2	7255211	91608313	LADCO Oil Peaking
IN	INDIANAPOLIS POWER & LIGHT CO HARDIN			7255211	91188413	LADCO Oil Peaking
IN	INDIANAPOLIS POWER & LIGHT CO HARDIN			7255211	91188513	LADCO Oil Peaking
IN	INDIANAPOLIS POWER & LIGHT CO HARDIN			7255211	91608413	LADCO Oil Peaking
IN	PERU UTILITIES POWER PLANT			4552711	28437313	LADCO Coal Peaking
IN	Wabash River Combined Cycle Plant			12766611	65429413	LADCO Gas Peaking
KS	Anthony Mun. Power Plant	1258	IC1	2975211	38086913	South Oil Peaking
KS	Anthony Mun. Power Plant	1258	IC2	2975211	38086813	South Oil Peaking
KS	Anthony Mun. Power Plant	1258	IC3	2975211	38086713	South Oil Peaking
KS	Augusta Mun. Power Plant #1	1261	1	3670411	37388313	South Oil Peaking
KS	Augusta Mun. Power Plant #1	1261	3	3670411	37388213	South Oil Peaking
KS	Augusta Mun. Power Plant #1	1261	5	3670411	37388113	South Oil Peaking
KS	Augusta Mun. Power Plant #1	1261	6	3670411	37387913	South Oil Peaking
KS	Augusta Mun. Power Plant #1	1261	7	3670411	37388013	South Oil Peaking
KS	Augusta Mun. Power Plant #2	6791	1	3670511	37387613	South Oil Peaking
KS	Augusta Mun. Power Plant #2	6791	2	3670511	37387713	South Oil Peaking
KS	Augusta Mun. Power Plant #2	6791	3	3670511	37387813	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	1	4527711	27615113	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	2	4527711	27615713	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	3	4527711	27615613	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	4	4527711	27615513	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	5	4527711	27615413	South Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
KS	Beloit Mun. Power Plant	1264	6	4527711	27615313	South Oil Peaking
KS	Beloit Mun. Power Plant	1264	7	4527711	27615213	South Oil Peaking
KS	Chanute Mun. Power Plant #2	1268	7	5414711	27353913	South Oil Peaking
KS	Chanute Mun. Power Plant #2	1268	8	5414711	27354113	South Oil Peaking
KS	Chanute Mun. Power Plant #3	7018	10	5414611	27354313	South Oil Peaking
KS	Chanute Mun. Power Plant #3	7018	11	5414611	27354413	South Oil Peaking
KS	Chanute Mun. Power Plant #3	7018	12	5414611	27354213	South Oil Peaking
KS	Chanute Mun. Power Plant #3	7018	13	5414611	27354613	South Oil Peaking
KS	Chanute Mun. Power Plant #3	7018	9	5414611	27354513	South Oil Peaking
KS	Clay Center Mun. Power Plant	1270	IC1	4499711	28277113	South Oil Peaking
KS	Clay Center Mun. Power Plant	1270	IC2	4499711	28276813	South Oil Peaking
KS	Clay Center Mun. Power Plant	1270	IC3	4499711	28276913	South Oil Peaking
KS	Clay Center Mun. Power Plant	1270	IC4	4499711	28277313	South Oil Peaking
KS	Clay Center Mun. Power Plant	1270	IC5	4499711	28277013	South Oil Peaking
KS	Empire District Electric - Riverton	1239	11	3878111	37460613	South Gas Peaking
KS	Empire District Electric - Riverton			3878111	37460713	South Gas Peaking
KS	Gardner Energy Center	7281	CT1	4538111	28270413	South Gas Peaking
KS	Kansas City BPU - Kaw			4628011	63914113	South Gas Peaking
KS	Kingman Mun. Power Plant	1296	2	4878111	30474813	South Oil Peaking
KS	Kingman Mun. Power Plant	1296	4	4878111	30474513	South Oil Peaking
KS	Kingman Mun. Power Plant	1296	6	4878111	30474313	South Oil Peaking
KS	Kingman Mun. Power Plant	1296	7	4878111	30474613	South Oil Peaking
KS	Kingman Mun. Power Plant	1296	8	4878111	30474713	South Oil Peaking
KS	Mid-Kansas Electric - Cimarron River	1230	2	3772011	37527513	South Gas Peaking
KS	Mid-Kansas Electric - Clifton	8037	2	4126711	34105213	South Oil Peaking
KS	Midwest Energy - Colby	1225	GT1	9615511	53881313	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	1	12657411	98357013	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	2	12657411	108775313	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	3	12657411	108775013	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	4	12657411	108775613	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	5	12657411	108775513	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	6	12657411	108775413	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	7	12657411	108775713	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	8	12657411	108775113	South Gas Peaking
KS	Midwest Energy - Hays (Goodman Energy Center)	56497	9	12657411	108775213	South Gas Peaking
KS	Ottawa Mun. Power Plant	1316	IC3	3734911	37538313	South Oil Peaking
KS	Ottawa Mun. Power Plant	1316	IC4	3734911	37537913	South Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
KS	Ottawa Mun. Power Plant	1316	IC6	3734911	37538113	South Oil Peaking
KS	Ottawa Mun. Power Plant	1316	IC7	3734911	37538213	South Oil Peaking
KS	Pratt Mun. Power Plant			5372811	27388213	South Gas Peaking
KS	Pratt Mun. Power Plant			5372811	27388413	South Gas Peaking
KS	Pratt Mun. Power Plant			5372811	98342813	South Oil Peaking
KS	Pratt Mun. Power Plant			5372811	98342913	South Oil Peaking
KS	Russell Mun. Power Plant #1	1319	11	3105611	38158013	South Oil Peaking
KS	Russell Mun. Power Plant #1	1319	7	3105611	38157913	South Oil Peaking
KS	Sunflower Electric - Garden City	1336	S3	3167811	38764813	South Gas Peaking
KS	Sunflower Electric - Garden City			3167811	38764713	South Gas Peaking
KS	Wellington Mun. Power Plant #1	1330	4	5444311	26795713	South Gas Peaking
KS	Wellington Mun. Power Plant #2	7339	6	5444811	26794813	South Gas Peaking
KY	Tennessee Valley Authority (TVA) - Shawnee Fossil Plant			6037011	24137613	SESARM Coal Peaking
LA	CLECO Power LLC - Teche Power Station			7204011	80795613	South Gas Peaking
LA	Joseph J Cefalu Sr Municipal Steam Plant			5060411	80432713	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	01	5836111	82087213	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	02	5836111	82087713	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	04	5836111	82087913	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	06	5836111	82087413	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	07	5836111	82087113	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	09	5836111	82087613	South Gas Peaking
LA	NRG Sterlington Power LLC - Sterlington Power Plant	55099	10	5836111	82088013	South Gas Peaking
MA	BRAINTREE ELECTRIC	1660	IC1	6569511	87608113	MANE-VU Oil Peaking
MA	CHICOPEE ELECTRIC LIGHT	7396	1	5920611	87848413	MANE-VU Oil Peaking
MA	CHICOPEE ELECTRIC LIGHT	7396	2	5920611	87848513	MANE-VU Oil Peaking
MA	CHICOPEE ELECTRIC LIGHT	7396	3	5920611	87848613	MANE-VU Oil Peaking
MA	HUDSON LIGHT & POWER DEPARTMENT	9038	10	4100911	87365013	MANE-VU Oil Peaking
MA	HUDSON LIGHT & POWER DEPARTMENT	9038	11	4100911	87365113	MANE-VU Oil Peaking
MA	HUDSON LIGHT & POWER DEPARTMENT	9038	12	4100911	87365213	MANE-VU Oil Peaking
MA	HUDSON LIGHT & POWER DEPARTMENT	9038	7	4100911	87365513	MANE-VU Oil Peaking
MA	HUDSON LIGHT & POWER DEPARTMENT	9038	8	4100911	87364813	MANE-VU Gas Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	1	6521911	87725013	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	10	6521911	87725813	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	11	6521911	18016113	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	12	6521911	18016213	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	2	6521911	87725113	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	6	6521911	87725413	MANE-VU Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
MA	IPSWICH MUNICIPAL LIGHT	1670	7	6521911	87725513	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	8	6521911	87725613	MANE-VU Oil Peaking
MA	IPSWICH MUNICIPAL LIGHT	1670	9	6521911	87725713	MANE-VU Oil Peaking
MA	MARBLEHEAD MUNICIPAL WILKINS	6586	1	6523111	87588913	MANE-VU Oil Peaking
MA	MARBLEHEAD MUNICIPAL WILKINS	6586	2	6523111	87589013	MANE-VU Oil Peaking
MA	NANTUCKET ELECTRIC COMPANY	1615	12	6110111	87827013	MANE-VU Oil Peaking
MA	NANTUCKET ELECTRIC COMPANY	1615	13	6110111	87827113	MANE-VU Oil Peaking
MA	NRG CANAL LLC - OAK BLUFFS	1597	UN1	5238711	87806113	MANE-VU Oil Peaking
MA	NRG CANAL LLC - OAK BLUFFS	1597	UN2	5238711	87806213	MANE-VU Oil Peaking
MA	NRG CANAL LLC - OAK BLUFFS	1597	UN3	5238711	87806313	MANE-VU Oil Peaking
MA	NRG CANAL LLC - WEST TISBURY	6049	UN1	5239211	87594513	MANE-VU Oil Peaking
MA	NRG CANAL LLC - WEST TISBURY	6049	UN2	5239211	87594613	MANE-VU Oil Peaking
MA	SHREWSBURY ELECTRIC AND CABLE OPERATIONS	6125	1	5096411	87700513	MANE-VU Oil Peaking
MA	SHREWSBURY ELECTRIC AND CABLE OPERATIONS	6125	2	5096411	87700613	MANE-VU Oil Peaking
MA	SHREWSBURY ELECTRIC AND CABLE OPERATIONS	6125	3	5096411	87700713	MANE-VU Oil Peaking
MA	SHREWSBURY ELECTRIC AND CABLE OPERATIONS	6125	4	5096411	87701013	MANE-VU Oil Peaking
MA	SHREWSBURY ELECTRIC AND CABLE OPERATIONS	6125	5	5096411	87700813	MANE-VU Oil Peaking
MD	Berlin Town Power Plant	6565	1A	6572311	88042713	MANE-VU Oil Peaking
MD	Berlin Town Power Plant	6565	2A	6572311	88042813	MANE-VU Oil Peaking
MD	Berlin Town Power Plant	6565	4A	6572311	88043013	MANE-VU Oil Peaking
MD	Berlin Town Power Plant	6565	5A	6572311	88042613	MANE-VU Oil Peaking
MD	Berlin Town Power Plant			6572311	88042913	MANE-VU Oil Peaking
MD	C.P. Crane LLC	1552	GT1	5155011	87895413	MANE-VU Oil Peaking
MD	Constellation - Notch Cliff	1555	GT1	5154811	87894013	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT2	5154811	87894113	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT3	5154811	87894213	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT4	5154811	87894313	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT5	5154811	87894413	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT6	5154811	87894513	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT7	5154811	87894613	MANE-VU Gas Peaking
MD	Constellation - Notch Cliff	1555	GT8	5154811	87894713	MANE-VU Gas Peaking
MD	Constellation - Riverside	1559	GT7	5154911	87894813	MANE-VU Oil Peaking
MD	Constellation - Riverside	1559	GT8	5154911	87894913	MANE-VU Oil Peaking
MD	Constellation - Riverside			5154911	87895113	MANE-VU Gas Peaking
MD	Constellation Energy Group - Philadelphia Road	1557	GT1	6435511	88059913	MANE-VU Oil Peaking
MD	Constellation Energy Group - Philadelphia Road	1557	GT2	6435511	88060013	MANE-VU Oil Peaking
MD	Constellation Energy Group - Philadelphia Road	1557	GT3	6435511	88060113	MANE-VU Oil Peaking

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MD	Constellation Energy Group - Philadelphia Road	1557	GT4	6435511	88060213	MANE-VU Oil Peaking
MD	CPV Maryland, LLC - St. Charles Project	56846	GTG1	17878111	125590313	MANE-VU Gas Peaking
MD	CPV Maryland, LLC - St. Charles Project	56846	GTG2	17878111	125590413	MANE-VU Gas Peaking
MD	CPV Maryland, LLC - St. Charles Project	56846	STGEN	17878111	125590513	MANE-VU Gas Peaking
MD	CPV Maryland, LLC - St. Charles Project			17878111	125590613	MANE-VU Gas Peaking
MD	Crisfield Energy Center	1563	CRIS	6414911	88023513	MANE-VU Oil Peaking
MD	Crisfield Energy Center	1563	CRS2	6414911	88023613	MANE-VU Oil Peaking
MD	Crisfield Energy Center	1563	CRS3	6414911	88023713	MANE-VU Oil Peaking
MD	Crisfield Energy Center	1563	CRS4	6414911	88023813	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	201	6415411	88028913	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	202	6415411	88029013	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	203	6415411	88028313	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	204	6415411	88028413	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	21	6415411	88028513	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	22	6415411	88028613	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	23	6415411	88028713	MANE-VU Oil Peaking
MD	Easton Utilities - Airport Park	4257	24	6415411	88028813	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	10	6415311	88027613	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	101	6415311	88028113	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	102	6415311	88028213	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	11	6415311	88027713	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	12	6415311	88027813	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	13	6415311	88027913	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	14	6415311	88028013	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	7	6415311	88027313	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	8	6415311	88027413	MANE-VU Oil Peaking
MD	Easton Utilities - Washington Street	1580	9	6415311	88027513	MANE-VU Oil Peaking
MD	NRG Chalk Point, LLC	1571	GT1	6011911	88002113	MANE-VU Oil Peaking
MD	NRG Dickerson Generating Station			5998011	87978413	MANE-VU Oil Peaking
MD	NRG Morgantown Generating Station	1573	GT1	6011511	87935713	MANE-VU Oil Peaking
MD	NRG Morgantown Generating Station	1573	GT2	6011511	87935613	MANE-VU Oil Peaking
MD	Raven Power Fort Smallwood LLC	1554	GT1	6084311	87886613	MANE-VU Oil Peaking
ME	FPL ENERGY CAPE LLC	1484	GT4	5824011	22915713	MANE-VU Oil Peaking
ME	FPL ENERGY CAPE LLC	1484	GT5	5824011	22915613	MANE-VU Oil Peaking
ME	MAINE INDEPENDENCE STATION	55068	GEN3	7719211	2941613	MANE-VU Gas Peaking
ME	VERSO ANDROSCOGGIN, LLC (COGENERATION)			5677011	94542213	MANE-VU Gas Peaking
ME	VERSO ANDROSCOGGIN, LLC (COGENERATION)			5677011	94542313	MANE-VU Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
ME	VERSO ANDROSCOGGIN, LLC (COGENERATION)			5677011	94542413	MANE-VU Gas Peaking
MI	B. C. Cobb Plant			7384111	82890713	LADCO Gas Peaking
MI	CLINTON VILLAGE OF	1818	1	5821211	20145813	LADCO Oil Peaking
MI	CLINTON VILLAGE OF			5821211	20145713	LADCO Oil Peaking
MI	Consumers Energy Gaylord Combustion Turbine Plant	1706	1	7024811	15163813	LADCO Gas Peaking
MI	Consumers Energy Karn-Weadock Facility			8172811	4492713	LADCO Gas Peaking
MI	DETROIT PUBLIC LIGHTING DEPARTMENT			8522911	242513	LADCO Oil Peaking
MI	Diesel Plant	1826	1	7087311	14145613	LADCO Gas Peaking
MI	DTE Electric Company - Northeast Peaking Facility	1734	5	5689511	23065913	LADCO Gas Peaking
MI	HILLSDALE CITY OF PUBLIC UTILITIES	1829	2	6056111	23806613	LADCO Oil Peaking
MI	HILLSDALE CITY OF PUBLIC UTILITIES	1829	3	6056111	23806713	LADCO Oil Peaking
MI	HILLSDALE CITY OF PUBLIC UTILITIES	1829	4	6056111	23806813	LADCO Gas Peaking
MI	HILLSDALE CITY OF PUBLIC UTILITIES	1829	5	6056111	23807113	LADCO Gas Peaking
MI	HILLSDALE CITY OF PUBLIC UTILITIES	1829	6	6056111	23807013	LADCO Oil Peaking
MI	HOLLAND BOARD OF PUBLIC WORKS	6356	1	7087011	14146113	LADCO Oil Peaking
MI	Holland BPW, Generating Station & WWTP	1830	4	8129311	6902813	LADCO Coal Peaking
MI	Holland BPW, Generating Station & WWTP			8129311	6903113	LADCO Coal Peaking
MI	J. H. Campbell Plant	1710	A	8125511	6964913	LADCO Oil Peaking
MI	J.R. WHITING CO			7285811	8570513	LADCO Oil Peaking
MI	MARQUETTE BOARD OF LIGHT & POWER	1843	2	7779711	3628213	LADCO Coal Peaking
MI	Marshall City, Electric Powerplant	1844	IC3	6416311	18094413	LADCO Gas Peaking
MI	ST. CLAIR / BELLE RIVER POWER PLANT	1743	11	7239111	7536013	LADCO Gas Peaking
MI	Sturgis Municipal Power Plant			6356811	15701413	LADCO Oil Peaking
MI	THUMB ELECTRIC COOPERATIVE	1875	1	5984511	24542613	LADCO Oil Peaking
MI	THUMB ELECTRIC COOPERATIVE	1875	8	5984511	24542713	LADCO Gas Peaking
MI	Vandyke Generating Plant	1880	6	5749211	20405913	LADCO Gas Peaking
MI	Vandyke Generating Plant	1880	8	5749211	20405713	LADCO Gas Peaking
MI	WHITE PINE ELECTRIC POWER LLC			7870111	3372213	LADCO Gas Peaking
MI	WHITE PINE ELECTRIC POWER LLC			7870111	3372613	LADCO Gas Peaking
MI	Wolverine Power Supply - Hersey	1877	10	7824811	2847613	LADCO Gas Peaking
MI	Wolverine Power, Gaylord Generating Station	7932	1	8062511	7179513	LADCO Gas Peaking
MI	Wolverine Power, Gaylord Generating Station	7932	2	8062511	7179613	LADCO Gas Peaking
MI	Wolverine Power, Gaylord Generating Station	7932	3	8062511	7179713	LADCO Gas Peaking
MI	Wolverine Power, Tower Power Plant	1873	GT4	4184811	32644613	LADCO Oil Peaking
MI	Wolverine Power, Vestaburg Power Plant	1881	6	5215711	25695813	LADCO Oil Peaking
MI	Wolverine Power, Vestaburg Power Plant	1881	7	5215711	25695713	LADCO Oil Peaking
MI	Wolverine Power, Vestaburg Power Plant	1881	8	5215711	25695913	LADCO Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
MI	ZEELAND BOARD OF PUBLIC WORKS	1867	10	6348411	16365413	LADCO Oil Peaking
MN	Hutchinson Utilities Commission -Plant 2	6358	9	7626711	11449113	LADCO Gas Peaking
MN	Otter Tail Power Co			7072311	15102613	LADCO Oil Peaking
MN	Otter Tail Power Co			7072311	15102713	LADCO Oil Peaking
MN	Rochester Public Utilities - Silver Lake Plant			7149811	14414013	LADCO Gas Peaking
MN	Worthington Diesel Generating Plant	2024	1	7148211	14421713	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	2	7148211	14421613	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	3	7148211	14421213	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	4	7148211	14421513	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	5	7148211	14421813	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	6	7148211	14421413	LADCO Oil Peaking
MN	Worthington Diesel Generating Plant	2024	7	7148211	14421313	LADCO Oil Peaking
MN	Xcel Energy - Granite City Generating	1910	1	6190211	15246513	LADCO Gas Peaking
MN	Xcel Energy - Granite City Generating	1910	2	6190211	15246413	LADCO Gas Peaking
MN	Xcel Energy - Granite City Generating	1910	3	6190211	15246313	LADCO Gas Peaking
MN	Xcel Energy - Granite City Generating	1910	4	6190211	15246213	LADCO Gas Peaking
MO	AMEREN MISSOURI KIRKSVILLE COMBUSTION TURBINE	2083	1	6996211	14719913	South Gas Peaking
MO	BUTLER MUNICIPAL POWER PLANT-BUTLER	2115	NG1	7131711	14438313	South Oil Peaking
MO	BUTLER MUNICIPAL POWER PLANT-BUTLER	2115	NG2	7131711	14438113	South Oil Peaking
MO	BUTLER MUNICIPAL POWER PLANT-BUTLER	2115	SG1	7131711	14437613	South Oil Peaking
MO	BUTLER MUNICIPAL POWER PLANT-BUTLER	2115	SG2	7131711	14438213	South Oil Peaking
MO	CARROLLTON MUNICIPAL UTILITIES	2120	10	7326011	11021213	South Oil Peaking
MO	CARROLLTON MUNICIPAL UTILITIES	2120	11	7326011	11020613	South Oil Peaking
MO	CARROLLTON MUNICIPAL UTILITIES	2120	7	7326011	11021713	South Gas Peaking
MO	CARROLLTON MUNICIPAL UTILITIES	2120	8	7326011	11021513	South Gas Peaking
MO	CARROLLTON MUNICIPAL UTILITIES	2120	9	7326011	11021413	South Oil Peaking
MO	CARTHAGE WATER AND ELECTRIC	2121	10	5339111	26480313	South Gas Peaking
MO	CHILLICOTHE MUNICIPAL UTILITIES	2122	D5	7297211	59066113	South Oil Peaking
MO	CITY OF WEST PLAINS-POWER STATION-POWER STATION	59664	UNIT1	7544611	11572513	South Gas Peaking
MO	CITY OF WEST PLAINS-POWER STATION-POWER STATION	59664	UNIT2	7544611	11572213	South Gas Peaking
MO	DOGWOOD ENERGY FACILITY PLEASANT HILL	55178	ST-1	7359211	10993913	South Gas Peaking
MO	EMPIRE DISTRICT ELECTRIC CO STATE LINE FACILITY	7296	2-3	5339011	26480813	South Oil Peaking
MO	FULTON POWER PLANT FULTON	2126	GT4	6323111	15999013	South Oil Peaking
MO	FULTON POWER PLANT FULTON	2126	IC3	6323111	15998713	South Gas Peaking

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MO	HIGGINSVILLE MUNICIPAL POWER FACILITY	2131	5	7269411	59062913	South Oil Peaking
MO	HIGGINSVILLE MUNICIPAL POWER FACILITY	2131	6	7269411	59063213	South Oil Peaking
MO	INDEPENDENCE POWER AND LIGHT BLUE VALLEY STATION	2132	1	8100311	6089413	South Gas Peaking
MO	INDEPENDENCE POWER AND LIGHT BLUE VALLEY STATION	2132	2	8100311	6089813	South Gas Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION H	2135	1	7577311	11540013	South Gas Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION H	2135	2	7577311	11539913	South Gas Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION I	2136	1	7577211	11540113	South Oil Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION I	2136	2	7577211	11540213	South Oil Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION J	2134	1	7577411	11539713	South Oil Peaking
MO	INDEPENDENCE POWER AND LIGHT SUB STATION J	2134	2	7577411	11539813	South Oil Peaking
MO	JACKSON MUNICIPAL UTILITIES-JACKSON	2137	7	6339311	15967313	South Oil Peaking
MO	KCP AND L GREATER MISSOURI OPERATIONS CO LAKE ROAD GENERATING STATION	2098	7	6346411	15422113	South Oil Peaking
MO	KCP AND L GREATER MISSOURI OPERATIONS CO LAKE ROAD GENERATING STATION			6346411	15422313	South Oil Peaking
MO	KCP AND L GREATER MISSOURI OPERATIONS CO NEVADA GAS TURBINE	2090	1	5204311	25407613	South Oil Peaking
MO	KENNETT GENERATING PLANT ANTHONY STREET	2139	10	6031511	24467713	South Oil Peaking
MO	KENNETT GENERATING PLANT ANTHONY STREET	2139	11	6031511	24467413	South Gas Peaking
MO	KENNETT GENERATING PLANT ANTHONY STREET	2139	12	6031511	24467313	South Gas Peaking
MO	KENNETT GENERATING PLANT ANTHONY STREET	2139	13	6031511	24467213	South Gas Peaking
MO	MALDEN MUNICIPAL POWER AND LIGHT S BECKWITH	2142	8	6031211	24468213	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	10	7593811	11517413	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	11	7593811	11517813	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	7	7593811	11517913	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	8	7593811	11518113	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	9	7593811	11517313	South Oil Peaking
MO	MARSHALL MUNICIPAL UTILITIES	2144	GT1	7593811	11517513	South Gas Peaking
MO	MARSHALL MUNICIPAL UTILITIES			7593811	11516913	South Gas Peaking
MO	POPLAR BLUFF MUNICIPAL UTILITIES GENERATING PLANT	7392	1	6321511	16016813	South Gas Peaking
MO	POPLAR BLUFF MUNICIPAL UTILITIES GENERATING PLANT	7392	2	6321511	16016613	South Gas Peaking
MO	SHELBINA POWER PLANT	7405	G1	5052711	25601213	South Oil Peaking
MO	SHELBINA POWER PLANT	7405	G2	5052711	25601113	South Oil Peaking
MO	SHELBINA POWER PLANT	7406	G3	5052711	25600813	South Oil Peaking

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MO	SHELBINA POWER PLANT	7406	G4	5052711	25600913	South Oil Peaking
MO	SHELBINA POWER PLANT	7406	G5	5052711	25601013	South Oil Peaking
MO	SHELBINA POWER PLANT	7406	G6	5052711	25601413	South Oil Peaking
MO	SHELBINA POWER PLANT	7860	G7	5052711	25601613	South Oil Peaking
MO	SHELBINA POWER PLANT	7860	G8	5052711	25602313	South Oil Peaking
MO	TRENTON MUNICIPAL UTILITIES TRENTON PEAKING PLANT	698	1	7528911	11609113	South Oil Peaking
MO	TRENTON MUNICIPAL UTILITIES TRENTON PEAKING PLANT	698	2	7528911	11609613	South Oil Peaking
MO	TRENTON MUNICIPAL UTILITIES TRENTON PEAKING PLANT	698	3	7528911	11609513	South Oil Peaking
MO	TRENTON MUNICIPAL UTILITIES TRENTON PEAKING PLANT	698	4	7528911	11609013	South Oil Peaking
MO	TRENTON MUNICIPAL UTILITIES TRENTON PEAKING PLANT	698	5	7528911	11609313	South Oil Peaking
MS	Clarksdale Public Utilities, Lewis L Wilkins Generating Station	2059	8	7167411	14340013	SESARM Gas Peaking
MS	Clarksdale Public Utilities, Lewis L Wilkins Generating Station	2059	9	7167411	14339813	SESARM Gas Peaking
MS	Cooperative Energy, Benndale Peaking Station	2068	1	7490811	11257413	SESARM Gas Peaking
MS	Cooperative Energy, Paulding Peaking Station	2071	1	6252611	16460313	SESARM Oil Peaking
MS	Entergy Mississippi Attala Plant	55220	A03	7036511	14202413	SESARM Gas Peaking
MS	Entergy Mississippi Inc, Rex Brown Plant	2053	GT1	6802311	13571113	SESARM Gas Peaking
MS	Greenwood Utilities, Henderson Station	2062	H1	8231311	5674613	SESARM Gas Peaking
MS	Greenwood Utilities, Henderson Station	2062	H10	8231311	5674813	SESARM Gas Peaking
MS	Greenwood Utilities, Henderson Station	2062	H11	8231311	5674713	SESARM Gas Peaking
MS	Greenwood Utilities, Henderson Station	2062	H3	8231311	5675413	SESARM Gas Peaking
MS	Greenwood Utilities, Henderson Station	2062	H4	8231311	5675213	SESARM Oil Peaking
MS	Greenwood Utilities, Henderson Station	2062	H5	8231311	5675513	SESARM Oil Peaking
MS	Greenwood Utilities, Henderson Station	2062	H6	8231311	5675113	SESARM Oil Peaking
MS	Greenwood Utilities, Henderson Station	2062	H7	8231311	5675013	SESARM Oil Peaking
MS	Greenwood Utilities, Henderson Station	2062	H8	8231311	5674913	SESARM Oil Peaking
MS	Greenwood Utilities, Henderson Station	2062	H9	8231311	5674313	SESARM Gas Peaking
MS	Mississippi Power Company, Plant Jack Watson			6788111	13581513	SESARM Gas Peaking
MS	Mississippi Power Company, Plant Jack Watson			6788111	13581713	SESARM Gas Peaking
MS	South Mississippi Electric Power Association, Moselle Plant			7139511	14101513	SESARM Gas Peaking

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MS	South Mississippi Electric Power Association, Moselle Plant			7139511	14101913	SESARM Gas Peaking
MS	TVA Southaven Combined Cycle Plant	55269	STG2	7184711	14318913	SESARM Gas Peaking
MS	Yazoo City Public Service Commission	2067	GT1	6314111	15463113	SESARM Gas Peaking
MS	Yazoo City Public Service Commission			6314111	15463213	SESARM Gas Peaking
MT	COLSTRIP ENERGY LTD PARTNERSHIP	10784	BLR1	7854911	2808213	West North Central Composite Peaking
MT	MDU - GLENDIVE	2176	GT1	8150511	5485713	West North Central Gas Peaking
MT	MDU - MILES CITY	2177	1	7398611	9302913	West North Central Gas Peaking
NC	Duke Energy Progress, LLC - L.V. Sutton Electric Plant			8547211	1554113	SESARM Oil Peaking
NC	Plant Rowan County	7826	STG	8508011	74216313	SESARM Gas Peaking
NC	Rosemary Power Station	50555	GEN3	8286911	454813	SESARM Gas Peaking
ND	Peak Load Generators	56098	1	10613311	64319513	West North Central Oil Peaking
ND	Peak Load Generators	56098	2	10613311	64319613	West North Central Oil Peaking
ND	RM Heskett Station	2790	B1	8087011	64287213	West North Central Composite Peaking
NE	Auburn Generating Plant	2215	1	5105811	24688813	West North Central Oil Peaking
NE	Auburn Generating Plant	2215	2	5105811	24688413	West North Central Oil Peaking
NE	Auburn Generating Plant	2215	4A	5105811	24688313	West North Central Oil Peaking
NE	Auburn Generating Plant	2215	5	5105811	24688513	West North Central Oil Peaking
NE	Auburn Generating Plant	2215	6	5105811	24688613	West North Central Oil Peaking
NE	Auburn Generating Plant	2215	7	5105811	24688713	West North Central Oil Peaking
NE	Benkelman Municipal Power			6712511	12869613	West North Central Oil Peaking
NE	Burwell Light Plant	2222	1	6714511	12865613	West North Central Oil Peaking
NE	Burwell Light Plant	2222	2	6714511	12865413	West North Central Oil Peaking
NE	Burwell Light Plant	2222	3	6714511	12865713	West North Central Oil Peaking
NE	Burwell Light Plant	2222	4	6714511	12865313	West North Central Oil Peaking
NE	C W Burdick Generating Station	2241	B-1	6714711	12864013	West North Central Gas Peaking
NE	C W Burdick Generating Station	2241	B-2	6714711	12864213	West North Central Gas Peaking
NE	C W Burdick Generating Station	2241	GT1	6714711	12864613	West North Central Gas Peaking
NE	Crete Municipal Plant			7630111	12540713	West North Central Oil Peaking
NE	David City Municipal Power	2233	5	7574511	11904113	West North Central Oil Peaking
NE	David City Municipal Power	2233	6	7574511	11903913	West North Central Gas Peaking
NE	David City Municipal Power	2233	7	7574511	11904013	West North Central Oil Peaking
NE	Laurel Municipal Plant	2249	1	7575311	11899513	West North Central Oil Peaking
NE	Lon D Wright Power Plant	2240	6	7766111	1753613	West North Central Composite Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
NE	Lon D Wright Power Plant	2240	7	7766111	1753313	West North Central Composite Peaking
NE	Madison Light & Power Plant	7469	FM1	5298011	25611213	West North Central Oil Peaking
NE	Madison Light & Power Plant	7469	FM2	5298011	25611113	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	10	5106711	24685313	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	2	5106711	24685013	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	3	5106711	24685613	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	4	5106711	24685513	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	5	5106711	24685413	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	8	5106711	24685213	West North Central Oil Peaking
NE	Nebraska City Power Plant No 1	2255	9	5106711	24685113	West North Central Oil Peaking
NE	OPPD Sarpy County Station	2292	3	7631011	12532613	West North Central Gas Peaking
NE	OPPD Sarpy County Station			7631011	12532513	West North Central Oil Peaking
NE	Red Cloud Municipal Plant	2299	2	7515011	12751713	West North Central Oil Peaking
NE	Red Cloud Municipal Plant	2299	3	7515011	12751813	West North Central Oil Peaking
NE	Red Cloud Municipal Plant	2299	4	7515011	12751913	West North Central Oil Peaking
NE	Red Cloud Municipal Plant	2299	5	7515011	12752013	West North Central Oil Peaking
NE	Wakefield Municipal Power	2311	5	6703511	12886313	West North Central Oil Peaking
NE	Wakefield Municipal Power	2311	6	6703511	12886213	West North Central Oil Peaking
NE	Wisner Municipal Power Plant	2316	3	7460111	11696213	West North Central Oil Peaking
NH	ESSENTIAL POWER NEWINGTON LLC	55661	ST	7458511	12074113	MANE-VU Gas Peaking
NH	GRANITE RIDGE ENERGY LLC	55170	STG	7458411	12075013	MANE-VU Oil Peaking
NM	Southwestern Public Service Co - Maddox Station	2446	2	5228411	82518513	Southwest Gas Peaking
NM	Southwestern Public Service Co - Maddox Station	2446	3	5228411	82518413	Southwest Gas Peaking
NY	Caithness Long Island Energy Center	56234	ST01	15488311	96986813	MANE-VU Oil Peaking
NY	CARTHAGE ENERGY COGEN FACILITY	10620	GEN2	8036811	3684213	MANE-VU Gas Peaking
NY	EPCOR POWER CASTLETON	10190	GEN2	7864311	3599813	MANE-VU Gas Peaking
NY	FREEPORT POWER PLANT #1	2678	2	7221211	7565913	MANE-VU Oil Peaking
NY	FREEPORT POWER PLANT #1	2678	3	7221211	7565813	MANE-VU Oil Peaking
NY	FREEPORT POWER PLANT #2	2679	3	7221311	7565613	MANE-VU Oil Peaking
NY	ROCKVILLE CENTRE POWER PLANT	2695	8	7221911	7561913	MANE-VU Oil Peaking
NY	SARANAC POWER PARTNERS COGENERATION FAC	54574	GEN3	8375111	1671413	MANE-VU Gas Peaking
NY	SOUTHAMPTON GT FACILITY	2519	1	7942611	2539113	MANE-VU Gas Peaking
NY	SOUTHOLD GT FACILITY	2520	1	7942711	2538913	MANE-VU Gas Peaking
NY	WPS SYRACUSE GENERATION LLC	10621	GEN2	7435911	7947613	MANE-VU Gas Peaking
OH	AMP Bowling Green Peaking Plant (0387020378)	55262	CT2	9253611	55202813	LADCO Gas Peaking
OH	AMP Galion Generation Station (0317030060)	55263	CT2	9289211	55698413	LADCO Gas Peaking

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OH	AMP Napoleon Peaking Plant (0335010056)	55264	CT2	9291911	55775113	LADCO Gas Peaking
OH	Cleveland Public Power - Service Center (1318000133)	2909	1	8250711	62813	LADCO Gas Peaking
OH	Department of Public Utilities, City of Orrville, Ohio (0285010188)	2935	10	3950711	34858413	LADCO Coal Peaking
OH	Department of Public Utilities, City of Orrville, Ohio (0285010188)	2935	11	3950711	34858513	LADCO Coal Peaking
OH	Department of Public Utilities, City of Orrville, Ohio (0285010188)	2935	12	3950711	34858213	LADCO Coal Peaking
OH	Department of Public Utilities, City of Orrville, Ohio (0285010188)	2935	13	3950711	34858313	LADCO Coal Peaking
OH	Dicks Creek Energy Facility (1409010078)	2831	3	9303211	55575713	LADCO Gas Peaking
OH	Dicks Creek Energy Facility (1409010078)	2831	4	9303211	55575813	LADCO Gas Peaking
OH	Dicks Creek Energy Facility (1409010078)	2831	5	9303211	55575913	LADCO Gas Peaking
OH	Dover Municipal Light Plant (0679010146)	2914	4	7345511	10655413	LADCO Coal Peaking
OH	DP&L, Killen Generating Station (0701000060)			8101411	89864113	LADCO Oil Peaking
OH	Miami Fort Power Station (1431350093)	2832	GT6	7738711	2470913	LADCO Oil Peaking
OH	OMEGA JV2-NAPOLEON (0335010055)	7776	4	14755911	106016313	LADCO Oil Peaking
OH	OMEGA JV2-NAPOLEON (0335010055)	7776	5	14755911	106016413	LADCO Oil Peaking
OH	OMEGA JV2-NAPOLEON (0335010055)	7776	6	14755911	106016513	LADCO Oil Peaking
OH	PAINESVILLE MUNICIPAL ELECTRIC PLANT (0243110008)	2936	4	8149311	5945413	LADCO Coal Peaking
OH	PAINESVILLE MUNICIPAL ELECTRIC PLANT (0243110008)	2936	5	8149311	5945213	LADCO Coal Peaking
OH	Piqua Municipal Power System (0855100041)	2937	8	8497311	1570113	LADCO Oil Peaking
OK	BOOMER LAKE STATION	3000	3	5615011	98406313	South Oil Peaking
OK	BOOMER LAKE STATION	3000	4	5615011	98406413	South Oil Peaking
OK	BOOMER LAKE STATION	3000	5	5615011	98406513	South Oil Peaking
OK	BOOMER LAKE STATION			5615011	21312413	South Gas Peaking
OK	BOOMER LAKE STATION			5615011	21312513	South Gas Peaking
OK	GREEN COUNTRY ENERGY PROJECT	55146	STG1	7218011	10018913	South Gas Peaking
OK	MCCLAIN ENGRY FACLTY	55457	ST1	882511	47401413	South Gas Peaking
PA	BRUNNER ISLAND LLC/BRUNNER ISLAND	3140	BID1	3193911	38702213	MANE-VU Oil Peaking
PA	BRUNNER ISLAND LLC/BRUNNER ISLAND	3140	BID2	3193911	38702313	MANE-VU Oil Peaking
PA	BRUNNER ISLAND LLC/BRUNNER ISLAND	3140	BID3	3193911	38702413	MANE-VU Oil Peaking
PA	CHAMBERSBURG BORO/FALLING SPRING 2ND ST DIESEL POWER PLT	7397	5	3769511	37866713	MANE-VU Gas Peaking
PA	CHAMBERSBURG BORO/FALLING SPRING 2ND ST DIESEL POWER PLT	7397	6	3769511	37866613	MANE-VU Gas Peaking

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PA	CHAMBERSBURG BORO/FALLING SPRING 2ND ST DIESEL POWER PLT	7397	7	3769511	37866813	MANE-VU Oil Peaking
PA	CHAMBERSBURG BORO/ORCHARD PARK GENERATING STA	55997	10	10722111	58850613	MANE-VU Gas Peaking
PA	CHAMBERSBURG BORO/ORCHARD PARK GENERATING STA	55997	11	10722111	58850713	MANE-VU Gas Peaking
PA	CHAMBERSBURG BORO/ORCHARD PARK GENERATING STA	55997	8	10722111	58850413	MANE-VU Gas Peaking
PA	CHAMBERSBURG BORO/ORCHARD PARK GENERATING STA	55997	9	10722111	58850513	MANE-VU Gas Peaking
PA	EXELON GENERATION CO/EDDYSTONE	3161	10	6662011	17764213	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/EDDYSTONE	3161	20	6662011	17764113	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/EDDYSTONE	3161	30	6662011	17765213	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/EDDYSTONE	3161	40	6662011	17765113	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/FALLS TWP PEAK PWR PLT	3162	1	2878411	37949613	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/FALLS TWP PEAK PWR PLT	3162	2	2878411	37949513	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/FALLS TWP PEAK PWR PLT	3162	3	2878411	37949413	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/MOSER GENERATING STATION	3163	1	3692211	37043713	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/MOSER GENERATING STATION	3163	2	3692211	37043513	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/MOSER GENERATING STATION	3163	3	3692211	37043613	MANE-VU Oil Peaking
PA	EXELON GENERATION CO/PENNSBURY POWER PLT	7690	1	2918911	38124713	MANE-VU Gas Peaking
PA	EXELON GENERATION CO/PENNSBURY POWER PLT	7690	2	2918911	38124813	MANE-VU Gas Peaking
PA	GENON NE MGMT CO/CONEMAUGH PLT	3118	A	2905911	38672913	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/CONEMAUGH PLT	3118	B	2905911	38672413	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/CONEMAUGH PLT	3118	C	2905911	38673113	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/CONEMAUGH PLT	3118	D	2905911	38673213	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/KEYSTONE STA	3136	3	3866111	37165013	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/KEYSTONE STA	3136	4	3866111	37164813	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/KEYSTONE STA	3136	5	3866111	37165113	MANE-VU Oil Peaking
PA	GENON NE MGMT CO/KEYSTONE STA	3136	6	3866111	37165513	MANE-VU Oil Peaking
PA	LIBERTY ELEC POWER LLC/EDDYSTONE PLT	55231	STG	4724611	27721313	MANE-VU Gas Peaking
PA	LOWER MT BETHEL ENERGY LLC/BANGOR	55667	G3	12796911	89392613	MANE-VU Gas Peaking
PA	LOWER MT BETHEL ENERGY LLC/BANGOR			12796911	89392713	MANE-VU Gas Peaking
PA	MARTINS CREEK LLC/ALLENTOWN CTG SITE	3139	CTG1	5452111	27541713	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/ALLENTOWN CTG SITE	3139	CTG2	5452111	27541513	MANE-VU Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
PA	MARTINS CREEK LLC/ALLENTOWN CTG SITE	3139	CTG3	5452111	27541813	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/ALLENTOWN CTG SITE	3139	CTG4	5452111	27541613	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/FISHBACH CTS	3142	UNT1	4736011	27907713	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/FISHBACH CTS	3142	UNT2	4736011	27907813	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARRISBURG CTG SITE	3143	CTG1	6660711	17773513	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARRISBURG CTG SITE	3143	CTG2	6660711	17773413	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARRISBURG CTG SITE	3143	CTG3	6660711	17773213	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARRISBURG CTG SITE			6660711	17773313	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARWOOD CTS	3144	CTG1	4473111	27692413	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARWOOD CTS	3144	CTG2	4473111	27692313	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/MARTINS CREEK	3148	CTG1	3881711	37150713	MANE-VU Gas Peaking
PA	MARTINS CREEK LLC/MARTINS CREEK	3148	CTG2	3881711	37151413	MANE-VU Gas Peaking
PA	MARTINS CREEK LLC/MARTINS CREEK	3148	CTG3	3881711	37151313	MANE-VU Gas Peaking
PA	MARTINS CREEK LLC/MARTINS CREEK	3148	CTG4	3881711	37150413	MANE-VU Gas Peaking
PA	MARTINS CREEK LLC/WEST SHORE CTG SITE	3154	CTG1	6464511	18718913	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/WEST SHORE CTG SITE	3154	CTG2	6464511	18719013	MANE-VU Oil Peaking
PA	NRG POWER MIDWEST LP/NEW CASTLE POWER PLT	3138	EMDA	3776611	37248913	MANE-VU Oil Peaking
PA	NRG REMA LLC/BLOSSBURG GEN STA	3120	1	3878511	37458813	MANE-VU Gas Peaking
PA	NRG REMA LLC/HAMILTON	3109	1	4713311	28152013	MANE-VU Oil Peaking
PA	NRG REMA LLC/ORRTANNA	3112	1	4713411	28151913	MANE-VU Oil Peaking
PA	NRG REMA LLC/SHAWNEE	3114	1	3748611	37854913	MANE-VU Oil Peaking
PA	NRG REMA LLC/SHAWVILLE GEN STA	3131	5	2985011	38387513	MANE-VU Oil Peaking
PA	NRG REMA LLC/SHAWVILLE GEN STA	3131	6	2985011	38388013	MANE-VU Oil Peaking
PA	NRG REMA LLC/SHAWVILLE GEN STA	3131	7	2985011	38388113	MANE-VU Oil Peaking
PA	NRG REMA LLC/TITUS GEN STA	3115	4	3857011	37800113	MANE-VU Oil Peaking
PA	NRG REMA LLC/TITUS GEN STA	3115	5	3857011	37799613	MANE-VU Oil Peaking
PA	NRG WHOLESALE GEN LP/HUNTERSTOWN PLT	3110	1	4713111	94841513	MANE-VU Oil Peaking
PA	NRG WHOLESALE GEN LP/HUNTERSTOWN PLT	3110	2	4713111	94841613	MANE-VU Oil Peaking
PA	NRG WHOLESALE GEN LP/HUNTERSTOWN PLT	3110	3	4713111	94841713	MANE-VU Oil Peaking
PA	NRG WHOLESALE GEN LP/HUNTERSTOWN PLT	55976	401	4713111	67433413	MANE-VU Gas Peaking
PA	PPL MARTINS CREEK LLC/LOCK HAVEN CTS	3147	CTG	6602011	19033913	MANE-VU Oil Peaking
PA	PPL MARTINS CREEK LLC/WILLIAMSPORT CTS	3155	CTG1	5450811	27550213	MANE-VU Oil Peaking
PA	PPL MARTINS CREEK LLC/WILLIAMSPORT CTS	3155	CTG2	5450811	27550113	MANE-VU Oil Peaking
PA	YORK PLT HOLDINGS LLC/SPRINGETTSBURY TWP	54693	GT#1	2986311	38380913	MANE-VU Gas Peaking
PA	YORK PLT HOLDINGS LLC/SPRINGETTSBURY TWP	54693	GT#2	2986311	38381013	MANE-VU Gas Peaking
PA	YORK PLT HOLDINGS LLC/SPRINGETTSBURY TWP	54693	GT#5	2986311	38381313	MANE-VU Gas Peaking
PA	YORK PLT HOLDINGS LLC/SPRINGETTSBURY TWP	54693	GT#6	2986311	38380813	MANE-VU Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
SC	SANTEE COOPER MYRTLE BEACH	3320	1	4760911	32047213	SESARM Oil Peaking
SC	SANTEE COOPER MYRTLE BEACH	3320	2	4760911	32047113	SESARM Oil Peaking
SC	SCE&G COIT	3281	1	3426211	38861013	SESARM Oil Peaking
SC	SCE&G HARDEEVILLE	3286	1	4508311	27624213	SESARM Oil Peaking
SC	SCE&G PARR COMBUSTION TURBINE FACILITY	3291	GT1	8332811	100013	SESARM Oil Peaking
SC	SCE&G URQUHART	3295	GT1	5045611	32105713	SESARM Gas Peaking
SC	SCE&G URQUHART	3295	GT2	5045611	32105513	SESARM Gas Peaking
SC	SCE&G URQUHART	3295	GT3	5045611	32105213	SESARM Oil Peaking
SD	Basin Electric Power Cooperative - Spirit Mound	6092	1	15647011	99777613	West North Central Oil Peaking
SD	Basin Electric Power Cooperative - Spirit Mound	6092	2	15647011	99777713	West North Central Oil Peaking
SD	Black Hill Power & Light Company (Ben French)	3325	GT1	6195711	15200113	West North Central Gas Peaking
SD	Black Hill Power & Light Company (Ben French)	3325	GT2	6195711	15200213	West North Central Gas Peaking
SD	Black Hill Power & Light Company (Ben French)	3325	GT3	6195711	15200313	West North Central Gas Peaking
SD	Black Hill Power & Light Company (Ben French)	3325	GT4	6195711	15200413	West North Central Oil Peaking
SD	Black Hill Power & Light Company (Ben French)			6195711	15199913	West North Central Composite Peaking
TN	Allen Fossil Plant	3393	G10	5720111	23031013	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G11	5720111	23031313	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G12	5720111	23029213	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G13	5720111	23028913	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G14	5720111	23029013	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G15	5720111	23030013	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	G16	5720111	23030613	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT1	5720111	23030113	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT2	5720111	23029613	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT3	5720111	23029913	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT4	5720111	23031113	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT5	5720111	23030913	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT6	5720111	23031213	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT7	5720111	23029313	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT8	5720111	23028613	SESARM Gas Peaking
TN	Allen Fossil Plant	3393	GT9	5720111	23028713	SESARM Gas Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	1	3787211	37840213	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	10	3787211	37839613	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	11	3787211	37839813	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	2	3787211	37839913	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	3	3787211	37840113	SESARM Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	4	3787211	37840013	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	5	3787211	37840613	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	6	3787211	37840413	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	7	3787211	37840513	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	8	3787211	37840313	SESARM Oil Peaking
TN	POWELL VALLEY ELECTRIC COOPERATIVE, INC.	7883	9	3787211	37839713	SESARM Oil Peaking
TX	ANTELOPE STATION	57865	E01	15625011	99191313	South Gas Peaking
TX	ANTELOPE STATION	57865	E02	15625011	99192213	South Gas Peaking
TX	ANTELOPE STATION	57865	E03	15625011	99192313	South Gas Peaking
TX	ANTELOPE STATION	57865	E04	15625011	99192413	South Gas Peaking
TX	ANTELOPE STATION	57865	E05	15625011	99192513	South Gas Peaking
TX	ANTELOPE STATION	57865	E06	15625011	99192613	South Gas Peaking
TX	ANTELOPE STATION	57865	E07	15625011	99192713	South Gas Peaking
TX	ANTELOPE STATION	57865	E08	15625011	99192813	South Gas Peaking
TX	ANTELOPE STATION	57865	E09	15625011	99192913	South Gas Peaking
TX	ANTELOPE STATION	57865	E10	15625011	99191413	South Gas Peaking
TX	ANTELOPE STATION	57865	E11	15625011	99191513	South Gas Peaking
TX	ANTELOPE STATION	57865	E12	15625011	99191613	South Gas Peaking
TX	ANTELOPE STATION	57865	E13	15625011	99191713	South Gas Peaking
TX	ANTELOPE STATION	57865	E14	15625011	99191813	South Gas Peaking
TX	ANTELOPE STATION	57865	E15	15625011	99191213	South Gas Peaking
TX	ANTELOPE STATION	57865	E16	15625011	99191913	South Gas Peaking
TX	ANTELOPE STATION	57865	E17	15625011	99192013	South Gas Peaking
TX	ANTELOPE STATION	57865	E18	15625011	99192113	South Gas Peaking
TX	ATKINS POWER STATION	3561	7	6598311	17346513	South Gas Peaking
TX	BASTROP ENERGY CENTER	55168	0003	3981411	35538813	South Oil Peaking
TX	CHANNELVIEW COGENERATION FACILITY			4057511	33490113	South Gas Peaking
TX	CHANNELVIEW COGENERATION FACILITY			4057511	33490413	South Gas Peaking
TX	CHANNELVIEW COGENERATION FACILITY			4057511	33490513	South Gas Peaking
TX	COOKE STATION 2	3602	GT2	5655211	19731113	South Gas Peaking
TX	JACK COUNTY GENERATION FACILITY	55230	ST1	13385011	71004013	South Gas Peaking
TX	JACK COUNTY GENERATION FACILITY	55230	ST2	13385011	99311113	South Gas Peaking
TX	JACK COUNTY GENERATION FACILITY			13385011	71004213	South Gas Peaking
TX	JACK COUNTY GENERATION FACILITY			13385011	99311213	South Gas Peaking
TX	JOHNSON COUNTY GENERATION FACILITY	54817	ST-1	6364211	15353213	South Gas Peaking
TX	LAMAR POWER PLANT	55097	STG1	7910611	2567813	South Oil Peaking
TX	LAMAR POWER PLANT	55097	STG2	7910611	2567913	South Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
TX	PARIS GENERATION	50109	GEN3	6431011	16595413	South Oil Peaking
TX	PEARSALL POWER PLANT	3630	1	3930211	37423513	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	10A	3930211	92108013	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	11A	3930211	92108113	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	12A	3930211	92108213	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	13A	3930211	92108313	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	14A	3930211	92108413	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	15A	3930211	92109613	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	16A	3930211	92108513	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	17A	3930211	92108613	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	18A	3930211	92108713	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	19A	3930211	92108813	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	1A	3930211	92107113	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	2	3930211	37423713	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	20A	3930211	92108913	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	21A	3930211	92109013	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	22A	3930211	92109113	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	23A	3930211	92109213	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	24A	3930211	92109313	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	2A	3930211	92107213	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	3	3930211	37423613	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	3A	3930211	92107313	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	4A	3930211	92107413	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	5A	3930211	92107513	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	6A	3930211	92107613	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	7A	3930211	92107713	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	8A	3930211	92107813	South Gas Peaking
TX	PEARSALL POWER PLANT	3630	9A	3930211	92107913	South Gas Peaking
TX	PH ROBINSON STATION ELECTRIC GENERATING STATION	3466	PHR1	4021011	126664313	South Gas Peaking
TX	PH ROBINSON STATION ELECTRIC GENERATING STATION	3466	PHR2	4021011	126664413	South Gas Peaking
TX	POWER LANE STEAM PLANT	4195	1	5655711	19719813	South Gas Peaking
TX	POWER LANE STEAM PLANT	4195	EP	5655711	91523413	South Gas Peaking
TX	POWER LANE STEAM PLANT	4195	EP2	5655711	91523513	South Gas Peaking
TX	POWER LANE STEAM PLANT	4195	EP3	5655711	91523613	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG01	17910611	126703713	South Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
TX	RED GATE POWER PLANT	59391	ENG02	17910611	126703813	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG03	17910611	126703913	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG04	17910611	126704013	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG05	17910611	126704113	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG06	17910611	126704213	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG07	17910611	126704313	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG08	17910611	126704413	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG09	17910611	126704513	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG10	17910611	126704613	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG11	17910611	126704713	South Gas Peaking
TX	RED GATE POWER PLANT	59391	ENG12	17910611	126704813	South Gas Peaking
TX	SOUTH TEXAS ELECTRIC COOP	3631	1	5863011	22230713	South Gas Peaking
TX	SOUTH TEXAS ELECTRIC COOP	3631	2	5863011	22230513	South Gas Peaking
TX	SOUTH TEXAS ELECTRIC COOP	3631	4	5863011	22230213	South Oil Peaking
TX	SOUTH TEXAS ELECTRIC COOP	3631	5	5863011	22230313	South Oil Peaking
TX	STRYKER CREEK ELECTRIC STATION	3504	D1	5729511	21908213	South Oil Peaking
TX	STRYKER CREEK ELECTRIC STATION	3504	D2	5729511	21908013	South Oil Peaking
TX	STRYKER CREEK ELECTRIC STATION	3504	D3	5729511	21907913	South Oil Peaking
TX	STRYKER CREEK ELECTRIC STATION	3504	D4	5729511	21907813	South Oil Peaking
TX	STRYKER CREEK ELECTRIC STATION	3504	D5	5729511	21907713	South Oil Peaking
TX	TH WHARTON ELECTRIC GENERATING STATION	3469	GT1	4926511	31238113	South Gas Peaking
TX	TRINIDAD STEAM ELEC STATION	3507	D1	4863311	29419613	South Oil Peaking
TX	TRINIDAD STEAM ELEC STATION	3507	D2	4863311	29419513	South Oil Peaking
TX	WA PARISH ELECTRIC GENERATING STATION	3470	GT1	3968411	34521513	South Gas Peaking
TX	WF COGENERATION PLANT	50127	GTA	5127311	25206313	South Gas Peaking
TX	WF COGENERATION PLANT	50127	GTB	5127311	25206213	South Gas Peaking
TX	WF COGENERATION PLANT	50127	GTC	5127311	25206113	South Gas Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BAYV	7665411	12168313	MANE-VU Oil Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BYV2	7665411	12168213	MANE-VU Oil Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BYV3	7665411	12168713	MANE-VU Oil Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BYV4	7665411	12168613	MANE-VU Oil Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BYV5	7665411	12168513	MANE-VU Oil Peaking
VA	Calpine Mid-Atlantic Generation LLC - Bayview	3782	BYV6	7665411	12168413	MANE-VU Oil Peaking
VA	Dominion - Bear Garden CT Station			15432111	96378113	MANE-VU Oil Peaking
VA	Dominion - Bear Garden CT Station			15432111	96378313	MANE-VU Oil Peaking
VA	Dominion - Chesapeake Energy Center	3803	6	5040211	28681613	MANE-VU Oil Peaking
VA	Dominion - Chesapeake Energy Center	3803	GT1	5040211	28680513	MANE-VU Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
VA	Dominion - Chesapeake Energy Center	3803	GT2	5040211	28680613	MANE-VU Oil Peaking
VA	Dominion - Chesapeake Energy Center	3803	GT4	5040211	28680713	MANE-VU Oil Peaking
VA	Dominion - Low Moor CT Station	3799	GT1	9047011	57565413	MANE-VU Oil Peaking
VA	Dominion - Low Moor CT Station	3799	GT2	9047011	57565513	MANE-VU Oil Peaking
VA	Dominion - Low Moor CT Station	3799	GT3	9047011	57565613	MANE-VU Oil Peaking
VA	Dominion - Low Moor CT Station	3799	GT4	9047011	57565713	MANE-VU Oil Peaking
VA	Dominion - Northern Neck CT Station	3800	GT1	9049611	58389513	MANE-VU Oil Peaking
VA	Dominion - Northern Neck CT Station	3800	GT2	9049611	58389613	MANE-VU Oil Peaking
VA	Dominion - Northern Neck CT Station	3800	GT3	9049611	58389713	MANE-VU Oil Peaking
VA	Dominion - Northern Neck CT Station	3800	GT4	9049611	58389813	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT1	7520511	12374213	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT2	7520511	12374413	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT3	7520511	12373613	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT4	7520511	12373213	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT5	7520511	12373813	MANE-VU Oil Peaking
VA	Dominion - Possum Point Power Station	3804	GT6	7520511	12373713	MANE-VU Oil Peaking
VA	Dominion-Gordonsville Power Station	54844	GOR3	5040011	28682913	MANE-VU Gas Peaking
VA	Dominion-Gordonsville Power Station	54844	GOR4	5040011	28683113	MANE-VU Gas Peaking
VA	INGENCO - Amelia	56681	1	6216811	16510613	MANE-VU Gas Peaking
VA	INGENCO - Brunswick Plant			10641711	58486313	MANE-VU Gas Peaking
VA	INGENCO - Charles City	56683	1	9089211	58367913	MANE-VU Gas Peaking
VA	INGENCO - Chester Plant	56684	1	10642911	58488213	MANE-VU Gas Peaking
VA	INGENCO - Rockville Plant	56692	1A	6760511	58482613	MANE-VU Oil Peaking
VA	Manassas City VMEA	7440	V3	7520711	12373013	MANE-VU Oil Peaking
VA	Manassas City VMEA	7441	V1	7520711	12372813	MANE-VU Oil Peaking
VA	Panda Stonewall LLC			17856211	125484913	MANE-VU Gas Peaking
VA	Panda Stonewall LLC			17856211	125485013	MANE-VU Gas Peaking
VA	Pow Gen (Suffolk) & Suff Energy Partners	54781	SU1	6894711	12959313	MANE-VU Gas Peaking
VA	Surry Power Station and Gravel Neck	7032	1	4937411	32379813	MANE-VU Oil Peaking
VA	Surry Power Station and Gravel Neck	7032	2	4937411	32379513	MANE-VU Oil Peaking
VA	Tenaska Virginia Partners, L.P.			9078811	58376713	MANE-VU Oil Peaking
VA	Tenaska Virginia Partners, L.P.			9078811	58376913	MANE-VU Oil Peaking
VA	Tenaska Virginia Partners, L.P.			9078811	58388613	MANE-VU Oil Peaking
WI	WISCONSIN PUBLIC SERVICE CORPORATION - FOX ENERGY CENTER	56031	STG	15038711	91926613	LADCO Gas Peaking
WI	WISCONSIN PUBLIC SERVICE CORPORATION- WESTON PLANT	4078	31	7078511	14849513	LADCO Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
WV	Dominion Resources, Inc. - MOUNT STORM POWER STATION	3954	JF1	6257011	71962013	SESARM Gas Peaking
WY	Neil Simpson One			8317511	72219713	West North Central Composite Peaking

Appendix H. *Additional Sector Source Apportionment*

Emission Sector Analysis

The following summaries examine contribution by source sector.

Figures H-1 though **H-9** examine each modeled exceedance day at the monitors of concern and the extent that each sector contributes on each day. Each exceedance day is in order by the total future DVF, though contribution from international emissions and boundary conditions are excluded from display.

Figure H-1. Emission Sector Contribution on Modeled Ozone Exceedance Day at Greenwich, CT

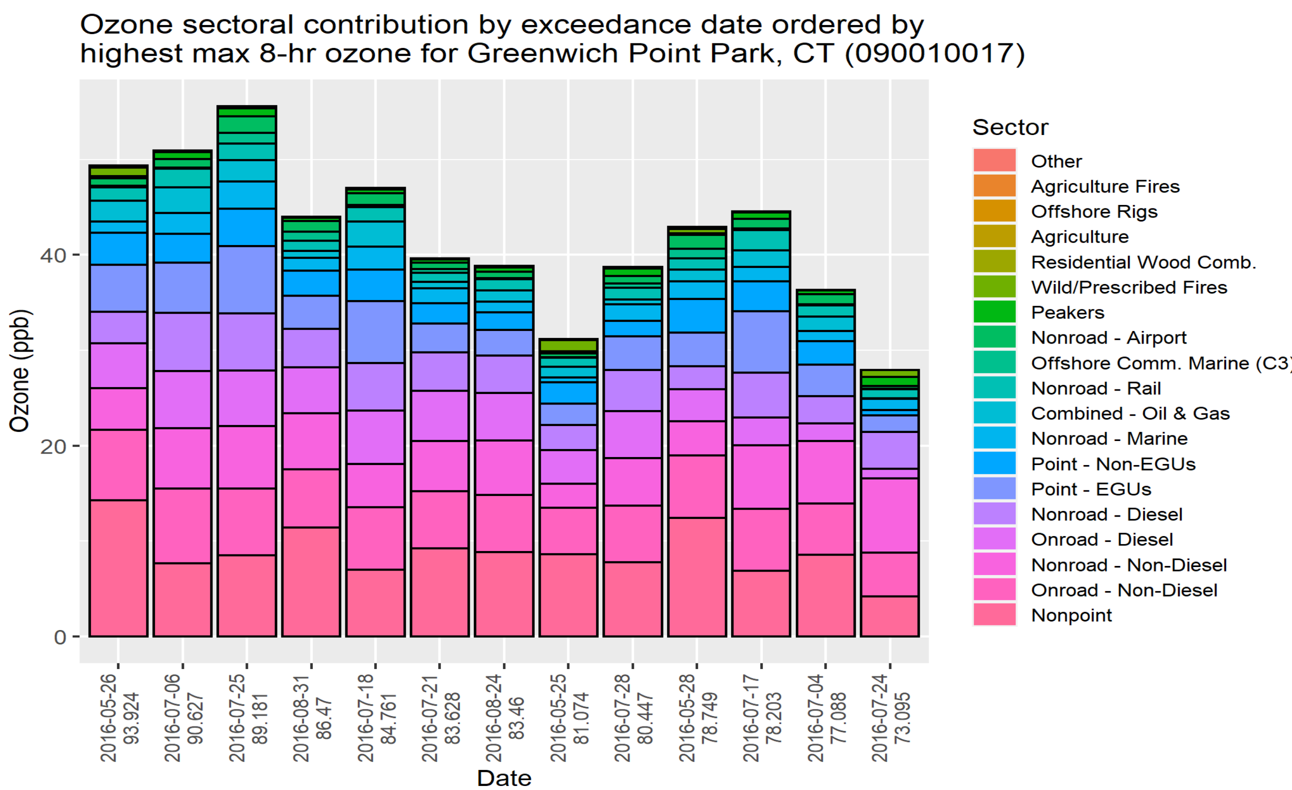


Figure H-2. Emission Sector Contribution on Modeled Ozone Exceedance Day at Stratford, CT.

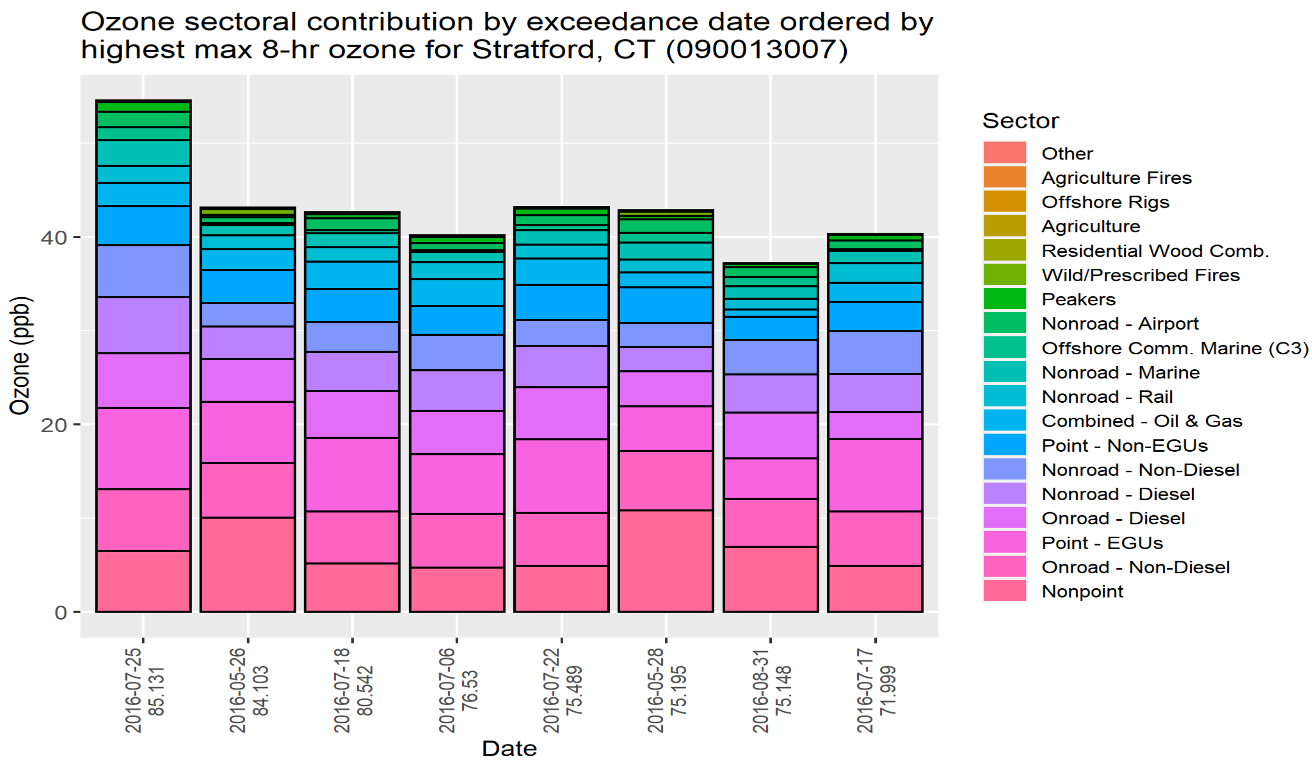


Figure H-3. Emission Sector Contribution on Modeled Ozone Exceedance Day at Westport, CT.

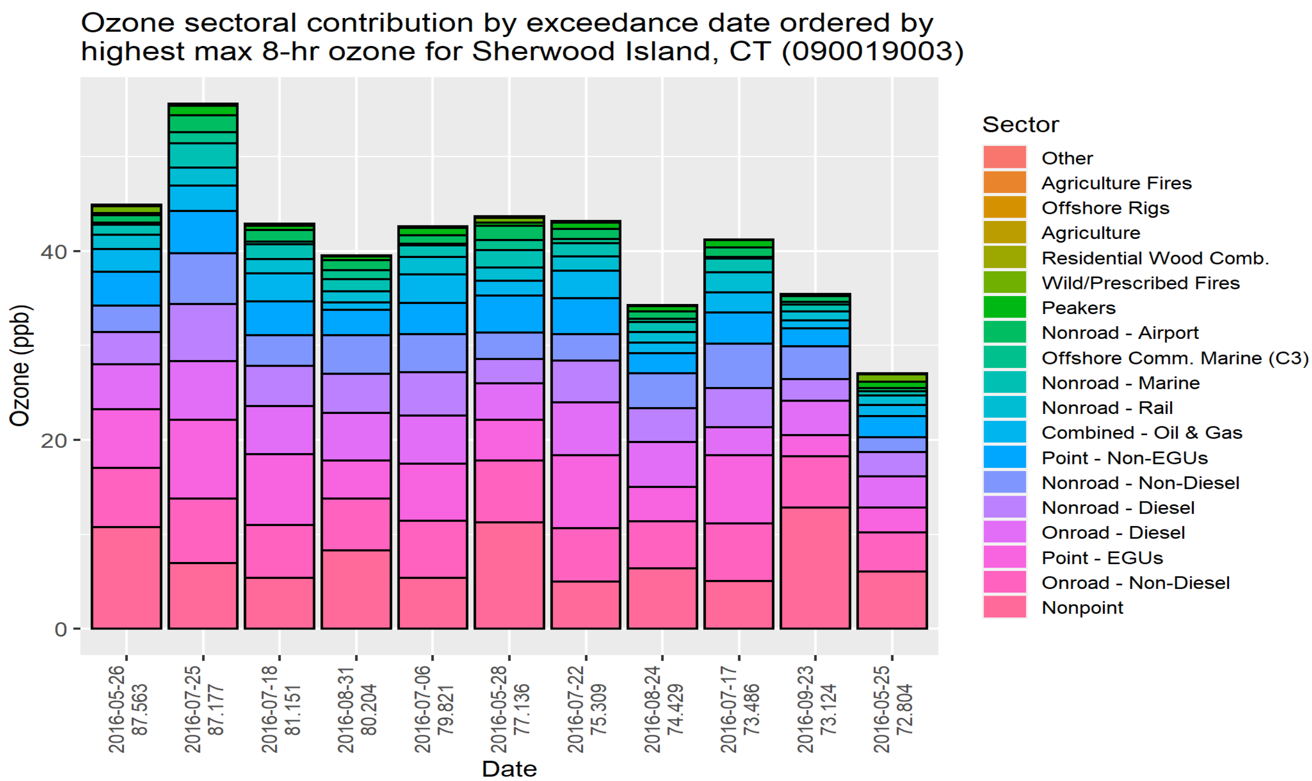


Figure H-4. Emission Sector Contribution on Modeled Ozone Exceedance Day at Madison, CT.

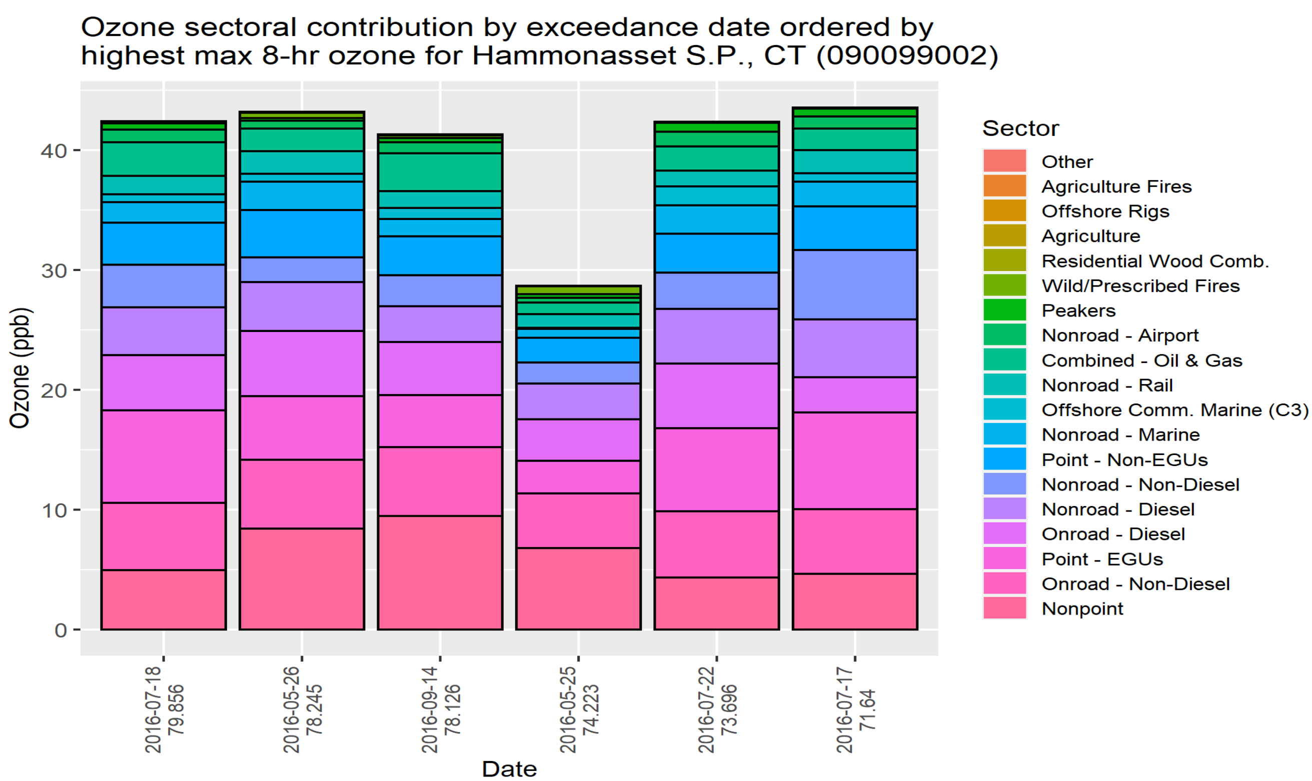


Figure H-5. Emission Sector Contribution on Modeled Ozone Exceedance Day at Groton, CT.

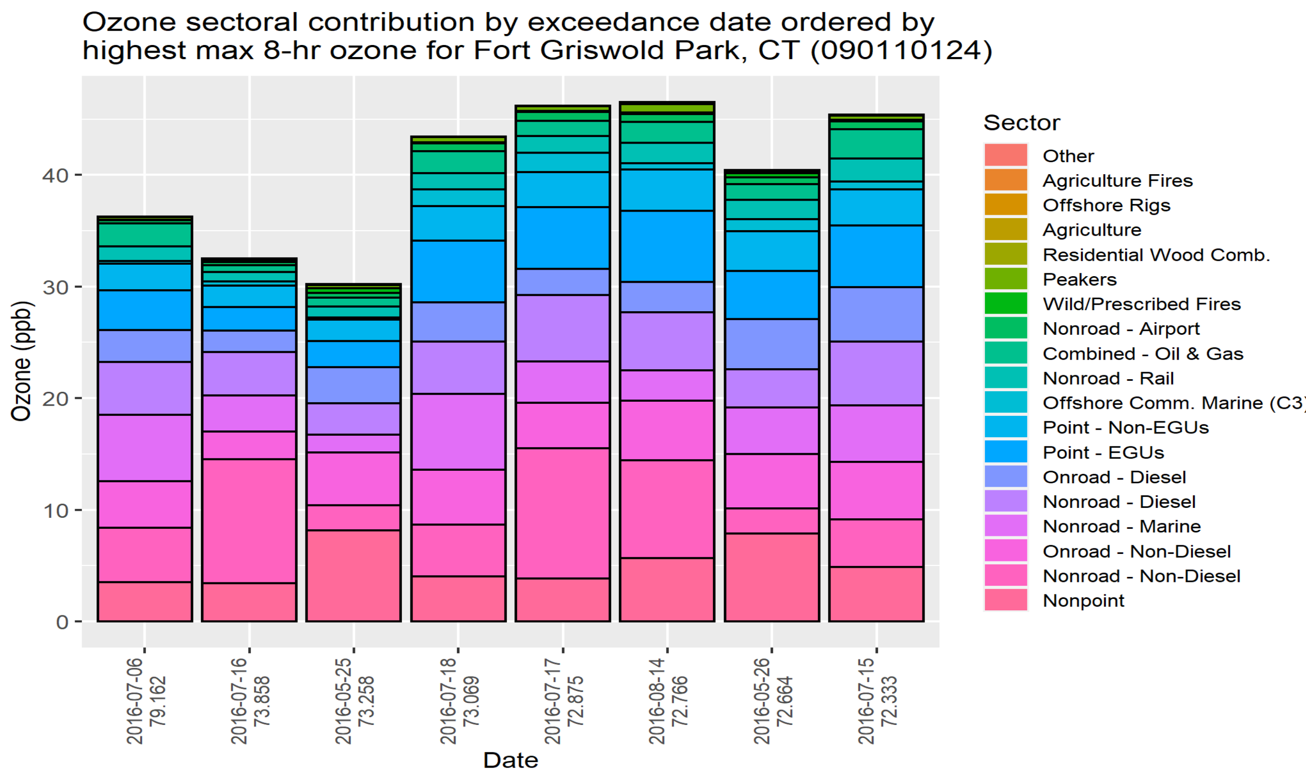


Figure H-6. Emission Sector Contribution on Modeled Ozone Exceedance Day at Susan Wagner H.S.

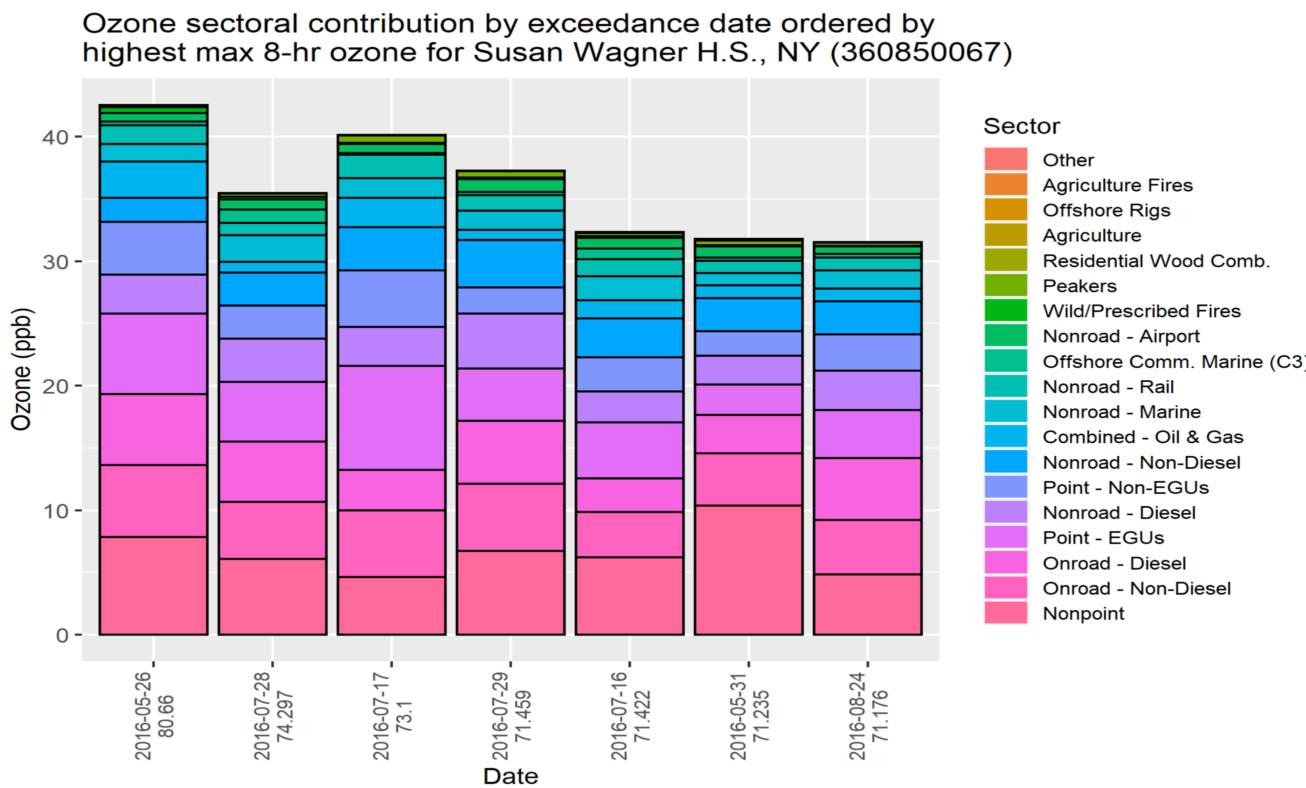


Figure H-7. Emission Sector Contribution on Modeled Ozone Exceedance Day at Babylon NY.

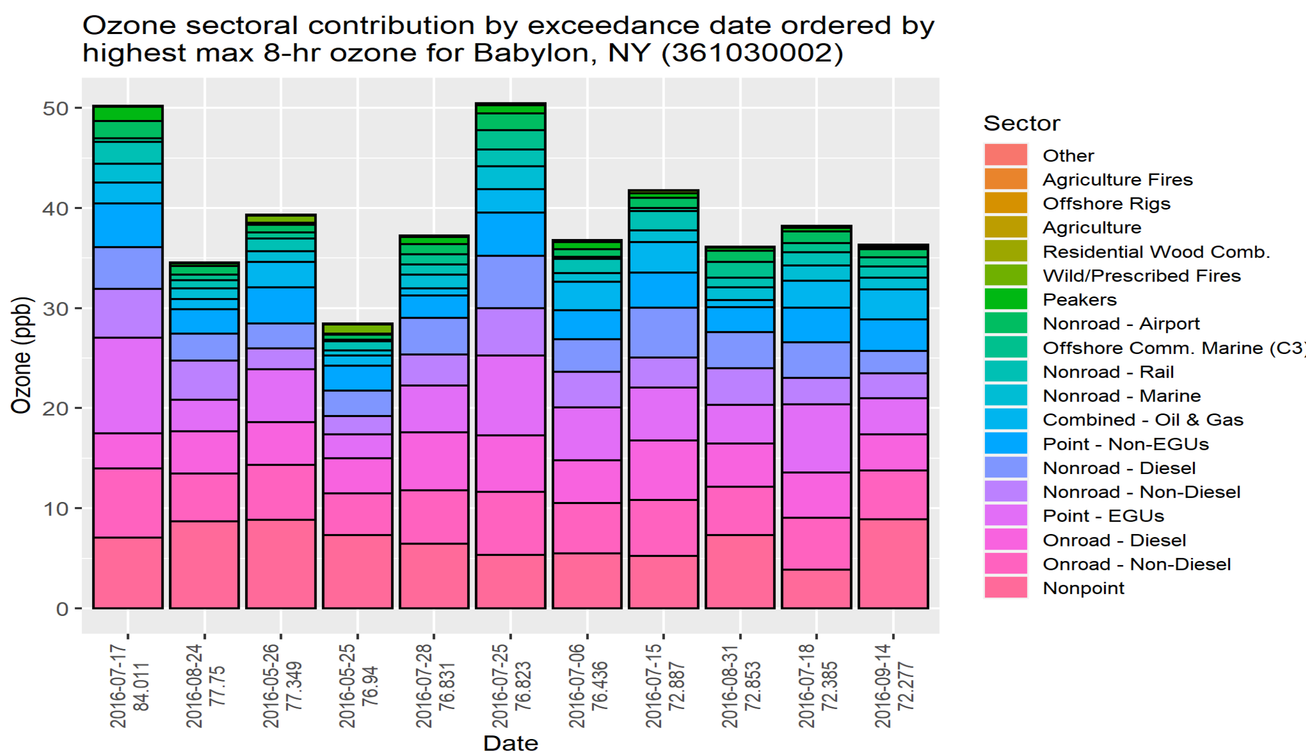


Figure H-8. Emission Sector Contribution on Modeled Ozone Exceedance Day at White Plaines, NY.

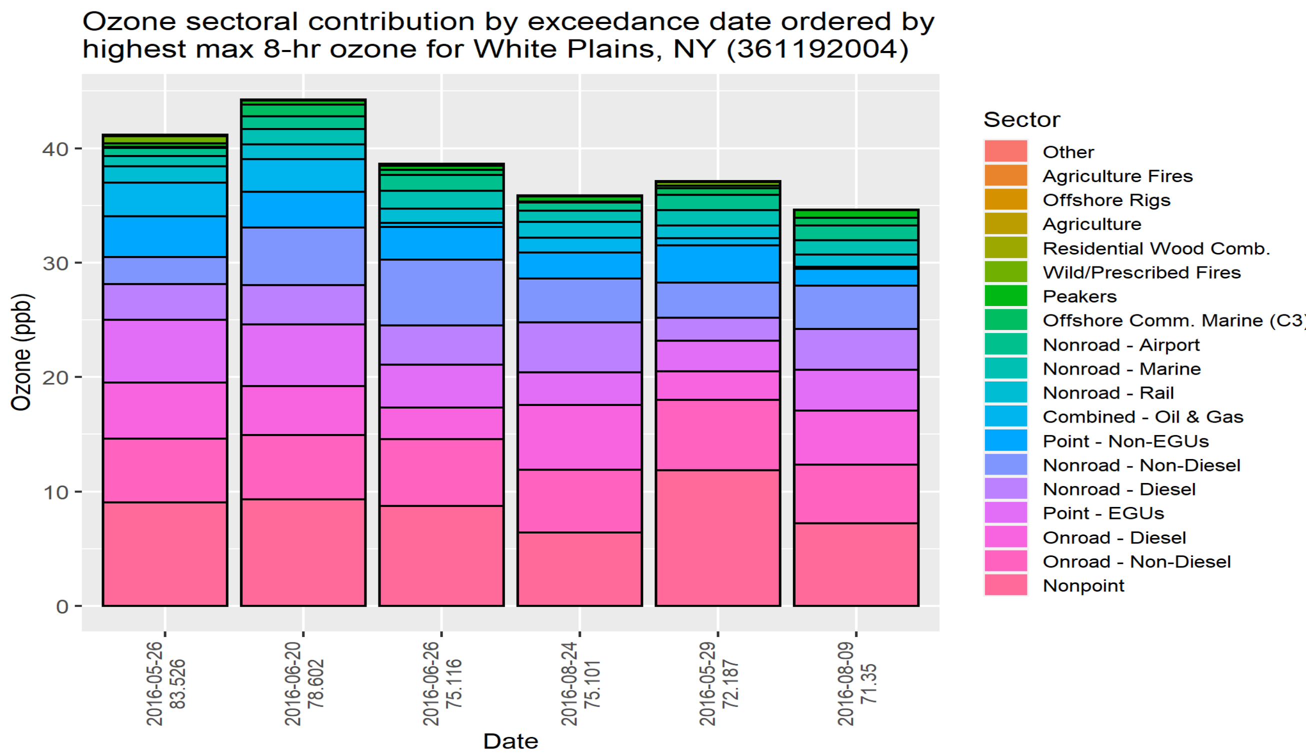
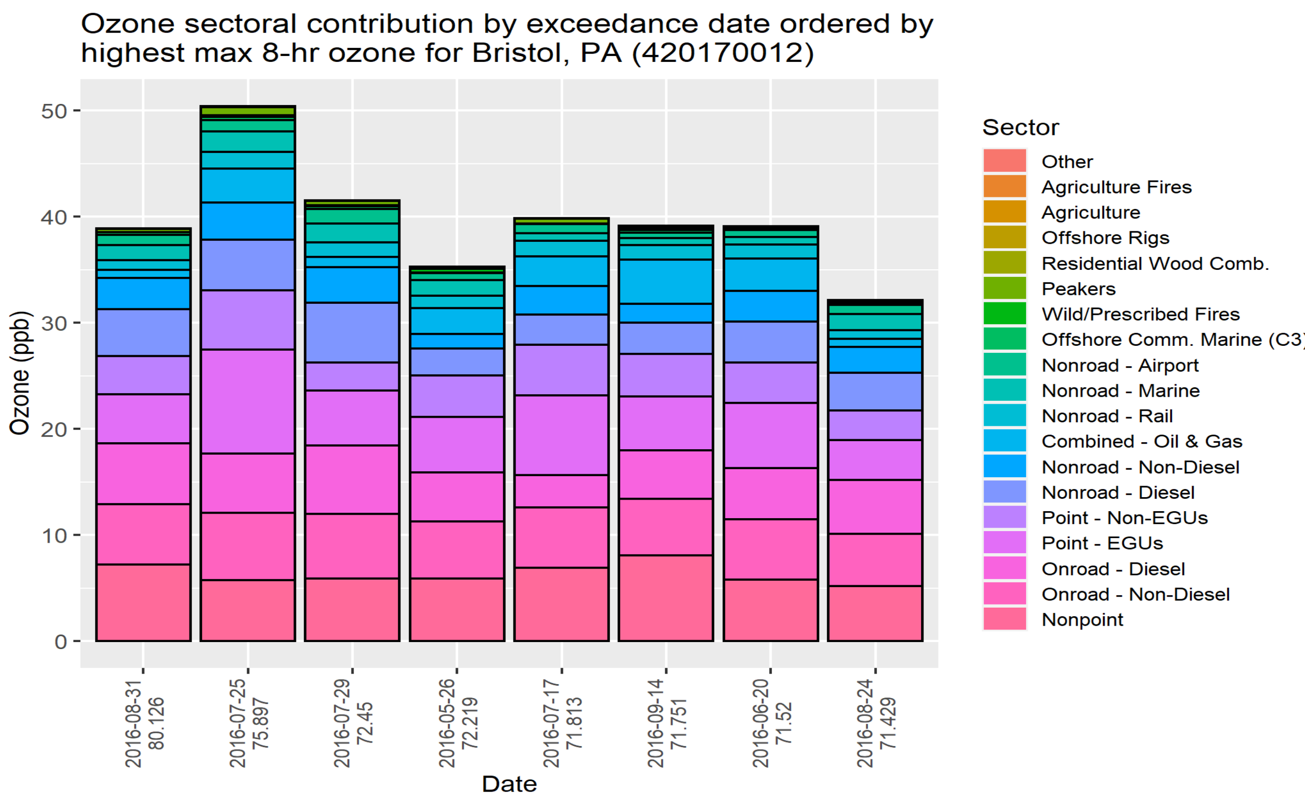


Figure H-9. Emission Sector Contribution on Modeled Ozone Exceedance Day at Bristol, PA.



Figures H-10 though H-18 examine the range of contribution for sectors on all exceedance days at the monitors of concern. Each sector is in order by the total contribution, only the eight most important sectors are displayed, and the contribution from international emissions and boundary conditions are excluded from display.

Figure H-10. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Greenwich, CT

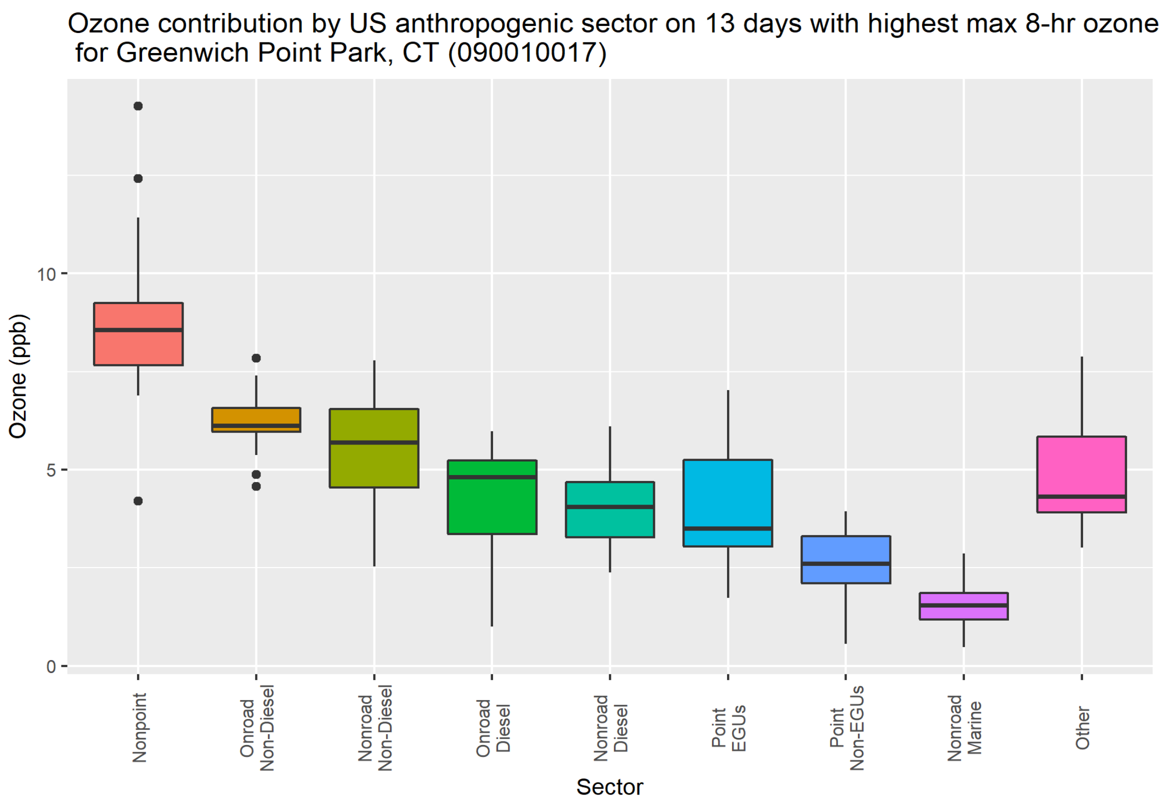


Figure H-11. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Stratford, CT

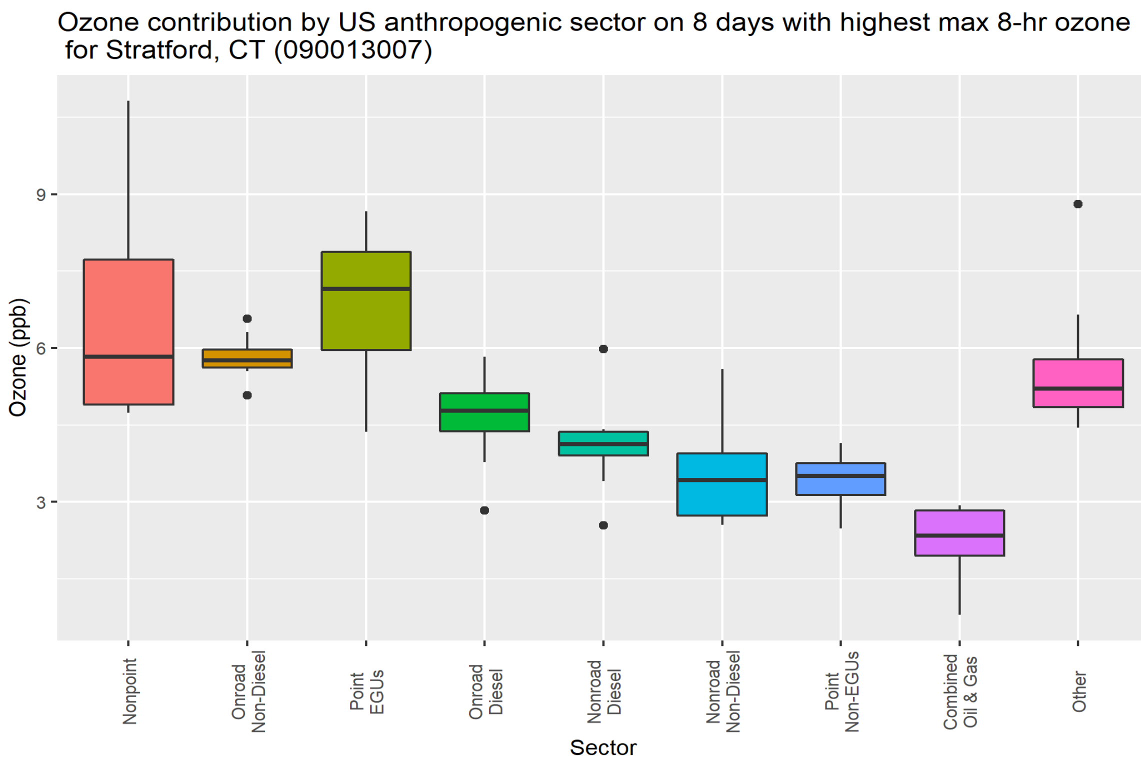


Figure H-11. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Westport, CT

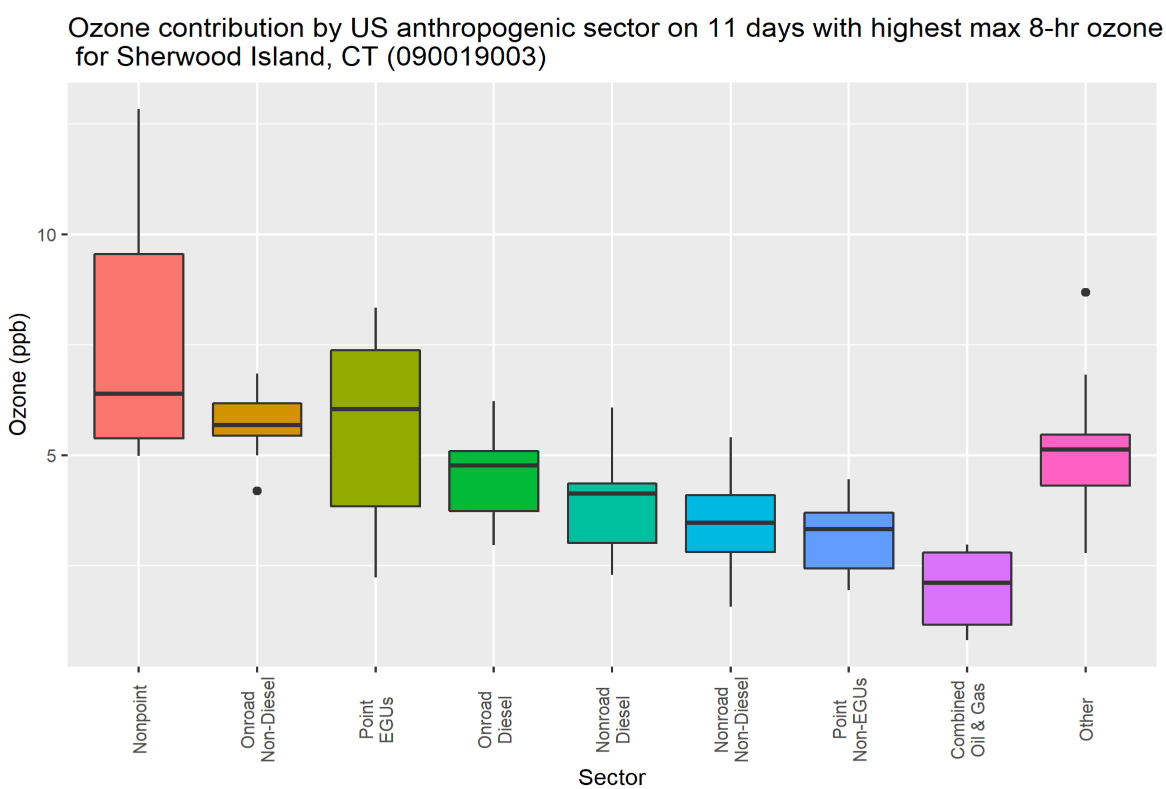


Figure H-13. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Madison, CT.

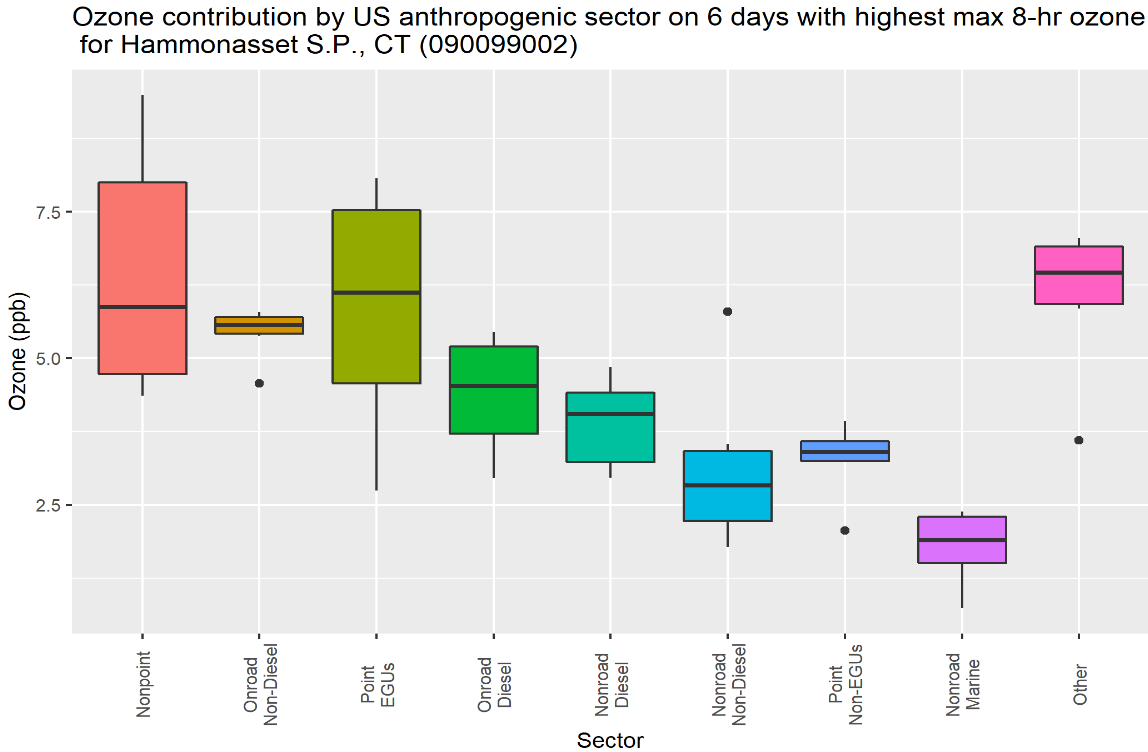


Figure H-14. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Groton, CT.

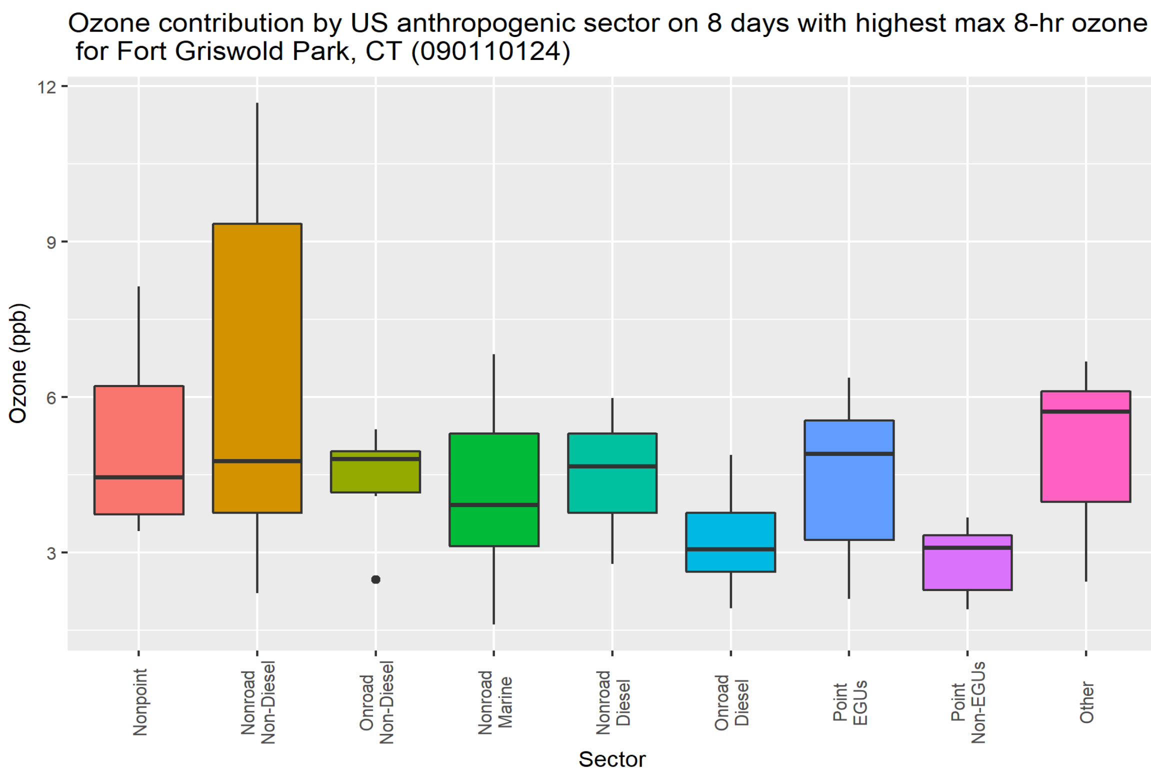


Figure H-15. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Susan Wagner H.S.

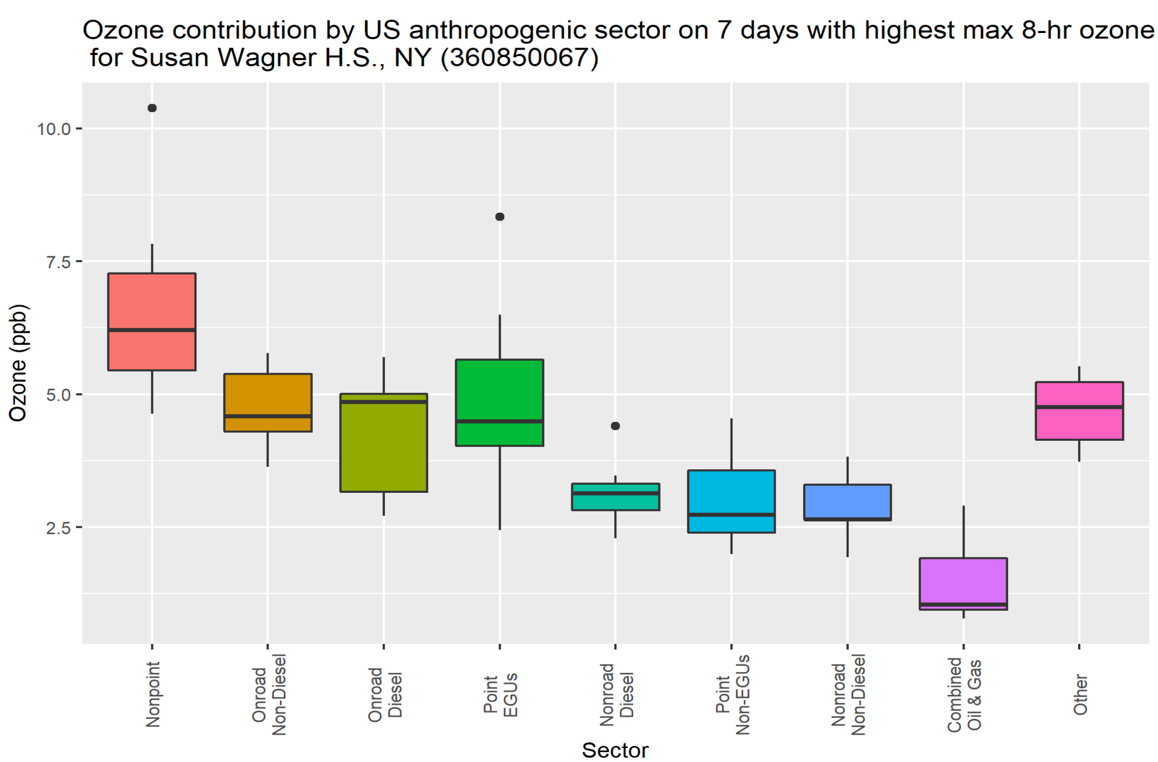


Figure H-16. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Babylon, NY.

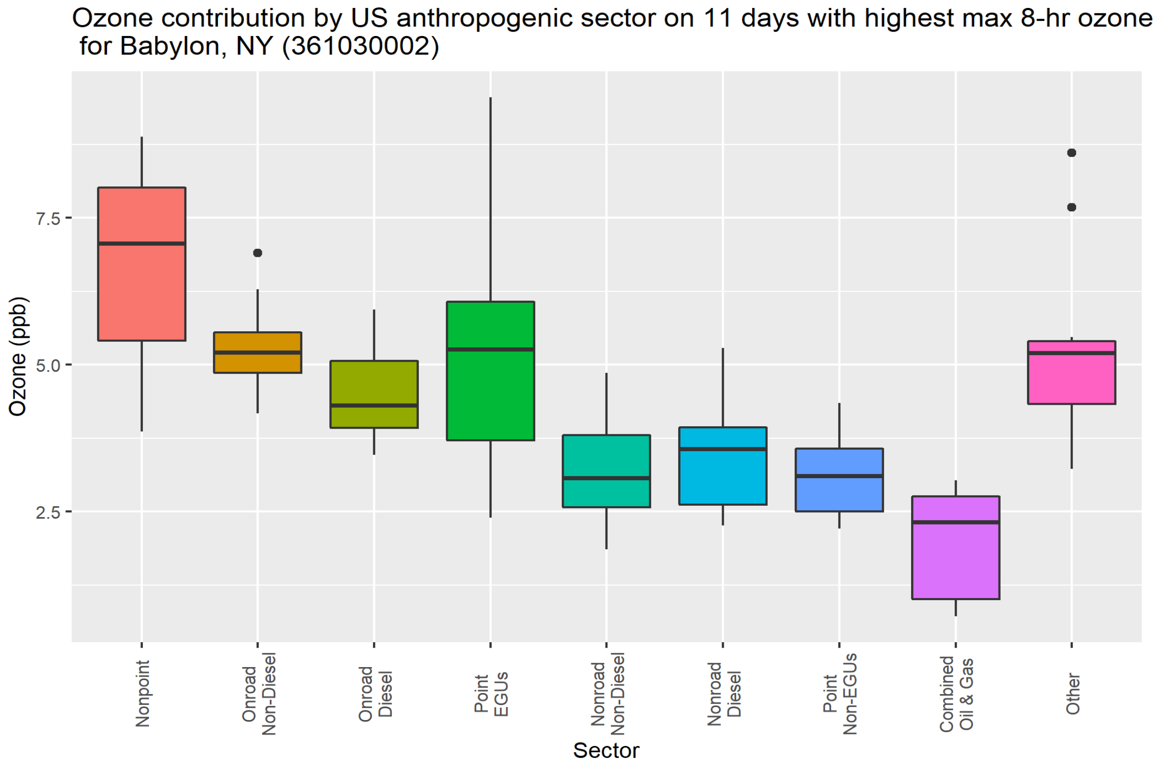


Figure H-17. Emission Sector Contribution on 13 Highest Modeled Ozone Days at White Plains, NY.

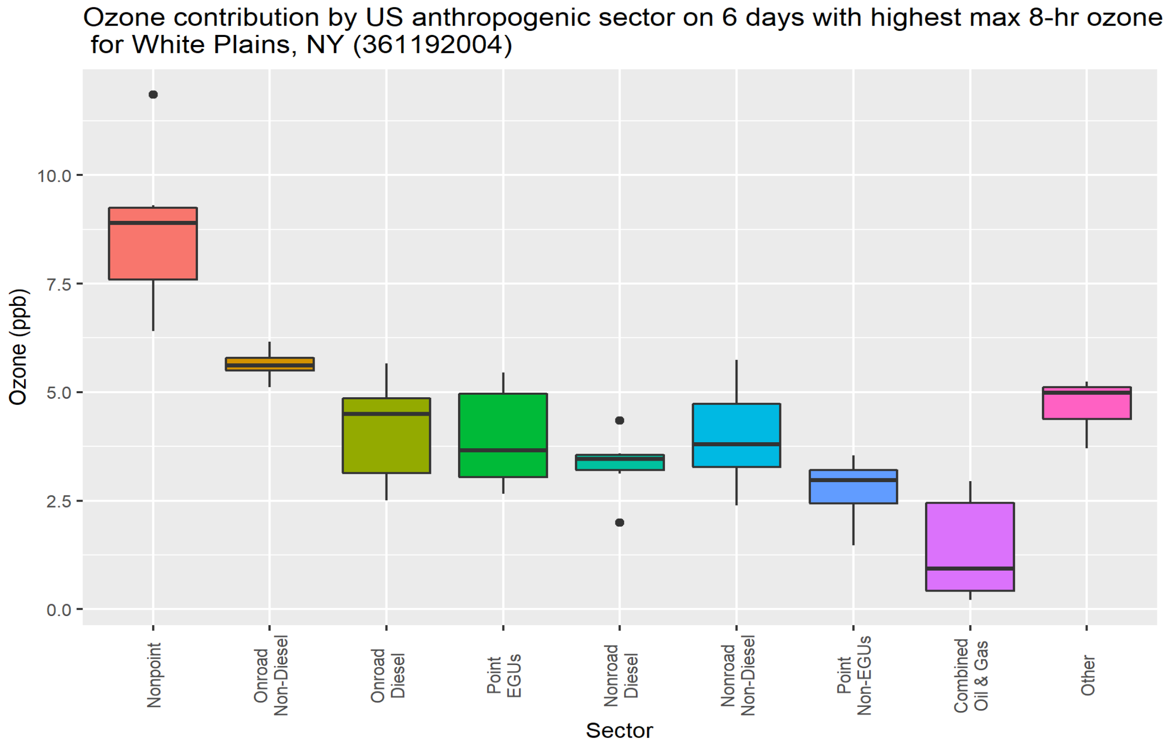
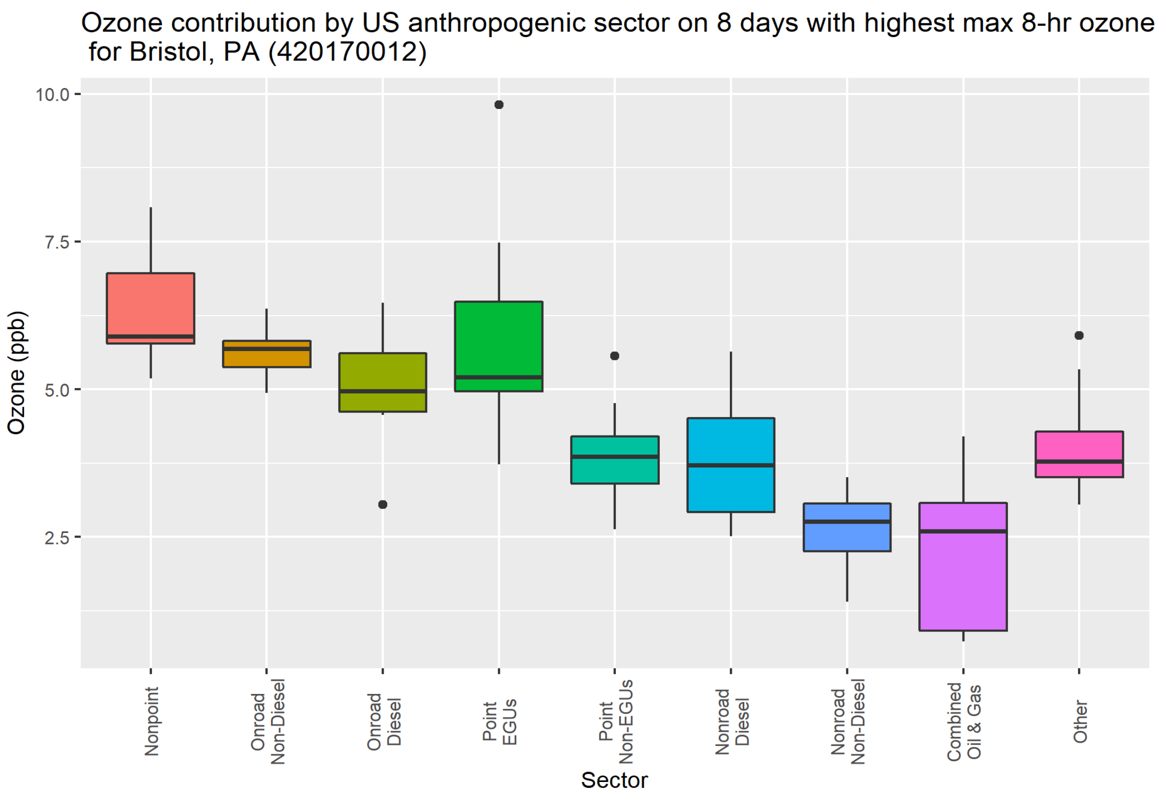


Figure H-17. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Bristol, PA.



State Analysis

The next section bases the analysis on contribution by state level summaries.

Figures H-19 though H-27 examine the range of contribution for each state on all exceedance days at the monitors of concern. Each state is in order by the total contribution and the contribution from international emissions and boundary conditions are not included. The black bar indicates the 1% threshold for contribution.

Figure H-19. State Contribution on 13 Highest Modeled Ozone Days at Greenwich, CT

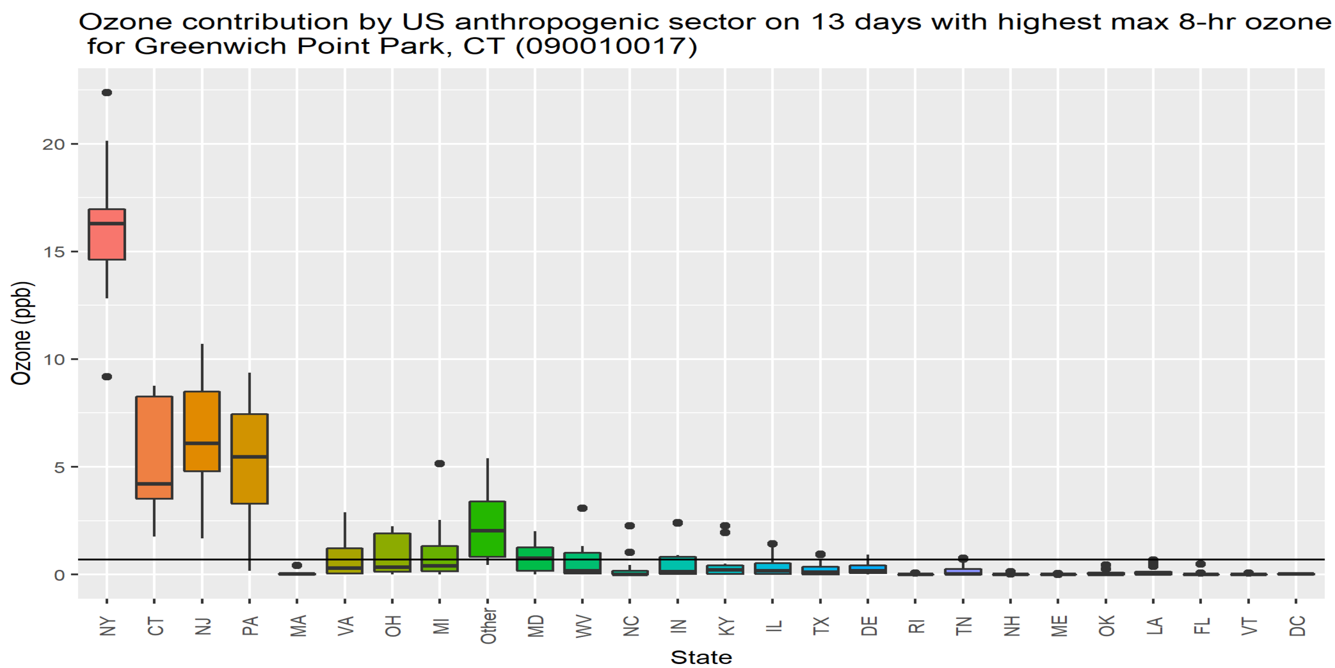


Figure H-20. State Contribution on 13 Highest Modeled Ozone Days at Stratford, CT

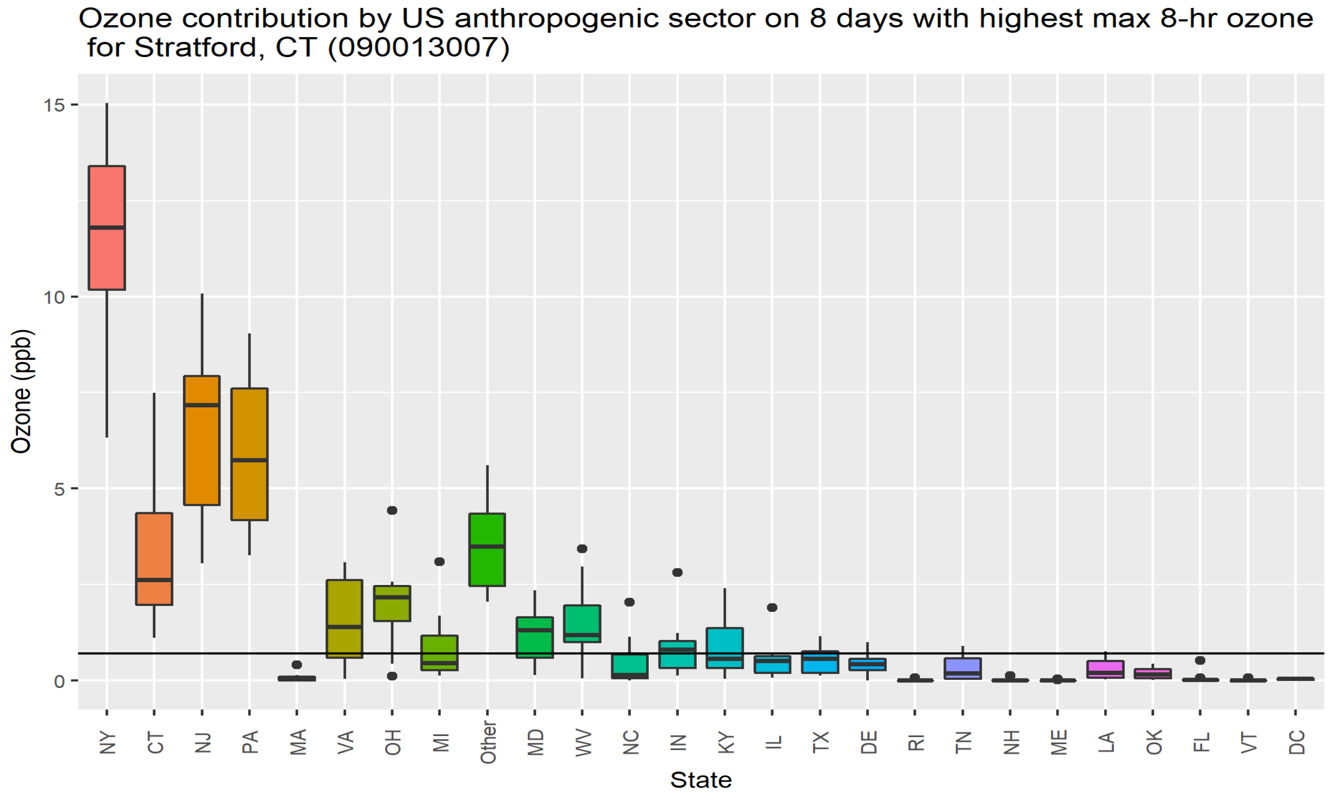


Figure H-20. State Contribution on 13 Highest Modeled Ozone Days at Westport, CT

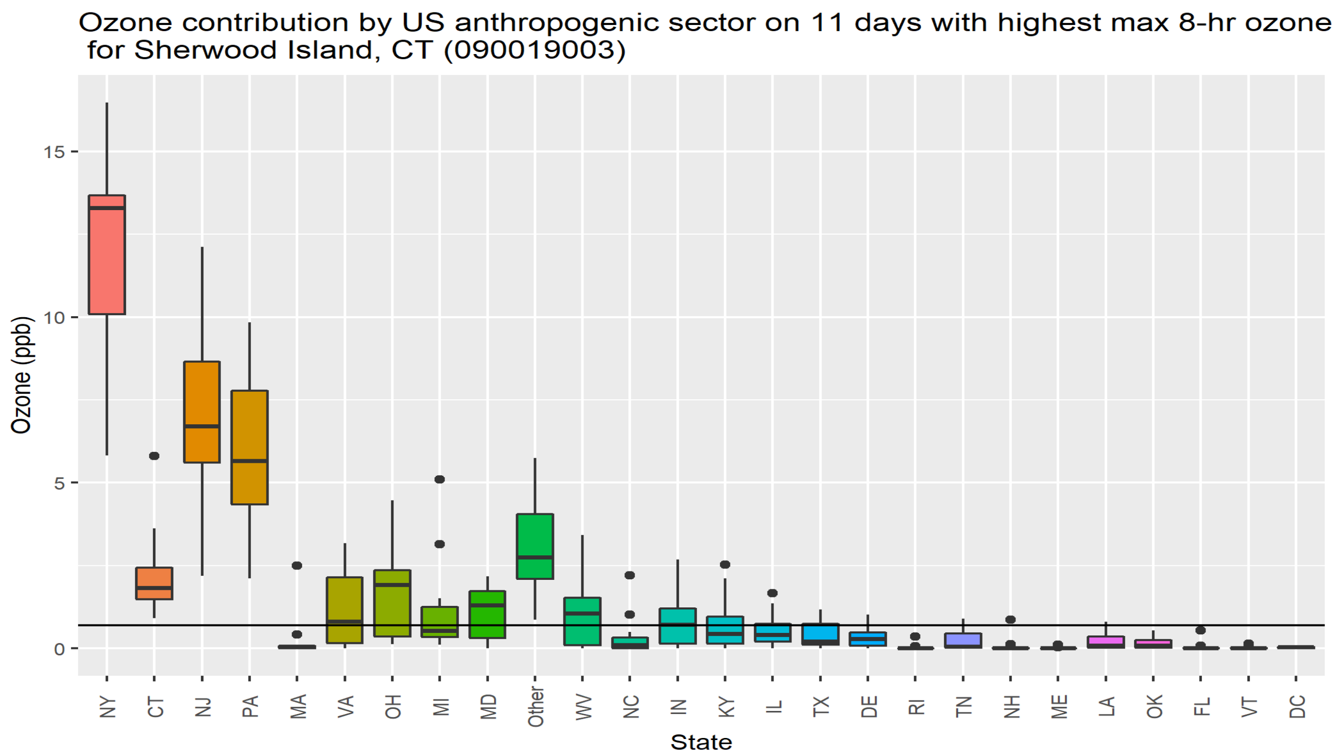


Figure H-22. State Contribution on 13 Highest Modeled Ozone Days at Madison, CT

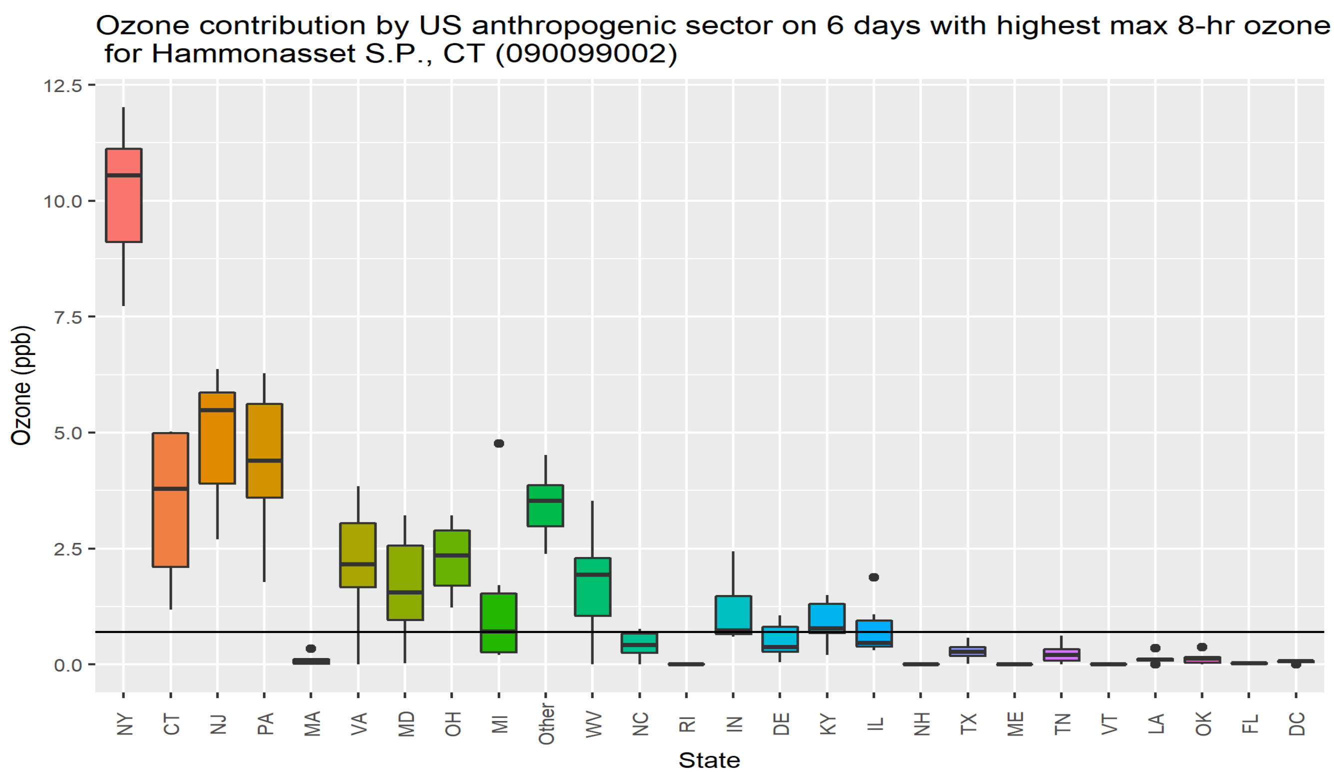


Figure H-23. State Contribution on 13 Highest Modeled Ozone Days at Groton, CT

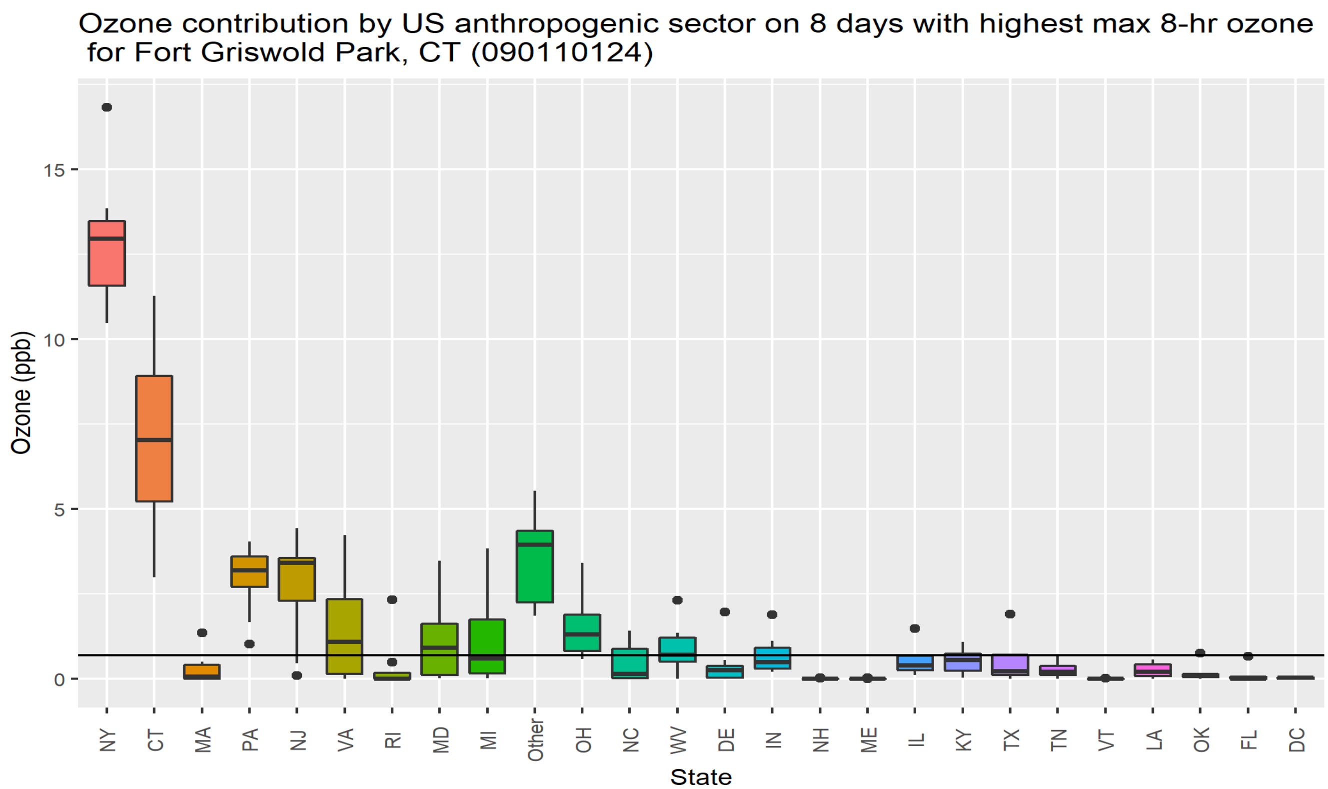

Ozone contribution by US anthropogenic sector on 8 days with highest max 8-hr ozone
for Fort Griswold Park, CT (090110124)
Ozone (ppb)
15
10
5
0
NY
CT
MA
PA
NJ
VA
RI
MD
MI
Other
OH
NC
WV
DE
IN
NH
ME
IL
KY
TX
TN
VT
LA
OK
FL
DC
State

Figure H-24. State Contribution on 13 Highest Modeled Ozone Days at Susan Wagner H.S.

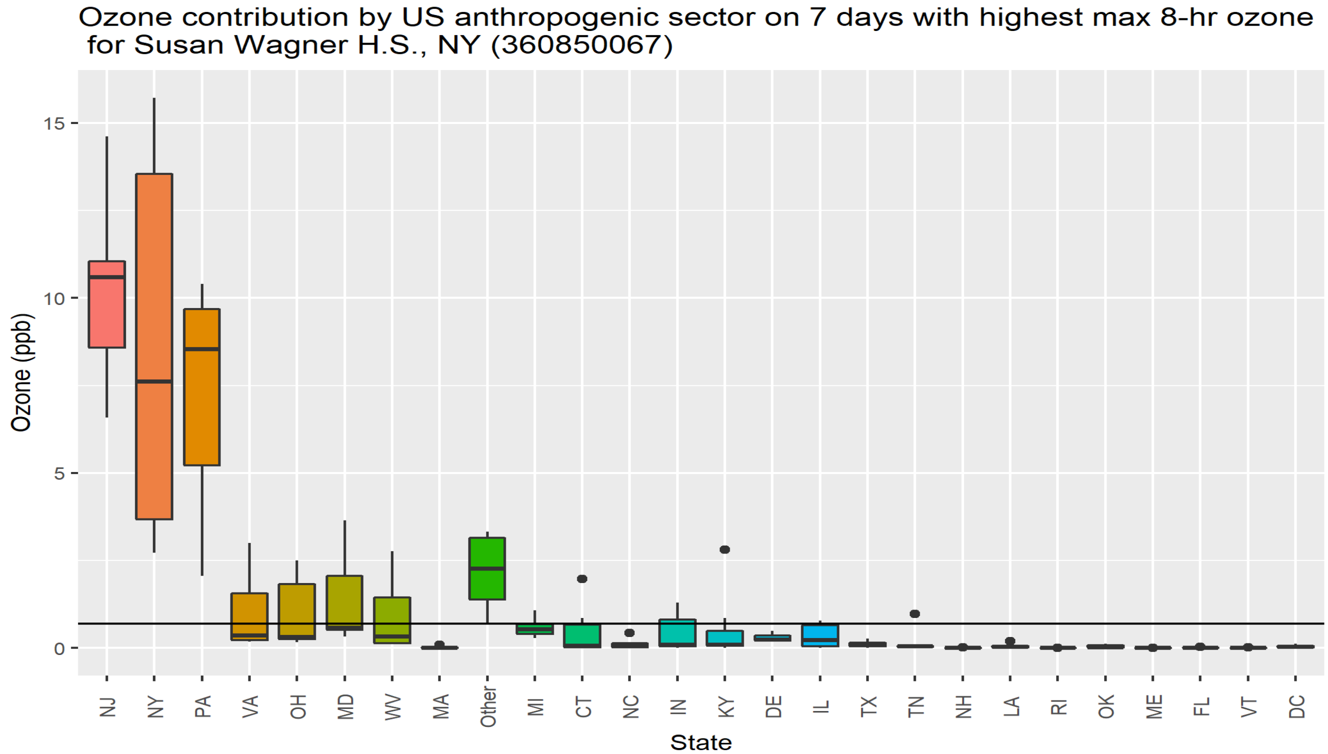
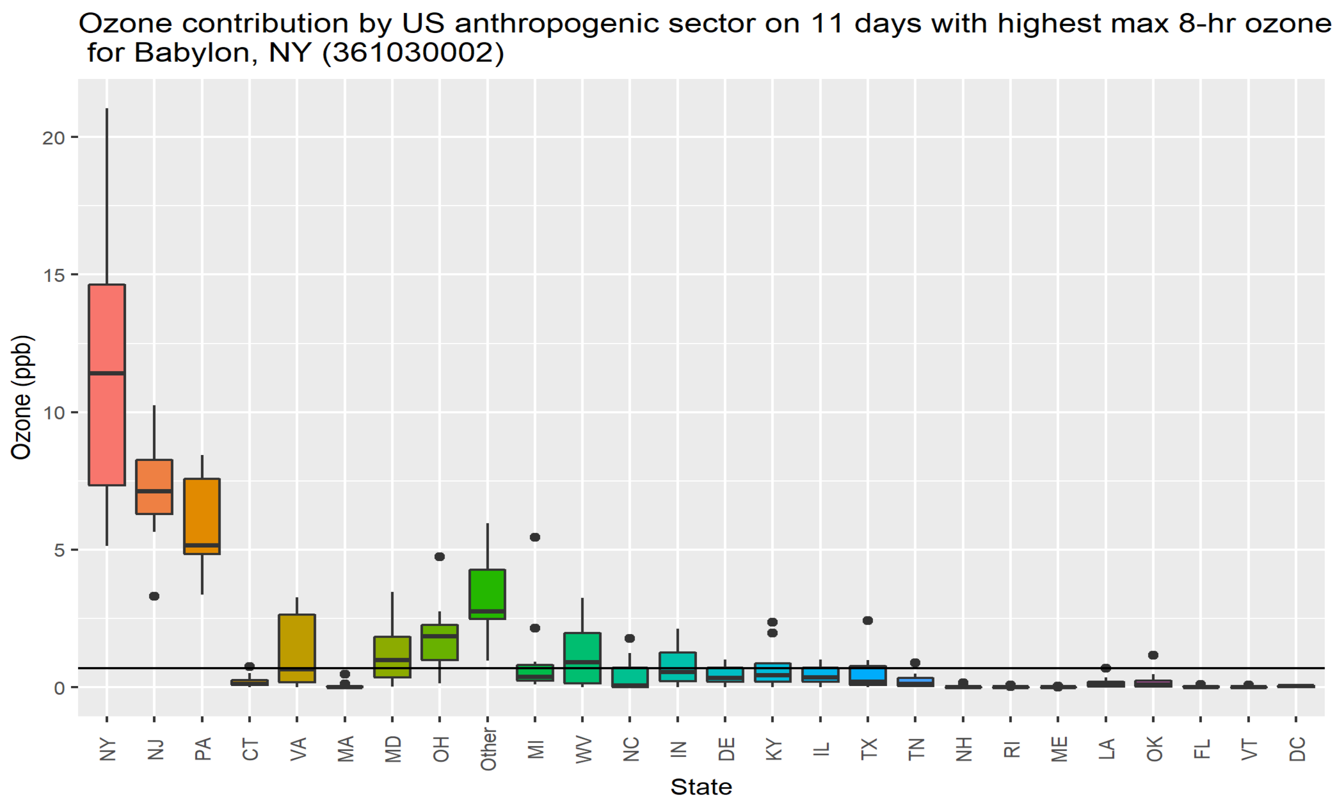
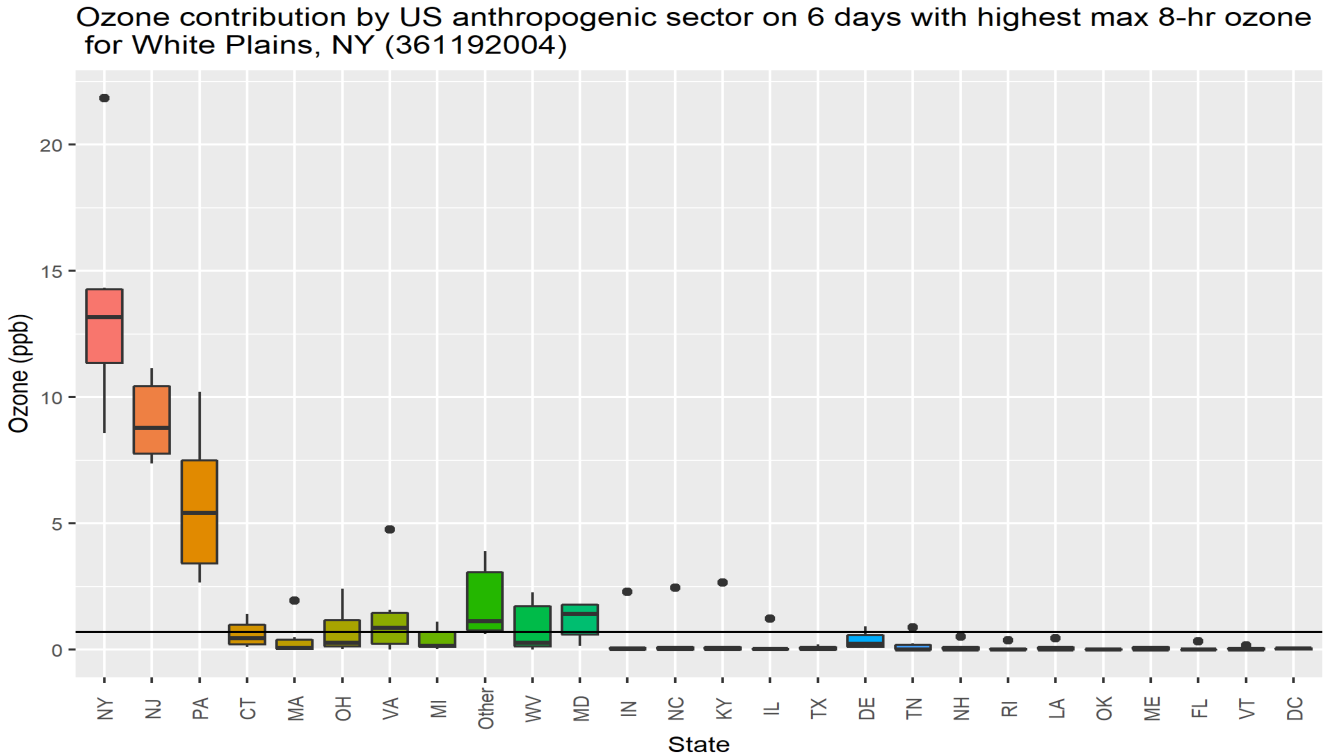


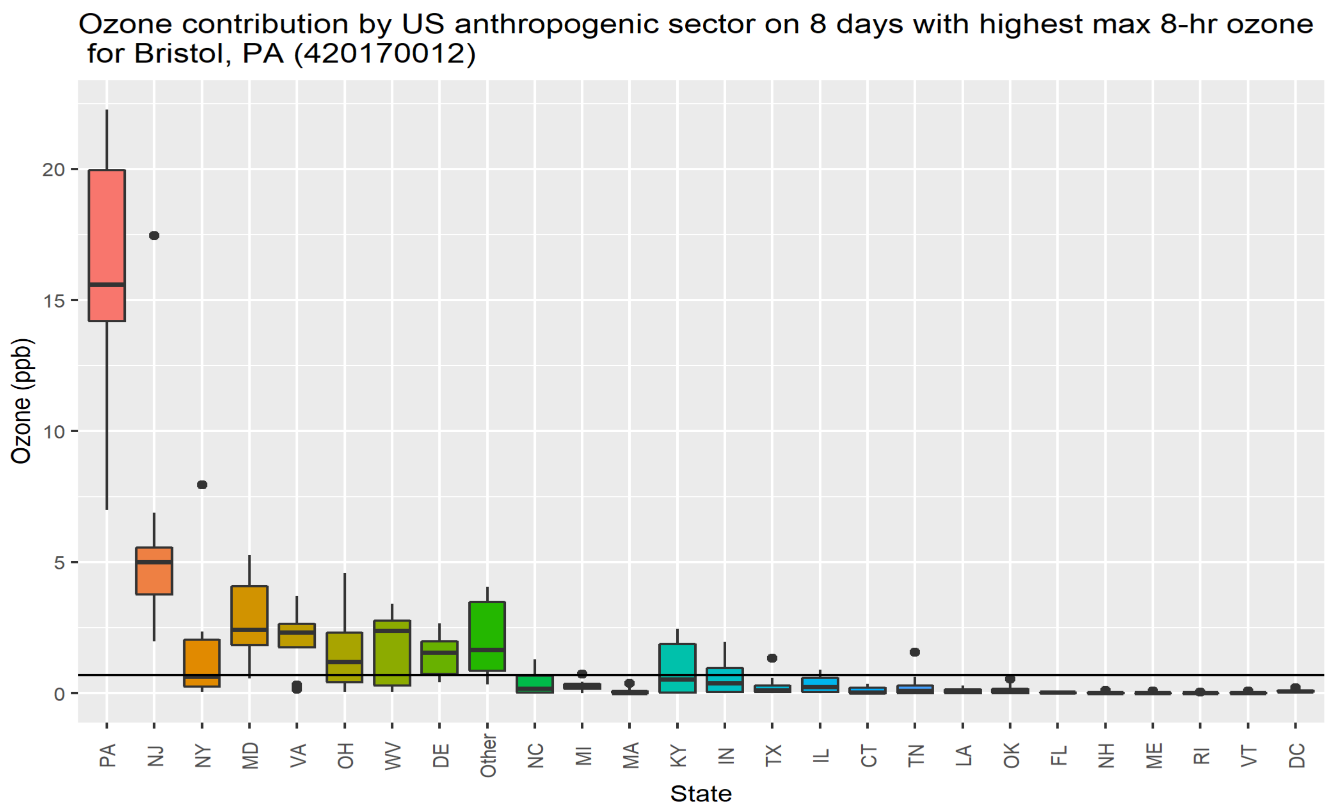
Figure H-25. State Contribution on 13 Highest Modeled Ozone Days at Babylon, NY.


Ozone contribution by US anthropogenic sector on 11 days with highest max 8-hr ozone for Babylon, NY (361030002)
Ozone (ppb)
20
15
10
5
0
NY
NJ
PA
CT
VA
MA
MD
OH
Other
MI
WV
NC
IN
DE
KY
IL
TX
TN
NH
RI
ME
LA
OK
FL
VT
DC
State

Figures H-26. State Contribution on 13 Highest Modeled Ozone Days at White Plains, NY



Figures H-27. State Contribution on 13 Highest Modeled Ozone Days at Bristol, PA



The states listed in **Tables H-1 though H-9** are projected to contribute at least 1% to each of the monitors of concern in 2023 and the top three source categories that make up that contribution.

When it comes to larger point sources, EGUs are often the top contributor and nearly always one of the top three contributors from states that are not adjacent to the state in which the monitor. Every instance of Indiana and Kentucky being a 1% contributor has EGUs as their top category. Most instances of Ohio being a top contributor also have EGU as the top contributor, though two instances have it being the second highest contributor. Unexpectedly EGUs are the third most important contributor from Michigan and Illinois in all cases. With West Virginia, EGUs are often the most important contributor, though for some monitors the Oil & Gas sector is the highest and EGUs second (West Virginia is the only state, in which Oil and Gas is consistently a top three contributor). When it comes to larger states in the OTR (Maryland, New York, Pennsylvania, and Virginia) EGUs often are a top three contributor, though in some instances they are not. In regards, to Non-EGUs they are often a top three contributor from states outside of the OTR (Indiana, Kentucky, Michigan, Ohio, West Virginia) as well as Pennsylvania.

As far as nonpoint stationary sources, they are more often a top three contributor from OTR states, in particular Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, and Virginia.

Mobile sources are also an important top three contributor. Onroad appears to be a top three contributors more often than nonroad, that non-diesel appears to be a top three contributor more often than diesel, and that mobile in general appears more often in states nearer to the monitor than in further away states.

Table H-1. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Greenwich Point Park, CT (090010017)

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Point - EGUs	Nonpoint	Onroad - Non-Diesel	Point - EGUs
2	Nonroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonpoint	Combined - Oil & Gas
3	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Point - Non-EGUs	Point - EGUs	Point - Non-EGUs

Table H-2. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Stratford, CT (090013007)

Rank	CT	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Point - EGUs	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Point - EGUs	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Combined - Oil & Gas
3	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Nonroad - Diesel	Point - EGUs	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table H-3. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Sherwood Island, CT (090019003)

Rank	CT	IN	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Combined - Oil & Gas
3	Nonroad - Non-Diesel	Point - Non-EGUs	Onroad - Non-Diesel	Point - EGUs	Nonroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Onroad - Diesel	Nonpoint	Point - Non-EGUs

Table H-4. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Hammonasset S.P., CT (090099002)

Rank	CT	IL	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonpoint	Nonroad - Diesel	Point - EGUs	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Combined - Oil & Gas
2	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Point - Non-EGUs	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Point - EGUs
3	Nonroad - Diesel	Point - EGUs	Point - Non-EGUs	Onroad - Non-Diesel	Onroad - Diesel	Point - EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Point - Non-EGUs

Table H-5. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Fort Griswold Park, CT (090110124)

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
1	Nonroad - Marine	Nonroad - Non-Diesel	Nonpoint	Nonpoint	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Nonroad - Non-Diesel	Point - EGUs	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonroad - Diesel	Point - EGUs	Nonpoint	Point - EGUs	Combined - Oil & Gas

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
3	Nonpoint	Onroad - Non-Diesel	Point - EGUs	Nonroad - Marine	Nonroad - Marine	Point - Non-EGUs	Point - Non-EGUs	Nonroad - Non-Diesel	Point - Non-EGUs

Table H-6. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Susan Wagner H.S., NY (360850067)

Rank	MD	MI	NJ	NY	OH	PA	VA	WV
1	Point – EGUs	Point - Non-EGUs	Nonpoint	Nonpoint	Point - EGUs	Point - EGUs	Onroad - Non-Diesel	Point - EGUs
2	Onroad – Diesel	Combined - Oil & Gas	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Onroad - Diesel	Combined - Oil & Gas
3	Onroad - Non-Diesel	Point - EGUs	Onroad - Diesel	Nonroad - Non-Diesel	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table H-7. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Babylon, NY (361030002)

Rank	IN	MD	MI	NJ	NY	OH	PA	VA	WV
1	Point - EGUs	Point - EGUs	Nonpoint	Nonpoint	Nonpoint	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Combined - Oil & Gas
2	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Point - EGUs	Point - EGUs	Point - EGUs
3	Onroad - Non-Diesel	Onroad - Non-Diesel	Point – EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs	Point - Non-EGUs	Nonpoint	Point - Non-EGUs

Table H-8. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at White Plains, NY (361192004)

Rank	CT	MA	MD	NJ	NY	PA	VA
1	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Nonpoint	Nonpoint	Nonpoint	Onroad - Non-Diesel
2	Nonpoint	Nonroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonpoint
3	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Nonroad - Non-Diesel	Nonroad - Non-Diesel	Point - Non-EGUs	Onroad - Diesel

Table H-9. Top 3 Sectors for Each State Which Contributes 1% to Exceedances at Bristol, PA (420170012)

Rank	DE	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
1	Onroad - Non-Diesel	Point - EGUs	Point - EGUs	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Nonpoint	Point - EGUs	Nonpoint	Onroad - Non-Diesel	Point - EGUs
2	Point - EGUs	Onroad - Non-Diesel	Point - Non-EGUs	Point - EGUs	Onroad - Non-Diesel	Onroad - Diesel	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGUs	Combined - Oil & Gas

Rank	DE	IN	KY	MD	MI	NJ	NY	OH	PA	VA	WV
3	Point - Non-EGUs	Point - Non-EGUs	Onroad - Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Nonroad - Diesel	Onroad - Non-Diesel	Point - Non-EGUs	Onroad - Diesel	Onroad - Diesel	Point - Non-EGUs

Another way to examine which sectors from which states are projected to contribute to nonattainment in 2023 is to look individually at each exceedance day. **Figures H-28 though H-36** shows which sector is projected to impact nonattainment the most on a day that was projected to exceed the 1% threshold. It should be noted that these charts do include all modeled states even if they did not contribute on any exceedance days and states that did not contribute to enough exceedances to warrant a linkage in the next section.

Figure H-28. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Greenwich

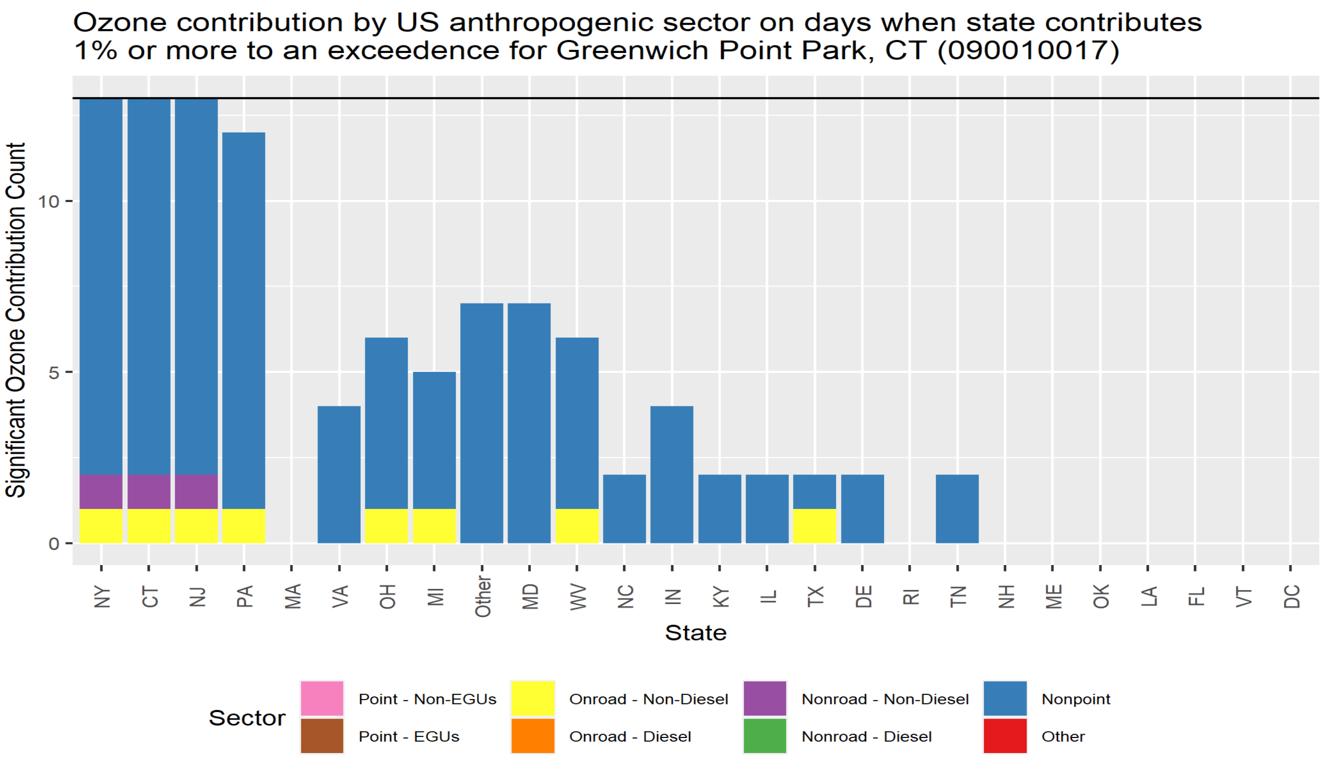


Figure H-29. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Stratford, CT.

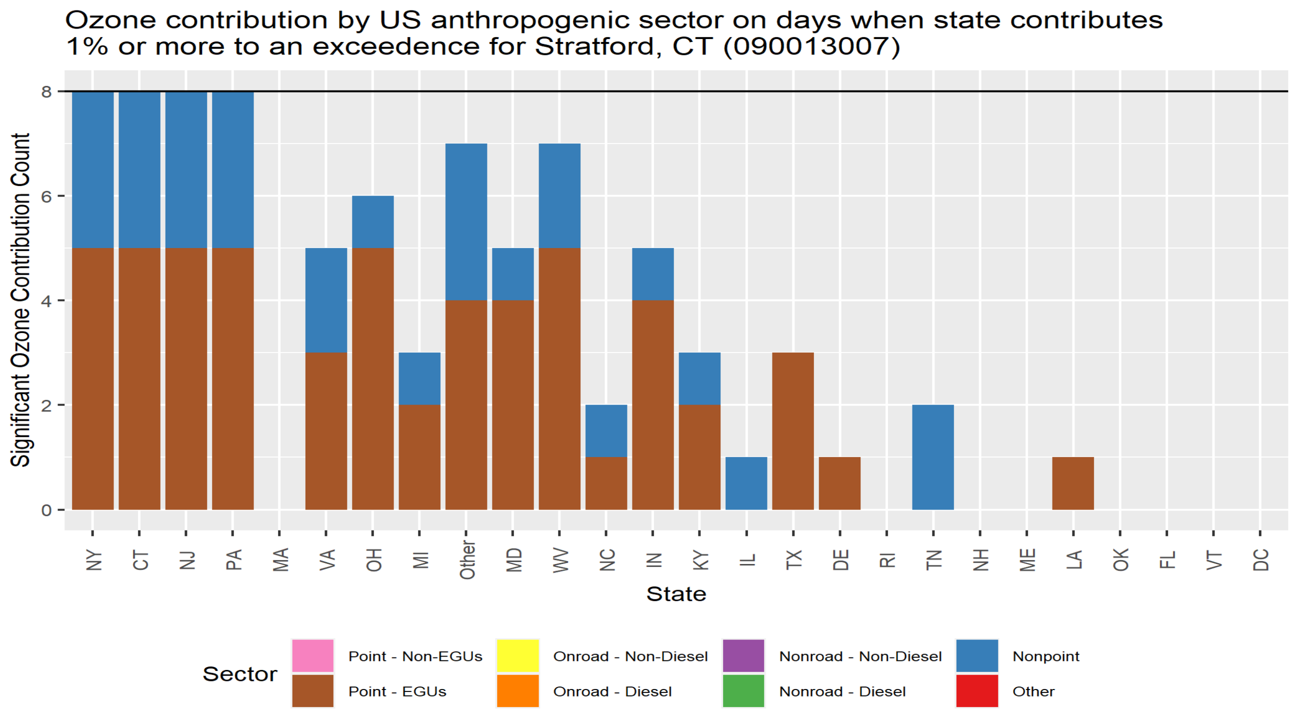


Figure H-30. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Westport, CT.

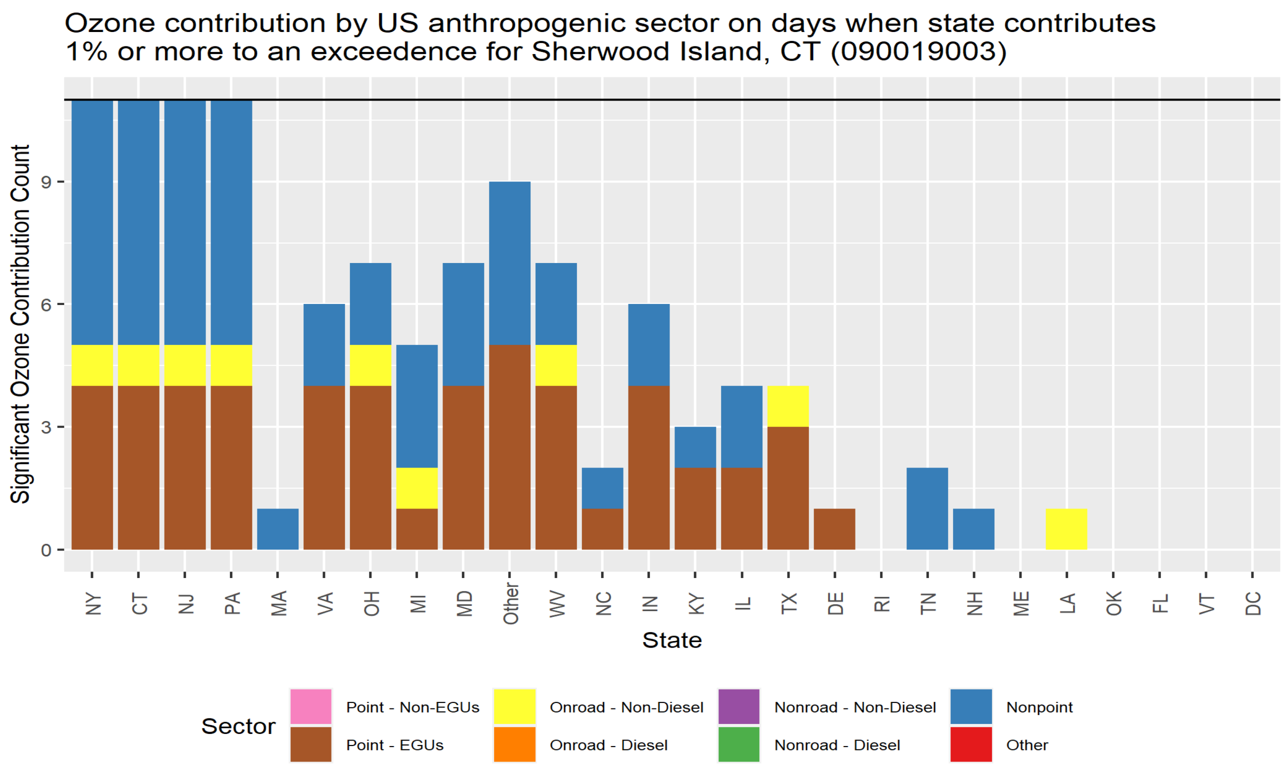


Figure H-31. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Madison, CT

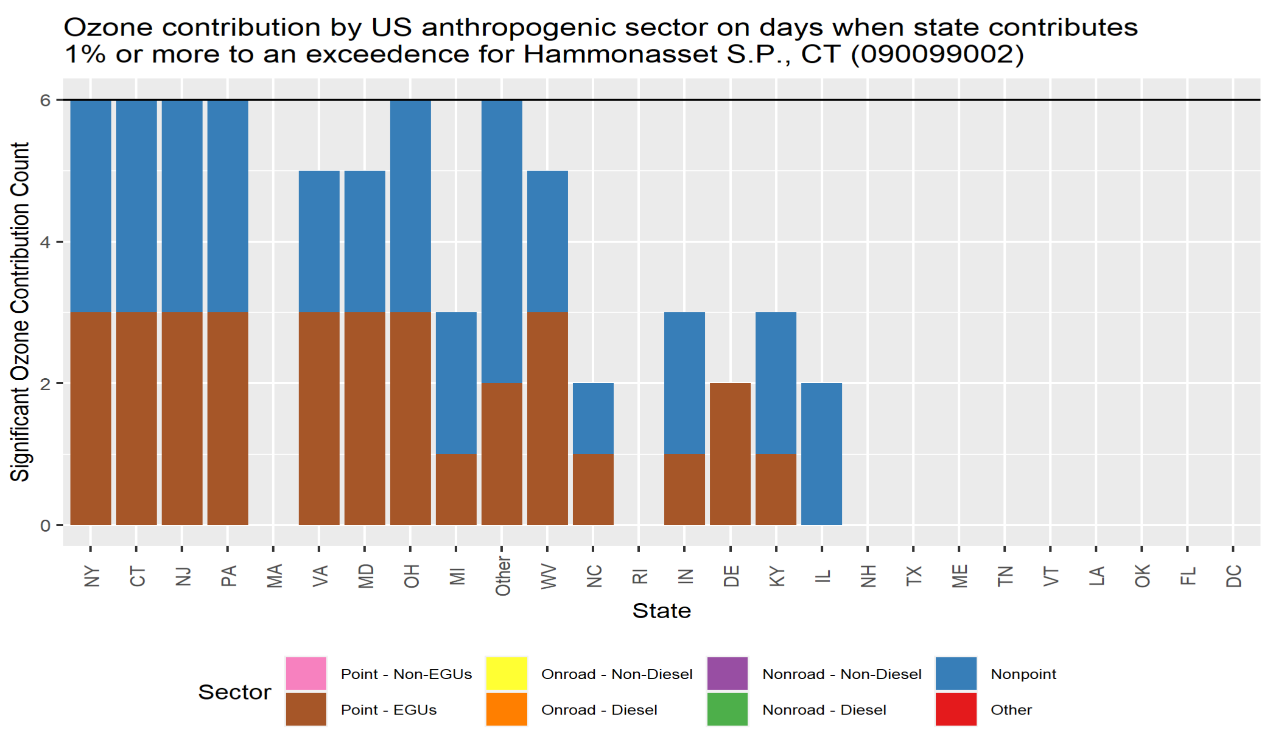


Figure H-32. Anthropogenic Emission Sector Contribution for States with >1% contribution of the

Ozone NAAQS at Groton, CT.

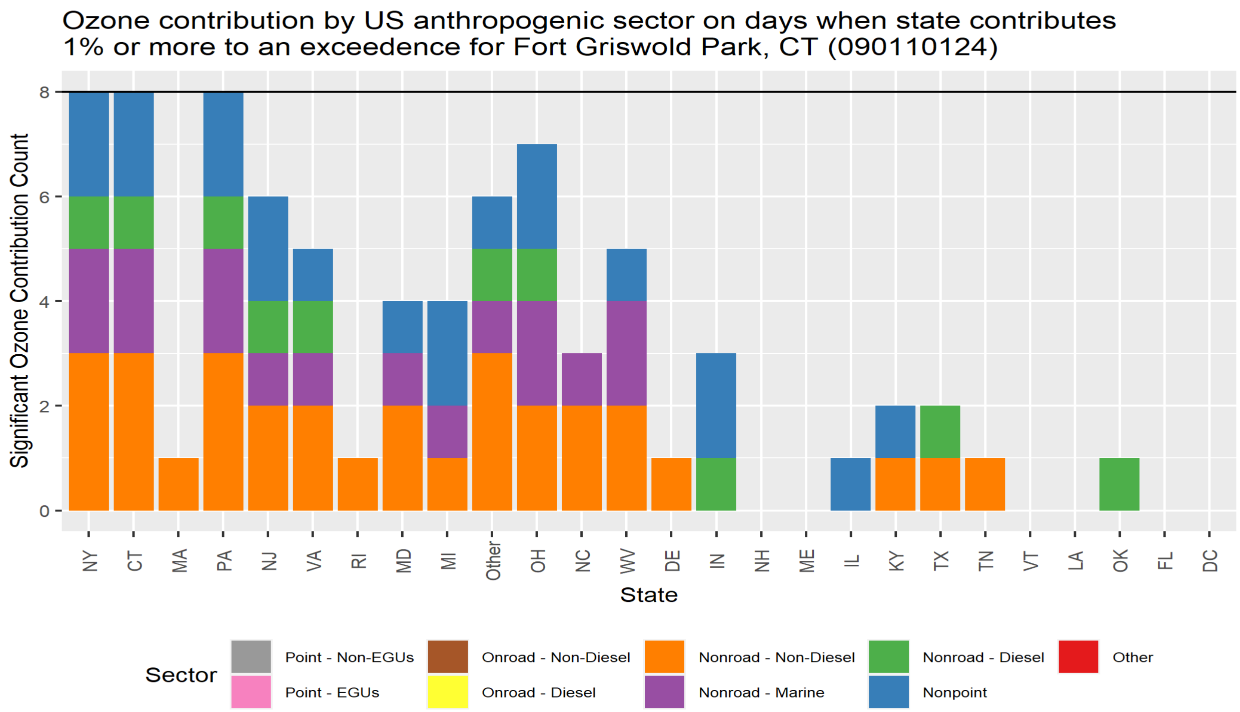


Figure H-34. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Susan Wagner H.S.

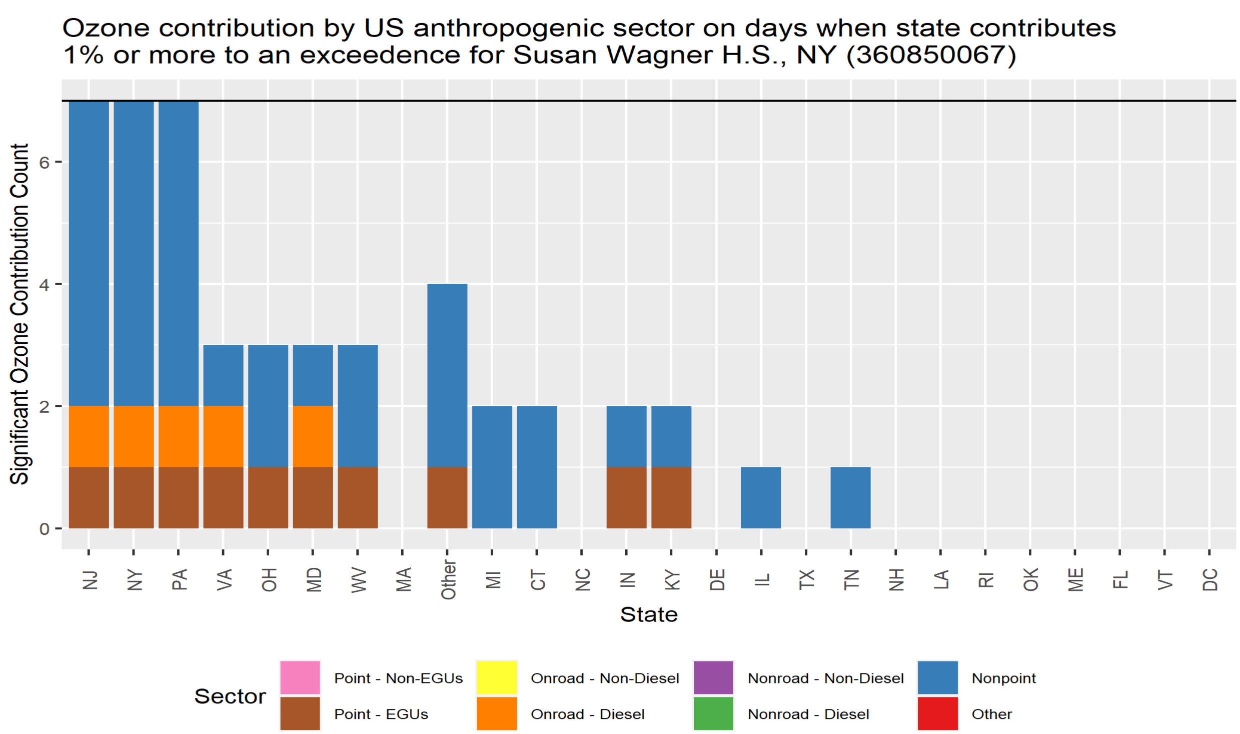


Figure H-35. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Babylon, NY.

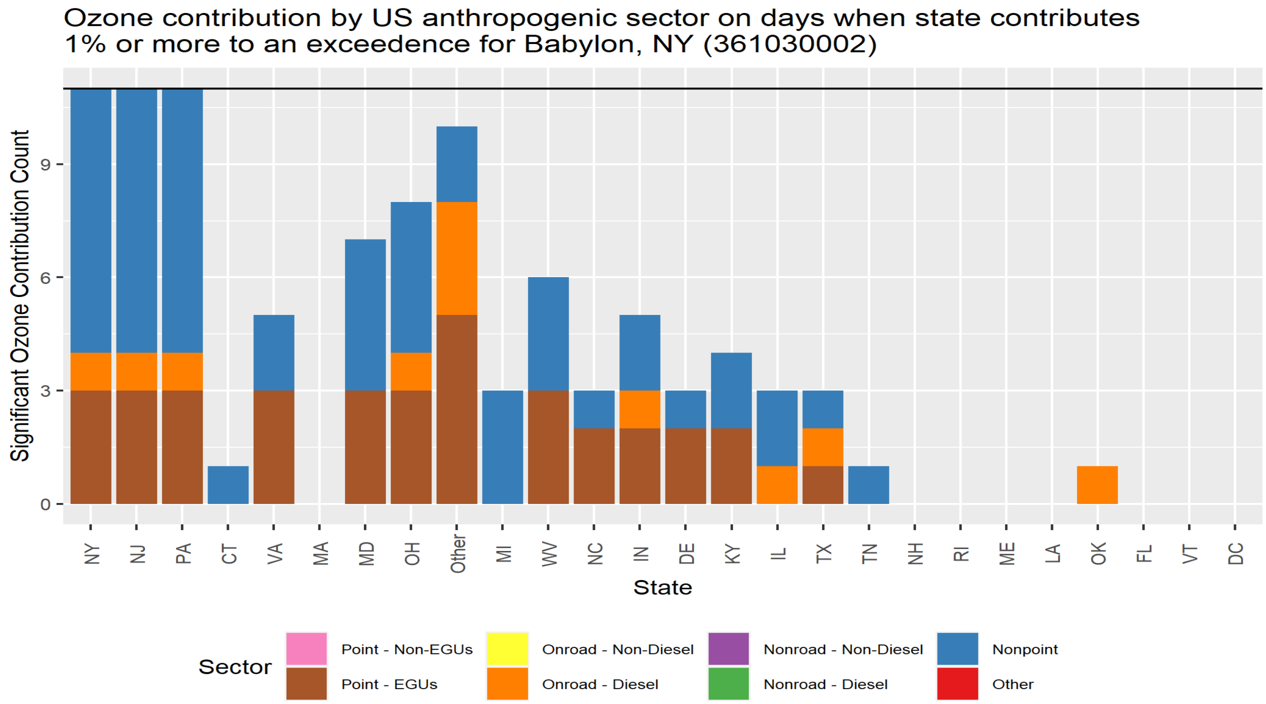


Figure H-36. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at White Plains, NY

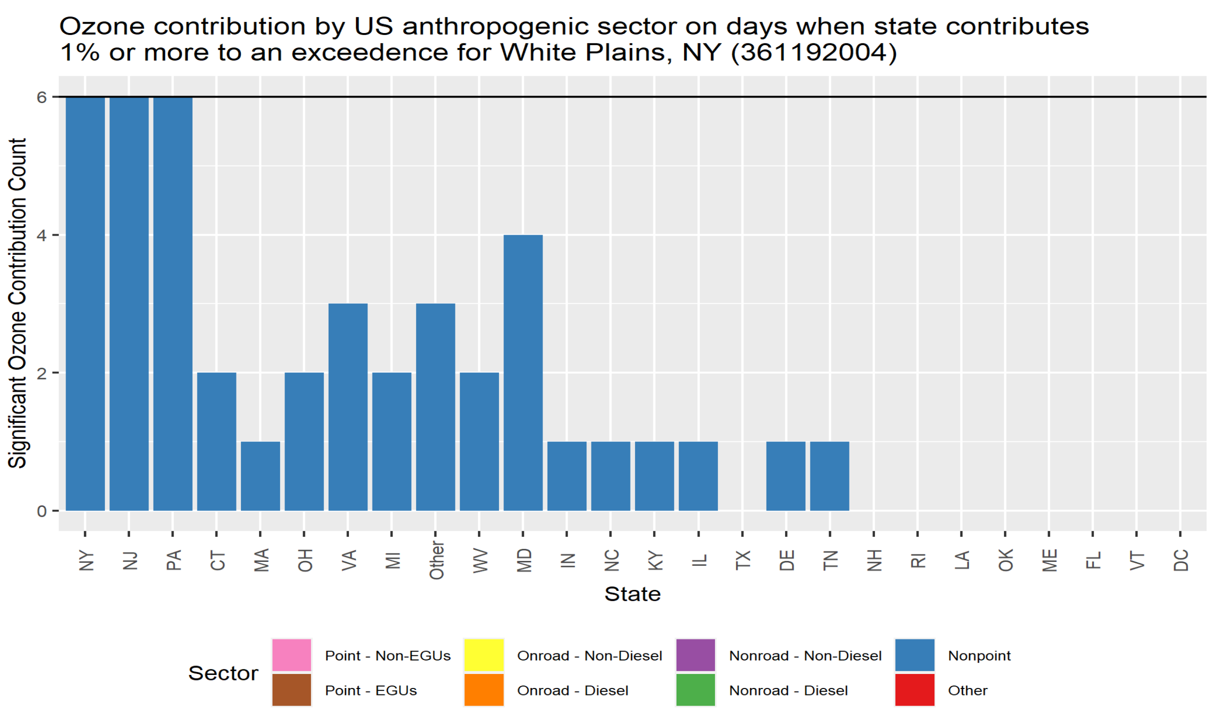
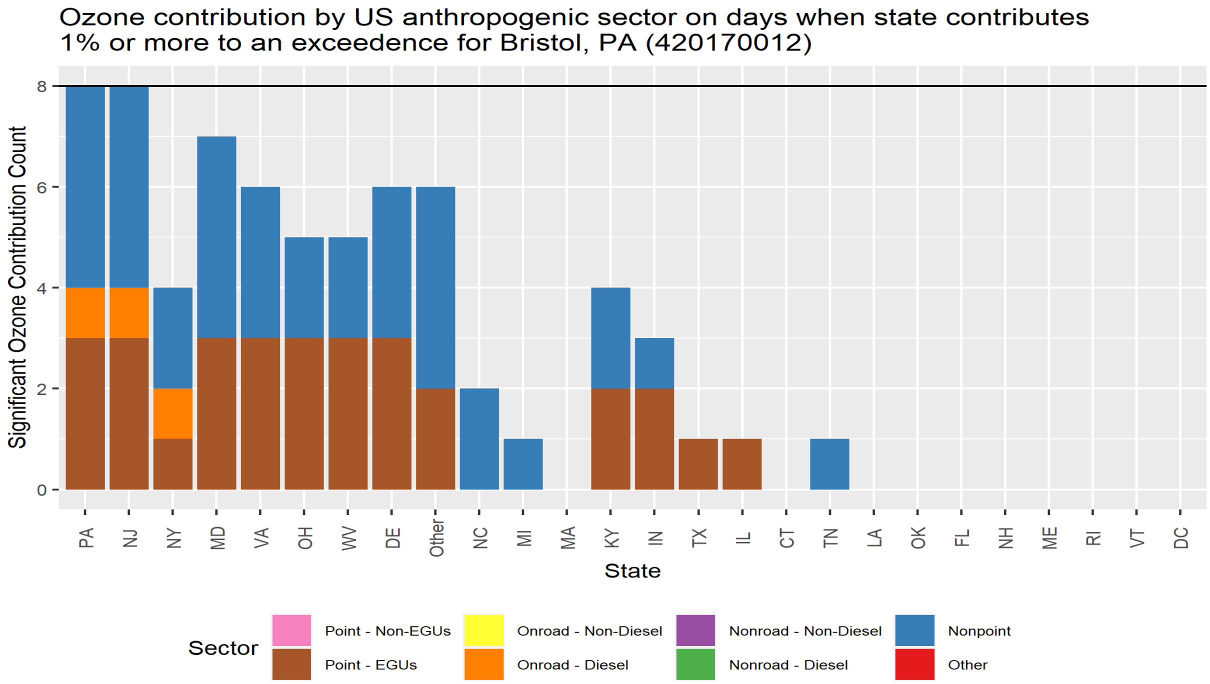


Figure H-37. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Bristol, NY



Additional Modeling Detail for Select Monitors

		CT: Greenwich Point Park (090010017)				CT: Stratford (090013007)				CT: Sherwood Island (090019003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	Sub Sector	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
EGUs	EGUs	4.2	5.2 %	5.2	5.7 %	6.8	8.7 %	7.4	9 %	5.3	6.8 %	6.5	7.8 %
EGUs	Peakers	0.5	0.6 %	0.5	0.6 %	0.6	0.7 %	0.6	0.7 %	0.5	0.7 %	0.5	0.6 %
Non-EGUs	Non-EGUs	2.7	3.3 %	3.2	3.6 %	3.4	4.4 %	3.6	4.4 %	3.1	4 %	3.6	4.2 %
Nonpoint	Nonpoint	8.7	10.7 %	10.5	11.6 %	6.7	8.6 %	6.6	8.1 %	7.4	9.5 %	7.8	9.3 %
Nonpoint	RWC	0	0 %	0	0.1 %	0	0 %	0	0 %	0	0 %	0	0 %
Onroad	Diesel	4.2	5.2 %	5.3	5.9 %	4.6	5.9 %	5	6.1 %	4.6	5.9 %	5.3	6.3 %
Onroad	Non-Diesel	6.1	7.5 %	7.1	7.9 %	5.8	7.5 %	5.9	7.3 %	5.7	7.3 %	6	7.2 %
Nonroad	Airport	0.9	1.1 %	1.1	1.3 %	1.1	1.4 %	1.1	1.3 %	1	1.3 %	1.2	1.4 %
Nonroad	Diesel	4	4.9 %	4.9	5.4 %	4.1	5.3 %	4.5	5.5 %	3.8	4.9 %	4.5	5.3 %
Nonroad	Marine	1.5	1.8 %	1.9	2.1 %	1.6	2 %	1.6	2 %	1.3	1.7 %	1.6	1.9 %
Nonroad	Marine Offshore C3	0.4	0.5 %	0.6	0.7 %	0.6	0.8 %	0.5	0.6 %	0.5	0.6 %	0.7	0.8 %
Nonroad	Non-Diesel	5.1	6.3 %	5.8	6.4 %	3.6	4.6 %	3.8	4.6 %	3.5	4.5 %	3.9	4.6 %
Nonroad	Rail	1.3	1.6 %	1.5	1.7 %	1.6	2 %	1.7	2 %	1.4	1.8 %	1.5	1.8 %
Oil & Gas	Combined - Oil & Gas	1.6	2 %	2	2.2 %	2.2	2.8 %	2.6	3.2 %	1.9	2.4 %	2.2	2.6 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
International	Canada	1.9	2.4 %	2.8	3.1 %	1.8	2.3 %	2.8	3.5 %	2	2.6 %	1	1.1 %
International	Mexico	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
Biogenic	Biogenic	13.9	17.1 %	16.5	18.3 %	10.6	13.6 %	11.7	14.3 %	10.3	13.2 %	12.9	15.4 %
BC/IC	Boundary	24	29.5 %	20.7	23 %	22.5	28.9 %	21.8	26.8 %	25.1	32.3 %	24.3	28.9 %
BC/IC	Initial	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Other	Other	0.3	0.4 %	0.3	0.4 %	0.2	0.3 %	0.3	0.3 %	0.3	0.3 %	0.3	0.4 %

		CT: Hammonasset S.P. (090099002)				CT: Fort Griswold Park (090110124)				DE: Bellevue S.P. (100031013)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	Sub Sector	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
EGUs	EGUs	5.9	7.7 %	5	6.5 %	4.4	6 %	3.4	4.5 %	10.1	13.9 %	7	10 %
EGUs	Peakers	0.5	0.6 %	0.4	0.5 %	0.4	0.5 %	0.3	0.4 %	1.2	1.6 %	0.7	1 %
Non-EGUs	Non-EGUs	3.3	4.3 %	3.2	4.1 %	2.9	3.9 %	2.3	3.1 %	4.8	6.6 %	3.9	5.6 %
Nonpoint	Nonpoint	6.4	8.5 %	7.4	9.5 %	5.2	7 %	4.8	6.4 %	3.1	4.3 %	4.1	5.7 %
Nonpoint	RWC	0	0 %	0	0.1 %	0	0.1 %	0.1	0.1 %	0	0 %	0	0 %
Onroad	Diesel	4.4	5.8 %	4.5	5.8 %	3.3	4.4 %	2.9	3.9 %	6	8.2 %	4.6	6.6 %
Onroad	Non-Diesel	5.4	7.2 %	5.4	7 %	4.5	6.1 %	4.1	5.4 %	6.2	8.6 %	5.2	7.3 %
Nonroad	Airport	0.9	1.1 %	0.7	1 %	0.6	0.8 %	0.4	0.6 %	0.9	1.2 %	0.7	1 %
Nonroad	Diesel	3.9	5.1 %	3.5	4.5 %	4.5	6.1 %	4	5.3 %	4.2	5.7 %	3.4	4.8 %
Nonroad	Marine	1.8	2.4 %	1.6	2 %	4.2	5.6 %	4.4	5.9 %	1.7	2.3 %	1.4	2 %

Nonroad	Marine Offshore C3	0.8	1 %	0.6	0.7 %	0.8	1.1 %	0.6	0.8 %	0.1	0.2 %	0.1	0.1 %
Nonroad	Non-Diesel	3.1	4.1 %	2.5	3.2 %	6.2	8.4 %	5.7	7.7 %	2.6	3.5 %	2.3	3.3 %
Nonroad	Rail	1.5	2 %	1.5	1.9 %	1.5	2 %	1.2	1.5 %	1.7	2.4 %	1.3	1.9 %
Oil & Gas	Combined - Oil & Gas	2.1	2.8 %	2.2	2.8 %	1.6	2.2 %	1.3	1.8 %	3.6	5 %	2.2	3.1 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
International	Canada	1.5	2 %	1.9	2.5 %	2.4	3.2 %	4.2	5.7 %	0.4	0.5 %	1.2	1.7 %
International	Mexico	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0	0 %	0.1	0.2 %	0.1	0.1 %
Biogenic	Biogenic	9.6	12.6 %	10.3	13.3 %	13.4	18.1 %	12.5	16.7 %	8.4	11.6 %	8.9	12.6 %
BC/IC	Boundary	24.5	32.3 %	26.4	34 %	17.8	24.1 %	22.4	30 %	17.4	23.9 %	23.3	33 %
BC/IC	Initial	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Other	Other	0.3	0.4 %	0.4	0.5 %	0.2	0.3 %	0.2	0.3 %	0.2	0.3 %	0.2	0.2 %

		DC: McMillan Reservoir (110010043)				ME: Cadillac Mountain (230090102)				MD: Fair Hill (240150003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	**Sub Sector**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
EGUs	EGUs	5.2	7.3 %	4.6	6.4 %	NA	NA %	4.2	7.7 %	8	11.3 %	6.4	9.3 %
EGUs	Peakers	0.3	0.4 %	0.2	0.3 %	NA	NA %	0.5	0.9 %	1.1	1.6 %	0.8	1.1 %
Non-EGUs	Non-EGUs	2.7	3.7 %	2.6	3.6 %	NA	NA %	2.9	5.4 %	3.7	5.3 %	3.6	5.2 %
Nonpoint	Nonpoint	5	7 %	5.8	8 %	NA	NA %	3.8	7 %	2.6	3.6 %	5	7.2 %
Nonpoint	RWC	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Onroad	Diesel	5.3	7.3 %	5.8	8.1 %	NA	NA %	4.2	7.7 %	6.3	8.9 %	4.9	7.2 %
Onroad	Non-Diesel	6.9	9.5 %	7.1	9.8 %	NA	NA %	3.8	7 %	5.9	8.3 %	5.3	7.7 %
Nonroad	Airport	1.8	2.6 %	1.9	2.6 %	NA	NA %	0.8	1.5 %	0.9	1.3 %	0.8	1.1 %
Nonroad	Diesel	4.5	6.2 %	4.9	6.7 %	NA	NA %	3.1	5.8 %	3.9	5.5 %	3.3	4.9 %
Nonroad	Marine	1.1	1.5 %	1.4	1.9 %	NA	NA %	2.4	4.4 %	1.5	2.1 %	1.4	2 %
Nonroad	Marine Offshore C3	0.3	0.4 %	0.4	0.6 %	NA	NA %	1.4	2.6 %	0.1	0.2 %	0.1	0.2 %
Nonroad	Non-Diesel	2.7	3.8 %	3	4.2 %	NA	NA %	2.3	4.2 %	2	2.8 %	2.5	3.6 %
Nonroad	Rail	1.4	1.9 %	1.3	1.8 %	NA	NA %	1.2	2.1 %	1.6	2.2 %	1.3	1.9 %
Oil & Gas	Combined - Oil & Gas	2.4	3.3 %	2	2.7 %	NA	NA %	1	1.9 %	2.9	4.2 %	2.1	3 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
International	Canada	0.9	1.3 %	1.2	1.7 %	NA	NA %	1.2	2.2 %	0.4	0.6 %	1.2	1.7 %
International	Mexico	0	0.1 %	0	0 %	NA	NA %	0	0.1 %	0.1	0.2 %	0.1	0.1 %
Biogenic	Biogenic	7.6	10.6 %	7.8	10.7 %	NA	NA %	5.4	9.9 %	6.7	9.5 %	9.2	13.3 %
BC/IC	Boundary	23.5	32.8 %	22.2	30.6 %	NA	NA %	16	29.5 %	22.6	32.1 %	20.8	30.3 %
BC/IC	Initial	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Other	Other	0.1	0.2 %	0.1	0.1 %	NA	NA %	0.1	0.1 %	0.1	0.2 %	0.1	0.2 %

		MD: Edgewood (240251001)				MD: Beltsville (240339991)				MD: P.G. Equestrian Ctr (240338003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	Sub Sector	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
EGUs	EGUs	6.3	8.6 %	7.8	10.4 %	5.2	7.2 %	5.2	7.2 %	6.7	9.4 %	5.8	8.1 %
EGUs	Peakers	0.9	1.2 %	1.1	1.5 %	0.7	0.9 %	0.7	0.9 %	0.5	0.7 %	0.4	0.6 %
Non-EGUs	Non-EGUs	4	5.5 %	4.4	5.8 %	3.1	4.3 %	3.1	4.3 %	4.1	5.7 %	3.5	5 %
Nonpoint	Nonpoint	5.3	7.2 %	4.3	5.7 %	5.1	7 %	5.1	7 %	4.5	6.3 %	5.8	8.2 %
Nonpoint	RWC	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Onroad	Diesel	6.1	8.3 %	6.6	8.8 %	6.9	9.5 %	6.9	9.5 %	6.8	9.5 %	6.5	9.2 %
Onroad	Non-Diesel	6.3	8.6 %	6.8	9.1 %	6.8	9.4 %	6.8	9.4 %	6.9	9.7 %	6.9	9.8 %
Nonroad	Airport	1.3	1.7 %	1.4	1.8 %	1.4	2 %	1.4	2 %	1.4	2 %	1.4	2 %
Nonroad	Diesel	3.4	4.6 %	3.7	4.9 %	4.8	6.6 %	4.8	6.6 %	4.5	6.3 %	4.2	5.9 %
Nonroad	Marine	2.1	2.9 %	2	2.7 %	0.9	1.3 %	0.9	1.3 %	0.9	1.3 %	1.2	1.7 %
Nonroad	Marine Offshore C3	0.1	0.2 %	0.1	0.1 %	0.3	0.4 %	0.3	0.4 %	0.1	0.1 %	0.2	0.3 %
Nonroad	Non-Diesel	2.2	3 %	2.3	3.1 %	2.6	3.6 %	2.6	3.6 %	2.4	3.4 %	2.5	3.5 %
Nonroad	Rail	1.6	2.1 %	1.7	2.3 %	1.4	2 %	1.4	2 %	1.8	2.5 %	1.6	2.3 %
Oil & Gas	Combined - Oil & Gas	2.6	3.5 %	3.4	4.5 %	1.7	2.4 %	1.7	2.4 %	3.3	4.7 %	2.6	3.7 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
International	Canada	0.6	0.9 %	0.3	0.4 %	1.3	1.7 %	1.3	1.7 %	0.4	0.5 %	0.5	0.7 %
International	Mexico	0.1	0.1 %	0.1	0.2 %	0	0.1 %	0	0.1 %	0.1	0.2 %	0.1	0.1 %
Biogenic	Biogenic	9.3	12.7 %	9.3	12.4 %	6.6	9.1 %	6.6	9.1 %	8.5	12 %	8.7	12.4 %
BC/IC	Boundary	21.1	28.6 %	19.2	25.6 %	23.5	32.5 %	23.5	32.5 %	18	25.3 %	18.5	26.2 %
BC/IC	Initial	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Other	Other	0.3	0.4 %	0.3	0.4 %	0.1	0.1 %	0.1	0.1 %	0.2	0.3 %	0.2	0.2 %

		MA: Martha's Vineyard (250070001)				NH: Mt. Washington Summit (330074001)				NJ: Ancora St. Hospital (340071001)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	Sub Sector	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
EGUs	EGUs	2.4	3.2 %	3.2	4.5 %	NA	NA %	2.1	4.2 %	3.8	5.2 %	4.9	7 %
EGUs	Peakers	0.2	0.2 %	0.2	0.3 %	NA	NA %	0.2	0.4 %	0.2	0.3 %	0.4	0.5 %
Non-EGUs	Non-EGUs	3	3.9 %	2.8	3.9 %	NA	NA %	1.9	3.7 %	4	5.6 %	3.9	5.6 %
Nonpoint	Nonpoint	7.4	9.7 %	5.5	7.6 %	NA	NA %	2.9	5.7 %	10.4	14.4 %	7.1	10.1 %
Nonpoint	RWC	0.1	0.1 %	0.1	0.1 %	NA	NA %	0	0.1 %	0	0.1 %	0	0 %
Onroad	Diesel	2.9	3.8 %	3.2	4.5 %	NA	NA %	1.9	3.8 %	4.3	5.9 %	5	7.2 %
Onroad	Non-Diesel	3.9	5.1 %	4	5.6 %	NA	NA %	2.8	5.4 %	5.4	7.5 %	5.3	7.6 %
Nonroad	Airport	0.6	0.8 %	0.7	1 %	NA	NA %	0.3	0.7 %	0.9	1.2 %	1.1	1.6 %
Nonroad	Diesel	5.3	7 %	5.3	7.4 %	NA	NA %	2	3.9 %	3.1	4.3 %	4.2	6 %
Nonroad	Marine	2.9	3.8 %	3	4.1 %	NA	NA %	0.5	0.9 %	1.4	1.9 %	1.3	1.8 %
Nonroad	Marine Offshore C3	0.8	1 %	1.4	2 %	NA	NA %	0.1	0.2 %	0.4	0.5 %	0.2	0.3 %
Nonroad	Non-Diesel	8.8	11.5 %	7.8	10.7 %	NA	NA %	1.5	2.9 %	2.3	3.2 %	2.7	3.9 %
Nonroad	Rail	1	1.2 %	1.1	1.6 %	NA	NA %	0.8	1.6 %	0.9	1.3 %	1.2	1.7 %
Oil & Gas	Combined - Oil & Gas	0.7	0.9 %	1	1.4 %	NA	NA %	1.2	2.3 %	0.6	0.8 %	1.3	1.9 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
International	Canada	2.8	3.7 %	2.3	3.1 %	NA	NA %	2.1	4.2 %	1.2	1.7 %	1.4	2 %

International	Mexico	0	0 %	0	0 %	NA	NA %	0.1	0.1 %	0	0 %	0.1	0.1 %
Biogenic	Biogenic	10.7	14.1 %	9.7	13.5 %	NA	NA %	3.7	7.2 %	10.3	14.2 %	9.7	13.9 %
BC/IC	Boundary	22.6	29.6 %	20.5	28.4 %	NA	NA %	27	52.5 %	22.8	31.6 %	20	28.6 %
BC/IC	Initial	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Other	Other	0.3	0.4 %	0.2	0.3 %	NA	NA %	0.1	0.2 %	0.1	0.1 %	0.1	0.1 %

		NJ: Collier's Mill (340290006)				NJ: Clarksboro (340150002)				NY: Susan Wagner H.S. (360850067)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	**Sub Sector**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
EGUs	EGUs	5	7 %	4.3	5.9 %	7.8	11 %	7.8	11 %	4.9	6.7 %	6	8 %
EGUs	Peakers	0.3	0.4 %	0.2	0.3 %	0.8	1.1 %	0.8	1.1 %	0.4	0.5 %	0.4	0.5 %
Non-EGUs	Non-EGUs	3.4	4.8 %	3.1	4.3 %	4.6	6.5 %	4.6	6.5 %	3	4.1 %	3.4	4.5 %
Nonpoint	Nonpoint	7.2	10 %	8.1	11.2 %	4.3	6 %	4.3	6 %	6.6	9 %	6.3	8.4 %
Nonpoint	RWC	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Onroad	Diesel	4.5	6.2 %	4.7	6.5 %	5.3	7.5 %	5.3	7.5 %	4.2	5.8 %	4.7	6.3 %
Onroad	Non-Diesel	5.3	7.3 %	5.3	7.4 %	5.5	7.8 %	5.5	7.8 %	4.7	6.5 %	5.3	7 %
Nonroad	Airport	1.2	1.6 %	1.1	1.5 %	1	1.5 %	1	1.5 %	0.9	1.2 %	0.8	1.1 %
Nonroad	Diesel	3.5	4.9 %	3.6	4.9 %	4.3	6 %	4.3	6 %	3.3	4.5 %	3.5	4.7 %
Nonroad	Marine	1.1	1.6 %	1.1	1.5 %	1.7	2.4 %	1.7	2.4 %	1.6	2.2 %	1.7	2.2 %
Nonroad	Marine Offshore C3	0.3	0.4 %	0.2	0.3 %	0.1	0.2 %	0.1	0.2 %	0.4	0.6 %	0.4	0.6 %
Nonroad	Non-Diesel	2.4	3.3 %	2.3	3.2 %	2.6	3.6 %	2.6	3.6 %	3	4.1 %	3	4 %
Nonroad	Rail	1.2	1.6 %	1.1	1.6 %	1.5	2.1 %	1.5	2.1 %	1.3	1.8 %	1.4	1.9 %
Oil & Gas	Combined - Oil & Gas	1.6	2.3 %	1.6	2.2 %	2.5	3.6 %	2.5	3.6 %	1.5	2.1 %	1.7	2.3 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
International	Canada	1.4	1.9 %	1.8	2.5 %	0.9	1.3 %	0.9	1.3 %	2	2.7 %	1.7	2.2 %
International	Mexico	0	0.1 %	0	0 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0	0 %
Biogenic	Biogenic	7.9	11 %	8.4	11.6 %	9.3	13.2 %	9.3	13.2 %	10.3	14.1 %	9.2	12.3 %
BC/IC	Boundary	25.5	35.4 %	25.2	34.7 %	18.4	26 %	18.4	26 %	24.6	33.7 %	25.1	33.5 %
BC/IC	Initial	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Other	Other	0.1	0.2 %	0.2	0.3 %	0.1	0.2 %	0.1	0.2 %	0.2	0.3 %	0.2	0.3 %

		NY: Holtsville (361030009)				NY: Babylon (361030002)				NY: White Plains (361192004)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	**Sub Sector**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
EGUs	EGUs	5.1	6.7 %	5.8	7.6 %	5.1	6.7 %	5.1	6.4 %	3.7	5 %	4.4	5.6 %
EGUs	Peakers	0.4	0.6 %	0.5	0.6 %	0.5	0.6 %	0.5	0.6 %	0.5	0.6 %	0.4	0.5 %
Non-EGUs	Non-EGUs	3.1	4.1 %	3.5	4.6 %	3.1	4.1 %	3.2	4.1 %	2.5	3.4 %	2.9	3.8 %
Nonpoint	Nonpoint	6.9	9.2 %	7.1	9.2 %	6.8	9 %	8	10.1 %	8.5	11.4 %	8.4	10.7 %
Nonpoint	RWC	0	0 %	0	0.1 %	0	0 %	0	0.1 %	0	0 %	0	0 %

Onroad	Diesel	4.5	6 %	4.4	5.8 %	4.5	5.9 %	3.9	4.9 %	3.5	4.7 %	4.4	5.6 %
Onroad	Non-Diesel	5.3	7 %	5.5	7.2 %	5.2	6.9 %	5.3	6.8 %	5.4	7.2 %	5.6	7.2 %
Nonroad	Airport	0.9	1.2 %	0.9	1.2 %	1	1.3 %	0.9	1.2 %	1	1.4 %	1	1.2 %
Nonroad	Diesel	3.4	4.6 %	3.5	4.6 %	3.5	4.6 %	3	3.8 %	3.1	4.2 %	3.6	4.6 %
Nonroad	Marine	1.4	1.9 %	1.3	1.7 %	1.3	1.7 %	1.1	1.4 %	1.2	1.6 %	1.2	1.5 %
Nonroad	Marine Offshore C3	0.8	1.1 %	0.7	0.9 %	0.8	1 %	0.4	0.5 %	0.5	0.7 %	0.4	0.5 %
Nonroad	Non-Diesel	3.1	4.1 %	3	3.9 %	3.2	4.3 %	3.2	4 %	4.2	5.6 %	4.2	5.4 %
Nonroad	Rail	1.4	1.8 %	1.5	2 %	1.3	1.7 %	1.3	1.6 %	1.2	1.6 %	1.3	1.7 %
Oil & Gas	Combined - Oil & Gas	1.7	2.2 %	2.1	2.7 %	1.9	2.5 %	1.7	2.1 %	1.1	1.5 %	1.9	2.4 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
International	Canada	1.9	2.5 %	1.8	2.3 %	2.1	2.8 %	2.1	2.6 %	1.4	1.9 %	1.3	1.7 %
International	Mexico	0.1	0.1 %	0.1	0.2 %	0.1	0.1 %	0	0 %	0	0 %	0	0 %
Biogenic	Biogenic	10.6	14.1 %	11.6	15.1 %	10.6	14.1 %	10.5	13.3 %	9.3	12.5 %	9.5	12.1 %
BC/IC	Boundary	24.2	32.2 %	22.8	29.7 %	24.4	32.2 %	28.3	35.8 %	27.1	36.3 %	27.3	35 %
BC/IC	Initial	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
Other	Other	0.3	0.4 %	0.5	0.6 %	0.3	0.4 %	0.5	0.6 %	0.2	0.2 %	0.2	0.3 %

		PA: NEA (421010024)				**PA: Harrison Twp (420031008)**				**PA: Bristol (420170012)**			
		Exceedance Avg		**4th High Avg**		**Exceedance Avg**		**4th High Avg**		**Exceedance Avg**		**4th High Avg**	
Sector	**Sub Sector**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
EGUs	EGUs	5.8	7.9 %	5.8	7.9 %	NA	NA %	5.4	8.1 %	5.6	7.7 %	6.2	8.3 %
EGUs	Peakers	0.3	0.5 %	0.3	0.5 %	NA	NA %	0.2	0.3 %	0.3	0.5 %	0.4	0.5 %
Non-EGUs	Non-EGUs	3.9	5.3 %	3.9	5.3 %	NA	NA %	3.9	5.8 %	3.8	5.2 %	3.9	5.2 %
Nonpoint	Nonpoint	6	8.1 %	6	8.1 %	NA	NA %	4.1	6.1 %	6.6	9 %	6.2	8.2 %
Nonpoint	RWC	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Onroad	Diesel	5.1	6.9 %	5.1	6.9 %	NA	NA %	3.4	5.2 %	4.8	6.7 %	5.6	7.5 %
Onroad	Non-Diesel	5.3	7.2 %	5.3	7.2 %	NA	NA %	3.7	5.6 %	5.5	7.5 %	5.9	7.8 %
Nonroad	Airport	0.9	1.2 %	0.9	1.2 %	NA	NA %	0.3	0.5 %	0.8	1.1 %	1	1.4 %
Nonroad	Diesel	3.6	4.9 %	3.6	4.9 %	NA	NA %	2.5	3.7 %	3.7	5.1 %	4.3	5.8 %
Nonroad	Marine	1.4	1.9 %	1.4	1.9 %	NA	NA %	0.4	0.6 %	1.1	1.6 %	1.7	2.2 %
Nonroad	Marine Offshore C3	0.1	0.1 %	0.1	0.1 %	NA	NA %	0	0.1 %	0.2	0.2 %	0.2	0.3 %
Nonroad	Non-Diesel	2.5	3.3 %	2.5	3.3 %	NA	NA %	1.2	1.9 %	2.4	3.3 %	2.8	3.7 %
Nonroad	Rail	1.1	1.5 %	1.1	1.5 %	NA	NA %	1.6	2.4 %	1.2	1.7 %	1.3	1.7 %
Oil & Gas	Combined - Oil & Gas	1.8	2.5 %	1.8	2.5 %	NA	NA %	5.8	8.6 %	2.1	2.9 %	1.8	2.4 %
Oil & Gas	Offshore Rigs	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
International	Canada	0.8	1 %	0.8	1 %	NA	NA %	1.1	1.7 %	1.1	1.5 %	0.9	1.2 %
International	Mexico	0.1	0.1 %	0.1	0.1 %	NA	NA %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
Biogenic	Biogenic	9.5	12.9 %	9.5	12.9 %	NA	NA %	7.3	10.9 %	8.6	11.8 %	9.8	13 %
BC/IC	Boundary	25.2	34.3 %	25.2	34.3 %	NA	NA %	25.4	38.1 %	24.6	33.8 %	22.9	30.4 %

BC/IC	Initial	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Other	Other	0.2	0.3 %	0.2	0.3 %	NA	NA %	0.1	0.2 %	0.2	0.2 %	0.2	0.2 %

		RI: AJ (440030002)				VT: Underhill (500070007)				VA: Aurora Hills (510130020)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Sector	**Sub Sector**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
EGUs	EGUs	NA	NA %	5.8	8.7 %	NA	NA %	2.3	4.4 %	4.9	6.7 %	5.5	7.7 %
EGUs	Peakers	NA	NA %	0.4	0.5 %	NA	NA %	0.2	0.4 %	0.4	0.5 %	0.5	0.7 %
Non-EGUs	Non-EGUs	NA	NA %	3.4	5.1 %	NA	NA %	2.2	4.3 %	2.7	3.8 %	2.7	3.8 %
Nonpoint	Nonpoint	NA	NA %	5	7.5 %	NA	NA %	3	5.9 %	6.1	8.4 %	5.5	7.7 %
Nonpoint	RWC	NA	NA %	0	0 %	NA	NA %	0.1	0.1 %	0	0 %	0	0 %
Onroad	Diesel	NA	NA %	3.8	5.7 %	NA	NA %	2.5	4.9 %	6	8.3 %	5.3	7.4 %
Onroad	Non-Diesel	NA	NA %	4.6	6.8 %	NA	NA %	2.9	5.7 %	7	9.7 %	6.9	9.6 %
Nonroad	Airport	NA	NA %	0.7	1 %	NA	NA %	0.4	0.7 %	1.5	2 %	1.3	1.8 %
Nonroad	Diesel	NA	NA %	3.2	4.8 %	NA	NA %	2.3	4.4 %	5.2	7.2 %	4.7	6.6 %
Nonroad	Marine	NA	NA %	2.1	3.1 %	NA	NA %	0.5	1 %	2.2	3 %	1.8	2.5 %
Nonroad	Marine Offshore C3	NA	NA %	1.1	1.6 %	NA	NA %	0.1	0.3 %	0.4	0.6 %	0.3	0.4 %
Nonroad	Non-Diesel	NA	NA %	2.8	4.1 %	NA	NA %	1.3	2.5 %	3.1	4.3 %	2.9	4 %
Nonroad	Rail	NA	NA %	1.5	2.2 %	NA	NA %	1	1.9 %	1.4	1.9 %	1.4	2 %
Oil & Gas	Combined - Oil & Gas	NA	NA %	2.2	3.3 %	NA	NA %	1.3	2.6 %	1.5	2 %	1.9	2.6 %
Oil & Gas	Offshore Rigs	NA	NA %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
International	Canada	NA	NA %	0.7	1.1 %	NA	NA %	1.6	3.1 %	1.3	1.8 %	1	1.4 %
International	Mexico	NA	NA %	0.1	0.1 %	NA	NA %	0	0.1 %	0	0 %	0	0 %
Biogenic	Biogenic	NA	NA %	7.3	10.8 %	NA	NA %	4.2	8.2 %	7.7	10.6 %	7.4	10.3 %
BC/IC	Boundary	NA	NA %	22.3	33.2 %	NA	NA %	25.2	49.1 %	21	29 %	22.4	31.2 %
BC/IC	Initial	NA	NA %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
Other	Other	NA	NA %	0.2	0.3 %	NA	NA %	0.2	0.4 %	0.1	0.1 %	0.1	0.1 %

Additional Contributing State Apportionment Modeling Results for Select Monitors

		CT: Greenwich Point Park (090010017)				CT: Stratford (090013007)				CT: Sherwood Island (090019003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	**State**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
OTC+VA	CT	4.6	5.7 %	5.9	6.6 %	3.4	4.4 %	4	4.9 %	2.2	2.9 %	2.5	3 %
OTC+VA	DC	0	0 %	0	0 %	0	0.1 %	0	0 %	0	0 %	0	0 %
OTC+VA	DE	0.3	0.3 %	0.4	0.5 %	0.4	0.6 %	0.4	0.5 %	0.3	0.4 %	0.6	0.7 %
OTC+VA	MA	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0	0 %	0.3	0.3 %	0.1	0.1 %
OTC+VA	MD	0.8	1 %	0.9	1 %	1.2	1.6 %	1.1	1.3 %	1	1.3 %	1.2	1.4 %
OTC+VA	ME	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NH	0	0 %	0	0 %	0	0 %	0	0 %	0.1	0.1 %	0	0 %

OTC+VA	NJ	6.3	7.7 %	7.4	8.2 %	6.5	8.3 %	6.1	7.5 %	7	9 %	8.4	10.1 %
OTC+VA	NY	14.8	18.2 %	17.4	19.3 %	11.5	14.8 %	12.3	15.1 %	11.9	15.3 %	11.9	14.1 %
OTC+VA	PA	5.4	6.6 %	6.2	6.9 %	5.9	7.5 %	5.1	6.2 %	6.3	8.1 %	7.1	8.4 %
OTC+VA	RI	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	VA	0.9	1.1 %	1	1.1 %	1.5	2 %	1.4	1.8 %	1.1	1.4 %	1.4	1.6 %
OTC+VA	VT	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
LADCO	IL	0.4	0.5 %	0.6	0.7 %	0.6	0.7 %	0.8	1 %	0.5	0.7 %	0.7	0.9 %
LADCO	IN	0.6	0.8 %	0.9	1 %	0.9	1.2 %	1.2	1.5 %	0.8	1.1 %	1.2	1.4 %
LADCO	MI	1	1.2 %	1.2	1.3 %	0.9	1.2 %	1.4	1.7 %	1.1	1.5 %	0.6	0.7 %
LADCO	OH	1.3	1.6 %	1.6	1.8 %	2	2.6 %	2.3	2.9 %	1.5	2 %	1.8	2.1 %
SESARM	FL	0	0.1 %	0	0 %	0.1	0.1 %	0	0 %	0.1	0.1 %	0	0 %
SESARM	KY	0.5	0.7 %	0.7	0.8 %	0.9	1.2 %	1.3	1.6 %	0.7	0.9 %	1.3	1.5 %
SESARM	NC	0.3	0.4 %	0.3	0.3 %	0.5	0.7 %	0.5	0.6 %	0.3	0.4 %	0.4	0.5 %
SESARM	TN	0.2	0.2 %	0.3	0.3 %	0.3	0.4 %	0.4	0.5 %	0.2	0.3 %	0.4	0.4 %
SESARM	WV	0.9	1.1 %	0.8	0.9 %	1.6	2 %	1.6	2 %	1.1	1.4 %	1.4	1.7 %
CENSARA	LA	0.1	0.2 %	0.3	0.3 %	0.3	0.4 %	0.4	0.4 %	0.2	0.3 %	0.2	0.2 %
CENSARA	OK	0.1	0.2 %	0.2	0.2 %	0.2	0.2 %	0.2	0.3 %	0.1	0.2 %	0.2	0.3 %
CENSARA	TX	0.3	0.4 %	0.6	0.6 %	0.6	0.7 %	0.7	0.9 %	0.4	0.5 %	0.6	0.7 %
Multi-State	AL/AR/GA/MS/SC	0.4	0.5 %	0.5	0.5 %	0.8	1 %	0.7	0.8 %	0.5	0.7 %	0.5	0.6 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.2 %	0.2	0.3 %	0.3	0.4 %	0.4	0.4 %	0.3	0.3 %	0.4	0.5 %
Multi-State	IA/MO/MN/NE/SD/WI	0.5	0.6 %	0.7	0.8 %	0.8	1 %	1	1.2 %	0.7	0.8 %	0.9	1.1 %
International	Canada	1.9	2.4 %	2.8	3.1 %	1.8	2.3 %	2.8	3.5 %	2	2.6 %	1	1.1 %
International	Mexcio	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
Not State Tagged		39.2	48.1 %	38.9	43.2 %	34.8	44.6 %	35.3	43.3 %	36.8	47.3 %	39	46.4 %

		CT: Hammonasset S.P. (090099002)				CT: Fort Griswold Park (090110124)				DE: Bellevue S.P. (100031013)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	3.4	4.5 %	3.6	4.7 %	7.1	9.7 %	7.2	9.7 %	0	0 %	0	0 %
OTC+VA	DC	0.1	0.1 %	0	0.1 %	0	0 %	0	0 %	0.5	0.7 %	0.3	0.4 %
OTC+VA	DE	0.5	0.7 %	0.3	0.3 %	0.4	0.6 %	0.2	0.2 %	4.3	5.9 %	3.4	4.9 %
OTC+VA	MA	0.1	0.1 %	0.1	0.2 %	0.3	0.4 %	0.5	0.6 %	0	0 %	0	0 %
OTC+VA	MD	1.7	2.2 %	1	1.3 %	1.2	1.6 %	0.6	0.8 %	12.5	17.2 %	7.6	10.8 %
OTC+VA	ME	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NH	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NJ	4.9	6.4 %	4.4	5.7 %	2.7	3.7 %	1.9	2.6 %	0.2	0.3 %	2.2	3.2 %
OTC+VA	NY	10.1	13.3 %	10.2	13.2 %	12.9	17.5 %	12.7	17 %	0.1	0.2 %	0.7	1 %
OTC+VA	PA	4.4	5.8 %	3.5	4.5 %	2.9	4 %	2.2	3 %	3.2	4.4 %	5.7	8.1 %
OTC+VA	RI	0	0 %	0	0 %	0.4	0.5 %	0.6	0.8 %	0	0 %	0	0 %
OTC+VA	VA	2.2	2.9 %	1.8	2.3 %	1.5	2.1 %	1.1	1.5 %	4.8	6.6 %	2.5	3.6 %
OTC+VA	VT	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
LADCO	IL	0.8	1 %	0.9	1.2 %	0.5	0.7 %	0.4	0.5 %	0.5	0.7 %	0.5	0.6 %
LADCO	IN	1.1	1.5 %	1.4	1.7 %	0.7	0.9 %	0.5	0.7 %	1.4	1.9 %	1.3	1.8 %
LADCO	MI	1.4	1.8 %	1.8	2.3 %	1.2	1.6 %	1.9	2.5 %	0.7	0.9 %	1.1	1.6 %
LADCO	OH	2.3	3 %	2.2	2.9 %	1.5	2 %	1.3	1.7 %	5.4	7.4 %	4.3	6 %
SESARM	FL	0	0 %	0	0 %	0.1	0.1 %	0	0 %	0	0 %	0	0 %
SESARM	KY	0.9	1.2 %	1	1.3 %	0.5	0.7 %	0.3	0.4 %	2.1	2.9 %	1.4	2 %
SESARM	NC	0.4	0.6 %	0.4	0.5 %	0.5	0.6 %	0.3	0.4 %	0.8	1 %	0.4	0.5 %
SESARM	TN	0.2	0.3 %	0.3	0.4 %	0.3	0.4 %	0.1	0.1 %	0.1	0.2 %	0.1	0.1 %
SESARM	WV	1.8	2.3 %	1.7	2.2 %	0.9	1.2 %	0.8	1 %	4.9	6.7 %	2.6	3.6 %
CENSARA	LA	0.1	0.2 %	0.1	0.2 %	0.2	0.3 %	0.1	0.2 %	0.3	0.4 %	0.1	0.2 %
CENSARA	OK	0.1	0.2 %	0.1	0.2 %	0.2	0.2 %	0.1	0.1 %	0.4	0.5 %	0.2	0.3 %
CENSARA	TX	0.3	0.4 %	0.3	0.4 %	0.5	0.7 %	0.3	0.3 %	0.9	1.3 %	0.5	0.7 %
Multi-State	AL/AR/GA/MS/SC	0.4	0.6 %	0.5	0.6 %	0.8	1.1 %	0.3	0.4 %	0.4	0.6 %	0.2	0.3 %
Multi-State	CO/MT/ND/NE/NM/WY	0.3	0.3 %	0.3	0.3 %	0.2	0.3 %	0.2	0.2 %	0.4	0.5 %	0.2	0.3 %
Multi-State	IA/MO/MN/NE/SD/WI	0.9	1.2 %	1	1.3 %	0.8	1 %	0.7	0.9 %	0.9	1.3 %	0.7	1 %
International	Canada	1.5	2 %	1.9	2.5 %	2.4	3.2 %	4.2	5.7 %	0.4	0.5 %	1.2	1.7 %
International	Mexcio	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0	0 %	0.1	0.2 %	0.1	0.1 %
Not State Tagged		36	47.4 %	38.5	49.6 %	33	44.7 %	36.3	48.5 %	27.4	37.6 %	33.3	47.2 %

		DC: McMillan Reservoir (110010043)				ME: Cadillac Mountain (230090102)				MD: Fair Hill (2400150003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	0.2	0.3 %	0.4	0.5 %	NA	NA %	0.8	1.5 %	0	0 %	0.6	0.8 %
OTC+VA	DC	3.8	5.3 %	3.7	5.1 %	NA	NA %	0.1	0.1 %	0.6	0.8 %	0.3	0.4 %
OTC+VA	DE	0.4	0.6 %	0.6	0.9 %	NA	NA %	0.5	0.9 %	0.1	0.1 %	2	3 %
OTC+VA	MA	0.3	0.4 %	0.4	0.6 %	NA	NA %	6.7	12.3 %	0	0 %	1.1	1.5 %
OTC+VA	MD	8.4	11.7 %	10.1	13.9 %	NA	NA %	1.6	2.9 %	15	21.2 %	8.7	12.7 %
OTC+VA	ME	0	0 %	0	0.1 %	NA	NA %	2	3.7 %	0	0 %	0	0 %
OTC+VA	NH	0.1	0.1 %	0.1	0.1 %	NA	NA %	1.4	2.7 %	0	0 %	0.1	0.2 %
OTC+VA	NJ	1	1.4 %	1.5	2.1 %	NA	NA %	2.5	4.7 %	0.1	0.1 %	2.6	3.8 %
OTC+VA	NY	1.1	1.6 %	1.7	2.3 %	NA	NA %	3.7	6.8 %	0.1	0.2 %	1.7	2.5 %
OTC+VA	PA	2.4	3.3 %	3.3	4.6 %	NA	NA %	4.6	8.4 %	1.9	2.7 %	6.2	9 %
OTC+VA	RI	0.1	0.1 %	0.1	0.1 %	NA	NA %	0.7	1.3 %	0	0 %	0.2	0.3 %
OTC+VA	VA	11.9	16.6 %	11.7	16.2 %	NA	NA %	1.1	2 %	5.5	7.8 %	2.5	3.7 %
OTC+VA	VT	0	0 %	0	0.1 %	NA	NA %	0.1	0.1 %	0	0 %	0	0 %
LADCO	IL	0.2	0.3 %	0.1	0.2 %	NA	NA %	0.2	0.4 %	0.3	0.5 %	0.3	0.5 %
LADCO	IN	0.4	0.6 %	0.3	0.3 %	NA	NA %	0.2	0.3 %	0.8	1.2 %	0.7	1 %
LADCO	MI	0.4	0.6 %	0.3	0.4 %	NA	NA %	0.6	1.1 %	1.1	1.6 %	0.5	0.8 %
LADCO	OH	1.5	2 %	0.6	0.9 %	NA	NA %	0.6	1.2 %	5.1	7.2 %	2.7	3.9 %
SESARM	FL	0	0.1 %	0.1	0.1 %	NA	NA %	0.1	0.1 %	0	0 %	0	0 %
SESARM	KY	0.6	0.9 %	0.4	0.6 %	NA	NA %	0.2	0.3 %	1	1.4 %	1.1	1.7 %
SESARM	NC	0.6	0.8 %	0.5	0.7 %	NA	NA %	0.4	0.6 %	0.8	1.2 %	0.3	0.5 %
SESARM	TN	0.2	0.3 %	0.3	0.4 %	NA	NA %	0.1	0.2 %	0	0 %	0.1	0.1 %
SESARM	WV	3.5	4.9 %	2.7	3.8 %	NA	NA %	0.4	0.8 %	4.5	6.4 %	2.7	3.9 %
CENSARA	LA	0.1	0.2 %	0.1	0.2 %	NA	NA %	0.1	0.2 %	0.2	0.3 %	0.2	0.2 %
CENSARA	OK	0.1	0.1 %	0.1	0.1 %	NA	NA %	0.1	0.2 %	0.3	0.4 %	0.2	0.3 %
CENSARA	TX	0.2	0.3 %	0.2	0.2 %	NA	NA %	0.3	0.6 %	0.6	0.8 %	0.5	0.7 %
Multi-State	AL/AR/GA/MS/SC	0.4	0.6 %	0.5	0.7 %	NA	NA %	0.3	0.5 %	0.2	0.3 %	0.2	0.3 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.3 %	0.1	0.2 %	NA	NA %	0.1	0.2 %	0.3	0.4 %	0.3	0.4 %
Multi-State	IA/MO/MN/NE/SD/WI	0.4	0.6 %	0.3	0.4 %	NA	NA %	0.4	0.7 %	0.7	1 %	0.6	0.9 %
International	Canada	0.9	1.3 %	1.2	1.7 %	NA	NA %	1.2	2.2 %	0.4	0.6 %	1.2	1.7 %
International	Mexcio	0	0.1 %	0	0 %	NA	NA %	0	0.1 %	0.1	0.2 %	0.1	0.1 %
Not State Tagged		32.1	44.7 %	30.9	42.7 %	NA	NA %	23.3	42.9 %	30.6	43.4 %	30.9	45 %

		MD: Edgewood (240251001)				MD: Beltsville (240339991)				MD: P.G. Equestrian Ctr. (240338003)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	0.2	0.3 %	0	0 %	0.3	0.4 %	0.3	0.4 %	0	0 %	0.2	0.3 %
OTC+VA	DC	0.6	0.8 %	0.7	1 %	1.3	1.8 %	1.3	1.8 %	2.1	2.9 %	2.3	3.3 %
OTC+VA	DE	0.2	0.3 %	0	0 %	0.7	0.9 %	0.7	0.9 %	0.2	0.3 %	0.4	0.6 %
OTC+VA	MA	0.3	0.4 %	0	0 %	0.3	0.5 %	0.3	0.5 %	0	0 %	0.3	0.5 %
OTC+VA	MD	17.1	23.3 %	17.7	23.6 %	15.4	21.2 %	15.4	21.2 %	13.6	19.1 %	14.4	20.4 %
OTC+VA	ME	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NH	0	0.1 %	0	0 %	0	0.1 %	0	0.1 %	0	0 %	0	0.1 %
OTC+VA	NJ	0.6	0.8 %	0.1	0.1 %	1.4	2 %	1.4	2 %	0.2	0.3 %	0.8	1.2 %
OTC+VA	NY	0.6	0.8 %	0.1	0.2 %	1.5	2.1 %	1.5	2.1 %	0.2	0.3 %	0.8	1.1 %
OTC+VA	PA	2	2.7 %	1.6	2.2 %	7.7	10.7 %	7.7	10.7 %	7.8	11 %	6.4	9 %
OTC+VA	RI	0.1	0.1 %	0	0 %	0.1	0.1 %	0.1	0.1 %	0	0 %	0.1	0.1 %
OTC+VA	VA	4.3	5.9 %	6	8 %	5.4	7.4 %	5.4	7.4 %	4.7	6.6 %	5.1	7.1 %
OTC+VA	VT	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
LADCO	IL	0.4	0.5 %	0.4	0.6 %	0.2	0.2 %	0.2	0.2 %	0.2	0.3 %	0.2	0.3 %
LADCO	IN	0.9	1.2 %	0.9	1.2 %	0.2	0.3 %	0.2	0.3 %	0.7	1 %	0.6	0.8 %
LADCO	MI	0.7	0.9 %	0.5	0.7 %	0.7	1 %	0.7	1 %	0.3	0.4 %	0.3	0.4 %
LADCO	OH	3.7	5 %	3.5	4.7 %	1.6	2.2 %	1.6	2.2 %	4.2	5.9 %	3.2	4.5 %
SESARM	FL	0	0.1 %	0.1	0.1 %	0	0 %	0	0 %	0.1	0.1 %	0.1	0.1 %
SESARM	KY	1.5	2.1 %	1.8	2.4 %	0.3	0.4 %	0.3	0.4 %	1.5	2.2 %	1.1	1.6 %
SESARM	NC	1.3	1.8 %	1.9	2.6 %	0.3	0.4 %	0.3	0.4 %	0.3	0.4 %	0.2	0.3 %
SESARM	TN	0.7	0.9 %	1	1.4 %	0	0.1 %	0	0.1 %	0.7	1 %	0.6	0.8 %
SESARM	WV	2.9	3.9 %	4	5.3 %	1.7	2.3 %	1.7	2.3 %	2.8	3.9 %	2.1	3 %
CENSARA	LA	0.2	0.2 %	0.2	0.3 %	0.1	0.1 %	0.1	0.1 %	0.4	0.6 %	0.3	0.5 %
CENSARA	OK	0.2	0.2 %	0.2	0.3 %	0.1	0.1 %	0.1	0.1 %	0.2	0.3 %	0.2	0.3 %
CENSARA	TX	0.4	0.5 %	0.5	0.7 %	0.2	0.3 %	0.2	0.3 %	0.7	1 %	0.6	0.8 %
Multi-State	AL/AR/GA/MS/SC	1.2	1.7 %	1.8	2.5 %	0.1	0.2 %	0.1	0.2 %	0.9	1.2 %	0.7	0.9 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.3 %	0.3	0.4 %	0.2	0.3 %	0.2	0.3 %	0.2	0.3 %	0.2	0.3 %
Multi-State	IA/MO/MN/NE/SD/WI	0.7	0.9 %	0.7	1 %	0.4	0.5 %	0.4	0.5 %	0.4	0.6 %	0.4	0.5 %
International	Canada	0.6	0.9 %	0.3	0.4 %	1.3	1.7 %	1.3	1.7 %	0.4	0.5 %	0.5	0.7 %
International	Mexcio	0.1	0.1 %	0.1	0.2 %	0	0.1 %	0	0.1 %	0.1	0.2 %	0.1	0.1 %
Not State		31.9	43.3 %	30.1	40.2 %	30.9	42.7 %	30.9	42.7 %	28	39.3 %	28.6	40.4 %

		MA: Martha's Vineyard (250070001)				NH: Mt Washington Summit (330074001)				NJ: Ancora St. Hospital (340071001)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	1.2	1.6 %	2.5	3.5 %	NA	NA %	1.3	2.5 %	1.1	1.5 %	0.4	0.5 %
OTC+VA	DC	0	0 %	0	0 %	NA	NA %	0	0.1 %	0	0 %	0	0 %
OTC+VA	DE	0.2	0.2 %	0.2	0.3 %	NA	NA %	0.3	0.5 %	2.7	3.7 %	1.2	1.7 %
OTC+VA	MA	15.6	20.5 %	9.4	13 %	NA	NA %	1.5	2.9 %	2.3	3.2 %	0.6	0.8 %
OTC+VA	MD	0.2	0.3 %	0.5	0.6 %	NA	NA %	0.7	1.4 %	2	2.8 %	0.8	1.1 %
OTC+VA	ME	0	0.1 %	0	0 %	NA	NA %	0.1	0.2 %	0.1	0.1 %	0	0 %
OTC+VA	NH	0	0.1 %	0	0 %	NA	NA %	0.6	1.2 %	0.5	0.6 %	0.1	0.2 %
OTC+VA	NJ	4.4	5.8 %	4.1	5.7 %	NA	NA %	1.2	2.4 %	8.2	11.4 %	9.7	13.9 %
OTC+VA	NY	7.7	10.1 %	9.6	13.2 %	NA	NA %	2.7	5.2 %	2.6	3.7 %	3.2	4.6 %
OTC+VA	PA	2.4	3.1 %	2.1	3 %	NA	NA %	2.6	5.1 %	15.3	21.2 %	16.9	24.1 %
OTC+VA	RI	1.6	2.1 %	1.7	2.3 %	NA	NA %	0.2	0.4 %	0.3	0.5 %	0.1	0.1 %
OTC+VA	VA	0.1	0.1 %	0.8	1.1 %	NA	NA %	0.4	0.8 %	0.1	0.1 %	0.1	0.2 %
OTC+VA	VT	0	0 %	0	0 %	NA	NA %	0.5	0.9 %	0.1	0.1 %	0	0 %
LADCO	IL	0.4	0.5 %	0.5	0.7 %	NA	NA %	0.8	1.5 %	0.2	0.3 %	0.5	0.7 %
LADCO	IN	0.6	0.8 %	0.6	0.8 %	NA	NA %	0.3	0.5 %	0.1	0.2 %	0.4	0.5 %
LADCO	MI	1.9	2.5 %	1.3	1.9 %	NA	NA %	1.2	2.3 %	0.3	0.5 %	0.8	1.1 %
LADCO	OH	0.8	1.1 %	0.9	1.2 %	NA	NA %	1.3	2.5 %	0.1	0.2 %	0.8	1.1 %
SESARM	FL	0	0 %	0	0 %	NA	NA %	0	0.1 %	0	0 %	0.1	0.1 %
SESARM	KY	0.1	0.1 %	0.3	0.4 %	NA	NA %	0.1	0.1 %	0	0 %	0.2	0.3 %
SESARM	NC	0	0 %	0.5	0.7 %	NA	NA %	0.1	0.1 %	0	0 %	0	0 %
SESARM	TN	0	0 %	0.2	0.2 %	NA	NA %	0	0.1 %	0	0 %	0.1	0.2 %
SESARM	WV	0.1	0.1 %	0.4	0.6 %	NA	NA %	0.6	1.2 %	0.1	0.1 %	0.2	0.3 %
CENSARA	LA	0	0 %	0	0.1 %	NA	NA %	0	0.1 %	0	0 %	0.1	0.1 %
CENSARA	OK	0.1	0.1 %	0.1	0.2 %	NA	NA %	0	0.1 %	0.1	0.1 %	0.1	0.2 %
CENSARA	TX	0.1	0.1 %	0.2	0.3 %	NA	NA %	0.1	0.2 %	0.1	0.1 %	0.4	0.5 %
Multi-State	AL/AR/GA/MS/SC	0.1	0.1 %	0.3	0.5 %	NA	NA %	0.1	0.3 %	0	0 %	0.3	0.5 %
Multi-State	CO/MT/ND/NE/NM/WY	0.1	0.2 %	0.2	0.3 %	NA	NA %	0.1	0.1 %	0.3	0.5 %	0.2	0.3 %
Multi-State	IA/MO/MN/NE/SD/WI	0.7	1 %	0.8	1.2 %	NA	NA %	0.8	1.6 %	0.4	0.5 %	0.7	1 %
International	Canada	2.8	3.7 %	2.3	3.1 %	NA	NA %	2.1	4.2 %	1.2	1.7 %	1.4	2 %
International	Mexcio	0	0 %	0	0 %	NA	NA %	0.1	0.1 %	0	0 %	0.1	0.1 %
Not State Tagged		35	45.8 %	32.5	44.9 %	NA	NA %	31.5	61.3 %	33.8	46.8 %	30.6	43.8 %

		NJ: Collier's Mill (340290006)				NJ: Clarksboro (340150002)				NY: Susan Wagner H.S. (360850067)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	0.4	0.6 %	0.5	0.7 %	0	0 %	0	0 %	0.5	0.6 %	0.5	0.7 %
OTC+VA	DC	0	0.1 %	0	0 %	0.2	0.3 %	0.2	0.3 %	0	0.1 %	0	0 %
OTC+VA	DE	0.9	1.2 %	0.5	0.6 %	2.3	3.2 %	2.3	3.2 %	0.3	0.3 %	0.3	0.4 %
OTC+VA	MA	0.5	0.7 %	0.7	0.9 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	MD	1.3	1.8 %	0.6	0.9 %	5.3	7.5 %	5.3	7.5 %	1.2	1.7 %	1.2	1.7 %
OTC+VA	ME	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NH	0.1	0.2 %	0.2	0.2 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	NJ	7.7	10.7 %	8	11 %	5.1	7.2 %	5.1	7.2 %	10.6	14.5 %	11.8	15.7 %
OTC+VA	NY	3.3	4.5 %	4.1	5.7 %	1.8	2.5 %	1.8	2.5 %	9.1	12.4 %	7.5	10.1 %
OTC+VA	PA	13.9	19.4 %	13.1	18.1 %	11.3	16 %	11.3	16 %	6.6	9 %	8.5	11.3 %
OTC+VA	RI	0.1	0.1 %	0.1	0.1 %	0	0 %	0	0 %	0	0 %	0	0 %
OTC+VA	VA	1.1	1.5 %	0.8	1 %	2.4	3.3 %	2.4	3.3 %	0.9	1.2 %	1.3	1.7 %
OTC+VA	VT	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
LADCO	IL	0.4	0.5 %	0.4	0.5 %	0.6	0.9 %	0.6	0.9 %	0.4	0.6 %	0.3	0.5 %
LADCO	IN	0.7	0.9 %	0.7	1 %	1	1.4 %	1	1.4 %	0.5	0.7 %	0.6	0.8 %
LADCO	MI	1	1.4 %	1.4	1.9 %	0.8	1.1 %	0.8	1.1 %	0.7	1 %	0.5	0.7 %
LADCO	OH	1.5	2 %	1.8	2.5 %	3.3	4.7 %	3.3	4.7 %	1	1.4 %	1.2	1.6 %
SESARM	FL	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %	0	0 %
SESARM	KY	0.6	0.8 %	0.6	0.8 %	1	1.5 %	1	1.5 %	0.5	0.7 %	1	1.3 %
SESARM	NC	0.2	0.3 %	0.3	0.4 %	0.5	0.7 %	0.5	0.7 %	0.1	0.1 %	0.2	0.2 %
SESARM	TN	0.1	0.2 %	0.2	0.2 %	0.1	0.1 %	0.1	0.1 %	0.2	0.2 %	0.3	0.4 %
SESARM	WV	1.1	1.5 %	0.9	1.3 %	2.2	3.1 %	2.2	3.1 %	0.8	1.1 %	1.3	1.7 %
CENSARA	LA	0	0.1 %	0	0.1 %	0.2	0.2 %	0.2	0.2 %	0.1	0.1 %	0.1	0.1 %
CENSARA	OK	0.1	0.1 %	0.1	0.1 %	0.4	0.5 %	0.4	0.5 %	0.1	0.1 %	0	0 %
CENSARA	TX	0.2	0.2 %	0.2	0.2 %	0.7	1 %	0.7	1 %	0.2	0.3 %	0.1	0.1 %
Multi-State	AL/AR/GA/MS/SC	0.2	0.3 %	0.2	0.3 %	0.3	0.5 %	0.3	0.5 %	0.2	0.3 %	0.2	0.3 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.3 %	0.2	0.3 %	0.5	0.7 %	0.5	0.7 %	0.2	0.3 %	0.1	0.2 %
Multi-State	IA/MO/MN/NE/SD/WI	0.5	0.7 %	0.5	0.7 %	0.9	1.3 %	0.9	1.3 %	0.8	1.1 %	0.5	0.7 %
International	Canada	1.4	1.9 %	1.8	2.5 %	0.9	1.3 %	0.9	1.3 %	2	2.7 %	1.7	2.2 %
International	Mexcio	0	0.1 %	0	0 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %	0	0 %
Not State Tagged		34.4	47.8 %	34.6	47.7 %	29.1	41 %	29.1	41 %	36.1	49.4 %	35.5	47.4 %

		NY: Holtsville (361030009)				NY: Babylon (361030002)				NY: White Plains (361192004)			
		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg		Exceedance Avg		4th High Avg	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	0.4	0.6 %	0.3	0.4 %	0.2	0.3 %	0.1	0.1 %	0.8	1.1 %	0.6	0.7 %
OTC+VA	DC	0	0.1 %	0	0.1 %	0	0 %	0.1	0.1 %	0	0.1 %	0	0 %
OTC+VA	DE	0.4	0.5 %	0.4	0.6 %	0.4	0.6 %	0.3	0.4 %	0.4	0.5 %	0.4	0.6 %
OTC+VA	MA	0	0 %	0	0 %	0.1	0.1 %	0	0 %	0.7	1 %	0.6	0.8 %
OTC+VA	MD	1.6	2.1 %	1.7	2.2 %	1.2	1.5 %	1.8	2.3 %	1.1	1.5 %	1.3	1.6 %
OTC+VA	ME	0	0 %	0	0 %	0	0 %	0	0 %	0.1	0.2 %	0.1	0.1 %
OTC+VA	NH	0	0 %	0	0 %	0	0 %	0	0 %	0.1	0.2 %	0.2	0.2 %
OTC+VA	NJ	6.3	8.4 %	6.1	8 %	7.3	9.7 %	7.3	9.2 %	7.8	10.4 %	9.7	12.5 %
OTC+VA	NY	12.3	16.4 %	11.1	14.5 %	11.6	15.3 %	10.7	13.6 %	14.9	20 %	12.3	15.8 %
OTC+VA	PA	5.1	6.7 %	4.9	6.4 %	6.2	8.2 %	6.1	7.7 %	4.9	6.5 %	7.3	9.3 %
OTC+VA	RI	0	0 %	0	0 %	0	0 %	0	0 %	0.1	0.2 %	0.1	0.1 %
OTC+VA	VA	1.2	1.6 %	1.5	1.9 %	1.2	1.6 %	1.4	1.7 %	1.1	1.4 %	0.8	1.1 %
OTC+VA	VT	0	0 %	0	0 %	0	0 %	0	0 %	0	0.1 %	0.1	0.1 %
LADCO	IL	0.6	0.7 %	0.8	1 %	0.4	0.6 %	0.6	0.8 %	0.2	0.2 %	0.3	0.4 %
LADCO	IN	1	1.3 %	1.4	1.9 %	0.7	1 %	1.2	1.5 %	0.3	0.4 %	0.6	0.7 %
LADCO	MI	1.3	1.7 %	1.7	2.2 %	0.9	1.3 %	1.8	2.3 %	0.3	0.4 %	0.5	0.7 %
LADCO	OH	1.9	2.5 %	2.6	3.4 %	1.7	2.2 %	1.6	2 %	0.6	0.8 %	1.1	1.4 %
SESARM	FL	0	0 %	0	0 %	0	0 %	0	0 %	0	0.1 %	0	0 %
SESARM	KY	0.7	0.9 %	0.9	1.2 %	0.7	0.9 %	0.9	1.1 %	0.4	0.5 %	0.7	0.9 %
SESARM	NC	0.3	0.4 %	0.2	0.3 %	0.4	0.5 %	0.2	0.2 %	0.3	0.4 %	0	0.1 %
SESARM	TN	0.2	0.3 %	0.3	0.4 %	0.2	0.3 %	0.2	0.3 %	0.1	0.2 %	0.2	0.3 %
SESARM	WV	0.8	1 %	1.1	1.4 %	1	1.4 %	1	1.3 %	0.6	0.9 %	1.2	1.5 %
CENSARA	LA	0.1	0.2 %	0.2	0.3 %	0.1	0.2 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
CENSARA	OK	0.2	0.3 %	0.3	0.4 %	0.2	0.3 %	0	0 %	0	0 %	0	0 %
CENSARA	TX	0.5	0.7 %	0.7	0.9 %	0.5	0.7 %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
Multi-State	AL/AR/GA/MS/SC	0.4	0.5 %	0.5	0.7 %	0.4	0.5 %	0.3	0.3 %	0.4	0.5 %	0.2	0.2 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.3 %	0.3	0.4 %	0.3	0.4 %	0.1	0.2 %	0.1	0.1 %	0.1	0.1 %
Multi-State	IA/MO/MN/NE/SD/WI	0.8	1.1 %	1.1	1.4 %	0.7	0.9 %	0.7	0.9 %	0.2	0.3 %	0.3	0.4 %
International	Canada	1.9	2.5 %	1.8	2.3 %	2.1	2.8 %	2.1	2.6 %	1.4	1.9 %	1.3	1.7 %
International	Mexcio	0.1	0.1 %	0.1	0.2 %	0.1	0.1 %	0	0 %	0	0 %	0	0 %
Not State Tagged		36.7	48.9 %	36.5	47.6 %	36.7	48.6 %	40.3	51 %	37.3	50.1 %	37.8	48.4 %

		PA: NEA (421010024)				PA: Harrison Twsp. (420031008)				PA: Bristol (420170012)			
		Exceedance Avg		4th High Avg.		Exceedance Ave.		4th High Avg.		Exceedance Avg.		4th High Avg.	
Region	**State**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
OTC+VA	CT	0.1	0.1 %	0.1	0.1 %	NA	NA %	0	0.1 %	0.2	0.2 %	0.2	0.2 %
OTC+VA	DC	0.1	0.2 %	0.1	0.2 %	NA	NA %	0	0 %	0.1	0.1 %	0.1	0.1 %
OTC+VA	DE	2.1	2.9 %	2.1	2.9 %	NA	NA %	0.1	0.1 %	1.3	1.8 %	1.7	2.3 %
OTC+VA	MA	0	0.1 %	0	0.1 %	NA	NA %	0	0 %	0.3	0.4 %	0.1	0.1 %
OTC+VA	MD	4.3	5.8 %	4.3	5.8 %	NA	NA %	0.6	0.9 %	2.8	3.8 %	2.9	3.9 %
OTC+VA	ME	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
OTC+VA	NH	0	0 %	0	0 %	NA	NA %	0	0 %	0.1	0.1 %	0	0 %
OTC+VA	NJ	2.9	4 %	2.9	4 %	NA	NA %	0.4	0.6 %	5.1	7 %	8.6	11.4 %
OTC+VA	NY	0.9	1.2 %	0.9	1.2 %	NA	NA %	0.7	1 %	1.6	2.1 %	2.7	3.6 %
OTC+VA	PA	15.9	21.6 %	15.9	21.6 %	NA	NA %	13.7	20.5 %	15.3	21.1 %	13.8	18.4 %
OTC+VA	RI	0	0 %	0	0 %	NA	NA %	0	0 %	0	0.1 %	0	0 %
OTC+VA	VA	2.1	2.9 %	2.1	2.9 %	NA	NA %	0.8	1.2 %	1.9	2.6 %	1.6	2.2 %
OTC+VA	VT	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
LADCO	IL	0.4	0.6 %	0.4	0.6 %	NA	NA %	0.7	1 %	0.4	0.6 %	0.4	0.6 %
LADCO	IN	0.7	1 %	0.7	1 %	NA	NA %	1.1	1.6 %	0.8	1.1 %	0.8	1 %
LADCO	MI	0.4	0.5 %	0.4	0.5 %	NA	NA %	1.1	1.7 %	0.7	1 %	0.4	0.5 %
LADCO	OH	1.6	2.1 %	1.6	2.1 %	NA	NA %	3.9	5.8 %	2.1	2.9 %	1.6	2.2 %
SESARM	FL	0	0 %	0	0 %	NA	NA %	0	0 %	0	0 %	0	0 %
SESARM	KY	1.2	1.6 %	1.2	1.6 %	NA	NA %	1.7	2.5 %	0.9	1.2 %	1.2	1.6 %
SESARM	NC	0.5	0.6 %	0.5	0.6 %	NA	NA %	0	0 %	0.3	0.5 %	0.5	0.6 %
SESARM	TN	0.5	0.6 %	0.5	0.6 %	NA	NA %	0.4	0.5 %	0.2	0.3 %	0.5	0.6 %
SESARM	WV	1.3	1.8 %	1.3	1.8 %	NA	NA %	4.3	6.4 %	1.7	2.3 %	1.2	1.7 %
CENSARA	LA	0.2	0.2 %	0.2	0.2 %	NA	NA %	0.1	0.2 %	0.1	0.1 %	0.2	0.2 %
CENSARA	OK	0.2	0.2 %	0.2	0.2 %	NA	NA %	0.2	0.3 %	0.1	0.2 %	0.2	0.2 %
CENSARA	TX	0.4	0.5 %	0.4	0.5 %	NA	NA %	0.3	0.5 %	0.3	0.4 %	0.4	0.5 %
Multi-State	AL/AR/GA/MS/SC	0.5	0.7 %	0.5	0.7 %	NA	NA %	0.2	0.3 %	0.3	0.4 %	0.5	0.7 %
Multi-State	CO/MT/ND/NE/NM/WY	0.2	0.3 %	0.2	0.3 %	NA	NA %	0.3	0.4 %	0.2	0.3 %	0.2	0.3 %
Multi-State	IA/MO/MN/NE/SD/WI	0.6	0.8 %	0.6	0.8 %	NA	NA %	1.1	1.6 %	0.6	0.8 %	0.6	0.8 %
International	Canada	0.8	1 %	0.8	1 %	NA	NA %	1.1	1.7 %	1.1	1.5 %	0.9	1.2 %
International	Mexcio	0.1	0.1 %	0.1	0.1 %	NA	NA %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
Not State Tagged		35.7	48.5 %	35.7	48.5 %	NA	NA %	33.9	50.9 %	34.1	47 %	33.7	44.8 %

		RI: AJ (440030002)				VT: Underhill (500070007)				VA: Aurora Hills (510130020)			
		Exceedance Avg		4th High Avg.		Exceedance Avg.		4th High Avg.		Exceedance Avg.		4th High Avg.	
Region	State	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
OTC+VA	CT	NA	NA %	2.9	4.3 %	NA	NA %	0.5	1 %	0.4	0.6 %	0.3	0.4 %
OTC+VA	DC	NA	NA %	0.1	0.1 %	NA	NA %	0	0.1 %	2.6	3.6 %	2.8	3.9 %
OTC+VA	DE	NA	NA %	0.7	1.1 %	NA	NA %	0.2	0.4 %	1	1.3 %	0.7	1 %
OTC+VA	MA	NA	NA %	0.2	0.4 %	NA	NA %	0.5	1 %	0.4	0.6 %	0.3	0.5 %
OTC+VA	MD	NA	NA %	1.9	2.9 %	NA	NA %	0.9	1.7 %	11.6	16 %	10.1	14 %
OTC+VA	ME	NA	NA %	0	0 %	NA	NA %	0.1	0.1 %	0	0 %	0	0 %
OTC+VA	NH	NA	NA %	0	0 %	NA	NA %	0.1	0.2 %	0	0.1 %	0	0.1 %
OTC+VA	NJ	NA	NA %	3.6	5.4 %	NA	NA %	1.3	2.6 %	1.8	2.4 %	1.3	1.8 %
OTC+VA	NY	NA	NA %	7.1	10.6 %	NA	NA %	4.2	8.1 %	2	2.8 %	1.5	2.1 %
OTC+VA	PA	NA	NA %	4.4	6.6 %	NA	NA %	3.3	6.4 %	5.2	7.2 %	3.9	5.5 %
OTC+VA	RI	NA	NA %	0.8	1.2 %	NA	NA %	0.1	0.1 %	0.1	0.1 %	0.1	0.1 %
OTC+VA	VA	NA	NA %	2.4	3.5 %	NA	NA %	0.6	1.3 %	11.4	15.7 %	11.7	16.3 %
OTC+VA	VT	NA	NA %	0	0 %	NA	NA %	0.6	1.2 %	0	0 %	0	0 %
LADCO	IL	NA	NA %	0.7	1 %	NA	NA %	1.1	2.1 %	0.3	0.4 %	0.4	0.6 %
LADCO	IN	NA	NA %	1	1.5 %	NA	NA %	0.4	0.9 %	0.4	0.5 %	0.6	0.8 %
LADCO	MI	NA	NA %	0.6	0.9 %	NA	NA %	1.1	2.2 %	0.5	0.8 %	0.4	0.6 %
LADCO	OH	NA	NA %	2.1	3.2 %	NA	NA %	1.6	3.1 %	1	1.3 %	1.2	1.7 %
SESARM	FL	NA	NA %	0	0.1 %	NA	NA %	0.1	0.2 %	0	0.1 %	0	0 %
SESARM	KY	NA	NA %	0.9	1.4 %	NA	NA %	0.2	0.3 %	0.2	0.3 %	0.6	0.9 %
SESARM	NC	NA	NA %	0.5	0.8 %	NA	NA %	0.2	0.4 %	0.3	0.4 %	0.2	0.3 %
SESARM	TN	NA	NA %	0.3	0.5 %	NA	NA %	0.1	0.2 %	0.1	0.2 %	0.1	0.2 %
SESARM	WV	NA	NA %	1.9	2.9 %	NA	NA %	0.6	1.2 %	0.8	1.1 %	2	2.7 %
CENSARA	LA	NA	NA %	0.2	0.2 %	NA	NA %	0	0.1 %	0	0.1 %	0.1	0.1 %
CENSARA	OK	NA	NA %	0.1	0.2 %	NA	NA %	0	0 %	0.1	0.1 %	0.1	0.1 %
CENSARA	TX	NA	NA %	0.3	0.4 %	NA	NA %	0.1	0.2 %	0.1	0.2 %	0.2	0.2 %
Multi-State	AL/AR/GA/MS/SC	NA	NA %	0.6	0.9 %	NA	NA %	0.3	0.5 %	0.3	0.4 %	0.3	0.4 %
Multi-State	CO/MT/ND/NE/NM/WY	NA	NA %	0.3	0.4 %	NA	NA %	0.1	0.1 %	0.2	0.3 %	0.3	0.4 %
Multi-State	IA/MO/MN/NE/SD/WI	NA	NA %	0.8	1.3 %	NA	NA %	1	1.9 %	0.5	0.6 %	0.6	0.8 %
International	Canada	NA	NA %	0.7	1.1 %	NA	NA %	1.6	3.1 %	1.3	1.8 %	1	1.4 %
International	Mexcio	NA	NA %	0.1	0.1 %	NA	NA %	0	0.1 %	0	0 %	0	0 %
Not State Tagged		NA	NA %	31.6	47.2 %	NA	NA %	30.5	59.4 %	29.6	41 %	30.8	42.9 %