

FINAL

**DELAWARE STATE IMPLEMENTATION PLAN REVISION
MODERATE NON-ATTAINMENT PLAN FOR NEW CASTLE
COUNTY FOR THE 2015 8-HOUR OZONE NATIONAL
AMBIENT AIR QUALITY STANDARD**

The New Castle County Portion of the Philadelphia-Wilmington-
Atlantic City, PA-NJ-MD-DE Non-attainment Area

Submitted To
U.S. Environmental Protection Agency

By

Delaware Department of Natural Resources and
Environmental Control



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Executive Summary

On June 4, 2018 (effective date August 3, 2018), the United States Environmental Protection Agency (EPA) designated 51 areas of the country as “non-attainment” under the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS) of 70 parts per billion (ppb). Among those non-attainment areas is the Philadelphia-Wilmington-Atlantic City (PA-NJ-MD-DE) Non-Attainment Area (NAA). This NAA includes New Castle County in Delaware, five counties in eastern Pennsylvania, one county in Maryland and nine counties in southern New Jersey. According to the federal Clean Air Act (CAA), this entire NAA must attain the 8-hour ozone NAAQS by August 3, 2024.

The 2018-2020 design value for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE NAA was 0.074 parts per million (ppm). The attainment deadline for the marginal NAAs was August 3, 2021. On October 7, 2022,¹ the EPA finalized actions to fulfill its statutory obligation under CAA section 181 to determine whether 31 marginal ozone NAAs attained the 2015 ozone NAAQS by August 3, 2021, the applicable attainment date for such areas. Delaware’s New Castle County, along with the greater Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE metropolitan statistical area was redesignated as moderate non-attainment for the 2015 Ozone NAAQS based upon the failure of the NAA to record data below the standard.

The effect of failing to attain by the applicable attainment date (August 3, 2021) requires that these areas or portions of areas to be reclassified by operation of law to “moderate” non-attainment for the 2015 ozone NAAQS on November 7, 2022, the effective date of this final rule. Accordingly, the responsible state air agencies are required to submit State Implementation Plan (SIP) revisions and implement controls to satisfy the statutory and regulatory requirements for moderate areas for the 2015 ozone NAAQS according to the deadlines established in the final rule.

Areas reclassified to moderate face more stringent CAA requirements designed to achieve attainment of the NAAQS by no later than August 3, 2024. These requirements include stricter permitting requirements, implementing reasonably available control technology for major sources and sources covered by certain EPA control technique guidance documents, basic vehicle inspection and maintenance (I/M) for urbanized areas, and the submission of a new plan demonstrating how the area will attain expeditiously.

Ground level ozone, one of the principal components of “smog,” is a serious air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. High levels of ozone also cause serious damage to forests and agricultural crops, resulting in economic losses to logging and farming operations.

¹ Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as marginal for the 2015 Ozone National Ambient Air Quality Standards. EPA Final Rule. 87 FR 60897. October 7, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf>

This document contains Delaware's State Implementation Plan revision for meeting the requirements associated with the 2015 8-hour ozone NAAQS. Specifically, this SIP revision:

- Fulfills the federal CAA's requirements for Reasonable Further Progress (RFP) and Attainment Demonstration (AD) under the 2015 8-hour ozone NAAQS.
- Demonstrates that with all existing and proposed controls, Delaware will meet the RFP requirements on Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x) emission reductions in 2023.
- Demonstrates that New Castle County portion of the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE moderate NAA will attain the 2015 8-hour ozone NAAQS in 2023.
- Confirms Delaware's 2023 mobile source budgets (portions of total allowable emissions that are allocated to Onroad mobile sources) for transportation conformity determination.
- Establishes Contingency Measures, specific control measures to be implemented if the area fails to make RFP, fails to meet any applicable milestone, or fails to attain the NAAQS by the applicable attainment date.

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Acronym List

AEO	-	Annual Energy Outlook
AST	-	Above Ground storage tanks
ACT	-	Alternative Control Techniques
AD	-	Attainment Demonstration
AIM	-	Architectural and Industrial Maintenance
AVFT	-	Alternative Vehicle Fuels and Technologies
AQ	-	Division of Air Quality
AQS	-	Air Quality System
BenMAP	-	Benefits Mapping and Analysis Program
BYI	-	Base Year Inventory
CAA	-	Clean Air Act
CAAA	-	Clean Air Act Amendments of 1990
CAMD	-	Clean Air Markets Division
CAMx	-	Comprehensive Air Quality Model with Extensions
CARB	-	California Air Resources Board
CFR	-	Code of Federal Regulations
CM	-	Contingency Measures
CMAQ	-	Community Multi-scale Air Quality model
CMV	-	Commercial Marine Vessel
CNG	-	Compressed Natural Gas
CO	-	Carbon Monoxide
C&CP	-	Consumer and Commercial Products
CPM	-	Continuous Pressure Monitoring
CTG	-	Control Technology Guidance
DPC	-	Delaware Population Consortium
DelDOT	-	Delaware Department of Transportation
DNREC	-	Delaware Department of Natural Resources and Environmental Control
DOL	-	Department of Labor
EGU	-	Electric Generating Unit
EPA	-	United States Environmental Protection Agency
ERC	-	Emission Reduction Credit
EVR	-	Enhanced Vapor Recovery
FHWA	-	Federal Highway Administration
FMVCP	-	Federal Motor Vehicle Control Program
GHG	-	Greenhouse Gas
GDFs	-	gasoline dispensing facilities
HPMS	-	Highway Performance Monitoring System
I/M	-	Inspection and Maintenance Program
IPM	-	Integrated Planning Model
LEV	-	Low Emission Vehicle
LPG	-	Liquefied Petroleum Gas
LTO	-	Landings and Take-offs
MANEVU	-	Mid-Atlantic and Northeast Visibility Union
MAR	-	Marine, Aircraft, and Rail
MARAMA	-	Mid-Atlantic Regional Air Management Association
MW	-	Megawatts
MOVES	-	Motor Onroad Vehicle Emissions Simulator

MPO	-	Metropolitan Planning Organization
MVEB	-	Motor Vehicle Emissions Budget
NAA	-	Non-Attainment Area
NAAQS	-	National Ambient Air Quality Standard
NEI	-	National Emission Inventory
NLEV	-	National Low Emission Vehicle
NLLJ	-	Nocturnal Low-level Jet
NNSR	-	Non-attainment New Source Review
NO _x	-	Oxides of Nitrogen
NSR	-	New Source Review
O ₃	-	Ozone
OBD	-	On-Board Diagnostic
ORVR	-	On-board Refueling Vapor Recovery
OTC	-	Ozone Transport Commission
OTR	-	Ozone Transport Region
OYW	-	One Year's Worth
PFC	-	Portable Fuel Containers
PM	-	Particulate Matter
POTW	-	Publicly Owned Treatment Works
ppm	-	parts per million
ppb	-	parts per billion
PSD	-	Prevention of Significant Deterioration
PSM	-	Performance Standard Modeling
RACM	-	Reasonably Available Control Measure
RACT	-	Reasonably Available Control Technology
RFG	-	Reformulated Gasoline
RFP	-	Reasonable Further Progress
ROP	-	Rate of Progress
RRF	-	Relative Response Factor
RTP	-	Regional Long-range Transportation Plan
RVP	-	Reid Vapor Pressure
SAFE	-	Safer Affordable Fuel Efficiency
SCC	-	Source Classification Code
SIP	-	State Implementation Plan
SLAMS	-	state and local air monitoring stations
SM	-	Synthetic Minor
SSWD	-	Summer Season Weekday
TIM	-	Time-in-Mode
TIP	-	Transportation Improvement Program
tpd	-	Tons per Day
tpy	-	Tons per Year
TSD	-	Technical Supporting Document
TV	-	Title V
UST	-	Underground Storage Tanks
VRS	-	Vapor Recovery Systems
VMT	-	Vehicle Miles Traveled
VOC	-	Volatile Organic Compound
WILMAPCO	-	Wilmington Area Planning Council

1.0 Introduction and Background

This document contains Delaware’s SIP revision for meeting the moderate non-attainment requirements for Delaware’s New Castle County for the 2015 8-hour ozone NAAQS. The document demonstrates that the New Castle County portion of the Philadelphia-Wilmington-Atlantic City (i.e., PA-NJ-MD-DE) moderate NAA will attain compliance with the 2015 8-hour ozone standard by August 3, 2024. The document is hereafter referred to as “Delaware’s 8-hour ozone SIP revision,” or simply as “the ozone SIP” and will show how New Castle County meets CAA Sections 172 and 182.

1.1 Background and Requirements

Clean Air Act

The CAA was designed to control air pollution in the United States, is administered by the EPA, and its implementing regulations are codified at 40 Code of Federal Regulations (CFR) Subchapter C, Parts 50-97. The history of national air pollution legislation began with the 1955 Air Pollution Control Act, but the first piece of legislation to control air pollution was the CAA of 1963. The Air Quality Act of 1967 continued the process of developing legislation to reduce air pollution, but it was in 1970 that the CAA in its modern form was adopted. Amendments were added in 1977 and 1990, which further expanded the control of emissions.

One of the programs to come out of the 1970 CAA was the creation of NAAQS, thresholds of air pollution considered to be the upper limit of healthy air that are based on the best scientific evidence available that must be met nationally).² NAAQS were developed for several pollutants, including ground-level (tropospheric) ozone.

The 1970 CAA also introduced the SIP, which is intended to demonstrate how an area that is not complying with the NAAQS will meet that standard through state programs that become federally enforceable following approval of the SIP. The 1990 amendments expanded the requirements for SIPs, particularly with regard to ground-level ozone.³

Ground level ozone, one of the principal components of “smog,” is a serious air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. High levels of ozone also cause serious damage to forests and agricultural crops, resulting in economic losses to logging and farming operations. Ground level ozone is not emitted directly into the air but is created by chemical reactions between oxides of nitrogen and VOCs. This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight.

² National primary and secondary ambient air quality standards. Clean Air Act, Section 109.

<https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partA-sec7409.htm>

³ State implementation plans for national primary and secondary ambient air quality standards. Clean Air Act, Section 110.

<https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partA-sec7410.htm>

Ozone Transport Region and Ozone Transport Commission

Congress established the Ozone Transport Region (OTR) in the federal CAA to address air pollution in downwind states that is caused by activities in upwind states. In order to reduce ozone concentrations in the ambient air, the CAA requires all ozone NAAs, and areas in the OTR established pursuant to Section 184 of the CAA, to implement relevant control measures on VOCs and NO_x emission sources to achieve emission reductions. The OTR is essentially a single, 13-state ozone NAA. The original member states of the OTR are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, parts of Virginia, and the District of Columbia (Figure 1-1).

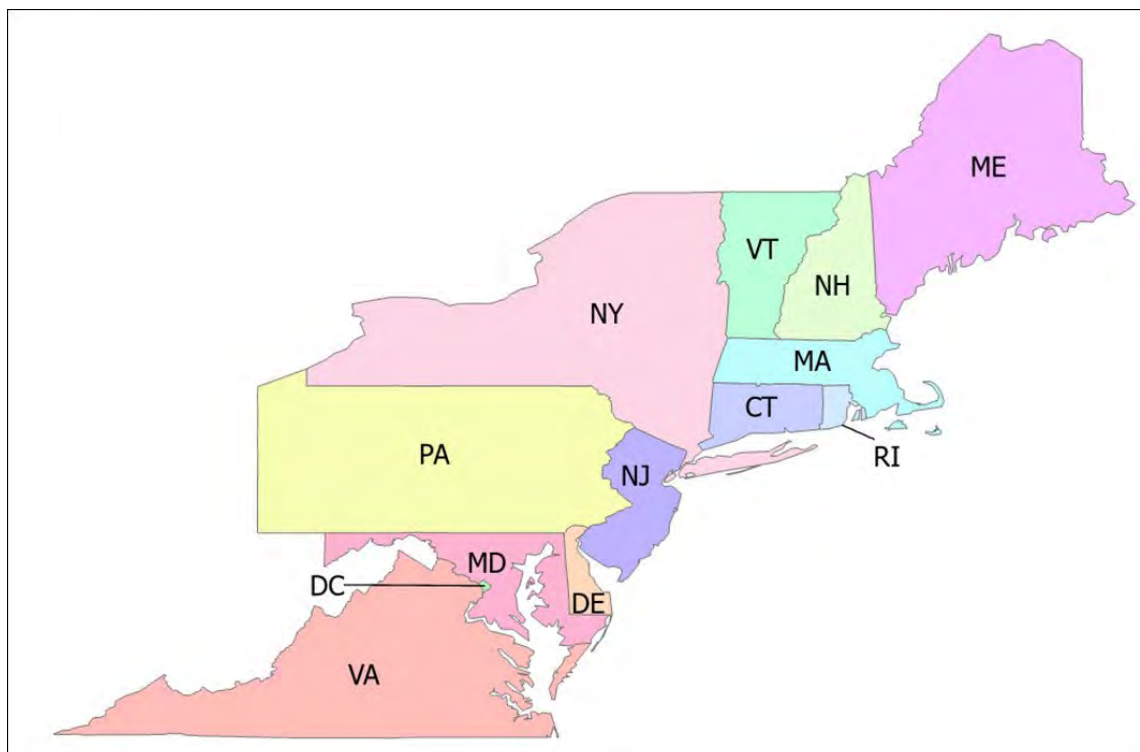


Figure 1-1. Original member states of the Ozone Transport Region

The Ozone Transport Commission (OTC) is a multi-state organization created under the CAA, Section 176A. It is responsible for advising EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions. OTC members states are the same as those of the OTR.

National Ambient Air Quality Standards

EPA is required by CAA Section 107(d) to designate areas throughout the nation as attaining or not attaining the NAAQS. Section 179(c)(1) of the CAA requires EPA to determine whether a NAA⁴ attained the applicable standard by the applicable attainment date based on the area's air quality as of that attainment date. A determination of whether an area's air quality meets applicable standards is generally based upon the most recent three years of complete, quality-assured data gathered at the established state and local air monitoring stations (SLAMS) in a NAA and entered into the EPA's Air Quality System (AQS) database. Data from ambient air monitors operated by state and local agencies in compliance with EPA's monitoring requirements must be submitted to AQS. Monitoring agencies annually certify that these data are accurate to the best of their knowledge.

EPA uses the certified air monitoring data to calculate design values that are used to determine the area's status in accordance with 40 CFR 50 Appendix U. Specifically, under EPA regulations in 40 CFR 50.19 and in accordance with 40 CFR 50 Appendix U, the primary and secondary NAAQS for ozone (O₃) are met at an ambient air quality monitoring site when the 3-year average of the annual fourth-highest daily maximum 8-hour average O₃ concentration (i.e., the design value) is less than or equal to 0.070 ppm. Design values are calculated by computing the annual fourth-highest daily maximum 8-hour O₃ concentration, averaged over three years, expressed in ppm. The fourth-highest daily maximum 8-hour O₃ concentration for each year shall be determined based only on days meeting the validity criteria in 40 CFR 50 Appendix U 3(d). The 3-year average shall be computed using the three most recent, consecutive years of ambient O₃ monitoring data. Design values shall be reported in ppm to three decimal places, with additional digits to the right of the third decimal place truncated.

After EPA sets a new NAAQS or revises an existing standard for a criteria air pollutant, the CAA requires EPA to determine if areas of the country meet the new standards. Within one year of setting a new or revised NAAQS for a criteria pollutant, States and tribes submit recommendations to the EPA as to whether or not an area is attaining the standard. The states and tribes base these recommendations on available air quality data collected from monitors at locations in urban and rural settings as well as other information characterizing air quality such as modeling. After working with the states and tribes and considering the information from air quality monitors, and/or models, EPA will "designate" an area based on whether or not it is meeting the standard.

If the air quality in a geographic area meets or is cleaner than the national standard, it is called an attainment area (designated "attainment/unclassifiable"); areas that don't meet the national standard are called NAAs. A designated NAA can include portions of two, three, or four states rather than falling entirely within a single state. In some cases, EPA is not able to determine an area's status after evaluating the available information and those areas are designated "unclassifiable." Once designations take effect, state and local governments with NAAs must develop implementation plans outlining how areas will attain and maintain the standards by reducing air pollutant emissions.

⁴ Delaware's New Castle County is included with the greater Philadelphia Metropolitan Statistical Area (MSA) which also includes counties in Pennsylvania, Maryland and New Jersey. For additional information on how EPA designates an area as nonattainment see EPA's Green Book - <https://www.epa.gov/green-book>.

2015 8-hour Ozone NAAQS

On October 26, 2015, the EPA issued its final action to revise the NAAQS for ozone to establish a new 8-hour standard.⁵ In that action, the EPA promulgated identical tighter primary and secondary ozone standards designed to protect public health and welfare that specified an 8-hour ozone level of 0.070 ppm for the three-year average of the 4th highest 8-hour average ozone concentration. Specifically, the standards require that the 3-year average of the annual fourth highest daily maximum 8-hour average ozone concentration may not exceed 0.070 ppm.

Prior to EPA making the attainment or non-attainment designations, the states provide EPA their recommendations as required by CAA Section 107(d). Delaware submitted its ozone attainment designation recommendations on September 23, 2016. In the letter, Delaware recommended a broad NAA:

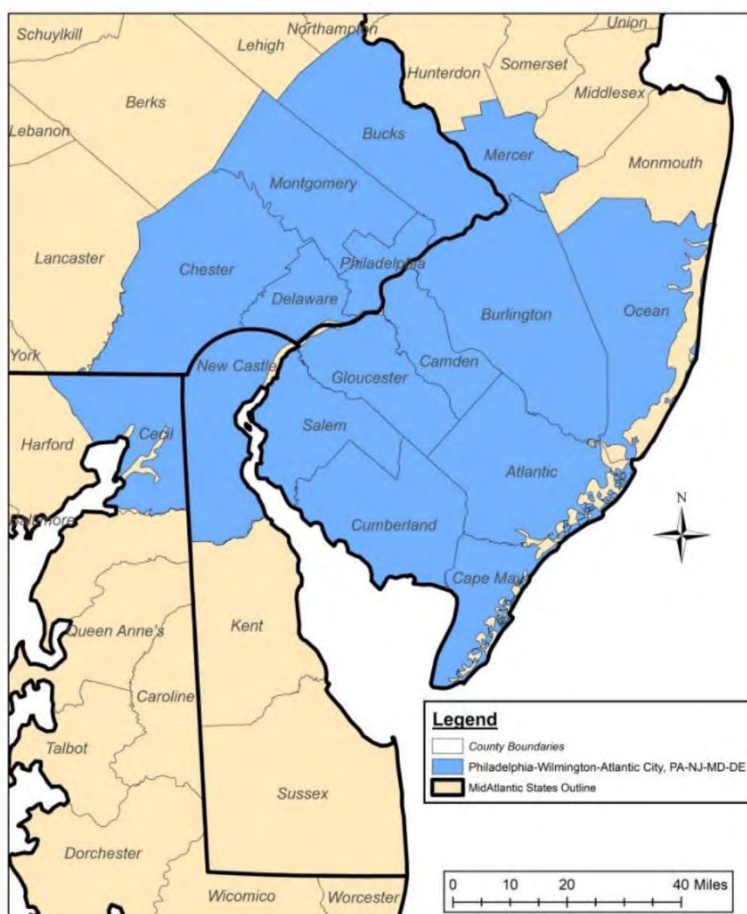
“Emissions cause ozone non-attainment and Delaware believes it is necessary to establish non-attainment boundaries that encompass enough of these emissions to make attainment feasible and possible goal for the area. To this end Delaware hereby recommends that the non-attainment area borders associated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

The EPA rejected Delaware’s recommendation and announced on November 16, 2017,⁶ that New Castle County was to be designated non-attainment for ozone and associated it with the greater Philadelphia Metropolitan Area (see 40 CFR 81.15), which consists of New Castle County in Delaware and counties in Maryland, New Jersey, and Pennsylvania, as shown in Figure 1-2. On June 4, 2018 the EPA designated the Philadelphia Metropolitan area as marginal non-attainment for the 2015 ozone NAAQS.⁷ EPA based the designations on the most recent 3 years (2014-2016) of certified ozone air quality monitoring data and on an evaluation of factors to assess contributions to non-attainment in nearby areas. In 2017, New Castle County was deemed to contribute emissions to the Philadelphia area and thereby included in the broad NAA.

⁵ National Ambient Air Quality Standards for Ozone. EPA Final Rule. 80 FR 65292. October 26, 2015. <https://www.govinfo.gov/content/pkg/FR-2015-10-26/pdf/2015-26594.pdf>

⁶ Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards (NAAQS). EPA Final Rule. 82 FR 54232. November 16, 2017. <https://www.govinfo.gov/content/pkg/FR-2017-11-16/pdf/2017-24640.pdf>

⁷ Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards. EPA Final Rule. 83 FR 25776, June 4, 2018. <https://www.govinfo.gov/content/pkg/FR-2018-06-04/pdf/2018-11838.pdf>



**Figure 1-2. Philadelphia-Wilmington-Atlantic City, PA-DE-MD-NJ
Moderate Non-Attainment Area for the 8-Hour Ozone NAAQS**

In a final rule dated June 4, 2018,⁸ the EPA designated 51 areas (Figure 2-2) in the country as non-attainment for the 2015 8-hour ozone NAAQS. In the same final rule, Kent and Sussex Counties were designated as attainment. The EPA made the designations of all three Delaware counties based on their 2014-2016 design values,⁹ and the effective date of the designations was August 3, 2018.

The 2015 Ozone NAAQS is met at an EPA approved regulatory monitoring site, when the design value does not exceed 0.070 ppm. For areas classified as marginal non-attainment for the 2015 Ozone NAAQS, the attainment deadline date was August 3, 2021. Because the design values are based on the three most recent, complete calendar years (2018- 2020), attainment must occur no later than December 31 of the year prior to the attainment date (i.e., December 31, 2020, in the case of marginal NAAs for the 2015 Ozone NAAQS).

⁸ Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards (NAAQS). EPA Final Rule. 83 FR 25776. June 4, 2018. <https://www.govinfo.gov/content/pkg/FR-2018-06-04/pdf/2018-11838.pdf>

⁹ The air quality design value at a monitoring site is defined as the 3-year average annual fourth-highest daily maximum 8-hour average ozone concentration is also the air quality design value for the site. (40 CFR Part 50, Appendix I, Interpretation of the 8-Hour Primary and Secondary National Ambient Air Quality Standards for Ozone)

Under CAA Section 107(c), within six months of the attainment deadline date (August 3, 2021), the EPA is required to make a determination on the area's air quality as of the attainment date, and whether an area (PA, NJ, MD, DE) attained by that date. If the EPA determines that area failed to attain by the attainment date, EPA is required to publish that determination in the Federal Register per CAA section 107(c)(2). As such the EPA's proposed determinations for each area are based upon the complete, quality assured, and certified ozone monitoring data from calendar years 2018, 2019 and 2020.

The 2018-2020 design value for the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE NAA was 0.074 ppm, as shown in Table 2-1. The attainment deadline for the marginal NAAs was August 3, 2021. On October 7, 2022,¹⁰ the EPA finalized actions to fulfill its statutory obligation under CAA section 181 to determine whether 31 marginal ozone NAAs attained the 2015 ozone NAAQS by August 3, 2021, the applicable attainment date for such areas. Delaware's New Castle County, along with the greater Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE metropolitan statistical area was redesignated as moderate Non-attainment for the 2015 Ozone NAAQS based upon the failure of the NAA to record data below the standard.

The effect of failing to attain by the applicable attainment date (August 3, 2021) requires that these areas or portions of areas to be reclassified by operation of law to "moderate" non-attainment for the 2015 Ozone NAAQS. Accordingly, the responsible state air agencies are required to submit SIP revisions and implement controls to satisfy the statutory and regulatory requirements for moderate NAAs according to the deadlines established in the final rule.

EPA established a deadline of January 1, 2023 for submittal of the SIP revisions. Because EPA did not issue its final rule until October 7, 2022, states were only given 87 days after the rule was published to submit their SIP revisions. This timeline was impossible to meet for a number of reasons. 1) Early engagement. It is recommended by EPA that Delaware submit draft SIP revisions to the EPA Region III office for a 30-60 day review prior to presenting a proposal at public hearing. 2) Public engagement. Delaware is required by statute to provide opportunity for the public to comment on the proposal. Delaware accomplishes this by holding a public hearing with an associated 30+ day comment period. 3) Draft EPA Guidance. EPA did not release its draft guidance for contingency measures (Section 14.1), until March 17, 2023. This guidance has yet to be finalized. Therefore, Delaware may need to revise its SIP if the draft guidance is revised substantially.

Delaware's designation to moderate non-attainment was the result of air quality monitors in the Philadelphia-Wilmington-Atlantic City recording ozone design value data for 2018-2020 above the 2015 Ozone NAAQS. Three monitors in Pennsylvania recorded design values for the 3-year period 2018-2020 that were greater than the standard (Table 1-1), thereby EPA determined that the NAA failed to meet the standard and was redesignated from marginal non-attainment to moderate non-attainment. The attainment deadline for areas designated moderate non-attainment is August 3, 2024, which requires the NAA's 3-year design value data for 2020-2023 to demonstrate attainment with the 2015 Ozone NAAQS.

¹⁰ Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as marginal for the 2015 Ozone National Ambient Air Quality Standards. EPA Final Rule. 87 FR 60897. October 7, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf>

Table 1-1 Philadelphia-Wilmington-Atlantic City NAA 2018-2020 Design Values - Moderate Reclassification

State Name	County Name	Local Site Name	Valid 2018-2020 Design Value (ppm) [1,2]	2018 4th Highest Daily Max. Value (ppm)	2019 4th Highest Daily Max. Value (ppm)	2020 4th Highest Daily Max. Value (ppm)	Number of Exceedance Days in 2018	Number of Exceedance Days in 2019	Number of Exceedance Days in 2020
Delaware	New Castle	Lums Pond	0.065	0.071	0.064	0.061	4	1	0
Delaware	New Castle	Brandywine Creek State Park	0.063	0.067	0.067	0.057	2	1	0
Delaware	New Castle	Bellevue State Park,	0.066	0.072	0.068	0.060	4	3	0
Delaware	New Castle	MLK Corner Of Mlk Blvd And Justison St	0.067	0.071	0.067	0.063	4	2	2
Maryland	Cecil	Fair Hill Natural Resource Management Area	0.068	0.073	0.068	0.064	7	3	0
New Jersey	Camden	Camden Spruce Street	0.069	0.075	0.070	0.062	5	3	0
New Jersey	Camden	Ancora State Hospital	0.064	0.068	0.067	0.059	1	3	0
New Jersey	Gloucester	Clarksboro	0.069	0.077	0.068	0.064	7	1	1
Pennsylvania	Bucks	Bristol	0.074	0.084	0.067	0.071	12	3	4
Pennsylvania	Chester	Chester County Transport Site Into Philadelphia	0.064	0.065	0.068	0.060	1	1	0
Pennsylvania	Delaware	A420450002lat/Lon Point Is Of Corner Of Trailer	0.068	0.073	0.069	0.062	4	3	1
Pennsylvania	Montgomery	A420910013lat/Lon Point Is Of Corner Of Trailer	0.068	0.073	0.065	0.066	7	1	0
Pennsylvania	Philadelphia	Air Management Services Laboratory	0.067	0.071	0.067	0.064	5	3	0
Pennsylvania	Philadelphia	North East Airport (NEA)	0.073	0.079	0.071	0.070	8	4	3
Pennsylvania	Philadelphia	North East Waste (New)	0.071	0.076	0.072	0.067	9	4	2

Notes:

1. The level of the 2015 8-hour ozone NAAQS is 0.070 parts per million (ppm). The design value is the 3-year average of the annual 4th highest daily maximum 8-hour ozone concentration.
2. The design values shown here are computed using Federal Reference Method or equivalent data reported by State, Tribal, and Local monitoring agencies to EPA's Air Quality System (AQS) as of May 5, 2021.

This document contains Delaware’s SIP revision for meeting the requirements associated with the 2015 8-hour ozone NAAQS. Specifically, this SIP revision:

- Fulfills the federal CAA’s requirements for RFP and AD under the 2015 8-hour ozone NAAQS.
- Demonstrates that with all existing and proposed controls, Delaware will meet the RFP requirements on VOCs and NO_x emission reductions in 2023.
- Demonstrates that the New Castle County portion of the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE moderate NAA will attain the 2015 8-hour ozone NAAQS in 2023.
- Confirms Delaware’s 2023 mobile source budgets for transportation conformity determination.
- Establishes Contingency Measures, specific control measures to be implemented if the area fails to make RFP, fails to meet any applicable milestone, or fails to attain NAAQS by the applicable attainment date.

Table 1-2: Ozone Implementation Plan SIP Revision Elements – 40 CFR 51.1308 – 51.1316

Source:	Required Element:	Location in SIP:
51.1308 (a)	<i>An area classified moderate under § 51.1303(a) shall submit an attainment demonstration that provides for such specific reductions in emissions of VOCs and NO_x as necessary to attain the primary NAAQS by the applicable attainment date, and such demonstration is due no later than 36 months after the effective date of the area’s designation for the 2015 ozone NAAQS.</i>	<u>Section 13</u> – Attainment Demonstration Modeling and Weight of Evidence.
51.1308 (c)	<i>An attainment demonstration due pursuant to paragraph (a) or (b) of this section must meet the requirements of Appendix W of this part and shall include inventory data, modeling results, and emission reduction analyses on which the state has based its projected attainment date; the adequacy of an attainment demonstration shall be demonstrated by means of a photochemical grid model or any other analytical method determined by the Administrator, in the Administrator’s discretion, to be at least as effective.</i>	<u>Section 13</u> – Attainment Demonstration Modeling and Weight of Evidence.
51.1308(d)	<i>Implementation of control measures. For each nonattainment area for which an attainment demonstration is required pursuant to paragraph (a) or (b) of this section, the state must provide for implementation of all control measures needed for attainment as expeditiously as practicable. All control measures in the attainment plan and demonstration must be implemented no later than the beginning of the attainment year ozone season, notwithstanding any alternate RACT and/or RACM implementation deadline requirements in § 51.1312.</i>	<u>Section 10</u> – Control Measures and Emission Reductions for Attainment
51.1310(a)	<i>RFP for nonattainment areas classified pursuant to § 51.1303. The RFP requirements specified in CAA section 182 for that area’s classification shall apply.</i>	<u>Section 8</u> – Reasonable Further Progress Calculation
51.1310(a)(2)(i)	<i>If classified moderate, the area is subject to the RFP requirements under CAA section 172(c)(2) and shall submit a SIP revision that:</i>	<u>Section 8</u> – Reasonable Further Progress

Source:	Required Element:	Location in SIP:
	(A) Provides for a 15 percent emission reduction from the baseline year within 6 years after the baseline year; and (B) Relies on either NO_x or VOC emissions reductions (or a combination) to meet the requirements of paragraph (a)(2)(i)(A) of this section. Use of NO_x emissions reductions must meet the criteria in CAA section 182(c)(2)(C).	
51.1310(b)	Baseline emissions inventory for RFP plans. For the RFP plans required under this section, at the time of designation as nonattainment for an ozone NAAQS the baseline emissions inventory shall be the emissions inventory for the most recent calendar year for which a complete triennial inventory is required to be submitted to the EPA under the provisions of subpart A of this part ...The emissions values included in the inventory required by this section shall be actual ozone season day emissions as defined by § 51.1300(q) .	Section 7 – Delaware 2017 Base Year Emission Inventory (Previously submitted to EPA)
51.1312(a)(1)	For each nonattainment area classified moderate or higher, the state shall submit a SIP revision that meets the VOC and NO _x RACT requirements in CAA sections 182(b)(2) and 182(f).	Section 11 – Reasonably Available Control Technology (Previously submitted to EPA)
51.1312(c)	RACM requirements. For each nonattainment area required to submit an attainment demonstration under § 51.1308(a) and (b) , the state shall submit with the attainment demonstration a SIP revision demonstrating that it has adopted all RACM necessary to demonstrate attainment as expeditiously as practicable and to meet any RFP requirements. The SIP revision shall include, as applicable, other control measures on sources of emissions of ozone precursors located outside the nonattainment area, or portion thereof, located within the state if doing so is necessary or appropriate to provide for attainment of the applicable ozone NAAQS in such area by the applicable attainment date.	Section 12 – Reasonably Available Control Measure (RACM)
51.1314	... For each nonattainment area, the state shall submit a nonattainment NSR plan or plan revision for a specific ozone NAAQS no later than 36 months after the effective date of the area's designation of nonattainment or redesignation to nonattainment for that ozone NAAQS.	Section 5 – Non-attainment New Source Review Certification (Previously submitted to EPA)
51.1315(a)	For each nonattainment area, the state shall submit a base year inventory as defined by § 51.1300(p) to meet the emissions inventory requirement of CAA section 182(a)(1). This inventory shall be submitted no later than 24 months after the effective date of designation. The inventory year shall be selected consistent with the baseline year for the RFP plan as required by § 51.1310(b) .	Section 7 – Delaware 2017 Base Year Emission Inventory (Previously submitted to EPA)
51.1315(b)	For each nonattainment area, the state shall submit a periodic emissions inventory of emissions sources in the area to meet the requirement in CAA section 182(a)(3)(A). With the exception of the inventory year and timing of submittal, this inventory shall be consistent with the requirements of paragraph (a) of this section. Each periodic inventory shall be submitted no later than the end of each 3-year period after the required submission of the base year inventory for the nonattainment area...	Section 7 – Delaware 2017 Base Year Emission Inventory (Previously submitted to EPA)
53.1316(b)(1)	The state shall submit a SIP revision that meets the RACT requirements of CAA section 184(b) for all portions of the state located in an ozone transport region.	Section 11 – Reasonably Available Control Technology (RACT)

2.0 Ozone Air Quality Status and Trends Analysis

2.1 Delaware Ozone Monitoring Network

Delaware set up its ambient ozone monitoring network in late 1980s under the 1-hour ozone standard. The network was modified and approved by EPA in 1995 for meeting the then-upcoming 8-hour ozone standard. The current network for monitoring ambient air quality contains 11 monitors, with 7 monitors in New Castle County. Figure 2-1 shows the locations of these monitors. Delaware currently monitors for ozone concentrations under the 8-hour ozone NAAQS at 4 of the New Castle County sites: Brandywine Creek State Park, Bellefonte II, MLK, and Lums Pond. Prior to 2001 an ozone monitor was located at the Bellefonte I site, in 2001 the ozone monitor was moved to a new site because of siting issues, the Bellefonte II site. Delaware maintains and operates the network to measure ambient ozone levels within Delaware for comparison to NAAQS. All data is measured using EPA approved methods, and the data is submitted to EPA's AQS.



Figure 2-1. Delaware Ozone Monitoring Network for 8-Hour Ozone NAAQS

2.2 Delaware 8-Hour Ozone Design Values

Under the 8-hour ozone standard (0.070 ppm), the design value of a specific county is defined as the highest three-year average of the 4th highest daily 8-hour maximum. The average is calculated as a ppm value truncated at three decimal places. Where there is more than one monitor in a county, the highest calculated value becomes the design value for that county. Figure 2-2 summarizes the 8-hour ozone design values of New Castle County in Delaware from 1997 to 2021. Figure 2-3 summarizes the 8-hour ozone design values for each individual monitor in New Castle County.

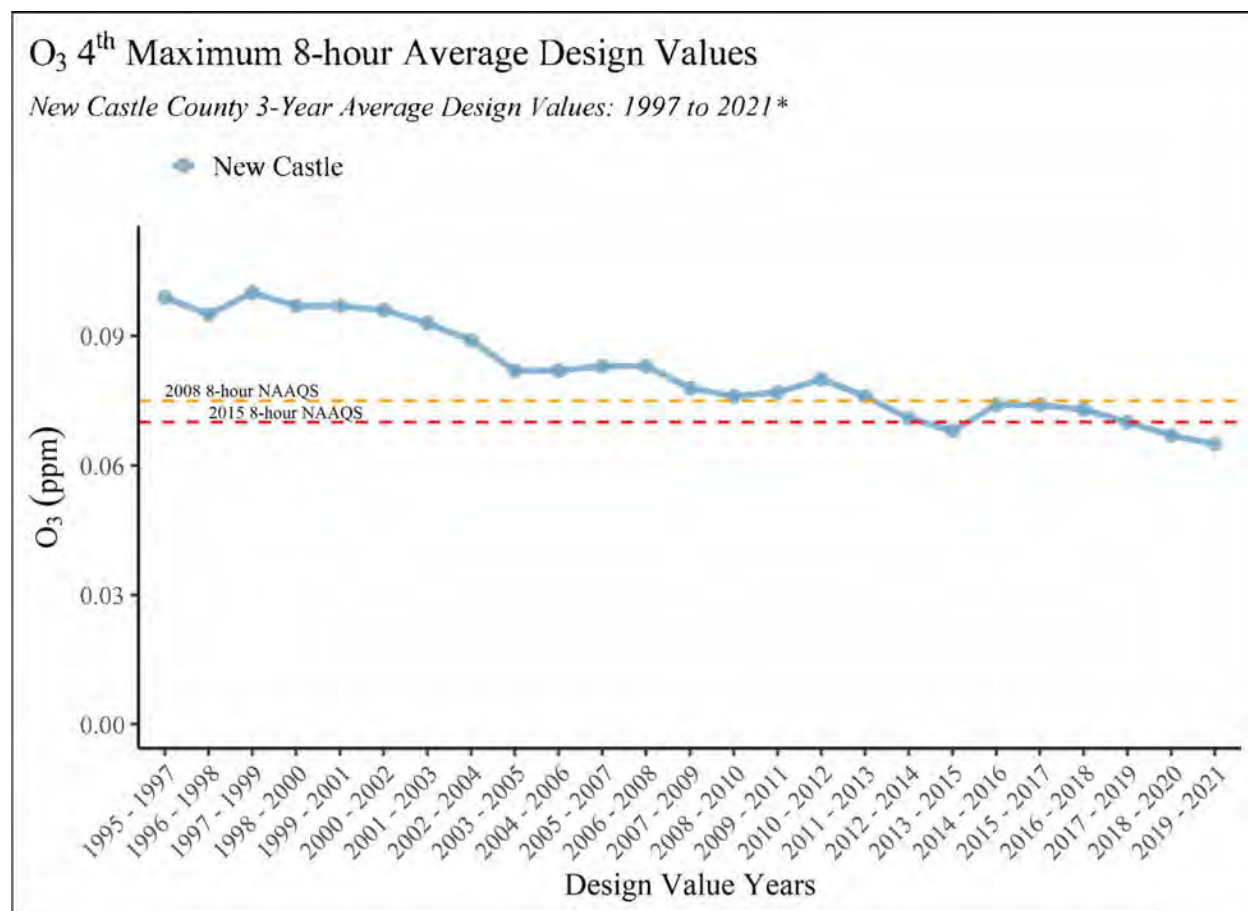


Figure 2-2. Delaware 8-Hour Ozone Design Values New Castle County

* At the time of preparation of this document, validated ozone monitoring data for New Castle County was only available through 2021.

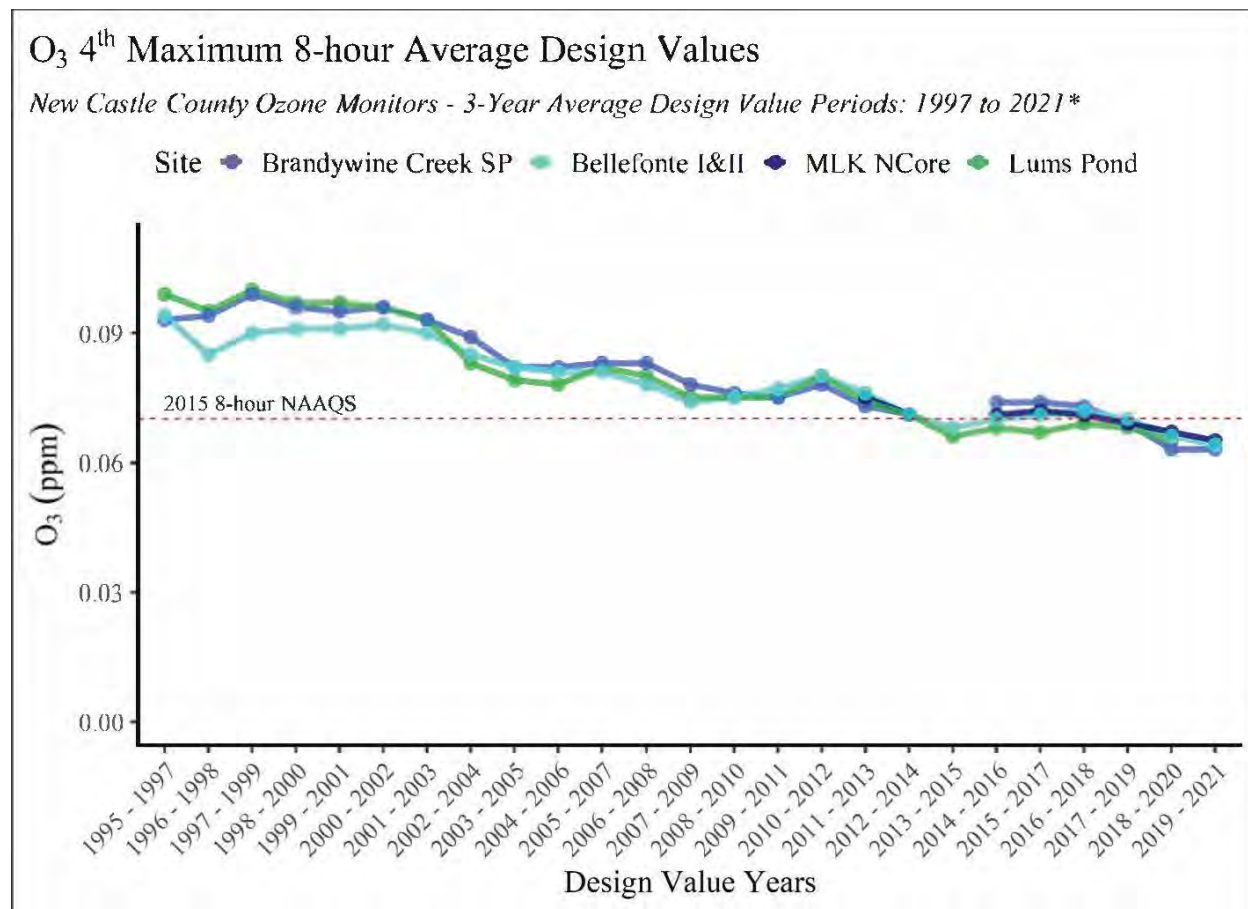


Figure 2-3. Delaware 8-Hour Ozone Design Values New Castle County Monitors

* At the time of preparation of this document, validated ozone monitoring data for New Castle County was only available through 2021.

2.3 Ozone Exceedances at Delaware Monitors

Delaware began recording the 8-hour ozone exceedances at its ambient monitors in 1997. An exceedance is recorded at a monitoring site when the daily maximum 8-hour average, rounded to three decimals, is greater than the standard of 0.070 ppm. Figure 2-4 summarizes the number of exceedances at all Delaware monitors from 1997 to 2021. It shows an overall decreasing trend in the number of exceedances. Since there is no averaging across years, it also shows the variability between years, likely due to variation in both emissions and meteorological conditions. For example, the implementation of control strategies or warm vs. cool summers.

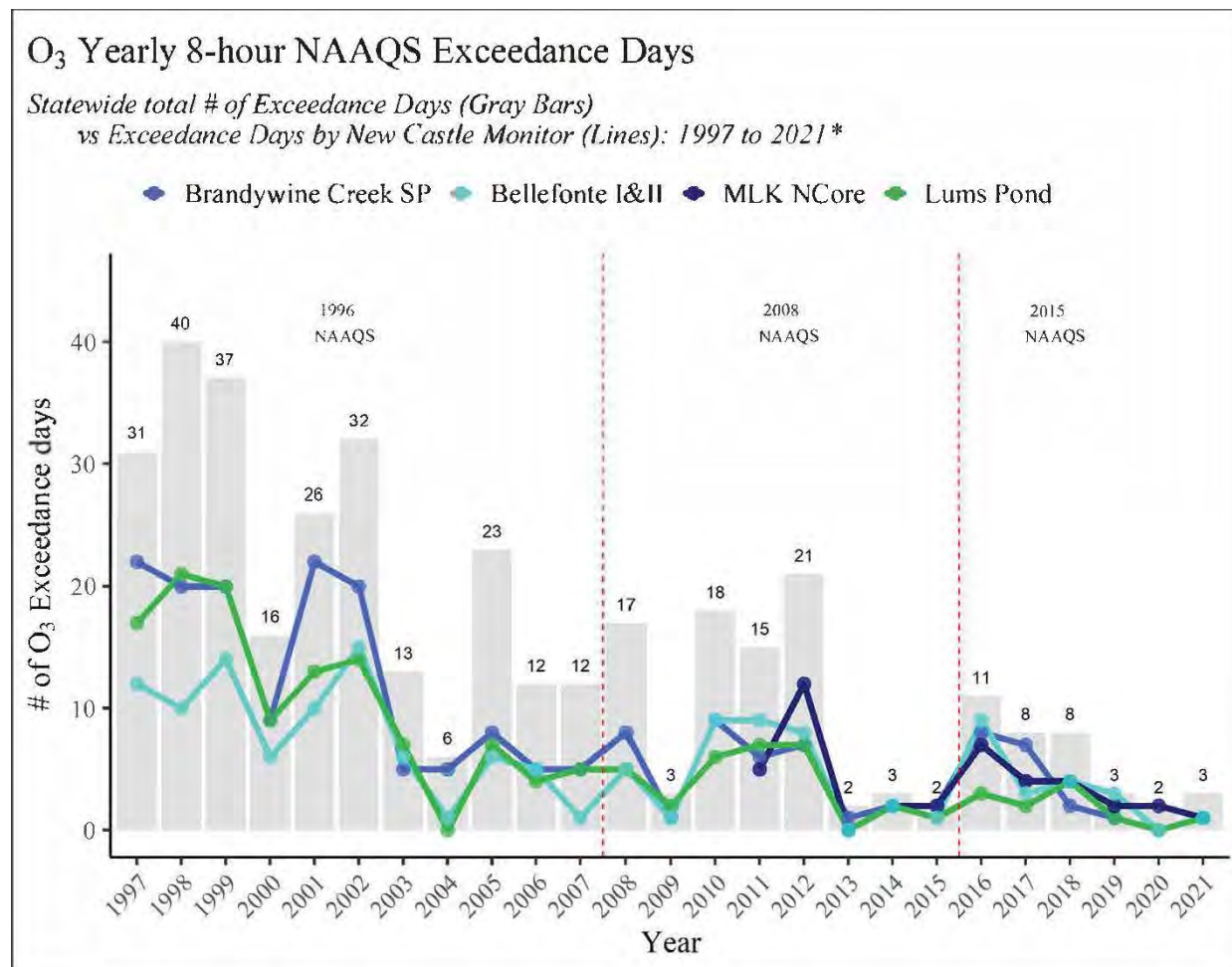


Figure 2-4. Number of 8-hour Ozone Exceedance Days at New Castle County Monitors

* At the time of preparation of this document, validated ozone monitoring data for New Castle County was only available through 2021.

2.4 Meteorological Analysis

Many meteorological factors affect the formation of ground level ozone. One major factor is the ambient temperature during the ozone season. One way of incorporating meteorology in evaluating trends in ozone concentrations is to analyze the number of ozone exceedances, the number of days with temperatures equal to or greater than 90°F and the ratio of these two variables. Figure 2-5 shows this set of data for Delaware from 1997 through 2001. It should be noted that the temperature data in Figure 2-5 is from New Castle County only (Wilmington Airport), while the number of exceedance days are for the entire state (i.e., all three counties). It can be reasonably assumed that the temperature profile for the entire state be similar to that of New Castle County. Figure 2-6 shows the ratio of 8-Hour Ozone NAAQS exceedance days to the number of $\geq 90^\circ$ Days.

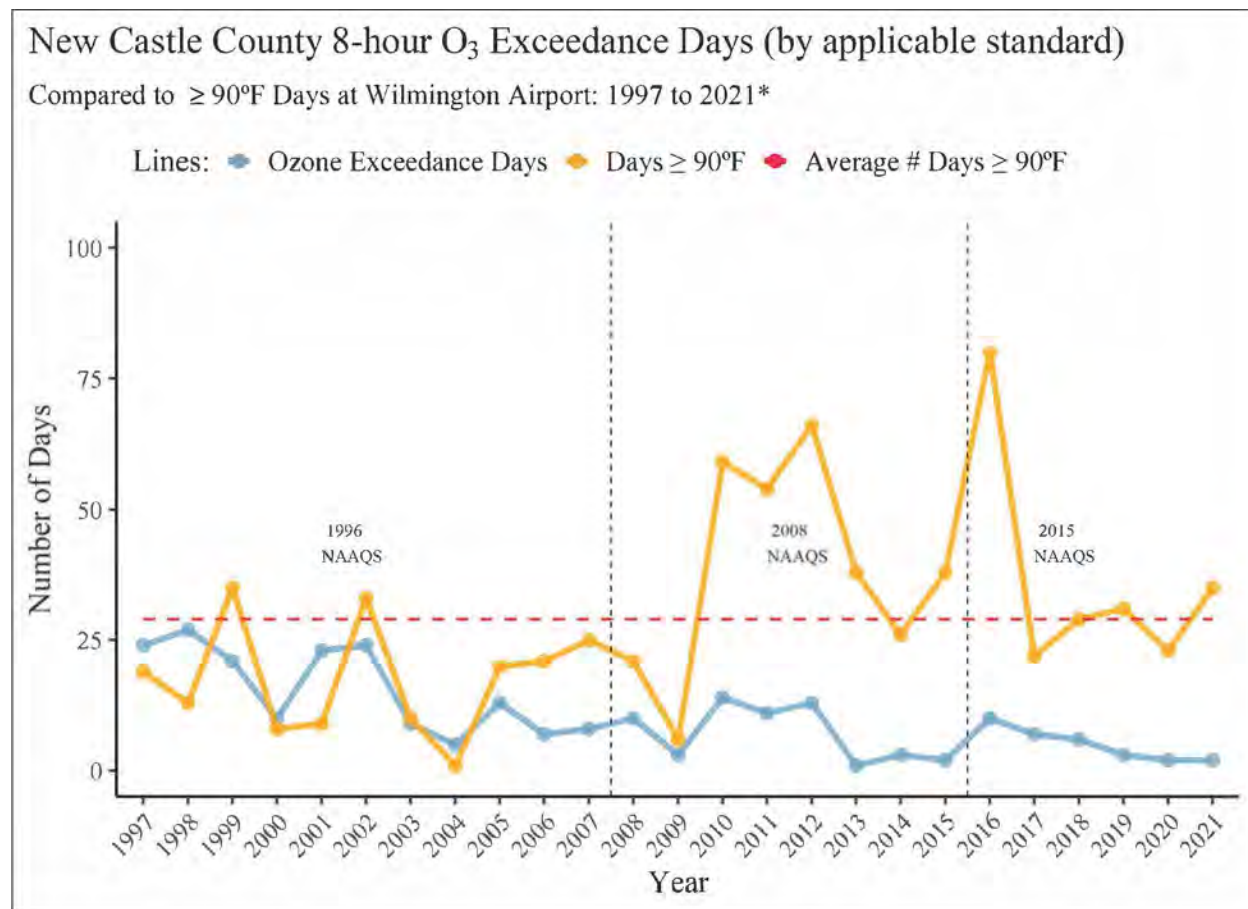


Figure 2-5 Delaware 8-Hour Ozone NAAQS Exceedance Days Compared to Number of $\geq 90^{\circ}$ Days at Wilmington Airport

* At the time of preparation of this document, validated ozone monitoring data for New Castle County was only available through 2021.

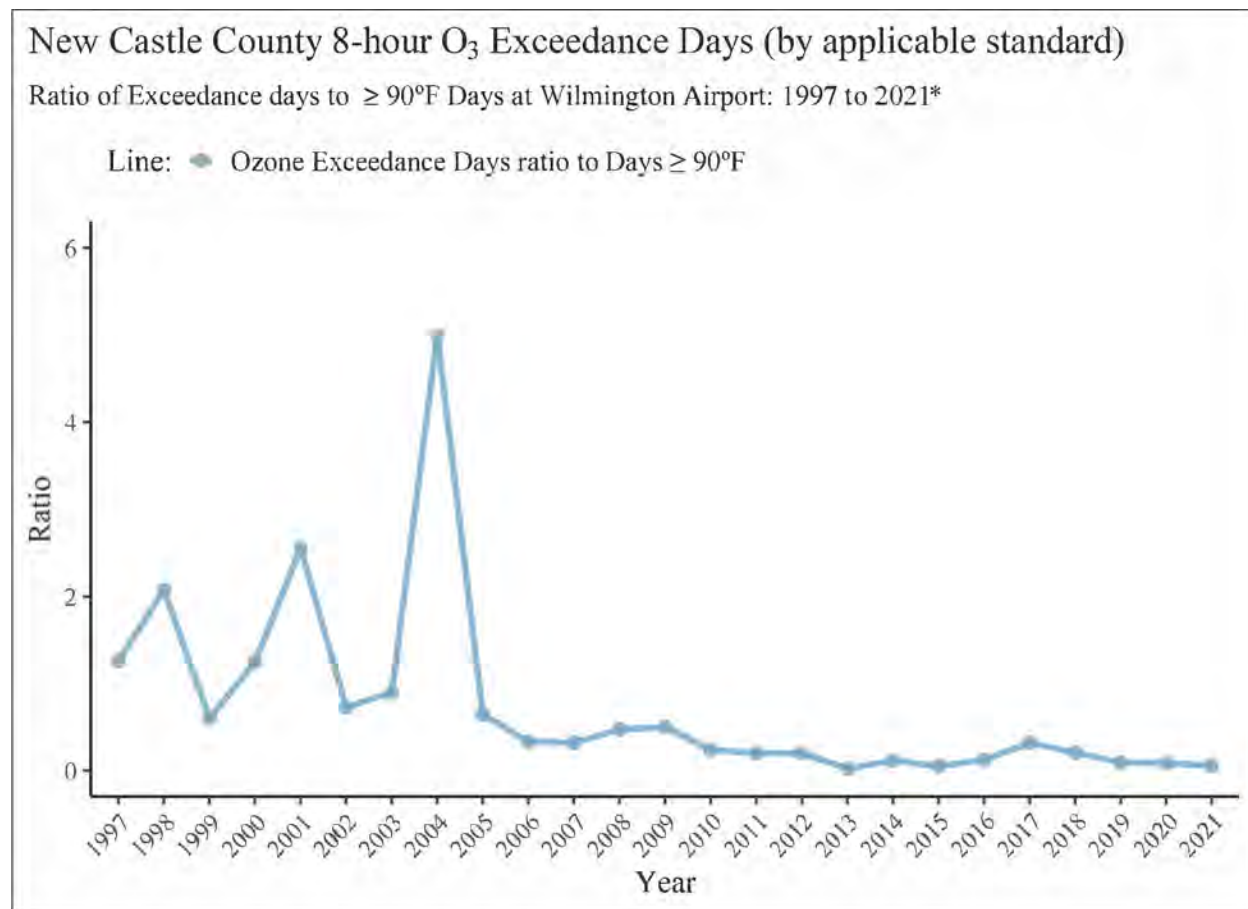


Figure 2-6 Delaware Ratio of 8-Hour Ozone NAAQS Exceedances Days to Number of $\geq 90^{\circ}$ Days at Wilmington Airport

* At the time of preparation of this document, validated ozone monitoring data for New Castle County was only available through 2021.

2.5 General Trend of Ambient Air Quality For 8-Hour Ozone NAAQS

From the data presented in this section, it is clear that the general trend of ambient ozone air quality in New Castle County is continuously improving, especially in the past 3 years. In summary:

- (1) The number of 8-hour ozone exceedances at New Castle County monitors show a clear decreasing trend (Figure 2-2)
- (2) Ambient ozone concentrations recorded at New Castle County monitors show a clear downward trend Figure 2-3)

3.0 Gasoline Vapor Recovery

CAA Section 182(b)(3) requires that this SIP revision must include information regarding Delaware's Gasoline Vapor Recovery program.

3.1 Background and Federal Requirements

Because gasoline vapors contain mainly VOCs that contribute to the formation of ground-level ozone in the ambient air, Section 182(b)(3) of the CAA requires states with moderate and higher ozone NAAs, including Delaware,¹¹ to revise their SIPs to require "owners or operators of gasoline dispensing systems to install and operate.....a system for gasoline vapor recovery of emissions from the fueling of motor vehicles."¹²

To comply with the above CAA requirement, Delaware has required, since 1993, gasoline dispensing facilities (GDFs) in the state to install Stage II vapor recovery systems (VRS) to control gasoline vapor emissions from motor vehicles during refueling processes. Stage II VRS controls gasoline vapor emissions by collecting gasoline vapors displaced from a vehicle's gasoline tank during the transfer of gasoline from GDF to the vehicle's tank, returning the collected vapors to GDF's Underground Storage Tanks (UST) or Above Ground storage tanks (AST).

Delaware has also required, since 1993, the GDFs to install Stage I VRS for their gasoline storage tanks to control gasoline vapor emissions during gasoline delivery. Stage I VRS controls gasoline vapor emissions by collecting gasoline vapors displaced from GDF's UST or AST when a delivery truck delivers gasoline into the UST or AST and returning the collected vapors to the tank of the delivery truck. A properly designed and installed Stage I system will assist in maintaining a vapor tight UST or AST and thereby prevent the escape of gasoline vapors during the daily operation at a GDF.

Since 1998, automobile manufacturers in the United States have been required by Section 202(a)(6) of the CAA to install on-board refueling vapor recovery (ORVR) systems on new vehicles. Both Stage II and ORVR systems are effective for controlling gasoline vapor emissions during vehicle refueling. However, the vacuum-assist Stage II systems¹³ and the ORVR systems are incompatible. When such Stage II-equipped GDFs are refueling ORVR-equipped vehicles, the ORVR system will force the Stage II's vacuum pump to pull fresh air into the UST or AST, causing vapor pressure growth in the storage tanks. The vapor pressure growth leads to additional vapor emissions from the USTs or ASTs, especially when those tanks are not vapor-tight.

¹¹ In early 1990s, two counties in Delaware, New Castle and Kent, were designated as "severe non-attainment areas" under the 1-hour ozone national ambient air quality standard.

¹² CAA 182(b)(3)(A)

¹³ There are two types of Stage II vapor recovery systems, the vacuum-assist system and the balance system. The Stage II systems installed at Delaware GDFs are all vacuum-assist systems.

In May 2012, the EPA determined that the ORVR systems were in widespread use nationwide on gasoline-powered vehicles and issued a final rule to waive Section 182(b)(3) Stage II requirements.¹⁴ The final rule aimed to reduce the adverse effect of the functional overlap and incompatibility between the vacuum-assist Stage II systems at GDFs and the ORVR system on vehicles. Under the final rule, the states in the OTR, including Delaware, are allowed to remove their GDF's Stage II vapor recovery requirements, provided the overall emissions from the GDFs without Stage II systems do not increase. Section 184(b)(2) of the CAA requires the Administrator of the EPA to identify "control measures capable of achieving emission reductions comparable to those achievable through vehicle refueling controls" and for states that are in OTR to adopt "such [comparable] measures or such vehicle refueling controls."

Since Delaware's Stage II systems are all vacuum-assist systems, in 2019, Delaware proposed to decommission the Stage II systems installed at all GDFs in Delaware, through amendments to 7 **DE Admin. Code** 1124, Section 26.0 "Gasoline Dispensing Facility Stage I Vapor Recovery" and Section 36.0 "Vapor Emission Control at Gasoline Dispensing Facilities".

3.2 Regulatory Amendments

The purpose of the amendments, effective July 11, 2020, were to: (1) finalize the deadline for decommissioning all Stage II systems in Delaware, (2) implement necessary requirements for GDFs to ensure that gasoline vapor emissions are well-controlled at both existing and new GDFs, and (3) provide to GDFs flexibilities for adopting new and revised requirements.

The amendments required the decommissioning of Stage II systems by December 31, 2021, and installing Stage I Enhanced Vapor Recovery (EVR) systems by December 31, 2025. The amendments will: (1) will result in VOC emission reductions of 71 tons per year starting in 2021, (2) provide an additional 58 tons of VOC emission reduction per year after 2025, and resulting in a total 129 tons of long-term VOC emission reductions for attaining and maintain the ozone air quality.

The amendments were submitted to EPA on November 30, 2020 and were approved into SIP on July 11, 2022.¹⁵

¹⁴ Air Quality: Widespread Use for Onboard Refueling Vapor Recovery and Stage II Waiver. EPA Final Rule. 77 FR 28772. May 16, 2012. <https://www.govinfo.gov/content/pkg/FR-2012-05-16/pdf/2012-11846.pdf>.

¹⁵ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Removal of Stage II Gasoline Vapor Recovery Program Requirements and Revision of Stage I Gasoline Vapor Recovery Program Requirements. EPA Final Rule. 87 FR 35423. June 10, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-06-10/pdf/2022-12236.pdf>

4.0 Inspection and Maintenance Program

CAA Section 182(b)(4) requires that this SIP revision must include information regarding Delaware's Motor Vehicle Inspection and Maintenance program.

4.1 Introduction and Background

Motor vehicles are significant contributors of VOCs, Carbon Monoxide (CO) and NO_x emissions. An important control measure to reduce these emissions is the implementation of a motor vehicle I/M program. Despite being subject to rigorous Federal and state vehicle pollution control programs, cars and trucks still create toxic contaminants, which contribute to about half of the ozone air pollution and nearly all of the CO air pollution in United States cities. Of all highway vehicles, passenger cars and light-duty trucks emit most of the vehicle-related CO and ozone-forming hydrocarbons. They also emit substantial amounts of NO_x and air toxics.

The CAA as amended in 1990 requires that most polluted areas adopt either "Basic" or "Enhanced" I/M programs, depending on the severity of the problem and the population of the area. The moderate ozone NAAs, plus marginal ozone areas with existing or previously required I/M programs, fall under the "Basic" I/M requirements. The 1990 Amendments to the CAA signed into law on November 15, 1990 required EPA to develop Federally enforceable guidance¹⁶ for two levels of I/M program: "Basic" I/M for areas designated as moderate nonattainment, and "Enhanced" I/M for serious and worse NAAs, as well as for areas within an OTR, regardless of attainment status.

"Basic" and "Enhanced" I/M programs both achieve their objective by identifying vehicles that have high emissions as a result of one or more malfunctions, and by requiring them to be repaired. An "Enhanced" program covers vehicles in operation more thoroughly than a Basic program. It employs inspection methods that are better at finding high emitting vehicles and has additional features to better assure that all vehicles are tested properly and effectively repaired.

The "Enhanced" I/M program can be implemented in two ways, as "Low Enhanced" or "High Enhanced". The determination of whether an area has a Low Enhanced or a High Enhanced program depends on the emissions reductions required for the area. If minimal reductions are needed to meet the Rate of Progress (ROP)/Attainment requirements, the Low Enhanced program is acceptable, otherwise a High Enhanced program must be adopted and implemented.

¹⁶ USEPA - Vehicle Emissions Inspection and Maintenance (I/M): Policy and Technical Guidance. 2022. Retrieved from <https://www.epa.gov/state-and-local-transportation/vehicle-emissions-inspection-and-maintenance-im-policy-and-technical>.

The EPA's rule for the "Enhanced" I/M program established two standards codified in 40 CFR 51.351(f) - *High Enhanced Performance Standard* and 40 CFR 51.351(g) - *Low Enhanced Performance Standard*. The High Enhanced performance standard achieves a greater reduction in emissions and uses a highly technical test method. The Low Enhanced performance standard provides flexibility for nonattainment areas that are required to implement enhanced I/M programs and can meet the Act's emission reduction requirements for reasonable further progress (referred to as 15% plans) and attainment from other sources. States may select the low enhanced performance standard if they have an approved SIP for 15%.

Delaware's I/M program for New Castle County was implemented on January 1, 1983, due to New Castle County being designated non-attainment for the 1979 1-hour standard with a severe classification in 1981. Vehicle inspection and maintenance is a mandated requirement of the CAA for any area classified as "moderate" or above. By 1982, EPA accepted Delaware's State Implementation Plan, and the program started on January 1, 1983. At the behest of the Governor Dupont's Clean Air Tasks Force's recommendation, the I/M program was expanded to include Sussex County with a subsequent amendment to 7 DE Admin. Code 1126.

On January 11, 2023, Delaware implemented the amended 7 **DE Admin. Code** 1131 in New Castle County. Under Delaware regulation 7 **DE Admin. Code** 1131, vehicle owners are now required to bring in their vehicles for emissions inspection every two years except newer vehicles with a seven model year exemption. Vehicle I/M programs help improve air quality by identifying high emitting vehicles and require them to be repaired. Owners of vehicles with high emissions are notified to make repairs so that emissions are within legal limits so that the vehicles can pass emission testing. For more information on EPA's approval of Delaware's I/M program amendments, see Tables 10-4 and 10-6 in Section 10.

4.2 Performance Standard Certification

EPA's final rule¹⁷ published October 7, 2022, reclassified certain ozone NAAs from marginal to moderate for the 2015 ozone NAAQS, which included New Castle County. The rule obligated NAAs reclassified as moderate for the 2015 ozone NAAQS to certify their "Basic" I/M programs. This rulemaking explained that states with existing I/M programs would need to conduct and submit a Performance Standard Modeling (PSM) analysis as well as make any necessary program revisions as part of their moderate area SIP submissions to ensure that I/M programs are operating at or above the "Basic" I/M performance standard level for the 2015 ozone NAAQS.

¹⁷ Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as marginal for the 2015 Ozone National Ambient Air Quality Standard. EPA Final Rule. 87 FR 60897. October 7, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf>.

Since New Castle County already implements a “Low Enhanced” I/M program that is more stringent than the “Basic” I/M program, Delaware was only required to perform the analysis and certify their program. The modeling and certification requirement is fulfilled in a separate report following EPA’s October 2022 Guidance, “Performance Standard Modeling for New and Existing Vehicle I/M Programs using the Motor Onroad Vehicle Emissions Simulator (MOVES) Mobile Source Emissions Model”.¹⁸ The PSM analysis shows New Castle County’s I/M program meets the “Basic” performance standard without modification or revision required of the regulation and that Delaware’s current I/M SIP (Motor Vehicle Emissions Inspection Program; Plan for Implementation), and meets the I/M regulations at 40 CFR 51.372 required elements outlined in (a)(1)-(8).

Delaware is addressing the PSM Certification requirement in a separate action. The public hearing for the PSM Certification is expected to take place in conjunction with this SIP revision. Delaware will submit an I/M certification SIP that both demonstrates compliance with the basic I/M performance standard at 40 CFR 51.352(e), by means of an I/M Performance Standard Certification (PSC) demonstration and a narrative description of Delaware’s SIP-approved program that attests how the existing enhanced I/M program (including Delaware’s most recent I/M update SIP revision request) complies with all applicable requirements for a basic I/M program under CAA section 182(b)(4).

¹⁸ Performance Standard Modeling for New and Existing Vehicle Inspection and Maintenance (I/M) Programs Using the MOVES Mobile Source Emissions Model EPA. October 2022. Retrieved from <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1015S5C.pdf>

5.0 NNSR Certification

40 CFR 51.1314 requires that states shall submit a Non-attainment New Source Review (NNSR) plan after a NAAQS designation. When new NAAQS are promulgated, states must submit certifications of adequacy for their NNSR Program as part of the required SIP elements. On August 3, 2020, Delaware submitted to EPA its certification that its existing NNSR program is at least as stringent as the requirements at 40 CFR 51.165 for ozone and its precursors, as amended by the final rule titled “Implementation of the 2015 NAAQS for Ozone: Nonattainment Area State Implementation Plan Requirements”. The requirements necessary to appropriately implement Delaware’s NNSR program are included in Table 5-1. Delaware’s NNSR SIP submittal was approved by EPA, effective June 14, 2021.

Table 5-1. 2015 Ozone NAAQS SIP Requirements for Review of New Sources and Modifications

40 CFR 51.165 Permit Requirements	Delaware Requirements
(a)(1)(iv)(A)(1)(i)-(iv) and (2): Major source thresholds for ozone – VOC and NOx	7 DE Admin. Code 1125 Section 2.2.
(a)(1)(iv)(A)(3): Change constitutes a major source by itself	7 DE Admin. Code 1125 Section 2.2.3.
(a)(1)(v)(E): Significant net emissions increase of NOx is significant for ozone	7 DE Admin. Code 1125 Section 1.9, Definitions – “Major Modification”.
(a)(1)(v)(F): Any emissions change of VOC in Extreme area triggers NNSR	Not applicable since no Delaware NAA is or has previously been designated as Extreme.
(a)(1)(x)(A)-(C) and (E): Significant emissions rates for VOC and NOx as ozone precursors	7 DE Admin. Code 1125 Section 1.9, Definitions – “Significant”.
(a)(3)(ii)(C)(1)-(2): Provisions for emissions reduction credits	7 DE Admin. Code 1125 Section 2.5 as approved into Delaware’s SIP on October 2, 2012. These SIP-approved provisions continue to apply to Delaware sources in NAAs.
(a)(8): Requirements for VOC apply to NOx as ozone precursors	7 DE Admin. Code 1125 Section 2.2.4.
(a)(9)(i)-(iii): Offset ratios for VOC and NOx for ozone nonattainment areas <i>[subparagraphs (a)(9)(i)-(iii) were changed to (a)(9)(ii)-(iv)]</i>	7 DE Admin. Code 1125 Section 2.4.3.
(a)(12): Anti-backsliding provision(s), where applicable	Sources in Kent and New Castle Counties remain subject to requirements and major source thresholds based on the Severe designation for the 1-hour ozone standard. Sussex County remains subject to requirements and major source thresholds based on the moderate designation as part of an ozone transport region.

6.0 Offsets and Emission Reduction Credits

CAA Section 182(b)(5) requires that this SIP revision must include information regarding General Offset Requirements.

6.1 Non-attainment New Source Review Offsets

Major stationary sources of air pollution and major modifications to major stationary sources are required by the CAA Section 182 to obtain an air pollution permit before commencing construction. The process is called new source review (NSR) and is required whether the major source or modification is planned for an area where the NAAQS are exceeded (NAAs). Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits; while permits for sources located in NAAs are referred to as NAA permits. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program.

Non-attainment New Source Review (NNSR) requires new major sources, or major modifications at existing sources, within NAAs to offset the annual emissions increase from the new source or modification and to provide a net air quality benefit. (7 **DE Admin. Code** 1125, or “Regulation 1125”). Emissions offset by NNSR are based upon NAA classification severity, using a ratio, which is specified in Section 2.0 of Regulation 1125.

As a result of Delaware’s non-attainment designations for prior ozone NAAQS, the offset requirements for new sources remain in place and are as stringent as the classifications from the 1979 1-hr ozone standard:

- Kent County - Severe under 1-hr standard; requires 1.3:1 offsets for NO_x and VOCs
- New Castle County - Severe under 1-hr standard; requires 1.3:1 offsets for NO_x and VOCs
- Sussex County - Marginal under 1-hr standard (but considered moderate since Delaware is part of the OTR; requires 1.15:1 offsets for NO_x and VOCs

Per the CAA Section 173(c)(1)-(2), Offsets, emission offsets may be obtained from a NAA which 1) is equal or higher in classification; and 2) contributes to non-attainment in the area.

6.2 Emission Reduction Credits

The CAA Section 182 requires new emission sources in NAAs for ozone to offset VOC and NO_x emissions, which are ozone precursors, depending on the non-attainment level for the area. The purpose for requiring offsetting emissions decreases is to allow an area to move towards attainment of the ozone NAAQS while still allowing for industrial growth.

This can be accomplished through the implementation of an emission banking and trading program, which provides incentives to make progress toward attainment of air quality standards. The 1990 CAA allows for the use of market-based approaches, including emission trading, to assist in attaining and maintaining the NAAQS, for all criteria pollutants. Emissions trading programs have two key components: a limit (or cap) on pollution, and tradable allowances equal to the limit that authorize allowance holders to emit a specific quantity (e.g., one ton) of the pollutant.

An emission reduction credit (ERC) is a credit earned by a company when it reduces its air emissions. ERCs are discrete quantities of actual emissions expressed in tons of pollutant reduced. ERCs are reductions in emissions in one place that can be used to compensate for (or offset) emission increases which occur in a NAA. These reductions can be generated through the shutdown of individual pieces of equipment or entire facilities. These credits can then be sold by the companies that hold them, to offset new emissions sources.

Delaware's regulation 7 **DE Admin. Code** 1134, *Emission Banking and Trading Program* ("Regulation 1134") was developed to establish a voluntary emission banking and trading program. ERCs do not have an expiration date, and they are retired after use. In accordance with the CAA Section 173(c)(1)-(2), Offsets:

"(1) The owner or operator of a new or modified major stationary source may comply with any offset requirement in effect under this part for increased emissions of any air pollutant only by obtaining emission reductions of such air pollutant from the same source or other sources in the same nonattainment area, except that the State may allow the owner or operator of a source to obtain such emission reductions in another nonattainment area if

- (A) the other area has an equal or higher nonattainment classification than the area in which the source is located and*
- (B) emissions from such other area contribute to a violation of the national ambient air quality standard in the nonattainment area in which the source is located. Such emission reductions shall be, by the time a new or modified source commences operation, in effect and enforceable and shall assure that the total tonnage of increased emissions of the air pollutant from the new or modified source shall be offset by an equal or greater reduction, as applicable, in the actual emissions of such air pollutant from the same or other sources in the area..."*

6.2.1 Certification of Emission Reduction Credits

In accordance with 7 **DE Admin. Code** 1134, Section 4.0, facilities that would like to create ERCs from shutdowns of facilities and/or equipment are required to submit an application for certification of an emission reduction to DNREC's Division of Air Quality (AQ). AQ reviews each application to determine if the reductions are real, surplus, permanent, quantifiable, and enforceable as defined in Section 2.0 of Regulation 1134:

“Real (reductions) means reductions in actual emissions released into the atmosphere.”

“Surplus (reductions) means actual emission reductions below the baseline (see 6.0 of this regulation) not required by regulations or proposed regulations, and not used by the source to meet any state or federal regulatory requirement.”¹⁹

“Enforceable means any standard, requirement, limitation or condition established by an applicable federal or state regulation or specified in a permit issued or order entered thereunder, or contained in a SIP approved by the Administrator of the U.S. Environmental Protection Agency (EPA), and which can be enforced by the Department and the Administrator of the EPA.”

“Permanent (reductions) means that the actual emission reductions submitted to the Department for certification have been incorporated in a permit or a permit condition or, in the case of a shutdown, the permit to operate for the emission unit or units has been voided.”

“Quantifiable (reductions) means that the amount, rate and characteristics of emission reductions can be determined by methods that are considered reliable by the Department and the Administrator of the EPA.”

6.2.2 Status of Credits

The current status of Delaware's New Castle County ERCs certified by the Department pursuant to 7 **DE Admin. Code** 1134, Emission Banking and Trading Program, since its inception are shown in Table 6-1:

¹⁹ In order to establish the amount of an emission reduction that is surplus and thus eligible for credit, an ozone season and a non-ozone season emission baseline must be established for each emission unit or units associated with a particular emission reduction. The formula for calculation of the ozone season and non-ozone season emission baselines can be found in 7 **DE Admin. Code** 1134, Section 6.3.

Table 6-1 - Current ERCs in New Castle and Kent Counties*, Delaware.

Held By	VOC (tons)		NO _x (tons)	
	Ozone Season	Non-Ozone Season	Ozone Season	Non-Ozone Season
<i>1734 LLC</i>	117	78	9	20
<i>Calpine</i>	0	0	27	19
<i>Delaware City Industries (DCI)</i>	4	2	1	1
<i>Diamond State Port Corporation</i>	34	24	9	7
<i>DuPont</i>	0	0	0	0
<i>Lafarge</i>	3	2	0	0
<i>NRG Energy Center</i>	0	0	121	147
<i>Veolia</i>	4	2	4	5
<i>VPI</i>	6	4	1	1
<i>Division of Small Business</i>	86	51	31	22
Total ERCs Currently in New Castle and Kent Counties	254	163	203	222

* Kent County ERCs are included in this table, as they are also used for calculating Reasonable Further Progress (see Section 8.2.2.1.3).

7.0 Delaware 2017 Base Year Emissions Inventory

40 CFR 51.1310(b), 51.1315(a), and 51.1315(b) require that this SIP revision must include a base year inventory (BYI). This section contains a revision of Delaware's 2017 base year inventory (originally submitted to EPA on November 6, 2020) for the 2015 8-hour ozone NAAQS SIP for use in the RFP demonstration.

7.1 Introduction

The Department finalized the 2017 base year inventory entitled, *2017 Base Year Emissions Inventory State Implementation Plan for VOC, NOX, and CO For Areas of Marginal Nonattainment of the 2015 Ozone NAAQS in Delaware* (Appendix A) in November 2020 to satisfy the marginal NAA SIP inventory requirement of the CAA. This document was originally submitted to EPA Region III to fulfill the SIP inventory requirement. The inventory includes CO, NO_x, and VOC emissions for all anthropogenic, human caused, sources in the NAA, New Castle County, for 2017. The 2017 base year inventory provides the source categories and descriptions, methodologies, controls, seasonal allocations, and example calculations and can be referenced in Appendix A.

The 2017 base year inventory is the starting point for calculating the emission reductions needed to demonstrate RFP, which is required for moderate NAAs for ozone by the CAA and EPA. This SIP revision updates the Original 2017 base year inventory to include emission estimates using the most recent and EPA mandated model for the Onroad and Nonroad sector. Additional updates are to the Nonpoint sector.

7.2 Background and Requirements

Sections 182(a)(1) and 172(c)(3) of the CAA require all ozone NAAs to establish a comprehensive, accurate, and current inventory of actual emissions from all sources of the relevant pollutant or pollutants in the area by August 3, 2020 (i.e., two years after designation as non-attainment). This inventory is referred to as the base year inventory. Delaware has previously been designated non-attainment for ozone under the 1979 1-hour, 1997 8-hour, and 2008 8-hour ozone NAAQS, and has therefore been subject to this emission inventory requirement since the 1990 amendments to the CAA.

Delaware has developed emission inventories that meet the criterion of CAA 182(a)(1) and 172(c)(3) every three years since 1990. At the time of the marginal designation for the 2015 8-hour ozone NAAQS, Delaware's latest comprehensive, accurate inventory of actual emissions from all sources of VOC, NO_x, and CO in the State covered calendar year 2017. Delaware's November 2020 SIP revision, *2017 Base Year Emissions Inventory* (Appendix A), established the 2017 calendar year emissions inventory as its base year inventory under the 2015 8-hour ozone NAAQS.

The inventory parameters defined by the base year emissions inventory requirements for the 2015 8-hour ozone NAAQS include the following:

- **Inventory year** – 2017
- **Pollutants**²⁰ – VOC, NO_x, and CO as precursors to ozone
- **Source coverage** – All sources, including Point, Nonpoint, Nonroad, and Onroad mobile sources
- **Spatial resolution** – County level emissions
- **Geographic coverage** – New Castle County
- **Seasonal Allocation** – Annual and summer season weekday (SSWD) daily emissions.
 - The summer season is defined as the months June, July, and August. Weekday is defined as the days Monday, Tuesday, Wednesday, Thursday, and Friday.

EPA requires states to update their base year inventory with the latest emission estimates as directed. This SIP revision updates the Onroad emissions to include emission estimates using the latest available EPA Motor Onroad Vehicle Emissions Simulator model, MOVES3. The EPA mandated use of MOVES3 for SIPs and Transportation Conformity in their January 7, 2021 Notice of Availability.²¹

In addition, the revision updates the Nonpoint sector for a more comprehensive and accurate baseline inventory as recommended in EPA's May 2017 Inventory Guidance, "Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter NAAQS and Regional Haze Regulations"²² (hereafter referred to as "EPA's 2017 Inventory Guidance"). The updated inventory will be referenced in this document as the "Adjusted 2017 base year inventory".

7.3 Delaware Adjusted 2017 Base Year Emission Inventory Summary

The Adjusted 2017 base year inventory for New Castle County is summarized in Table 7-1 by source sector emissions, which include Point, Nonpoint, Nonroad, and Onroad. Each sector will be described in detail in the following subsections. Throughout Section 7 of this document, annual emissions are reported in tons per year (tpy) and SSWD emissions in tons per day (tpd). The totals may not match the sum of the individual values due to independent rounding.

²⁰ Per 40 CFR 51.1315, a base year inventory only requires emissions from sources of VOC and NO_x. However, Delaware included sources of CO to be consistent with past base year inventory reports.

²¹ Official Release of the MOVES3 Motor Vehicle Emissions Model for SIPs and Transportation Conformity. EPA Notice of Availability. 86 FR 1106. January 7, 2021. <https://www.govinfo.gov/content/pkg/FR-2021-01-07/pdf/2021-00023.pdf>

²² Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. EPA. May 2017. Retrieved July 2023 from https://www.epa.gov/sites/default/files/2017-07/documents/ei_guidance_may_2017_final_rev.pdf

Table 7-1 Adjusted 2017 Base Year Inventory for New Castle County by Source Sector

Source Sectors	2017 Annual Emissions (tpy)			2017 SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Point	1,766	2,504	747	10.42	14.53	3.12
Nonpoint	3,678	1,445	3,184	7.46	2.51	9.59
Nonroad	23,844	3,152	2,262	92.89	9.27	7.69
Onroad	26,302	5,105	1,693	83.23	16.06	5.37
All Sectors	55,590	12,206	7,886	194.00	42.38	25.76

7.3.1 Point Sources

The Point source inventory represents facility-specific data for larger stationary sources. Emissions data for all other source categories are reported at the county level. Point sources typically include large industrial, commercial, and institutional facilities. Manufacturing facilities, within the industrial sector, comprise the majority of all reporting Point sources. The institutional sector includes hospitals, universities, prisons, military bases, landfills, and wastewater treatment plants.

The following criteria were established for defining the universe of facilities to be surveyed for 2017:

- Facilities that held a Title V permit in 2017; and
- Facilities that held a Synthetic Minor permit in 2017.

There are 82 facilities located within New Castle County that were included in the Original 2017 base year inventory.

For the list of facilities, emission estimates, methodologies, and season allocations refer to Delaware's *2017 Base Year Emissions Inventory* (Appendix A). In this SIP revision no changes were made to the Point source emissions from the Original 2017 base year inventory.

7.3.2 Nonpoint Sources

Stationary Nonpoint sources represent a large and diverse set of individual emission source categories. A Nonpoint source category is either: 1) represented by small facilities too numerous to individually inventory, such as commercial cooking at restaurants and fuel combustion at a variety of small businesses; or 2) a common activity, such as residential open burning.

For Nonpoint sources, the first task involved gathering activity data for each source category. In many cases, these data were obtained from Delaware-specific sources. In some cases, the activity data were developed through the allocation of a portion of a national activity dataset (*i.e.*, national off-road equipment populations) to Delaware. Basic demographic data were also used for some source categories and are presented in Table 7-2. Once activity data were obtained, spreadsheets were developed to manage the data and combine the activity data with the selected emission factors to obtain uncontrolled emissions.

Table 7-2 2017 Demographic Data for New Castle County

Demographic Parameter	New Castle County
Population ²³	564,193
Households	207,325
Land Area (square miles)	439
Annual Vehicle Miles Traveled (VMT) (million miles)	6,095

Finally, for those sources where controls were applied, emissions were adjusted to account for control efficiency, rule effectiveness, and rule penetration. These terms are defined as:

- Control efficiency - represents the typical emissions reduction achieved as compared to the otherwise uncontrolled emissions.
- Rule effectiveness - reflects the ability of the regulatory program to achieve all emissions reductions that could have been achieved by full compliance with the applicable regulations at all sources at all times.
- Rule penetration - represents the percent of sources within a source category that are subject to the rule that requires control.

Table 7-3 lists the Nonpoint source categories for which CO, NO_x, and VOCs for New Castle County were estimated. For source category listings and descriptions, methods and data sources, emission factors, and seasonal allocations refer to Delaware's *2017 Base Year Emissions Inventory* (Appendix A).

²³ Delaware Population Consortium. (2018). Annual Projections from the Delaware Population Consortium. Retrieved on Sep 17, 2018 from <https://stateplanning.delaware.gov/demography/dpc.shtml>

Table 7-3 2017 Base Year Inventory for Nonpoint Categories

VOC Emissions Only	Emissions of VOC, NO _x , and CO
Agricultural Pesticides	Agricultural Burning
AIM Coatings*	Commercial Cooking
Asphalt Paving	Commercial Fuel Combustion
Autobody Refinishing	Industrial Fuel Combustion
Commercial & Consumer Products	Land Clearing Debris Burning
Degreasing	Prescribed Burning
Dry Cleaning	Residential Fuel Combustion
Gasoline (Petroleum) Marketing	Residential Open Burning
Graphic Arts	Residential Wood Combustion
Industrial Adhesives	Structure Fires
Industrial Surface Coatings	Vehicle Fires
Traffic Markings	Wildfires

*AIM: Architectural and Industrial Maintenance

7.3.2.1 Nonpoint Sources Emission Revisions

Delaware evaluated the Nonpoint emissions from the Original 2017 base year inventory and identified revisions needed for its use as the RFP base year inventory. This SIP revision updates the Nonpoint section of the Original 2017 Base Year Emissions Inventory.

According to *EPA's 2017 Inventory Guidance*, the EPA recommends updating emissions for a more comprehensive and accurate baseline inventory when better information is available. During the evaluation of the Nonpoint inventory, Delaware identified errors that were made during the compilation of the inventory. For accuracy, the categories with errors were corrected in the Adjusted 2017 base year inventory. Descriptions of the compilation errors can be found in more detail in *Adjusted 2017 Nonpoint Inventory Excel Spreadsheet*, (Appendix B, tab "Nonpoint Categories").

In addition to small corrections, Delaware included several categories that were omitted from the Original 2017 Base Year Emissions Inventory to be consistent with the categories provided in EPA's 2017 National Emissions Inventory (NEI) and modeling platforms. For the omitted categories, Delaware used EPA's calculated emissions from the 2017 NEI. The SSWD factors for these source categories are calculated internally and included in the *Adjusted 2017 Nonpoint Inventory* (Appendix B, tab "SSWD Variations").

One source category, Lighter Fluid (from the Consumer & Commercial Products category), was a new category added to the 2020 NEI. Delaware calculated the 2017 adjusted base year emissions for Lighter Fluid by growing EPA's most recent modeling platform (2016v3) data with EPA's growth rate. The calculation details are included in (Appendix B, tab "Lighter Fluid").

Table 7-4 lists the Nonpoint categories that are being revised/added. The table compares the emission totals from the Original 2017 base year inventory to the revised totals in the Adjusted 2017 base year inventory.

Table 7-4 Original vs Adjusted 2017 Base Year Inventory Nonpoint Annual Category Totals

Source Categories	Original 2017 Base Year Inventory			Adjusted 2017 Base Year Inventory		
	Annual Emissions (tpy)			Annual Emissions (tpy)		
	CO	NO _x	VOC	CO	NO _x	VOC
Agricultural Pesticides	-	-	117	-	-	30
AIM ⁴ Coatings	-	-	403	-	-	390
Animal Cremation ¹	-	-	-	<1	<1	<1
Animal Husbandry ¹	-	-	-	-	-	35
Auto Refinishing	-	-	29	-	-	22
Human Cremation ¹	-	-	-	<1	<1	<1
Lighter Fluid (C&CP ²) ¹	-	-	-	-	-	12
POTWs ^{1,3}	-	-	-	-	-	12
Residential Grilling ¹	-	-	-	150	3	8
Retail Gasoline Stations	-	-	402	-	-	240
Total	-	-	951	150	3	749

1) New Category

2) C&CP: Consumer and Commercial Products

3) POTWs: Publicly Owned Treatment Works

4) AIM: Architectural and Industrial Maintenance

Table 7-5 includes the revisions to the Nonpoint SSWD emissions by source categories. It is noted some source categories required only an adjustment to the annual emissions or the SSWD emissions. Adjusted SSWD factor calculations are shown in *Adjusted 2017 Nonpoint Inventory* (Appendix B, tab “SSWD Variations”).

Table 7-5 Original vs Adjusted 2017 Base Year Inventory Nonpoint SSWD Category Totals

Source Categories	Original 2017 Base Year Inventory			Adjusted 2017 Base Year Inventory		
	SSWD Emissions (tpd)			SSWD Emissions (tpd)		
	CO	NOx	VOC	CO	NOx	VOC
Agricultural Pesticides	-	-	0.32	-	-	0.11
Animal Cremation ¹	-	-	-	<0.01	<0.01	<0.01
Animal Husbandry ¹	-	-	-	-	-	0.10
Commercial Fuel	0.43	0.73	0.04	0.43	0.52	0.03
Human Cremation ¹	-	-	-	<0.01	<0.01	<0.01
Lighter Fluid (C&CP ²) ¹	-	-	-	-	-	0.05
Portable Fuel Containers	-	-	0.33	-	-	0.42
POTWs ^{1,3}	-	-	-	-	-	0.03
Residential Grilling ¹	-	-	-	0.66	0.01	0.04
Residential Fuel	0.12	0.28	0.02	0.10	0.22	0.01
Retail Gasoline Stations	-	-	1.91	-	-	0.78
Total	0.55	1.01	2.62	1.19	0.76	1.57

1) New Category

2) C&CP: Consumer and Commercial Products

3) POTWs: Publicly Owned Treatment Works

The total Nonpoint emissions of the Adjusted 2017 base year inventory compared to the Original 2017 base year inventory are shown in Table 7-6.

Table 7-6 Original vs Adjusted 2017 Base Year Inventory Nonpoint Emission Totals

2017 Nonpoint Emissions	2017 Annual Emissions (tpy)			2017 SSWD Emissions (tpd)		
	CO	NOx	VOC	CO	NOx	VOC
Original BYI	3,527	1,444	3,387	6.76	2.76	10.63
Adjusted BYI	3,678	1,445	3,184	7.46	2.51	9.59

*BYI: Base Year Inventory

7.3.3 Onroad Sources

The 2017 Onroad mobile source inventory is an estimate of vehicle emissions based on actual vehicle miles traveled (VMT) on Delaware roadways in 2017 using EPA's MOVES model. The model requires activity data imported as input databases. For any type of data used by the model for which Delaware-specific data did not exist, the model used the system defaults. Activity data used in the input databases include the following:

- Road Type Distribution
- Source Type Population
- Vehicle Miles Traveled
- Inspection and Maintenance Program
- Age Distribution
- Average Speed Distribution
- Fuel
- Meteorology Data

Delaware used the input files submitted for EPA's 2017 NEI with EPA's MOVES to estimate Onroad emissions. The MOVES model version used for the Original 2017 base year inventory was MOVES2014b. For more detail on the Onroad emissions see Delaware's *2017 Base Year Emissions Inventory* (Appendix A).

7.3.3.1 Onroad Sources Emission Revisions

This SIP revision updates the Onroad emissions to include emission estimates using the latest available EPA MOVES model, MOVES3.1.0. The EPA mandated use of MOVES3 for SIPs and Transportation Conformity in their January 7, 2021 Notice of Availability.²⁴ MOVES3.1.0 was the most up to date version available during this analysis and is the version the Department used to calculate future emissions for RFP. As indicated in Section 3.4.2 of *EPA's 2017 Inventory Guidance*:

“It would be inconsistent to compare estimates from a new mobile model at the end of a 6-year period to estimates using an old model at the beginning of that 6-year period, and so the EPA could be unable to determine whether a 15 percent reduction (or subsequent 3 percent reductions) can be (or has been) achieved by an ROP/RFP plan. Thus, an updated ROP/RFP baseline NAA inventory may need to be created using the updated mobile model to appropriately meet the requirements of the Ozone Implementation Rule.”

²⁴ Official Release of the MOVES3 Motor Vehicle Emissions Model for SIPs and Transportation Conformity. EPA Notice of Availability. 86 FR 1106. January 7, 2021. <https://www.govinfo.gov/content/pkg/FR-2021-01-07/pdf/2021-00023.pdf>

The MOVES 2014b input database was converted to MOVES3 formatting using the MOVES2014 to MOVES3 conversion tool and guidance.²⁵ The county-specific input data types created for the 2017 inventory include VMT (by vehicle and roadway type), vehicle registration data (vehicle populations and age distributions), average speeds in the form of speed bin fractions (weekday versus weekend and by roadway type), and I/M program specifications. Table 7-7 lists the updated inputs and assumptions for MOVES3 used to calculate the mobile emissions for the Adjusted 2017 base year inventory.

Table 7-7 Onroad Adjusted 2017 Base Year Inputs and Assumptions

Data Item	2017 Newcastle County Inputs and Assumptions
MOVES RunSpec	
Emission Model	MOVES3.1.0 (default database: MOVESDB20221007)
Scale/Calculation Type	County Scale Inventory Run
Analysis Years	2017
Analysis Months	June, July, August (Peak Ozone Season)
Analysis Days	Weekdays
Analysis Hours	All
Geographic Bounds	New Castle, DE (10003)
Pollutants	VOC, NO _x + Necessary Precursors
Fuel Types	Compressed Natural Gas (CNG), Diesel, Electricity, Ethanol (E-85), Gasoline
Traffic Data	
VMT Growth Forecast	Not applicable
Vehicle Population Growth Forecast	Not applicable
MOVES Inputs	
SourceTypeYearVMT	Use 2017 Highway Performance Monitoring System (HPMS) data from DELDOT. Used the distribution as was used in the EPA draft data set for the 2017NEI. This distribution was applied to the 5 HPMS vehicle types to allocate the VMT.
Month VMT Fractions	Used the month VMT from the 2017 MOVES Defaults & CRCA100 Data Sets
Day VMT Fractions	Used the day VMT from the 2017 MOVES Defaults & CRCA100 Data Sets
Hourly VMT Fractions	Used the hourly VMT from the 2017 MOVES Defaults & CRCA100 Data Sets
I/M Parameters	Used the enhanced plan prior to the amendments finalized in January 2023 to regulations 1126 and 1131
Road Type Distribution	Used the analysis of the 2017 Delaware Department of Transportation (DelDOT) tables: https://deldot.gov/Publications/reports/hpms/index.shtml As well as yielding VMT, this data also yields road type distributions

²⁵ MOVES3 Database Conversion Tool Help. EPA. Revised November 6, 2020. Retrieved July 2023 from Tools menu in MOVES3.1.0 Interface.

Data Item	2017 Newcastle County Inputs and Assumptions
SourceTypeYear (Population)	Using Vehicle Population data (R45CAM07) for 2017
Vehicle Age Distribution	Analysis of 2017 R45CAM07 data.
Average Speed Distribution	Used the CRCA100 data set
Fuel Supply	MOVES3.1 default tables
Fuel Formulation	MOVES3.1 default tables
Fuel Usage Fraction	MOVES3.1 default tables, Set ethanol Fraction to 0
Alternative Vehicle Fuels and Technologies (AVFT)	MOVES3.1 default Tables
ZoneMonthHour	Average hourly data by month from years 2015, 2016 and 2017 meteorological datasets maintained by NOAA
MOVES Inputs - Advanced	
Early National Low Emission Vehicle (NLEV)	Used MOVE3_DE_LEV_IN table. Added as an advanced feature in the MOVES3 interface. This was developed per EPA guidance and when invoked, replaces the EmissionRateByAge table

The Onroad emissions from the MOVES3 model for the Adjusted 2017 base year inventory are compared to the MOVES2014b emissions from the Original 2017 base year inventory in Table 7-8. Detailed results of the MOVES run results are shown in *Adjusted 2017 Onroad MOVES Output Results* (Appendix C).

Table 7-8 Original vs Adjusted 2017 Base Year Inventory Onroad Emission Totals

2017 Onroad Emissions	EPA MOVES Model Version	2017 Annual Emissions (tpy)			2017 SSWD Emissions (tpd)		
		CO	NOx	VOC	CO	NOx	VOC
Original BYI	MOVES2014b	28,807	5,184	2,213	87.23	15.70	6.23
Adjusted BYI	MOVES3	26,302	5,105	1,693	83.23	16.06	5.37

*BYI: Base Year Inventory

7.3.4 Nonroad Sources

Nonroad mobile sources represent a large and diverse set of off-road vehicles and non-stationary equipment. Emission estimates of VOCs, NO_x, and CO for this source sector account for exhaust emissions from engine fuel combustion.

Nonroad vehicles and equipment are grouped into four source category types for the purpose of developing emission estimates. These include:

- Aircraft – Commercial, military, and private aircraft.
- Locomotives (or Rail) – Commercial line haul and yard locomotives.
- Commercial Marine Vessels (CMVs) – Various types of vessels that navigate the Delaware Bay and River and the Chesapeake and Delaware Canal are included under this source category. Recreational boats are included in the next category.
- Other Off-road Vehicles and Equipment – All other off-road emission sources are accounted for through the use of EPA's MOVES model in Nonroad mode. The model compiles off-road equipment pertinent to Delaware into the following subcategories:

7.3.4.1 Marine, Aircraft and Rail (MAR) Sources

Marine, Aircraft, and Rail (MAR) emissions were estimated by multiplying an indicator of collective activity within the inventory area for a source category by a corresponding emission factor. The activity for MAR sources include landing and take-offs (LTOs), vessel port-of-calls, time-in-mode (TIMs, which are pertinent to aircraft and CMVs), gross ton miles (locomotives), equipment populations, and economic activity (both pertinent to Nonroad equipment) that can be correlated with the emissions from that source. The corresponding emission factors are amount of pollutant (either grams or pounds) per unit of fuel used (locomotives and military/commercial aircraft), per LTO (air taxi and general aviation), or per unit of power output in brake horsepower or kilowatt-hours (Nonroad equipment and CMVs, respectively).

For the list of emission estimates, methodologies, and seasonal allocations refer to Delaware's *2017 Base Year Emissions Inventory* (Appendix A). In this SIP revision no changes were made to the MAR source emissions from the Original 2017 base year inventory.

7.3.4.2 Other Off-road Vehicles and Equipment Sources

The MOVES Nonroad model estimates emissions from equipment such as recreational marine vessels, recreational land-based vehicles, farm and construction machinery, lawn and garden equipment, aircraft ground support equipment and rail maintenance equipment. This equipment is powered by diesel, gasoline, compressed natural gas or liquefied petroleum gas engines

The Department used MOVES2014b to develop 2017 annual and SSWD daily emission estimates for the Original 2017 base year inventory. For more detail on Nonroad emissions see Delaware's *2017 base year inventory* (Appendix A).

7.3.4.2.1 Other Off-road Vehicles and Equipment Sources Emission Revisions

Similar to Onroad emissions, EPA mandated the use of MOVES3 for Nonroad emissions as it is the most state-of-the-art model. Estimating 2017 emissions with MOVES3 is also required to match the Nonroad model used in the future year inventory for RFP.

Delaware ran MOVES3.1.0 in Nonroad mode for New Castle County with the same assumptions used in the Original 2017 base year inventory. Detailed results of the model run are shown in *Adjusted 2017 Nonroad MOVES Output Results* (Appendix D).

As shown in Table 7-9, there are minimal differences in the MOVES3.1.0 Nonroad emissions compared to the Original 2017 base year inventory nonroad emissions.

Table 7-9 Original vs Adjusted 2017 Base Year Inventory Nonroad Emission Totals

2017 Nonroad Emissions	EPA MOVES Model Version	2017 Annual Emissions (tpy)			2017 SSWD Emissions (tpd)		
		CO	NOx	VOC	CO	NOx	VOC
Original BYI	MOVES2014b	23,112	1,110	2,090	90.89	3.68	7.25
Adjusted BYI	MOVES3.1.0	23,112	1,110	2,106	90.89	3.68	7.26

*BYI: Base Year Inventory

8.0 Reasonable Further Progress

40 CFR 51.1310(a) and 51.1310(a)(2)(i) require that this SIP revision must include a RFP demonstration.

8.1 Introduction

RFP is required by the CAA under Part D, Title I to ensure that the air quality in NAAs makes steady and incremental progress toward attaining air quality standards.²⁶ SIP revisions for moderate NAAs are required to include an RFP demonstration. Listed in 40 CFR 51.1310(a)(2), moderate NAA requirements for RFP state that the area must provide 15% emission reduction from the baseline year within 6 years. It also states that the reduction relies on either NO_x or VOC (or combination) depending on criteria in CAA 182(c)(2)(C).

The EPA provides additional RFP guidance in their 2005 Phase 2 Implementation Rule.²⁷ This ruling indicates Delaware must achieve 15% VOC and/or NO_x emission reduction in New Castle County from their combined 2017 baseline level, before the end of 2023. RFP can be shown with either VOC or NO_x or a combination of the two pollutants since New Castle County had a 15% VOC Rate-of-Progress (ROP) plan approved by EPA under the 1-hour ozone standard.

Section 8.3 describes the methodology the Department used to show RFP has been satisfied.

8.2 Reasonable Further Progress 2023 Projected Inventory

To demonstrate RFP, the Department must show appropriate emissions reductions have occurred from the Adjusted 2017 base year inventory (Section 7.0) to an attainment year inventory. The attainment year inventory is a projected inventory based on the attainment date of the NAA. While New Castle County has an attainment date of August 3, 2024, the area is required to demonstrate attainment by the end of the last full ozone season prior to the designated date, which is the end of the 2023 ozone season. Therefore, the attainment year inventory (hereafter referred to as “2023 Projected Attainment Inventory”) is for future year 2023.

²⁶ Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. EPA. May 2017. Retrieved July 2023 from https://www.epa.gov/sites/default/files/2017-07/documents/ei_guidance_may_2017_final_rev.pdf

²⁷ Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 2; Final Rule To Implement Certain Aspects of the 1990 Amendments Relating to New Source Review and Prevention of Significant Deterioration as They Apply in Carbon Monoxide, Particulate Matter and Ozone NAAQS; Final Rule for Reformulated Gasoline. EPA Final Rule. 70 FR 71612. November 29, 2005. <https://www.govinfo.gov/content/pkg/FR-2005-11-29/pdf/05-22698.pdf>.

8.2.1 Background

Department staff developed the 2023 Projected Attainment Inventory by applying appropriate growth factors to the Adjusted 2017 base year inventory. EPA's May 2017 Inventory Guidance "*Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter NAAQS and Regional Haze Regulations*" (hereafter referred to as "*EPA's 2017 Inventory Guidance*") was used in the development of the 2023 Projected Attainment Inventory. As indicated in the guidance, the goal of the projected inventory is to make a "reasonable and technically credible estimate of future-year emissions that accounts for key variables".²⁸ These variables include changes to activities, emission controls, fuel types, and/or regulations.

The EPA periodically develops modeling platforms with a set of future year inventories and detailed documentation of the approaches used to develop the inventories. Section 5 of EPA's 2017 Inventory Guidance suggests air agencies use EPA's modeling platforms "to develop and improve their own emissions projections". As a recommended resource in the guidance, Delaware relied on EPA's most recent modeling platform, 2016v3, which included future year 2023, for selecting projection methods. This ensured that Delaware's 2023 Projected Attainment Inventory was grown using the most up-to-date methods. The Technical Support Document (TSD) for EPA's 2016v3 platform²⁹ is referred to as "*EPA's 2016v3 TSD*" in this document. Deviations from EPA's 2016v3 modeling platform methodology will be discussed in detail in the sections below.

8.2.2 Growth Projection Methodology

The following section describes the methods used to develop each sector of the 2023 Projected Attainment Inventory for RFP. The four sectors grown for the inventory are Point, Nonpoint, Onroad, and Nonroad.

8.2.2.1 Point Sources Growth Projection Methodology

Delaware Point sources were grown following the methods from EPA's 2016v3 TSD, except for the Electricity Generating Units (EGUs) and ERCs. For EGUs the Department used the Mid Atlantic Regional Air Management Association's (MARAMA's) projections from the Eastern Regional Technical Advisory Committee (ERTAC) EGU Projection Tool. The ERTAC EGU Projection Tool was developed by a regional team, and the calculated future emission estimates are more representative of DE's future EGU emissions than the emissions from EPA's Integrated Planning Model (IPM). The Emission Reduction Credits are Point emissions from closed or curtailed facilities that are not currently emitting pollutants into the air, but have the potential; therefore, they are required in the RFP inventory.

Table 8-1 summarizes the Point sources for the 2023 Projected Attainment Inventory by annual and SSWD emissions. Annual emissions are shown in tons per year (tpd) and SSWD emissions are shown in tpd.

²⁸ Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. EPA. May 2017. Retrieved July 2023 from [Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards \(NAAQS\) and Regional Haze Regulations \(epa.gov\)](#)

²⁹ Technical Support Document (TSD): Preparation of Emissions Inventories for the 2016v3 North American Emissions Modeling Platform. EPA. January 2023. Retrieved July 2023 from https://www.epa.gov/system/files/documents/2023-03/2016v3_EmisMod_TSD_January2023_1.pdf

Table 8-1 2023 Projected Attainment Inventory - Point Source Emissions

2023 Point Source Projections	Annual (tpy)			SSWD (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Emission Reduction Credits (ERCs) ^{1,2,3}	-	425	417	-	1.16	1.14
Projected Point w/o ERCs	1,619	2,218	449	9.22	13.63	2.42
Total Project Point w/ ERCs	1,619	2,643	866	9.22	14.80	3.56

1) ERCs: Emission Reduction Credits as of 2021 Audit Report; *Delaware Regulation 1134 Emission Banking and Trading Program, Final August 2022 Emission Reduction Credit Audit*

2) Verified with DE Compliance Manager that no other facilities are pursuing credits as of May 2023

3) TPD for ERCs are calculated from annual emissions since seasonal factors are not available; calculation conservative because it is known that the majority of credits will not be applied in 2023

8.2.2.1.1 Non-EGU Point Sources Growth Projection Methodology

Non-EGU sources are Point Sources that are not EGUs. For all non-EGU Point sources, Delaware followed EPA's projection method for the 2016v3 platform. Emissions from the most recent EPA inventory were used to be representative of future emissions. The most recent emissions data available is dependent on the type of facility. Delaware organizes Point sources into two main categories; facilities that hold a Title V (TV) permit and facilities that hold a Synthetic Minor (SM) permit. Facilities that meet and exceed Delaware's major source potential to emit thresholds are considered major sources and assigned a TV permit. Delaware requires these TV permit facilities (major sources) to submit an emissions inventory on an annual basis. Facilities who voluntarily limit their potential to emit below the major source potential to emit thresholds are assigned a SM permit. Delaware requires these SM permit facilities to submit an emissions inventory on a triennial basis.

EPA's triennial inventory is called the NEI and is compiled every three years with the 2017 NEI being the last triennial inventory finalized at the time this inventory was developed. As a result, Delaware used the 2017 NEI emissions to represent all SM permit facilities in New Castle for the 2023 Projected Attainment Inventory.

For TV permits, the last annual emission inventory finalized during the development of the projected inventory was the 2020 inventory; however, the 2020 emissions were not considered representative of future years because of the impact Coronavirus Disease (COVID-19) had on businesses. Delaware used emission data from EPA's finalized 2019 inventory to represent the TV facilities' 2023 projected emissions. This was in line with the EPA's 2016v3 modeling platform inventory selections.

Delaware reviewed the facilities emissions to determine if changes had occurred since the 2017 or 2019 inventory (dependent on permit type). New/changed processes, new/changed controls, and closures/startups were accounted for to ensure accurate 2023 projections. Based on the review, there were eight updates made to the Point inventory. Table 8-2 summarizes the updates.

Table 8-2 Adjustments made to the 2023 Point Source Inventory

Facility	Permit Type	Facility Action:	Inventory Update:
Printpack	Title V	Closed in 2023	Removed emissions from 2023 inventory
Dassault Falcon Jet-Wilmington Corp	Title V	Closed in 2021	Removed emissions from 2023 inventory
Delaware City Refinery	Title V	Updated VOC calculation for one process in 2021	Used the 2021* emission estimates for that one process
Datwyler Pharma	Synthetic Minor	Newly permitted facility in 2021	Used 2021* emission estimates
United Cocoa Processor, Inc.	Synthetic Minor	Newly permitted facility in 2020	Used 2020 NEI emissions
Delaware Health & Social Services – Herman Holloway Campus	Synthetic Minor	Newly permitted facility in 2020	Used 2020 NEI emissions
New Haven Packaging, LLC	Synthetic Minor	Closed in 2021	Removed emissions from 2023 inventory
IKO Production Wilmington Inc.	Synthetic Minor	Closed in 2021	Removed emissions from 2023 inventory

*2021 emissions data was not finalized at the time the 2023 Projected Inventory was developed although it was submitted by the facility and reviewed by Delaware personnel.

Annual and SSWD emissions for the 76 non-EGU facilities located within New Castle County are summarized in Table 8-3. A more detailed summary is provided in *RFP Inventory and Analysis* (Appendix E, tab “Point”). The SSWD emissions were calculated using the same method described in Section 2.1 of Delaware’s *2017 Base Year Emissions Inventory* (Appendix A), although the operation data was updated to match the year the inventory emissions were reported (e.g., 2019 operations were used for most Title V permitted facilities).

Table 8-3 2023 Non-EGU Facility-Level Emissions for New Castle County

Facility Name	Annual (tpy)			SSWD (tpd)		
	CO	NOx	VOC	CO	NOx	VOC
1007 Market	4	5	<1	0.03	0.03	0.00
Aearo Technologies LLC	<1	<1	3	<0.01	<0.01	0.01
Alfred I. Dupont Hospital for Children	10	14	1	0.09	0.27	0.01
Allan Myers Delaware, Inc. - Wilmington	5	2	1	0.03	0.01	0.01
American Air Liquide	<1	<1	1	<0.01	<0.01	<0.01
Amtrak Wilmington Maintenance Facility	-	-	1	-	-	0.01
Astrazeneca Pharmaceuticals, LLC-Newark	5	6	<1	0.02	0.02	<0.01
Bank of America - Bracebridge	1	2	<1	0.01	0.03	<0.01
Bank Of America - Christiana Complex	<1	<1	<1	<0.01	0.02	<0.01
Bank Of America - Deerfield	<1	1	<1	<0.01	0.02	<0.01
BASF Colors & Effects, Newport	15	13	20	0.06	0.06	0.09
Bilcare Research Inc.	2	2	2	0.01	0.01	0.01
Chestnut Run Plaza - Dupont Specialty Products USA, LLC	10	8	2	0.05	0.04	0.01
Christiana Care - Wilmington Hospital	5	7	1	0.02	0.06	<0.01
Christiana Care Health Services - Christiana Hospital	19	15	4	0.16	0.21	0.02
Christiana Energy Center	<1	<1	<1	<0.01	<0.01	<0.01
Christiana Materials	14	4	2	0.09	0.03	0.01
Clean Earth of New Castle	-	-	1	-	-	<0.01
Contractors Materials LLC Hot Mix Plt	11	2	3	0.05	0.01	0.01
Corrado Construction Co LLC	-	-	-	-	-	-
Croda Inc.	15	22	8	0.09	0.15	0.03
Dana Railcare	<1	<1	<1	<0.01	<0.01	0.02
Datwyler Pharma Packaging USA, Inc.	<1	<1	<1	-	-	0.00
DE Solid Waste Authority Cherry Island	42	13	6	0.16	0.05	0.02
Delaware City Refinery	1,046	1,206	198	5.40	5.01	1.35
Delaware City Sales Terminal	1	<1	6	<0.01	<0.01	0.03
Delaware Health & Social Services - Herman Holloway Campus	2	3	<1	0.01	0.04	<0.01
Delaware Park Racetrack & Casino	<1	<1	<1	0.03	0.02	0.01
Delaware Recyclable Products Inc	22	5	4	0.07	0.02	0.01
Diamond Materials LLC	13	2	1	0.07	0.01	0.01
Dupont Experimental Station - Dupont Specialty Products USA, LLC	32	50	8	0.24	0.44	0.04
Dupont Nutrition USA, Inc.	33	24	2	0.11	0.09	0.01
Eastern Shore Natural Gas Delaware City	1	6	3	0.01	0.03	0.01
Edge Moor Energy Center	3	4	1	0.02	0.06	<0.01
First State Investors 5200	<1	<1	<1	0.01	0.03	<0.01
FMC Stine Research Center	10	12	3	0.08	0.17	0.03
Ge Aviation - Newark, DE	<1	<1	3	<0.01	<0.01	0.02
GT USA Wilmington - Port of Wilmington	9	43	2	0.08	0.33	0.01
Hay Road Energy Center	-	-	<1	-	-	<0.01
Hercules LLC Research Center	4	2	1	0.01	0.01	0.02
Holland Mulch, Inc.	7	5	1	0.14	0.11	0.02
Honeywell/City of Wilmington	6	6	6	0.02	0.02	0.02

Facility Name	Annual (tpy)			SSWD (tpd)		
	CO	NOx	VOC	CO	NOx	VOC
Howard R. Young Correctional Institution	1	1	<1	<0.01	0.01	<0.01
James T. Vaughn Correctional Center	4	5	1	0.01	0.01	<0.01
JP Morgan Chase - 4001 Gov Printz Blvd	1	6	1	0.02	0.08	0.02
JP Morgan Chase - Bear Christiana Road	1	7	1	0.01	0.03	0.00
JP Morgan Chase - Morgan Christiana Center	1	6	<1	0.11	0.63	0.01
Kuehne Chemical Company Inc	<1	2	<1	<0.01	0.01	<0.01
Magco Inc.	3	2	0	0.01	0.01	<0.01
Magellan Terminals Holdings, L.P.	6	4	21	0.23	0.08	0.05
Marcus Hook Industrial Complex	-	-	<1	-	-	<0.01
Mcconnell Johnson	<1	<1	<1	0.01	0.05	<0.01
Medal A Div of Air Liquide Adv Tech Us	3	3	16	0.01	0.01	0.05
Micropore, Inc.	-	-	4	-	-	0.01
Middletown Materials	1	5	<1	0.01	0.05	<0.01
Newark Data Center	<1	1	<1	0.01	0.06	<0.01
News Journal Company	-	-	1	-	-	<0.01
Noramco	2	1	1	0.01	<0.01	0.01
Polymer Technologies, Inc.	<1	<1	1	<0.01	<0.01	0.01
Port Of Wilmington - Fumigation	-	-	51	-	-	0.01
Prince Minerals LLC	<1	<1	<1	<0.01	<0.01	<0.01
Ps-5 LLC	11	13	1	0.04	0.05	<0.01
R & M Recycling	<1	1	<1	<0.01	0.02	<0.01
Refined Products Company Inc.	1	3	<1	<0.01	0.01	<0.01
Rogers Corporation - Bear Facility	2	2	4	0.01	0.01	0.02
Rohm And Haas Electronic Materials Cmp, Inc.	4	3	6	0.02	0.02	0.03
Siemens Healthcare Diagnostics - Glasgow	6	8	<1	0.03	0.08	<0.01
St. Francis Hospital	3	3	<1	0.01	0.02	<0.01
Stratis Visuals LLC	-	-	2	-	-	0.01
Transflo Terminal Services, Inc.	-	-	<1	-	-	<0.01
United Cocoa Processor, Inc.	1	1	6	<0.01	<0.01	0.02
University Of Delaware Newark	28	20	8	0.08	0.10	0.03
Veolia - Red Lion Plant	<1	17	1	<0.01	0.07	<0.01
Verisign (6 Generators Of 2250 Kw Each)	<1	<1	<1	0.02	0.02	<0.01
Veterans Administration Hospital	2	3	<1	0.01	0.01	<0.01
Wilmington Wastewater Treatment Plant	4	5	1	0.01	0.02	0.00
Grand Total	1,435	1,608	425	7.82	8.86	2.19

8.2.2.1.2 EGU Point Sources Growth Projection Methodology

Emissions from EGUs are reported in this section. Delaware deviated from EPA's 2016v3 methodology for EGUs to follow a more regionally specific approach.

EGUs are regulated under 40 CFR Part 75 to continuously measure emissions and report their data to the EPA. These units have electric generating capacities greater than 25 Megawatts (MW) and burn fossil fuels.³⁰ It is noted that these units are typically part of facilities that produce other emissions. These additional emissions are reported in the non-EGU section of this report (Section 8.2.2.1.1).

Emission patterns from the electric generating fleet and resulting power sector vary substantially over time based on changing economic conditions, fuel markets, and regulatory requirements.³¹ As a result, future emissions must be derived from modeling that accounts for these variables.

ERTAC developed their EGU Emission Projection Tool to grow EGU emissions using EPA Clean Air Markets Division (CAMD) data, fuel-specific growth rates, and state provided information such as controls and retirements.³² MARAMA developed EGU emissions for future year 2023 using the ERTAC EGU Growth tool.

ERTAC emissions were chosen over EPA's projections from the IPM to ensure emissions were regionally appropriate and accounted for Delaware specific controls/retirements. These emissions were obtained from MARAMA's spreadsheet, *ERTAC EGU Emissions "C3.0CONUSv16.2_2023-RCU_fs_ff10_future.csv"* (Appendix F).

Table 8-4 shows 2023 emissions from EGUs in New Castle County. The SSWD emissions were calculated using the same method described in Section 2.1 of Delaware's *2017 Base Year Emissions Inventory* (Appendix A), although the operation data was updated to match the year the inventory emissions were reported.

³⁰ CAMD's Power Sector Emissions Data Guide. EPA. July 2022. Retrieved from <https://www.epa.gov/system/files/documents/2022-07/CAMD%27s%20Power%20Sector%20Emissions%20Data%20Guide%20-%202007182022.pdf>

³¹ Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations. EPA. May 2017. Retrieved July 2023 from [Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards \(NAAQS\) and Regional Haze Regulations \(epa.gov\)](https://www.epa.gov/air-quality/emissions-inventory-guidance-for-implementation-of-ozone-and-particulate-matter-national-ambient-air-quality-standards-naaqs-and-regional-haze-regulations)

³² MARAMA (n.d.). ERTAC EGU. MARAMA.org. <https://marama.org/technical-center/ertac-egu-projection-tool/#:~:text=ERTAC%20has%20developed%20the%20Energy%20Generating%20Unit%20%28EGU%29,assessment%20on%20both%20annual%20and%20episodic%20peak%20bases>

Table 8-4 2023 EGU Projection Emissions for New Castle County

Facility Name	Annual (tpy)			SSWD (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Christiana Energy Center	<1	<1	<1	<0.01	<0.01	<0.01
Delaware City Energy Center	<1	<1	<1	<0.01	<0.01	<0.01
Delaware City Refinery*	77	88	4	0.28	0.32	0.01
Edge Moor Energy Center	27	62	5	0.55	1.22	0.10
Hay Road Energy Center	79	459	15	0.56	3.22	0.11
West Energy Center	<1	<1	<1	<0.01	<0.01	<0.01
Total	184	610	24	1.40	4.78	0.23

*Delaware City Refinery Power Plant

8.2.2.1.3 Emission Reduction Credits

The EPA also requires ERCs in the projected inventory.³³ An ERC is a credit earned by a company when it reduces its air emissions (Section 6.2). They are generated through facility shutdowns or curtailments. Since the credits can be sold to offset new emission sources, they must be considered as “in the air” for the projected inventory when demonstrating attainment.

Delaware’s ERC program is regulated by 7 **DE Admin. Code** 1134, Emission Banking and Trading Program. The ERCs were last reported in the 2021 Audit Report and have not changed since, *Delaware Regulation 1134 Emission Banking and Trading Program Emission Reduction Credit Audit* (Appendix G).

As noted in Delaware’s 2021 ERC Audit Report, “per the Clean Air Act Section 173c(1)-(2), emission offsets may be obtained from a NAA which 1) is equal or higher in classification; and 2) contributes to non-attainment in the area.” Since New Castle County was classified as Severe under the 1979 1-hr ozone standard, facilities can only buy credits from other counties that are at that classification or higher. Kent County was classified as Severe for the 1979 1-hr ozone standard while Sussex County was only classified as marginal. As a result, New Castle County facilities can only procure credits that originated in New Castle or Kent County. Delaware did not include ERCs that originated in Sussex County in the projected inventory as they cannot be purchased by a New Castle facility.

All the potential emissions from ERCs included in the 2023 Projected Attainment Inventory are shown in Table 8-5.

³³ Phase 2 of the Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard—Notice of Reconsideration. EPA Proposed Rule. 71 FR 75902. December 19, 2006. <https://www.govinfo.gov/content/pkg/FR-2006-12-19/pdf/FR-2006-12-19.pdf>

Table 8-5 Emission Reduction Credits for New Castle and Kent County

ERCs Held By ¹	Annual (tpy)		SSWD ² (tpd)	
	NO _x	VOC	NO _x	VOC
1734 LLC	29	195	0.08	0.53
Calpine	46	0	0.13	0.00
Delaware City Industries (DCI)	2	6	0.01	0.02
Diamond State Port Corporation	16	58	0.04	0.16
DuPont	0	0	0.00	0.00
Lafarge	0	5	0.00	0.01
NRG Energy Center	268	0	0.73	0.00
Veolia	9	6	0.02	0.02
VPI	2	10	0.01	0.03
Division of Small Business	53	137	0.15	0.38
Total in New Castle and Kent County	425	417	1.16	1.14

- 1) Sussex County Facilities removed because according to CAA guidelines, New Castle builds/modifications could not use Sussex credits, as Sussex County has a lower classification under the 1979 1-hr ozone standard.
- 2) Assumes no seasonal variation; which is conservative, as the credits are not anticipated to be used prior to the end of 2023 ozone season of September 30, 2023.

8.2.2.2 Nonpoint Sources Growth Projection Methodology

The Nonpoint sector consists of 30 unique categories, which require different projection approaches. While Delaware relied on EPA's 2016v3 platform methods described in EPA's 2016v3 TSD, Delaware specific growth factors were used in place of EPA's national growth factors where applicable. This section details the Nonpoint growth projection methods.

Nonpoint source categories in which 2023 VOCs, NO_x, and CO emissions were estimated are shown in Table 8-6.

Table 8-6 2023 Projected Attainment Year Inventory - Nonpoint Categories

VOC Emissions Only	Emissions of VOC, NOx, and CO
Agricultural Pesticides	Animal Cremation*
AIM Coatings	Agricultural Burning
Animal Husbandry*	Commercial Cooking
Asphalt Paving	Commercial Fuel Combustion
Autobody Refinishing	Human Cremation*
CMV EVAP	Industrial Fuel Combustion
Commercial & Consumer Products (Lighter Fluid*)	Land Clearing Debris Burning
Degreasing	Prescribed Burning
Dry Cleaning	Residential Fuel Combustion
Gasoline (Petroleum) Marketing	Residential Grilling*
Graphic Arts	Residential Open Burning
Industrial Adhesives	Residential Wood Combustion
Industrial Surface Coatings	Structure Fires
Public Water Treatment Plants (POTWs)*	Vehicle Fires
Traffic Markings	Wildfires

*Categories added to the Adjusted 2017 Base Year Inventory in revised SIP

Nonpoint source projections are made using growth surrogates gathered from local information. Typically, the surrogate data is any parameter associated with the activity level of a source, such as production, employment, fuel usage, or population that can be correlated with the emissions from that source.

Table 8-7 lists the source category, activity data, and the source of the growth factor used to estimate 2023 emissions. For categories' dependent on population or employment data, Delaware used Delaware specific data for growth rates. Otherwise, the growth surrogates/methods from EPA's 2016v3 TSD were used.

Delaware used human population data from the Delaware Population Consortium (DPC) rather than from the Benefits Mapping and Analysis Program (BenMAP) model, EPA's population data source. The DPC populations and growth rate used in the analysis are shown in *Adjusted 2017 Nonpoint Inventory* (Appendix B, tab "DPC Growth Rate NC").

For categories that use employment data as a surrogate for growth, Delaware relied on Delaware's Department of Labor (DOL) Industry Forecasts for New Castle County. The growth factor was developed from the 2017 to 2023 employment projections per North American Industry Classification System's (NAICSs) code. DOL projections and growth rates are shown in *Adjusted 2017 Nonpoint Inventory* (Appendix B, tab "DOL Growth Rate NC").

For other categories that do not rely on population or employment, Delaware assessed the 2016v3 platform methods to determine if the surrogate growth factors were a reasonable assumption or if adjustments were needed. EPA’s 2016v3 platform is primarily grown from 2016 emissions, but some categories are grown from 2017 emissions. Therefore, the growth rates could not always be used directly. Delaware used:

- EPA’s growth factor (if the EPA base year was 2017 and matched the Adjusted 2017 base year inventory emissions),
- EPA’s 2023 emissions (if EPA’s base year was 2016 but emissions were back casted from Delaware’s Adjusted 2017 base year inventory emissions),
- or an adjusted growth factor (if EPA used a different methodology and year, but the growth factor for the category was the best available.)

More details on the growth factors used for each category can be found in *Adjusted 2017 Nonpoint Inventory*, tab “2017_2023 Inventory” (Appendix B).

Table 8-7 2023 Projected Attainment Year Inventory – Source of Growth Factors

Source Category	Activity Data	Source of Growth Factor
Agricultural Burning	Acreage and vegetation type	Assume No Growth: No SSWD Emissions
Agricultural Pesticides	Planted crop acreage	Assume No Growth
AIM Coatings	Solvents in U.S. paint shipments; U.S. Population	Delaware Population Consortium
Animal Cremation	Animal Population	Assume No Growth
Animal Husbandry	Animal population	National Projection Factors for Livestock
Asphalt Paving	Cutback and emulsified asphalt usage	Assume No Growth
Autobody Refinishing	Employment data; Autobody shop usage reports	DE DOL Industry Growth Forecast for New Castle County NAICS 811
Commercial Cooking	Population	Delaware Population Consortium
CMV EVAP	Fuel	MARAMA AEO2019 Growth Factor
Commercial & Consumer Products	Population	Delaware Population Consortium
Commercial & Consumer Products (Lighter Fluid)	Population	Delaware Population Consortium
Commercial Fuel Combustion	Fuel consumption	MARAMA AEO2019 Growth Factor
Degreasing	Employment data	DE DOL Industry Growth for New Castle County NAICS 31-22_441_811
Dry Cleaning	Employment data	DE DOL Industry Growth for New Castle County NAICS 812

Source Category	Activity Data	Source of Growth Factor
Gasoline (Petroleum) Marketing 1. Portable Fuel Containers (PFC) 2. Retail 3. Aircraft Refueling	1. Employment data 2. Gasoline fuel sales 3. Aircraft Fuel Sales	1. Delaware Population Consortium 2. MARAMA growth AEO2019 gasoline 3. MARAMA growth AEO2019 Avgas
Graphic Arts	Employment data	Delaware Population Consortium
Human Cremation	Population	Delaware Population Consortium
Industrial Adhesives	Population	Delaware Population Consortium
Industrial Fuel Combustion	Fuel consumption	MARAMA AEO2019 Growth Factor
Industrial Surface Coatings	Employment data	DE DOL Industry Growth for New Castle County
Land Clearing Debris Burning	Acreage disturbed during road, commercial, and residential construction	Assume No Growth
Prescribed Burning	Acreage and vegetation type	Assume No Growth
Publicly Owned Treatment Works (POTWs)	Population	Delaware Population Consortium
Residential Fuel Combustion	Fuel consumption	MARAMA AEO2019 Growth Factor
Residential Grilling	Population	Delaware Population Consortium
Residential Open Burning	Rural households	Assume No Growth
Residential Wood Combustion	Occupied households	Derived using the MARAMA tool
Structure Fires	Number of structures fires	Assume No Growth
Traffic Markings	U.S. paint shipments; U.S. and State public road miles	Assume No Growth
Vehicle Fires	Number of vehicle fires	Assume No Growth
Wildfires	Acreage and vegetation type	Assume No Growth

Another key factor to emission projections is applying appropriate control efficiencies. Since all control measures that were implemented during and before 2017 are included in the grown emissions, only controls that were applied after 2017 need to be included in the 2023 Projected Attainment Inventory.

After reviewing each Nonpoint category, Delaware determined there were four source categories that required additional controls. Table 8-8 lists the categories by source classification code (SCC) along with their total control efficiency. While total control efficiencies can be applied to raw emission data, the 2023 Projected Attainment Inventory emissions can have pre-2018 controls already applied. As a result, Delaware calculated the cumulative or phased in control efficiency required to achieve the total control efficiency. These calculations can be found in *Adjusted 2017 Nonpoint Inventory*, tab “Cumulative Controls” (Appendix B).

Table 8-8 Control Efficiencies for Nonpoint Sources

Category	Total Control Efficiency	Cumulative or Phased In Control	Effective Date	Additional Controls
Gasoline Marketing - PFCs SCC: 2501011011 - 2501012015	57	12	1/1/2018	PFC control efficiency increased from 51% in 2017 to 57% in 2018.
Gasoline Marketing - Stage 1 (Retail) SCC: 2501060053	97	5	12/31/2020	Gas stations have until 2025 to add enhanced vapor control. Conservatively use 2020 control counts to account for some decommission.
Gasoline Marketing - Underground Tank: Breathing and Emptying (Retail) SCC: 2501060201	90	86	Decommission of Stage II vapor recovery system by 12/31/21.	With the removal of stage II by the end of 2021, the control efficiency of underground tanks has increased.
Solvent Cleaning SCC: 2415000000	80	27	8/11/2022	Implementation of 2022 OTC model rule increased control efficiency from 60% to 80%.

Table 8-9 summarizes the 2023 annual and SSWD Nonpoint emissions for New Castle County, including controls. SSWD emissions were calculated using the same seasonal allocations applied to the Nonpoint categories in Delaware’s *2017 Base Year Emissions Inventory* (Appendix A). All categories that were not included in the Original 2017 base year inventory have SSWD calculations included in *Adjusted 2017 Nonpoint Inventory*, tab “SSWD Variations” (Appendix B).

Table 8-9 Summary of 2023 Nonpoint Emissions for New Castle County

Category	2023 Annual Emissions (tpy)			2023 SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
SOLVENT USE						
Ag. Pesticides	-	-	30	-	-	0.11
AIM Coatings	-	-	401	-	-	1.49
Asphalt Paving	-	-	0	-	-	0.00
Auto Refinishing	-	-	22	-	-	0.08
Commercial & Consumer Products	-	-	1,161	-	-	3.31
Dry Cleaners	-	-	2	-	-	0.01
Graphic Arts	-	-	264	-	-	1.02
Industrial Adhesives	-	-	110	-	-	0.42
Industrial Surface	-	-	78	-	-	0.30
Solvent Cleaning	-	-	66	-	-	0.21
Traffic Markings	-	-	2	-	-	0.01
Total Solvent Use	-	-	2,136	-	-	6.97
GASOLINE MARKETING						
CMV EVAP (Loading/Transport)	-	-	98	-	-	0.27
Gasoline Marketing - Retail	-	-	164	-	-	0.56
Gasoline Marketing - Aircraft Refueling	-	-	3	-	-	0.01
Gasoline Marketing - PFCs	-	-	108	-	-	0.38
Total Gasoline Marketing	-	-	374	-	-	1.22
FUEL COMBUSTION						
Commercial Fuel	330	443	24	0.49	0.60	0.03
Fuel Comb - Residential - Wood	2,475	44	362	5.34	0.09	0.78
Industrial Fuel	329	715	44	0.98	2.03	0.13
Residential Fuel	200	489	27	0.11	0.25	0.01
Total Fuel Combustion	3,334	1,691	457	6.92	2.98	0.95
OPEN BURNING						
Ag Burning	8	0	1	-	-	-
Land Clearing	-	-	-	-	-	-
Prescribed Burning	273	4	65	-	-	-
Structure Fires	15	0	3	0.03	0.00	0.01
Vehicle Fires	3	0	1	0.01	0.00	0.00
Wildfires	-	-	-	-	-	-
Residential Open Burning	15	1	2	0.01	0.00	0.00
Total Open Burning	315	6	71	0.05	0.00	0.01
MISCELLANEOUS SOURCES						
Animal Cremation	0	0	0	0.00	0.00	0.00
Animal Husbandry	-	-	36	-	-	0.10
Commercial Cooking	98	-	36	0.27	-	0.10
Human Cremation	0	0	0	0.00	0.00	0.00
POTW	-	-	12	-	-	0.03
Res Grilling	154	3	8	0.68	0.01	0.04
Total Miscellaneous Sources	253	4	92	0.95	0.02	0.27
NONPOINT TOTAL						
	3,901	1,701	3,130	7.93	3.00	9.41

8.2.2.3 Onroad Sources Growth Projection Methodology

The 2023 Onroad emissions were created using EPA’s most recent MOVES model, MOVES3.1.0. These annual and SSWD emissions are shown in Table 8-10. As indicated by EPA’s *2017 Inventory Guidance*, the Onroad portion of the projected inventory for RFP are the Motor Vehicle Emissions Budgets for Transportation Conformity. Therefore, a complete description of the methodology used to estimate the 2023 mobile emissions can be found in Section 9 of this report.

Detailed results of the model run are shown in *2023 Onroad MOVES Output Results* (Appendix H).

Table 8-10 2023 Onroad Source Emissions

Analysis Year	Onroad Annual Emissions (tpy)			Onroad SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x *	VOC*
2023	20,130	2,736	1,278	70.18	8.53	4.57

*Includes 10% Safety Margin. See Section 9.2.2

8.2.2.4 Nonroad Sources Growth Projection Methodology

Nonroad sources include the following categories: Commercial Marine Vessels, Aircrafts, Locomotives (or Rail), and Other Off-road Vehicles and Equipment. Commercial Marine Vessels, Aircrafts, and Rail sources were projected to 2023 using EPA’s 2016v3 methodology, while the Off-road Vehicles and Equipment category was forecasted using EPA’s MOVES model.

Table 8-11 summarizes the total 2023 Projected Attainment Inventory emissions from Nonroad sources. The projection methodology for each source category is discussed in detail in this section.

Table 8-11 2023 Nonroad Source Emissions for New Castle

Source Sector	2023 Annual Emissions (tpy)			2023 SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Nonroad - MOVES3.1	25,024	936	1,720	100.02	3.06	6.23
Marine, Aircraft, Rail	800	1,786	159	2.19	4.88	0.45
Total	25,824	2,721	1,879	102.20	7.94	6.67

8.2.2.4.1 Marine, Air, Rail Sources Growth Projection Methodology

Commercial Marine Vessels, Aircrafts, and Rail sources, referred to as “MAR” sources, were primarily grown using EPA’s 2016v3 modeling platform methodology. This method was appropriate because the MAR base year emissions are the same for EPA’s 2016v3 modeling platform and Delaware’s Adjusted 2017 base year inventory. The growth methodologies for each category are as follows:

Commercial Marine Vessels (CMV) are split into two groups; category 1 and 2 vessels, and category 3 vessels. Category 1 and 2 vessels are typically smaller vessels with engines less than 30 liters per cylinder. The EPA projected category 1 and 2 vessel emissions using national factors derived from *the Regulatory Impact Analysis Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters per Cylinders*.³⁴ Category 3 vessels are larger vessels with engines greater than 30 liter per cylinder. EPA used an EPA report on projected bunker fuel and Regulatory Impact Assessment data to calculate the appropriate growth factors. More detail on the CMV growth methodologies can be found in Section 4.2.3.2 of *EPA’s 2016v3 TSD*.

For Aircraft emissions, Delaware used EPA’s 2023 aircraft emissions directly from EPA’s 2016v3 modeling platform. Large aircrafts were grown using Terminal Area Forecast data from the Federal Aviation Administration; smaller crafts were grown using state default factors, and military aircraft emissions were kept flat to account for the uncertainty in this category. More information on the 2023 aircraft growth methodology can be found in Section 4.2.3.7 of *EPA’s 2016v3 TSD*.

Rail emissions are based primarily on EPA’s 2023 emissions from EPA’s 2016v3 modeling platform. Base year emissions for the Class I/II/III railroads and passenger rails were grown with factors derived from the fuel use values from the Energy Information Administration’s 2018 Annual Energy Outlook (AEO) freight rail energy use growth rate projections. However, Delaware deviated from EPA’s 2016v3 modeling platform by including additional rail yard emissions in the base year and future year inventory. Delaware’s rail yard data was grown using national factors from the 2018 AEO growth rates for rail subgroups summarized in *EPA’s 2016v3 TSD*. More information on the 2023 rail growth methodology can be found in Section 4.3.3 of *EPA’s 2016v3 TSD*. The rail yard calculation that deviated from EPA’s method is found in *RFP Inventory and Analysis* (Appendix E, tab “MAR”).

Table 8-12 summarizes the final 2023 Projected Attainment Inventory emissions for the Marine, Aircraft, and Rail categories. SSWD emissions were calculated using the same seasonal factors applied to the Original 2017 base year inventory emissions at the SCC level, except the aircraft seasonal factor was applied at the category level. A breakdown of MAR projections and seasonal allocations are found in *RFP Inventory and Analysis* (Appendix E, tab “MAR”).

³⁴ Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder. EPA. March 2008. Retrieved July 2023 from <https://nepis.epa.gov/Exe/ZyPDF.cgi/P10023S4.PDF?Dockey=P10023S4.PDF>

Table 8-12 2023 Emissions for CMV, Aircrafts, and Rail

Category	2023 Annual Emissions (tpy)			2023 SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Aircrafts	502	71	43	1.38	0.19	0.12
CMV	224	1,279	88	0.60	3.50	0.24
Rail	74	436	28	0.21	1.19	0.08
Total	800	1,786	159	2.19	4.88	0.45

8.2.2.4.2 Other Off-road Vehicles and Equipment Sources Growth Projection Methodology

Delaware developed the 2023 other off-road vehicles and equipment source emissions for New Castle County using MOVES3.1.0 in Nonroad mode. Most off-road equipment covered by the MOVES Nonroad model is powered by diesel-fueled compression-ignition engines or gasoline-fueled spark-ignition engines. Engines fueled by compressed natural gas (CNG) and liquefied petroleum gas (LPG) are also included in the Nonroad model. Equipment covered by the model include the following:

- Recreational (land-based);
- Construction;
- Industrial;
- Lawn and Garden;
- Agricultural;
- Commercial;
- Logging;
- Airport Ground Support;
- Recreational Marine; and
- Railway Maintenance.

To mirror the Adjusted 2017 base year inventory, the MOVES3.1.0 Nonroad model was run with national default assumptions for analysis year 2023. Table 8-13 summarizes the annual and SSWD outputs. Detailed results of the Nonroad model run outputs are included in *2023 Nonroad MOVES Output Results* (Appendix I).

Table 8-13 2023 Nonroad MOVES3 Results

Category	2023 Annual Emissions (tpy)			2023 SSWD Emissions (tpd)		
	CO	NO _x	VOC	CO	NO _x	VOC
Nonroad - MOVES3	25,024	936	1,720	100.02	3.06	6.23

8.3 Reasonable Further Progress Demonstration

To demonstrate RFP, the Department must show appropriate emissions reductions have occurred from a base year inventory to a future inventory. The Department followed EPA's 2017 Inventory Guidance, *"Emissions Inventory Guidance for Implementation of EPA's 2017 Inventory Guidance"* in the development of these inventories.

Delaware submitted their marginal NAA base year inventory, *"2017 Base Year Emissions Inventory State Implementation Plan for VOC, NOX, and CO For Areas of Marginal Nonattainment of the 2015 Ozone NAAQS in Delaware"*, to Region III EPA in November 2020. This SIP document can be found in Appendix A and remains in place to fulfill the SIP inventory requirement.

While typically the NAA 2017 Base Year Emissions Inventory is used as the RFP base year inventory, the guidance indicates that adjustments are needed to the inventory to be comparable to future years. The primary changes made to the Original 2017 base year inventory include re-estimating Onroad and Nonroad emissions with EPA's most recent model, MOVES3.1.0. Changes were also made to the Nonpoint sector to improve accuracy and comprehensiveness as recommended by *EPA's 2017 Inventory Guidance*. Section 7 of this report details these revisions and summarizes the inventory used as the RFP base year inventory (referred to as the "Adjusted 2017 base year inventory").

The future inventory required for RFP was for attainment year 2023. The Department developed the 2023 Projected Attainment Inventory for both CO, VOC and NO_x following *EPA's 2017 Inventory Guidance*. The methodology and summary of the RFP future year inventory (referred to as the "2023 Projected Attainment Inventory") is detailed in Section 8.2.

Section 11 of this document presents details of control measures that Delaware has adopted, and the 2023 Projected Attainment Inventory has those controls in place.

This section describes the methodology the Department used to demonstrate the RFP has been satisfied.

8.3.1 Reasonable Further Progress Calculations

The first step of showing RFP is to calculate the amount of emission reductions required of NO_x and VOC from the Adjusted 2017 base year inventory. As previously mentioned, EPA provides states discretion on how to apportion the 15% requirement between NO_x and VOC. The Department chose a combination of both NO_x and VOC pollutants to achieve 15% RFP required emission reductions – 11% for NO_x and 4% for VOC. Emission reductions required for RFP were calculated as shown in the following equations.

Equation 8-1

RFP Emission Reductions = % RFP Reduction x Adjusted 2017 Base Year Inventory Emissions

Equation 8-2

RFP NO_x Reductions = 11% x Adjusted 2017 Base Year Inventory NO_x Emissions

Equation 8-3

RFP VOC Reductions = 4% x Adjusted 2017 Base Year Inventory VOC Emissions

With the RFP reductions, the Department was able to calculate a “2023 Target Level”, that is the emissions level needed to achieve 4% VOC and 11% NO_x reductions. This is calculated by subtracting the RFP reductions from the Adjusted 2017 base year inventory emission levels. The emissions in the 2023 Projected Attainment Inventory will need to meet or be lower than the 2023 Target Level emissions to demonstrate RFP.

According to the 1990 Clean Air Act Amendment (CAAA) – 42 U.S.C. §7545 and 7546, reductions necessary to meet the RFP requirement must exclude the effects of the noncredible Federal Motor Vehicle Control Program (FMVCP) and Reid Vapor Pressure (RVP) programs. EPA proposed in their SIP Requirements for the 2008 ozone NAAQS that states no longer needed to calculate and deduct emissions related to these measures.³⁵ As a result, these reductions were not included in the 2023 Target Level calculations. The general 2023 Target Level Equation is shown in Equation 8-4:

Equation 8-4

2023 Target Level = Adjusted 2017 Base Year Inventory Emissions – RFP Emission Reductions

The 2023 NO_x and VOC Target Level equations are shown below:

Equation 8-5

2023 NO_x Target Level = Adjusted 2017 Base Year Inventory NO_x – RFP NO_x Reductions

Equation 8-6

2023 VOC Target Level = Adjusted 2017 Base Year Inventory VOC – RFP VOC Reductions

The VOC and NO_x 2023 Target Levels are calculated in Table 8-14 and Table 8-15. Emissions are shown as SSWD emissions in tpd. Details on the RFP calculations and inventory summaries can be found in *RFP Inventory and Analysis* (Appendix E, tab “RFP Calculation”).

³⁵ Final Rule To Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 2; Final Rule To Implement Certain Aspects of the 1990 Amendments Relating to New Source Review and Prevention of Significant Deterioration as They Apply in Carbon Monoxide, Particulate Matter and Ozone NAAQS; Final Rule for Reformulated Gasoline. EPA Final Rule. 70 FR 71612. November 29, 2005. <https://www.govinfo.gov/content/pkg/FR-2005-11-29/pdf/05-22698.pdf>

Table 8-14 Reasonable Further Progress Calculations for NO_x

NO _x Target Level for 2023 Milestone New Castle Non-attainment Area Emissions in Tons per Day			
		Formula	Tpd
A	Adjusted 2017 Base Year Inventory		42.38
B	Biogenic Emissions (Not included in BYI)		0.00
C	Adjusted 2017 Base Year Inventory	A - B	42.38
D	FMVCP/RVP Reductions Between 2017 and 2023 ¹		0.00
E	Adjusted 2017 Base Year Inventory Relative to 2023	C - D	42.38
F	Ratio		11.0%
G	Emissions Reductions Required Between 2017 and 2023	E * F	4.66
H	2023 Target Level for NO _x	C - D - G	37.72
Emission Level from 2023 Projected Attainment Inventory ²			34.26
J	Surplus Emissions for NO _x (tpd)		3.45

1) FMVCP/RVP reductions are considered negligible by EPA Guidance and are no longer required.

2) Mobile emissions include safety margin for Motor Vehicle Emissions Budget

Table 8-15 Reasonable Further Progress Calculations for VOC

VOC Target Level for 2023 Milestone New Castle Non-attainment Area Emissions in Tons per Day			
		Formula	Tpd
A	Adjusted 2017 Base Year Inventory		25.76
B	Biogenic Emissions (Not included in BYI)		0.00
C	Adjusted 2017 Base Year Inventory	A - B	25.76
D	FMVCP/RVP Reductions Between 2017 and 2023 ¹		0.00
E	Adjusted 2017 Base Year Inventory Relative to 2023	C - D	25.76
F	Ratio		4.0%
G	Emissions Reductions Required Between 2017 and 2023	E * F	1.030
H	2023 Target Level for VOC	C - D - G	24.73
Emission Level from 2023 Projected Attainment Inventory ²			24.22
J	Surplus Emissions for VOC (tpd)		0.51

1. FMVCP/RVP reductions are considered negligible by EPA Guidance and are not longer required.

2. Mobile emissions include safety margin for Motor Vehicle Emissions Budget

8.3.2 Reasonable Further Progress Results

As shown in Table 8-16, the NO_x and VOC emission levels for the 2023 Projected Attainment Inventory are below the NO_x and VOC target emission levels. This indicates Delaware has met the RFP requirements for NO_x and VOC reductions.

Table 8-16 New Castle County RFP 2023 Target Levels to Projected Inventory

Description	NO _x Emissions (tpd)	VOC Emissions (tpd)
2023 Target Levels	37.72	24.73
2023 Projected Inventory	34.26	24.22

9.0 Mobile Budgets for Transportation Conformity

Section 176 of the CAA requires that highway transportation activities in ozone NAAs must not impair progress in air quality improvements.

9.1 Introduction to Transportation Conformity

In general, Section 176 specifies that (1) states establish, in their SIP, mobile source VOC and NO_x emission budgets for each of the milestone years up to the attainment year, and submit the mobile budgets to EPA for approval, (2) upon adequacy determination or approval of EPA, states must conduct transportation conformity analysis for their Transportation Improvement Programs (TIPs) and long range transportation plans to ensure that future highway vehicle emissions will not exceed relevant mobile budgets, and (3) failure of demonstrating such transportation conformity in TIPs and long range plans will lead to conformity lapse(s), resulting in freezing of federal highway funds and all federal highway projects in the lapsed area.

New Castle County's Metropolitan Planning Organization (MPO), the Wilmington Area Planning Council (WILMAPCO), is responsible for planning, coordinating, and programming transportation investments with federal funds. They develop a TIP and a Regional Long-range Transportation Plan (RTP) in cooperation with state, county, and local governments, and transportation providers. They must also show that the RTP and TIP conform to the transportation emission budgets set forth in this section of the SIP. If emissions generated from the projects programmed in the TIP and RTP are equal to or less than the emission budgets in the SIP, then conformity has been demonstrated.³⁶

9.2 Motor Vehicle Emissions Budget

According to EPA's Phase 2 Implementation Rule,³⁷ Delaware is required to establish mobile budgets for the attainment year, 2023. The emissions budget, otherwise known as the Motor Vehicle Emissions Budget (MVEB), is set by the Department in this section as required by New Castle County's moderate reclassification of the 2015 Ozone NAAQS.

MVEB is defined in 40 CFR 93.101 as "that portion of the total allowable emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan for a certain date for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS, for any criteria pollutant or its precursors, allocated to highway and transit vehicle use and emissions." For New Castle County the MVEB is the level of Onroad emissions for attainment year 2023 that still allows the county to show reasonable further progress. The emission budget becomes the mobile source emissions for the 2023 Projected Attainment Inventory (shown in Section 8) and directly limits mobile emissions from future transportation projects.

³⁶ Air Quality Conformity Determination For the New Castle County, Delaware Portion of the PA-NJ-MD-DE 8-hour Ozone Nonattainment Area & PA-NJ-DE Fine Particulate Matter (PM_{2.5}) Maintenance Area. WILMAPCO. May, 2022. Retrieved on http://www.wilmapco.org/Aq/NCC_Conformity_FY23_TIP.pdf

³⁷ Ibid 36.

As part of the development of the SIP, on February 23, 2023 the Department consulted with WILMAPCO and the Delaware Department of Transportation on the inputs used to establish the budgets. Since New Castle County is in non-attainment for ozone, the SIP includes MVEB for ozone's precursors, NO_x and VOC. The modeling and established budget are reported below.

9.2.1 Motor Vehicle Emissions Budget Modeling

The 2023 mobile emissions were estimated using EPA's MOVES3.1.0 with Delaware specific activity. The three parameters that significantly affect the model outputs include 1) VMT, 2) age distribution, and 3) source type population. VMT is the total miles traveled by all vehicles in Delaware and is reported by the Federal Highway Administration (FHWA). Age distribution is the fleet's model year profile that accounts for fleet turnover and is determined through an analysis of vehicle registration data. Source type population is also determined through vehicle registration data and is the number of vehicles per MOVES vehicle class. More detail about MOVES input databases can be found in Delaware's *2017 Base Year Emissions Inventory* (Appendix A).

Each parameter described above was grown to year 2023 to estimate future mobile emissions. Delaware grew 2019 VMT data to 2023 using FHWA's national Onroad growth factor. The 2022 age distribution was grown using EPA's projection tool: *moves3-age-distribution-projection-tool-20210405.xls*.³⁸ Source type population was grown via a linear regression from 2017 to 2022. All other inputs and assumptions used to estimate the MVEB are shown in Table 9-1. Detailed results of the MOVES run are shown in *2023 Onroad MOVES Output Results* (Appendix H).

³⁸ EPA (2021, April 4) Age Distribution Projection Tool for MOVES3. <https://www.epa.gov/moves/tools-develop-or-convert-moves-inputs>

Table 9-1 2023 Newcastle County MVEB Inputs and Assumptions

Data Item	2023 Newcastle County MVEB Inputs and assumptions
MOVES RunSpec	
Emission Model	MOVES3.1.0 (default database: MOVESDB20221007)
Scale/Calculation Type	County Scale Inventory Run
Analysis Years	2023
Analysis Months	June, July, August (Peak Ozone Season)
Analysis Days	Weekdays
Analysis Hours	All
Geographic Bounds	New Castle, DE (10003)
Pollutants	VOC, NOx + Necessary Precursors
Fuel Types	Compressed Natural Gas (CNG), Diesel, Electricity, Ethanol (E-85), Gasoline
Traffic Data	
VMT Growth Forecast	Used the Federal Highway Administration (FHWA) forecast growth rate for 2019 to 2049 (1.007733). Applied this to the 2019 data to get the projected 2023 VMT. https://www.fhwa.dot.gov/policyinformation/tables/vmt/
Vehicle Population Growth Forecast	Using Vehicle Population from 2017 to 2022, projected to 2023 using a linear model
MOVES Inputs	
SourceTypeYearVMT	Grow the 2019 VMT data to 2023, using a growth factor of 1.00733 per annum. Used the same distribution as was used in the EPA draft data set for the 2020NEI. This distribution was applied to the 13 MOVES vehicle types to allocate the VMT.
Month VMT Fractions	Used the month VMT from the 2017 NEI
Day VMT Fractions	Used the day VMT from the 2017 NEI
Hourly VMT Fractions	Used the hourly VMT from the 2017 NEI
I/M Parameters	Used the unified statewide plan adopting the January 2023 changes to regulations 1126 and 1131
Road Type Distribution	Used the analysis of the 2020 DelDOT tables: https://deldot.gov/Publications/reports/hpms/index.shtml As well as yielding VMT, this data also yields road type distributions
SourceTypeYear (Population)	Using Vehicle Population data (R45CAM07), we collected the data from years 2017 to 2022, and projected this data forward to 2023 using a linear regression model
Vehicle Age Distribution	Analysis of 2022 R45CAM07 data. The distribution was grown to 2023 using the EPA's spreadsheet tool: moves3-age-distribution-projection-tool-202104051.xls
Average Speed Distribution	Used the CRCA100 data set
Fuel Supply	MOVES3.1 default tables
Fuel Formulation	MOVES3.1 default tables
Fuel Usage Fraction	MOVES3.1 default tables, Set ethanol Fraction to 0
AVFT	MOVES3.1 Default Tables, edited by using Delaware's EV registration data from 2010 to 2022. We used the same EV proportions for future years. MOVES3.1 only accepts Electric vehicles for Source Use Types 21,31 and 32.

Data Item	2023 Newcastle County MVEB Inputs and assumptions
ZoneMonthHour	Average hourly data by month from years 2020, 2021 and 2022 meteorological datasets maintained by NOAA
MOVES Inputs - Advanced	
Early NLEV	Used MOVE3_DE_LEV_IN table. Added as an advanced feature in the MOVES3 interface. This was developed per EPA guidance and when invoked, replaces the EmissionRateByAge table

9.2.2 Motor Vehicle Emissions Budget for 2023

The 2023 MVEB is based on the MOVES3 results for New Castle County, which includes all mobile control measures plus a safety margin. EPA regulation allows for a safety margin to be applied to the mobile emissions to account for unknowns in future modeling as long as Delaware can still show RFP with the new mobile emissions. To account for the uncertainty in VMT projections/modeling, the Department added a 10% safety margin in the mobile vehicle emissions budget. The safety margin was chosen as it adequately allows for future uncertainty while also allowing Delaware to satisfy RFP requirements. The safety margin was selected with consultation from Region III EPA and WILMAPCO.

The MVEB shown in Table 10-2 contains safety margins of 10% for VOC and NO_x emissions.

Table 9-2 2023 Mobile Vehicle Emission Budgets for New Castle County

Pollutant	SSWD NO _x Emissions (tpd)	SSWD VOC Emissions(tpd)
2023 Motor Vehicle Emission Budget*	8.53	4.57

*Safety margin included

9.3 Trends in Motor Vehicle Emissions Budget

The 2023 MVEB in this revised SIP replaces the MVEB established in 2009. The 2023 budget for VOCs and NO_x is about 55% lower than the 2009 budget as shown in Table 10-3. This is a reduction of about 4% per year and is in line with the emission reductions found in neighboring states. These reductions are primarily due to new motor vehicles meeting the much lower tailpipe emissions. Fleet turnover whereby newer cleaner cars replace older dirtier ones has led to substantial total emission reductions even though the total vehicle population and VMT have increased between 2009 and 2023. These reductions demonstrate the benefits of federal tailpipes standards combined with Delaware's Low Emission Vehicle Program. A small part of the reduction is due to the adoption of electric vehicles.

Another factor is that between 2009 and 2023 there have been multiple changes to the emissions model. The 2009 budget was set using Mobile 6. Since then, the model has been changed multiple times; first to EPA's MOVES model, then to MOVES2010, MOVES2014a, MOVES2014b, and most recently, MOVES4 is being projected to be released by the year's end.

The EPA develops new versions of the MOVES model to reflect real-life conditions and current vehicle emission standards more accurately. An example of this shift was shown when Delaware re-modeled their 2017 New Castle County Onroad emissions (which were previously modeled with MOVES2014b), with the new MOVES3.1.0 model. The results showed a small decrease in NO_x and a ~20% decrease in VOC. The major changes that were made to MOVES3.1.0 from the MOVES2014b model include the following:

- Updated Onroad exhaust emission rates, including Heavy Duty (HD) Greenhouse Gas (GHG) Phase 2 and Safer Affordable Fuel Efficiency (SAFE) rules
- Updated Onroad activity, vehicle populations and fuels
- Added gliders and off-network idle
- Revised inputs for hoteling and starts³⁹

This demonstrates that the reduction in emissions from 2009 to 2023 are expected and are due to fleet turnover from high performing vehicles; however, model changes also have an effect.

Table 9-3 2023 MVEB vs 2009 MVEB

Pollutant	SSWD NO_x Emissions (tpd)	SSWD VOC Emissions(tpd)
2023 Motor Vehicle Emission Budget*	8.53	4.57
2009 Motor Vehicle Emission Budget	19.23	9.89

*Safety margin included

³⁹ EPA (2021, March) Overview of EPA's Motor Vehicle Emission Simulator (MOVES3). Retrieved on July 2023 from <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P1011KV2.pdf>

10.0 Control Measures and Emission Reductions for Attainment

40 CFR 51.1308(d) requires that this SIP revision must include control measures needed for attainment. This chapter is divided into three sections.

Section 10.1 identifies the control measures that were adopted and in place in New Castle County, as reflected in the development of the 2017 base year inventory for the Delaware Nonattainment Area. Some of the control measures were instituted as part of the 1-Hour Ozone SIP for the Delaware Nonattainment Area (2002) and/or part of the 8-Hour Ozone reasonable further progress demonstration (2008). These regulations/control measures continue to be in existence and continue to reduce emissions in the region.

Section 10.2 of this chapter identifies measures implemented in New Castle County after 2017 that were not part of the 2017 base year inventory and are giving specific emission reductions to the region's 2015 8-hour Ozone NAAQS reasonable further progress demonstration.

Section 10.3 describes in more detail, how the control measures in Section 10.2 reduced emissions after 2017. These post-2017 emission reductions were used to demonstrate the 15% emission reductions for VOCs/NO_x required for RFP (Section 8.3). These controls were implemented or have effective dates after 2017 and are not accounted for in the 2017 base year inventory. Specifically, these controls included additional, more stringent emission reductions, which were used to demonstrate the 15 % RFP emissions reduction between the 2017 base inventory year and the 2023 attainment year.

Delaware-specific regulations listed in the following sections are from 7 **DE Admin. Code** – Natural Resources and Environmental Control and will be referred to below by Regulation number, i.e. “Regulation 1144”. Unless otherwise noted, all Delaware regulatory actions have been accepted into the Delaware SIP.

10.1 CONTROL MEASURES INCLUDED IN THE 2017 BASE YEAR INVENTORY

10.1.1 Electric Generating Units

Table 10-1 Delaware Specific EGU Controls, Pre-2017

Regulation	Title	Pollutant(s)	Effective Date	EPA SIP Approval
1144	Control of Stationary Generator Emissions	VOC/NO _x	1/11/06	August 11, 2010 [75 FR 48566] ⁴⁰
1146	EGU Multi-Pollutant Regulation	NO _x	12/11/06	August 11, 2010 [75 FR 48566] ⁴¹
1148	Control of Stationary Combustion Turbine Electric Generating Unit Emissions	NO _x	7/11/07	August 11, 2010 [75 FR 48566] ⁴²

10.1.2 Non-EGUs

Table 10-2 Delaware Specific Non-EGU Controls, Pre-2017

Regulation	Title	Pollutant(s)	Effective Date	EPA SIP Approval
1124 - 46.0	Crude Oil Lightering Operations	VOC	5/11/07	August 11, 2010 [75 FR 48566] ⁴³
1142 – 2.0	Control of NO _x Emissions from Industrial Boilers and Process Heaters at Petroleum Refineries*	NO _x	12/1/01, 7/11/07, 4/11/11	May 15, 2012 [77 FR 28489] ⁴⁴

*Delaware City Refinery, enforceable emission cap for NO_x

⁴⁰ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Administrative and Non- Substantive Amendments to Existing Delaware SIP Regulations. EPA Direct Final Rule. 75 FR 48566. August 11, 2010. <https://www.govinfo.gov/content/pkg/FR-2010-08-11/pdf/2010-19571.pdf>

⁴¹ Ibid 40.

⁴² Ibid 40.

⁴³ Ibid 40.

⁴⁴ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Amendments to the Control of Nitrogen Oxides Emissions From Industrial Boilers and Process Heaters at Petroleum Refineries. EPA Final Rule. 77 FR 28489. May 15, 2012. <https://www.govinfo.gov/content/pkg/FR-2012-05-15/pdf/2012-11656.pdf>

10.1.3 Area Sources

Table 10-3 Delaware Specific Area Source Controls, Pre-2017

Regulation	Title	Pollutant(s)	Effective Date	EPA SIP Approval
1113	Open Burning	VOC/NO _x	4/11/07	August 11, 2010 [75 FR 48566] ⁴⁵
1124 - 11.0	Mobile Equipment Repair and Refinishing	VOC	10/11/10	August 11, 2010 [75 FR 48566] ⁴⁶
1141 - 1.0	Architectural and Industrial Maintenance Coatings	VOC	11/11/06	August 11, 2010 [75 FR 48566] ⁴⁷
1141 - 1.0	Architectural & Industrial Maintenance Coating	VOC	3/1/2017	Not included in Delaware's SIP
1141 - 2.0	Consumer Products	VOC	4/11/09	October 20, 2010 [75 FR 64673] ⁴⁸
1141 - 2.0	Consumer Products	VOC	1/1/2017	Not included in Delaware's SIP
1141 - 3.0	Portable Fuel Containers	VOC	4/11/10	December 14, 2010 [75 FR 77758] ⁴⁹
1141 - 4.0	Adhesives and Sealants	VOC	4/11/09	December 22, 2011 [76 FR 79537] ⁵⁰

⁴⁵ Ibid 40.

⁴⁶ Ibid 40.

⁴⁷ Ibid 40.

⁴⁸ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Limiting Emissions of Volatile Organic Compounds From Consumer Products. EPA Final Rule. 75 FR 64673. October 20, 2010.

<https://www.govinfo.gov/content/pkg/FR-2010-10-20/pdf/2010-25314.pdf>

⁴⁹ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Limiting Emissions of Volatile Organic Compounds From Portable Fuel Containers. EPA Direct Final Rule. 75 FR 77758. December 14, 2010.

<https://www.govinfo.gov/content/pkg/FR-2010-12-14/pdf/2010-31220.pdf>

⁵⁰ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Adhesives and Sealants Rule. EPA Final Rule. 76 FR 79537. December 22, 2011. <https://www.govinfo.gov/content/pkg/FR-2011-12-22/pdf/2011-32646.pdf>

10.1.4 Nonroad Sources

Federal Regulations

- Aircraft: Exhaust Emission Standards (40 CFR Part 87)
- Nonroad Compression-Ignition Engines: Exhaust Emission Standards (40 CFR 1039, 40 CFR 89.112)
- Nonroad Large Spark-Ignition Engines: Exhaust and Evaporative Emission Standards (40 CFR 1048)
- Locomotives: Exhaust Emission Standards (40 CFR 1033.101)
- Federal Marine Compression-Ignition (CI) Engines: Exhaust Emission Standards (40 CFR 1042)
- Marine Spark-Ignition Engines and Vehicles: Exhaust Emission Standards (40 CFR Part 91 and 1045)
- Nonroad Recreational Engines and Vehicles: Exhaust Emission Standards (40 CFR 1051)
- Nonroad Spark-Ignition Engines 19 Kilowatts and Below: Exhaust Emission Standards (40 CFR Part 90 & 1054)
- Nonroad Spark-Ignition Engines 19 Kilowatts and Below, Recreational Engines and Vehicles, and Marine Spark-Ignition Engines: Evaporative Emission Standards (40 CFR Part 1045, 1051, 1054, and 1060)⁵¹

10.1.5 Onroad Sources

Table 10-4 Delaware Specific Onroad Controls, Pre-2017

Regulation	Title	Pollutant(s)	Effective Date	EPA SIP Approval
1131	Low Enhanced Inspection and Maintenance Program	NOx	10/11/01	November 26, 2003 [68 FR 66343] ⁵²
1132	Transportation Conformity Regulation	NOx	11/11/07	August 11, 2010 [75 FR 48566] ⁵³
1140	Delaware Low Emission Vehicle Program	NOx	10/11/99	October 14, 2015 [80 FR 61752] ⁵⁴
1145	Excessive Idling of Heavy Duty Vehicle	NOx	4/11/05	August 11, 2010 [75 FR 48566] ⁵⁵

⁵¹ EPA (2022) EPA Emission Standards for Nonroad Engines and Vehicles retrieved on August 2023 from <https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles>

⁵² Approval and Promulgation of Air Quality Implementation Plans; Delaware; Revisions to Delaware's Motor Vehicle Emissions Inspection Program and Low Enhanced Inspection and Maintenance Program. EPA Direct Final Rule. 68 FR 66343. November 26, 2003. <https://www.govinfo.gov/content/pkg/FR-2003-11-26/pdf/03-29427.pdf>

⁵³ Ibid 40.

⁵⁴ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Low Emission Vehicle Program. EPA Direct Final Rule. 80 FR 61752. October 14, 2015. <https://www.govinfo.gov/content/pkg/FR-2015-10-14/pdf/2015-25954.pdf>

⁵⁵ Ibid 40.

Federal Regulations

- 40 CFR Parts 80, 85, and 86 Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards , NO_x emission control
- 40 CFR Parts 69, 80, and 86 Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards , NO_x emission control

10.2 CONTROL MEASURES POST 2017 BASE YEAR INVENTORY

10.2.1 Area Sources

Table 10-5 Delaware Specific Area Source Controls, Post-2017

Regulation	Title	Pollutant	Effective Date	EPA SIP Approval
1124 - 26.0 and 36.0	Gasoline Dispensing Facility Stage I Vapor Recovery, and Vapor Emission Control at Gasoline Dispensing Facilities*	VOC	7/11/20	July 11, 2022 [87 FR 35423] ⁵⁶
1124 - 33.0	Solvent Cleaning and Drying	VOC	8/11/21	November 3, 2022 [87 FR 60102] ⁵⁷
1124 - 36.0	Vapor Emission Control at Gasoline Dispensing Facilities	VOC	4/11/21	July 11, 2022 [87 FR 35423] ⁵⁸

*Stage II Vapor Recovery Decommissioning

10.2.2 Onroad Sources

Table 10-6 Delaware Specific Onroad Controls, Post-2017

Regulation	Title	Pollutant(s)	Effective Date	EPA SIP Approval
1140	Delaware Low Emission Vehicle Program	NO _x	3/11/18 and 5/1/19	October 14, 2015 [80 FR 61752] ⁵⁹
1131	Low Enhanced Inspection and Maintenance Program – Kent and New Castle Counties	NO _x	1/11/23	Pending approval into the Delaware SIP (Submitted to EPA on March 13, 2023)

⁵⁶ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Removal of Stage II Gasoline Vapor Recovery Program Requirements and Revision of Stage I Gasoline Vapor Recovery Program Requirements. EPA Final Rule. 87 FR 35423. June 10, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-06-10/pdf/2022-12236.pdf>

⁵⁷ Air Plan Approval; Delaware; Control of Volatile Organic Compound Emissions From Solvent Cleaning and Drying. EPA Final Rule. 87 FR 60102. October 4, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-10-04/pdf/2022-21254.pdf>

⁵⁸ Ibid 56.

⁵⁹ Ibid 54.

10.3 DETAILS OF CONTROL MEASURES FOR REASONABLE FURTHER PROGRESS

The following control measures are credited for New Castle County demonstrating RFP (see Section 8.3). These controls were implemented or have effective dates after 2017 and are not accounted for in the 2017 base year inventory. The controls contain new emission limits, that resulted in emission reductions that are included in the 2023 Projected Attainment Inventory (Section 8.2) used to show RFP.

10.3.1 Area Sources

Solvent Cleaning 7 DE Admin. Code 1124, Section 33.0

The Department amended the solvent cleaning control requirements based upon the 2012 OTC Model Rule and to reduce emissions of VOC from solvent cleaning operations, thus reducing the formation of ground-level ozone in Delaware. The rule became effective on August 11, 2022. Solvent cleaning is the process of using solvents to remove contaminants from various plastic, metal or other substrates (surfaces). These amendments reduced emissions of VOCs from cold solvent cleaning operations by: (1) eliminating the exemptions for cold cleaning machines containing one liter or less of solvent and with a VOC concentration of 5% by weight or less; (2) allowing cold cleaning machines to be heated to below boiling; (3) reducing the solvent VOC concentration from 800 grams per liter to 25 grams per liter for most applications; and (4) allowing higher VOC concentrations to be used in conjunction with a VOC capture and control device.

The Department estimated that the OTC model rule will increase the control efficiency from 60% to 80%. The new control measure resulted in 0.08 tpd of VOC emissions reductions as reflected in the 2023 Projected Attainment Inventory for New Castle County.

Gas Station Vapor Recovery – Decommissioning Stage II Vapor Recovery Systems and Requiring Stage I Enhanced Vapor Recovery Systems at Gasoline Dispensing Facilities DE Admin. Code 1124 Sections 26 and 36;

The Department updated requirements for GDFs: (1) to require all GDF's to decommission existing Stage II vapor recovery systems in light of the redundancy of on-board refueling vapor recovery canisters that exist in vehicles starting with model year 1998, (2) to remove the requirement that new GDFs must install Stage II systems, and (3) to update Stage I requirements to ensure all GDFs remain well controlled. The proposed amendments will also require regulated GDFs to monitor a vapor-tight status of its gasoline storage tanks by performing annual pressure decay tests or by installing a continuous pressure monitoring (CPM) system.

The decommissioning of Stage II systems was required by December 31, 2021, and installing Stage I EVR systems is required by December 31, 2025. These deadlines will (1) avoid incompatibility VOC emission of 71 tons in 2021, (2) provide 58 tons of VOC emission reduction after 2025, and (3) total 129 ton of long term VOC emission reductions for attaining and maintain the ozone air quality for the state of Delaware.

The implemented regulations resulted in 0.28 tpd of VOC emission reductions as reflected in the 2023 Projected Attainment Inventory for New Castle County.

Phased in Reduction of Portable Fuel Containers (PFCs) – 7 DE Admin. Code 1141 Section 3.0

Delaware adopted the OTC Model Rule for PFCs (based on the 2000 California Air Resources Board (CARB) rule), which became effective on January 1, 2003. This regulation was developed to reduce the amount of VOC emissions escaping PFCs via evaporation or permutation and applies to anyone who sells, supplies, offers for sale, or manufactures for sale portable fuel container (or containers) or spout (or spouts) or both portable fuel container (or containers) and spout (or spouts) for use in the State of Delaware. The rule had a total control of 65% when it was fully implemented after 10 years because turnover of the PFCs was estimated to take 10 years.

In 2009, the EPA approved the Federal Hazardous Air Pollutant Mobile Source Rule, which regulated PFCs in a manner similar to CARBs new 2006 amendments. The rule regulated PFCs permeability and evaporative losses to 0.3 grams of hydrocarbons per gallon per day and the controls were estimated to be fully implemented in 2018. Delaware adopted this rule (while removing the OTC model rule for PFCs), which became effective in April 11, 2010. EPA estimates about a 3% reduction in 2009 and approximately 6% per year thereafter; with a 57% reduction when fully implemented in 2018.

Delaware's PFC control efficiency increased from 51% to 57% in 2018. These phased in reductions resulted in 0.08 tpd of VOC emission reductions as reflected in the 2023 Projected Attainment Inventory for New Castle County.

10.3.2 Onroad Mobile Sources

Mobile source reductions are due to motor vehicles being produced to much lower tailpipe emissions as a result of Delaware's Low Emission Vehicle Program and federal tailpipe standards. Additional mobile reductions are a result of fuel standards. All emission reductions listed below were calculated using the MOVES3.1.0 model. The following regulations, along with fleet turnover, have contributed to mobile source reductions of 7.53 tpd of NO_x and 0.80 tpd of VOC in New Castle County as reflected in the 2023 Projected Attainment Inventory.

Motor Vehicle Emissions Inspection Program - Kent and New Castle Counties 7 DE Admin. Code 1131

Amendments to 7 DE Admin. Code 1131, “Low Enhanced Inspection and Maintenance Program – Kent and New Castle Counties,” increases the applicability of the regulation to include vehicles that weigh 8,501 up to 14,000 pounds gross vehicle weight beginning with model year 2008 for the On-Board Diagnostic (OBD) test; modify the older vehicle testing requirements to include curb idle and gas cap tests for vehicles 1995 and older; and include language that prevents vehicle tampering. The amended inspection and maintenance program ensures cars and trucks are emitting emissions within legal limits and vehicles with high emissions are identified and repaired. For more information on the I/M program, see Section 4.0.

Delaware Low Emission Vehicle 7 DE Admin. Code 1140

The Department has chosen to adopt California’s Low Emission Vehicle (LEV) and GHG standards as part of the Delaware Code (7 DE Admin. Code 1140). These standards (7 DE Admin. Code 1140) became effective in Delaware for model year 2014 vehicles, significantly reducing a number of emissions including VOCs and NOx. The LEV III regulations include increasingly stringent emission standards for both criteria pollutants and greenhouse gases for new passenger vehicles through the 2025 model year. By adopting California’s motor vehicle emission vehicle standards, Delaware joined a growing number of states, currently at 14 (including the District of Columbia), committed to reducing pollution from motor vehicles.⁶⁰

Reformulated Gasoline (40 CFR Part 80, Subpart D)

Reformulated Gasoline (RFG) was mandated by Section 211(k) of the federal CAA for metropolitan areas with the worst smog beginning in 1995. This includes New Castle and Kent County Delaware; and Sussex County which was opted in by the Governor in 1993. RFG is blended to burn more cleanly than conventional gasoline, reducing emissions of ozone-forming and toxic pollutants. The first phase of the RFG program began in 1995 and the second (current) phase began in 2000.⁶¹

Federal Tier 3 Motor Vehicle Emission and Fuel Standards (79 FR 23414, Apr 28, 2014)

The program considers the vehicle and its fuel as an integrated system, setting new vehicle emissions standards and a new gasoline sulfur standard beginning in 2017. The vehicle emissions standards will reduce both tailpipe and evaporative emissions from passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. The gasoline sulfur standard will enable more stringent vehicle emissions standards and will make emissions control systems more effective.⁶²

⁶⁰ Division of Air Quality (n.d) Clean Vehicles and Fuels. Retrieved on August 14, 2023 from <https://dnrec.alpha.delaware.gov/air/mobile-sources/clean-vehicles-fuels/>

⁶¹ Division of Air Quality (n.d) Mobile Sources. Retrieved on August 4, 2023 from <https://dnrec.alpha.delaware.gov/air/mobile-sources/>

⁶² Final Rule for Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards Retrieved on August 2023 from <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-air-pollution-motor-vehicles-tier-3>

10.3.3 Nonroad Sources

Nonroad sources include a variety of different mobile equipment (Aircrafts, Rail, Commercial Marine Vessels, and Other Off-road Vehicles and Equipment Sources). Federal regulations that address emissions standards of these sources and fuel composition have all contributed to Nonroad emission reductions. These regulations include the following:

- Aircraft: Exhaust Emission Standards (40 CFR Part 87)
- Nonroad Compression-Ignition Engines: Exhaust Emission Standards (40 CFR 1039, 40 CRF 89.112)
- Nonroad Large Spark-Ignition Engines: Exhaust and Evaporative Emission Standards (40 CRF 1048)
- Locomotives: Exhaust Emission Standards (40 CRF 1033.101)
- Federal Marine Compression-Ignition (CI) Engines: Exhaust Emission Standards (40 CFR 1042)
- Marine Spark-Ignition Engines and Vehicles: Exhaust Emission Standards (40 CFR Part 91 and 1045)
- Nonroad Recreational Engines and Vehicles: Exhaust Emission Standards (40 CRF 1051)
- Nonroad Spark-Ignition Engines 19 Kilowatts and Below: Exhaust Emission Standards (40 CRF Part 90 & 1054)
- Nonroad Spark-Ignition Engines 19 Kilowatts and Below, Recreational Engines and Vehicles, and Marine Spark-Ignition Engines: Evaporative Emission Standards (40 CRF Part 1045, 1051, 1054, and 1060)⁶³

Emission reductions from other off-road vehicles and equipment sources are modeled through EPA's MOVES in Nonroad mode. Delaware used the latest version of the model, MOVES3.1.0 to model emissions from 2017 and 2023 in New Castle County. The difference in emissions from these two model runs are based on the implementation of federal rules combined with equipment turnover. The emissions reductions of 1.03 tpd of VOC and 0.63 tpd of NO_x contribute to Delaware demonstrating RFP for New Castle County, as reflected in the 2023 Projected Attainment Inventory.

Emission reductions from Commercial Marine Vessels, Rail, and Aircrafts are the difference of the 2017 and 2023 inventories. The inventories for these sectors are developed by the EPA, which is discussed in more detail in Section 7 and 8. The controls resulted in 0.71 tpd of NO_x emission reductions as reflected in the 2023 Projected Attainment Inventory for New Castle County.

⁶³ EPA (2022). EPA Emission Standards for Nonroad Engines and Vehicles. Retrieved on August 2023 from <https://www.epa.gov/emission-standards-reference-guide/epa-emission-standards-nonroad-engines-and-vehicles>

11.0 Reasonably Available Control Technology (RACT)

40 CFR 51.1312(a)(1) requires that this SIP revision must include a RACT demonstration.

11.1 Background and Requirements

The EPA has defined the RACT as the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.⁶⁴ Section 182 of the CAA sets forth two separate RACT requirements for ozone NAAs.

The first requirement, contained in section 182(a)(2)(A) of the CAA, and referred to as RACT fix-up, requires the correction of RACT rules for which EPA identified deficiencies before the Act was amended in 1990.

The second requirement, set forth in section 182(b)(2) of the CAA, applies to moderate or worse ozone NAAs as well as to marginal and attainment areas in OTRs established pursuant to section 184 of the CAA, and requires these NAAs to implement RACT controls on all major VOC and NO_x emission sources and on all sources and source categories covered by a Control Technique Guideline (CTG) and Alternate Control Techniques (ACTs) issued by EPA.

Under section 183 of the CAA, EPA was required to issue by certain timeframes several guidance documents for RACT controls that would help states meet the requirements of section 182(b)(2). This requirement upon EPA includes developing (1) CTGs for controls of VOC emissions from stationary sources, and (2) ACTs for controls of VOC and NO_x emissions from stationary sources.

In general, states meet the CAA's RACT requirements by imposing controls that meet the control requirements established in final CTG documents and considering the information in ACT documents to relevant VOC and NO_x sources in their moderate or worse NAAs. Adoption of new RACT regulation(s) shall occur when states have new stationary sources not covered by existing RACT regulations, or when new data or technical information indicates that a previously adopted RACT measure does not represent a newly-available RACT control level.

Delaware submitted its RACT SIP for the 2015 Ozone NAAQS to EPA on August 3, 2020 (see Appendix J).

⁶⁴ State Implementation Plans; General Preamble for Proposed Rulemaking on Approval of Plan Revisions for Nonattainment Areas-Supplement (on Control Techniques Guidelines. EPA General Preamble for proposed rulemaking-Supplement. 44 FR 53762. September 17, 1979. https://archives.federalregister.gov/issue_slice/1979/9/17/53760-53764.pdf#page=3

12.0 Reasonably Available Control Measure (RACM)

40 CFR 51.1312(c) requires that this SIP revision must include a RACM demonstration.

12.1 Background and requirements

The 1990 CAAA and 40 CFR 51.912(d) impose a RACM requirement for areas designated non-attainment for the 8-hour NAAQS. According to this requirement, Delaware must demonstrate that it has adopted all RACM controls necessary to move toward attainment as expeditiously as practicable and to meet all RFP requirements.

RACM is defined by the EPA⁶⁵ as any potential control measure that meets the following criteria:

- Economically feasible;
- Technologically feasible;
- Does not cause “substantial widespread and long-term adverse impacts”;
- Is not “absurd, unenforceable, or impracticable”; and
- Can advance the attainment date by at least one year.

The attainment deadline for areas designated moderate non-attainment is August 3, 2024, which requires the NAA’s 3-year design value data for 2020-2023 to demonstrate attainment with the 2015 Ozone NAAQS. Therefore, the attainment year is 2023. To meet the requirements of RACM, the attainment date would have to be advanced to the end of the 2022 ozone season (September 30) in order to advance the attainment date by at least one year.

Some candidate RACM measures have the potential to cause substantial and widespread adverse impacts to a particular social group or sector of the economy, including communities with environmental justice concerns. Accordingly, measures that cause substantial or widespread adverse impacts will not be considered RACM.

12.2 RACM Determination

Advancement of Attainment Date By One Year Requirement

The EPA did not issue its final rule for the Determinations of Attainment by the Attainment Date and Reclassification of Areas Classified as marginal for the 2015 Ozone NAAQS until October 7, 2022.⁶⁶ Consequently, by the time the rule was issued, the deadline of September 30, 2022 required by RACM to advance the attainment date by one year had already passed. In addition, it can take Delaware a year or more to finish the process of adopting a new regulation, especially when more stringent controls are involved. Therefore, Delaware would not have been able to adopt any new regulations before the “advancement of attainment date” deadline of September 30, 2022.

⁶⁵ State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990. EPA General preamble for future proposed rulemakings. 57 FR 13498. Page 13560-13561. April 16, 1992. https://archives.federalregister.gov/issue_slice/1992/4/16/13412-13570.pdf#page=87

⁶⁶ Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as marginal for the 2015 Ozone National Ambient Air Quality Standards. EPA Final Rule. 87 FR 60897. October 7, 2022. <https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf>

Ozone Transport Commission Model Rules

The OTC is a multi-state organization created under the CAA⁶⁷. It is responsible for advising EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions.

The OTC has developed a number of Model Rules⁶⁸ that can be used by states as a template to adopt VOC emission reduction regulations. Some Model Rules have different Phases, or successively more stringent emissions controls. Delaware has already adopted the majority of applicable OTC model rules for Stationary and Area Sources:⁶⁹

- Consumer Products, Phase I
- Consumer Products, Phase II
- Consumer Products, Phase III
- Consumer Products, Phase IV
- Architectural & Industrial Maintenance, Phase I
- Architectural & Industrial Maintenance, Phase II
- Asphalt Paving
- Portable Fuel Containers, Phase I, Federal
- Portable Fuel Containers, Phase II, Federal
- Mobile Equipment Repair & Refinishing, Phase I
- Mobile Equipment Repair & Refinishing, Phase II
- Solvent Degreasing, Phase I
- Solvent Degreasing, Phase II
- Industrial, Commercial & Institutional Adhesives & Sealants
- Industrial, Commercial & Institutional Boilers, Stationary Combustion Turbine, Stationary Reciprocating Engine
- Distributed Generation Standards
- Stationary Generators
- Electric Generating Units: High Electric Demand Days Combustion Turbines

In regard to applicable OTC Model Rules that Delaware has not yet adopted:

- Consumer Products Phase V – Delaware is using the Consumer Products Phase V rule as a VOC contingency measure (Section 14).
- Large Above Ground VOC Storage Tanks – Delaware is in the process of exploring the economic feasibility and potential emissions reductions of adopting the Tanks model rule.

Additional regulations that have been adopted by Delaware can be found in Section 10.0, Control Measures and Emission Reductions for Attainment.

⁶⁷ CAA Section 176A

⁶⁸ Status of Adoption of OTC Model Rules/Regulatory & Technical Guidelines. Updated May 10, 2023
<https://otcair.org/document.asp?view=modelrules>

⁶⁹ Ibid 68.

In conclusion, it is Delaware's position that it has met the requirements of RACM through its RACT submittal (Appendix J) and its adoption of many VOC and NO_x emission reduction related regulations.

13.0 Attainment Demonstration Modeling

40 CFR 51.1308(a) and 51.1308(c) require that this SIP revision must include Attainment Demonstration Modeling.

13.1 Background and Objectives

As discussed in Section 1 of this document, the EPA designated one county in Delaware, New Castle County, as moderate non-attainment for the 8-hour ozone standard. New Castle County is part of a greater Philadelphia-Wilmington-Atlantic City (PA-NJ-MD-DE) moderate NAA for the 8-hour ozone standard. As shown in Figure 1-2, the counties within this NAA are:

Delaware:	New Castle County
Maryland:	Cecil County
New Jersey:	Atlantic County, Burlington County, Camden County, Cape May County, Cumberland County, Gloucester County, Mercer County, Ocean County, Salem County;
Pennsylvania:	Bucks County, Chester County, Delaware County, Montgomery County, Philadelphia County.

Ozone has been a chronic problem, particularly along the I-95 corridor from Washington, DC to Boston, Massachusetts. The ozone non-attainment in the Northeast and Mid-Atlantic regions is attributed not only to the anthropogenic emissions in the area but also to regional transport, which is a significant portion of ozone observed.

The EPA requires that the areas in non-attainment for the 8-hour ozone NAAQS demonstrate, by the use of photochemical grid modeling, that they would attain the NAAQS by August 3, 2024. The attainment demonstration requires the NAA's 3-year design value data for 2020-2023 to demonstrate attainment with the 2015 Ozone NAAQS. Therefore, the attainment year used for modeling is 2023.

The attainment demonstration assesses whether emissions reductions resulting from a set of selected control measures will result in ambient concentrations that meet the NAAQS. It predicts whether or not all estimated future 2023 design values will be less than or equal to the concentration level specified for the 2015 8-hour ozone NAAQS.

The objective of this section (i.e., Attainment Demonstration Modeling) is to evaluate the efficacy of proposed/adopted control strategies, and to demonstrate that such measures will result in attainment of the ozone standard by August 3, 2024. This SIP shows that progress is being made to improve air quality in the PA-NJ-MD-DE moderate NAA, that all necessary steps are being taken to attain the 8-hour ozone NAAQS by 2023, and that New Castle County will comply with the 8-hour ozone NAAQS by the August 3, 2024 attainment date.

The basis for Delaware's attainment demonstration for the 2015 8-hour ozone standard is the *Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Support Document*; January 31, 2023 (Appendix K). This modeling document (V1) was subsequently updated with an addendum that incorporated a new, updated modeling platform V2/V3, *Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Technical Support Document: OTC V2/V3 Modeling Platform Update*; July 14, 2023 (Appendix L). The purpose of these reports is to document the results and technical details of SIP quality modeling efforts undertaken by the OTC/Mid-Atlantic Northeast Visibility Union (MANEVU) to support member state SIP submittals for the 2008 and 2015 ozone standards.

The PA-NJ-MD-DE's modeling runs were performed in coordination with the 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, New Jersey Department of Environmental Protection, Virginia Department of Environmental Quality, University of Maryland College Park via the Maryland Department of the Environment, and Office of Research Commercialization at Rutgers University via New Jersey Department of Environmental Protection.

13.2 OTC Modeling Methodology

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 NO_x and 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 southeast 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 attributed to U.S. human activity. This U.S. 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.⁷⁰

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”.⁷¹

Models

The OTC used two different models in its analysis: Community Multi-scale Air Quality model (CMAQ) and the Comprehensive Air Quality Model with Extensions (CAMx), the two photochemical models most used by the air quality modeling community.

CMAQ is a numerical atmospheric chemistry/air quality model that simulates the physics and chemistry of the atmosphere at relatively high spatial and seasonal resolution. CAMx is a multi-scale, three dimensional photochemical grid model designed to simulate the formation and fate of oxidant precursors, primary and secondary particulate matter concentrations, and deposition over regional and urban spatial scales.

Base Year Selection

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 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”⁷² produced by the Inventory Collaborative Base Year Selection Workgroup, December 12, 2017.

⁷⁰ US EPA 2014, Policy Assessment for the Review of the O3 National Ambient Air Quality Standards, Research Triangle Park, NC, https://www.epa.gov/sites/default/files/2020-05/documents/o3-final_pa-05-29-20compressed.pdf

⁷¹ The Nature of the Ozone Air Quality Problem in the Ozone Transport Region: A Conceptual Description, Downs et al., August 2010, https://www.nescaum.org/documents/2010_o3_conceptual_model_final_revised_20100810.pdf

⁷² Base Year Selection Workgroup Final Report, www.wrapair2.org/pdf/2017-12-12_Base_Year_Selection_Report_V1.1.pdf

Future Year Selection

The New York Metropolitan moderate NAA 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 expected that marginal NAAs 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 O₃ NAAQS. Therefore, a future analysis year of 2023 was selected to best meet the attainment planning needs of these jurisdictions.

13.3 OTC Modeling Results

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.

EPA guidance recommends the use of the RRF approach to demonstrate attainment of the 8- hour O₃ NAAQS,⁷³ 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.

Results were presented based on the standard 3x3 method, as well as a modified 3x3 method in which all grid cells identified as water were excluded (“3x3 No Water 1 method”), as per the EPA guidance. More details about the specific OTC modeling methodology can be found in Appendices K and L.

In this document, Delaware is presenting a subset of the OTC modeling results, Delaware monitors in New Castle County (Table 13-1). The modeling results show all of Delaware’s New Castle County monitors in attainment with the 70 ppb NAAQS for the 2023 attainment year. Full modeling results can be found in Appendix C of the July 14, 2023 *OTC Modeling Technical Support Document* (Appendix L).

⁷³ US EPA, 2018. “Air Quality Modeling Technical Support Document for the Updated 2023 Projected Ozone Design Values”, accessed at https://www.epa.gov/sites/default/files/2018-06/documents/air_modelingtsd_updated_2023_modeling_o3_dvs.pdf

Table 13-1 2023 Future Design Values for Delaware Ozone Monitors in the Philadelphia Non-attainment Area*.

				CAMx v7.10				CMAQ v5.3.1			
				3x3		3x3 No Water 1		3x3		3x3 No Water 1	
Site ID	State	Monitor	County	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
100031010	DE	Brandywine Creek State Park	New Castle	65.4	65.7	65.4	65.7	65.5	65.8	65.5	65.8
100031013	DE	Bellevue State Park	New Castle	62.6	63.5	62.6	63.5	62.8	63.7	62.8	63.7
100032004	DE	MLK	New Castle	62.9	63.5	62.9	63.5	63.1	63.7	63.1	63.7
100031007	DE	Lums Pond	New Castle	59.4	60.3	59.4	60.3	58.9	59.8	58.9	59.8

* 2023 modeling future predicted design values (DVs) for 3x3 and 3x3 No Water 1 methodology for CAMx (green header) and CMAQ (blue header) used the V2/V3 inventory.

14.0 Contingency Measures

The CAA Section 172(c)(9) requires that this SIP revision must include contingency measures.

14.1 Requirements on Contingency Measures

The CAAA requires States with NAAs to implement specific control measures if the area fails to make reasonable further progress, fails to meet any applicable milestone, or fails to attain the NAAQS by the applicable attainment date. The EPA has interpreted this CAAA provision as a requirement for States with moderate and above ozone NAAs to include sufficient contingency measures (CMs) in their RFP and attainment demonstration. Under the same provision of the CAAA, EPA also requires that the contingency measures must be fully-adopted control measures or rules, so that, upon failure to meet milestone requirements or to attain the standards, the contingency measures can be implemented without any further rulemaking activities by the States and/or EPA.

EPA Draft Contingency Measure Guidance

On March 17, 2023, EPA released the document, entitled, *Draft Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter* (Appendix M).

The purpose of the guidance document is to assist air agencies that are required to prepare non-attainment plan submissions under Part D of Title I of the CAA. Specifically, in the document the EPA provides guidance to air agencies for the preparation of ozone and particulate matter (PM) plans, and focuses on the requirement for those plans to include CMs. CMs are control requirements that would take effect if an area fails to attain a NAAQS by an applicable attainment date, or fails to make RFP toward attainment.

These CM requirements are specified in CAA section 172(c)(9) for NAAs generally, and in section 182(c)(9) for Serious or higher ozone NAAs. The document addresses application of the CM requirements for the ozone and PM NAAQS. It does not address contingency provisions required for maintenance plans in section 175A(d), nor does it address specific contingency provisions for anticipated control measures in Extreme ozone NAAs under section 182(e). It also does not address CM requirements for pollutants other than PM and ozone, where existing CM guidance remains in effect.

EPA is issuing the guidance document because recent court decisions – discussed later in the document – have invalidated key aspects of EPA’s historical approach to implementing the CM requirement. These court decisions had the effect of prohibiting an approach that many air agencies have historically used to meet the CM requirement, i.e., the reliance on implemented control measures as CMs (particularly the commonly used approach of relying on surplus reductions from mobile source fleet turnover from already-implemented federal or state control measures).

EPA has received feedback from some air agencies that this constraint, together with the evolution toward more stringent control programs in the 30 years since EPA first articulated its CM guidance (explained in Section 2 of the guidance), has increased the difficulty that they face in identifying measures sufficient to meet the CM requirement. Some air agencies, particularly those with longstanding non-attainment problems that have implemented progressively more stringent control measures over time to meet more stringent NAAQS, have stated that the scarcity of remaining unimplemented control measures poses a significant challenge to meeting CM requirements. EPA intends the guidance to address that increased challenge by clarifying and explaining approaches available to air agencies to meet the CM requirement, while still meeting the CAA as interpreted by the courts.

The guidance focuses on three key aspects of EPA’s CM guidance. First, the guidance addresses the method that air agencies should use to calculate EPA-recommended amount of emissions reductions that CMs should provide. Longstanding EPA guidance, discussed in Section 2 of the document guidance, has recommended that CMs provide reductions approximately equal to or greater than the amount needed to meet the requirement for RFP in the relevant area for 1 year. In the guidance EPA continues to recommend an annual progress-based approach for calculating the recommended amount of reductions for CMs but changes the metric to be more closely tied to the air quality improvement needs of the area when the CMs are triggered. (The term “triggered” for CMs refers to the effective date of EPA’s final determination that a NAA has failed to attain a NAAQS by the applicable attainment date or has failed to meet RFP. The CAA establishes time frames for EPA to make such determinations.)

Second, the guidance addresses the situation where an air agency cannot identify feasible CMs in sufficient quantity to produce the recommended amount of reductions using the updated metric. Previous EPA policy has indicated that states could provide a “reasoned justification” to have CMs that result in less than the recommended one year’s worth (OYW) of RFP. The guidance provides air agencies with specific recommendations about how to develop such reasoned justifications to support SIP submissions for which the submitting agency is asserting that it cannot provide for the recommended amount of CM reductions due to a lack of feasible measures.

Finally, the guidance addresses the time period within which reductions from CMs should occur. EPA previously recommended that CMs take effect within 60 days of being triggered, and that the resulting reductions generally occur within 1 year of the CMs being triggered. In instances where there are insufficient CMs available to achieve the recommended amount of emissions reductions within 1 year, EPA provides recommendations for how air agencies could include CMs that provide reductions within up to 2 years of being triggered. The guidance does not alter the 60-day recommendation for the measures to take effect. While the guidance document focuses on these three aspects of CM guidance that EPA is updating, it also provides additional information to summarize EPA's existing guidance for CMs more broadly, including aspects that EPA is not updating, to ensure clarity and national consistency.

14.2 EPA's Contingency Measures Calculation Methodology

OYW of Progress Calculation Described: EPA recommends that air agencies use the following equation to calculate OYW of progress for the purpose of assessing the adequacy of the reductions provided by the submitted CMs:

$$\frac{(base\ year\ EI - attainment\ year\ EI)}{(attainment\ year - base\ year)} \div base\ year\ EI \times attainment\ year\ EI = OYW\ of\ Progress$$

The OYW of progress calculation is based on anthropogenic emissions. All uses of the term "emissions," including "base year EI" and "projected attainment EI," refer to anthropogenic emissions.

States should use this approach for ozone and PM non-attainment plans and should perform the calculation separately for each relevant pollutant and precursor. This calculation can be broken down into three steps.

- Step 1:** Calculate the average annual emissions reductions needed to attain. For each relevant precursor, determine the amount of emissions reductions between the base year and the projected attainment year and divide by the number of years between the base year and the attainment year. Note: for PM, this typically represents the RFP annual average reduction, but for ozone, this will likely be different from the 3 percent annual requirement for RFP.
- Step 2:** Calculate the annual percentage reduction needed to attain. Determine what percentage of the base year inventory is represented by the annual average emissions reduction needed to attain by dividing the annual average reductions by the base year inventory for the NAA.
- Step 3:** Calculate the amount of emissions reductions needed for OYW of progress. Multiply the total emissions from the attainment projected inventory for the NAA by the annual percentage reduction needed to attain. This represents the amount of emissions reductions CMs should provide to meet OYW of progress.

EPA notes that this calculation depends on an approvable attainment demonstration, which could either be a modeled attainment demonstration or, where the model does not show attainment, one that relies on weight of evidence to demonstrate attainment. For reasons explained in Section 2, EPA believes it is appropriate to base the OYW of progress amount on the attainment projected inventory for the NAA. However, if EPA is unable to approve the attainment demonstration for reasons related to the adequacy of the modeling or weight of evidence demonstration, then EPA would not be able to approve as adequate the amount of CMs the air agency provided.

To affirm that the CMs achieve OYW of progress, the SIP submission should provide documentation of the expected reductions from the CMs contained within the plan and should compare the expected emissions reductions to the OYW of progress amount calculated above. Air agencies should include all steps of these calculations in their SIP submissions. EPA expects that the CM requirement would be met if the expected reductions meet or exceed the OYW of progress amount for the relevant precursor(s) / pollutant(s), and the CMs meet all other applicable requirements and guidance.

If submitted CMs fall short of this amount, Section 4 of this guidance addresses the potential for an infeasibility justification for a lesser amount. Air agencies should ensure that other CM requirements and guidance unrelated to the amount of reductions are met (e.g., the measures are prospective and conditional and will take effect without further actions by the state or EPA as §172(c)(9) requires). Finally, we note that this OYW of progress approach is only for the purpose of calculating the amount for CM purposes and does not relieve an area from meeting other applicable CAA requirements (e.g., RFP, the milestone compliance demonstration requirements in CAA §182(g), or the quantitative milestone requirements of §189(c), which are separate and distinct from §172(c)(9) and §182(c)(9)).

OYW of progress is calculated for all relevant precursors to determine the amount of emissions reductions that CMs would need to provide to continue the annual percentage reduction, as applied to the attainment projected inventory. However, attainment demonstration modeling may provide a reasonable basis to identify ratios of the effectiveness of reductions of one precursor to reduce ambient concentrations relative to other precursors. If that is the case, then a state may use the ratio to substitute CM reductions of one precursor for a shortfall in CM reductions of another precursor. This applies to VOC and NO_x for ozone and to the PM_{2.5} plan precursors for PM_{2.5}. EPA recommends that an air agency intending to use such a substitution approach consult with its Regional Office concerning selection of a methodology for developing appropriate ratios.

14.3 Delaware's Contingency Measures Calculations

Step 1: Calculate the average annual emissions reductions needed to attain.

Step 1a: Determine the amount of emissions reductions between the base year and the projected attainment year

Step 1b: Divide by the number of years between the base year and the attainment year.

Equation 1:

$$\text{Annual Avg. Reduction} = \frac{(\text{Adjusted 2017 base year EI} - \text{2023 attainment EI})}{(2023 - 2017)}$$

Table 14-1 Contingency Measure Step 1 for VOC and NOx

Step	Value	Units
Step 1a: VOC	25.76 - 24.22 = 1.54	tpd
Step 1b: VOC	1.54 ÷ (2023 - 2017) = 0.26	tpd per year
Step 1a: NOx	42.38 - 34.26 = 8.11	tpd
Step 1b: NOx	8.11 ÷ (2023 - 2017) = 1.35	tpd per year

Step 2: Calculate the annual percentage reduction needed to attain. Determine what percentage of the base year inventory is represented by the annual average emissions reduction needed to attain by dividing the annual average reductions by the base year inventory for the NAA.

Equation 2:

$$\text{Annual \% Reduction} = \frac{(\text{Annual Avg. Reduction})}{(\text{Adjusted 2017 base year EI})}$$

Table 14-2 Contingency Measure Step 2 for VOC and NOx

Step	Value	Units
Step 2: VOC	0.26 ÷ 25.76 = 1.0%	annual reduction (%)
Step 2: NOx	1.35 ÷ 42.38 = 3.2%	annual reduction (%)

Step 3: Calculate the amount of emissions reductions needed for OYW of progress. Multiply the total emissions from the attainment projected inventory for the NAA by the annual percentage reduction needed to attain.

Equation 3:

$$OYWof\ Progress = Annual\ \% \ Reduction \times 2023\ attainment\ EI$$

Table 14-3 Contingency Measure Step 3 for VOC and NOx

Step	Value	Units
Step 3: VOC	1.0% x 24.22 = 0.24	tpd
Step 3: NOx	3.2% x 34.26 = 1.09	tpd

14.4 Delaware's Proposed Contingency Measures

14.4.1 Volatile Organic Compounds

Delaware is proposing to implement the OTC model rule for Consumer Products Phase V.⁷⁴ Delaware will update 7 **DE Admin. Code** 1141, *Limiting Emissions of Volatile Organic Compounds from Consumer and Commercial Products*, Section 2.0 *Consumer Products*, to require Phase V to be automatically triggered if the Philadelphia NAA does not attain by the end of the 2023 Ozone Season. The regulatory amendments will allow at least one year for existing sources to comply, as the additional emission reductions within the amendments may require reformulation of products. The compliance period would also allow retailers addition time to transition to compliant product. New sources would be expected to comply upon the effective date of the amendments. Delaware estimates that these amendments would result in 0.30 tpd of VOC reductions for 2023 in New Castle County.

14.4.2 Nitrogen Oxides

Delaware is proposing to amend regulations 7 **DE Admin. Code** 1112, *Control of Nitrogen Oxides Emissions*, and/or 1142, *Specific Emission Control Requirements*, by reducing emission limits, to obtain the required NOx emission reductions of 1.09 tpd. Regulation 1112 applies to major stationary sources of NOx that have fuel burning equipment with a rated heat input capacity of 100 Million btu/hour or greater. Regulation 1142 applies to any person that owns or operates any combustion unit with a maximum heat input capacity of equal to or greater than 100 million btu per hour.

The amendments would automatically be triggered if the Philadelphia NAA does not attain by the end of the 2023 Ozone Season. The amendments will allow at least one year for existing sources to comply, as sources may require time to install or upgrade controls. New sources would be expected to comply upon the effective date of the amendments.

⁷⁴ Ozone Transport Commission. Retrieved on September 18, 2023. <https://otcair.org/document.asp?fview=modelrules>

14.5 Contingency Measure Implementation

Delaware may adopt additional or alternative rulemakings to replace or augment the proposed contingency measures mentioned above. These rulemakings would provide equivalent or greater emission reductions, as required to achieve EPA's total contingency measure emission reduction requirements for Delaware. The new rulemakings would include a public comment period and public hearing. The actions would subsequently be submitted to the Delaware SIP for review by EPA.

In the event that EPA's draft contingency measure emissions calculation methodology is revised, Delaware reserves the right to draft new contingency measures to meet EPA's revised emission reduction requirements for Delaware. These new contingency measures would also include a public comment period and public hearing and would be submitted to the Delaware SIP.

ATTACHMENTS

Final

**DELAWARE STATE IMPLEMENTATION PLAN REVISION
MODERATE NON-ATTAINMENT PLAN FOR NEW CASTLE
COUNTY FOR THE 2015 8-HOUR OZONE NATIONAL
AMBIENT AIR QUALITY STANDARD**

The New Castle County Portion of the Philadelphia-Wilmington-
Atlantic City, PA-NJ-MD-DE Non-attainment Area

Submitted To
U.S. Environmental Protection Agency attachments

By

Delaware Department of Natural Resources and
Environmental Control



March 2024

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Appendix A

2017 Base Year Emissions Inventory State Implementation Plan for VOC, NO_x, and CO

For Areas of Marginal Nonattainment of the 2015 Ozone NAAQS in Delaware

F I N A L

Submitted to:

U.S. Environmental Protection Agency

Region 3 – Philadelphia, PA

Prepared by:

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November 2020

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SECTION 1 - 2017 OZONE INVENTORY OVERVIEW AND SUMMARY

1.1 Introduction

This document contains Delaware's base year emissions inventory State Implementation Plan (SIP) revision under the 2015 8-hour ozone National Ambient Air Quality Standard (NAAQS) set forth by US Environmental Protection Agency (EPA).

1.2 Background and Requirements

Ground-level ozone, one of the principal components of "smog," is a serious air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. High levels of ozone also cause serious damage to forests and agricultural crops, resulting in economic losses to logging and farming operations. Ozone is generally not directly emitted to the atmosphere. It is formed in the atmosphere by photochemical reactions among volatile organic compounds (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO) in the presence of sunlight.

In October 2015, the EPA revised the 2008 8-hour ozone NAAQS of 0.075 parts per million (ppm) to 0.070 ppm (80 FR 65291). The 2015 ozone NAAQS of 0.070 ppm is expected to provide better protections of public health and environment. In a final rule dated June 4, 2018, the EPA designated 51 areas in the country as nonattainment for the 2015 ozone NAAQS.

New Castle County of Delaware was designated nonattainment as a part of the Philadelphia-Wilmington-Atlantic City Marginal Nonattainment Area (NAA) (83 FR 25776). Since this marginal NAA is centered by the City of Philadelphia, it is often referred to as "the Philadelphia NAA." In the same final rule, Kent and Sussex Counties were designated as attainment (83 FR 25776). The EPA made the designations of these three counties based on their 2014-2016 design values, and the effective date of the designations was August 3, 2018.

To facilitate planning, Sections 182(a)(1) and 172(c)(3) of the Clean Air Act (CAA) require all ozone NAAs to establish a comprehensive, accurate, and current inventory of actual emissions from all sources of the relevant pollutant or pollutants in the area by August 3, 2020 (i.e., two years after designation as nonattainment). This inventory is commonly referred to as a base year inventory. Delaware has previously been designated nonattainment for ozone under the 1979 1-hour, 1997 8-hour, and 2008 8-hour ozone NAAQSs, and has therefore been subject to this emission inventory requirement since the 1990 amendments to the CAA.

Delaware has developed emission inventories that meet the criterion of CAA 182(a)(1) and 172(c)(3) every three years since 1990. Delaware's latest comprehensive, accurate inventory of actual emissions from all sources of VOC, NO_x, and CO in the State covered calendar year 2017. The purpose of this SIP revision is to establish Delaware's calendar year 2017 emissions inventory, described in this document, as its base year emissions inventory under the 2015 8-hour ozone NAAQS.¹

¹ Per 40 CFR 51.1315, a base year inventory only requires emissions from sources of VOC and NO_x. However, Delaware included sources of CO to be consistent with past base year inventory reports.

1.3 Responsibilities

The agency with direct responsibility for developing and submitting this SIP revision is Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air Quality (DAQ), under the Division Director, David F. Fees, P.E. The working responsibility for Delaware's air quality SIP planning falls within DAQ's Planning Section, with Acting Section Manager, Valerie Gray, and Airshed Planning and Inventory Program Manager, Renae Held. Shane Cone, Jacquelyn Cuneo, and Jolyon Shelton, of DAQ's Planning Section are the authors of this document.

1.4 Project Management

The Airshed Planning and Inventory (API) Program and the Greenhouse Gas, Mobile, and Air Toxics Program within the Planning Section of DAQ were responsible for preparing the 2017 Periodic Emission Inventory (PEI) for criteria pollutants to include emissions of VOC, NO_x, and CO summarized in this report. Internal planning began in September 2017, with focus on the 2017 point source inventory reporting cycle taking place in March and April of 2018.

The project manager was responsible for identifying overall inventory goals, objectives, and deadlines, initiating inventory planning, approving estimation methodologies recommended by staff, reviewing emissions development work, and preparing inventory reports and documentation.

1.4.1 Point Sources

Point sources staff was responsible for the following:

- Identifying point source inventory goals, objectives, and deadlines;
- Establishing the universe of facilities to inventory;
- Providing training and guidance to industry representatives;
- Performing a technical review of emissions data submitted by facilities;
- Working with facility representatives to correct errors;
- Managing the point source inventory database; and
- Overseeing quality control of point sources data.

1.4.2 Nonpoint and Nonroad Sources

Nonpoint and nonroad sources staff was responsible for the following:

- Researching and recommending emission estimation methodologies;
- Defining all simplifying assumptions;
- Obtaining 2017 activity data, current emission factors, and applicable control information;
- Using spreadsheets to calculate emissions;
- Providing data to the EPA for developing aircraft emissions;
- Reviewing emission calculations for accuracy and completeness;
- Preparing report documents; and
- Compiling supporting documentation.

1.4.3 Onroad Mobile Sources

Onroad mobile sources staff was responsible for the following:

- Downloading EPA's Motor Vehicle Emission Simulator (MOVES) MOVES2014b model;
- Obtaining 2017 vehicle miles traveled (VMT), vehicle registration, and other mobile input data from the Delaware Department of Transportation (DelDOT);
- Obtaining other data for inclusion in the model inputs;
- Preparing the input files for running MOVES;
- Running MOVES and summarizing the model outputs;
- Reviewing emissions for accuracy and completeness;
- Preparing report documents; and
- Compiling supporting documentation.

As is noted in Section 5 of this report, DAQ is utilizing output from EPA's 2017 National Emission Inventory (NEI) run of the MOVES model.

1.5 Inventory Planning

Calendar year 2017 is a PEI year as defined by the Air Emissions Reporting Requirements (AERR). The AERR specifies the emissions data for criteria pollutants that are required to be reported to EPA's NEI. A PEI requires the development of emissions estimates from all sources within a state or local area for all criteria pollutants and their precursors. As such, the 2017 emissions inventory can provide the necessary data for the 2015 8-hour ozone NAAQS base year inventory.

1.5.1 Inventory Parameters

The inventory parameters defined by the base year emissions inventory requirements for the 2015 8-hour ozone NAAQS include the following:

- **Inventory year** – 2017
- **Pollutants** – VOC, NO_x, and CO as precursors to ozone
- **Source coverage** – All sources, including point, nonpoint, nonroad, and onroad mobile sources
- **Spatial resolution** – County level emissions
- **Geographic coverage** – New Castle County
- **Temporal resolution** – Annual and summer season weekday (SSWD) daily emissions. The summer season is defined as the months June, July, and August. Weekday is defined as the days Monday, Tuesday, Wednesday, Thursday, and Friday.

1.5.2 Data Collection and Management

For all source categories, the gathering of local activity data represented a major task spread over many months. For point sources, all facilities reported their emissions through the use of the State and Local Emissions Inventory System (SLEIS) on-line reporting application. Data entered into the on-line application was transferred to a DAQ database for review and correction.

Microsoft Excel[®] spreadsheets were employed for managing activity data and calculating emissions from stationary nonpoint sources and some nonroad categories. A consistent set of tabs within each source category spreadsheet included activity data, point source data (if applicable, for back outs), emission factors, controls, emission calculations, NEI input formats, and notes on QA/QC procedures.

Emissions for most of the nonroad vehicles and equipment categories were calculated using the MOVES Nonroad model. Aircraft engine emissions for landing and take-offs at airports in Delaware were calculated by the EPA after a review of this data by DAQ.

Emissions data were transferred from SLEIS (point sources), from the nonpoint and nonroad spreadsheets, and from the model outputs to staging tables in Microsoft Access[®] databases. These databases were then converted to XML files via the Emissions Inventory System (EIS) bridge tool, and then transmitted to the EIS via the Central Data Exchange (CDX) web client to meet EPA NEI deadlines.

1.6 Inventory Development

For point sources, DAQ developed a set of criteria to use in establishing the universe of facilities required to report. These criteria are presented in the point source section of this report (Section 2). A reporting structure was created within SLEIS for each facility meeting one or more of the reporting criteria. An extensive amount of review and follow up was performed on the point source data submitted by facilities.

For nonpoint sources, the first task involved gathering activity data for each source category. In many cases, these data were obtained from Delaware-specific sources. In some cases, the activity data were developed through the allocation of a portion of a national activity dataset (*i.e.*, national off-road equipment populations) to Delaware. Basic demographic data were also used for some source categories and are presented in Table 1-1. Once activity data were obtained, spreadsheets were developed to manage the data and combine the activity data with the selected emission factors to obtain uncontrolled emissions. Finally, for those sources where controls were applied, emissions were adjusted to account for control efficiency, rule effectiveness, and rule penetration.

Table 1-1. 2017 Demographic Data for New Castle County

Demographic Parameter	New Castle County
Population ²	564,193
Households ²	207,325
Land Area (square miles)	439
Annual VMT (million miles)	6,095

For onroad mobile and nonroad equipment, the MOVES model was used to develop emissions from these sources. In the use of the model, activity data was included in the model input files. For any type of data used by the model for which Delaware-specific data did not exist, the model used the system defaults. Details about Delaware-specific and default parameters are discussed in the nonroad and onroad and sections of this report (Sections 4 and 5, respectively).

² Delaware Population Consortium, 2017 estimate: <https://stateplanning.delaware.gov/demography/dpc.shtml>

1.7 Emissions Summary

The following emission summaries present the 2017 emissions inventory for VOC, NO_x, and CO for New Castle County by source sector. Throughout this document, annual emissions are reported in tons per year (tpy) and SSWD daily emissions in tons per day (tpd). The totals may not match the sum of the individual values due to independent rounding.

Table 1-2. 2017 New Castle County Emissions by Source Sector

Source Sector	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
Point	747	2,504	1,766	3.11	14.53	10.42
Nonpoint	3,387	1,444	3,527	10.63	2.76	6.76
Nonroad	2,245	3,152	23,844	7.68	9.27	92.89
Onroad	2,213	5,184	28,807	6.23	15.70	87.23
All Sectors	8,592	12,284	57,944	27.65	42.26	197.30

SECTION 2 - STATIONARY POINT SOURCES

The point source inventory represents facility-specific data for larger stationary sources. Emissions data for all other source categories are reported at the county level. Point sources typically include large industrial, commercial, and institutional facilities. Manufacturing facilities, within the industrial sector, comprise the majority of all reporting point sources. The institutional sector includes hospitals, universities, prisons, military bases, landfills, and wastewater treatment plants.

The planning and execution of the point source inventory was accomplished in the following chronological order:

- Establish the reporting criteria and list of facilities to survey;
- Obtain inventory data from facilities;
- Perform administrative and technical review of data received from facilities;
- Seek resubmissions/corrections from facilities based on data review;
- Perform internal data manipulation (*i.e.*, apply rule effectiveness, remove non-reactive VOCs, create SSWD daily emission values); and
- Prepare inventory data files, report, and supporting documentation.

A final activity is to provide point source back out data, if there is overlap between point sources and stationary nonpoint source categories. Point source back out data includes emissions, throughput, and/or employees, depending on the nonpoint source category methodology.

The following criteria were established for defining the universe of facilities to be surveyed for 2017:

- Facilities that held a Title V permit in 2017; and
- Facilities that held a Synthetic Minor permit in 2017.

Based on these criteria, 126 facilities statewide reported air emissions data for 2017. Only New Castle County has been designated as marginal nonattainment in Delaware for the 2015 8-hour ozone NAAQS. Therefore, only 82 facilities that are located within New Castle County will be presented in this report.

2.1 Emissions Estimation and Methodology

Unlike other source sector emissions which are estimated by DAQ, point source emissions data are submitted to DAQ by the facilities. Emissions are reported at the process level and include both confined (stack) emission points as well as unconfined (fugitive) emission sources. A key aspect of point source data is the inclusion of facility coordinates to accurately allocate emissions spatially within a county for purposes of performing air dispersion modeling.

The summer months of June, July, and August were used to calculate point source SSWD emissions. The first step in calculating SSWD emissions was to calculate the number of weekdays

that each process operated during summer months, *Summer Season Weekdays*. The following parameters were utilized to calculate *Summer Season Weekdays*:

- *Summer Season Days*: Facilities reported the total number of days (including weekdays and weekends) that each process operated during the summer months (June, July, and August) in SLEIS.
- *Average Days / Week*: Facilities reported the average process operating schedule in days per week in SLEIS.

Summer Season Weekdays were calculated using the following assumptions:

- If *Average Days / Week* is less than or equal to 5 days, then *Summer Season Weekdays* = *Summer Season Days*.
- If *Average Days / Week* is greater than 5, but less than or equal to 6 days, then *Summer Season Weekdays* = (*Summer Season Days* * 5/6).
- If *Average Days / Week* is greater than 6, but less than or equal to 7 days, then *Summer Season Weekdays* = (*Summer Season Days* * 5/7).

To calculate SSWD emissions per process, the following equation was used:

$$\frac{\left(\frac{(\text{June} + \text{July} + \text{August Throughput})}{\text{Annual Throughput}} \right) \times \text{Total Emissions}}{\text{Summer Season Weekdays}}$$

where:

- June + July + August Throughput = A facility's reported monthly throughput for each process in SLEIS.
- Annual Throughput = SLEIS calculated annual throughput for each process as the sum of reported monthly throughput.
- Total Emissions = A facility's reported total emissions per pollutant for each process in SLEIS.
- Summer Season Weekdays = Value calculated as described above.

The SSWD emissions per facility is the sum of the SSWD emissions for each process at that facility.

2.2 Emissions Summary

Annual and SSWD emissions for the 82 facilities located within New Castle County are summarized in Table 2-1 and provided in Appendix A.

Table 2-1. 2017 Facility-Level Emissions for New Castle County

Facility Name	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
1007 Market Condominium Association	<1	6	5	<0.01	0.03	0.03
Aearo Technologies LLC	5	<1	<1	0.02	<0.01	<0.01
Alfred I. duPont Hospital for Children	<1	18	11	0.03	0.59	0.19
Allan Myers Delaware, Inc. - Wilmington	1	2	5	<0.01	0.01	0.03
American Air Liquide - Glasgow	<1	<1	<1	<0.01	<0.01	<0.01
Amtrak Wilmington Maintenance Facility	1			<0.01		
AstraZeneca Pharmaceuticals, LLC - Fairfax	<1	2	<1	<0.01	0.03	<0.01
AstraZeneca Pharmaceuticals, LLC - Newark	<1	6	5	<0.01	0.02	0.02
Bank of America - Bracebridge	<1	2	1	<0.01	0.03	<0.01
Bank of America - Christiana Complex	<1	<1	<1	<0.01	0.02	<0.01
Bank of America - Deerfield	<1	1	<1	<0.01	0.02	<0.01
BASF Colors & Effects, Newport	22	17	31	0.07	0.08	0.11
Bilcare Research, Inc	2	2	2	<0.01	<0.01	<0.01
Boxwood Industrial Park, LLC	<1	2	1	0.00	0.00	0.00
Calpine - Christiana Energy Center	<1	<1	<1	<0.01	0.12	<0.01
Calpine - Delaware City Energy Center	<1	<1	<1	<0.01	0.05	<0.01
Calpine - Edge Moor Energy Center	8	97	76	0.16	1.81	1.53
Calpine - Hay Road Energy Center	30	498	120	0.14	2.33	0.56
Calpine - West Energy Center	<1	<1	<1	<0.01	0.05	<0.01
Christiana Care - Christiana Hospital	4	15	24	0.02	0.10	0.10
Christiana Care - Wilmington Hospital	<1	7	5	<0.01	0.06	0.02
Christiana Materials	2	4	14	0.01	0.03	0.09
Clean Earth of New Castle	<1	6	3	<0.01	0.06	0.03
Contractor's Materials	3	2	11	0.01	<0.01	0.05
Corrado Construction	0	0	0	0.00	0.00	0.00
Croda, Inc.	9	18	13	0.04	0.10	0.05
Dana Railcare	<1	<1	<1	0.02	<0.01	<0.01
Dassault Falcon Jet - Wilmington Corp.	11	1	<1	0.05	<0.01	<0.01
DE Solid Waste Authority - Cherry Island	4	13	44	0.02	0.05	0.15
Delaware City Refining Company - Delaware City	341	1,456	1,067	1.47	5.99	5.75
Delaware City Refining Company - Marketing Terminal	23	<1	<1	0.10	<0.01	<0.01
Delaware Park Horse Racing Track	<1	<1	<1	<0.01	0.02	0.03
Delaware Recyclable Products, Inc.	4	5	22	0.01	0.02	0.07
Department of Veterans Affairs Medical Center	<1	2	2	<0.01	0.02	0.02
Diamond Materials, LLC	1	2	13	<0.01	0.01	0.07
Diamond State Port Corporation - Port of Wilmington	52	52	11	0.08	0.45	0.07
DuPont Chestnut Run	<1	9	11	<0.01	0.03	0.04
DuPont Experimental Station	9	55	36	0.05	0.49	0.21
DuPont Nutrition USA, Inc.	3	21	90	0.01	0.12	0.44
Eastern Shore Natural Gas - Delaware City	3	6	<1	0.01	0.03	<0.01
First State Investors 5200	<1	<1	<1	<0.01	0.03	<0.01
FMC Stine Research Center	3	9	9	0.01	0.05	0.05
Formosa Plastics Corporation	47	29	20	0.17	0.14	0.08
GE Aviation - Newark, DE	3	<1	<1	0.02	<0.01	<0.01
Hercules Inc., Research Center	<1	2	4	0.02	<0.01	0.01
Honeywell / City of Wilmington (REBF)	4	2	4	0.03	0.02	0.03

2017 BASE YEAR SIP EMISSIONS INVENTORY FOR VOC, NO_x, & CO

Facility Name	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
Howard R. Young Correctional Institution	<1	1	<1	<0.01	0.01	<0.01
IKO Production Wilmington Inc.	5	4	3	0.02	0.03	0.02
James T. Vaughn Correctional Center	1	5	4	<0.01	<0.01	<0.01
JP Morgan Chase - 4001 Gov Printz Blvd.	1	6	1	0.02	0.08	0.02
JP Morgan Chase - Bear Christiana Road	<1	7	1	<0.01	0.03	<0.01
JP Morgan Chase - Morgan Christiana Center	<1	6	1	0.01	0.63	0.11
Kuehne Chemical Company	<1	2	<1	<0.01	<0.01	<0.01
Linde LLC	<1	<1	<1	<0.01	<0.01	<0.01
Magco Inc.	<1	2	3	<0.01	<0.01	0.01
Magellan Midstream Partners	48	4	2	0.06	0.03	<0.01
McConnell Johnson	<1	<1	<1	<0.01	0.05	0.01
Medal L.P., Air Liquide	16	3	3	0.05	<0.01	<0.01
Micropore, Inc.	4			0.01		
Middletown Materials	<1	5	1	<0.01	0.05	0.01
New Haven Packaging, LLC	<1	<1	<1	<0.01	<0.01	<0.01
Newark Data Center	<1	<1	<1	<0.01	0.06	0.01
News Journal Company	1			<0.01		
Noramco Inc.	<1	1	2	<0.01	<0.01	<0.01
PGR Holdings, LLC	<1	3	<1	<0.01	<0.01	<0.01
Polymer Technologies, Inc.	1	<1	<1	0.01	<0.01	<0.01
Prince Minerals, Inc.	<1	<1	<1	<0.01	<0.01	<0.01
Printpack, Inc.	9	2	2	0.03	<0.01	<0.01
PS-5 LLC (Community Education Building)	<1	13	11	<0.01	0.05	0.04
R & M Recycling	<1	<1	<1	<0.01	0.02	<0.01
Rogers Corporation - Bear Facility	4	2	2	0.02	<0.01	<0.01
Rohm and Haas Electronic Materials, Cmp, Inc.	6	3	4	0.05	0.05	0.02
Siemens Healthcare Diagnostics - Glasgow	<1	8	6	<0.01	0.08	0.03
St. Francis Hospital	<1	3	3	<0.01	0.02	<0.01
Stratis Visuals, LLC	2			<0.01		
Sunoco Partners & Marketing Terminal	39	4	18	0.12	0.01	0.06
Transflo Terminal Services, Inc.	<1			<0.01		
University of Delaware - Newark	4	20	27	0.01	0.08	0.07
Veolia - Red Lion Plant	<1	19	<1	<0.01	0.10	<0.01
Verisign	<1	<1	<1	<0.01	0.02	0.02
WDK Energy Partners	<1	<1	<1	<0.01	<0.01	<0.01
Wilmington Wastewater Treatment Plant	<1	5	4	<0.01	0.02	0.01
New Castle County Total	747	2,504	1,766	3.11	14.53	10.42

SECTION 3 - STATIONARY NONPOINT SOURCES

Stationary nonpoint sources represent a large and diverse set of individual emission source categories. A nonpoint source category is either: 1) represented by small facilities too numerous to individually inventory, such as commercial cooking at restaurants and fuel combustion at a variety of small businesses; or 2) a common activity, such as residential open burning. Emissions from the nonpoint source categories were estimated at the county level.

3.1 Source Categories

There are a number of nonpoint source categories which contribute emissions of ozone precursors. These categories can be grouped into several category types. These include:

- **Solvent Use** – Many products used by homeowners and businesses contain VOC solvents to achieve the intended purpose of the product. Paints, cleaners, pesticides, personal care products, and inks are a few examples of products that contain VOC solvents.
- **Gasoline Usage** – The distribution and use of gasoline in vehicles and other gasoline-powered engines result in emissions of VOCs whenever the volatile gasoline vapors are allowed to escape.
- **Fuel Combustion** – The combustion of fuels in industrial, commercial, institutional, and residential furnaces, engines, boilers, wood stoves, and fireplaces create emissions of VOCs, NO_x, and CO.
- **Open Burning** – Open burning creates emissions of VOCs, NO_x, and CO. Open burning categories include trash burning, prescribed burning, burning of land clearing debris, wildfires, building fires, and vehicle fires.

Individual facilities are typically grouped with other like sources into a source category. Source categories are grouped in such a way that emissions are estimated collectively using one methodology. For the 2017 inventory, the distinction between point and nonpoint was defined by an annual emission threshold based on recent point source data (see Section 2 for point source criteria). Table 3-1 lists the source categories for which VOCs, NO_x, and CO for New Castle County were estimated.

3.2 Emission Estimation Methodologies and Activity Data

The 2014 Delaware PEI served as the starting point for nonpoint source category selection and methodology development. New methods were applied to some existing source categories, and emission factors were updated where available. New methods and emission factors came primarily from current *Emission Inventory Improvement Program, Volume III* documents and documented projects performed by the California Air Resource Board (CARB).

Other sources of information included the *Compilation of Air Pollutant Emission Factors, Volume I* (AP-42), the *Factor Information Retrieval System* (FIRE), and several projects performed by the Mid-Atlantic Regional Air Management Association (MARAMA), the Eastern Regional Technical Advisory Committee (ERTAC), and EPA. Also, a number of categories used the most recent emission factors listed in Nonpoint Method Advisory (NOMAD) committee Nonpoint Emissions Methodology and Operator Instructions (NEMO) documents, and emission factors as listed in the most recent version of the EPA Wagon Wheel Tool.

Table 3-1. Nonpoint Source Categories Inventoried

VOC Emissions Only	Emissions of VOC, NO _x , and CO
Agricultural Pesticides	Agricultural Burning
AIM Coatings	Commercial Cooking - EPA
Asphalt Paving	Commercial Fuel Combustion
Autobody Refinishing	Industrial Fuel Combustion
Commercial & Consumer Products	Land Clearing Debris Burning
Degreasing	Prescribed Burning
Dry Cleaning	Residential Fuel Combustion
Gasoline (Petroleum) Marketing	Residential Open Burning
Graphic Arts	Residential Wood Combustion
Industrial Adhesives	Structure Fires
Industrial Surface Coatings	Vehicle Fires
Traffic Markings	Wildfires - EPA

A major portion of the work involved in creating the 2017 nonpoint source inventory was in collecting activity data for each source category. The activity data gathered was related to the type of emission factors available and, in many cases, obtained from local sources. Surveys, letters, e-mails, and phone calls to individual businesses to obtain representative data for a source category was a technique used for several source categories. The type of activity data and the data source for each category is provided in Table 3-2.

Emissions from most nonpoint source categories were estimated by multiplying an indicator of collective activity by a corresponding emission factor. An indicator is any parameter associated with the activity level of a source, such as production, employment, fuel usage, or population that can be correlated with the emissions from that source. The corresponding emission factors are per unit of production, per employee, per unit of commodity consumed, or per capita, respectively. The basic equation that was applied to emission development for most nonpoint source categories is as follows:

$$\text{Emissions (E)} = \text{Activity Data (Q)} \times \text{Emission Factor (EF)}$$

If a source category had a regulatory control placed on it at the Federal or State level, the equation expands to the following:

$$E = Q \times EF \times [1 - (CE)(RE)(RP)]$$

where: CE = control efficiency
 RE = rule effectiveness
 RP = rule penetration

The control efficiency (CE) represents the typical emissions reduction achieved as compared to the otherwise uncontrolled emissions. A control may be a piece of equipment, such as a condenser used to recover vaporized solvent, or it may be an operational control, such as the use of only low VOC content paints.

Rule effectiveness (RE) reflects the ability of the regulatory program to achieve all emissions reductions that could have been achieved by full compliance with the applicable regulations at all sources at all times. If a rule is not being followed by all of the regulated community, then emissions will be higher than would otherwise be if there was 100% compliance. As an example, while the burning of trash is illegal under any circumstances in Delaware, the practice of burning household trash in backyard burn barrels still takes place in many rural areas of the State.

Rule penetration (RP) represents the percent of sources within a source category that are subject to the rule that requires control. As an example, gas stations that dispense more than 10,000 gallons of gasoline in a month are required by Delaware regulations to place vapor recovery systems on their gas pumps.³ Those dispensing less than 10,000 gallons are not required to install controls. Therefore, RP is less than 100%. In the case of the burning of trash or leaves, no person or business is exempt, and thus RP is 100%.

An alternative to the use of an emission factor is the mass balance approach. The mass balance approach is applicable to VOC source categories where all of the VOC content in the products used evaporates and is emitted as a result of the normal use of the product. Delaware used the mass balance approach for several source categories, such as adhesives, asphalt paving, and painting (commercial, consumer, autobody, and traffic markings). Raw material or product purchase records were used to quantify emissions. Emissions were then equated to the VOC content of the material usage minus amounts leaving the site as or in waste.

To avoid double counting of emissions between point and nonpoint sources, point source back out was performed for the industrial and commercial fuel combustion categories and many of the solvent usage categories. Point source fuel usage was backed out from fuel consumption data obtained from the U.S. Department of Energy's (DOE) Energy Information Administration (EIA).⁴ Point source employment was backed out from employment data obtained from the Delaware Department of Labor.

Non-reactive VOCs were excluded from emission estimates. Emission factors specified as non-methane organic carbon (NMOC) in AP-42 were used when available. In some instances, the AP-42 emission factor was in terms of total organic carbon (TOC) and the percentage of the methane component was indicated in a footnote. In these cases, the emission factor was reduced by the

³ DAQ is in the process of amending its vapor recovery regulations to phase out Stage II vapor recovery systems at Delaware gasoline dispensing facilities, and to set up effective controls on vapor emission from gasoline underground storage tanks after phasing out Stage II systems (7 DE Admin. Code 1124).

⁴ The primary EIA data that is used is from the State Energy Data System, SEDS:
<https://www.eia.gov/state/seds/?sid=DE>. Other reports and forms from EIA are also used.

percentage of methane to remove the non-reactive methane component in the emission total. For example, for evaporative emissions from crude oil, the methane component was 15 percent. The emission factor was reduced by 15 percent to remove methane from the calculation.

Source activity may fluctuate significantly on a seasonal basis. As an example, residential wood combustion is primarily performed outside the summer season. Paint usage, on the other hand, is used more often in the warmer months of the year. Because nonpoint source emissions are generally a direct function of source activity, seasonal changes in activity levels were examined closely.

Delaware's 2017 inventory includes annual and SSWD emission calculations. SSWD daily emissions were developed through the use of a temporal allocation factor (TAF) applied to the annual emissions. Monthly and weekly profiles were used to develop the TAF. The monthly profile for each source category was developed through the use of monthly activity data, when available, or through EPA guidance (*Procedures, Volume I* and EIIP documents⁵). Most weekly profiles were developed through EPA guidance which defines activity taking place five, six, or seven days per week. Through EPA guidance, all TAFs include the work week. A few TAFs were developed based on the exact dates of episodic activity, such as firefighting training burns and prescribed fires. A full table of DNREC TAF is available in Appendix B.

⁵ Air emissions inventory improvement program documents: <https://www.epa.gov/air-emissions-inventories/air-emissions-inventory-improvement-program-eiip>

Table 3-2. Summary of 2017 Nonpoint Source Activity Data

Source Category	Activity Data	Source of Activity Data
Agricultural Burning	Acreage and vegetation type	DAQ Area Source Compliance Program
Agricultural Pesticides	Planted crop acreage	Delaware Department of Agriculture
AIM Coatings	Solvents in U.S. paint shipments; U.S. Population	U.S. Census Bureau
Asphalt Paving	Cutback and emulsified asphalt usage	Delaware Department of Transportation
Autobody Refinishing	Employment data; Autobody shop usage reports	Delaware Department of Labor; Autobody shops
Commercial & Consumer Products	Population	Delaware Population Consortium
Commercial Cooking	Population	Delaware Population Consortium
Commercial Fuel Combustion	Fuel consumption	DOE Energy Information Admin.
Degreasing	Employment data	Delaware Department of Labor
Dry Cleaning	Facility-level solvent usage	DAQ Area Source Compliance Program
Gasoline (Petroleum) Marketing	Gasoline fuel sales; VMT through use of MOVES (Stage 2); employment data (comm. portable fuel containers)	FHWA Motor Fuel Tax Administration; DelDOT (VMT); Delaware Department of Labor (employment data)
Graphic Arts	Employment data	Delaware Department of Labor
Industrial Adhesives	Population	Delaware Population Consortium
Industrial Fuel Combustion	Fuel consumption	DOE Energy Information Admin.
Industrial Surface Coatings	Employment data	Delaware Department of Labor
Land Clearing Debris Burning	Acreage disturbed during road, commercial, and residential construction	DAQ data calculated for the construction dust categories
Prescribed Burning	Acreage and vegetation type	DAQ Area Source Compliance Program
Residential Fuel Combustion	Fuel consumption	DOE Energy Information Admin.
Residential Open Burning	Rural households	U.S. Census Bureau
Residential Wood Combustion	Occupied households	Delaware Population Consortium
Structure Fires	Number of structures fires	Delaware Fire Marshal and DAQ Area Source Compliance Program
Traffic Markings	U.S. paint shipments; U.S. and State public road miles	U.S. Census Bureau; FHWA highway statistics publication
Vehicle Fires	Number of vehicle fires	Delaware Fire Marshal
Wildfires	Acreage and vegetation type	Delaware Division of Forestry

3.3 Emissions Summary

Table 3-3 provides a summary of the 2017 annual (tpy) and SSWD daily (tpd) emissions for each nonpoint source category for New Castle County.

Table 3-3. Summary of 2017 Nonpoint Emissions for New Castle County

Source Categories	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
SOLVENT USE						
Agricultural Pesticides	117	---	---	0.32*	---	---
AIM Coatings	403	---	---	1.45	---	---
Asphalt Paving	<1	---	---	<0.01	---	---
Auto Refinishing	29	---	---	0.08	---	---
Commercial & Consumer Products	1,118	---	---	3.17	---	---
Dry Cleaning	1	---	---	0.01	---	---
Graphic Arts	257	---	---	0.99	---	---
Industrial Adhesives & Sealants	107	---	---	0.41	---	---
Industrial Surface Coating	79	---	---	0.30	---	---
Solvent Cleaning	91	---	---	0.29	---	---
Traffic Markings	2	---	---	0.01	---	---
Solvent Use Total	2,205	---	---	7.04	---	---
GASOLINE MARKETING						
<i>Retail Gasoline Stations</i>	402	---	---	1.91	---	---
<i>Other Gasoline Marketing Activities</i>						
Aircraft Refueling	3	---	---	<0.01	---	---
Marinas	0	---	---	0	---	---
Portable Fuel Containers	120	---	---	0.33	---	---
CMV Loading and Transport	117	---	---	0.32	---	---
Gasoline Marketing Total	642	---	---	2.57	---	---
FUEL COMBUSTION						
Commercial/Institutional	21	384	289	0.04	0.73	0.43
Industrial	36	585	268	0.10	1.66	0.80
Residential Fossil Fuel	23	426	175	0.02	0.28	0.12
Residential Wood	353	40	2,385	0.76*	0.09*	5.15*
Fuel Combustion Total	433	1,435	3,117	0.92	2.76	6.50
OPEN BURNING						
Agricultural Burning	1	<1	8	<0.01	<0.01	<0.01
Residential Open Burning	2	<1	15	<0.01	<0.01	<0.01
Land Clearing Debris Burning	0	0	0	0	0	0
Prescribed Burning	65	5	273	<0.01	<0.01	<0.01
Structure Fires	3	<1	15	<0.01	<0.01	<0.01
Vehicle Fires	1	<1	3	<0.01	<0.01	<0.01
Wildfires	0	0	0	0	0	0
Open Burning Total	72	9	314	<0.01	<0.01	<0.01
MISCELLANEOUS SOURCES						
Commercial Cooking	35	0	96	0.10*	0	0.26*
NONPOINT SECTOR TOTAL	3,387	1,444	3,527	10.63*	2.76*	6.76*

* These figures include EPA annual totals with Delaware-specific temporal profiles for SSWD calculation.

SECTION 4 - NONROAD MOBILE SOURCES

Nonroad mobile sources represent a large and diverse set of off-road vehicles and non-stationary equipment. Emission estimates of VOCs, NO_x, and CO for this source sector account for exhaust emissions from engine fuel combustion.

Nonroad vehicles and equipment are grouped into four source category types for the purpose of developing emission estimates. These include:

- **Aircraft** – Commercial, military, and private aircraft.
- **Locomotives** – Commercial line haul and yard locomotives.
- **Commercial Marine Vessels (CMVs)** – Various types of vessels that navigate the Delaware Bay and River and the Chesapeake and Delaware Canal are included under this source category. Recreational boats are included in the next category.
- **Other Off-road Vehicles and Equipment** – All other off-road emission sources are accounted for through the use of EPA's MOVES2014b model in Nonroad mode. The model compiles off-road equipment pertinent to Delaware into the following subcategories:
 - Recreational (land-based);
 - Construction;
 - Industrial;
 - Lawn and Garden;
 - Agricultural;
 - Commercial;
 - Logging;
 - Airport Ground Support;
 - Recreational Marine; and
 - Railway Maintenance.

Individual equipment Source Classification Codes (SCCs) covered in the MOVES Nonroad model are further broken down by the fuel type, including 2-stroke gasoline, 4-stroke gasoline, diesel, liquefied petroleum gas (LPG), and compressed natural gas (CNG).

4.1 Emission Estimation Methodologies

The 2014 Delaware PEI served as the starting point for nonroad source category selection and methodology development. No new sources were added to Delaware's off-road mobile source inventory. However, EPA ran the Federal Aviation Administration's (FAA) new Aviation Environmental Design Tool (AEDT) in 2017, and Delaware is adopting these emission estimates.

Similar to the estimation of stationary nonpoint emissions, off-road equipment emissions were estimated by multiplying an indicator of collective activity within the inventory area for a source category by a corresponding emission factor. The indicators of activity for off-road sources include landing and take-offs (LTOs), vessel port-of-calls, time-in-mode (TIMs, which are pertinent to aircraft and CMVs), gross ton miles (locomotives), equipment populations, and economic activity (both pertinent to nonroad equipment) that can be correlated with the emissions from that source. The corresponding emission factors are amount of pollutant (either grams or pounds) per unit of fuel used (locomotives and military/commercial aircraft), per LTO (air taxi and general aviation), or per unit of power output in brake horsepower or kilowatt-hours (nonroad equipment and CMVs, respectively).

A major portion of the work involved in creating the 2017 nonroad source inventory was in collecting activity data for each source category. The activity data gathered was related to the type of emission factors available and, in many cases, obtained from local sources. More information about gathering activity data for each source category is presented below.

There are no point source data that must be backed out of the nonroad mobile source sector. Even though larger airports may report as a point source, their reported point source emissions do not include ground support equipment or aircraft engine emissions. Also, aircraft emissions are estimated only for LTOs that take place at a Delaware airport. Emissions from aircraft that transit Delaware airspace are not included in Delaware's inventory.

4.2 Emissions Summary

Table 4-1 provides the summary of the 2017 annual (tpy) and SSWD daily (tpd) emissions for New Castle County for aircraft, locomotives, commercial marine vessels, and all equipment emissions estimated using EPA's MOVES Nonroad model. The nonroad sector is a significant contributor to ozone precursors in Delaware.

Table 4-1. Summary of 2017 Nonroad Emissions for New Castle County

Source Categories	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
MOVES Nonroad Equipment	2,090	1,110	23,112	7.25	3.68	90.89
Aircraft	47	78	463	0.13	0.21	1.27
Locomotives	28	432	70	0.08*	1.18*	0.19*
Commercial Marine Vessels	80	1,532	199	0.22*	4.20*	0.54*
TOTAL	2,245	3,152	23,844	7.68	9.27	92.89

* These figures include EPA annual totals with Delaware-specific temporal profiles for SSWD calculation.

4.3 MOVES 2014b Nonroad Model Equipment

DAQ used MOVES2014b to develop 2017 annual and SSWD daily emission estimates for New Castle County. Most equipment covered by the MOVES Nonroad model is powered by diesel-fueled compression-ignition engines or gasoline-fueled spark-ignition engines. Engines fueled by compressed natural gas (CNG) and liquefied petroleum gas (LPG) are also included in the Nonroad model. Table 4-2 lists general SCCs addressed by the model. Equipment categories are defined

at the 7-digit SCC level (with recreational marine and railway maintenance being exceptions) and specific equipment are defined at the 10-digit SCC level.

To estimate pollutant emissions, the MOVES Nonroad model multiplies equipment populations and their associated activity by the appropriate emission factors. Geographic allocation factors (GAFs) are used to distribute national equipment populations to states/counties. These factors are based on surrogate indicators of equipment populations. For example, harvested cropland is the surrogate indicator used in allocating agricultural equipment. A national average engine activity (*i.e.*, load factor times annual hours of use) is used in the MOVES Nonroad model.

Table 4-2. SCCs Addressed by the Nonroad Model

Nonroad SCCs	SCC Descriptions	Nonroad SCCs	SCC Descriptions
2260xxxxxx	2-stroke gasoline engines	2268xxxxxx	CNG engines
2260001xxx	- recreational vehicles	2268002xxx	- construction equipment
2260002xxx	- construction equipment	2268003xxx	- industrial equipment
2260003xxx	- industrial equipment	2268005xxx	- agricultural equipment
2260004xxx	- lawn & garden equipment	2268006xxx	- light commercial equipment
2260005xxx	- agricultural equipment	226801xxxx	- oil field equipment
2260006xxx	- light commercial equipment	2270xxxxxx	Diesel engines
2260007xxx	- logging equipment	2270001xxx	- recreational vehicles
2265xxxxxx	4-stroke gasoline engines	2270002xxx	- construction equipment
2265001xxx	- recreational vehicles	2270003xxx	- industrial equipment
2265002xxx	- construction equipment	2270004xxx	- lawn & garden equipment
2265003xxx	- industrial equipment	2270005xxx	- farm equipment
2265004xxx	- lawn & garden equipment	2270006xxx	- light commercial equipment
2265005xxx	- agricultural equipment	2270007xxx	- logging equipment
2265006xxx	- light commercial equipment	2270008xxx	- airport service equipment
2265007xxx	- logging equipment	2270009xxx	- underground mining equipment
2265008xxx	- airport service equipment	227001xxxx	- oil field equipment
226501xxxx	- oil field equipment	2282xxxxxx	Recreational marine equipment
2267xxxxxx	LPG engines	2285xxx015	Railway maintenance equipment
2267001xxx	- recreational vehicles		
2267002xxx	- construction equipment		
2267003xxx	- industrial equipment		
2267004xxx	- lawn & garden equipment		
2267005xxx	- agricultural equipment		
2267006xxx	- light commercial equipment		
2267008xxx	- airport service equipment		

MOVES Nonroad model option files were prepared to account for temperatures and fuel characteristics representative for each of the four seasons (winter, spring, summer, and fall). Temperature and fuel input values for each three-month period (December-February, March-May, June-August, and September-November) were averaged to estimate seasonal values. Minimum, maximum, and average temperatures per month were obtained from the National Weather Service for the New Castle County Airport. Table 4-3 presents a summary of county temperature and gasoline fuel characteristics data used for each season. A sulfur content of 15 ppm for nonroad diesel fuel was used for 2017 based on EPA requirements.

Table 4-3. 2017 MOVES Nonroad Model Temperature and Fuel Characteristic Input Values by Season for New Castle County

Season	Reid Vapor Pressure (RVP)	Gasoline Sulfur ppm	Daily Average Temperature, °F		
			Minimum	Maximum	Average
Summer	6.9	10	65	83	75
Autumn	9.75	10	42	77	60
Winter	11.31	10	31	51	39
Spring	9.75	10	36	60	54

A single MOVES Nonroad model run was used to compute both the SSWD emissions and the annual emissions. To achieve this, MOVES Nonroad was run by selecting all months, both day types, all hours, and the output time aggregation of “24-hour day”. An Excel pivot table was created from the MOVES Output Table (provided in Appendix C, Tab 1. Pivot_SSWD & Annual) to select the summer months of June, July, and August and just the weekdays. The pivot table results were averaged to calculate average SSWD emissions for each pollutant.

The first step in calculating annual emissions was to calculate *Daily Emissions* from the MOVES Output Table. A new column was added to the same MOVES Output Table to calculate *Daily Emissions* using the following equation:

$$\text{emissionQuant} \times (\text{DayID} / 7) \times \text{DaysInMonth}$$

where:

emissionQuant	=	MOVES model output, quantity of emissions (tons/day)
DayID	=	MOVES model output, representing weekend (2) or weekday (5)
DaysInMonth	=	number of days in a particular month

Then, an Excel pivot table was created from the MOVES Output table (provided in Appendix C, Tab 1. Pivot_SSWD & Annual), selecting all months and both DayID types. Table 4.4 summarizes the fields that were utilized in the pivot tables to calculate SSWD and annual emissions.

Table 4.4. Calculation of SSWD and Annual Emissions Pivot Table Details

Pivot Table Fields	Emission Tally Type	
	SSWD	Annual
Columns	Pollutant	Pollutant
Rows	MonthID (Select 6,7,8)	MonthID (Select All)
	DayID (Select 5)	DayID (Select Both)
Σ values	Sum of Emission Quant	Sum of Daily Emissions
Post Processing	Calculate Average	Use Grand Total Columns

Table 4-5 provides the summary of the 2017 annual (tpy) and SSWD daily (tpd) emissions for New Castle County for all equipment emissions estimated using EPA’s MOVES Nonroad model by fuel type.

Table 4-5. 2017 New Castle County Emissions for Nonroad Equipment

Fuel Type	Equipment Category	Annual (tpy)			SSWD (tpd)		
		VOC	NO _x	CO	VOC	NO _x	CO
Gasoline	All Equipment	2,024.4	471.4	22,412.5	7.01	1.40	88.53
Diesel	All Equipment	50.7	559.4	247.4	0.19	2.03	0.92
LPG	All Equipment	10.9	71.9	413.1	0.03	0.23	1.32
CNG	All Equipment	4.2	7.7	39.3	0.01	0.02	0.13
All Fuels	Total	2,090	1,110	23,112	7.25	3.68	90.89

4.4 Aircraft

The aircraft source category includes emissions from commercial, air taxi, general aviation, and military aircraft. These sub-categories are described as follows:

- Military aircraft – used by the U.S. military in a wide range of missions;
- Commercial aircraft – used for scheduled service transporting passengers, freight, or both;
- General aviation – includes other non-military aircraft used for recreational flying, business, personal transportation, and various other activities; and
- Air taxis – used for scheduled service carrying passengers and/or freight, but are smaller aircraft that operate on a more limited basis than the commercial carriers.

Airport-specific emissions for all aircraft sub-categories were allocated to the county in which each airport is located. Where there are multiple airports in a given county, the emissions were summed to provide a county-level emissions estimate. Aircraft emissions are reported under the following SCCs:

Table 4-6. SCCs for Aircraft

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2275001000	Mobile Sources	Aircraft	Military Aircraft	Total
2275020000	Mobile Sources	Aircraft	Commercial Aircraft	Total: All Types
2275050000	Mobile Sources	Aircraft	General Aviation	Total
2275060000	Mobile Sources	Aircraft	Air Taxi	Total

EPA estimated annual aircraft emissions using a combination of airport-specific activity data and FAA/EPA emission factors. Estimating aircraft emissions focuses on the “mixing zone,” which has a height (mixing height) equal to the thickness of the inversion layer. Air emissions within this zone are trapped by the inversion layer and ultimately affect ground-level pollutant concentrations. When aircraft are above the mixing zone, emissions tend to disperse and have no ground-level effects. The aircraft operations within the mixing zone are defined by the LTO cycle. Each LTO cycle consists of five specific operating modes:

- Approach – when the aircraft approaches the airport on its descent from the mixing height to when it lands on the runway.
- Taxi/idle-in – when the aircraft taxis from the runway to the gate and turns its engines off.
- Taxi/idle-out – from engine start-up to take-off as the aircraft taxis from the gate back out to the runway.
- Take-off – this mode is characterized primarily by full-throttle operation that typically lasts until the aircraft reaches between 500 and 1,000 feet above ground, which is when engine power is reduced.
- Climb-out – this mode begins right after the take-off mode and lasts until the aircraft passes out of the mixing height.

The operation time in each of these modes is dependent on the aircraft category, local meteorological conditions, and operational considerations at a given airport. The TIM for the take-off operating mode is the least variable.

The following are the general steps to be used to estimate aircraft emissions:

- Determine the mixing height to be used to define the LTO cycle;
- Define the fleet make-up for each airport;
- Determine airport activity in terms of the number of LTOs by aircraft/engine type;
- Select emission factors for each engine model associated with the aircraft fleet;
- Estimate the TIM for the aircraft fleet at each airport;
- Calculate emissions based on aircraft LTOs, emission factors for each aircraft engine model, and estimated aircraft TIM; and
- Aggregate the emissions across aircraft.

LTO data were obtained from DelDOT for all airports in New Castle County. Table 4-7 provides the LTO data by the four aircraft types for airports in New Castle County. Delaware reviewed LTO data and airport data that EPA provided. DAQ made changes to include the LTO counts in Table 4-7 in the EPA run of the FAA model and also verified the county location of each airport. The activity data for this category is not provided in a way that indicates the time the LTOs occurred. Therefore, DAQ final SSWD values are simple daily values, calculated from the annual total.

Table 4-7. 2017 LTO Data for New Castle County

Airport	Aircraft Type	LTOs
A.I. Dupont Children's Hospital	General Aviation, Piston	18
	General Aviation, Turbine	33
Bracebridge III	General Aviation, Piston	18
	General Aviation, Turbine	33
Christina Hospital	General Aviation, Piston	18
	General Aviation, Turbine	33
Duffy's	General Aviation, Piston	110
Full Throttle Farm	General Aviation, Piston	114
Greenville	General Aviation, Piston	18
	General Aviation, Turbine	33
Mckeown	General Aviation, Piston	83
New Castle County	Air Taxi, Piston	653
	Air Taxi, Turbine	2,342
	Commercial Aircraft, Total: All Types	40
	General Aviation, Piston	22,945
	General Aviation, Turbine	8,901
	Military Aircraft, Total	6,372
Okolona Plantation	General Aviation, Piston	79
Rollins Bldg	General Aviation, Piston	18
	General Aviation, Turbine	33
Scotty's Place	General Aviation, Piston	83
Spirit Airpark	General Aviation, Piston	131
Summit	General Aviation, Piston	22,665
	General Aviation, Turbine	8,771
	Military Aircraft, Total	100
Townsend A	General Aviation, Piston	114

DAQ provided these data to EPA for their run of the most updated FAA model. The values in Table 4-7 were different from the EPA-supplied data, and were compiled with state-specific data from the airports in the state. The results for the 2017 annual emissions by aircraft category are presented in Table 4-8.

Table 4-8. 2017 Annual Emissions of Aircraft in New Castle County

SCC	Aircraft Category	Annual (tpy)			SSWD (tpd)		
		VOC	NO _x	CO	VOC	NO _x	CO
2275001000	Military	35	72	84	0.10*	0.20*	0.23*
2275020000	Commercial	<1	<1	<1	<0.01*	<0.01*	<0.01*
2275050011	General Aviation - Piston	3	2	279	0.01*	<0.01*	0.76*
2275050012	General Aviation - Turbine	6	3	86	0.02*	0.01*	0.24*
2275060011	Air Taxi - Piston	<1	<1	9	<0.01*	<0.01*	0.03*
2275060012	Air Taxi - Turbine	1	<1	4	<0.01*	<0.01*	0.01*
22750xxxxx	Total: Aircraft	47	78	463	0.13	0.21	1.27

* = These figures are using EPA annual totals with Delaware-specific temporal profiles for SSWD calculation.

4.5 Locomotives

Railroad locomotives are a combustion source of emissions with most significant emissions occurring where there is a concentration of railroad activity (such as a large switch yard). The primary fuel consumed by railroad locomotives is distillate oil (diesel fuel). Locomotives can perform two different types of operations: line haul and yard (or switch). Line haul locomotives generally travel between distant locations, such as from one city to another. Yard locomotives are primarily responsible for moving railcars within a particular railway yard. Locomotive emissions are reported under the SCCs provided in Table 4-9.

For 2017, DAQ coordinated efforts with the ERTAC Rail group to develop locomotive emission estimates. The ERTAC Rail line haul estimates represent the highest quality data available, as no fuel use information was provided to the State from Norfolk Southern (NS) or CSX Transportation (CSX). For line haul locomotives, ERTAC and DAQ calculated Class I operation emissions separately from Class II/III operations. Line haul locomotive emissions for passenger trains and commuter lines were estimated to be zero since rail service in Delaware (Amtrak and SEPTA) is electric powered. Fuel consumption was used to estimate locomotive engine emissions. Fuel consumption rates are usually known only for the entire interstate operating region, therefore, it is necessary to allocate the total amount of fuel consumed "system-wide" to Delaware and its counties.

Table 4-9. SCCs for Locomotives

SCC	Descriptor 1	Descriptor 3	Descriptor 6	Descriptor 8
2285002006	Mobile Sources	Railroad Equipment	Diesel	Line Haul Locomotives: Class I Operations
2285002007	Mobile Sources	Railroad Equipment	Diesel	Line Haul Locomotives: Class II/Class III Operations
2285002010	Mobile Sources	Railroad Equipment	Diesel	Yard Locomotives

4.5.1 Line Haul Locomotives – Class I Operations

CSX operates Class I locomotives within New Castle County, while NS operates throughout the State. DAQ contacted these companies to obtain estimates of fuel consumption or data to calculate fuel consumption (*e.g.*, gross ton-miles (GTM) and gallons of fuel consumed per GTM). These companies did not provide fuel use to the DAQ. Therefore, ERTAC estimates were used for these categories. The ERTAC rail workgroup was able to obtain two high quality sets of data: national Class I fuel use and link-level rail activity density. Using these two datasets, they were able to estimate emissions for all counties in the US at a higher resolution than the DAQ previously achieved. However, because of the sensitive nature of the data, the DAQ does not have access to the raw data, and so only totals are provided in this document.

4.5.2 Line Haul Locomotives – Class II/III Operations

Five railroads operate Class II/III locomotives within the State:

- Maryland & Delaware (MDDE) Railroad – New Castle County and Sussex County;

- Delaware Coast Line Railroad – Sussex County;
- Delmarva Central Railroad – All three counties of the State;
- East Penn Railroad – New Castle County (company did not provide data for 2017); and
- Wilmington and Western – New Castle County.

Each of these companies, with the exception of East Penn, provided DAQ with fuel used in each county of the State. The system-wide reported fuel use and track miles of each railroad is presented in Table 4-10.

Table 4-10. 2017 Locomotive Fuel Consumption Data by County for Line Haul Operations

Railroad Company	Class	County	Track Miles	Fuel Consumed, gallons/year
Maryland & Delaware	II/III	New Castle	11.25	0
Delaware Coast Line	II/III	Sussex	13	9,000
Delmarva Central	II/III	New Castle	122.3*	52,202
Delmarva Central	II/III	Kent	122.3*	99,731
Delmarva Central	II/III	Sussex	122.3*	118,933
East Penn	II/III	New Castle	No Data Provided	No Data Provided
Wilmington and Western	II/III	New Castle	10	410

*Note: Track miles are system/state-wide

4.5.3 Yard Locomotives

Table 4-11 provides a summary of switchyard operations and fuel consumption by rail company and county. MDDE and Delaware Central Railroad both provided fuel used at switchyard by county for 2017. No data was received from the Class I railroads for the 2017 inventory year. Therefore, a count of switchyard locomotives was done for each known switchyard in Delaware via Google Earth satellite imagery. Fuel consumed for these yard locomotives was calculated from the annual R-1 report provided by each respective Class I railroad company. The total US switcher fuel was apportioned to Delaware based on the proportion of the number of switcher locomotives counted in Delaware to the total number of US switchyard locomotives.

Table 4-11. 2017 Switchyard Activity and Estimated Fuel Consumption

Switchyard	No. of Yard Locomotives	Fuel Consumed, gallons/year
MDDE	2	1090
Delaware Central	No Data Provided	2610
Norfolk Southern	14	922,077
CSX	7	461,038

4.5.4 Locomotive age/Engine build

Delaware Central Railroad and MDDE both provided the make and model of their locomotives. These are found in the table below.

Table 4-12. Delaware Central Railroad and MDDE Locomotive Make and Model

Company	Tier	Locomotive Type	APU or Auto start/stop
DCR	0	No data Provided	ZTR AESS
DCR	0+	No data Provided	ZTR AESS
DCR	0	No data Provided	ZTR AESS
DCR	0	No data Provided	ZTR AESS
DCR	0	No data Provided	ZTR AESS
DCR	Pre-1973	No data Provided	none
DCR	Pre-1973	No data Provided	ZTR AESS
DCR	Pre-1973	No data Provided	ZTR AESS
DCR	0+	No data Provided	APU
DCR	0+	No data Provided	APU
DCR	Pre-1973	No data Provided	APU
DCR	Pre-1973	No data Provided	APU
DCR	Pre-1973	No data Provided	APU
MDDE	No Data Provided	RS3M	Unknown
MDDE	No Data Provided	RS3M	Unknown
MDDE	No Data Provided	RS3M	Unknown
MDDE	No Data Provided	SW900	Unknown
MDDE	No Data Provided	CF7	Unknown

4.5.5 Sample Calculations and Results

Line Haul Locomotive

To determine the amount of pollutant **p** at the county level:

$$E_p = FC \times EF_p$$

where:

- E_p = amount of pollutant **p** emitted for the county in pounds
- FC = fuel consumption for the county in gallons
- EF_p = emission factor for pollutant **p** in pounds per gallon

Yard Locomotive

To determine the amount of pollutant **p** at the county-level:

$$E_p = Yd \times FC_{Yd} \times EF_p$$

where:

- E_p = amount of pollutant **p** emitted for the county in pounds
- Yd = number of yard locomotives in the county
- FC_{Yd} = fuel consumption per yard locomotive in gallons per year
- EF_p = emission factor for pollutant **p** in pounds per gallon

The results for the 2017 locomotive emissions by county are presented in Table 4-13. The activity data for this category is not provided in a way that indicates the time when activity occurred. Also, EPA has not provided seasonality in their estimations of line haul data. Therefore, DAQ final SSWD values are simple daily values, calculated from the annual total.

Table 4-13. 2017 Locomotives Emissions in New Castle County

SCC	Category Description	Annual (tpy)			SSWD (tpd)		
		VOC	NO _x	CO	VOC	NO _x	CO
2285002006	Class I Line Haul	6	127	25	0.02*	0.35*	0.07*
2285002007	Class II/III Line Haul	1	19	2	<0.01*	0.05*	0.01*
2285002010	Yard Locomotives	21	286	43	0.06	0.78	0.12
22850020xx		28	432	70	0.08*	1.18*	0.19*

* = These figures are using EPA annual totals with Delaware-specific temporal profiles for SSWD calculation.

4.6 Commercial Marine Vessels

The CMV sector includes many types of vessels, such as large deep-draft vessels, barge towboats, harbor tugs, dredging vessels, ferries, excursion vessels, and commercial fishing vessels. In addition to the numerous vessel types, each vessel type engages in different activities such as hoteling, maneuvering within the port, and cruising.

In its 1999 final rule for commercial marine diesel engines, EPA defined three categories of marine diesel engines based on engine displacement, power and revolutions per minute (rpm). Table 4-14 presents the definitions for each category.

Table 4-14. U.S. EPA Marine Engine Category Definitions

Category	Displacement per cylinder	Power range (kW)	RPM range
1	disp. < 5 liters and power ≥ 37 kW	37 - 2,300	1,800 - 3,000
2	5 ≤ displacement < 30 liters	1,500 - 8,000	750 - 1,500
3	displacement ≥ 30 liters	2,500 - 80,000	60 - 900

The EPA classifies CMV emissions by fuel type (residual and diesel) and by mode of operation (port and underway). CMVs often burn multiple types of fuel and may burn different fuels for different operating modes or locations (*i.e.*, near ports). DAQ used the port and underway SCCs to characterize the CMV emissions as listed in Table 4-15. The SCC classification is based on the most common type of fuel utilized by the vessel category. Beginning in 2015, International Maritime Organization (IMO) regulations required ships in emission control areas (ECAs) to limit sulfur content to 0.1%S.

Table 4-15. SCCs for Commercial Marine Vessels

SCC	Descriptor 1	Descriptor 3	Descriptor 4
2280002101	Mobile Sources	Diesel	C1C2 Port emissions: Main Engine
2280002102	Mobile Sources	Diesel	C1C2 Port emissions: Auxiliary Engine
2280002201	Mobile Sources	Diesel	C1C2 Underway emissions: Main Engine
2280002202	Mobile Sources	Diesel	C1C2 Underway emissions: Auxiliary Engine
2280002103	Mobile Sources	Diesel	C3 Port emissions: Main Engine
2280002104	Mobile Sources	Diesel	C3 Port emissions: Auxiliary Engine
2280002203	Mobile Sources	Diesel	C3 Underway emissions: Main Engine
2280002204	Mobile Sources	Diesel	C3 Underway emissions: Auxiliary Engine
2280003103	Mobile Sources	Residual	C3 Port emissions: Main Engine
2280003104	Mobile Sources	Residual	C3 Port emissions: Auxiliary Engine
2280003203	Mobile Sources	Residual	C3 Underway emissions: Main Engine
2280003204	Mobile Sources	Residual	C3 Underway emissions: Auxiliary Engine

There are four activity modes for CMV: cruise, reduced speed zone (RSZ), maneuver, and hotel. Underway emissions are estimated as the combined activity of cruise and RSZ modes. Port emissions are estimated as the combined activity of maneuvering and hoteling modes. Emissions from ferries and dredging are considered port emissions since these vessels operate primarily within the port area.

DAQ calculated emissions for ocean-going vessels, towboats, tug-assist vessels, ferries and vessels associated with dredging operations. CMV engine emissions are assumed to be a function of the following:

- Mode of operation;
- Vessel type (bulk carrier, tanker, towboat, etc.);
- Vessel dead weight tonnage (DWT);
- Type of engine (2-stroke, 4-stroke, or steam); and
- Length of waterway segment.

Therefore, DAQ accounted for these variations when estimating CMV activity. The four modes of operation that are performed by vessels are defined below:

Cruise – Assumed to begin 25 miles out from the port breakwater until the vessel reaches the breakwater. The breakwater is located at the mouth of the Delaware Bay. Cruise mode is only applicable to Sussex County.

Reduced Speed Zone (RSZ) – Begins at the breakwater and continues until the vessel is one to two nautical miles from the berth or anchorage. The vessel is assumed to have a speed of twelve knots during this mode. This mode is also referred to as transit, and escort for towboats and tug-assist vessels.

Maneuvering – Time the vessel slows to below four knots until the dock lines are secure. This mode is also referred to as assist mode for tug-assist vessels.

Hoteling – Time the vessel is at dock. During this mode, the vessel operates auxiliary engines for electrical power.

The waterway segment distances used to estimate activity and to allocate the activity to each county were estimated from the Google Earth website in 2017 by tracing the shipping channel. Segment distances are shown in Table 4-16. The distance South is given to the breakwater at the mouth of the Delaware Bay. The distance North is given to the Delaware-Pennsylvania border. The distance for the C&D Canal East is given from the Delaware-Maryland border to the entrance of the Delaware River (Reedy Point).

Table 4-16. Waterway Segment Distances for the Delaware River Area

Waterway Segment	Distance (mi.)
Point	South
DE/PA Border	83.8
Oceanport	83.3
Port of Wilmington	76.1
Magellan Terminal	75.6
Delaware City Refinery	66.0
C&D Canal	62.6
Latitude 39°30'	57.7
New Castle Co/Kent Co	48.5
Kent Co/Sussex Co	15.9
Point	North
Port of Wilmington	7.7
C&D Canal	21.2
Point	East
C&D Canal	13.0

The engine activity for each mode is calculated using the following equation:

$$Activity_{mode} = Power \times Load\ Factor \times Time_{mode} \times Calls$$

where:

- Activity_{mode} = activity by mode (kilowatt-hours)
- Power = rated engine power by vessel and engine type (kilowatts)
- Load Factor = load factor of the engine by vessel type and mode
- Time_{mode} = time in mode per call by vessel type (hours)
- Calls = number of calls by vessel and engine type

This calculation must be performed for both propulsion and auxiliary engines and for each mode. Both propulsion engines and auxiliary engines are operating during cruise, RSZ, and maneuvering modes. Only auxiliary engines operate during hoteling. Once the activity is calculated, it is allocated to the county level using county allocation factors.

This approach to calculating activity of CMVs was used for all vessel types except vessels involved in dredging activity. For dredging, the activity data used for emissions calculations was the volume of material dredged. Details on the sources and development of activity data are provided in the following subsections.

4.6.1 Ocean-Going Vessels

DAQ obtained vessel call data for ocean-going vessels (OGVs) during calendar year 2017 from the Maritime Exchange for the Delaware River and Bay. Data were obtained for vessels that traveled anywhere into or through the Delaware River. The data for the entire port area is required since the majority of vessels pass through Delaware waters en route to other ports. The vessel call data included the vessel name, ship type, DWT, pier, and the date of the call. The ship types calling on the Delaware River Area ports in 2017 are shown in Table 4-17.

Vessels may shift between piers during the same call on the Delaware River area. DAQ adjusted the vessel call data to remove shifts between piers, where possible, to avoid double counting using a methodology recommended by the staff of the Marine Exchange. Data on the engine power and engine type (2-stroke, 4-stroke, and steam) used on OGVs were not available through the Marine Exchange. Therefore, DAQ assigned engine power and engine type based on average engine data obtained from other sources.

For propulsion engines, the average engine power and the engine type were obtained from the EPA report *Commercial Marine Activity for Deep Sea Ports in the United States (Deep Sea Ports)*. This report presents data for vessels that called on the Delaware River area ports during calendar year 1996. Note that the Delaware River area includes ports in Delaware, New Jersey and Pennsylvania, which are located on the Delaware River. The number of calls by vessel and engine type is presented for specific DWT ranges. The average engine power is also given.

Table 4-17. Vessel Types Calling on Delaware River Area Ports in 2017

Codes	Main Vessel Type	Additional Vessel Types Included w/ Main Type
BU	Bulk	Bulk Cargo (BG), Chemical (CH), Bulk (HR)
CC	Container	Container/Bulk (CB), Part Container (PC)
GC	General Cargo	
MS	Miscellaneous	Livestock (LV), Tall Ship (TS)
PR	Passenger	
RF	Refrigerated Cargo (Reefer)	Container Reefer (CR)
RR	Roll on-Roll off (RORO)	RORO Container (RC)
TA	Tanker	Tanker (AS), Bulk Oil (BO), Chemical Oil Tanker (CO), Gas Carrier (PG and NG)
VE	Vehicle Carrier	

In 2017, DAQ changed its methodology in calculating OGV emissions by ascertaining each ship trip segment between every location where an Automatic Identification System (AIS) “ping” occurs. There were 50 such locations. All other “ping” points in New Jersey and all ports in Pennsylvania are located north of the Delaware/Pennsylvania state line. Vessels calling on New Jersey and Pennsylvania ports must be included in underway emission calculations for Delaware since the vessels travel through the Delaware portion of the bay and river.

Table 4-18 presents the assigned propulsion engine power and the number of “pings” by vessel type, DWT range and engine type for calls on the Delaware River area in 2017. In addition to

vessels traveling in the Delaware River Bay and River, 256 OGVs traversed the C&D Canal to or from the Chesapeake Bay.

Table 4-18. Average Propulsion Engine Power and the 2017 ship “pings” for OGVs traversing the Delaware River Area (DE, NJ and PA)

Main Vessel Type	Rig Type Included	Average Propulsion Engine Power	Number of Ship “Pings”
BU	BU, BG, OR	<25K	226
BU	BU, BG, OR	25K-35K	156
BU	BU, BG, OR	35K-45K	731
BU	BU, BG, OR	>45K	2
CC	CC, CB, PC	<25K	791
CC	CC, CB, PC	25K-35K	921
CC	CC, CB, PC	35K-45K	137
CC	CC, CB, PC	>45K	64
GC	GC	<15K	13
GC	GC	15K-30K	14
GC	GC	30K-45K	9
MS	CL, HL, LV	<10K	190
PR	PR	<5K	2
PR	PR	5K-10K	3
RF	RF, CR	5K-10K	168
RF	RF, CR	10K-15K	136
RF	RF, CR	15K-25K	49
RR	RR, RC	<15K	37
RR	RR, RC	15K-30K	92
RR	RR, RC	>30K	285
TA	TA, AS, BO, CH, CO, NP, PD, PG	<30K	283
TA	TA, AS, BO, CH, CO, NP, PD, PG	30K-60K	716
TA	TA, AS, BO, CH, CO, NP, PD, PG	60K-90K	15
TA	TA, AS, BO, CH, CO, NP, PD, PG	90K-120K	365
TA	TA, AS, BO, CH, CO, NP, PD, PG	120K-150K	5
TA	TA, AS, BO, CH, CO, NP, PD, PG	>150K	21
VE	VE	<12.5K	27
VE	VE	12.5K-15K	84
VE	VE	15K-17.5K	666
VE	VE	>17.5K	2
ALL		TOTAL	6,210

4.6.2 Towboats and Tug Assists

Towboats are used to transport non-self-propelled vessels, either dry cargo or tanker barges, throughout the Delaware River area, including the C&D Canal. DAQ obtained data on the number of towboat trips during calendar year 2017 from *Waterborne Commerce of the United States*. DAQ subtracted the number of towboat trips for the Port of Wilmington (POW) and the C&D Canal from the number of trips on the Delaware River (PA to the Sea). For towboats traveling to and from the POW and traveling through the C&D Canal, DAQ assumed that half the vessels travel north and the other half travel south to/from the POW and the canal.

In 2017, 5,911 towboat trips transited Delaware waters on the Delaware River, with a trip defined as a one-way passage. 347 towboat trips entered or exited the POW, and 1,479 towboat trips transited the C&D Canal.

Tugs assist OGVs from the shipping channel to its intended berth and then back to the channel when the vessel leaves port. This activity is considered the maneuvering mode for OGVs. Two tugs are typically required to assist an OGV with a DWT greater than 20,000 tons; for smaller OGVs, one tug suffices. The number of tug assists (982 in 2017) is directly related to the number of OGVs calling to a Delaware port. Note that a tug assisting a vessel to Bermuda International in New Jersey and the piers at the oil refineries in Marcus Hook, PA will require a tug to pick up the OGV in Delaware waters, thus tug assists are included for these docks. The tug meeting time to the docking time is usually within one hour.

In addition to assisting OGVs to maneuver into port, tugboats escort gas carriers through the Delaware Bay and River. Other vessels typically do not utilize an escort. Tug escort trips are included in the number of towboat trips transiting Delaware waters presented above. DAQ did not estimate emissions from hoteling of towboats and tugs due to lack of activity data.

Vessel speeds, average maneuvering and hoteling time, propulsion and auxiliary engine horsepower ratings, and engine load factors for OGVs, towboats, and tugs were obtained from EPA's *Deep Sea Ports and Preparing Port Emission Inventories*. For RSZ mode, time-in-mode for each vessel was calculated based on vessel speeds and waterway segment distances provided in Table 4-15.

4.6.3 Dredging

Maintenance dredging is performed routinely on the Delaware River to keep the channels to their required depths. Dredging involves multiple vessels, including dredges, assist tugs, and generator barges that provide additional power. Estimating emissions from dredging vessel engine activity is time-consuming. Therefore, DAQ developed emissions based on the volume of material dredged during calendar year 2017 rather than engine activity in kilowatt-hours.

DAQ obtained the dredging activity data from both the United States Army Corps of Engineers (USACE) and from within DNREC. The amount of material dredged by USACE contractors was obtained from the USACE report on dredging contracts awarded for the year 2017. DAQ also contacted the Delaware Division of Soil and Water Conservation to obtain the amount of material dredged by the Division. Table 4-19 presents the estimated amount of material dredged and the

type of dredge used. DAQ assumed all the dredging activity is maintenance dredging. New cut dredging results in higher emissions, therefore this assumption may result in lower emission estimates than are actually occurring in the area.

Table 4-19. Material Dredged in Delaware Waters during 2017

County	Type of Equipment	Total Material Dredged (cubic yards)
Kent	Hydraulic	558,201
New Castle	Hydraulic	297,000
Sussex	Hydraulic	2,252,379
Kent	Bucket/Clamshell	558,201
New Castle	Bucket/Clamshell	297,000
Sussex	Bucket/Clamshell	909,879

4.6.4 Ferries

The only ferry in Delaware that operates in New Castle County is the Three Forts Ferry. This ferry travels from either Delaware City, DE or Fort Mott, NJ to Fort Delaware located on Pea Patch Island in the Delaware River. Monthly trip count data for the ferry was obtained by contacting the Delaware River & Bay Authority (DRBA). The Three Forts Ferry made 2,862 one-way trips in 2017. The DRBA also provided the engine and time-in-mode data for the Three Forts Ferry.

4.6.5 Spatial Allocation

DAQ developed county allocation factors for CMV activity data based on the location of the activity on the various waterways and length of the waterway segment. In developing county allocation factors, DAQ assumed that from latitude 39°30' to 25 miles beyond the mouth of the Delaware Bay, the activity is split evenly between Delaware and New Jersey since the ship channel roughly corresponds to the boundary between the two states. Above latitude 39°30', all emissions are allocated to Delaware since the entire breadth of the river is under Delaware's jurisdiction. Allocations were developed for each activity mode, since the activity takes place in different areas depending on the mode.

For OGV maneuvering and hoteling modes, the activity is allocated to the county in which the port is located. All large Delaware ports are located in New Castle County. Much of the maneuvering and hoteling activity thus takes place in New Castle County. OGVs will also hotel at one of the several anchorages along the shipping channel. Emissions are estimated for hoteling that takes place at Delaware's anchorages.

For the RSZ mode, county allocation factors were developed for the four ports in Delaware (Port of Wilmington, Magellan Terminal, Oceanport, and Delaware City Refinery), Bermuda International in New Jersey, and from the Pennsylvania-Delaware border to the breakwater (PA/DE to the Sea).

Allocating dredging to each county was based on the river miles in each county, and split between Delaware and New Jersey below latitude 39°30'. While the Three Forts Ferry travels to Fort Mott

on the New Jersey side of the Delaware River, at that latitude, Delaware's jurisdictional waters extend the breadth of the river. Therefore, all activity for the Three Forts Ferry was allocated to New Castle County.

The results for the 2017 annual emissions by CMV category are presented in Table 4-20.

Table 4-20. 2017 Commercial Marine Vessel Emissions for New Castle County

SCC	Category Description	Annual (tpy)			SSWD (tpd)		
		VOC	NO _x	CO	VOC	NO _x	CO
2280002101	C1C2 Port emissions: Main Engine - Diesel	2	18	1	<0.01*	0.05*	<0.01*
2280002102	C1C2 Port emissions: Auxiliary Engine- Diesel	2	78	12	0.01*	0.21*	0.03*
2280002201	C1C2 Underway emissions: Main Engine – Diesel	11	286	42	0.03*	0.78*	0.12*
2280002202	C1C2 Underway emissions: Auxiliary Engine – Diesel	6	198	31	0.02*	0.54*	0.08*
2280002103	C3 Port emissions: Main Engine – Diesel	8	45	8	0.02*	0.12*	0.02*
2280002104	C3 Port emissions: Auxiliary Engine – Diesel	9	196	22	0.02*	0.54*	0.06*
2280002203	C3 Underway emissions: Main Engine – Diesel	35	543	63	0.10*	1.49*	0.17*
2280002204	C3 Underway emissions: Auxiliary Engine – Diesel	8	169	19	0.02*	0.46*	0.05*
2280003103	C3 Port emissions: Main Engine - Residual	0	0	0	0.00*	0.00*	0.00*
2280003104	C3 Port emissions: Auxiliary Engine – Residual	0	0	0	0.00*	0.00*	0.00*
2280003203	C3 Underway emissions: Main Engine – Residual	0	0	0	0.00*	0.00*	0.00*
2280003204	C3 Underway emissions: Auxiliary Engine - Residual	0	0	0	0.00*	0.00*	0.00*
228000xxxx		80	1,532	199	0.22*	4.20*	0.54*

* = These figures are using EPA annual totals with Delaware-specific temporal profiles for SSWD calculation.

SECTION 5 - ONROAD MOBILE SOURCES

The 2017 onroad mobile source inventory is an estimate of vehicle emissions based on actual VMT on Delaware roadways in 2017 using EPA's MOVES2014b model. DAQ used the input files submitted for the EPA's 2017 NEI run of the MOVES2014b model. These inputs files are organized in a county database (CDB), the details of which are outlined in Table 5-1. MOVES uses many more inputs; those not mentioned here would use the default tables from the MOVES database (movesdb20181022).

Table 5-1. County Database

MOVES CDB Tab	Input datasource	Data Source Details
Road Type Distribution	RoadTypeDistribution	Analyzed the DMV's Road type VMT data which is collected by road type. This was converted to the appropriate MOVES road type.
Source Type Population	SourceTypeYear	The DMV's registration database was used.
Vehicle Type VMT	HpmsVtypeYear	Delaware 2017 VMT report together with the MOVES database. This is discussed in detail below.
	MonthVmtFraction	Used the data from the CRC-A100 dataset.
	DayVMTFraction	
	HourVMTFraction	
I/M Programs	IMCoverage	This is discussed in more detail below.
Generic	EmissionRateByAge	Delaware adopted the LEV-III standards in 2014, the following guidance was used to generate an appropriate "EmissionRateByAge" table: "Instructions for Using LEV and NLEV Inputs for MOVES2014" EPA-420-B-14-060a"
Age Distribution	SourceTypeAgeDistribution	The DMV's registration database was used.
Average Speed Distribution	AvgSpeedDistribution	Used the data from the CRC-A100 data set. This came from a study of massive amounts of Bluetooth data. This was used nationally for the 2014 NEI. Where the vehicle types were not available, the data from the Delaware Department of Transport's Travel Demand Model was used.
Fuel	FuelSupply	Used the MOVES default tables for New Castle County.
	FuelFormulation	
	FuelUsageFraction	
	AVFT	
Meteorology Data	ZoneMonthHour	Temperature and humidity data was downloaded from NOAA website for 2017.

5.1 Delaware-Specific Input Data for 2017

As outlined above, the MOVES model allows for a variety of model inputs. DAQ, with assistance from DelDOT, puts considerable effort in creating county-specific input data files. The county-specific input data types created for the 2017 inventory include VMT (by vehicle and roadway type), vehicle registration data (vehicle populations and age distributions), average speeds in the form of speed bin fractions (weekday versus weekend and by roadway type), and inspection and maintenance (I/M) program specifications. Each of these input data sets are discussed separately

below. DAQ relies on the MOVES model defaults for fuel parameters (formulations and supply), ramp fractions, and weekly and daily fractions.

5.1.1 Vehicle Miles Traveled (VMT) Data

The activity data used for developing the onroad emission inventory is VMT. DelDOT provided 2017 VMT data by roadway type for all counties in Delaware. DelDOT is required to submit calendar year VMT data annually to the Federal Highway Administration's (FHWA) Highway Performance Monitoring System (HPMS). The VMT is estimated based on data from permanent traffic count stations throughout the county.

DelDOT's traffic count program provides daily and seasonal variation data. Additional temporary stations provide shorter-term counts that are expanded with factors derived from appropriate permanent count stations. Counting and expansion activities are consistent with FHWA guidelines. The traffic data submitted to HPMS are considered the most accurate VMT totals for Delaware.

Since the VMT provided by DelDOT is supplied by HPMS roadway type, the task of creating VMT by MOVES road type fractions requires mapping the twelve HPMS road types to the four MOVES road types. The road type allocations for New Castle County for 2017 are provided in Table 5-2.

Table 5-2. New Castle County VMT Fractions by Road Type

MOVES Road Type Code	Road Type Description	VMT Fraction by Road Type
2	Rural Restricted Access	0.0000
3	Rural Unrestricted Access	0.1550
4	Urban Restricted Access	0.5457
5	Urban Unrestricted Access	0.2993
Total		1.0000

5.1.2 VMT Fractions by Vehicle Type

MOVES requires VMT by HPMS vehicle types as an input, however, VMT by vehicle type data are not collected in Delaware, so an alternate method was used.

The output from a MOVES statewide run at the national level was analyzed for VMT distribution by vehicle type. These VMT proportions were then used to allocate the VMT as measured by DelDOT to the vehicle types, as can be seen in Table 5-3.

Table 5-3. New Castle County VMT by Vehicle Type

HPMSVtypeID	HPMSVtypeName	yearID	HPMSBaseYearVMT
10	Motorcycles	2017	37,567,788
25	Light Duty Vehicles	2017	5,525,977,280
40	Buses	2017	28,773,188
50	Single Unit Trucks	2017	217,394,603
60	Combination Trucks	2017	285,900,620

5.1.3 VMT Temporal Allocations

The MOVES model input files include allocations of VMT by month. Monthly allocation of VMT is accomplished through the use of permanent count station data provided by DelDOT. For 2017, DelDOT provided monthly VMT data from the permanent count stations throughout New Castle County. Each month's data for all count stations was summed and divided by the sum of the annual VMT recorded by the all count stations in a county. The monthly VMT fractions created in this way are provided in Table 5-4.

Table 5-4. Monthly VMT Allocation Fractions for New Castle County

Month	VMT Fraction
January	0.0700
February	0.0732
March	0.0782
April	0.0834
May	0.0874
June	0.0934
July	0.0907
August	0.0911
September	0.0855
October	0.0847
November	0.0818
December	0.0807

5.1.4 Vehicle Populations and Age Distributions

Vehicle registration data was obtained from the Delaware Division of Motor Vehicles (DMV) registration database on July 1, 2018. The data shows the number of vehicles registered by model year (MY) for each of the 16 MOBILE6.2 vehicle classes.

The data is first transformed to the 13 MOVES source types using the techniques outlined in the Vehicle Type Mapping sheet in the EPA's conversion tool:

“VMT-Converter-road-veh16-20100209.xls”

Then, the last storage bin (25 years and older) is reallocated across five years according to the proportions listed in the MOVES2014 default database for calendar year 2017.

5.1.5 Speed Bin Fractions

The MOVES model represents average vehicle speeds by roadway type through the use of speed bin fractions. There are 16 speed bins with the first representing speeds less than 2.5 miles per hour (mph), with each subsequent bin having a range of 5 mph (*i.e.*, 42.5 mph – 47.5 mph). The final bin represents speeds equal to or greater than 72.5 mph.

For 2017, DelDOT provided seasonal speed bin fractions for each of the four MOVES roadway types, for each hour of the day, and for weekday and weekend driving patterns. DelDOT estimated speeds using the Peninsula travel demand model. The model accounts for traffic volumes and variations in travel according to purpose, which impact average speeds.

However, the Speed Bin data that was used came from the telematics data that the CRC A-100 study⁶ provided. Between September 2015 and August 2016 telematics data from millions of vehicles was taken nationally and compiled into MOVES ready tables. The CRC A-100 dataset covered the vehicle types as outlined in Table 5-5. These cover the vast majority of vehicles. Where CRC A-100 data was not available, the data came from the DelDOT Peninsula travel model. This is the same approach as used for the NEI2014v2 MOVES runs, and is being used again for the NEI 2017 runs.

Table 5-5. 2017 Vehicle Populations for New Castle County

Vehicle Code	Vehicle Type	Number of Vehicles	Include in CRC A-100 Telematics
11	Motorcycle	12,037	Yes
21	Passenger Vehicle	227,297	Yes
31	Passenger Truck	152,764	Yes
32	Light Commercial Truck	81,766	Yes
41	Intercity Bus	145	No
42	Transit Bus	435	No
43	School Bus	721	No
51	Refuse Truck	43	No
52	Single Unit Short-Haul Truck	3,719	Yes
53	Single Unit Long-Haul Truck	271	Yes
54	Motor Home	430	No
61	Combination Short-Haul Truck	696	Yes
62	Combination Long-Haul Truck	482	Yes

5.1.6 Inspection and Maintenance (I/M)

Table 5-6 outlines the I/M program as implemented in New Castle County.

The program includes a biennial onboard diagnostic testing program (OBD II) for 1996 and later model year (MY) vehicles. Vehicle emission computer systems are checked for any diagnostic trouble codes present, a symptom of excess emissions which results in the vehicle failing.

Older vehicles, starting with MY 1968, are given a curb idle test (MY 1968-1980) or a two-speed idle test (MY 1981-1995). A tailpipe probe is inserted for 60 seconds to determine exhaust concentrations of hydrocarbons and carbon monoxide. Depending on the MY, vehicles with an excess emission concentration of either pollutant will fail the test.

Older vehicles (MY 1975-1995) are also given a fuel system pressure test (FP) and a gas cap (GC) test. Air pressure is applied to the fuel system from the fuel inlet to the canister. After air pressure has been applied, pressure degradation is monitored. Vehicles fail the FP if it cannot maintain the equivalent pressure of eight inches of water for up to two minutes after being pressurized to 14.0 ± 0.5 inches of water. A similar pressure test is applied to the vehicle's GC.

⁶ http://csrcsite.wpengine.com/wp-content/uploads/2019/05/ERG_FinalReport_CRCA100_28Feb2017.pdf

Table 5-6. New Castle County I/M Program Parameters

Test Type	IDLE	2500/IDLE	FP & GC	OBD I/M
Test Frequency	Biennial	Biennial	Biennial	Biennial
Program Type	Test Only	Test Only	Test Only	Test Only
Model Years	1968-1980	1981-1995	1975-1995	1996-2010
Regulatory Class Coverage				
Passenger Vehicle	96.02	96.02	96.02	95.62
Passenger Truck	94.10	94.10	94.10	93.71
Light Comm. Truck	88.34	88.34	88.34	87.97
Vehicles Tested (gasoline only)				
Passenger Vehicle	Yes	Yes	Yes	Yes
Passenger Truck	Yes	Yes	Yes	Yes
Light Comm. Truck (up to 8,500 GVWR)	Yes	Yes	Yes	Yes
School Bus	No	No	No	No
Single Unit Short-Haul Truck	No	No	No	No
Single Unit Long-Haul Truck	No	No	No	No
Refuse Truck	No	No	No	No
Combination Short-Haul Truck	No	No	No	No
Combination Long-Haul Truck	No	No	No	No
Motor Home	No	No	No	No
Intercity Bus	No	No	No	No
Transit Bus	No	No	No	No
Motorcycle	No	No	No	No

5.1.7 Meteorology

The ZoneMonthHour table is a listing of the average hourly temperature and relative humidity data. This data is averaged for each hour for each month so that there are 288 (12 x 24) readings for both parameters.

Hourly data for every day of every month for 2017 was downloaded using the Local Climatological Data tool⁷ provided by NOAA as presented in Table 5-7.

Table 5-7. New Castle County Local Climatological Data Station Details

County	Station Location
New Castle	NEW CASTLE COUNTY AIRPORT (13781)

⁷ <https://www.ncdc.noaa.gov/cdo-web/datatools/lcd?prior=N>

This data was processed so as to produce the data in the format as defined in the ZoneMonthHour table.

5.2 Controls

All MOVES-recognized onroad control measures known to be in place in Delaware in 2017 were included in the MOVES emission inventory mode modeling. Local control programs include Delaware's I/M program, the Federal reformulated gasoline program, and the Northeast Ozone Transport Region LEV program. The MOVES model internally includes all national control programs, such as the Tier 1, Tier 2 and Tier 3 gasoline fuel and light duty engine emission standards as well as the ultra-low sulfur diesel fuel and heavy duty engine standards.

Two Delaware control programs, the anti-tampering procedures (ATP) performed at the inspections lanes and the anti-idling regulation, were not accounted for in the MOVES runs since the model does not provide for inputting these programs. For the ATP control program, vehicles that are tested are also checked to see if the catalytic converter, GC, and fuel inlet restrictor are present. Vehicles will fail inspection if any of these devices are missing.

7 DE Admin. Code 1145, Excessive Idling of Heavy Duty Vehicles, is designed to eliminate emissions caused by extending idling. While MOVES delineates emissions processes for extended idling, the currently available control programs within MOVES do not account for anti-idling measures. Delaware currently has no off-model method to determine emission benefits from either ATP or 7 DE Admin. Code 1145.

5.3 Emission Estimation Methodologies

A single MOVES model run was used to compute both the SSWD emissions and the annual emissions. To achieve this, MOVES was run by selecting all months, both day types, all hours, and the output time aggregation of "24-hour day". An Excel pivot table was created from the MOVES Output Table (provided in Appendix D, Tab 1. Pivot SSWD), to select the summer months of June, July, and August and just the weekdays. The pivot table results were averaged to calculate average SSWD emissions for each pollutant.

The first step in calculating annual emissions was to calculate *Daily Emissions* from the MOVES Output Table. A new column was added to the same MOVES Output Table to calculate *Daily Emissions* using the following equation:

$$emissionQuant \times DayID / 7 \times DaysInMonth$$

where:	emissionQuant	= MOVES model output, quantity of emissions (tons/day)
	DayID	= MOVES model output, representing weekend (2) or weekday (5)
	DaysInMonth	= number of days in a particular month

Then, an Excel pivot table was created from the MOVES Output table (provided in Appendix D, Tab 2. Pivot Annual), selecting all months and both DayID types. Table 5-8 summarizes the fields that were utilized in the pivot tables to calculate SSWD and annual emissions.

Table 5-8. Calculation of SSWD and Annual Emissions Pivot Table Details

Pivot Table Fields	Emission Tally Type	
	SSWD	Annual
Columns	Pollutant	Pollutant
Rows	MonthID (Select 6,7,8)	MonthID (Select All)
	DayID (Select 5)	DayID (Select Both)
Σ values	Sum of Emission Quant	Sum of Daily Emissions
Post Processing	Calculate Average	Use Grand Total Columns

5.4 Calculated 2017 Onroad Emissions

Table 5-9. 2017 Annual and SSWD Emissions for Onroad Mobile Sources

County	Annual (tpy)			SSWD (tpd)		
	VOC	NO _x	CO	VOC	NO _x	CO
New Castle	2,213	5,184	28,807	6.23	15.70	87.23

Appendix B

Tabs:	Notes:
Nonpoint Categories	Contains notes on adjustments made to the 2017 BYI inventory; summarizes variations in the 2017 BYI compared to the Adjusted 2017 BYI.
SSWD Variations	Lists SSWD factors for categories that were not included in the original BYI or have been adjusted from the BYI. Same SSWD factors were used for 2017 and 2023.
2017_2023 Inventory	The 2017 and 2023 inventory by SCC. Includes growth factors, sswd factors, controls, and uncontrolled inventory.
Summary	Pivot table of the 2017 adjusted byi and 2023 projected inventory.
DOL GrowthRate NC	DE Department of Labor Industry Growth Rates (2018-2028) for New Castle County used in the inventory where noted.
DPC Growth Rate nc	Delaware Population Consortium Data used for Delaware specific population growth factor.
Cumulative Controls	Includes calculation of phased-in/cumulative controls.
Lighter Fluid	Lighter fluid calculation from EPA's 2016v3 modeling data.

Nonpoint Categories

Growth Factors:

Delaware followed the growth methods from the EPA 2016v3 Technical Support Document. When available Delaware specific growth factors where substituted for EPA's/MARAMA growth factors. Since EPA grew emissions from 2016, adjustments were made were applicable.

Corrected Categories:

Ag: Pesticides
Auto Refinishing
Gasoline Marketing
AIM
Residential Fuel SSWD
Commercial fuel SSWD
POTW
Animal Husbandry
cremation
animal cremation
res grilling
BYI added emissions from SCC 2460800000 (FIFRA emissions) that were already accounted for in CCP SCCs;removed FIFRA emissions from ag pesticides to avoid double count.
BYI added emissions from Kent and New Castle County; removed Kent County emissions. SSWD did not contain same error.
BYI double counted Aircraft refueling and PFCs; removed double count.
BYI annual emissions did not match internal calculations, but the summer season weekday was correct. Updated annual data to relect DE's inventory.
Annual data is correct, but source of BYI SSWD factor is unknown; Adjust SSWD data to match internal DE data.
Annual data is correct, but source of BYI SSWD factor is unknown; Adjust SSWD data to match internal DE data.

2017 NEI SCC was not included in original BYI:

POTW
Used 2017 NEI data and grew with DE Population. SSWD calculated internally; no seasonal variation.
Animal Husbandry
cremation
Used 2017 NEI data and grew with national animal projection factors found in EPA's 2016v3 model platform. Used Delaware specific seasonal variation
animal cremation
Used 2017 NEI data and grew with DE Population. SSWD calculated internally; no seasonal variation.
res grilling
Used 2017 NEI data and assumed no growth as done in EPA's 2016v3 modelling platform. SSWD calculated internally; no seasonal variation.
Used 2017 NEI data and grew with DE Population. SSWD calculated internally; higher emissions in summer.

New SCCs:

CCP - Lighter Fluid (24603095 Calculated EPA 2017 value and grew to 2023 with DE Population. SSWD calculated internally; higher emissions in summer.

Other Notes:

Industrial Fuel
Gas Marketing 2501060100
BYI data does not match 2017 NEI. Use BYI (DE internal data) and grow that data with MARAMA growth factors used by EPA
Removed from nonpoint as refueling emissions are already accounted for in onroad inventory

Table 3-4

Adjusted vs Original 2017 BYI Nonpoint Annual Category Totals

Adjustment Notes:	Source Categories	Original 2017 Base Year Inventory				Adjusted 2017 Base Year Inventory			
		Annual Emissions (tpy)				Annual Emissions (tpy)			
		CO	NOx	VOC		CO	NOx	VOC	
VOC Double Count	Agricultural Pesticides	-	-	117		-	-	30	
VOC Double Count	AIM ⁴ Coatings	-	-	403		-	-	390	
Missing SCC	Animal Cremation ¹	-	-	-		<1	<1	<1	
Missing SCC	Animal Husbandry ¹	-	-	-		-	-	35	
VOC Double Count	Auto Refinishing	-	-	29		-	-	22	
Missing SCC	Human Cremation ¹	-	-	-		<1	<1	<1	
New SCC	Lighter Fluid (C&CP) ¹	-	-	-		-	-	12	
Missing SCC	POTWs ^{1,3}	-	-	-		-	-	12	
Missing SCC	Residential Grilling ¹	-	-	-		150	3	8	
VOC Double Count	Retail Gasoline Stations	-	-	402		-	-	240	
	Total	-	-	951		150	3	749	

1) New Category
2) C&CP: Consumer and Commercial Products
3) POTWs: Publicly Owned Treatment Works
4) AIM: Architectural and Industrial Maintenance

Table 3-5

Adjusted vs Original 2017 BY1 Nonpoint SSWD Category Totals

Adjustment Notes:	Source Categories	Original 2017 Base Year Inventory SSWD Emissions (tpd)			Adjusted 2017 Base Year Inventory SSWD Emissions (tpd)		
		CO	NOx	VOC	CO	NOx	VOC
Use Internal SSWD	Agricultural Pesticides	-	-	0.32	-	-	0.11
Missing SCC	Animal Cremation ¹	-	-	-	<0.01	<0.01	<0.01
Missing SCC	Animal Husbandry ¹	-	-	-	-	-	0.1
Use Internal SSWD	Commercial Fuel	0.43	0.73	0.04	0.43	0.52	0.03
Missing SCC	Human Cremation ¹	-	-	-	<0.01	<0.01	<0.01
New SCC	Lighter Fluid (C&CP) ² ¹	-	-	-	-	-	0.05
Use Internal SSWD	Portable Fuel Containers	-	-	0.33	-	-	0.42
Missing SCC	POTWs ^{1,3}	-	-	-	-	-	0.03
Missing SCC	Residential Grilling ¹	-	-	-	0.66	0.01	0.04
Use Internal SSWD	Residential Fuel	0.12	0.28	0.02	0.1	0.22	0.01
Use Internal SSWD	Retail Gasoline Stations	-	-	1.91	-	-	0.78
	Total	0.55	1.01	2.62	1.19	0.76	1.57

1) New Category

2) C&CP: Consumer and Commercial Products

3) POTWs: Publicly Owned Treatment Works

This tab clarifies SSWD factors for categories that were not included in the byi or have been adjusted from the byi. Same factors were used for 2017 and 2023.

These categories were not included in the original BYI:

Categories	SCC	Pollutant_ (2017 SSWC) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MON	TUE	WED	THU	FRI	SAT	SUN	TOTAL
Animal Husbandry	2805002000 VOC	0.003201	42	42	97	97	97	97	97	97	97	97	97	42	999	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805018000 VOC	0.003201	42	42	97	97	97	97	97	97	97	97	97	42	999	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805025000 VOC	0.006435	15	15	82	82	82	195	195	41	41	41	41	15	999	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805007100 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805009100 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805010200 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805035000 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805040000 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Husbandry	2805045000 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Ag. Pesticides	2461850000 VOC	0.003667	0	0	111	111	111	111	111	111	111	111	111	0	1000	143	143	143	143	143	143	1000
Human Cremation	2810060100 CO	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Human Cremation	2810060100 NOX	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Human Cremation	2810060100 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Cremation	2810060200 CO	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Cremation	2810060200 NOX	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Animal Cremation	2810060200 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
POTW	2630020000 VOC	0.002747	83	83	83	83	83	83	83	83	83	83	83	83	996	142.9	142.9	142.9	142.9	142.9	142.9	1000.3
Res Grilling	2810025000 CO	0.004431	2	2	2	10	16	16	16	16	10	5	3	2	100	5	5	5	5	20	30	100
Res Grilling	2810025000 NOX	0.004431	2	2	2	10	16	16	16	16	10	5	3	2	100	5	5	5	5	20	30	100
Res Grilling	2810025000 VOC	0.004431	2	2	2	10	16	16	16	16	10	5	3	2	100	5	5	5	5	20	30	100
Commercial & Consur	2460030999 VOC	0.004431	2	2	2	10	16	16	16	16	10	5	3	2	100	5	5	5	5	20	30	100

These categories sswd factor were adjusted from the original byi typically from annual value being adjusted:

Categories	SCC	Pollutant_ (2017 SSWC) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL	MON	TUE	WED	THU	FRI	SAT	SUN	TOTAL		
Commercial Fuel	2103001000 VOC	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0	0.003213	0.0341078	0.1354424	0.225902	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004001 VOC	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004002 VOC	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103005000 VOC	0.000958	0.177663	0.107213	0.1218842	0.0261987	0.0216209	0.0524348	0.0175376	0.0045881	0.0139533	0.0966224	0.1501916	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103006000 VOC	0.00157	0.14104	0.112533	0.1266741	0.0561915	0.0539469	0.0419753	0.0373363	0.0428732	0.0487841	0.0625514	0.1095398	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103007000 VOC	0.000578	0.182615	0.1362	0.1546442	0.0545185	0.0401279	0.0149951	0.0149951	0.01763	0.0429655	0.1260658	0.200248	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103001000 NOX	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0	0.003213	0.0341078	0.1354424	0.225902	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004001 NOX	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004002 NOX	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103005000 NOX	0.000958	0.177663	0.107213	0.1218842	0.0261987	0.0216209	0.0524348	0.0175376	0.0045881	0.0139533	0.0966224	0.1501916	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103006000 NOX	0.00157	0.14104	0.112533	0.1266741	0.0561915	0.0539469	0.0419753	0.0373363	0.0428732	0.0487841	0.0625514	0.1095398	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103007000 NOX	0.000578	0.182615	0.1362	0.1546442	0.0545185	0.0401279	0.0149951	0.0149951	0.01763	0.0429655	0.1260658	0.200248	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103001000 CO	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0	0.003213	0.0341078	0.1354424	0.225902	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004001 CO	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103004002 CO	0.000177	0.197734	0.144251	0.1655039	0.0501303	0.0335483	0.0045881	0.0045881	0.0076243	0.036818	0.1325734	0.218053	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103005000 CO	0.000958	0.177663	0.107213	0.1218842	0.0261987	0.0216209	0.0524348	0.0175376	0.0045881	0.0139533	0.0966224	0.1501916	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103006000 CO	0.00157	0.14104	0.112533	0.1266741	0.0561915	0.0539469	0.0419753	0.0373363	0.0428732	0.0487841	0.0625514	0.1095398	1	167	167	167	167	167	167	167	0	1000	
Commercial Fuel	2103007000 CO	0.000578	0.182615	0.1362	0.1546442	0.0545185	0.0401279	0.0149951	0.0149951	0.01763	0.0429655	0.1260658	0.200248	1	167	167	167	167	167	167	167	0	1000	
Gasoline Marketing	2501060051 VOC	0.003432	0.081145	0.071113	0.0671631	0.0826335	0.0984194	0.0864317	0.0801063	0.1011787	0.0709678	0.0980548	0.082865	1	166.7	166.7	166.7	166.7	166.7	166.7	166.7	0	1000	
Gasoline Marketing	2501060053 VOC	0.003432	0.081145	0.071113	0.0671631	0.0826335	0.0984194	0.0864317	0.0801063	0.1011787	0.0709678	0.0980548	0.082865	1	166.7	166.7	166.7	166.7	166.7	166.7	166.7	0	1000	
Gasoline Marketing	2501060201 VOC	0.002942	0.081145	0.071113	0.0671631	0.0826335	0.0984194	0.0864317	0.0801063	0.1011787	0.0709678	0.0980548	0.082865	1	142.86	142.86	142.86	142.86	142.86	142.86	142.86	0	1000	
Gasoline Marketing	2505030120 VOC	0.003432	0.081145	0.071113	0.0671631	0.0826335	0.0984194	0.0864317	0.0801063	0.1011787	0.0709678	0.0980548	0.082865	1	166.7	166.7	166.7	166.7	166.7	166.7	166.7	0	1000	
Gasoline Marketing - F	2501011011 VOC	0.003414	0.02	0.02	0.09	0.09	0.09	0.133	0.133	0.133	0.09	0.09	0.09	0.999	111.1	111.1	111.1	111.1	111.1	222.2	222.2	999.9	0	999.9
Gasoline Marketing - F	2501011012 VOC	0.003414	0.02	0.02	0.09	0.09	0.09	0.133	0.133	0.133	0.09	0.09	0.09	0.999	111.1	111.1	111.1	111.1	111.1	222.2	222.2	999.9	0	999.9
Gasoline Marketing - F	2501011013 VOC	0.003414	0.02	0.02	0.09	0.09	0.09	0.133	0.133	0.133	0.09	0.09	0.09	0.999	111.1	111.1	111.1	111.1	111.1	222.2	222.2	999.9	0	999.9

Gasoline Marketing - F 2501011014 VOC	0.003414	0.02	0.02	0.09	0.09	0.133	0.133	0.133	0.09	0.09	0.02	0.999	111.1	111.1	111.1	111.1	222.2	222.2	999.9
Gasoline Marketing - F 2501011015 VOC	0.003414	0.02	0.02	0.09	0.09	0.133	0.133	0.133	0.09	0.09	0.02	0.999	111.1	111.1	111.1	111.1	222.2	222.2	999.9
Gasoline Marketing - F 2501012011 VOC	0.003786	0.0622	0.0622	0.0856	0.0856	0.0997	0.0997	0.0997	0.0856	0.0856	0.0622	0.993	164.5	164.5	164.5	164.5	88.9	88.9	1000.3
Gasoline Marketing - F 2501012012 VOC	0.003786	0.0622	0.0622	0.0856	0.0856	0.0997	0.0997	0.0997	0.0856	0.0856	0.0622	0.993	164.5	164.5	164.5	164.5	88.9	88.9	1000.3
Gasoline Marketing - F 2501012013 VOC	0.003786	0.0622	0.0622	0.0856	0.0856	0.0997	0.0997	0.0997	0.0856	0.0856	0.0622	0.993	164.5	164.5	164.5	164.5	88.9	88.9	1000.3
Gasoline Marketing - F 2501012014 VOC	0.003786	0.0622	0.0622	0.0856	0.0856	0.0997	0.0997	0.0997	0.0856	0.0856	0.0622	0.993	164.5	164.5	164.5	164.5	88.9	88.9	1000.3
Gasoline Marketing - F 2501012015 VOC	0.003786	0.0622	0.0622	0.0856	0.0856	0.0997	0.0997	0.0997	0.0856	0.0856	0.0622	0.993	164.5	164.5	164.5	164.5	88.9	88.9	1000.3
Residential Fuel	2104002000 VOC	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000
Residential Fuel	2104004000 VOC	0.000197	0.195722	0.14318	0.1640589	0.0507143	0.0344238	0.005973	0.005973	0.0089557	0.037636	0.1317075	1	143	143	143	143	143	1000
Residential Fuel	2104006000 VOC	0.000574	0.19715	0.141168	0.170675	0.0618432	0.0353678	0.0209175	0.0152587	0.015966	0.0173808	0.0251617	0.0963015	1	143	143	143	143	1000
Residential Fuel	2104007000 VOC	0.000075	0.171373	0.130214	0.1465697	0.057812	0.0450201	0.0227331	0.0227331	0.0250696	0.0475363	0.1212272	1	143	143	143	143	143	1000
Residential Fuel	2104001000 VOC	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000
Residential Fuel	2104002000 NOX	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000
Residential Fuel	2104004000 NOX	0.000197	0.195722	0.14318	0.1640589	0.0507143	0.0344238	0.005973	0.005973	0.0089557	0.037636	0.1317075	1	143	143	143	143	143	1000
Residential Fuel	2104006000 NOX	0.000574	0.19715	0.141168	0.170675	0.0618432	0.0353678	0.0209175	0.0152587	0.015966	0.0173808	0.0251617	0.0963015	1	143	143	143	143	1000
Residential Fuel	2104007000 NOX	0.000075	0.171373	0.130214	0.1465697	0.057812	0.0450201	0.0227331	0.0227331	0.0250696	0.0475363	0.1212272	1	143	143	143	143	143	1000
Residential Fuel	2104010000 NOX	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000
Residential Fuel	2104002000 CO	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000
Residential Fuel	2104004000 CO	0.000197	0.195722	0.14318	0.1640589	0.0507143	0.0344238	0.005973	0.005973	0.0089557	0.037636	0.1317075	1	143	143	143	143	143	1000
Residential Fuel	2104006000 CO	0.000574	0.19715	0.141168	0.170675	0.0618432	0.0353678	0.0209175	0.0152587	0.015966	0.0173808	0.0251617	0.0963015	1	143	143	143	143	1000
Residential Fuel	2104007000 CO	0.000075	0.171373	0.130214	0.1465697	0.057812	0.0450201	0.0227331	0.0227331	0.0250696	0.0475363	0.1212272	1	143	143	143	143	143	1000
Residential Fuel	2104001000 CO	0	0.204399	0.1478	0.1702916	0.0481957	0.0306476	0	0	0.003213	0.0341078	0.1354424	0.225902	1	143	143	143	143	1000

Commercial Fuel	10 003	2103004001	CO	5.1	0.00	ANNUAL BVI, SSWD ADJUSTED	6.3	0.00	1.23 2019	EPA 2016v3: EPA uses MARAMA Projections based on DE 2017 data; AEO	0 NA		6.26	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Commercial Fuel	10 003	2103004002	CO	7.0	0.00	ANNUAL BVI, SSWD ADJUSTED	8.6	0.00	1.23 2019	EPA2016v3: EPA uses MARAMA Projections based on DE 2017 data; AEO	0 NA		8.56	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Commercial Fuel	10 003	2103005000	CO	0.1	0.00	ANNUAL BVI, SSWD ADJUSTED	0.0	0.00	0.75 2019	EPA2016v3: EPA uses MARAMA Projections based on DE 2017 data; AEO	0 NA		0.04	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Commercial Fuel	10 003	2103006000	CO	273.9	0.43	ANNUAL BVI, SSWD ADJUSTED	312.3	0.49	1.14 2019	EPA2016v3: EPA uses MARAMA Projections based on DE 2017 data; AEO	0 NA		312.30	0.49	Adjust SSWD fraction to match internal data SSWD calculation.
Commercial Fuel	10 003	2103007000	CO	2.8	0.00	ANNUAL BVI, SSWD ADJUSTED	3.3	0.00	1.20 2019	EPA2016v3: EPA uses MARAMA Projections based on DE 2017 data; AEO	0 NA		3.33	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Dry Cleaners	10 003	2420010700	VOC	1.4	0.01	BVI	1.5	0.01	1.08	NAICS 812 Use DE DOL Industry Growth for NCC	0 NA		1.54	0.01	
Gasoline Marketing	10 003	2501060051	VOC	0.7	0.00	ADJUSTED BVI	0.7	0.00	1.07 2016, 202x, 2019 05 26, withMEQ2019 gasoline	EPA 2016v3: Use EPA 2023 value (MARAMA growth)	0 NA	2020 enhanced vapor pressure controls	0.71	0.00	SSWD/annual different than bvi; EPA projected value
Gasoline Marketing	10 003	2501060053	VOC	136.7	0.47	ADJUSTED BVI	139.4	0.48	1.07 2016, 202x, 2019 05 26, withMEQ2019 gasoline	EPA 2016v3: Use EPA 2023 value (MARAMA growth)	4.86		146.54	0.50	SSWD/annual different than bvi; EPA projected value with DE controls
Gasoline Marketing															
Gasoline Marketing - aircraft refueling	10 003	2501060201	VOC	94.3	0.28	ADJUSTED BVI	14.7	0.04	1.07 2016, 202x, 2019 05 26, withMEQ2019 gasoline	EPA 2016v3: Use EPA 2023 value (MARAMA growth)	85.5	All stage II removed in 2021. 100% removal accounted for with 99% rate penetration	101.08	0.30	SSWD/annual different than bvi; EPA projected value with DE controls
Gasoline Marketing - aircraft refueling	10 003	2501080050	VOC	1.6	0.01	BVI	1.6	0.01	1.06 EPA 2016v3: Use EPA 2023 value (MARAMA 2016 to 2023 Growth Code = AEO2019_SA_TRANS_AVGAS)	EPA 2016v3: Use EPA 2023 value (MARAMA 2016 to 2023 Growth Code = AEO2019_SA_TRANS_AVGAS)	0 NA		9.36	0.03	SSWD/annual different than bvi; Use EPA GF for this cc
Gasoline Marketing - aircraft refueling	10 003	2501080100	VOC	1.1	0.00	BVI	1.2	0.00	1.05	EPA 2016v3: Use EPA 2023 value (MARAMA 2016 to 2023 Growth Code = AEO2019_SA_TRANS_AVGAS)	0 NA		1.64	0.01	EPA projected value
Gasoline Marketing - PFCs	10 003	2501080201	VOC	0.4	0.00	BVI	0.4	0.00	1.05	EPA 2016v3: Use EPA 2023 value (MARAMA 2016 to 2023 Growth Code = AEO2019_SA_TRANS_AVGAS)	0 NA		1.15	0.00	EPA projected value
Gasoline Marketing - PFCs	10 003	2501011011	VOC	7.4	0.03	ANNUAL BVI, SSWD ADJUSTED	6.7	0.02	1.03	Delaware Population Consortium: See Tab "DPC"	0 NA		0.45	0.00	EPA projected value
Gasoline Marketing - PFCs	10 003	2501011012	VOC	63.7	0.23	ANNUAL BVI, SSWD ADJUSTED	57.6	0.20	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		7.58	0.03	SSWD different than bvi; controls calculated from DE internal documents; EPA growth method is population.
Gasoline Marketing - PFCs	10 003	2501011013	VOC	3.5	0.01	ANNUAL BVI, SSWD ADJUSTED	3.2	0.01	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		65.50	0.22	EPA growth method is population.
Gasoline Marketing - PFCs	10 003	2501011014	VOC	12.4	0.04	ANNUAL BVI, SSWD ADJUSTED	11.2	0.04	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		3.59	0.01	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501011015	VOC	2.2	0.01	ANNUAL BVI, SSWD ADJUSTED	2.0	0.01	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		12.77	0.04	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501012011	VOC	0.6	0.00	ANNUAL BVI, SSWD ADJUSTED	0.6	0.00	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		2.24	0.01	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501012012	VOC	7.7	0.03	ANNUAL BVI, SSWD ADJUSTED	6.9	0.03	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		0.64	0.00	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501012013	VOC	5.5	0.02	ANNUAL BVI, SSWD ADJUSTED	5.0	0.02	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		7.88	0.03	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501012014	VOC	14.2	0.05	ANNUAL BVI, SSWD ADJUSTED	12.9	0.05	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		5.69	0.02	SSWD different than bvi; controls calculated from DE internal documents.
Gasoline Marketing - PFCs	10 003	2501012015	VOC	2.5	0.01	ANNUAL BVI, SSWD ADJUSTED	2.3	0.01	1.03	Delaware Population Consortium: See Tab "DPC"	12 1/1/2018		14.61	0.06	SSWD different than bvi; controls calculated from DE internal documents.
Graphic Arts	10 003	2425000000	VOC	268.8	0.99	BVI	263.9	1.02	1.03	Delaware Population Consortium: See Tab "DPC"	0 NA		2.56	0.01	SSWD different than bvi; controls calculated from DE internal documents.
Industrial Adhesives	10 003	2440020000	VOC	106.9	0.41	BVI	109.8	0.42	1.03	Delaware Population Consortium: See Tab "DPC"	0 NA		263.93	1.02	
Industrial Fuel	10 003	2102002000	VOC	0.0	0.00	BVI	0.0	0.00	0.00 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		109.82	0.42	
Industrial Fuel	10 003	2102004001	VOC	0.2	0.00	BVI	0.2	0.00	1.22 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102004002	VOC	23.7	0.06	BVI	29.0	0.078	1.22 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		0.21	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102005000	VOC	0.0	0.00	BVI	0.0	0.00	0.00 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		28.96	0.08	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102006000	VOC	12.5	0.04	BVI	15.3	0.05	1.22 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102007000	VOC	0.0	0.00	BVI	0.0	0.00	0.00 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		15.30	0.05	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102002000	NOX	0.0	0.00	BVI	0.0	0.00	0.00 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102004001	NOX	16.9	0.05	BVI	20.7	0.06	1.22 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102004002	NOX	340.4	0.91	BVI	416.5	1.12	1.22 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		20.69	0.06	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102005000	NOX	0.0	0.00	BVI	0.0	0.00	0.00 2017 data:	EPA 2016v3 Method: EPA uses MARAMA Growth Factors based on DE	0 NA		416.53	1.12	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.

Industrial Fuel	10 003	2102006000	NOX	227.2	0.70 Bt/l		278.2	0.86	1.22	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	278.19	0.86	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102007000	NOX	0.0	0.00 Bt/l		0.0	0.00	0.00	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102002000	CO	0.0	0.00 Bt/l		0.0	0.00	0.00	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102004001	CO	4.2	0.01 Bt/l		5.2	0.01	1.22	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	5.17	0.01	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102004002	CO	73.3	0.20 Bt/l		89.6	0.24	1.22	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	89.65	0.24	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102005000	CO	0.0	0.00 Bt/l		0.0	0.00	0.00	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102006000	CO	190.8	0.59 Bt/l		233.7	0.72	1.22	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	233.68	0.72	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Fuel	10 003	2102007000	CO	0.0	0.00 Bt/l		0.0	0.00	0.00	EPA 2016a3 Method: EPA uses MARAMA Growth Factors based on DE 2017 data:	0 NA	0.00	0.00	BVI doesn't match NEI/EPA; therefore, use EPA growth factors, not emission values.
Industrial Surface	10 003	2401015000	VOC	3.3	0.01 Bt/l		2.9	0.01	0.90	NAICS 321 Use DE DOL Industry Growth for NCC	0 NA	2.92	0.01	
Industrial Surface	10 003	2401020000	VOC	2.0	0.01 Bt/l		1.9	0.01	0.95	NAICS 337 Use DE DOL Industry Growth for NCC	0 NA	1.93	0.01	
Industrial Surface	10 003	2401025000	VOC	0.6	0.00 Bt/l		0.6	0.00	0.95	NAICS 337 Use DE DOL Industry Growth for NCC	0 NA	0.55	0.00	
Industrial Surface	10 003	2401030000	VOC	12.9	0.05 Bt/l		13.3	0.05	1.03	NAICS 332 Use DE DOL Industry Growth for NCC	0 NA	13.27	0.05	
Industrial Surface	10 003	2401040000	VOC	0.0	0.00 Bt/l		0.0	0.00	1.03	NAICS 332 Use DE DOL Industry Growth for NCC	0 NA	0.00	0.00	
Industrial Surface	10 003	2401045000	VOC	1.2	0.00 Bt/l		1.3	0.00	1.03	NAICS 332 Use DE DOL Industry Growth for NCC	0 NA	1.27	0.00	
Industrial Surface	10 003	2401050000	VOC	0.0	0.00 Bt/l		0.0	0.00	1.07	NAICS 333 Use DE DOL Industry Growth for NCC	0 NA	0.00	0.00	
Industrial Surface	10 003	2401060000	VOC	0.0	0.00 Bt/l		0.0	0.00	1.03	NAICS 335 Use DE DOL Industry Growth for NCC	0 NA	0.00	0.00	
Industrial Surface	10 003	2401065000	VOC	0.0	0.00 Bt/l		0.0	0.00	1.03	NAICS 334 Use DE DOL Industry Growth for NCC	0 NA	0.00	0.00	
Industrial Surface	10 003	2401070000	VOC	4.8	0.02 Bt/l		4.6	0.02	0.96	NAICS 336 Use DE DOL Industry Growth for NCC	0 NA	4.58	0.02	
Industrial Surface	10 003	2401075000	VOC	2.5	0.01 Bt/l		2.4	0.01	0.96	NAICS 336 Use DE DOL Industry Growth for NCC	0 NA	2.37	0.01	
Industrial Surface	10 003	2401080000	VOC	3.9	0.02 Bt/l		3.7	0.01	0.96	NAICS 336 Use DE DOL Industry Growth for NCC	0 NA	3.74	0.01	
Industrial Surface	10 003	2401085000	VOC	0.0	0.00 Bt/l		0.0	0.00	0.96	NAICS 336 Use DE DOL Industry Growth for NCC	0 NA	0.00	0.00	
Industrial Surface	10 003	2401090000	VOC	35.0	0.13 Bt/l		33.9	0.13	0.97	NAICS 339 Use DE DOL Industry Growth for NCC	0 NA	33.90	0.13	
Land Clearing	10 003	2610000500	VOC	0.0	0.00 Bt/l		0.0	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	0.00	0.00	
Land Clearing	10 003	2610000500	NOx	0.0	0.00 Bt/l		0.0	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	0.00	0.00	
Prescribed Burning	10 003	2811015001	NOX	0.3	0.00 Bt/l		0.3	0.00	1.00	EPA 2016a3 Method: Assume No Growth	0 NA	0.32	0.00	
Prescribed Burning	10 003	2811015002	NOX	4.2	0.00 Bt/l		4.2	0.00	1.00	EPA 2016a3 Method: Assume No Growth	0 NA	4.17	0.00	
Prescribed Burning	10 003	2811015002	VOC	47.2	0.00 Bt/l		47.2	0.00	1.00	EPA 2016a3 Method: Assume No Growth	0 NA	47.19	0.00	
Residential Fuel	10 003	2104002000	VOC	0.0	0.00 ANNUAL Bt/l, SSWD ADJUSTED		0.0	0.00	0.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.00	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104004000	VOC	2.5	0.00 ANNUAL Bt/l, SSWD ADJUSTED		3.1	0.00	1.25	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	3.13	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104006000	VOC	19.7	0.01 ANNUAL Bt/l, SSWD ADJUSTED		22.3	0.01	1.13	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	22.33	0.01	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104007000	VOC	0.9	0.00 ANNUAL Bt/l, SSWD ADJUSTED		1.0	0.00	1.07	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.98	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104011000	VOC	0.1	0.00 ANNUAL Bt/l, SSWD ADJUSTED		0.1	0.00	1.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.06	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104002000	NOX	0.0	0.00 ANNUAL Bt/l, SSWD ADJUSTED		0.0	0.00	0.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.00	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104004000	NOX	64.5	0.01 ANNUAL Bt/l, SSWD ADJUSTED		80.6	0.02	1.25	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	80.60	0.02	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104006000	NOX	386.6	0.19 ANNUAL Bt/l, SSWD ADJUSTED		381.6	0.22	1.13	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	381.62	0.22	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104007000	NOX	23.9	0.02 ANNUAL Bt/l, SSWD ADJUSTED		25.5	0.02	1.07	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	25.47	0.02	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104011000	NOX	1.4	0.00 ANNUAL Bt/l, SSWD ADJUSTED		1.4	0.00	1.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	1.43	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104002000	CO	0.0	0.00 ANNUAL Bt/l, SSWD ADJUSTED		0.0	0.00	0.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.00	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104004000	CO	17.9	0.00 ANNUAL Bt/l, SSWD ADJUSTED		22.4	0.00	1.25	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	22.39	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104006000	CO	143.2	0.08 ANNUAL Bt/l, SSWD ADJUSTED		162.4	0.09	1.13	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	162.39	0.09	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Fuel	10 003	2104007000	CO	13.8	0.01 ANNUAL Bt/l, SSWD ADJUSTED		14.7	0.01	1.07	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	14.69	0.01	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Open Burning	10 003	2104011000	CO	0.4	0.00 ANNUAL Bt/l, SSWD ADJUSTED		0.4	0.00	1.00	EPA2016a3: EPA uses MARAMA Projections based on DE 2017 data: AIO	0 NA	0.39	0.00	Adjust SSWD fraction to match internal data SSWD calculation.
Residential Open Burning	10 003	2610000100	CO	0.3	0.00 Bt/l		0.3	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	0.34	0.00	
Residential Open Burning	10 003	2610000400	CO	12.9	0.00 Bt/l		12.9	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	12.93	0.00	
Residential Open Burning	10 003	2610030000	CO	2.2	0.00 Bt/l		2.2	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	2.21	0.00	
Residential Open Burning	10 003	2610000100	NOX	0.0	0.00 Bt/l		0.0	0.00	1.00	EPA 2016a3: Assume No Growth	0 NA	0.02	0.00	

Residential Open Burning	10 003	2610000400 NOX	0.5	0.00 BVI		0.5	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.46	0.00
Residential Open Burning	10 003	2610030000 NOX	0.2	0.00 BVI		0.2	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.16	0.00
Residential Open Burning	10 003	2610000100 VOC	0.1	0.00 BVI		0.1	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.09	0.00
Residential Open Burning	10 003	2610000400 VOC	1.8	0.00 BVI		1.8	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		1.75	0.00
Residential Open Burning	10 003	2610030000 VOC	0.2	0.00 BVI		0.2	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.16	0.00
Solvent Cleaning	10 003	2415000000 VOC	91.0	0.29 BVI		66.0	0.21	1.00 NCC	EPA 2016a3: NAICS 31-22_441_811 (Use DE DOL Industry Growth for	27	8/11/2022	90.99	0.29 DE Control
Structure Fires	10 003	2810030000 VOC	2.5	0.01 BVI		2.5	0.01	1.00 EPA 2016a3: Assume No Growth		0 NA		2.47	0.01
Structure Fires	10 003	2810035000 VOC	0.2	0.00 BVI		0.2	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.23	0.00
Structure Fires	10 003	2810030000 NOX	0.3	0.00 BVI		0.3	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.31	0.00
Structure Fires	10 003	2810035000 NOX	0.0	0.00 BVI		0.0	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.03	0.00
Structure Fires	10 003	2810030000 CO	13.5	0.03 BVI		13.5	0.03	1.00 EPA 2016a3: Assume No Growth		0 NA		13.48	0.03
Structure Fires	10 003	2810035000 CO	1.2	0.00 BVI		1.2	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		1.24	0.00
Traffic, Marlings	10 003	2401008000 VOC	2.3	0.01 BVI		2.3	0.01	1.00 EPA 2016a3: Assume No Growth	0.3-1.2017 - 9.7%	0 NA		2.28	0.01
Vehicle Fires	10 003	2810050000 NOX	0.1	0.00 BVI		0.1	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.10	0.00
Vehicle Fires	10 003	2810050000 CO	3.1	0.01 BVI		3.1	0.01	1.00 EPA 2016a3: Assume No Growth		0 NA		3.08	0.01
Fuel Comb - Residential - Wood	10 003	2810050000 VOC	0.8	0.00 BVI		0.8	0.00	1.00 EPA 2016a3: Assume No Growth		0 NA		0.79	0.00
Fuel Comb - Residential - Wood	10 003	21040080100 CO	409.8	0.88 BVI		435.5	0.98	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		435.55	0.98 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080210 CO	144.1	0.31 BVI		128.1	0.28	0.89 EPA 2016a3: EPA accepted value 2017/2023		0 NA		128.08	0.28 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080220 CO	101.2	0.22 BVI		113.2	0.24	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		113.24	0.24 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080230 CO	52.0	0.11 BVI		60.2	0.13	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		60.24	0.13 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080310 CO	386.0	0.83 BVI		350.3	0.76	0.91 EPA 2016a3: EPA accepted value 2017/2023		0 NA		350.33	0.76 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080320 CO	71.2	0.39 BVI		70.3	0.65	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		70.33	0.65 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080340 CO	139.4	0.30 BVI		161.3	0.33	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		161.34	0.33 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080400 CO	14.4	0.03 BVI		16.9	0.04	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		16.97	0.04 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080510 CO	74.7	0.16 BVI		71.1	0.08	0.96 EPA 2016a3: EPA accepted value 2017/2023		0 NA		71.06	0.08 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080530 CO	14.3	0.01 BVI		16.3	0.02	1.31 EPA 2016a3: EPA accepted value 2017/2023		0 NA		16.32	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080540 CO	14.3	0.01 BVI		16.3	0.02	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		16.32	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080610 CO	46.3	0.20 BVI		93.2	0.31	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		93.16	0.31 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080630 CO	50.2	0.21 BVI		54.2	0.21	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		54.41	0.21 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040080700 CO	42.3	0.19 BVI		46.8	0.10	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		46.78	0.10 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090000 NOX	7.2	0.02 BVI		7.9	0.02	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		7.93	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090310 NOX	1.1	0.00 BVI		1.5	0.00	0.89 EPA 2016a3: EPA accepted value 2017/2023		0 NA		1.51	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090320 NOX	1.4	0.00 BVI		1.5	0.00	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		1.56	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090330 NOX	0.8	0.00 BVI		1.0	0.00	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.97	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090340 NOX	4.7	0.01 BVI		4.3	0.01	0.91 EPA 2016a3: EPA accepted value 2017/2023		0 NA		4.25	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090350 NOX	3.7	0.01 BVI		4.2	0.01	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		4.01	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090360 NOX	2.3	0.00 BVI		2.6	0.01	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		2.60	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090370 NOX	3.4	0.01 BVI		4.5	0.01	1.31 EPA 2016a3: EPA accepted value 2017/2023		0 NA		4.51	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090380 NOX	0.7	0.00 BVI		0.9	0.00	0.36 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.26	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090390 NOX	1.5	0.00 BVI		2.0	0.00	1.31 EPA 2016a3: EPA accepted value 2017/2023		0 NA		2.02	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090400 NOX	0.8	0.00 BVI		0.8	0.00	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.81	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090410 NOX	0.5	0.00 BVI		0.5	0.00	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.52	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090420 NOX	0.0	0.00 BVI		0.0	0.00	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.04	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090430 NOX	8.9	0.02 BVI		9.8	0.02	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		9.85	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090440 NOX	2.6	0.01 BVI		2.9	0.01	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		2.87	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090450 NOX	33.1	0.02 BVI		29.4	0.06	0.89 EPA 2016a3: EPA accepted value 2017/2023		0 NA		57.53	0.12 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090460 NOX	52.0	0.11 BVI		57.5	0.12	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		57.53	0.12 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090470 NOX	7.3	0.02 BVI		8.2	0.02	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		29.41	0.06 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090480 NOX	6.3	0.01 BVI		7.3	0.02	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		8.20	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090490 NOX	88.6	0.19 BVI		81.1	0.18	0.91 EPA 2016a3: EPA accepted value 2017/2023		0 NA		7.29	0.02 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090500 NOX	19.6	0.04 BVI		22.0	0.05	1.12 EPA 2016a3: EPA accepted value 2017/2023		0 NA		81.09	0.18 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090510 NOX	16.9	0.04 BVI		19.5	0.04	1.16 EPA 2016a3: EPA accepted value 2017/2023		0 NA		21.96	0.05 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090520 NOX	2.0	0.00 BVI		2.6	0.01	1.31 EPA 2016a3: EPA accepted value 2017/2023		0 NA		19.54	0.04 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090530 NOX	4.8	0.01 BVI		1.7	0.00	0.36 EPA 2016a3: EPA accepted value 2017/2023		0 NA		2.61	0.01 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090540 NOX	0.9	0.00 BVI		1.2	0.00	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		1.72	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090550 NOX	26.6	0.06 BVI		27.3	0.06	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		1.17	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090560 NOX	17.0	0.00 BVI		17.4	0.04	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		27.30	0.06 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090570 NOX	0.0	0.00 BVI		0.0	0.00	1.03 EPA 2016a3: EPA accepted value 2017/2023		0 NA		17.44	0.04 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090580 NOX	64.7	0.14 BVI		71.6	0.15	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		0.02	0.00 Use EPA values.
Fuel Comb - Residential - Wood	10 003	21040090590 NOX	13.4	0.03 BVI		14.8	0.03	1.11 EPA 2016a3: EPA accepted value 2017/2023		0 NA		71.59	0.15 Use EPA values.
Ag. Pesticides	10 003	2461850000 VOC	30.4	0.11 ADJUSTED BVI		30.4	0.11	1.00 EPA 2016a3 Method: Assume No Growth		0 NA		14.80	0.03 Use EPA values.
Commercial Cooking	10 003	2302003000 VOC	2.8	0.01 BVI		2.9	0.01	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		30.40	0.11 From 2016.
Commercial Cooking	10 003	2302003000 NOX	4.3	0.01 BVI		4.5	0.01	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		2.88	0.01
Commercial Cooking	10 003	2302002000 VOC	0.1	0.00 BVI		0.1	0.00	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		4.45	0.01
Commercial Cooking	10 003	2302002000 NOX	21.0	0.06 BVI		21.6	0.06	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		0.13	0.00
Commercial Cooking	10 003	2302002000 CO	6.3	0.02 BVI		6.5	0.02	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		21.62	0.06
Commercial Cooking	10 003	2302002000 CO	20.9	0.06 BVI		21.5	0.06	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		6.45	0.02
Commercial Cooking	10 003	2302002000 CO	68.8	0.19 BVI		70.7	0.19	1.03 Delaware Population Consortium: See Tab "DPC"		0 NA		21.51	0.06
Commercial Cooking	10 003	2302002000 CO								0 NA		70.72	0.19

Commercial Cooking	10 003	2302030300	CO	5.8	0.02	BVI			6.0	0.02	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	5.98	0.02	
Prescribed Burning	10 003	2811015001	VOC	17.5	0.00	BVI			17.5	0.00	1.00	EPA 2016v3 Method: Assume No Growth		0 NA	17.48	0.00	
Prescribed Burning	10 003	2811015002	CO	198.3	0.00	BVI			198.3	0.00	1.00	EPA 2016v3 Method: Assume No Growth		0 NA	198.27	0.00	
Prescribed Burning	10 003	2811015001	CO	74.9	0.00	BVI			74.9	0.00	1.00	EPA 2016v3 Method: Assume No Growth		0 NA	74.90	0.00	
CAV Evap	10 003	2509020030	VOC	84.8	0.23	BVI			63.0	0.17	0.74	EPA 2016v3: MARANA AEO2019 Growth Factor		0 NA	63.05	0.17	
CAV Evap	10 003	2509020060	VOC	0.0	0.00	BVI			0.0	0.00	0.75	EPA 2016v3: MARANA AEO2019 Growth Factor		0 NA	0.00	0.00	
CAV Evap	10 003	2509020090	VOC	0.3	0.00	BVI			0.4	0.00	1.09	EPA 2016v3: MARANA AEO2019 Growth Factor		0 NA	0.38	0.00	
CAV Evap	10 003	2509020120	VOC	29.2	0.08	BVI			31.0	0.09	1.06	EPA 2016v3: MARANA AEO2019 Growth Factor		0 NA	31.03	0.09	
CAV Evap	10 003	2509020150	VOC	3.1	0.01	BVI			3.8	0.01	1.25	EPA 2016v3: MARANA AEO2019 Growth Factor		0 NA	3.82	0.01	
Wildfires	10 003	2810001001	CO	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Wildfires	10 003	2810001002	CO	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Wildfires	10 003	2810001001	NOX	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Wildfires	10 003	2810001002	NOX	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Wildfires	10 003	2810001001	VOC	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Wildfires	10 003	2810001002	VOC	0.0	0.00	BVI			0.0	0.00	1.00	No wildfire in internal model or EPA 2020 NEI model for eastcoast		0 NA	0.00	0.00	
Human Cremation	10 003	2810046000	CO	0.3	0.00	ADJUSTED BVI			0.3	0.00	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	0.32	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Human Cremation	10 003	2810046000	NOX	0.4	0.00	ADJUSTED BVI			0.4	0.00	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	0.39	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Human Cremation	10 003	2810046000	VOC	0.0	0.00	ADJUSTED BVI			0.0	0.00	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	0.03	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Animal Cremation	10 003	2810060200	CO	0.000083	0.00000023	ADJUSTED BVI			0.0	0.00	1.00	EPA 2016v3: Assume No Growth		0 NA	0.00	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Animal Cremation	10 003	2810060200	NOX	0.000100	0.00000027	ADJUSTED BVI			0.0	0.00	1.00	EPA 2016v3: Assume No Growth		0 NA	0.00	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Animal Cremation	10 003	2810060200	VOC	0.000008	0.00000002	ADJUSTED BVI			0.0	0.00	1.00	EPA 2016v3: Assume No Growth		0 NA	0.00	0.00	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
POTW	10 003	2630020000	VOC	11.6	0.03	ADJUSTED BVI			11.9	0.03	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	11.91	0.03	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Res Grilling	10 003	2810075000	CO	150.0	0.66	ADJUSTED BVI			154.2	0.68	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	154.20	0.68	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Res Grilling	10 003	2810075000	NOX	3.1	0.01	ADJUSTED BVI			3.2	0.01	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	3.19	0.01	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Res Grilling	10 003	2810075000	VOC	8.2	0.04	ADJUSTED BVI			8.5	0.04	1.03	Delaware Population Consortium: See Tab "DPC"		0 NA	8.45	0.04	2017 NEI SCC Not included in BVI: Use 2017 NEI value and grow by DE population
Commercial & Consumer	10 003	2460030999	VOC	12.3	0.05	ADJUSTED BVI			12.6	0.06	1.03	Delaware Population Consortium: See Tab "DPC"		0 17/2017 - 13.4%	12.61	0.06	New SCCs: Backcalculated from EPA 2016v3 data

DE Department of Labor Industry Growth Rates (2018-2028) for New Castle County						Calculated			Base Year	End Year	Total Years
NAICS	Industry	2018 Empl.	2028 Empl.	10-Year Job Change	Annual Growth Rate	Growth Factor for 6 years at	Min	Max	2017	2023	6
	Total Employment, All Jobs	315,660	330,470	14,810	0.46%	1.028	0.75	1.25			
	Total Self-Employed and Unpaid Family Workers, Primary Job	13,120	13,880	760	0.6%	1.034	0.75	1.25			
						1.000	0.75	1.25			
11	Ag, For. Fishing	770	750	-20	-0.3%	0.984	0.75	1.25			
111	Crop production	420	410	-10	-0.2%	0.986	0.75	1.25			
112	Animal Production	340	330	-10	-0.3%	0.982	0.75	1.25			
115	Support Activities for Agriculture and Forestry	10	10	0	0.0%	1.000	0.75	1.25			
						1.000	0.75	1.25			
21	Mining	*	*	*	*		0.75	1.25			
						1.000	0.75	1.25			
22	Utilities	*	*	*	*		0.75	1.25			
						1.000	0.75	1.25			
23	Construction	14,010	14,360	350	0.2%	1.015	0.75	1.25			
236	Construction of buildings	3,070	3,340	270	0.8%	1.052	0.75	1.25			
237	Heavy and civil engineering construction	1,760	1,390	-370	-2.3%	0.868	0.75	1.25			
238	Specialty trade contractors	9,180	9,630	450	0.5%	1.029	0.75	1.25			
						1.000	0.75	1.25			
31	Manufacturing	11,530	11,650	120	0.1%	1.006	0.75	1.25			
311	Food manufacturing	250	300	50	1.8%	1.116	0.75	1.25			
312	Beverage and tobacco product manufacturing	*	*	*	*		0.75	1.25			
314	Textile product mills	80	60	-20	-2.8%	0.841	0.75	1.25			
315	Apparel manufacturing	*	*	*	*		0.75	1.25			
321	Wood product manufacturing	120	100	-20	-1.8%	0.896	0.75	1.25			
322	Paper manufacturing	40	40	0	0.0%	1.000	0.75	1.25			
323	Printing and related support activities	310	210	-100	-3.8%	0.792	0.75	1.25			
324	Petroleum and coal products manufacturing	*	*	*	*		0.75	1.25			
325	Chemical manufacturing	2,010	2,030	20	0.1%	1.006	0.75	1.25			
326	Plastics and rubber products manufacturing	1,180	1,060	-120	-1.1%	0.938	0.75	1.25			
327	Nonmetallic mineral product manufacturing	400	430	30	0.7%	1.044	0.75	1.25			
331	Primary metal manufacturing	50	50	0	0.0%	1.000	0.75	1.25			
332	Fabricated metal product manufacturing	860	900	40	0.5%	1.028	0.75	1.25			
333	Machinery manufacturing	270	300	30	1.1%	1.065	0.75	1.25			
334	Computer and electronic product manufacturing	2,790	2,910	120	0.4%	1.026	0.75	1.25			
335	Electrical equipment and appliance manufacturing	720	780	60	0.8%	1.049	0.75	1.25			
336	Transportation equipment manufacturing	410	380	-30	-0.8%	0.955	0.75	1.25			
337	Furniture and related product manufacturing	390	360	-30	-0.8%	0.953	0.75	1.25			
339	Miscellaneous manufacturing	190	180	-10	-0.5%	0.968	0.75	1.25			
						1.000	0.75	1.25			
42	Wholesale Trade	6,940	6,910	-30	0.0%	0.997	0.75	1.25			
423	Merchant wholesalers, durable goods	3,770	4,220	450	1.1%	1.070	0.75	1.25			
424	Merchant wholesalers, nondurable goods	2,380	2,030	-350	-1.6%	0.909	0.75	1.25			
425	Electronic markets and agents and brokers	790	660	-130	-1.8%	0.898	0.75	1.25			
						1.000	0.75	1.25			
44	Retail Trade	30,170	30,090	-80	0.0%	0.998	0.75	1.25			
441	Motor vehicle and parts dealers	4,020	4,070	50	0.1%	1.007	0.75	1.25			
442	Furniture and home furnishings stores	1,190	1,210	20	0.2%	1.010	0.75	1.25			
443	Electronics and appliance stores	1,190	1,430	240	1.9%	1.117	0.75	1.25			
444	Building material and garden supply stores	2,750	2,580	-170	-0.6%	0.962	0.75	1.25			
445	Food and beverage stores	5,440	5,770	330	0.6%	1.036	0.75	1.25			
446	Health and personal care stores	2,440	2,550	110	0.4%	1.027	0.75	1.25			
447	Gasoline stations	1,630	1,730	100	0.6%	1.036	0.75	1.25			
448	Clothing and clothing accessories stores	2,930	2,810	-120	-0.4%	0.975	0.75	1.25			
451	Sporting goods, hobby, book, and music stores	1,330	1,170	-160	-1.3%	0.926	0.75	1.25			
452	General merchandise stores	4,880	4,570	-310	-0.7%	0.961	0.75	1.25			
453	Miscellaneous store retailers	1,670	1,550	-120	-0.7%	0.956	0.75	1.25			
454	Nonstore retailers	700	650	-50	-0.7%	0.957	0.75	1.25			
						1.000	0.75	1.25			
48	Transportation and Warehousing	11,420	11,940	520	0.4%	1.027	0.75	1.25			
481	Air transportation	170	190	20	1.1%	1.069	0.75	1.25			
482	Rail transportation	1,110	970	-140	-1.3%	0.922	0.75	1.25			
484	Truck transportation	1,540	1,740	200	1.2%	1.076	0.75	1.25			
485	Transit and ground passenger transport	910	650	-260	-3.3%	0.817	0.75	1.25			
488	Support activities for transportation	1,700	2,010	310	1.7%	1.106	0.75	1.25			
491	Postal service	1,370	1,340	-30	-0.2%	0.987	0.75	1.25			
492	Couriers and messengers	1,060	1,140	80	0.7%	1.045	0.75	1.25			
493	Warehousing and storage	*	*	*	*		0.75	1.25			
						1.000	0.75	1.25			
51	Information	3,190	2,890	-300	-1.0%	0.942	0.75	1.25			
511	Publishing industries	550	520	-30	-0.6%	0.967	0.75	1.25			
512	Motion picture and sound recording industries	340	310	-30	-0.9%	0.946	0.75	1.25			
515	Broadcasting (except Internet)	140	120	-20	-1.5%	0.912	0.75	1.25			
517	Telecommunications	1,610	1,790	180	1.1%	1.066	0.75	1.25			
518	Data processing, hosting and related services	420	50	-370	-19.2%	0.750	0.75	1.25			
519	Other information services	130	100	-30	-2.6%	0.854	0.75	1.25			
						1.000	0.75	1.25			
52	Finance and Insurance	38,340	39,760	1,420	0.4%	1.022	0.75	1.25			
522	Credit intermediation and related activities	25,210	26,470	1,260	0.5%	1.030	0.75	1.25			
523	Securities, commodity contracts, investments	8,410	8,790	380	0.4%	1.027	0.75	1.25			
524	Insurance carriers and related activities	4,710	4,480	-230	-0.5%	0.970	0.75	1.25			
525	Funds, trusts, and other financial vehicles	10	20	10	7.2%	1.250	0.75	1.25			
						1.000	0.75	1.25			
53	Real Estate and Rental and Leasing	3,530	3,730	200	0.6%	1.034	0.75	1.25			
531	Real estate	2,720	2,850	130	0.5%	1.028	0.75	1.25			
532	Rental and leasing services	810	880	70	0.8%	1.051	0.75	1.25			
						1.000	0.75	1.25			
54	Professional and Technical Services	21,280	21,660	380	0.2%	1.011	0.75	1.25			
						1.000	0.75	1.25			
55	Management of Companies and Enterprises	6,970	7,230	260	0.4%	1.022	0.75	1.25			
						1.000	0.75	1.25			
56	Administrative and Waste Services	19,380	19,270	-110	-0.1%	0.997	0.75	1.25			
561	Administrative and support services	18,190	18,120	-70	0.0%	0.998	0.75	1.25			
562	Waste management and remediation service	1,190	1,150	-40	-0.3%	0.980	0.75	1.25			
						1.000	0.75	1.25			
61	Educational Services	28,000	28,270	270	0.1%	1.006	0.75	1.25			
						1.000	0.75	1.25			
62	Health Care and Social Assistance	48,930	56,590	7,660	1.5%	1.091	0.75	1.25			
621	Ambulatory health care services	13,770	15,550	1,780	1.2%	1.076	0.75	1.25			
622	Hospitals	17,960	21,650	3,690	1.9%	1.119	0.75	1.25			
623	Nursing and residential care facilities	8,760	9,960	1,200	1.3%	1.080	0.75	1.25			
624	Social assistance	8,440	9,430	990	1.1%	1.069	0.75	1.25			
						1.000	0.75	1.25			
71	Arts, Entertainment, and Recreation	6,140	7,050	910	1.4%	1.086	0.75	1.25			
711	Performing arts and spectator sports	510	520	10	0.2%	1.012	0.75	1.25			
712	Museums, historical sites, zoos, and parks	850	840	-10	-0.1%	0.993	0.75	1.25			
713	Amusement, gambling, and recreation industries	4,780	5,690	910	1.8%	1.110	0.75	1.25			
						1.000	0.75	1.25			
72	Accommodation and Food Services	23,370	24,990	1,620	0.7%	1.041	0.75	1.25			
721	Accommodation	1,820	1,960	140	0.7%	1.045	0.75	1.25			
722	Food services and drinking places	21,550	23,030	1,480	0.7%	1.041	0.75	1.25			
						1.000	0.75	1.25			
81	Other Services, Except Public Administration	12,870	13,400	530	0.4%	1.025	0.75	1.25			
811	Repair and maintenance	1,930	1,890	-40	-0.2%	0.988	0.75	1.25			
812	Personal and laundry services	3,400	3,860	460	1.3%	1.079	0.75	1.25			
813	Religious, grantmaking, civic, professional, and similar	7,250	7,320	70	0.1%	1.006	0.75	1.25			

814	Private households	290	330	40	1.3%	1.081	0.75	1.25
						1.000	0.75	1.25
	Government	14,210	14,600	390	0.3%	1.016	0.75	1.25
	Federal Government, Excluding Postal Service	7,500	7,670	170	0.2%	1.014	0.75	1.25
	State Government, Excluding Education and Hospital	4,780	5,110	330	0.7%	1.041	0.75	1.25
	Local government, Excluding Education and Hospital	1,930	1,820	-110	-0.6%	0.965	0.75	1.25
	31-33, 441, 811 Average Growth					1.000	0.75	1.25

An asterisk (*) represents data that cannot be released due to employer confidentiality restrictions.

Retrieved 4-20-23

<https://labor.delaware.gov/divisions/oelmi/projections/Projections-QCEW-LT/>

Delaware Population Consortium

DPC-2022vo-single-year-5year-age-cohorts retrieved 5-12-2023

<https://stateplanning.delaware.gov/demography/dpc.shtml>

New Castle:

2017	2023	Growth Rate
562,453.00	578,060.00	1.028

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Population	538753	544177	546727	549557	552518	555811	559282	562453	565467	568198	570888	572867	575897	578060	580140	582088	584076
Households	198207	200910	202649	204592	206615	208888	211227	213506	215731	217899	222314	223058	224073	224558	224996	225307	225676
Population Ch	5424	2550	2830	2961	3293	3471	3171	3014	2731	2690	1979	3030	2163	2080	1948	1988	1886
Births	6780	6880	6482	6451	6461	6599	6448	6413	6228	6254	6262	6249	6217	6164	6105	6042	5984
Deaths	4221	4394	4260	4341	4339	4555	4676	4894	4987	5061	5139	5220	5306	5394	5488	5587	5688
Net Migration	2865	64	608	851	1171	1427	1399	1495	1490	1497	856	2001	1252	1310	1331	1533	1590
Household Ch	2703	1739	1943	2023	2273	2339	2279	2225	2168	4415	744	1015	485	438	311	369	225
Total Labor Force	272217	277662	277961	275762	284612	293437	299262	296709	300921	305794	300358	300511	300727	300488	300135	299774	299435
Civilian	271852	277392	277606	275411	284173	293008	298832	296352	300468	305257	299826	299984	300205	299970	299622	299266	298932
Employed	247824	255154	256649	255423	264797	275293	278904	279236	285161	290850	287833	287985	288197	287971	287637	287295	286975
Private	208875	215053	216313	215280	223180	232027	235071	235350	240344	245139	242596	242724	242903	242712	242431	242143	241873
Government	28867	29720	29895	29752	30844	32066	32487	32526	33216	33878	33527	33545	33569	33543	33504	33464	33427
Self-Employed	9718	10006	10064	10016	10384	10796	10937	10950	11182	11406	11287	11293	11302	11293	11280	11266	11254
Unpaid Family	364	375	377	375	389	404	409	410	419	427	423	423	423	423	422	422	421
Unemployed	24028	22238	20957	19988	19376	17715	19928	17116	15307	14407	11993	11999	12008	11999	11985	11971	11957
Military	365	270	355	351	439	429	430	357	453	537	532	527	522	518	513	508	503
Jobs by Place of Work	263947	266255	266860	270496	278328	285877	287479	288069	291306	300050	296939	297095	297314	297081	296736	296383	296054
Jobs by Residence	247823	255153	256649	255423	264796	275293	278904	279235	285160	290849	287833	287984	288197	287970	287636	287295	286975
Net Community Change	16124	11102	10211	15073	13532	10584	8575	8834	6146	9201	9106	9111	9117	9111	9100	9088	9079

	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
585962	587675	589254	590820	591649	592325	593012	593583	593973	594251	594450	594505	594440	594231	593669	593425	592853	592044	
225901	226166	226293	226330	226047	225695	225582	225447	225190	224541	224042	223420	222988	222503	221668	221314	220620	219781	
1713	1579	1566	829	676	687	571	390	278	199	55	-65	-209	-562	-244	-572	-809	-871	
5936	5898	5869	5851	5839	5834	5835	5842	5846	5847	5847	5846	5835	5821	5800	5775	5747	5713	
5796	5909	6024	6142	6259	6378	6494	6613	6726	6838	6940	7032	7116	7194	7267	7332	7381	7425	
1573	1590	1721	1120	1096	1231	1230	1161	1158	1190	1148	1121	1072	811	1223	985	825	841	
265	127	37	-283	-352	-113	-135	-257	-649	-499	-622	-432	-485	-835	-354	-694	-839	-772	
299271	298890	298630	298287	297629	297125	296508	296006	295372	294756	294090	293484	292953	292386	291891	291414	290822	290156	
298772	298396	298140	297802	297148	296649	296036	295539	294909	294297	293635	293033	292507	291944	291453	290980	290392	289730	
286821	286460	286214	285890	285262	284783	284195	283717	283113	282525	281890	281312	280807	280266	279795	279341	278776	278141	
241743	241439	241232	240958	240429	240025	239530	239127	238618	238122	237587	237100	236674	236218	235821	235439	234963	234428	
33409	33367	33338	33301	33228	33172	33103	33048	32977	32909	32835	32767	32709	32646	32591	32538	32472	32398	
11248	11233	11224	11211	11186	11168	11145	11126	11102	11079	11054	11032	11012	10991	10972	10954	10932	10907	
421	421	420	420	419	418	417	416	416	415	414	413	412	411	411	410	409	408	
11951	11936	11926	11912	11886	11866	11841	11822	11796	11772	11745	11721	11700	11678	11658	11639	11616	11589	
499	494	490	485	481	476	472	467	463	459	455	451	446	442	438	434	430	426	
295894	295522	295269	294933	294286	293791	293185	292692	292069	291462	290807	290211	289689	289131	288646	288178	287595	286941	
286820	286459	286214	285888	285261	284782	284194	283716	283113	282524	281889	281312	280806	280265	279795	279341	278776	278141	
9074	9063	9055	9045	9025	9009	8991	8976	8956	8938	8918	8899	8883	8866	8851	8837	8819	8800	

2045	2046	2047	2048	2049	2050
591173	590283	589311	588287	587225	586107
219009	218062	217277	216341	215366	214331
-890	-972	-1024	-1062	-1118	
5675	5642	5610	5579	5547	
7464	7499	7525	7543	7547	
899	885	891	902	882	
-947	-785	-936	-975	-1035	
289513	288855	288104	287239	286307	285331
289091	288437	287689	286828	285900	284928
277527	276900	276181	275355	274464	273531
233910	233381	232776	232079	231328	230542
32327	32254	32170	32074	31970	31861
10883	10859	10830	10798	10763	10726
407	406	405	404	403	402
11564	11537	11508	11473	11436	11397
422	418	415	411	407	403
286306	285659	284918	284066	283147	282184
277526	276899	276181	275355	274464	273530
8780	8760	8737	8711	8683	8654

Cumulative/Phased-In Controls:

Category	Region	County	SCC		Control Efficiency	Calc Pre-control E	Calc - Emissions w	Calculation - Cum	Cumulative/Pha	Effective Date	Notes
Gasoline Marketing - PFCs		10 003	2501011011	VOC	57	7.4	6.5	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501011012	VOC	57	64.2	56.3	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501011013	VOC	57	3.5	3.1	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501011014	VOC	57	12.9	11.3	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501011015	VOC	57	2.3	2.0	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501012011	VOC	57	0.6	0.6	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501012012	VOC	57	8.0	7.0	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501012013	VOC	57	5.8	5.0	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501012014	VOC	57	14.7	12.9	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing - PFCs		10 003	2501012015	VOC	57	2.6	2.3	12%	12	1/1/2018	Controls calculated from DE 2020 internal documents.
Gasoline Marketing		10 003	2501060053	VOC	97	125.6	119.5	4.9%	4.9	2020 enhanced	Controls calculated from DE 2020 internal documents. Conservatively use 2020 controls. Rate Penetration is 90%.
Gasoline Marketing		10 003	2501060201	VOC	90	86.80	12.6	85.5%	85.5	All stage II rem	Controls calculated from DE 2020 internal documents. Assume all stage II removed in 2023. Rate Penetration is 99%.
Solvent Cleaning		10 003	2415000000	VOC	80	149.1	108.2	27.4%	27	8/11/2022	Controls calculated from DE 2017 internal documents. New rule increases control efficiency from 63 to 80%. Rate effectiveness is 80%.

NOTES:

PFC Controls use 12% to match incremental increase from 2017 to 2018 (The effect of going from 51% to 57%).
 Stage 1: Balanced Submer Used 2020 controls (additional percentage) to account for increased # of enhanced vapor recovery
 Underground Tank: Breathing and Empt Used 2020 controls (additional percentage) to account for reduced stage II (less incompatibility emissions)
 Solvent Cleaning: 2022 OTC controls 27%

Category	Total Control Efficiency	Cumulative/Phased In Control	Effective Date	Notes
Gasoline Marketing - PFCs SCC:2501011011-2501012015	57	12	1/1/2018	PFC Controls use 12% to match incremental increase from 2017 to 2018 (The additional reductions needed to go from 51% to 57%).
Gasoline Marketing - Stage 1 (Retail) SCC: 2501060053	97	5	2020	Gas stations have until 2025 to add enhanced vapor control. Conservatively use 2020 control values to account for some decommission.
Gasoline Marketing - Underground Tank: Breathing and Emptying (Retail) SCC: 2501060201	90	86	Decommission of Stage II vapor recovery system by 12/31/21.	Underground Tank: Breathing and Emptying. With the removal of stage II, the control of underground tanks has increased.
Solvent Cleaning SCC:2415000000	80	27	8/11/2022	2022 OTC model rules implementation increased control from 60% to 80%.

Lighter fluid calculaton for 2017 emissions from EPA's 2016v3 modeling data:

Data from EPA's 2016v2 modeling platform.

country_cd	region_cd	scc	poll	EPA 2023 tpy	EPA 2016	Calculated 2017 (tpy)	2016-2023 GF	2016-2017 annual gf	calc_year	date_updated	data_set_id
US	10003	2460030999	VOC	12.70	12.19	12.27	1.04	1.01	2016.00	20220621.00	VCPy_2016

Calculated Emissions for 2017 (tpy)

12.27

Appendix C

SSWD

Output_Database	BYI_2017_10003_20191003_m3_out		
OutputTable	MOVESOutput		
TimeAggregation_Input	24-hr		
dayID	5		

Sum of emissionQuant		Column Labels		
Row Labels		Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
6		87.4	16.9	5.5
7		80.9	15.2	5.3
8		81.4	16.0	5.3
SSWD Average		83.2	16.1	5.4

Based of the Sum(Daily Emission) ... Can be added to give the correct Annual totals ...
If all the Hours, DayTypes & Months are included

TimeAggregation_Input 24-hr				
Sum of Daily Emission monthID	dayID	Pollutant Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
1	2	490.4	65.8	32.8
	5	1723.1	326.3	111.2
2	2	484.1	73.7	29.6
	5	1575.0	327.0	96.9
3	2	502.1	72.1	31.6
	5	1732.0	357.6	106.8
4	2	495.5	82.3	31.3
	5	1437.3	351.3	96.6
5	2	506.9	80.0	35.0
	5	1597.5	350.5	111.5
6	2	565.8	78.3	36.0
	5	1872.3	362.8	117.5
7	2	691.0	90.5	40.5
	5	1792.4	337.2	117.1
8	2	577.9	75.7	37.0
	5	1801.7	354.6	118.0
9	2	470.7	72.7	33.1
	5	1578.3	335.2	108.4
10	2	434.0	71.5	30.0
	5	1524.9	356.6	101.6
11	2	540.3	87.8	32.0
	5	1646.5	357.3	100.8
12	2	526.4	78.0	31.9
	5	1735.8	360.5	105.8
Grand Total		26301.9	5105.4	1693.0

Based of the Sum(Daily Emission) ... Can be added
to give the correct Annual totals ... If all the Hours,
DayTypes & Months are included

TimeAggregation_Input 24-hr

Sum of Daily Emission Row Labels	Column Labels		
	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
2201110101	0	0	0
2201110102	4.628330271	0.11934628	0.593030425
2201110111			5.047853821
2201110112			18.39846426
2201110113			6.608021314
2201110115	0	0	0
2201110116	0	0	0
2201110118			0.009153484
2201110119			0.001274323
2201110201	0	0	0
2201110215	0	0	0
2201110218			0
2201110219			0
2201110301	88.28189529	4.764450751	4.430030237
2201110311			0.005716764
2201110312			1.877830723
2201110313			0.073920205
2201110315	0	0	0
2201110318			0.358876459
2201110319			0.048071588
2201110401	324.6692319	18.0586841	14.8083131
2201110411			0.016762813
2201110412			5.4747553
2201110413			0.215621167
2201110415	0	0	0
2201110418			1.312411244
2201110419			0.176494601
2201110501	167.2264213	7.774494914	11.09659309
2201110511			0.019822658
2201110512			6.5013601
2201110513			0.255962401
2201110515	0	0	0
2201110518			0.670028189
2201110519			0.089862299
2201210101	38.46540189	5.841553451	4.765194614
2201210102	2413.09951	114.1409569	209.9187373
2201210111			58.77316481
2201210112			99.87295686
2201210113			89.51143486
2201210115	0.020002003	0.000233662	0.062900486
2201210116	1.254813259	0.004565639	2.770925241
2201210118			0.76166167
2201210119			0.83811612
2201210201	0	0	0
2201210215	0	0	0
2201210218			0
2201210219			0
2201210301	1134.387943	82.60605571	15.14163201
2201210311			0.28036137
2201210312			3.293773244
2201210313			4.38274592
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2202430102	1.094232186	0.501221364	0.226487502
2202430115	0.045225081	0.017242678	0.024919651
2202430116	0.12021802	2.81949E-06	0.002887906
2202430118			0
2202430119			0.008078559
2202430201	0	0	0
2202430215	0	0	0
2202430218			0
2202430219			0
2202430301	1.699118871	4.104420683	0.330563059
2202430315	0.073637409	0.019287372	0.029004225
2202430318			0
2202430319			0.024973392
2202430401	5.466345686	14.02174733	1.021479414
2202430415	0.235928145	0.061962721	0.089776761
2202430418			0
2202430419			0.087661388
2202430501	3.87585044	8.9301735	0.797972254
2202430515	0.166135167	0.046459885	0.070789661
2202430518			0
2202430519			0.05080668
2202510101	1.078950484	2.86856958	0.279355978
2202510102	0.075202421	0.025050394	0.008276468
2202510115	0.037800593	0.01720183	0.022479346
2202510116	0.010348426	3.51443E-08	0.000144977
2202510118			0
2202510119			0.006342908
2202510201	0	0	0
2202510215	0	0	0
2202510218			0
2202510219			0
2202510301	0.986915203	2.90677203	0.12919551
2202510315	0.028541063	0.010518163	0.010639795
2202510318			0
2202510319			0.011468885
2202510401	3.25699977	10.3252506	0.402020332
2202510415	0.090915808	0.034592608	0.032988898
2202510418			0
2202510419			0.041569439
2202510501	2.207966027	5.953894871	0.3088921
2202510515	0.065181042	0.025331491	0.026147567
2202510518			0
2202510519			0.022170674
2202520101	33.65518974	49.2385002	7.106960671
2202520102	5.800144297	5.2847825	3.362118301
2202520115	0.900740428	0.227705188	0.483682047
2202520116	0.386320634	0.001181882	0.046498757
2202520118			0
2202520119			0.114990195
2202520201	0	0	0
2202520215	0	0	0
2202520218			0
2202520219			0
2202520301	28.75447917	64.06678746	4.838938377
2202520315	0.756624391	0.182970019	0.319171105
2202520318			0
2202520319			0.263680939
2202520401	88.97917271	203.4717057	14.79655873
2202520415	2.353617673	0.530447487	0.96062202
2202520418			0
2202520419			0.886503153
2202520501	83.7937164	170.588123	14.66084538
2202520515	2.173524454	0.592750669	0.994509076
2202520518			0
2202520519			0.598064586
2202530101	3.288125906	4.864101231	0.640481016
2202530102	0.05916832	0.057697059	0.024760919
2202530115	0.090194354	0.024717354	0.047370967
2202530116	0.005458256	8.23648E-06	0.000300143
2202530118			0
2202530119			0.012892078
2202530201	0	0	0
2202530215	0	0	0
2202530218			0

2202530219			0
2202530301	2.636466257	5.653076466	0.414477121
2202530315	0.072360508	0.016810571	0.029119855
2202530318			0
2202530319			0.029191642
2202530401	9.120149054	19.49493366	1.435626526
2202530415	0.250952196	0.056981349	0.100459475
2202530418			0
2202530419			0.101906808
2202530501	6.797102583	13.93859877	1.099641674
2202530515	0.184131221	0.048974358	0.079437795
2202530518			0
2202530519			0.062923409
2202540101	0	0	0
2202540102	0.166906749	0.035426924	0.011681977
2202540115	0	0	0
2202540116	0.010851006	9.4793E-07	0.000234116
2202540118			0
2202540119			7.93602E-05
2202540201	0	0	0
2202540215	0	0	0
2202540218			0
2202540219			0
2202540301	1.008853709	2.565911586	0.220415478
2202540315	0.036293309	0.008107986	0.01489595
2202540318			0
2202540319			0.010598732
2202540401	3.158616693	8.621690429	0.66755539
2202540415	0.114490931	0.024736143	0.044780944
2202540418			0
2202540419			0.036272905
2202540501	2.387308033	5.6672282	0.545506211
2202540515	0.083678758	0.02094714	0.037493219
2202540518			0
2202540519			0.022360722
2202610101	19.71153247	53.06458497	3.880921483
2202610102	1.484086306	0.516547043	0.309576878
2202610115	0.677498104	0.486644726	0.525031345
2202610116	0.232740864	0	0.003581785
2202610118			0
2202610119			0.129087127
2202610201	0	0	0
2202610215	0	0	0
2202610218			0
2202610219			0
2202610301	34.48582913	95.99981514	3.395989463
2202610315	0.950295803	0.6015583	0.464479366
2202610318			0
2202610319			0.471991794
2202610401	119.2812586	332.0885184	11.74123187
2202610415	3.305110126	2.051968294	1.59938803
2202610418			0
2202610419			1.647675059
2202610501	83.43801311	221.3088817	8.944690857
2202610515	2.298115506	1.558458136	1.221575791
2202610518			0
2202610519			0.972262789
2202620101	9.248498637	26.42615441	2.041745231
2202620102	0.713259326	0.280680869	0.047360054
2202620115	0.290644147	0.199410669	0.225633996
2202620116	0.133379121	0	0.000694582
2202620117	0.681501973	0.249375866	0.49105447
2202620118			0
2202620119			0.125633629
2202620190	25.01968653	48.95380611	5.916014454
2202620191	0.292441812	0.497373253	0.044640778
2202620201	0	0	0
2202620215	0	0	0
2202620218			0
2202620219			0
2202620301	64.00516429	195.5194037	6.663619651
2202620315	1.569168474	0.949562283	0.737439708
2202620318			0
2202620319			0.788525744
2202620401	221.5319909	678.2568903	23.1181523
2202620415	5.456763294	3.238213873	2.54165069

2202620418			0
2202620419			2.751064853
2202620501	153.3944081	437.9102369	16.97336083
2202620515	3.787286534	2.455539077	1.925627416
2202620518			0
2202620519			1.632750684
2203410101	0.258662175	0.081968716	0.028053414
2203410102	0.084993314	0	0.000333486
2203410115	0.000134504	3.27875E-06	0.000370305
2203410116	4.41965E-05	0	4.40201E-06
2203410201	0	0	0
2203410215	0	0	0
2203410301	0.788800593	0.167187507	0.01997829
2203410315	0.000410177	6.6875E-06	0.000263714
2203410401	2.691273399	0.588569224	0.059152746
2203410415	0.001399462	2.35428E-05	0.000780816
2203410501	1.623439637	0.329633265	0.053355161
2203410515	0.000844189	1.31853E-05	0.000704289
2203420101	0.669503451	0.212159679	0.072599223
2203420102	0.284931259	0	0.001117798
2203420115	0.000348142	8.48639E-06	0.00095831
2203420116	0.000148164	0	1.47549E-05
2203420201	0	0	0
2203420215	0	0	0
2203420301	2.329083441	0.494610083	0.057114741
2203420315	0.001211124	1.97844E-05	0.000753916
2203420401	7.881193743	1.698752854	0.1716364
2203420415	0.004098222	6.79501E-05	0.002265599
2203420501	4.875241563	1.018668326	0.149875119
2203420515	0.002535125	4.07467E-05	0.001978352
2203430101	0.060597053	0.013751348	0.005693919
2203430102	0.025646284	0	0.000128819
2203430115	3.15105E-05	5.50054E-07	7.51598E-05
2203430116	1.33361E-05	0	1.70042E-06
2203430201	0	0	0
2203430215	0	0	0
2203430301	0.245044139	0.017194865	0.005038559
2203430315	0.000127423	6.87795E-07	6.6509E-05
2203430401	0.824334504	0.055853159	0.014523615
2203430415	0.000428654	2.23413E-06	0.000191712
2203430501	0.515068669	0.038584148	0.013676614
2203430515	0.000267836	1.54337E-06	0.000180531
2203510101	0.484994001	0.096657922	0.03886943
2203510102	0.012191039	0	4.11453E-05
2203510115	0.000252197	3.86632E-06	0.000513077
2203510116	6.33934E-06	0	5.43118E-07
2203510201	0	0	0
2203510215	0	0	0
2203510301	0.794583886	0.018945002	0.012944855
2203510315	0.000413183	7.578E-07	0.000170872
2203510401	2.690265157	0.055983504	0.036849171
2203510415	0.001398939	2.23934E-06	0.000486408
2203510501	1.649116473	0.04906761	0.035086566
2203510515	0.00085754	1.9627E-06	0.000463142
2203520101	1.229338873	0.258698448	0.103724959
2203520102	0.230200232	0	0.001499156
2203520115	0.000639256	1.03479E-05	0.00136917
2203520116	0.000119704	0	1.97888E-05
2203520201	0	0	0
2203520215	0	0	0
2203520301	3.071758029	0.146671814	0.061576017
2203520315	0.001597316	5.86687E-06	0.000812804
2203520401	10.05771624	0.44354381	0.171584927
2203520415	0.005230011	1.77417E-05	0.00226492
2203520501	7.851755417	0.454444191	0.217473252
2203520515	0.004082913	1.81778E-05	0.002870646
2203530101	0.136926997	0.028620804	0.011492205
2203530102	0.002501947	0	1.17908E-05
2203530115	7.12021E-05	1.14483E-06	0.000151697
2203530116	1.30101E-06	0	1.55639E-07
2203530201	0	0	0
2203530215	0	0	0
2203530301	0.334254308	0.014171055	0.006082994
2203530315	0.000173812	5.66842E-07	8.02955E-05
2203530401	1.16816113	0.048839882	0.020614911
2203530415	0.000607444	1.9536E-06	0.000272117

2203530501	0.774635304	0.038709221	0.018460767
2203530515	0.000402811	1.54837E-06	0.000243682
2203540101	0	0	0
2203540102	1.8748E-06	0	1.12588E-08
2203540115	0	0	0
2203540116	9.74893E-10	0	1.48616E-10
2203540201	0	0	0
2203540215	0	0	0
2203540301	5.06941E-05	4.23163E-05	7.10822E-06
2203540315	2.63609E-08	1.69265E-09	9.38286E-08
2203540401	0.000166383	0.000141913	2.09768E-05
2203540415	8.65192E-08	5.67653E-09	2.76894E-07
2203540501	0.000115728	9.04487E-05	1.90138E-05
2203540515	6.01785E-08	3.61795E-09	2.50982E-07
2203610101	1.889297416	0.381057713	0.15619958
2203610102	0.059404036	0	0.000308466
2203610115	0.000982435	1.52423E-05	0.002061834
2203610116	3.08901E-05	0	4.07176E-06
2203610201	0	0	0
2203610215	0	0	0
2203610301	6.139246106	0.155254355	0.092277975
2203610315	0.003192405	6.21017E-06	0.001218068
2203610401	21.5251586	0.532527669	0.313461169
2203610415	0.011193082	2.13011E-05	0.004137681
2203610501	13.50885474	0.450085824	0.278429704
2203610515	0.007024608	1.80034E-05	0.00367527
2205210101	0.012724488	0.00081857	0.000687456
2205210102	1.42771321	0.063203349	0.118399929
2205210111			0.026042733
2205210112			0.041394836
2205210113			0.031151045
2205210115	6.61673E-06	3.27428E-08	9.07442E-06
2205210116	0.000742411	2.52813E-06	0.00156288
2205210118			0.00032298
2205210119			0.001075635
2205210201	0	0	0
2205210215	0	0	0
2205210218			0
2205210219			0
2205210301	0.622695149	0.014675413	0.003179099
2205210311			0.00016523
2205210312			0.000990488
2205210313			0.002023491
2205210315	0.000323801	5.87017E-07	4.19641E-05
2205210318			0.000544829
2205210319			0.001719533
2205210401	2.032474184	0.051480108	0.009982266
2205210411			0.000483973
2205210412			0.002887816
2205210413			0.00590241
2205210415	0.001056887	2.05921E-06	0.000131766
2205210418			0.001843052
2205210419			0.005841061
2205210501	1.32358923	0.026912254	0.007736896
2205210511			0.000572459
2205210512			0.003429296
2205210513			0.007006713
2205210515	0.000688266	1.07649E-06	0.000102127
2205210518			0.001228723
2205210519			0.003872053
2205310101	0.052011887	0.002452734	0.002056682
2205310102	3.867542683	0.233148855	0.340651909
2205310111			0.068991496
2205310112			0.072700817
2205310113			0.086041087
2205310115	2.70461E-05	9.81095E-08	2.71482E-05
2205310116	0.002011122	9.32595E-06	0.004496605
2205310118			0.002515131
2205310119			0.003878343
2205310201	0	0	0
2205310215	0	0	0
2205310218			0
2205310219			0
2205310301	2.070282819	0.060787646	0.010453753
2205310311			0.000509836
2205310312			0.002822786

2205310313			0.006215336
2205310315	0.001076547	2.43151E-06	0.00013799
2205310318			0.004699338
2205310319			0.006729811
2205310401	7.064933186	0.21811966	0.033643825
2205310411			0.001486828
2205310412			0.008229976
2205310413			0.018129791
2205310415	0.003673766	8.72478E-06	0.000444098
2205310418			0.016085675
2205310419			0.023146433
2205310501	4.024945207	0.105889454	0.024428302
2205310511			0.001764935
2205310512			0.009773139
2205310513			0.021521748
2205310515	0.002092972	4.23558E-06	0.000322454
2205310518			0.010260608
2205310519			0.014663028
2205320101	0.029559093	0.001300004	0.001295708
2205320102	2.553720617	0.148398192	0.22345744
2205320111			0.044450824
2205320112			0.047468988
2205320113			0.049241971
2205320115	1.53707E-05	5.20002E-08	1.71033E-05
2205320116	0.001327934	5.93593E-06	0.002949638
2205320118			0.001443243
2205320119			0.002568851
2205320201	0	0	0
2205320215	0	0	0
2205320218			0
2205320219			0
2205320301	1.083806847	0.030692357	0.005898394
2205320311			0.000286697
2205320312			0.001610818
2205320313			0.003545888
2205320315	0.00056358	1.22769E-06	7.78588E-05
2205320318			0.00246015
2205320319			0.004151069
2205320401	3.527063499	0.106767711	0.01872115
2205320411			0.000817968
2205320412			0.004604077
2205320413			0.010137988
2205320415	0.00183407	4.27071E-06	0.000247119
2205320418			0.00824283
2205320419			0.013927457
2205320501	2.314405911	0.054898526	0.01437453
2205320511			0.00102738
2205320512			0.005640872
2205320513			0.012413338
2205320515	0.00120349	2.19594E-06	0.000189744
2205320518			0.005542868
2205320519			0.009207513
Grand Total	26301.90216	5105.417063	1693.034986

Annual:

Model	Output Database	CO	NOx	VOC
MOVES2014b	BYI_2017_10003_20191003_out	28806.93	5183.784	2212.762
MOVES3	BYI_2017_10003_20191003_m3_out	26301.9	5105.417	1693.035
	Difference (Tons)	-2505.03	-78.3667	-519.727
	Percent Change (%)	-9%	-2%	-23%

SSWD:

Model	Output Database	CO	NOx	VOC
MOVES2014b	BYI_2017_10003_20191003_out	87.23088	15.69509	6.22809
MOVES3	BYI_2017_10003_20191003_m3_out	83.22924	16.05692	5.367888
	Difference (Tons)	-4.00164	0.361834	-0.8602
	Percent Change (%)	-5%	2%	-14%

Table for Report:

2017 Onroad Emissions	EPA MOVES Model Version	2017 Annual (TPY)			2017 SSWD (TPD)		
		CO	NOx	VOC	CO	NOx	VOC
Original BYI	MOVES2014b	28,807	5,184	2,213	87.23	15.70	6.23
Adjusted BYI	MOVES3	26,302	5,105	1,693	83.23	16.06	5.37

Appendix D

Database	BYL_2017nr_c10003_20230414_m3_out
Table	movesoutput
outputTimePeriod	Day

Annual Totals (Tons)

Sum of Daily Emission	Pollutant			
monthID	VOC	NOx	CO	
1	54.8	48.9	660.3	
2	62.4	48.5	664.8	
3	157.9	92.1	1,890.4	
4	166.4	88.5	1,930.6	
5	163.4	88.0	1,937.4	
6	312.0	142.5	3,179.5	
7	316.1	141.6	3,204.8	
8	310.2	142.7	3,174.1	
9	171.3	87.6	1,960.2	
10	174.8	88.8	1,945.1	
11	164.0	91.9	1,907.4	
12	52.9	49.1	657.7	
Annual Total	2,106.5	1,110.4	23,112.3	

Database	BYL_2017nr_c10003_20230414_m3_out
Table	movesoutput
outputTimePeriod	Day
dayID	5

SSWD

Sum of emissionQuant	monthID	Pollutant		
FuelType		VOC	NOx	CO
Gasoline		6	7.15	1.43
		7	7.05	1.37
		8	6.86	1.39
Gasoline Total			21.07	4.20
Diesel		6	0.19	2.07
		7	0.19	2.01
		8	0.19	2.01
Diesel Total			0.56	6.09
LPG		6	0.04	0.23
		7	0.03	0.23
		8	0.03	0.23
LPG Total			0.10	0.69
CNG		6	0.01	0.03
		7	0.01	0.02
		8	0.01	0.02
CNG Total			0.04	0.07

All Fuels

7.26	3.68	90.89
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	VOC	NOx	CO
	7.02	1.40	88.53
	0.19	2.03	0.92
	0.03	0.23	1.32
	0.01	0.02	0.13

Annual:

Model	Output Database	VOC	NOX	CO
MOVES2014b	BYI_2017nr_10003_20191003_	2089.8	1110.4	23112.3
MOVES3	BYI_2017nr_c10003_20230414	2106.5	1110.4	23112.3
	Difference (Tons)	16.7	0.0	0.0
	Percent Change (%)	1%	0%	0%

SSWD:

Model	Output Database	VOC	NOX	CO
MOVES2014b	BYI_2017nr_10003_20191003_	7.2	3.7	90.9
MOVES3	BYI_2017nr_c10003_20230414	7.3	3.7	90.9
	Difference (Tons)	0.0	0.0	0.0
	Percent Change (%)	0%	0%	0%

Appendix E

TAB NAME	COMMENT	Complete
Point	Point Emissions (EGU, Non-EGU) by Facility for the 2023 Inventory.	yes
Point - ERC	Point Emission Reduction Credits added to the 2023 Projected Point Inventory.	yes
Nonpoint Summary	Summary of Nonpoint 2017/2023 Nonpoint Emissions by source category and totals. Nonpoint emissions totals adjusted from 2017 BYI submittal. Adjustments include corrections to BYI values along with additional source categories.	yes
MAR	Commercial Marine Vessels, Airports, and Locomotive 2017 and 2023 emission inventory by scc	yes
MAR Summary	Summary of 2017 and 2023 MAR emissions.	yes
Onroad Summary	Onroad emissions adjusted from 2017 BYI submittal. Updated model from MOVES2014b to MOVES3.	yes
Nonroad Summary	Nonroad emissions adjusted from 2017 BYI submittal. Updated model from MOVES2014b to MOVES3.	yes
Total	2017 & 2023 SSWD and Annual Emissions Totaled	yes
RFP Calculation	RFP Calculation for NOX and VOC	yes
Contingency	Contingency Measures Calculations based on EPA's 2023 draft guidance	yes
Benefits	Solvent Cleaning, VOC -27% Reduction, Effective 2022	yes
	PFCs, VOC - 12% Phased in Reduction, Effective 2018	
	Gas Marketing, Balance Submerged Filling, VOC - 4.8% Phased in Reduction, Partly Effective in 2023	
	Gas Marketing, Underground Tank: Breathing and Emptying, VOC - 86% Phased in Reduction, Effective 2021	
	All Nonroad and Onroad Mobile Measures	

Tab Point: New Castle County Point Emissions (EGU, Non-EGU) by Facility for the 2023 Inventory.

Facility ID	Datasource	2023 Future Emissions					
		CO (tpy)	CO (tpd)	NOX (tpy)	NOX (tpd)	VOC (tpy)	VOC (tpd)
1000300001	2020DEDNR	2	0.01	3	0.04	0	0.002
1000300003	2019DEDNR	15	0.06	13	0.06	20	0.088
1000300005	ERTAC 2023 Projection	0	0.00	0	0.00	0	0.000
1000300006	ERTAC 2023 Projection	0	0.00	0	0.00	0	0.000
1000300007	2019DEDNR	3	0.02	4	0.06	1	0.004
	ERTAC 2023 Projection	27	0.55	62	1.22	5	0.104
1000300011	2019DEDNR	32	0.24	50	0.44	8	0.036
1000300016	2019DEDNR	1044	5.39	1203	5.00	198	1.352
	2019DEDNR; 2021DEDNR	3	0.01	3	0.01	0	0.001
	ERTAC 2023 Projection	77	0.28	88	0.32	4	0.014
1000300017	2017DEDNR	4	0.01	2	0.01	1	0.015
1000300021	2019DEDNR	0	0.00	0	0.00	0	0.001
1000300022	2019DEDNR	28	0.08	20	0.10	8	0.031
1000300023	2019DEDNR	0	0.00	0	0.00	1	0.005
1000300024	2017DEDNR	5	0.02	7	0.06	1	0.004
1000300033	2019DEDNR	4	0.02	3	0.02	6	0.027
1000300040	2017DEDNR	5	0.03	2	0.01	1	0.008
1000300049	2019DEDNR	4	0.03	5	0.03	0	0.002
1000300051	2019DEDNR	33	0.11	24	0.09	2	0.008
1000300058	2019DEDNR	15	0.09	22	0.15	8	0.032
1000300059	2017DEDNR	2	0.01	2	0.01	4	0.020
1000300066	2017DEDNR	11	0.05	2	0.01	3	0.011
1000300068	2017DEDNR	14	0.09	4	0.03	2	0.011
1000300069	2017DEDNR	13	0.07	2	0.01	1	0.008
1000300073	2019DEDNR	0	0.00	0	0.00	3	0.013
1000300077	2019DEDNR	2	0.01	3	0.01	0	0.001
1000300080	2019DEDNR	19	0.16	15	0.21	4	0.018
1000300090	2017DEDNR	4	0.01	5	0.01	1	0.003
1000300093	2019DEDNR	0	0.00	0	0.00	0	0.000
1000300107	2017DEDNR	5	0.02	6	0.02	0	0.001
1000300111	2019DEDNR	42	0.16	13	0.05	6	0.025
1000300115	2019DEDNR	0	0.00	2	0.01	0	0.000
1000300125	2017DEDNR	6	0.03	8	0.08	0	0.004
1000300126	2019DEDNR	10	0.05	8	0.04	2	0.007
1000300131	2019DEDNR	10	0.09	14	0.27	1	0.012
1000300133	2017DEDNR	3	0.01	3	0.02	0	0.001
1000300142	2017DEDNR	0	0.00	0	0.00	1	0.004
1000300166	2017DEDNR	0	0.00	0	0.00	1	0.013
1000300277	2017DEDNR	0	0.00	1	0.02	0	0.001
1000300279	2019DEDNR	10	0.08	12	0.17	3	0.032
1000300288	2017DEDNR	0	0.00	0	0.00	0	0.000
1000300290	2019DEDNR	0	0.00	0	0.00	1	0.003
1000300291	2019DEDNR	6	0.23	4	0.08	21	0.052
1000300317	2019DEDNR	0	0.00	0	0.00	0	0.000
	ERTAC 2023 Projection	0	0.00	0	0.00	0	0.000
1000300324	2019DEDNR	2	0.01	1	0.00	1	0.005
1000300351	2017DEDNR	0	0.00	0	0.00	0	0.021
1000300383	2017DEDNR	3	0.01	3	0.01	16	0.050
1000300388	2019DEDNR	0	0.00	0	0.00	0	0.001
	ERTAC 2023 Projection	79	0.56	459	3.22	15	0.108
1000300389	2019DEDNR	4	0.01	5	0.02	1	0.004
1000300404	2019DEDNR	1	0.00	0	0.00	6	0.025
1000300415	2017DEDNR	22	0.07	5	0.02	4	0.013

1000300462	2017DEDNR	1	0.01	6	0.03	3	0.013
1000300463	2017DEDNR	1	0.00	3	0.01	0	0.000
1000300482	2017DEDNR	0	0.00	0	0.00	0	0.000
1000300498	2017DEDNR	0	0.00	0	0.00	3	0.020
1000300506	2017DEDNR	0	0.01	1	0.06	0	0.003
1000300508	2017DEDNR	1	0.00	1	0.01	0	0.001
1000300516	2017DEDNR	0	0.00	0	0.00	4	0.014
1000300599	2017DEDNR	0	0.00	0	0.02	0	0.001
1000300600	2017DEDNR	1	0.01	2	0.03	0	0.001
1000300622	2019DEDNR	9	0.08	43	0.33	2	0.015
1000300646	2017DEDNR	1	0.01	5	0.05	0	0.002
1000300673	2019DEDNR	0	0.00	17	0.07	1	0.003
1000300686	2017DEDNR	1	0.02	6	0.08	1	0.021
1000300687	2017DEDNR	1	0.01	7	0.03	1	0.004
1000300782	2017DEDNR	2	0.01	2	0.01	2	0.007
1000300785	2017DEDNR	0	0.00	0	0.00	1	0.004
1000300800	2017DEDNR	0	0.00	0	0.00	0	0.000
1000300803	2017DEDNR	0	0.01	0	0.05	0	0.003
1000300804	2017DEDNR	1	0.11	6	0.63	0	0.013
1000300806	2017DEDNR	0	0.02	0	0.02	0	0.001
1000300822	2017DEDNR	0	0.01	0	0.03	0	0.002
1000300827	2017DEDNR	0	0.03	0	0.02	0	0.008
1000300847	2017DEDNR	3	0.01	2	0.01	0	0.000
1000300899	2019DEDNR	6	0.02	6	0.02	6	0.023
1000300904	2017DEDNR	0	0.00	1	0.02	0	0.001
1000300906	2017DEDNR	11	0.04	13	0.05	1	0.003
1000300930	2017DEDNR	0	0.00	0	0.00	2	0.005
1000300934	2019DEDNR	7	0.14	5	0.11	1	0.016
1000300963	2021DEDNR	0	0.00	0	0.00	0	0.000
1000300978	2020DEDNR	1	0.00	1	0.00	6	0.024
1000300986	2019DEDNR	0	0.00	0	0.00	51	0.007
Grand Total		1619	9.22	2218	13.63	449	2.417

Tab Point - ERC: Point Emission Reduction Credits added to the 2023 Projected Point Inventory.

Table 1: New Castle and Kent County Emission Reduction Credits

Held By ^{2,3}	Annual (tpy)		SSWD ¹ (tpd)	
	NOx	VOC	NOx	VOC
1734 LLC	29	195	0.08	0.53
Calpine	46	0	0.13	0.00
Delaware City Industries (DCI)	2	6	0.01	0.02
Diamond State Port Corporation	16	58	0.04	0.16
DuPont	0	0	0.00	0.00
Lafarge	0	5	0.00	0.01
NRG Energy Center	268	0	0.73	0.00
Veolia	9	6	0.02	0.02
VPI	2	10	0.01	0.03
Division of Small Business	53	137	0.15	0.38
Total in New Castle and Kent County	425	417	1.16	1.14

1) TPD is calculated from annual emissions since seasonal factors are not available; calculation conservative because we know majority of credits will not be applied in 2023; however they are all accounted for.

3) ERCs: Emission Reduction Credits as of 2021 Audit Report; Delaware Regulation 1134 Emission Banking and Trading Program, Final August 2022 Emission Reduction Credit Audit

2) Sussex County Facilities (NRG Indian River) removed because according to CAA guidelines, New Castle builds/modifications could not use Sussex credits as Sussex County has a lower classification under the 1979 1-hr ozone standard.

Table 2: Point and Emission Reduction Credit Emissions

	ANNUAL (tpy)		SSWD (tpd)	
	NOx	VOC	NOx	VOC
Emission Reduction Credits ^{1,2,3}	425	417	1.16	1.14
2023 Projected Point w/o ERC	2218	449	13.63	2.42
2023 Project Point w/ ERC Total	2643	866	14.80	3.56

1) ERCs: Emission Reduction Credits as of 2021 Audit Report; Delaware Regulation 1134 Emission Banking and Trading Program, Final August 2022 Emission Reduction Credit Audit

2) Verified with DE Compliance Manager that no other facilities are pursuing credits as of May 2023

3) TPD is calculated from annual emissions since seasonal factors are not available; calculation conservative because we know majority of credits will not be applied in 2023; however they are all accounted for.

Tab Nonpoint: Summary of the Nonpoint Emissions for 2017 Adjusted Base Year Inventory and 2023 Projected Inventory

Table 1: 2017 and 2023 Nonpoint Inventory Summary

	SSWD (TPD)			Annual (TPY)		
	CO	NOX	VOC	CO	NOX	VOC
2017 Nonpoint	7.46	2.51	9.59	3678	1445	3184
2023 Nonpoint	7.93	3.00	9.41	3901	1701	3130
Tons Reduced	-0.5	-0.48	0.18	-223	-256	54
% Difference	-6%	-19%	1.8%	-6%	-18%	2%

Table 2: 2017 and 2023 Nonpoint Inventory by Category

Category	Adjusted 2017 Base Year Inventory						2023 Projected Inventory					
	Annual (tpy) CO	NOX	VOC	SSWD (tpd) CO	NOX	VOC	Annual (tpy) CO	NOX	VOC	SSWD (tpy) CO	NOX	VOC
Ag Burning	8	0	0	1	0.00	0.00	8	0	1	0.00	0.00	0.00
Ag. Pesticides				30					30			0.11
AIM Coatings				390					401			1.49
Animal Cremation	0	0	0	0	0.00	0.00	0	0	0	0.00	0.00	0.00
Animal Husbandry				35					36			0.10
Asphalt Paving				0					0			0.00
Auto Refinishing				22					22			0.08
CMV Evap				117					98			0.27
Commercial & Consumer Products				1130					1161			3.31
Commercial Cooking	96			35	0.26			98	36	0.27		0.10
Commercial Fuel	289	384		21	0.43	0.52	330	443	24	0.49	0.60	0.03
Dry Cleaners				1		0.01		2				0.01
Fuel Comb - Residential - Wood	2385	40		353	5.15	0.09	2475	44	362	5.34	0.09	0.78
Gasoline Marketing				240		0.78			164			0.56
Graphic Arts				257		0.99			264			1.02
Human Cremation	0	0	0	0	0.00	0.00	0	0	0	0.00	0.00	0.00
Industrial Adhesives				107		0.41			110			0.42
Industrial Fuel	268	585		36	0.80	1.66	329	715	44	0.98	2.03	0.13
Industrial Surface				79		0.30			78			0.30
Land Clearing	0	0	0	0	0.00	0.00	0	0	0	0.00	0.00	0.00
POTW				12		0.03			12			0.03
Prescribed Burning	273	4		65	0.00	0.00	273	4	65	0.00	0.00	0.00
Res Grilling	150	3		8	0.66	0.01	154	3	8	0.68	0.01	0.04
Residential Fuel	175	426		23	0.10	0.22	200	489	27	0.11	0.25	0.01
Solvent Cleaning				91		0.29			66			0.21
Structure Fires	15	0	3	3	0.03	0.00	15	0	3	0.03	0.00	0.01
Traffic Markings				2		0.01			2			0.01
Vehicle Fires	3	0	1	1	0.01	0.00	3	0	1	0.01	0.00	0.00
Wildfires	0	0	0	0	0.00	0.00	0	0	0	0.00	0.00	0.00
Gasoline Marketing - aircraft refueling				3		0.01			3			0.01
Gasoline Marketing - PFCs				120		0.42			108			0.38
Residential Open Burning	15	1		2	0.01	0.00	15	1	2	0.01	0.00	0.00
Grand Total	3678	1445	3184	7.46	2.51	9.59	3901	1701	3130	7.93	3.00	9.41

Tab MAR Summary: Summary of 2017 and 2023 MAR emissions.

Annual:

	2017 Annual (TPY)			2023 Annual (TPY)			Ton Reduced			% Difference		
	CO	NOX	VOC	CO	NOX	VOC	CO	NOX	VOC	CO	NOX	VOC
Aircrafts	463.0	78.0	47.0	501.5	70.7	43.0	-38.51	7.31	4.02	-8%	9%	9%
CMV	198.7	1531.8	80.5	223.9	1279.2	88.3	-25.12	252.58	-7.79	-13%	16%	-10%
Rail	70.4	431.7	27.7	74.3	435.7	28.2	-3.91	-3.93	-0.44	-6%	-1%	-2%
Total	732.1	2041.5	155.2	799.7	1785.5	159.4	-67.54	255.96	-4.20	-9%	13%	-3%

SSWD:

	2017 SSWD (TPD)			2023 SSWD (TPD)			Ton Reduced			% Difference		
	CO	NOX	VOC	CO	NOX	VOC	CO	NOX	VOC	CO	NOX	VOC
Aircrafts	1.27	0.21	0.13	1.38	0.19	0.12	-0.11	0.02	0.01	-8%	9%	9%
CMV	0.54	4.20	0.22	0.60	3.50	0.24	-0.06	0.70	-0.02	-11%	17%	-10%
Rail	0.19	1.18	0.08	0.21	1.19	0.08	-0.02	-0.01	0.00	-11%	-1%	-4%
Total	2.0	5.6	0.4	2.2	4.9	0.4	-0.19	0.71	-0.02	-9%	13%	-4%

Summary:

	SSWD (TPD)			Annual (TPY)		
	CO	NOX	VOC	CO	NOX	VOC
2017 MAR	2.00	5.59	0.43	732.1	2041.5	155.2
2023 MAR	2.19	4.88	0.45	799.7	1785.5	159.4
Tons Reduced	-0.2	0.71	-0.02	-67.5	256.0	-4.2
% Difference	-9%	13%	-4%	-9%	13%	-3%

Tab Nonroad Summary: Nonroad emissions adjusted from 2017 BYI submittal. Updated model from MOVES2014b to MOVES3.

New Castle County Ozone Emissions Summary Using MOVES3 [MOVESDB20221007]

NON-ROAD

Analysis Year	Non-road SSWD Emissions (Tons/Day)			Non-road Annual Emissions (Tons)		
	CO	NOX	VOC	CO	NOX	VOC
2017 (Adjusted Base Year)	90.9	3.7	7.3	23,112.3	1,110.4	2,106.5
2023	100.0	3.1	6.2	25,023.9	935.9	1,719.7
Tons / Day Reduced	-9.1	0.6	1.0	(1,911.63)	174.52	386.79
Percent Reduction	-10%	17%	14%	-8%	16%	18%

Note:

2017 Run: Using 2017 BYI Input Assumptions with existing emission standards/controlled measures in MOVES3

2023 Run: Using 2023 National Default Assumptions with existing emission standards/controlled measures in MOVES3. Updated meteorology input table to match 2023 onroad.

Tab Onroad Summary: Onroad emissions adjusted from 2017 BYI submittal. Updated model from MOVES2014b to MOVES3.

New Castle County Ozone Emissions Summary Using MOVES3 [MOVESDB20221007]

ON-ROAD

Analysis Year	Annual VMT	On-road SSWD Emissions (Tons/Day)			On-road Annual Emissions (Tons)			
		CO	NOX	VOC	CO	NOX	VOC	
2017 (Adjusted Base Year)	6,095,613,480	83.23	16.06	5.37	26,301.9	5,105.4	1,693.0	
2023	6,000,308,476	70.18	7.75	4.15	20,129.8	2,736.0	1,277.7	
	Tons / Day Reduced	13.05	8.31	1.22	6,172.1	2,369.4	415.3	
	Percent Reduction	16%	52%	23%	23%	46%	25%	

Note:

2017 Run: Using 2017 BYI Input Assumptions with existing emission standards/ controlled measures in MOVES3

2023 Run: Using 2023 MVEB Input Assumptions with existing emission standards/ controlled measures in MOVES3

2023	Motor Vehicle Emission Budget	NA	8.53	4.57
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Tab Total: 2017 & 2023 SSWD and Annual Emissions Totaled

Table 1: 2017 Adjusted Base Year Inventory - New Castle County Emissions by Source Sector

Source Sector	2017 Annual (TPY)			2017 SSWD (TPD)		
	CO	NOx	VOC	CO	NOx	VOC
Point	1,766	2,504	747	10.42	14.53	3.12
Nonpoint	3,678	1,445	3,184	7.46	2.51	9.59
Nonroad	23,112	1,110	2,106	90.89	3.68	7.26
Onroad	26,302	5,105	1,693	83.23	16.06	5.37
MAR	732	2,042	155	2.00	5.59	0.43
All Sectors	55,590	12,206	7,886	194.00	42.38	25.76

Table 2: 2023 RFP Projected Inventory- New Castle County Emissions by Source Sector

Source Sector	2023 Annual (TPY)			2023 SSWD (TPD)		
	CO	NOx	VOC	CO	NOx	VOC
Point	1619	2218	449	9.22	13.63	2.42
ERC (Point)	0.00	425.00	417.00	0.00	1.16	1.14
Nonpoint	3901	1701	3130	7.93	3.00	9.41
Nonroad	25024	936	1720	100.02	3.06	6.23
Onroad w/Safety Margin	20130	2736	1278	70.18	8.53	4.57
MAR	800	1786	159	2.19	4.88	0.45
All Sectors	51474	9801	7153	189.53	34.26	24.22

Table 3: 2017/2023 Inventory Tons Reduced & Percent Difference- New Castle County Emissions by Source Sector

	2017/2023 Annual (TPY)			2017/2023 SSWD (TPD)		
	CO	NOx	VOC	CO	NOx	VOC
Tons Reduced	4116.80	2404.96	733.03	4.47	8.11	1.54
% Difference	7%	20%	9%	2%	19%	6%

Tab RFP: Calculation RFP Calculation for NOx and VOC

VOC Target Level for 2023 Milestone New Castle Nonattainment Area Emissions in Tons per Day			
		Formula	
A	2017 Base Year Inventory		25.76
B	Biogenic Emissions (Not included in BYI)		0.00
C	2017 Rate-of Progress Base Year Inventory	A - B	25.76
D	FMVCP/RVP Reductions Between 2017 and 2023*		0.00
E	2017 Adjusted Base Year Inventory Calculated Relative to 2023	C - D	25.76
F	Ratio		4.0%
G	Emissions Reductions Required Between 2017 and 2023	E * F	1.030
H	Target Level for 2023 [TL ₍₂₀₂₃₎]	C - D - G	24.73
Emission Level Obtained 2023			24.22
J	Surplus Emissions (tpd)		0.51

*FMVCP/RVP reductions are considered negligible by EPA Guidance and are not longer required. State Implementation Plan Requirements: 2008 National Ambient Air Quality Standards for Ozone
<https://www.regulations.gov/document/EPA-HQ-OAR-2010-0885-0066>

NOx Target Level for 2023 Milestone New Castle Nonattainment Area Emissions in Tons per Day			
		Formula	
A	2017 Base Year Inventory		42.38
B	Biogenic Emissions (Not included in BYI)		0.00
C	2017 Rate-of Progress Base Year Inventory	A - B	42.38
D	FMVCP/RVP Reductions Between 2017 and 2023		0.00
E	2017 Adjusted Base Year Inventory Calculated Relative to 2023	C - D	42.38
F	Ratio		11.0%
G	Emissions Reductions Required Between 2017 and 2023	E * F	4.66
H	Target Level for 2023 [TL ₍₂₀₂₃₎]	C - D - G	37.72
Emission Level Obtained 2023			34.26
J	Surplus Emissions (tpd)		3.45

*FMVCP/RVP reductions are considered negligible by EPA Guidance and are not longer required. State Implementation Plan Requirements: 2008 National Ambient Air Quality Standards for Ozone
<https://www.regulations.gov/document/EPA-HQ-OAR-2010-0885-0066>

Tab Contingency: Contingency Measures Calculations based on EPA's 2023 draft guidance
EPA CM Draft Guidance_3-16-23

OYW (One Year's Worth of progress):

(Adjusted Base Year EI - Attainment Year EI) / (Attainment Year - Base Year) / Adjusted Base Year EI x Attainment Year EI = OYW of Progress

<i>Adjusted 2017 Base Year EI - VOC (tpd)</i>	25.76
<i>2023 Attainment Year EI - VOC (tpd)</i>	24.22
<i>Adjusted 2017 Base Year EI - Nox (tpd)</i>	42.38
<i>Attainment Year EI -Nox (tpd)</i>	34.26
<i>Base Year EI</i>	2017
<i>Attainment Year EI</i>	2023

Step 1: Calculate the annual average reduction needed to attain for each relevant precursor

<i>VOC 1a.</i>	1.54 tpd
<i>VOC 1b.</i>	0.26 tpd per year
<i>NOX 1a.</i>	8.11 tpd
<i>NOX 1b.</i>	1.35 tpd per year

Step 2: Calculate the annual percentage reduction needed to attain.

<i>VOC 2.</i>	1.0% annual reduction
<i>NOX 2.</i>	3.2% annual reduction

Step 3: Calculate the amount of reductions needed for OYW of progress

<i>VOC 3.</i>	0.24 tpd
<i>NOx 3.</i>	1.09 tpd

Tab Benefits: Emission Reductions/Benefits of Control Programs

Control Measure	2023 Emission Reductions	
	VOC	NOx
I/M		
Tier I		
Reform Gas		
LEV		
HDDE		
Total Mobile	0.80	7.53
OTC - Solvent Cleaning (27%)	0.08	0.00
OTC - PFCs (12%)	0.05	
OTC - Gas Marketing, Balanced Submerged Filling (4.8%)	0.02	
OTC - Gas Marketing, Underground Tank (86%)	0.25	
Nonroad Model	1.03	0.63
MAR	0.00	0.71
Total	2.24	8.87

Appendix F

#FORMAT=FT10_POINT
#COUNTRY=US
#YEAR=2023
#PROJECTION YEAR 2023
#TYPE Point Sources
#DESC ANNUAL
#DESC Contact: ertacegu@gmail.com
#DESC ERTAC Version: 3.0
#DESC ERTAC to SMOKE Run Date: 10/25/22
#DESC Er in short to from ERTAC
#DESC Pn Code V3.0, 2022-10-21
#DESC Pn Code V3.0, 2022-10-21
#DESC ERTAC_for_SMOKE Inputs: 2021-10-22 (Unique PUSP files. One file for 2024 and earlier, one file for 2025 and later.)
#DESC Av NOX and Hi, Pr default/OS=NO3 for NOX). 2016 BYPR run and projection runs use HZG=N for all regions except CONUS. CONUS units have HZG=Y.
#DESC Ch Tennessee Eastman to non-EQU.
#DESC Run using --keep_Feb29 switch
country_cd region_cd tribal_code facility_id unit_id ref_point_j process_id agy_facility agy_unit_id agy_rel_po agy_process pol ann_value ann_pct_ref facility_nar erptype stkhgt stkdiam stktemp stklow stklvl naics longitude latitude il_datum horiz_coll_design_cap design_cap_reg_codes fac_source
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 NOX 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 SO2 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 CO 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 VOC 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 PM10 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 PM2_5 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 10100404 NH3 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 NOX 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 SO2 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 CO 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 VOC 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 PM10 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 PM2_5 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48461614 1E+09 2 2 2 3 10100501 NH3 0 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 NOX 17.09719 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 SO2 0.146103 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 CO 5.075171 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 VOC 1.163061 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 PM10 0.125799 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 PM2_5 0.104026 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46233113 43899312 48462114 1E+09 2 2 2 4 10100604 NH3 0.676688 0 Edge Moor 2 220 13.5 261 6904.667 48.2 221112 -75.5033 397372 1 99.10191 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 NOX 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 SO2 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 CO 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 VOC 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 PM10 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 3 10100501 PM2_5 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 NOX 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 SO2 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 CO 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 VOC 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 PM10 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 2 10100404 PM2_5 0 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462514 1E+09 3 3 3 4 10100604 NOX 40.88126 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 SO2 0.381942 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 CO 15.7937 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 VOC 3.619993 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 PM10 0.342198 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 PM2_5 0.282971 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 827811 46232713 43899712 48462714 1E+09 3 3 3 4 10100604 NH3 2.105832 0 Edge Moor 2 220 13.5 285 10388.3 72.6 221112 -75.5033 397372 1 200.6083 MW 1
US 10003 640311 46482113 44160312 48487614 1E+09 3 3 3 2 20100901 NOX 0 0 Hay Road 2 188 15.5 200 17136.42 90.8 221112 -75.5072 397436 1 143.6046 MW 1
US 10003 640311 46482113 44160312 48487614 1E+09 3 3 3 2 20100901 SO2 0 0 Hay Road 2 188 15.5 200 17136.42 90.8 221112 -75.5072 397436 1 143.6046 MW 1

US	10003	640311	46482213	44160312	48487614	1E+09	3	3	3	2	20100901	VOC	0	0.000983		Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487614	1E+09	3	3	3	2	20100901	CO	0.000983			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487614	1E+09	3	3	3	2	20100901	PW10	0.025515			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487614	1E+09	3	3	3	2	20100901	PW2_5	0.024826			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487614	1E+09	3	3	3	2	20100901	NH3	15.57646			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	NOX	157.5501			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	SO2	1.475671			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	CO	31.90923			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	VOC	5.118678			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	PW10	0.714149			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	PW2_5	0.454463			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482213	44160312	48487714	1E+09	3	3	3	2	20100201	NH3	0			Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	143.6046	NW
US	10003	640311	46482013	44160212	48488014	1E+09	1	1	1	2	20100901	NOX	0			Hay Road	2	188	15.5	206	17136.42	90.8	221112	-75.5072	39.7436	1	139.1401	NW
US	10003	640311	46482013	44160212	48488014	1E+09	1	1	1	2	20100901	SO2	0			Hay Road	2	188	15.5	206	17136.42	90.8	221112	-75.5072	39.7436	1	139.1401	NW
US	10003	640311	46482013	44160212	48488014	1E+09	1	1	1	2	20100901	CO	0.003952			Hay Road	2	188	15.5	206	17136.42	90.8	221112	-75.5072	39.7436	1	139.1401	NW
US	10003	640311	46482013	44160212	48488014	1E+09	1	1	1	2	20100901	VOC	0.002619															

[illegible]

US	10003	640311	46482513	44160712	90910614	1E+09	6	6	3	20100901	PM2_5	0	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482513	44160712	90910614	1E+09	6	6	3	20100901	NH3	0.060183	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	NOX	0	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	SO2	0	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	CO	0	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	VOC	9.54E-05	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	PM10	0.001538	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	PM2_5	0.001538	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486814	1E+09	7	7	2	20100901	NH3	0.817423	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	NOX	0.038388	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	SO2	0.094426	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	VOC	0.131151	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	PM10	0.243073	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	PM2_5	0.243073	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	48486914	1E+09	7	7	1	20100201	NH3	0	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	90910714	1E+09	7	7	3	20100901	NOX	0.038529	Hay Road	2	188	15.5	200	17136.42	90.8	221112	-75.5072	39.7436	1	148.4516	NW
US	10003	640311	46482613	44160512	90910714	1E+09	7	7	3	20100901															

Appendix G

**Delaware Regulation 1134
Emission Banking and Trading Program
Emission Reduction Credit Audit**

FINAL August 2022



BACKGROUND:

Ground-level ozone, one of the principal components of “smog,” is an air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. The Clean Air Act (CAA) requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants that are common in outdoor air, considered harmful to public health and the environment, and that come from numerous and diverse sources.

The NAAQS for ozone is currently set at 0.070 ppm (2015 8-hour ozone NAAQS), which is expected to provide protection of public health and environment (80 FR 65291)¹. New Castle County of Delaware was designated nonattainment as a part of the Philadelphia-Wilmington-Atlantic City Marginal Nonattainment Area (NAA) under the 2015 8-hour ozone NAAQS.

The Clean Air Act requires new emission sources in non-attainment areas for ozone to offset Volatile Organic Compound (VOC) and Nitrogen Oxides (NO_x) emissions, which are ozone precursors, depending on the non-attainment level for the area. The purpose for requiring offsetting emissions decreases is to allow an area to move towards attainment of the ozone NAAQS while still allowing for industrial growth.

This can be accomplished through the implementation of an emission banking and trading program, which provides incentives to make progress toward attainment of air quality standards. The 1990 CAA allows for the use of market-based approaches, including emission trading, to assist in attaining and maintaining the NAAQS, for all criteria pollutants. Emissions trading programs have two key components: a limit (or cap) on pollution, and tradable allowances equal to the limit that authorize allowance holders to emit a specific quantity (e.g., one ton) of the pollutant.

An emission reduction credit (ERC) is a credit earned by a company when it reduces its air emissions. ERCs are discrete quantities of actual emissions expressed in tons of pollutant reduced. ERCs are reductions in emissions in one place that can be used to compensate for (or offset) emission increases which occur in a non-attainment area. These reductions can be generated through the shutdown of individual pieces of equipment or entire facilities. These credits can then be sold by the companies that hold them, to offset new emissions sources.

Delaware’s regulation 7 **DE Admin. Code** 1134, *Emission Banking and Trading Program* (“Regulation 1134”) was developed to establish a voluntary emission banking and trading program.

¹ National Ambient Air Quality Standards for Ozone. EPA Final Rule. 80 FR 65292. October 26, 2015. <https://www.govinfo.gov/content/pkg/FR-2015-10-26/pdf/2015-26594.pdf>

In accordance with the Clean Air Act Section 173(c)(1)-(2), Offsets:

“(1) The owner or operator of a new or modified major stationary source may comply with any offset requirement in effect under this part for increased emissions of any air pollutant only by obtaining emission reductions of such air pollutant from the same source or other sources in the same nonattainment area, except that the State may allow the owner or operator of a source to obtain such emission reductions in another nonattainment area if (A) the other area has an equal or higher nonattainment classification than the area in which the source is located and (B) emissions from such other area contribute to a violation of the national ambient air quality standard in the nonattainment area in which the source is located. Such emission reductions shall be, by the time a new or modified source commences operation, in effect and enforceable and shall assure that the total tonnage of increased emissions of the air pollutant from the new or modified source shall be offset by an equal or greater reduction, as applicable, in the actual emissions of such air pollutant from the same or other sources in the area...”

In accordance with Section 14.0 of Regulation 1134, the Delaware Division of Air Quality (AQ) is required to conduct periodic audits of its emission banking and trading program, to ensure that the goals of the program are being met. In accordance with Section 14.3 of Regulation 1134, the audit was legal noticed in two general circulation newspapers as well as posted on the Division’s website on July 17, 2022, and included a public comment period of 30 days after publication of the notice, until August 17, 2022. No comments were received from the public on the audit.

DELAWARE’S COMMITMENT TO IMPROVING AIR QUALITY:

The Delaware Division of Air Quality is comprised of engineers, scientists and planners who work to protect human health and the environment. In addition to implementing a strictly regulated ERC program, Delaware AQ applies more stringent requirements on industrial sources than what is required by the CAA and federal regulations.

Emissions from any new sources must not impact the state’s attainment or maintenance of health-based federal air quality standards (NAAQS) and sources are required to have an air quality permit at very low levels. Delaware’s threshold for requiring these stringent levels of pollution control is lower than neighboring states. Equipment emitting more than 10 lbs pollution/day requires a permit.

AQ staff are highly trained to review the detailed permit applications and determine if the level of control the facility has proposed meets the rigorous control requirement established by state regulations. These air permits may require additional controls to minimize the impacts of emissions. In addition, the permits can include monitoring, recordkeeping and reporting requirements. AQ staff inspect facilities on a routine basis to determine compliance with state and federal requirements.

Some additional examples of AQ's efforts to improve air quality in Delaware include, but are not limited to:

- Continuous development and revision of state regulations to reduce air pollution in all communities
- Programs to reduce vehicle and diesel emissions, promoting clean fuel and alternative vehicle use
- Strict 'open burning' policies throughout the state of Delaware
- Close collaboration with neighboring states and the EPA, ensuring all matters related to air pollution are handled in an efficient and timely fashion, keeping in line with (if not exceeding) federal regulations

EMISSION OFFSETS:

In Delaware the generated ERCs are used to fulfill two emission offset requirements, Nonattainment New Source Review and Coastal Zone Act Program, as detailed below.

Nonattainment New Source Review

Major stationary sources of air pollution and major modifications to major stationary sources are required by the Clean Air Act to obtain an air pollution permit before commencing construction. The process is called new source review (NSR) and is required whether the major source or modification is planned for an area where the NAAQS are exceeded (non-attainment areas). Permits for sources in attainment areas are referred to as prevention of significant air quality deterioration (PSD) permits; while permits for sources located in non-attainment areas are referred to as Non-attainment Area (NAA) permits. The entire program, including both PSD and NAA permit reviews, is referred to as the NSR program.

Non-attainment New Source Review (NNSR) requires new major sources, or major modifications at existing sources, within non-attainment areas to offset the annual emissions increase from the new source or modification and to provide a net air quality benefit. (7 **DE Admin. Code** 1125, or "Regulation 1125"). Emissions offset by NNSR are based upon non-attainment area classification severity, using a ratio, which is specified in Section 2.0 of Regulation 1125.

The EPA revised the 1-hour ozone NAAQS to an 8-hour NAAQS of 0.080 ppm (62 FR 38856)² in 1997, and again revised the ozone NAAQS to an 8-hour NAAQS of 0.075 ppm in 2008 (73 FR 16436)³. Under the 1997 8-hour ozone NAAQS, the entire state of Delaware was designated a part of the Philadelphia moderate NAA. Under the 2008 8-hour ozone NAAQS, New Castle County was designated a part of the Philadelphia marginal NAA, while Sussex County was designated a standalone marginal NAA. Therefore, Delaware continued to be subject to the CAA requirements through the 1997 and 2008 ozone NAAQS due to its inclusion in a non-attainment area.

² National Ambient Air Quality Standards for Ozone. EPA Final Rule. 62 FR 38856. July 18, 1997. <https://www.govinfo.gov/content/pkg/FR-1997-07-18/pdf/97-18580.pdf>

³ National Ambient Air Quality Standards for Ozone. EPA Final Rule. 73 FR 16436. March 27, 2008. <https://www.govinfo.gov/content/pkg/FR-2008-03-27/pdf/E8-5645.pdf>

On April 30, 2004 (84 FR 23857)⁴, EPA designated all three Delaware counties as moderate nonattainment under the 1997 8-hour ozone NAAQS, as part of the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE nonattainment area. EPA granted the area a 1-year extension of its attainment date (from 2010 to 2011) on January 21, 2011 (76 FR 3840)⁵. On March 26, 2012, EPA determined that the area had attained the 8-hour ozone NAAQS by its attainment date and also that it qualified for a clean data determination, which suspended most CAA air quality planning requirements based on air quality monitoring data showing that the area met the NAAQS for the most recent three prior years. Therefore, the area was never formally redesignated to attainment prior to EPA's revocation of the 1997 8-hour NAAQS on March 6, 2015 (44 FR 12264)⁶, effective April 6, 2015.

Classifications from the 1979 1-hr ozone standard still apply as the most stringent:

- Kent Co. - Severe under 1-hr standard; requires 1.3:1 offsets for nitrogen oxides (NO_x) and volatile organic compounds (VOC)
- New Castle Co. - Severe under 1-hr standard; requires 1.3:1 offsets for NO_x and VOC
- Sussex Co. - Marginal under 1-hr standard (but considered Moderate since Delaware is part of the Ozone Transport Region, or OTR); requires 1.15:1 offsets for NO_x and VOC

Per the Clean Air Act Section 173(c)(1)-(2), Offsets, emission offsets may be obtained from a non-attainment area which 1) is equal or higher in classification; and 2) contributes to non-attainment in the area.

Coastal Zone Act Program

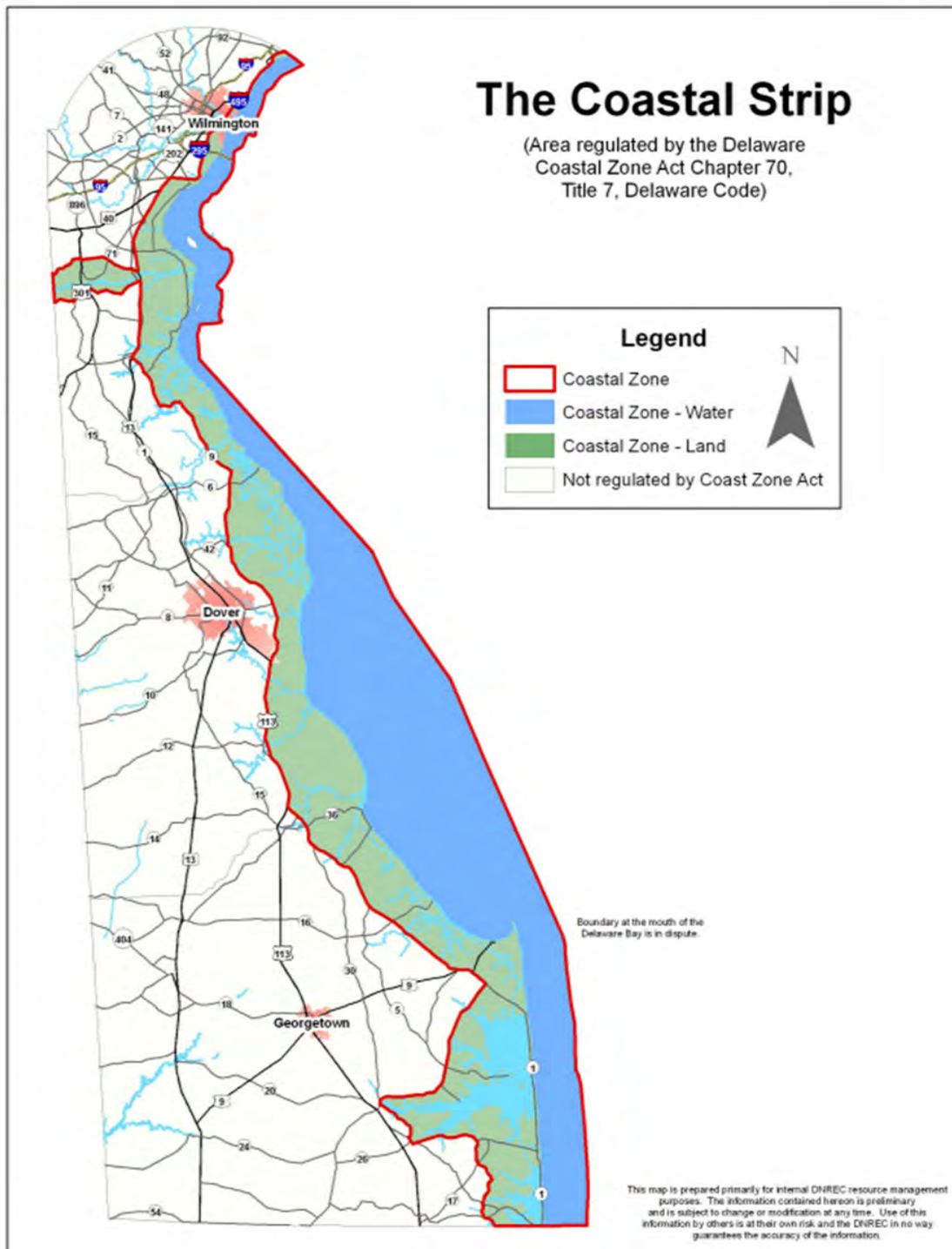
The Coastal Zone Act (CZA) Program regulates new and existing manufacturing and heavy industrial activities in Delaware's Coastal Zone, which generally runs the length of the state along the Delaware River, the Delaware Bay, the Inland Bays and the Atlantic Ocean, as shown in **Figure 1**.

⁴ Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas With Deferred Effective Dates. EPA Final Rule. 84 FR 23857. April 30, 2004. <https://www.govinfo.gov/content/pkg/FR-2004-04-30/pdf/04-9152.pdf>

⁵ Approval of One-Year Extension for Attaining the 1997 8-Hour Ozone Standard for the Delaware, Maryland, and Pennsylvania Portions of the Philadelphia-Wilmington-Atlantic City Moderate Nonattainment Area. EPA Final Rule. 76 FR 3840. January 21, 2011. <https://www.govinfo.gov/content/pkg/FR-2011-01-21/pdf/2011-1262.pdf>

⁶ Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements. EPA Final Rule. 44 FR 12264. March 6, 2015. <https://www.govinfo.gov/content/pkg/FR-2015-03-06/pdf/2015-04012.pdf>

Figure 1 – The Delaware Coastal Zone Map



Delaware's Coastal Zone Act (CZA) was passed in 1971. The intent was to "strike the correct balance between" introducing new industry to the state and protecting the state's environment, natural beauty, and outdoor recreation opportunities. The CZA provides to the Secretary of the Department of Natural Resources and Environmental Control (DNREC) and the Coastal Zone Industrial Control Board the authority to promulgate regulations to carry out the requirements contained within the Act. DNREC's Coastal Zone Program was developed to accomplish two key goals:

- 1) Promote improvement of the environment within the Coastal Zone and
- 2) Providing existing and new industries in Delaware's Coastal Zone with the flexibility necessary to stay competitive and to prosper.

In accordance with 7 **DE Admin. Code** 101, *Regulations Governing Delaware's Coastal Zone*, Section 9.0; projects that will result in negative environmental impact require an offset proposal for a project that benefits Delaware:

"9.1.1 Any application for a permit for an activity or facility that will result in any negative environmental impact shall contain an offset proposal for a project that benefits Delaware. Offset projects shall more than offset the negative environmental impacts associated with the proposed project or activity requiring a permit, including on an annual basis, if applicable. The applicant shall propose an offset project that is clearly and demonstrably more beneficial to the environment in Delaware than the harm done by the negative environmental impacts associated with the proposed project."

Companies have historically used AQ's ERCs as an option to fulfill the CZA requirements for project offsets.

EMISSION REDUCTION CREDITS:

In Delaware, ERCs are created via requirements specified in 7 **DE Admin. Code** 1134, Section 8.5:

"Prior to certifying an emission reduction, the Department will make the following adjustments to both the ozone season and non-ozone season emission reductions that are submitted to the Department for certification:

8.5.1 Credit for all emission reductions, except any reductions generated by shutdowns or generated prior to October 6, 1997, will be reduced by the value of 10% of the total reductions to provide a net air quality benefit.

8.5.2 Credit for emission reductions generated by shutdowns will be reduced by the value of 50% of the total reductions. 25% of the total reductions will be retired to provide a net air quality benefit and 25% will be held in a separate account by the Delaware Department of State, Division of Small Business, for economic development purposes after certification by the Department pursuant to 8.6 of this regulation.

8.5.3 Credit for reductions generated before October 6, 1997 will be adjusted by a discount factor relating to the uncertainty of the emission estimation method used. The amount of the discount will be determined by the Department on a case-by-case basis. Factors that the Department will take into consideration in determining the uncertainty of the emission estimation method used include the nature of the reduction, the validity of the baseline data, and any previous review or inspection of relevant test methods by the Department. The Department will then reduce the adjusted amount by the value of 10% to provide a net air quality benefit."

ERCs do not have an expiration date and they are retired after use. They are only created for NO_x and VOC, both of which are ozone precursors. Regulation 1134 specifies the various components of a typical banking system: qualifying emission reductions, quantifying emission reductions, certifying ERCs, banking and accounting of ERCs, and trading and use of ERCs.

In accordance with Regulation 1134, Section 8.5; for partial facility shutdowns, credit for emission reductions are reduced by the value of 10% of the total reductions to provide a net air quality benefit. For total facility shutdowns, 50% of the created ERCs are allotted to the applicant; 25% are allotted to the Division of Small Business for future economic development purposes; and 25% are immediately retired to provide a net air quality benefit. AQ tracks the creation, transfer, and use of ERCs. AQ does not own or sell credits. ERCs are created at the voluntary request by an applicant. Such requests must be submitted within 1 year after the emission reduction occurs.

ERCs are broken down into "ozone season" and "non-ozone season" for every calendar year. In Regulation 1134, ozone season is defined as the period between April 1 and October 31. Non-ozone season would then be the period between November 1 and March 31.

Certification of Credits

7 DE Admin. Code 1134, Section 4.0 sets the guidelines for generating an Emission Reduction Credit:

"4.1 An emission reduction is valid as an ERC only after certification by the Department. Emission reductions generated for the purpose of creating ERCs must meet, at a minimum, all of the following criteria:

4.1.1 The reductions must be created from decreases of VOC or NO_x emissions;

4.1.2 The emissions must be included in the 1990 or subsequent emission inventory;

4.1.3 The reductions must have occurred after January 1, 1991;

4.1.4 The emission reduction must be equal to or greater than one ton per year; and

4.1.5 The reductions must be real, surplus, permanent, quantifiable, and enforceable."

In accordance with 7 **DE Admin. Code** 1134, Section 4.0, facilities that would like to create ERCs from shutdowns of facilities and/or equipment are required to submit an application for certification of an emission reduction to AQ. AQ reviews each application to determine if the reductions are real, surplus, permanent, quantifiable, and enforceable as defined in Section 2.0 of Regulation 1134:

“Real (reductions) means reductions in actual emissions released into the atmosphere.”

“Surplus (reductions) means actual emission reductions below the baseline (see 6.0 of this regulation) not required by regulations or proposed regulations, and not used by the source to meet any state or federal regulatory requirement.⁷”

“Enforceable means any standard, requirement, limitation or condition established by an applicable federal or state regulation or specified in a permit issued or order entered thereunder, or contained in a SIP approved by the Administrator of the U.S. Environmental Protection Agency (EPA), and which can be enforced by the Department and the Administrator of the EPA.”

“Permanent (reductions) means that the actual emission reductions submitted to the Department for certification have been incorporated in a permit or a permit condition or, in the case of a shutdown, the permit to operate for the emission unit or units has been voided.”

“Quantifiable (reductions) means that the amount, rate and characteristics of emission reductions can be determined by methods that are considered reliable by the Department and the Administrator of the EPA.”

⁷ In order to establish the amount of an emission reduction that is surplus and thus eligible for credit, an ozone season and a non-ozone season emission baseline must be established for each emission unit or units associated with a particular emission reduction. The formula for calculation of the ozone season and non-ozone season emission baselines can be found in 7 **DE Admin. Code** 1134, Section 6.3.

Table 1 lists all facilities/businesses contributing to the Total Certified ERCs, starting from the most recent activity:

Table 1 – Individual Facility/Business ERC Contributions in Delaware

Facility/Business Name and Activity Date	VOC (tons)		NO _x (tons)	
	Ozone Season	Non- Ozone Season	Ozone Season	Non- Ozone Season
Transfer of all ERCs from Formosa to Veolia 9/11/19	-	-	-	-
Formosa Shutdown 5/21/19:	26	21	14	14
<i>Held by Formosa</i>	13	11	7	7
<i>Held by Division of Small Business</i>	7	5	4	3
<i>Retired by DNREC</i>	6	5	3	4
Transfer of all ERCs from Chemours to Diamond State Port Corporation 5/15/18	-	-	-	-
Chemours Edge Moor Shutdown 12/28/17:	68	48	18	13
<i>Held by Chemours</i>	34	24	9	7
<i>Held by Division of Small Business</i>	17	12	5	3
<i>Retired by DNREC</i>	17	12	4	3
Kaneka Shutdown 1/29/04:	11	7	3	1
<i>Held by DCI</i>	4	2	1	1
<i>Held by Division of Small Business</i>	2	2	1	0
<i>Retired by DNREC</i>	3	2	1	0
<i>Used by Uniqema under Coastal Zone Regulations</i>	2 -- 1 from DCI and 1 from DEDO	1 from DCI	0	0

Facility/Business Name and Activity Date	VOC (tons)		NO _x (tons)	
	Ozone Season	Non- Ozone Season	Ozone Season	Non- Ozone Season
DuPont Holly Run Shutdown:	0	0	13	9
<i>Held by DuPont</i>	0	0	0	0
<i>Held by Division of Small Business</i>	0	0	3	2
<i>Retired by DNREC</i>	0	0	3	2
<i>Used by DuPont as part of Red Lion NOX Compliance Program</i>	0	0	7 from DuPont	5 from DuPont
Metachem Shutdown:	31	21	36	27
<i>Held by Division of Small Business</i>	23	16	27	20
<i>Retired by DNREC</i>	8	5	9	7
Lafarge Shutdown:	7	4	45	28
<i>Held by Lafarge</i>	3	2	0	0
<i>Held by Division of Small Business</i>	2	1	11	7
<i>Retired by DNREC</i>	2	1	11	7
<i>Used in Main Channel Deepening</i>			23 from Lafarge	14 from Lafarge
VPI Mirrex Shutdown:	12	8	3	1
<i>Held by VPI</i>	6	4	1	1
<i>Held by Division of Small Business</i>	3	2	1	0
<i>Retired by DNREC</i>	3	2	1	0
Chrysler Shutdown 10/12/10:	233	156	17	40
<i>Held by 1734 LLC</i>	117	78	9	20
<i>Held by Division of Small Business</i>	58	39	4	10
<i>Retired by DNREC</i>	58	39	4	10
Calpine Switch to Gas:	0	0	181	128
<i>Held by Calpine</i>	0	0	27	19
<i>Retired by DNREC</i>	0	0	17	12
<i>Used by Garrison Energy Center, LLC</i>	0	0	81	57
<i>Used by Hay Road Energy Center Compressor Upgrade</i>	0	0	56	40

Facility/Business Name and Activity Date	VOC (tons)		NO _x (tons)	
	Ozone Season	Non- Ozone Season	Ozone Season	Non- Ozone Season
NRG Energy Center	0	0	135	163
<i>Held by NRG</i>	0	0	121	147
<i>Retired by DNREC</i>	0	0	14	16
NRG Indian River	3	2	370	266
<i>Held by NRG</i>	3	2	333	239
<i>Retired by DNREC</i>	0	0	37	27
Total Certified:	391	267	835	690

Current Bank totals are determined by subtracting Delaware's Total Used/Retired ERCs from all available Total Certified Credits. **Table 2** breaks these totals down further:

Table 2 – Certified, Used, Retired and Bank ERCs

Retired/Used by	VOC (tons)		NO _x (tons)	
	Ozone Season	Non-Ozone Season	Ozone Season	Non-Ozone Season
Total Certified:	391	267	835	690
<i>Retired</i>	-97	-66	-104	-88
<i>From Division of Small Business, Used by FujiFilm (December 2021)</i>	-1	0	-1	-1
<i>From Division of Small Business, Used by ArgoRefiner (2020)</i>	-1	-1	0	-1
<i>Used by Veolia (September 2019)</i>	-9	-9	-3	-2
<i>From Division of Small Business, Used by Essential Minerals (2018)</i>	0	-2	0	-1
<i>From Division of Small Business, Used by NALCO (2016)</i>	0	0	0	-1
<i>From Division of Small Business, Used by MAGCO (2016)</i>	0	0	0	-3
<i>From Division of Small Business, Used by Green Recovery Technologies (2015)</i>	-1	-1	-4	-3
<i>From Division of Small Business, Used by TECHMER (2015)</i>	-4	-4	0	0
<i>From Division of Small Business, Used by CRODA (2014)</i>	-3	-1	-2	-1
<i>From Division of Small Business, Used by MAGCO (2009)</i>	0	0	-8	-5
<i>From Division of Small Business, used by Grantham Lane Associates(2009)</i>	0	0	-1	-1
<i>From Division of Small Business, Used by Tapeta under Coastal Zone Regulations (2007)</i>	-1	0	-3	-2
<i>From Division of Small Business, Used by Voight and Schweitzer under Coastal Zone Regulations (2007)</i>	0	0	-4	-3
<i>From DCI /Division of Small Business(VOC 1-nonozone), Used by Uniqema under Coastal Zone Regulations (2004)</i>	-2	-1	0	0

Retired/Used by	VOC (tons)		NOX (tons)	
	Ozone Season	Non-Ozone Season	Ozone Season	Non-Ozone Season
<i>From Division of Small Business, Used by Ion Power under Coastal Zone Regulations (2004)</i>	-1	0	0	0
<i>From the Baltimore, Maryland Severe Nonattainment Area, Used by RecyClean Plastics under Coastal Zone Regulations (2002)*</i>	0	0	-1	-1
<i>From the Baltimore, Maryland Severe Nonattainment Area, Used by Printpack under Coastal Zone Regulations (2001)*</i>	-23	-12	-2	-1
<i>Used by DuPont as part of Red Lion NOx Compliance Program</i>	0	0	-7	-5
<i>From Lafarge; used in Main Channel Deepening</i>	0	0	-23	-14
<i>From Division of Small Business; used by CRODA</i>	-3	-1	-2	-1
<i>From Division of Small Business; used by PBF</i>	-11	-16	0	0
<i>Used by Garrison Energy Center, LLC</i>	0	0	-81	-57
<i>Used by Hay Road Energy Center Compressor Upgrade</i>	0	0	-56	-40
Total Retired/Used	-157	-114	-302	-231
Total In Bank	234	153	533	459

*These ERCs were purchased from Maryland but were applied to a project that was located in Delaware. Therefore, the potential emissions that were offset were originated from Delaware.

The current status of all ERCs certified by the Department pursuant to 7 DE Admin. Code 1134, Emission Banking and Trading Program, since its inception are shown in **Table 3**:

Table 3 - The current ERCs in Delaware, as of 12/31/21.

Held By	VOC (tons)		NO _x (tons)	
	Ozone Season	Non-Ozone Season	Ozone Season	Non-Ozone Season
<i>1734 LLC</i>	117	78	9	20
<i>Calpine</i>	0	0	27	19
<i>Delaware City Industries (DCI)</i>	4	2	1	1
<i>Diamond State Port Corporation</i>	34	24	9	7
<i>DuPont</i>	0	0	0	0
<i>Lafarge</i>	3	2	0	0
<i>NRG Energy Center</i>	0	0	121	147
<i>NRG Indian River</i>	3	2	333	239
<i>Veolia</i>	4	2	4	5
<i>VPI</i>	6	4	1	1
<i>Division of Small Business</i>	86	51	31	22
Total Currently in Delaware's Bank (12/31/21)	257	165	536	461

PROGRAM EVALUATION:

As part of the ERC program audit, AQ is required to evaluate the effectiveness of the program, as specified in Regulation 1134, Section 14.2:

“The Department shall conduct an audit of the emission banking and trading program within three years from October 6, 1997, and every three years thereafter to ensure that the program is achieving the goals specified in 1.0 of this regulation. The audits will evaluate whether the emission banking and trading program:

14.2.1 Is consistent with the maintenance of NAAQS and does not interfere with Reasonable Further Progress (RFP) towards attainment of NAAQS;

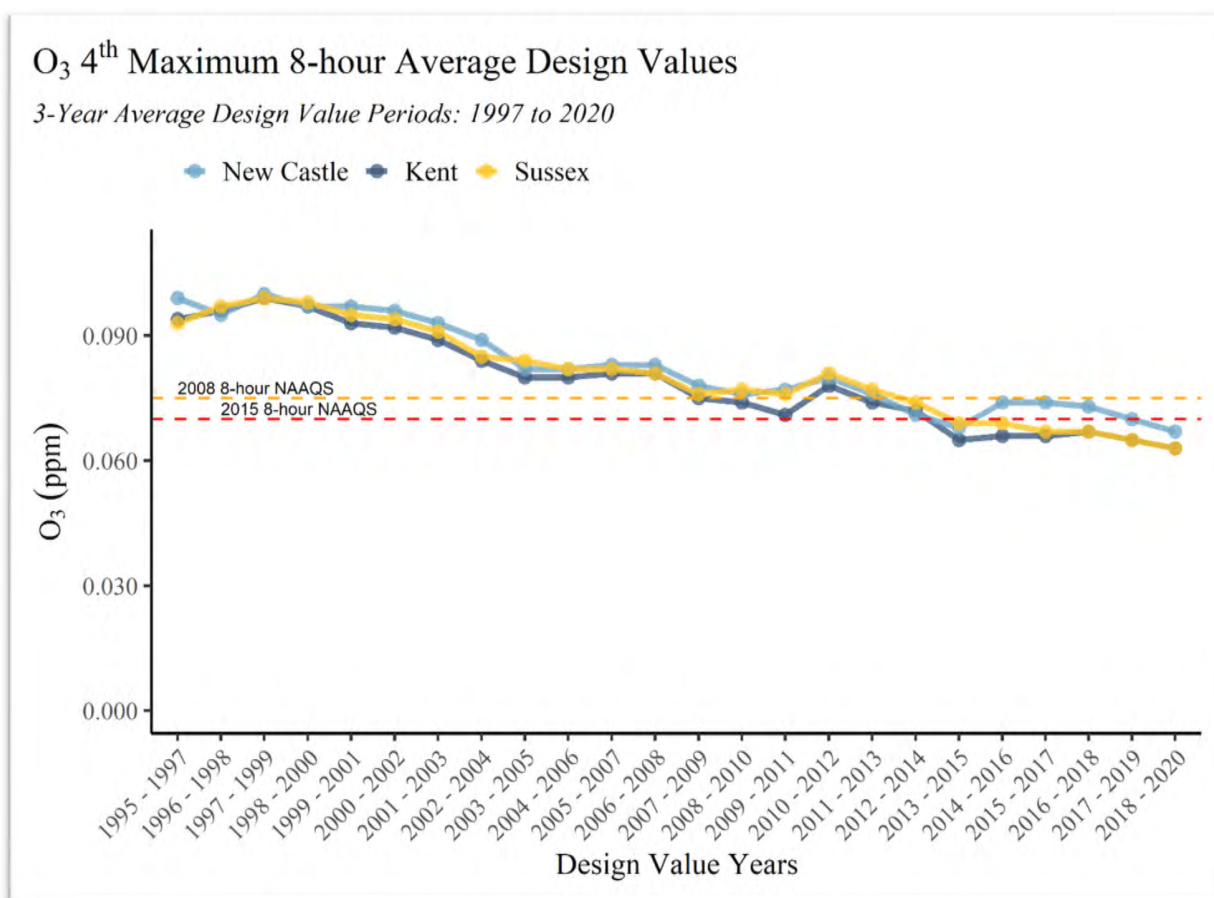
14.2.2 Requirements for monitoring, record keeping, reporting and enforcement have resulted in a sufficiently high level of compliance; and

14.2.3 Has caused any localized adverse effects to the public health, safety or welfare or the environment.”

14.2.1: Consistent with NAAQS

As shown below in **Figure 2**, ozone levels in Delaware have steadily declined since 1997. In addition, the most recent ozone levels for 2020 are below the 2015 8-hour ozone NAAQS of 0.070 ppm (80 FR 65292)⁸. The continued decrease in ambient ozone concentrations demonstrates that the offset program is consistent with the maintenance of NAAQS.

Figure 2 – County Level Ozone Values in Delaware



14.2.1: Does Not Interfere with Reasonable Further Progress (RFP) towards attainment of NAAQS

Reasonable further progress means incremental reductions in emission of an air pollutant which are sufficient to provide for attainment of the NAAQS. Every three years, Delaware conducts an emissions inventory which is an accounting of the amount of pollutants discharged into the atmosphere. These inventories included the calculation of VOCs and NO_x air emissions. Actual VOC and NO_x missions from facilities are reported directly to AQ. Therefore, once a company has shut down there will be no more emissions from that facility and/or unit in the inventory.

⁸ Ibid. 1.

Changes in emissions over time can be analysed by looking at differences between individual inventories. For the purposes of the 1997 8-hour Ozone NAAQS, the Clean Air Act requires a demonstration that areas classified moderate and above, demonstrate Reasonable Further Progress (RFP) towards attainment of the NAAQS by achieving at least a 15% emissions reduction of VOCs and NO_x⁹.

Delaware developed a 2002 Base Year Inventory for the purposes of calculating Reasonable Further Progress for the Delaware portion of the Philadelphia 1997 8-hour ozone moderate non-attainment area (75 FR 2452)¹⁰ (Tables 4 and 5).

Table 4 - 2002 Base Year VOC Emissions by Source Sector¹¹

Source Sector	Summer Season Weekday¹² (TPD)			
	Kent	New Castle	Sussex	State Total
Point	0.49	9.42	13.35	23.26
Non-point	5.75	20.02	7.31	33.08
On-road	5.45	16.98	9.95	32.38
Non-road	5.17	12.24	9.36	26.77
All Sectors	16.86	56.66	39.97	115.49

Table 5 - 2002 Base Year NO_x Emissions by Source Sector¹³

Source Sector	Summer Season Weekday¹⁴ (TPD)			
	Kent	New Castle	Sussex	State Total
Point	5.06	44.09	24.95	74.10
Non-point	0.45	1.95	0.77	3.17
On-road	13.97	36.56	18.50	69.03
Non-road	15.02	24.62	13.15	52.79
All Sectors	34.50	107.22	57.37	199.09

⁹ Approval and Promulgation of Air Quality Implementation Plans; Delaware; Reasonable Further Progress Plan, 2002 Base Year Inventory, Reasonably Available Control Measures, Contingency Measures, and Transportation Conformity Budgets for the Delaware Portion of the Philadelphia 1997 8-Hour Ozone Moderate Nonattainment Area. EPA Proposed Rule. 75 FR 2452. January 15, 2010. <https://www.govinfo.gov/content/pkg/FR-2010-01-15/pdf/2010-745.pdf>

¹⁰ Ibid. 5.

¹¹ Ibid. 4.

¹² The 2002 Base Year Inventory for the 1997 8 hour Ozone Non-attainment Area for the purposes of determining Reasonable Further Progress were calculated for Summer Season Weekdays: weekdays in June, July, and August.

¹³ Ibid. 4.

¹⁴ Ibid 4.

In **Tables 6 and 7**, a reduction of 15% was applied to the 2002 Base Year Inventory data, to calculate the 15% RFP reduction.

Table 6 - 2002 VOC Emissions – Reasonable Further Progress, 15% Reduction

Source Sector	Summer Season Weekday (TPD)			
	Kent	New Castle	Sussex	State Total
Point	0.42	8.01	11.35	19.78
Non-point	5.66	17.02	6.21	28.89
On-road	5.37	14.43	8.46	28.26
Non-road	5.09	10.40	7.96	23.45
All Sectors	16.54	49.86	33.98	100.38

Table 7 - 2002 NOx Emissions – Reasonable Further Progress, 15% Reduction

Source Sector	Summer Season Weekday (TPD)			
	Kent	New Castle	Sussex	State Total
Point	4.30	37.48	21.21	62.99
Non-point	0.38	1.66	0.65	2.69
On-road	11.87	31.08	15.73	58.68
Non-road	12.77	20.93	11.18	44.88
All Sectors	29.32	91.15	48.77	169.24

The 2002 Base Year Inventory totals were also compared to inventory data from the most recent Emissions Inventory in 2017 (**Tables 8 and 9**), to determine what percentage change in emissions has occurred between 2002 and 2017. As shown in **Tables 8 and 9**; there has been an overall decrease in emissions from 2002-2017 of 54.46% for VOCs and 67.31% for NOx.

Table 8 - 2017 VOC Emissions by Source Sector¹⁵

Source Sector	Annual (TPD)				Total % Decrease from 2002
	Kent	New Castle	Sussex	State Total	
Point	0.27	2.05	0.20	2.52	
Non-point	3.58	9.01	6.30	18.90	
On-road	2.24	5.94	3.57	11.74	
Non-road	3.87	6.15	9.41	19.43	
All Sectors	9.97	23.15	19.48	52.59	54.46%

Table 9 - 2017 NOx Emissions by Source Sector¹⁶

Source Sector	Annual (TPD)				Total % Decrease from 2002
	Kent	New Castle	Sussex	State Total	
Point	0.42	6.86	0.65	7.92	
Non-point	1.13	3.95	2.55	7.63	
On-road	5.10	14.07	8.14	27.31	
Non-road	5.17	8.64	8.42	22.23	
All Sectors	11.82	33.52	19.75	65.09	67.31%

To determine if the 15% RFP reduction has been achieved, the total statewide inventory for 2017 (**Tables 8 and 9**) was added to the tons of banked ERCs that are still available for use, adjusted to Tons Per Day (Table 3), and compared to the total statewide 15% RFP tons in **Tables 6 and 7**. For both VOCs and NOx, the 2017 totals + the total ERCs available were below the calculated 15% RFP in **Tables 6 and 7**:

VOC

$$2017 \text{ total (52.59 TPD)} + \frac{\text{Total ERCs}}{365} \left(\frac{257+165}{365} \right) = \mathbf{53.75 \text{ TPD}} \leq 15\% \text{ RFP (100.38 TPD)}$$

NOx

$$2017 \text{ total (65.09 TPD)} + \frac{\text{Total ERCs}}{365} \left(\frac{536+461}{365} \right) = \mathbf{67.82 \text{ TPD}} \leq 15\% \text{ RFP (169.24 TPD)}$$

¹⁵ 2017 Annual emissions are used for comparison to the 2002 data, since 7 DE Admin. Code 1134 applies to the entire year, not just Summer Season Weekdays.

¹⁶ Ibid. 14.

14.2.2: Program Compliance

Facilities that would like to create ERCs from shutdowns of facilities and/or equipment are required to submit an application for certification of an emission reduction to AQ. AQ then reviews the request to determine if it is true, accurate and complete. To ensure that the ERCs are permanent, AQ conducts inspections to ensure that facilities are permanently shut down. Periodic inspections of operating facilities ensure that specific pieces of equipment are permanently rendered inoperable, or removed from the site.

14.2.3 Effects to the Public Health, Safety or Welfare or the Environment

As shown in **Figure 2**, the most recent ozone levels for 2020 are below the 2015 8-hour ozone NAAQS of 0.070 ppm. Therefore, Delaware is currently meeting the current health based ozone NAAQS.

CONCLUSION

This report shows that the program, as outlined by 7 DE Admin Code 1134, is meeting the goals listed in sections 1.0 and 14.2 of the regulation. The Division of Air Quality does not recommend any changes to the regulation at this time.

Appendix H

SSWD

Output_Database	mveb_c10003_y2023_annual_out
OutputTable	MOVESrunOutput
TimeAggregation_Input	24-hr
dayID	5

Sum of emissionQuant	Column Labels		
Row Labels	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
6	65.2	7.9	4.0
7	73.8	7.7	4.2
8	71.5	7.7	4.2
SSWD Average	70.2	7.75	4.15

Based of the Sum(Daily Emission) ... Can be added to give the correct Annual totals ...
If all the Hours, DayTypes & Months are included

TimeAggregation_Input	24-hr
-----------------------	-------

Sum of Daily Emission		Pollutant		
monthID	dayID	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
1	2	387.3	55.9	25.0
	5	1169.1	166.1	73.2
2	2	351.5	52.2	22.2
	5	1058.1	155.0	64.8
3	2	400.9	59.9	25.8
	5	1207.0	178.0	74.6
4	2	371.3	59.4	25.6
	5	1115.7	176.5	73.7
5	2	389.3	59.9	29.1
	5	1165.2	177.7	83.8
6	2	467.5	57.0	30.4
	5	1396.4	169.2	86.2
7	2	546.8	57.1	33.1
	5	1634.8	169.6	93.9
8	2	531.5	57.4	32.5
	5	1584.3	170.4	92.5
9	2	412.2	54.3	28.7
	5	1230.0	161.3	81.7
10	2	384.2	58.4	26.8
	5	1153.8	173.4	76.9
11	2	384.3	57.7	25.2
	5	1158.0	171.5	72.4
12	2	406.1	59.9	25.4
	5	1224.8	178.1	74.1
Grand Total		20129.8	2736.0	1277.7

Based of the Sum(Daily Emission) ... Can be added to
 give the correct Annual totals ... If all the Hours,
 DayTypes & Months are included

TimeAggregation_Input 24-hr

Sum of Daily Emission	Column Labels		
Row Labels	Carbon Monoxide (CO)	Oxides of Nitrogen (NOx)	Volatile Organic Compounds
2201110101	0	0	0
2201110102	4.198761414	0.106882647	0.537607062
2201110111			4.282835361
2201110112			19.56452123
2201110113			9.527822657
2201110115	0	0	0
2201110116	0	0	0
2201110118			0.008990109
2201110119			0.001141817
2201110201	42.23471116	2.38101434	1.904214393
2201110215	0	0	0
2201110218			0.207212716
2201110219			0.026652638
2201110301	134.971139	7.467520719	6.817897701
2201110311			0.007922905
2201110312			3.026528771
2201110313			0.165773979
2201110315	0	0	0
2201110318			0.63241292
2201110319			0.081346031
2201110401	101.8877445	5.660542574	4.89517157
2201110411			0.005186437
2201110412			1.9827731
2201110413			0.108640904
2201110415	0	0	0
2201110418			0.486215721
2201110419			0.062733454
2201110501	222.1050137	10.32309837	15.25970835
2201110511			0.025136797
2201110512			9.571914473
2201110513			0.524296149
2201110515	0	0	0
2201110518			1.049250652
2201110519			0.135281715
2201210101	21.99843353	2.78987599	2.090577497
2201210102	1483.928944	73.31533357	112.8184609
2201210111			45.16502839
2201210112			98.43420043
2201210113			108.1520319
2201210115	0.011439182	0.000111595	0.027595627
2201210116	0.771643334	0.002932612	1.489202853
2201210118			0.475878861
2201210119			0.650381874
2201210201	535.2233743	22.15198033	3.938447516
2201210215	0.278316417	0.000886078	0.051987494
2201210218			0.42368558
2201210219			0.574176187
2201210301	1178.719004	50.927443	10.89875317

2201210311			0.281853621
2201210312			3.206852899
2201210313			7.124185357
2201210315	0.612934177	0.0020371	0.143863523
2201210318			1.073200913
2201210319			1.449128407
2201210401	1511.609671	65.55279886	12.823675
2201210411			0.316162384
2201210412			3.60600938
2201210413			8.012564643
2201210415	0.78603777	0.002622114	0.169272556
2201210418			1.344712747
2201210419			1.825388959
2201210501	3256.274893	116.3237427	34.54301277
2201210511			1.171555977
2201210512			13.30447236
2201210513			29.5572257
2201210515	1.693263173	0.004652953	0.455967631
2201210518			2.901692843
2201210519			3.904812896
2201310101	31.877618	2.661480249	1.913978157
2201310102	1256.972793	80.559983	96.60398543
2201310111			26.71419296
2201310112			45.13336606
2201310113			72.33443086
2201310115	0.016576356	0.000106459	0.025264513
2201310116	0.653625597	0.003222401	1.275173353
2201310118			0.738038847
2201310119			0.782504153
2201310201	680.1877843	28.27652144	4.741638966
2201310215	0.353697795	0.001131061	0.062589597
2201310218			0.904057403
2201310219			0.937658111
2201310301	1544.70408	71.61729929	14.28923054
2201310311			0.297639746
2201310312			2.721676163
2201310313			7.569015971
2201310315	0.803246143	0.002864692	0.188617793
2201310318			2.472296051
2201310319			2.555822411
2201310401	1376.732616	61.73751571	11.3091986
2201310411			0.221384009
2201310412			2.027878754
2201310413			5.640684886
2201310415	0.715900941	0.002469501	0.149281472
2201310418			2.075148056
2201310419			2.156434579
2201310501	2760.266253	111.388335	31.77410309
2201310511			0.877202894
2201310512			8.002414043
2201310513			22.25518466
2201310515	1.435336326	0.004455538	0.419418812
2201310518			4.568973923
2201310519			4.704425783
2201320101	6.514710057	0.839284707	0.465769825
2201320102	1097.042369	59.29845329	65.75391757
2201320111			15.54802324
2201320112			24.2964929
2201320113			35.25773587
2201320115	0.003387648	3.35714E-05	0.006148164
2201320116	0.570462091	0.00237194	0.867951627
2201320118			0.22321328

2201320119			0.233549472
2201320201	66.35951871	3.960774657	0.616891654
2201320215	0.034506936	0.000158431	0.008142964
2201320218			0.106168622
2201320219			0.106317469
2201320301	168.6190823	10.2030564	2.114375667
2201320311			0.033736218
2201320312			0.337208405
2201320313			0.81702261
2201320315	0.087681839	0.000408123	0.027909752
2201320318			0.286014375
2201320319			0.285442802
2201320401	192.9541913	12.09446454	2.160682417
2201320411			0.034325673
2201320412			0.345184878
2201320413			0.836633534
2201320415	0.100336202	0.000483779	0.028521015
2201320418			0.331199292
2201320419			0.33275394
2201320501	412.3812896	21.62712004	6.979065471
2201320511			0.124556076
2201320512			1.242725507
2201320513			3.01112438
2201320515	0.214438479	0.000865085	0.092123748
2201320518			0.692459831
2201320519			0.689166824
2201410101	0.872997209	0.01875544	0.045004269
2201410102	0.43412712	0.03558994	0.04088987
2201410111			-0.000247008
2201410112			-7.8091E-05
2201410113			0.001010848
2201410115	0.000453959	7.50217E-07	0.000594057
2201410116	0.000225746	1.4236E-06	0.000539746
2201410118			0.046303001
2201410119			0.005699802
2201410201	28.18382426	0.206149909	0.154566798
2201410215	0.014655595	8.246E-06	0.002040282
2201410218			0.106553911
2201410219			0.013095422
2201410301	30.36838221	0.309210392	0.216102158
2201410311			0.000957139
2201410312			0.002934534
2201410313			0.006759367
2201410315	0.015791566	1.23684E-05	0.002852548
2201410318			0.186478439
2201410319			0.022921527
2201410401	35.41953733	0.310413201	0.217738778
2201410411			0.00072839
2201410412			0.002246276
2201410413			0.005175796
2201410415	0.01841816	1.24165E-05	0.002874151
2201410418			0.172637686
2201410419			0.021282857
2201410501	28.11264741	0.428570485	0.387372509
2201410511			0.002857159
2201410512			0.008741949
2201410513			0.0201369
2201410515	0.014618577	1.71428E-05	0.005113314
2201410518			0.31634859
2201410519			0.038959229
2201420101	0.210620632	0.004508043	0.010849834
2201420102	1.452226616	0.119237173	0.137005577

2201420111			0.005652889
2201420112			0.028138414
2201420113			0.012163032
2201420115	0.000109523	1.80322E-07	0.000143218
2201420116	0.000755158	4.76948E-06	0.001808474
2201420118			0.011847553
2201420119			0.001466237
2201420201	8.336258414	0.063422007	0.046314673
2201420215	0.00433485	2.53688E-06	0.000611353
2201420218			0.033438573
2201420219			0.004109398
2201420301	9.188400857	0.098315653	0.064899475
2201420311			0.000518508
2201420312			0.000974007
2201420313			0.002243295
2201420315	0.004777966	3.93263E-06	0.000856674
2201420318			0.060247416
2201420319			0.007404606
2201420401	12.80279647	0.118170794	0.080724459
2201420411			0.00052159
2201420412			0.000921094
2201420413			0.002122148
2201420415	0.006657446	4.72683E-06	0.001065563
2201420418			0.067509699
2201420419			0.008322551
2201420501	9.736958186	0.147605598	0.119226672
2201420511			0.001654086
2201420512			0.002970462
2201420513			0.006841735
2201420515	0.005063217	5.90423E-06	0.001573791
2201420518			0.108316903
2201420519			0.013336882
2201430101	0.022941093	0.000849247	0.001536639
2201430102	0.236321171	0.012037827	0.015509355
2201430111			0.003705428
2201430112			0.007442493
2201430113			0.006223874
2201430115	1.19294E-05	3.39699E-08	2.02836E-05
2201430116	0.000122887	4.81513E-07	0.000204724
2201430118			0.000975162
2201430119			0.000120834
2201430201	0.589437769	0.013569938	0.004730862
2201430215	0.000306507	5.42798E-07	6.24474E-05
2201430218			0.003679409
2201430219			0.000452187
2201430301	0.934804379	0.028716679	0.010755429
2201430311			5.28216E-05
2201430312			0.000634911
2201430313			0.000778821
2201430315	0.000486097	1.14867E-06	0.000141972
2201430318			0.008148904
2201430319			0.001001128
2201430401	0.719537087	0.019905224	0.007119746
2201430411			3.0613E-05
2201430412			0.000376124
2201430413			0.000461533
2201430415	0.000374159	7.96209E-07	9.39807E-05
2201430418			0.005504044
2201430419			0.000678411
2201430501	1.142107736	0.041512907	0.022039617
2201430511			0.000124547
2201430512			0.00149942

2201430513			0.001839353
2201430515	0.000593896	1.66052E-06	0.000290923
2201430518			0.012678397
2201430519			0.001559611
2201510101	0.004169231	0.001447703	0.000646519
2201510102	0.014729091	0.000285884	0.000478956
2201510111			0.000491974
2201510112			0.001480466
2201510113			0.003507985
2201510115	2.168E-06	5.79081E-08	8.53404E-06
2201510116	7.65913E-06	1.14354E-08	6.32223E-06
2201510118			9.68866E-05
2201510119			1.17556E-05
2201510201	0.027825605	0.002866752	0.000321978
2201510215	1.44693E-05	1.1467E-07	4.2501E-06
2201510218			0.000144703
2201510219			1.7509E-05
2201510301	0.061102779	0.006483012	0.001059645
2201510311			9.02887E-06
2201510312			3.40785E-05
2201510313			0.000164583
2201510315	3.17735E-05	2.59321E-07	1.39873E-05
2201510318			0.000329559
2201510319			3.98762E-05
2201510401	0.050689495	0.005512885	0.000730621
2201510411			6.55772E-06
2201510412			2.50968E-05
2201510413			0.000121247
2201510415	2.63585E-05	2.20515E-07	9.64421E-06
2201510418			0.00027542
2201510419			3.34256E-05
2201510501	0.085678956	0.0083225	0.002502289
2201510511			1.95927E-05
2201510512			7.56712E-05
2201510513			0.000365471
2201510515	4.45531E-05	3.329E-07	3.30302E-05
2201510518			0.000437035
2201510519			5.30005E-05
2201520101	8.864578943	0.390656176	0.545335683
2201520102	30.47656119	2.581774744	2.048080534
2201520111			0.470043231
2201520112			1.932597554
2201520113			1.550130346
2201520115	0.004609577	1.56262E-05	0.00719843
2201520116	0.015847826	0.000103271	0.02703465
2201520118			0.325819306
2201520119			0.052819565
2201520201	48.67403857	1.455647409	0.437418925
2201520215	0.025310514	5.82259E-05	0.005773933
2201520218			0.445705246
2201520219			0.071907198
2201520301	85.57246586	3.12494229	1.209325931
2201520311			0.014656609
2201520312			0.064223791
2201520313			0.116345309
2201520315	0.044497669	0.000124998	0.015963097
2201520318			1.002156424
2201520319			0.161743537
2201520401	74.43172043	2.515866436	0.840760263
2201520411			0.01035802
2201520412			0.044180841
2201520413			0.080062934

2201520415	0.038704511	0.000100635	0.011098031
2201520418			0.786121306
2201520419			0.127236544
2201520501	92.21063414	4.014836457	2.667553541
2201520511			0.033335731
2201520512			0.140207299
2201520513			0.254003761
2201520515	0.047949544	0.000160594	0.035211694
2201520518			1.417230104
2201520519			0.2293113
2201530101	0.620395547	0.023094629	0.037876073
2201530102	0.303150949	0.021520577	0.021620765
2201530111			0.037751558
2201530112			0.115100627
2201530113			0.103264939
2201530115	0.000322605	9.23785E-07	0.000499965
2201530116	0.000157639	8.60823E-07	0.000285394
2201530118			0.020350177
2201530119			0.003657054
2201530201	2.63326181	0.092256016	0.027615939
2201530215	0.001369296	3.69024E-06	0.00036453
2201530218			0.026995462
2201530219			0.004820094
2201530301	5.599212886	0.214582479	0.076366076
2201530311			0.002173309
2201530312			0.005571465
2201530313			0.007495643
2201530315	0.002911588	8.58329E-06	0.001008032
2201530318			0.064737444
2201530319			0.011568803
2201530401	4.447804609	0.166600432	0.055161689
2201530411			0.001583384
2201530412			0.003996002
2201530413			0.005377085
2201530415	0.002312859	6.66402E-06	0.000728134
2201530418			0.049541221
2201530419			0.008875045
2201530501	6.704894529	0.289684268	0.160611373
2201530511			0.004574157
2201530512			0.011492233
2201530513			0.015461755
2201530515	0.003486542	1.15874E-05	0.002120071
2201530518			0.09349959
2201530519			0.016758748
2201540101	0	0	0
2201540102	4.857286829	0.141443086	0.209353933
2201540111			0.079507497
2201540112			0.062126746
2201540113			0.176049901
2201540115	0	0	0
2201540116	0.002525791	5.65772E-06	0.002763472
2201540118			0.001638283
2201540119			0.000198923
2201540201	14.50302497	0.539722513	0.126247092
2201540215	0.007541577	2.15889E-05	0.001666461
2201540218			0.108456068
2201540219			0.0133295
2201540301	23.46657571	1.100823877	0.31865449
2201540311			0.001397342
2201540312			0.014045647
2201540313			0.029234077
2201540315	0.012202622	4.40329E-05	0.004206233

2201540318			0.227947839
2201540319			0.028003323
2201540401	18.08631963	0.782746191	0.197701052
2201540411			0.00083725
2201540412			0.00849335
2201540413			0.017683742
2201540415	0.009404885	3.13098E-05	0.002609654
2201540418			0.157495363
2201540419			0.019411543
2201540501	25.40830029	1.39315455	0.66571176
2201540511			0.002973001
2201540512			0.029937183
2201540513			0.062312626
2201540515	0.013212314	5.57262E-05	0.008787395
2201540518			0.323624328
2201540519			0.039805486
2201610101	0.000372123	1.74636E-05	3.29186E-05
2201610102	0.000511151	1.66659E-05	1.67622E-05
2201610111			0.000194339
2201610112			0.000620981
2201610113			0.000336676
2201610115	1.93504E-07	6.98545E-10	4.34526E-07
2201610116	2.65798E-07	6.66638E-10	2.21261E-07
2201610118			3.34728E-06
2201610119			4.09012E-07
2201610201	0.007433812	0.000340539	7.9984E-05
2201610215	3.86558E-06	1.36216E-08	1.05579E-06
2201610218			1.31297E-05
2201610219			1.60082E-06
2201610301	0.013422902	0.000633574	0.00016221
2201610311			3.68403E-06
2201610312			1.35933E-05
2201610313			8.87025E-06
2201610315	6.97991E-06	2.5343E-08	2.14117E-06
2201610318			2.50609E-05
2201610319			3.0552E-06
2201610401	0.010121086	0.000474108	0.000116624
2201610411			2.49029E-06
2201610412			9.38386E-06
2201610413			6.12451E-06
2201610415	5.26297E-06	1.89643E-08	1.53943E-06
2201610418			1.84894E-05
2201610419			2.26039E-06
2201610501	0.010463167	0.000515558	0.000173298
2201610511			4.72492E-06
2201610512			1.78813E-05
2201610513			1.16688E-05
2201610515	5.44085E-06	2.06223E-08	2.28754E-06
2201610518			2.19478E-05
2201610519			2.68017E-06
2202210101	0.17238668	0.012720402	0.013753665
2202210102	7.639966129	0.485284696	0.981325753
2202210115	0.000169679	2.44791E-06	8.56466E-05
2202210116	0.006133859	3.51225E-05	0.002314921
2202210118			0
2202210119			0.003689882
2202210201	4.905664229	0.123931308	0.030813504
2202210215	0.003966045	2.03125E-05	0.000162983
2202210218			0
2202210219			0.00360249
2202210301	10.67247443	0.282161015	0.081206359
2202210315	0.008781314	4.65608E-05	0.000451149

2202210318			0
2202210319			0.009085681
2202210401	13.78260069	0.365018297	0.09761485
2202210415	0.01122822	6.00224E-05	0.000530747
2202210418			0
2202210419			0.011450346
2202210501	29.18057121	0.62552769	0.243995348
2202210515	0.02437339	0.000105415	0.001430235
2202210518			0
2202210519			0.024407966
2202310101	7.313834371	8.088346657	1.01323866
2202310102	13.73228847	14.52664999	3.102030223
2202310115	0.013718577	0.00153433	0.008634495
2202310116	0.027938503	0.000878825	0.012349404
2202310118			0
2202310119			0.030930914
2202310201	13.1526148	5.239071143	0.653941937
2202310215	0.027469526	0.001064749	0.006876385
2202310218			0
2202310219			0.041233366
2202310301	34.8901536	16.74029136	2.245794584
2202310315	0.074299824	0.003203315	0.023268796
2202310318			0
2202310319			0.116052343
2202310401	29.38493241	13.04850729	1.739277364
2202310415	0.061591286	0.00255355	0.018038642
2202310418			0
2202310419			0.096167836
2202310501	71.48236486	40.25398614	5.4372871
2202310515	0.152811539	0.007141272	0.054944936
2202310518			0
2202310519			0.218031155
2202320101	1.673312181	2.00688876	0.274134827
2202320102	8.861398843	13.0611342	2.23839871
2202320115	0.004080097	0.000496419	0.002792845
2202320116	0.031249512	0.000958854	0.013686784
2202320118			0
2202320119			0.011282763
2202320201	1.696811501	1.293417526	0.168867098
2202320215	0.005699339	0.000307223	0.002036362
2202320218			0
2202320219			0.006609599
2202320301	4.933518003	3.977504564	0.546575179
2202320315	0.0163166	0.000910385	0.006520338
2202320318			0
2202320319			0.017995867
2202320401	5.483842714	4.287617	0.594303956
2202320415	0.018019264	0.000992521	0.007095306
2202320418			0
2202320419			0.020825316
2202320501	13.93131681	11.7885594	1.665549044
2202320515	0.044818266	0.002584278	0.019473978
2202320518			0
2202320519			0.043211736
2202410101	3.265072284	7.896045943	0.172853067
2202410102	0.109755675	0.095423303	0.018580923
2202410115	0.096391257	0.107744971	0.060370289
2202410116	0.0297218	4.43677E-07	2.61608E-05
2202410118			0
2202410119			0.023170916
2202410201	3.070005269	4.838698557	0.075830105
2202410215	0.064966933	0.053498999	0.026643768

2202410218			0
2202410219			0.047940688
2202410301	6.410175443	10.72345374	0.175387408
2202410315	0.146640464	0.12465445	0.061559924
2202410318			0
2202410319			0.087518254
2202410401	5.409149829	8.649510186	0.139385805
2202410415	0.120979836	0.097361086	0.048800095
2202410418			0
2202410419			0.079018713
2202410501	15.08187141	28.55769683	0.474998467
2202410515	0.331842979	0.362435269	0.168455243
2202410518			0
2202410519			0.160535655
2202420101	0.781660759	1.81339422	0.045590462
2202420102	0.367248095	0.320148211	0.062300291
2202420115	0.028033324	0.023808783	0.015668829
2202420116	0.099733018	1.47988E-06	8.75984E-05
2202420118			0
2202420119			0.00592169
2202420201	0.958340133	1.368137711	0.026340094
2202420215	0.025535482	0.015236609	0.00906409
2202420218			0
2202420219			0.014919647
2202420301	2.038206696	3.047836464	0.061413621
2202420315	0.057737449	0.035606675	0.021156829
2202420318			0
2202420319			0.028345686
2202420401	2.133389204	3.087888286	0.061835993
2202420415	0.059748998	0.035257208	0.021251129
2202420418			0
2202420419			0.030973499
2202420501	4.816531163	8.2818216	0.165745774
2202420515	0.13000769	0.105298204	0.057949183
2202420518			0
2202420519			0.055039024
2202430101	0.526480596	1.30382911	0.101526017
2202430102	0.5262122	0.460508621	0.10862315
2202430115	0.01774515	0.015089007	0.011463714
2202430116	0.107196475	1.15346E-06	0.000734455
2202430118			0
2202430119			0.005077155
2202430201	0.97259747	2.08777269	0.119777586
2202430215	0.032292175	0.014566827	0.012955799
2202430218			0
2202430219			0.020189677
2202430301	2.500840437	5.2368107	0.337078865
2202430315	0.0831979	0.040935071	0.036979538
2202430318			0
2202430319			0.045152515
2202430401	1.615746191	3.343143217	0.211656565
2202430415	0.053858384	0.024985387	0.022863463
2202430418			0
2202430419			0.030422859
2202430501	4.580681226	10.43576653	0.678315016
2202430515	0.144434454	0.093665272	0.078974921
2202430518			0
2202430519			0.071100608
2202510101	0.513594304	1.341527167	0.064940158
2202510102	0.048127196	0.040206968	0.005301029
2202510115	0.009707494	0.016079455	0.008379312
2202510116	0.016089113	5.42586E-09	3.65781E-05

2202510118			0
2202510119			0.003447012
2202510201	0.309704672	0.637837007	0.019925859
2202510215	0.005173452	0.004696077	0.002372162
2202510218			0
2202510219			0.00516208
2202510301	0.769717839	1.50105117	0.052786775
2202510315	0.01304853	0.012536421	0.006220607
2202510318			0
2202510319			0.010674624
2202510401	0.610780303	1.204420759	0.041002494
2202510415	0.010407175	0.009350808	0.004744235
2202510418			0
2202510419			0.009243652
2202510501	1.391840609	2.763286864	0.099857293
2202510515	0.021839152	0.027737948	0.012662481
2202510518			0
2202510519			0.014584787
2202520101	24.74184163	40.41866579	2.548171477
2202520102	2.839401644	5.72030588	2.44837835
2202520115	0.297068458	0.347954227	0.268047881
2202520116	0.601666837	0.00032215	0.009710097
2202520118			0
2202520119			0.115627817
2202520201	15.38477633	20.08215987	0.973276071
2202520215	0.166276355	0.114786068	0.082450412
2202520218			0
2202520219			0.202334707
2202520301	39.93912094	55.35407057	2.780972004
2202520315	0.446063991	0.359767147	0.248598514
2202520318			0
2202520319			0.451581723
2202520401	29.30778267	38.96263957	1.96456961
2202520415	0.32387251	0.238074579	0.169889084
2202520418			0
2202520419			0.354753987
2202520501	72.73573471	112.5668904	5.420339757
2202520515	0.790755179	0.84380119	0.532521197
2202520518			0
2202520519			0.637339447
2202530101	1.521836	2.543095227	0.14538297
2202530102	0.031739866	0.068196347	0.018083654
2202530115	0.014588726	0.022328066	0.015730782
2202530116	0.008510962	2.16927E-06	5.90727E-05
2202530118			0
2202530119			0.007797611
2202530201	0.937995704	1.129339036	0.056739699
2202530215	0.008436428	0.007027979	0.004737518
2202530218			0
2202530219			0.013141069
2202530301	2.450150624	3.111068994	0.155734705
2202530315	0.022245418	0.020987556	0.013616398
2202530318			0
2202530319			0.031329111
2202530401	1.821469729	2.252451381	0.113689729
2202530415	0.016491393	0.014763651	0.009738683
2202530418			0
2202530419			0.024051557
2202530501	4.35746908	6.2844302	0.293767818
2202530515	0.038766281	0.048038444	0.028459167
2202530518			0
2202530519			0.045276136

2202540101	0	0	0
2202540102	0.115953976	0.063270225	0.009033692
2202540115	0	0	0
2202540116	0.01837338	5.50622E-07	0.000102252
2202540118			0
2202540119			8.07008E-05
2202540201	0.528403579	1.1373627	0.077465262
2202540215	0.013758276	0.005845743	0.005933823
2202540218			0
2202540219			0.007865951
2202540301	1.372766437	2.783693841	0.209906173
2202540315	0.034299668	0.017490395	0.016530432
2202540318			0
2202540319			0.017203209
2202540401	0.86731037	1.770017771	0.130632206
2202540415	0.022157005	0.010111778	0.010071977
2202540418			0
2202540419			0.011670561
2202540501	2.52303344	5.152709971	0.396373405
2202540515	0.056739435	0.040222829	0.032980421
2202540518			0
2202540519			0.025721895
2202610101	9.474036157	26.18644036	0.920753334
2202610102	0.780999851	0.807123779	0.228575316
2202610115	0.09633924	0.385171563	0.244535499
2202610116	0.336109615	0	0.000578886
2202610118			0
2202610119			0.064910101
2202610201	15.538301	28.79543383	0.7843398
2202610215	0.145554123	0.353563304	0.202441945
2202610218			0
2202610219			0.254622685
2202610301	32.94960861	59.91409543	1.653348246
2202610315	0.308734233	0.754488199	0.421905476
2202610318			0
2202610319			0.486399639
2202610401	23.47981956	42.61167286	1.179253201
2202610415	0.22070871	0.530553017	0.301242907
2202610418			0
2202610419			0.360302985
2202610501	37.5421742	69.27567329	1.830749383
2202610515	0.332558383	0.93093111	0.46662976
2202610518			0
2202610519			0.421118155
2202620101	11.30726601	31.31061799	1.26724051
2202620102	0.511159577	0.471381091	0.035786354
2202620115	0.150490379	0.421682521	0.273509534
2202620116	0.212969114	0	0.00016356
2202620117	0.411078857	0.399118325	0.547950399
2202620118			0
2202620119			0.165040507
2202620190	33.05517634	47.54391914	3.770851289
2202620191	1.19078478	2.256031166	0.181771028
2202620201	149.438576	305.582222	8.6366293
2202620215	1.784864677	3.05223656	1.789411403
2202620218			0
2202620219			2.243852581
2202620301	119.8696417	237.2977724	6.872948557
2202620315	1.427296271	2.478828194	1.411544024
2202620318			0
2202620319			1.616643011
2202620401	121.2640897	241.1634953	6.981292929

2202620415	1.451797357	2.466381116	1.43200921
2202620418			0
2202620419			1.70429612
2202620501	118.9942836	231.2485859	6.596747843
2202620515	1.326664034	2.689104684	1.367093817
2202620518			0
2202620519			1.243444701
2203410101	2.351959781	0.51123511	0.250497548
2203410102	0.042752991	0	0.000111853
2203410115	0.00122302	2.04494E-05	0.003306566
2203410116	2.22315E-05	0	1.47646E-06
2203410201	5.515638314	0.169483058	0.069864181
2203410215	0.002868133	6.77933E-06	0.000922208
2203410301	11.00387476	0.367435578	0.203872016
2203410315	0.005722015	1.46974E-05	0.00269111
2203410401	9.717434686	0.308293646	0.148747347
2203410415	0.005053065	1.23317E-05	0.001963464
2203410501	21.7630998	0.87171118	0.647079366
2203410515	0.01131682	3.48685E-05	0.008541462
2203420101	0.568009407	0.123434845	0.060524142
2203420102	0.14334642	0	0.000375519
2203420115	0.000295365	4.93739E-06	0.000798919
2203420116	7.45401E-05	0	4.95685E-06
2203420201	1.769755047	0.054223786	0.022734791
2203420215	0.000920272	2.16895E-06	0.000300099
2203420301	3.656938224	0.124020385	0.065305569
2203420315	0.001901607	4.96081E-06	0.000862034
2203420401	3.920189156	0.12431597	0.061489836
2203420415	0.002038498	4.97264E-06	0.000811665
2203420501	7.353713386	0.312231419	0.204283004
2203420515	0.003823928	1.24892E-05	0.002696536
2203430101	0.070444383	0.01489813	0.007350275
2203430102	0.022456779	0	7.61192E-05
2203430115	3.66311E-05	5.95925E-07	9.70236E-05
2203430116	1.16775E-05	0	1.00477E-06
2203430201	0.383455865	0.009728531	0.005740563
2203430215	0.000199397	3.89141E-07	7.57754E-05
2203430301	0.911962463	0.027073052	0.018939121
2203430315	0.000474221	1.08292E-06	0.000249996
2203430401	0.61315712	0.016508994	0.011029904
2203430415	0.000318841	6.6036E-07	0.000145595
2203430501	1.439204594	0.057429439	0.04597507
2203430515	0.000748387	2.29718E-06	0.000606872
2203510101	0.77040052	0.155615932	0.072740758
2203510102	0.025938887	0	6.34308E-05
2203510115	0.000400609	6.22464E-06	0.000960177
2203510116	1.34882E-05	0	8.37286E-07
2203510201	1.128201366	0.01528051	0.014288748
2203510215	0.000586664	6.11221E-07	0.000188612
2203510301	2.557957329	0.047212002	0.045878508
2203510315	0.001330137	1.88848E-06	0.000605596
2203510401	2.170122287	0.034444505	0.032606042
2203510415	0.001128464	1.37778E-06	0.0004304
2203510501	3.76394975	0.108530876	0.103584526
2203510515	0.001957253	4.34124E-06	0.001367317
2203520101	2.81677157	0.572861147	0.266173203
2203520102	0.390157927	0	0.00191711
2203520115	0.001464721	2.29145E-05	0.003513488
2203520116	0.000202882	0	2.53059E-05
2203520201	5.455249443	0.100262853	0.084605594
2203520215	0.002836732	4.01051E-06	0.001116794
2203520301	13.35683624	0.308115126	0.272872583

2203520315	0.006945553	1.23246E-05	0.003601917
2203520401	10.1951794	0.211219988	0.181575598
2203520415	0.005301491	8.44879E-06	0.002396799
2203520501	21.10290233	0.688903891	0.604169151
2203520515	0.010973508	2.75562E-05	0.007975031
2203530101	0.181767736	0.036871159	0.017105039
2203530102	0.004127617	0	1.45131E-05
2203530115	9.45192E-05	1.47485E-06	0.000225787
2203530116	2.14636E-06	0	1.91573E-07
2203530201	0.353260181	0.006609971	0.005830152
2203530215	0.000183695	2.64399E-07	7.6958E-05
2203530301	0.88322456	0.019160261	0.017043634
2203530315	0.000459277	7.66411E-07	0.000224976
2203530401	0.671206936	0.013698475	0.012140966
2203530415	0.000349028	5.47939E-07	0.000160261
2203530501	1.38134817	0.040762229	0.036116431
2203530515	0.000718301	1.63049E-06	0.000476738
2203540101	0	0	0
2203540102	1.05148E-06	0	4.68261E-09
2203540115	0	0	0
2203540116	5.4677E-10	0	6.18104E-11
2203540201	1.76569E-05	1.55671E-05	2.16783E-06
2203540215	9.18156E-09	6.22683E-10	2.86154E-08
2203540301	4.09234E-05	3.48748E-05	6.09125E-06
2203540315	2.12802E-08	1.39499E-09	8.04045E-08
2203540401	2.6553E-05	2.35319E-05	3.62522E-06
2203540415	1.38076E-08	9.41275E-10	4.78529E-08
2203540501	6.71256E-05	5.19927E-05	1.25701E-05
2203540515	3.49053E-08	2.07971E-09	1.65925E-07
2203610101	2.189048493	0.442168323	0.205191098
2203610102	0.11032489	0	0.00043351
2203610115	0.001138305	1.76867E-05	0.002708522
2203610116	5.7369E-05	0	5.72234E-06
2203610201	8.512396914	0.125930068	0.114692811
2203610215	0.004426449	5.03721E-06	0.001513946
2203610301	17.03602394	0.298740336	0.274686106
2203610315	0.008858736	1.19496E-05	0.00362586
2203610401	12.52468454	0.204752016	0.187715717
2203610415	0.006512838	8.19008E-06	0.002477847
2203610501	15.85433787	0.407717592	0.376478772
2203610515	0.008244254	1.63087E-05	0.004969523
2205210112			0
2205210113			0
2205210312			0
2205210313			0
2205210412			0
2205210413			0
2205210512			0
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2205310112			0
2205310113			0
2205310312			0
2205310313			0
2205310412			0
2205310413			0
2205310512			0
2205310513			0
2205320112			0
2205320113			0
2205320312			0
2205320313			0
2205320412			0

2205320413			0
2205320512			0
2205320513			0
2205320213			0
2205310213			0
2205210213			0
2201610213			3.82472E-06
2201540213			0.010118544
2201530213			0.002618446
2201520213			0.038115242
2201510213			5.5018E-05
2201430213			0.000252215
2201420213			0.000829363
2201410213			0.002544922
2201320213			0.222094154
2201310213			1.956527173
2201210213			2.0184803
2201110213			0.036204691
2205320212			0
2205310212			0
2205210212			0
2201610212			5.8613E-06
2201540212			0.004860752
2201530212			0.001946296
2201520212			0.021036782
2201510212			1.13902E-05
2201430212			0.000205579
2201420212			0.000360042
2201410212			0.001104691
2201320212			0.091650319
2201310212			0.703514829
2201210212			0.908568899
2201110212			0.660951483
2201610211			1.59333E-06
2201540211			0.000482711
2201530211			0.00075974
2201520211			0.004727851
2201510211			3.07281E-06
2201430211			1.69286E-05
2201420211			0.000193386
2201410211			0.000359713
2201320211			0.009132173
2201310211			0.076857634
2201210211			0.079788128
2201110211			0.001728366
2209310501	0	0	
2209210501	0	0	
2209310401	0	0	
2209210401	0	0	
2209310301	0	0	
2209210301	0	0	
2209310201	0	0	
2209210201	0	0	
2209310102	0	0	
2209210102	0	0	
2209310101	0	0	
2209210101	0	0	
Grand Total	20129.81668	2735.985953	1277.692152

Appendix I

Database	c10003y2023_20230412_rfp_out
Table	movesoutput
outputTimePeriod	Day

Annual Totals (Tons)			
Sum of Daily Emission		Pollutant	
monthID	VOC	NOx	CO
1	53.6	38.3	716.3
2	54.3	38.1	718.9
3	140.6	76.4	2,073.3
4	137.9	75.4	2,087.6
5	137.0	73.9	2,108.9
6	233.5	124.2	3,405.0
7	241.0	122.9	3,449.2
8	236.3	123.5	3,427.1
9	141.7	73.3	2,130.6
10	142.0	75.1	2,103.9
11	143.8	76.6	2,081.8
12	58.2	38.0	721.4
Annual Total		1,719.7	25,023.9

Database	c10003y2023_20230412_rfp_out
Table	movesoutput
outputTimePeriod	Day
dayID	5

Sum of emissionQuant		monthID	Pollutant		
FuelType			VOC	NOx	CO
Gasoline		6	6.11	1.44	99.71
		7	6.15	1.36	97.93
		8	6.00	1.38	97.21
Gasoline Total			18.26	4.18	294.86
Diesel		6	0.11	1.45	0.52
		7	0.11	1.41	0.50
Diesel Total		8	0.11	1.41	0.50
			0.32	4.27	1.52
LPG		6	0.03	0.22	1.14
		7	0.03	0.22	1.10
		8	0.03	0.22	1.10
LPG Total			0.08	0.66	3.35
CNG		6	0.01	0.02	0.11
		7	0.01	0.02	0.11
CNG Total		8	0.01	0.02	0.11
			0.03	0.07	0.32

All Fuels			6.23	3.06	100.02
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VOC	NOx	CO
6.085437	1.392634	98.286079
0.107513	1.422023	0.507014
0.026263	0.218827	1.117033
0.010112	0.022118	0.106211

Database	c10003y2023_20230412_rfp_out
Table	movesoutput
outputTimePeriod	Day

Sum of Daily Emission	Pollutant		
SCC	VOC	NOx	CO
2260001010	10.9	0.1	12.3
2260001030	1.1	0.1	6.5
2260001060	0.3	0.1	9.9
2260002006	2.3	0.1	9.5
2260002009	0.1	0.0	0.4
2260002021	0.1	0.0	0.4
2260002027	0.0	0.0	0.0
2260002039	5.8	0.1	24.7
2260002054	0.0	0.0	0.1
2260003030	0.3	0.0	1.3
2260003040	0.0	0.0	0.1
2260004015	1.1	0.0	4.3
2260004016	9.3	0.4	38.7
2260004020	21.4	0.7	60.3
2260004021	185.7	4.2	661.6
2260004025	23.0	0.9	77.3
2260004026	92.8	3.6	361.5
2260004030	13.9	0.6	52.8
2260004031	92.8	3.4	402.9
2260004071	0.0	0.0	0.1
2260005035	0.0	0.0	0.2
2260006005	1.7	0.1	5.9
2260006010	11.6	0.4	37.9
2260006035	0.1	0.0	0.3
2260007005	0.0	0.0	0.0
2265001010	0.5	0.1	4.6
2265001030	5.3	0.6	56.4
2265001050	11.9	4.4	565.0
2265001060	0.3	0.1	9.4
2265002003	0.1	0.0	4.7
2265002006	0.0	0.0	0.0
2265002009	0.3	0.1	8.4
2265002015	0.2	0.1	8.6
2265002021	0.4	0.2	18.2
2265002024	0.2	0.1	7.8
2265002027	0.0	0.0	0.4
2265002030	0.3	0.1	13.8
2265002033	0.1	0.1	3.8
2265002039	0.7	0.3	35.2
2265002042	0.4	0.1	15.9
2265002045	0.0	0.0	0.4
2265002054	0.0	0.0	2.1
2265002057	0.0	0.0	0.2
2265002060	0.0	0.0	0.3
2265002066	0.2	0.1	11.9
2265002072	0.1	0.1	4.5
2265002078	0.1	0.0	2.6
2265002081	0.0	0.0	0.3
2265003010	1.6	1.7	65.5
2265003020	1.7	4.9	44.1
2265003030	1.5	1.0	62.2
2265003040	6.3	2.1	191.2
2265003050	0.1	0.1	5.4
2265003060	0.1	0.0	5.5

2265003070	0.1	0.4	3.7
2265004010	47.1	7.0	605.0
2265004011	48.2	9.0	758.3
2265004015	4.2	0.6	51.4
2265004016	32.6	5.3	458.7
2265004025	0.3	0.0	3.4
2265004026	1.3	0.2	21.9
2265004030	0.4	0.1	6.4
2265004031	29.9	8.3	932.9
2265004040	6.3	1.4	191.7
2265004041	3.4	1.1	156.2
2265004046	4.1	1.4	175.8
2265004051	3.7	0.6	52.8
2265004055	69.6	18.5	2,570.1
2265004056	44.5	15.5	2,123.8
2265004066	4.7	2.5	217.9
2265004071	130.2	50.1	5,898.2
2265004075	2.9	0.7	73.3
2265004076	6.3	1.6	167.5
2265005010	0.0	0.0	0.5
2265005015	0.0	0.0	0.5
2265005025	0.0	0.0	0.4
2265005030	0.0	0.0	0.4
2265005035	0.1	0.1	3.5
2265005040	0.4	0.1	12.7
2265005045	0.0	0.1	0.6
2265005055	0.0	0.1	1.5
2265005060	0.0	0.0	0.3
2265006005	34.9	11.4	1,387.1
2265006010	9.0	3.0	274.6
2265006015	3.8	1.5	130.9
2265006025	8.7	3.3	361.5
2265006030	17.1	5.1	556.9
2265006035	0.6	0.2	28.5
2265007010	0.0	0.0	0.0
2265008005	0.0	0.0	0.0
2267001060	0.0	0.0	0.1
2267002003	0.0	0.0	0.0
2267002015	0.0	0.0	0.0
2267002021	0.0	0.0	0.0
2267002024	0.0	0.0	0.0
2267002030	0.0	0.0	0.1
2267002033	0.0	0.0	0.2
2267002039	0.0	0.0	0.1
2267002045	0.0	0.0	0.1
2267002054	0.0	0.0	0.0
2267002057	0.0	0.0	0.1
2267002060	0.0	0.0	0.1
2267002066	0.0	0.0	0.0
2267002072	0.0	0.0	0.3
2267002081	0.0	0.0	0.1
2267003010	0.2	1.0	5.7
2267003020	7.2	61.8	316.2
2267003030	0.0	0.4	2.1
2267003040	0.0	0.1	0.5
2267003050	0.0	0.0	0.2
2267003070	0.0	0.3	1.4
2267004066	0.1	0.8	4.0
2267005055	0.0	0.0	0.0
2267006005	0.5	3.0	13.3
2267006010	0.0	0.3	1.9

2267006015	0.0	0.2	1.4
2267006025	0.0	0.3	1.9
2267006030	0.0	0.0	0.0
2268002081	0.0	0.0	0.0
2268003020	2.1	5.0	24.6
2268003060	0.0	0.0	0.0
2268005055	0.0	0.0	0.0
2268005060	0.0	0.0	0.2
2268006005	0.7	1.2	5.2
2268006010	0.0	0.0	0.0
2268006015	0.0	0.0	0.1
2268006020	0.3	0.6	3.3
2270001060	0.0	0.2	0.2
2270002003	0.1	1.2	0.3
2270002006	0.0	0.0	0.0
2270002009	0.0	0.1	0.1
2270002015	0.2	3.5	1.1
2270002018	0.1	1.8	0.8
2270002021	0.0	0.2	0.1
2270002024	0.0	0.3	0.1
2270002027	0.1	1.1	0.4
2270002030	0.1	2.8	0.8
2270002033	0.3	4.4	1.3
2270002036	0.3	6.4	1.7
2270002039	0.0	0.2	0.1
2270002042	0.0	0.2	0.1
2270002045	0.1	2.5	0.6
2270002048	0.1	1.2	0.4
2270002051	0.4	16.1	1.4
2270002054	0.0	0.7	0.2
2270002057	0.2	4.8	1.8
2270002060	0.7	14.2	4.3
2270002066	3.8	20.7	17.3
2270002069	0.4	9.9	2.6
2270002072	3.8	19.2	18.4
2270002075	0.1	2.2	0.4
2270002078	0.0	0.1	0.1
2270002081	0.2	2.5	1.1
2270003010	0.5	3.3	2.5
2270003020	0.3	15.6	1.5
2270003030	0.2	6.0	1.2
2270003040	0.4	7.5	1.9
2270003050	0.1	0.6	0.4
2270003060	1.9	55.4	7.6
2270003070	0.1	3.4	0.7
2270004031	0.0	0.0	0.0
2270004046	1.9	23.0	7.8
2270004056	0.5	5.1	2.0
2270004066	2.0	27.2	9.4
2270004071	0.1	2.0	0.5
2270004076	0.0	0.1	0.0
2270005010	0.0	0.0	0.0
2270005015	1.6	23.5	10.2
2270005020	0.2	2.7	1.0
2270005025	0.0	0.0	0.0
2270005030	0.0	0.0	0.0
2270005035	0.0	0.2	0.1
2270005045	0.0	0.2	0.1
2270005055	0.0	0.5	0.2
2270005060	0.0	0.3	0.1
2270006005	2.2	24.4	9.0

2270006010	0.5	5.8	2.2
2270006015	0.4	9.4	2.4
2270006025	1.3	8.1	6.4
2270006030	0.1	0.8	0.3
2270006035	0.0	0.4	0.1
2270007015	0.0	0.0	0.0
2270008005	0.0	0.2	0.1
2270010010	0.0	0.4	0.1
2282005010	511.6	143.8	2,375.0
2282005015	83.8	67.7	1,220.9
2282010005	62.2	69.0	761.4
2282020005	3.4	55.8	12.5
2282020010	0.0	0.2	0.1
2285002015	0.0	0.3	0.2
2285004015	0.0	0.0	0.8
Grand Total	1,719.7	935.9	25,023.9

Appendix J

Delaware
Reasonably Available Control Technology (RACT)
State Implementation Plan (SIP)
Under the 2015 8-Hour Ozone National Ambient Air
Quality Standard (NAAQS)

FINAL REPORT

Submitted to:

U.S. Environmental Protection Agency

Region 3 – Philadelphia, PA

Prepared by:

Department of Natural Resources & Environmental Control

Division of Air Quality

Airshed Planning & Inventory Program

State Street Commons
100 W. Water Street, Suite 6A
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August 2020

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1. INTRODUCTION

This document contains Delaware’s State Implementation Plan (SIP) revision for meeting the Reasonably Available Control Technology (RACT) requirements of the Clean Air Act (CAA) under the 8-hour ozone National Ambient Air Quality Standard (NAAQS) set forth by US Environmental Protection Agency (EPA) in 2015. The document is hereafter referred to as “Delaware’s 2015 8-hour ozone RACT SIP revision,” or simply as “the 2015 RACT SIP.”

1.1. Background and Requirements

Ground-level ozone, one of the principal components of “smog,” is a serious air pollutant that harms human health and the environment. High levels of ozone can damage the respiratory system and cause breathing problems, throat irritation, coughing, chest pains, and greater susceptibility to respiratory infection. High levels of ozone also cause serious damage to forests and agricultural crops, resulting in economic losses to logging and farming operations.

In October 2015, the EPA revised the 2008 8-hour ozone NAAQS of 0.075 parts per million (ppm) to 0.070 ppm (80 FR 65291). The 2015 8-hour ozone NAAQS of 0.070 ppm is expected to provide better protections of public health and environment. In a final rule dated June 4, 2018 (83 FR 25776), the EPA designated 51 areas in the country as nonattainment for the 2015 8-hour ozone NAAQS. New Castle County of Delaware was designated nonattainment as a part of the Philadelphia-Wilmington-Atlantic City Marginal Nonattainment Area (NAA) under the 2015 8-hour ozone NAAQS. Since this marginal NAA is centered by the City of Philadelphia, it is often referred to as “the Philadelphia NAA.” In the same final rule, Kent and Sussex Counties were designated as attainment (83 FR 25776). The EPA made the designations of these three counties based on their 2014-2016 design values,¹ and the effective date of the designations was August 3, 2018. Figure 1 provides a visual of Delaware’s three counties and New Castle County as part of the Philadelphia NAA.

Ozone is generally not directly emitted to the atmosphere. It is formed in the atmosphere by photochemical reactions among volatile organic compounds (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO) in the presence of sunlight. Consequently, in order to reduce ozone concentrations in the ambient air, the CAA requires all ozone nonattainment areas, and areas in the Ozone Transport Region (OTR) established pursuant to Section 184 of the CAA,² to implement relevant control measures on VOC and NO_x emission sources to achieve emission reductions.³

¹ The air quality design value at a monitoring site is defined as the 3-year average annual fourth-highest daily maximum 8-hour average ozone concentration is also the air quality design value for the site. (40 CFR Part 50, Appendix I, Interpretation of the 8-Hour Primary and Secondary National Ambient Air Quality Standards for Ozone)

² Congress established the Ozone Transport Region (OTR) in the federal Clean Air Act in order to address air pollution in downwind states that is caused by activities in upwind states. The OTR is essentially a single, 13-state ozone nonattainment area. The original member states of the OTR are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, parts of Virginia, and the District of Columbia.

³ Since CO’s role in forming ozone is relatively insignificant, the CAA does not specify requirements on CO emission reductions regarding attainment of ozone standard.

Among effective control measures, the Reasonably Available Control Technology (RACT) controls are a major group for reducing VOC and NO_x emissions from stationary sources.

The EPA has defined the RACT as the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility (44 FR 53762). Section 182 of the CAA sets forth two separate RACT requirements for ozone nonattainment areas.

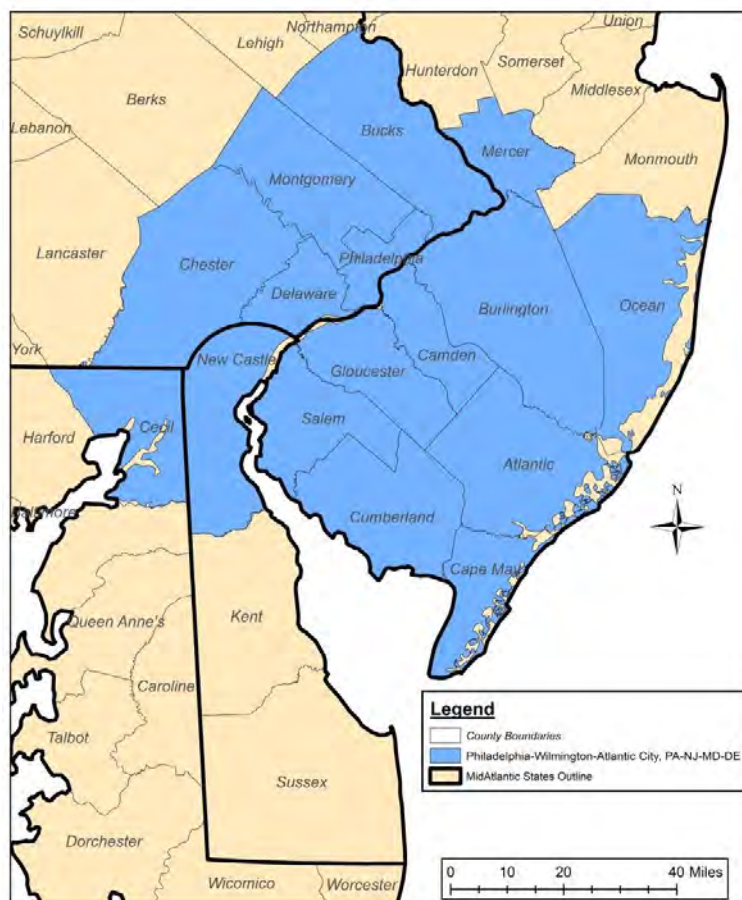


Figure 1. Map of the Philadelphia Nonattainment Area Under the 2015 8-hour ozone NAAQS.

The first requirement, contained in section 182(a)(2)(A) of the CAA, and referred to as RACT fix-up, requires the correction of RACT rules for which EPA identified deficiencies before the Act was amended in 1990. Delaware has no deficiencies to correct under this section of the CAA.

The second requirement, set forth in section 182(b)(2) of the CAA, applies to moderate or worse ozone nonattainment areas (NAAs) as well as to all areas within the OTR, including all of Delaware, and requires these areas to implement RACT controls on all major VOC and NO_x emission sources and on all sources and source categories covered by Control Technique Guidelines (CTGs) and Alternate Control Techniques (ACTs) issued by EPA.

Under section 183 of the CAA, EPA is required to develop and issue by certain timeframes relevant guidance documents for RACT controls that help states meet the requirements of Section 182(b)(2). This requirement upon EPA includes developing (1) CTGs for controls of VOC emissions from stationary sources, and (2) ACTs for controls of VOC and NO_x emissions from stationary sources. The controls in both CTG and ACT documents provide a basis for RACT determination.

Historically, the EPA has issued three groups of CTG documents, establishing a “presumptive norm” for RACT controls for various categories of VOC sources: Group I, issued before January 1978 including 15 CTGs; Group II, issued in 1978 including 9 CTGs; and Group III, issued in the early 1980s including 5 CTGs. Sources not covered by the issued CTGs are referred to as non-CTG sources. The EPA has also issued numerous ACTs for various categories of VOCs and NO_x sources. In addition, the EPA updated some CTGs in the 2006-2008 periods. All published CTG and ACT documents, along with other documentation, are listed in Section 5 of this document.

Section 182(b)(2) of the CAA requires states with ozone nonattainment areas classified as moderate or worse to implement RACT controls for all pre-enactment (i.e., pre-1990) CTG source categories, for all sources subject to post-enactment (i.e., post-1990) CTGs, and for all non-CTG major sources in their nonattainment areas. In addition, Section 184(b)(1) of the CAA requires states within the OTR to implement RACT controls with respect to all CTG-ACT sources, whether those sources are in nonattainment or attainment areas.

As a general guidance from EPA, a state should use current EPA CTG/ACT guidance and other information available in making RACT determination.⁴ The EPA also points out that while the CTGs and ACTs provide a starting point for the RACT control analysis, RACT level controls can change over time as new technology becomes available or the cost of existing technology adjusts, and states are encouraged to use the latest information available in other forms when making RACT determinations, whether that information is in CTGs, ACTs, or in other guidance or forms that are available, or through information submitted during the public review process.⁵

Under the 1-hour ozone NAAQS of 0.12 ppm,⁶ Kent County and New Castle County of Delaware were designated as a part of the Philadelphia severe ozone NAA, and Sussex County was designated as a marginal ozone nonattainment area within the OTR. Therefore, all three counties were subject to the RACT requirements under the 1-hour ozone NAAQS. Consequently, in the 1990s, Delaware implemented numerous RACT controls throughout the state to meet the CAA’s RACT requirements. These RACT controls were promulgated in Delaware’s Administrative Code under 7 **DE Admin. Code** 1124 for VOC sources and 7 **DE Admin. Code** 1112 for NO_x sources.

⁴ EPA’s current CTGs and ACTs are located at: <https://www.epa.gov/ground-level-ozone-pollution/control-techniques-guidelines-and-alternative-control-techniques>.

⁵ RACT Qs & As-Reasonably Available Control Technology (RACT): Questions and Answers. William T. Harnett, Director, Air Quality Policy Division, EPA, May 18, 2006.

⁶ EPA promulgated the 1-hour ozone NAAQS in 1979 (44 FR 8202).

The EPA revised the 1-hour ozone NAAQS to an 8-hour NAAQS of 0.08 ppm (62 FR 38856) in 1997, and again revised the ozone NAAQS to an 8-hour NAAQS of 0.075 ppm in 2008 (73 FR 16436). Under the 1997 8-hour ozone NAAQS, the entire state of Delaware was designated a part of the Philadelphia moderate NAA. Under the 2008 8-hour ozone NAAQS, New Castle County was designated a part of the Philadelphia marginal NAA, while Sussex County was designated a standalone marginal NAA. Therefore, Delaware continued to be subject to the CAA RACT requirements through the 1997 and 2008 ozone NAAQS due to its inclusion in nonattainment areas and its inclusion in the OTR.

Delaware promulgated and revised its RACT regulations, and again demonstrated that it completely complied with the CAA RACT requirements for all three counties in SIP revisions under each of the 1997 and 2008 8-hour ozone NAAQS.⁷ The EPA's approvals were based on thorough reviews of all Delaware's RACT-related regulations. Such approval indicated that Delaware fulfilled the CAA RACT requirements under the 1997 and 2008 8-hour ozone NAAQS.

As aforementioned, the EPA revised the 2008 8-hour ozone NAAQS to a new 0.070 ppm level in 2015 (80 FR 65291). Under the 2015 8-hour ozone NAAQS, only New Castle County is designated as (marginal) nonattainment, while Kent and Sussex Counties are designated as attainment. Since Delaware is located within the OTR, under Section 184(b)(1) of the CAA, all three counties of Delaware are subject to the RACT requirements set forth in the CAA Section 182(b)(2), regardless of which counties are classified as nonattainment.

The EPA requires that Delaware meets the RACT requirements for all three counties through (1) certifying that previously-adopted RACT controls in its SIP revisions approved by EPA under the 1997 and 2008 8-hour ozone NAAQS represent adequate RACT control levels for attainment purposes under the new 2015 8-hour ozone NAAQS, or (2) adopting new or updated more stringent regulations that represent adequate RACT control levels under the new 2015 8-hour ozone NAAQS.

Certification shall be accompanied by appropriate supporting information such as consideration of information received during the public comment period and consideration of new data, that may supplement existing RACT guidance documents that were developed for the 1997 and 2008 8-hour ozone NAAQS, such that the state SIPs accurately reflect RACT for the new 2015 8-hour ozone NAAQS based on the current availability of technically and economically feasible controls. Adoption of new RACT regulations shall occur when states have new stationary sources not covered by existing RACT regulations, or when new data or technical information indicates that a previously adopted RACT measure does not represent a newly-available RACT control level. Delaware has decided to use certification in this SIP revision to demonstrate its fulfillment of the CAA RACT requirements under the 2015 8-hour ozone NAAQS.

⁷ Delaware submitted its RACT SIP revision for the 1997 8-hour ozone NAAQS in 2006, which was approved by the EPA in July 2008 (73 FR 42681). Delaware submitted its RACT SIP revision for the 2008 8-hour ozone NAAQS in 2015, which was approved by the EPA in December 2017 (82 FR 57849).

For purposes of meeting the 2015 8-hour ozone NAAQS RACT requirement, a State's RACT analysis only needs to include an evaluation of RACT for CTG sources and for non-CTG major sources based on the area's 8-hour classification. However, under "anti-backsliding" requirements⁸ of the CAA and EPA's ozone implementation rule for the 2008 8-hour ozone NAAQS (80 FR 12264);⁹ a State may not remove RACT requirements for sources that were subject to RACT for the 1-hour ozone NAAQS, but would not have been subject to RACT based on the area's 8-hour classification.^{5, 10}

Under the 1-hour ozone NAAQS, Delaware's New Castle County and Kent County were designated as severe NAAs and adopted major source thresholds for VOC and NO_x of 25 tons per year (tpy), in accordance with Section 182(d) of the CAA. In contrast, according to Section 184(b)(2) of the CAA, the major source threshold is set at 50 tpy for non-CTG stationary VOC sources and 100 tpy for stationary NO_x sources, for states within the OTR.

Therefore, under the "anti-backsliding" requirements, sources between the 1-hour ozone NAAQS thresholds and 184(b)(2) CAA thresholds must remain subject to Delaware RACT. Therefore, 25-50 tpy VOC sources and 25-100 tpy NO_x sources remain subject to Delaware RACT rules for New Castle and Kent County in this document.

It should be noted that all of Delaware's RACT regulations apply state-wide. Under the 1-hour ozone NAAQS, major source thresholds for VOC and NO_x in Delaware's Sussex County were 50 tpy and 100 tpy, respectively, due to its inclusion in the OTR. Therefore, Sussex County is not affected by "anti-backsliding" requirements.

In summary, through this RACT SIP revision Delaware demonstrates that 1) its ozone-related SIP regulations meet the CAA's RACT requirements for the 50 tpy CTG and non-CTG major VOC sources and for all 100 tpy NO_x sources, and 2) that all CTG covered source categories are addressed at the emission thresholds set in the CTG or in the "Blue Book" (Reference 63) for those CTG categories for which the CTG set no emission threshold.

This demonstration is an analysis and certification that the control measures in Delaware SIP-approved regulations are based on currently available technically and economically feasible controls, and they represent RACT control levels adequate for implementing the 2015 8-hour ozone NAAQS.

1.2. Responsibilities

The agency with direct responsibility for developing and submitting this SIP document is Delaware Department of Natural Resources and Environmental Control (DNREC), Division of

⁸ Anti-backsliding measures ensure that certain emission controls remain in place and air quality in the nonattainment areas does not get worse after a prior ozone NAAQS is revoked.

⁹ The EPA has not revoked the 2008 ozone NAAQS, and therefore there are no new "anti-backsliding" provisions which are specific to EPA's implementation of the 2015 8-hour ozone NAAQS.

¹⁰ The anti-backsliding provisions may be found at 40 CFR 51.905 and 51.1105 and apply to all former 1-hour nonattainment areas.

Air Quality (DAQ), under the Division Director, David F. Fees, P.E.. The working responsibility for Delaware's air quality SIP planning falls within DAQ's Planning Section, with Acting Section Manager Valerie Gray. Renae Held, Airshed Planning and Inventory Program Manager is supervising this SIP revision development. Mark A. Prettyman, Environmental Scientist in the Airshed Planning and Inventory Program, is the project leader and principal author of this document.

2. DETERMINATION OF COMPLIANCE OF VOC RACT REQUIREMENTS

2.1. Certification of VOC RACT Requirements

Delaware's VOC RACT controls are contained in 7 **DE Admin. Code** 1124, "Control of Volatile Organic Compound Emissions" (hereafter in this document referred to as Regulation 1124). Various sections in Regulation 1124, covering corresponding VOC sources, were originally developed and implemented into Delaware SIP under the 1-hour ozone NAAQS or the 1997 8-hour ozone NAAQS, and have been periodically updated based on advancements in technology. All major sources in Delaware and all CTG/ACT covered sources with applicability cut-off levels consistent with the "Blue Book" (Reference 63) are covered by adequate RACT controls in the corresponding Regulation 1124 sections.

Identification and certification/adoption of Regulation 1124 VOC RACT controls for meeting the 2015 8-hour ozone NAAQS is provided in Table 1. Explanations for the columns of Table 1 are as follows:

- Column 1: Identifies each section of Regulation 1124 that contains a Delaware VOC RACT rule. The effective date of each section is also provided in this column. In general, Regulation 1124 sections requires major VOC emitting sources to comply with the relevant deadlines specified in the CAA and EPA's implementation rules for the NAAQS.
- Column 2: Identifies the underlying basis for each RACT control rule and its implementation.
- Column 3: Identifies the date the RACT rule was approved into the Delaware SIP, along with the Federal Register citation.
- Column 4: Explains briefly the RACT control applicability and requirements.
- Column 5: Certifies that the rule represents the current RACT requirement under the 2015 8-hour ozone NAAQS.

Notes for Column 5:

- (1) Each section of Regulation 1124 was approved by the EPA as adequate under the 2008 8-hour ozone NAAQS.
- (2) When certifying that a current SIP-approved rule represents the RACT level under the ozone NAAQS, DAQ affirms that it is not aware of any significant change in the RACT control technology after the previous RACT SIP determination that would affect this RACT SIP compliance determination. In other words, the current SIP-approved rule still sets up the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility.

- (3) Any discussion on cost effectiveness is relative only to this RACT SIP, and is not relevant as to whether or not control of a particular source or source category is cost effective relative to Delaware's entire SIP.

It should be pointed out that Delaware's minor source permitting program under 7 **DE Admin. Code** 1102, "Permits" (hereafter in this RACT SIP referred to as Regulation 1102), requires a detailed administrative and technical review of Delaware sources that emit air contaminants at levels far below the major source threshold and CTG cut-offs. For example, permits are required for the emission of 10 pounds per day or more of "aggregate" air contaminants, and registrations for emissions between 0.2 and 10 lb/day of air contaminants. This permitting program gives additional confidence that all major and CTG covered sources are controlled by RACT or better controls.

Table 1. Delaware VOC RACT Control List and Determination of Compliance under the 2015 8-hour Ozone NAAQS

Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Section 8.0 Handling, Storage, and Disposal of Volatile Organic Compounds (VOCs) 03/11/2011	CTG for Industrial Cleaning Solvents. EPA 453/R-06-001, September 2006.	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	This section applies to any facility subject to any of Sections 10.0 through 50.0 of Regulation 1124, with a few exceptions as specified in 8.3.1 of this section, when the facility deals with activities involving handling, storage and disposal of VOCs and VOC-containing solvents. The section establishes for the regulated facilities (1) work practice standards, (2) control requirements, (3) testing methods and procedures, and (4) recordkeeping requirements, to reinforce effective control of VOC emissions from using VOCs or VOC-containing solvents in the regulated facilities.	Yes. Section 8.0 was not included in Delaware's RACT SIP under the 1997 ozone NAAQS. It was updated in 2011 to fully implement relevant RACT requirements regarding handling, storage and disposal of VOCs and VOC-containing solvents as specified in the 2006 CTG. The requirements set up the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 10.0 Aerospace Coatings 08/11/2002	CTG for Control of Volatile Organic Compound Emissions from Coating Operations at Aerospace Manufacturing and Rework Operations. EPA-453/R-97-004, December 1997.	Final Rule Federal Register Date: 03/24/2004 69 FR 13737	This section applies to any aerospace manufacturing and rework facility In brief, this section establishes vapor pressure limits, VOC content limits, emission limits and/or work practice standards for: (a) hand-wipe, spray gun, or flush cleaning operations, (b) primer, topcoat, self-priming topcoat, and specialty coating operations, (c) chemical milling maskant application, (d)	Yes. This section was updated in 2002 to fully implement the RACT-level controls specified in the 1997 CTG. It was approved by the EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
			depainting of aerospace vehicles, and (e) handling and storing of VOC.	The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 11.0 Mobile Equipment Repair and Refinishing 10/11/2010	OTC Alternate Model Rule "Motor Vehicle Mobile Equipment Repair and Refinishing (MVMERR)", adopted in September 2009 and based on (1) CTG for Miscellaneous Metal and Plastic Parts Coatings (MMPPC)," EPA-453/R-08-003, September 2008. (2) National Emission Standards for Hazardous Air Pollutants (NESHAP): Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources; Final Rule January 9, 2008 (73 FR 1738). Alternative Control Techniques (ACT) for Reduction of Volatile	Revision with effective date of 10/11/2010 expected to be submitted to EPA in March 2020.	This section applies to any person who applies coatings to mobile equipment for beautification or protection in the State of Delaware. It establishes: (a) Requirements for using improved transfer efficiency coating and application equipment; (b) requirements for enclosed spray gun cleaning techniques; and (c) minimum training standards in the proper use of equipment and materials.	Yes. The previous version of this section was revised in 2001 based on an OTC model rule to implement controls to mitigate Delaware's attainment shortfall under the 1-hour ozone NAAQS. The control levels were more stringent than the then-ACT requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2010, this section was updated to adopt more stringent limits set forth in EPA's 2008 NESHAP rule and CTG. It also adopted some VOC limits from the California Air Resources Board (CARB) Suggested Control Measure (SCM) for Automotive Coatings, published October 2005, which are more stringent. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Organic Compound Emissions from Automobile Refinishing, EPA- 450/3-88-009, October 1988.			current technological and economic feasibility
Section 12.0 Surface Coating of Plastic Parts 10/11/2011	CTG for Miscellaneous Metal and Plastic Parts Coatings (MMPPC). EPA-453/R-08-003, September 2008 ACT for Surface Coating of Automotive/Transport ation and Business Machine Plastic Parts EPA-453/R-94-017, February 1994.	Final Rule Federal Register Date: 09/25/2012 77 FR 58953	This section applies to any plastic part or product coating unit. It establishes VOC content limits of various coatings, sets up requirements for control devices, testing methods and compliance certification.	Yes. This section was revised in 2001 to fully implement the 1994 ACT control requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2010, it was updated to expand the applicability scope and to adopt more stringent requirements set forth in EPA's 2008 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 13.0 Automobile and Light- Duty Truck Coating Operations 03/11/2011	CTG for Automobile and Light-Duty Truck Assembly Coatings. EPA 453/R-08-006, September 2008.	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	This section applies to coating operations at automobile or light- duty truck assembly plants. It establishes VOC content limits in adhesives, sealing materials, primer, coating materials used in	Yes. This section was developed in 1993 to fully implement the 1977 CTG requirements in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-Duty Truck Primer-Surfacer and Topcoat Operations. EPA 453/R-08-002, September 2008. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks. EPA-450/2-77-008, May 1977. (Group I)		automobile and light-duty truck coating operations, and requirements for control device, test methods, and recordkeeping for such operations.	In 2011, it was updated to implement the new VOC limits and operational requirements specified in the 2008 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility There are currently no automobile assembly plants in Delaware, at the time of this SIP submission.
Section 14.0 Can Coating Section 15.0 Coil Coating Section 17.0 Fabric Coating Section 18.0 Vinyl Coating	CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks.	Final Rule Federal Register Date: 05/03/1995 60 FR 21707	These sections apply to coating operations at any can, coil, paper, fabric, or vinyl coating unit. They establish various coating VOC content limits, depending on the particular coating and the substrate being coated, and operational requirements for relevant coating operations.	Yes. These sections were developed in 1993 for fully implementing the 1977 CTG specified controls the targeted sources or source categories in Delaware. They were approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
01/11/1993 for all above sections.	EPA-450/2-77-008, May 1977. (Group I)			in RACT control technology for these sections. The requirements are the lowest emission limitations that the covered sources are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 16.0 Paper, Film, and Foil Coating 03/11/2011	CTG for Paper, Film, and Foil Coatings. EPA 453/R-07-003, September 2007. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks. EPA-450/2-77-008, May 1977. (Group I)	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	This section applies to paper, film, and foil surface coating operations. It establishes VOC limits in coating materials used in paper, film, and foil surface coating operations, and requirements for control device, test methods, and recordkeeping for such operations.	Yes. This section was developed in 1993 to fully implement the 1977 CTG specified VOC limits for paper coating materials in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was updated (1) to add film and foil coating operations, and (2) to implement the new VOC limits specified in the 2007 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 19.0 Coating of Metal Furniture	CTG for Metal Furniture Coatings.	Final Rule Federal Register Date: 09/25/2012	This section applies to the coating operation of metal furniture.	Yes.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
10/11/2011	EPA 453/R-07-005, September 2007. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume III: Surface Coating of Metal Furniture. EPA-450/2-77-032, December 1977. (Group I)	77 FR 58953	It establishes VOC content limits in coating materials and other requirements such as control device, testing methods and recordkeeping, etc., for metal furniture coating operations.	This section was developed in 1993 to fully implement the 1977 CTG specified requirements for metal furniture coating operation in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was updated to implement the new requirements specified in the 2007 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 20.0 Coating of Large Appliances 10/11/2011	CTG for Large Appliance Coatings. EPA 453-07-004, September 2007. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume V: Surface Coating of Large Appliances. EPA-450/2-77-034, December 1977. (Group I)	Final Rule Federal Register Date: 09/25/2012 77 FR 58953	This section applies to the coating operation of large appliances. It establishes VOC content limits in coating materials and other requirements such as control device, testing methods and recordkeeping, etc., for large appliance coating operations.	Yes. This section was developed in 1993 to fully implement the 1977 CTG specified requirements for large appliance coating operation in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was updated to implement the new requirements specified in the 2007 CTG. The requirements are the lowest emission limitations that the covered

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
				source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 21.0 Coating of Magnet Wire 11/29/1994	CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume IV: Surface Coating of Insulation of Magnet Wire, EPA-450/2-77- 033, December 1977. (Group I)	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to the coating operation of magnet wire. It requires use of compliant coatings with a VOC content of less than 1.7 lb/gal, and sets up requirements on control device, test methods, and recordkeeping for coating operation of magnet wire.	Yes. This section was developed in 1994 to fully implement the 1977 CTG specified requirements in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 22.0 Coating of Miscellaneous Metal Parts 10/11/2011	CTG for Miscellaneous Metal and Plastic Parts Coatings (MMPPC). EPA-453/R-08-003, September 2008 CTG for Control of Volatile Organic	Final Rule Federal Register Date: 09/25/2012 77 FR 58953	This section applies to any miscellaneous metal parts coating unit. It establishes VOC content limits in coating materials and other requirements such as control device, testing methods, compliance certification and recordkeeping, etc.,	Yes. This section was developed in 1993 to fully implement the 1978 CTG specified requirements for miscellaneous metal part coating operations in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Emissions from Existing Stationary Sources, Volume VI: Surface Coating of Miscellaneous Metal Parts and Products. EPA-450/2-78-015, June 1978. (Group II)		for miscellaneous metal part coating operations.	In 2011, it was updated to implement the new requirements specified in the 2008 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 23.0 Coating of Flat Wood Paneling 03/11/11	CTG for Flat Wood Paneling Coatings. EPA 453/R-06-004, September 2006. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VII: Factory Surface Coating of Flat Wood Paneling. EPA-450/2-78-032, June 1978. (Group II)	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	The section applies to coating operations of flat wood paneling. It establishes VOC content limits in coatings, inks or adhesives used in coating operations for flat wood paneling, and sets up requirements of control device, test methods, and recordkeeping for such operations.	Yes. This section was developed in 1993 to fully implements the 1978 CTG specified requirements for coating operation of flat wood paneling in Delaware, and approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was updated to implement the new requirements specified in the 2006 CTG. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 24.0		Final Rule		Yes.

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Bulk Gasoline Plants 01/11/1993	CTG for Control of Volatile Organic Emissions from Bulk Gasoline Plants. EPA-450/2-77-035, December 1977. (Group I)	Federal Register Date: 05/03/1995 60 FR 21707	This section applies to all unloading, loading, and storage operations at bulk gasoline plants and to any gasoline tank truck delivering or receiving gasoline at a bulk gasoline plant. It established requirements for the use of vapor balance, and set up various equipment and work practice standards for regulated operations.	This section was developed in 1993 to fully implement the 1977 CTG specified requirements in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 25.0 Bulk Gasoline Terminals 11/29/1994	CTG for Control of Volatile Organic Emissions from Bulk Gasoline Plants, EPA- 450/2-77-035, December, 1977. (Group I)	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to the total of all the loading racks at any bulk gasoline terminal that deliver liquid product into gasoline tank trucks. It sets up requirements for control using a vapor collection and control system designed to collect and destroy the organic compound liquids or vapors displaced from gasoline tank trucks during product loading, and various other equipment and operational requirements.	Yes. This section was developed in 1994 to fully implement the 1977 CTG specified requirements in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS? application of control technology that is reasonably available considering current technological and economic feasibility.
Section 26.0 Gasoline Dispensing Facility Stage I Vapor Recovery 01/11/2002	CTG for Design Criteria for Stage I Vapor Control Systems - Gasoline Service Stations, EPA- 450/R-75-102, November 1975. (Group I)	Final Rule Federal Register Date: 11/14/2003 68 FR 64540	It applies to stationary gasoline storage tanks at gasoline dispensing facilities (GDFs). It sets up requirements that include (1) loading gasoline with submerged fill method, and (2) installing vapor recovery system that returns the displaced vapors to the delivery vessels and then to the bulk plant or terminal.	Yes. This section was updated in 2002 to provide for better control of emissions from GDFs than the 1975 CTG specified level. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. This section is expected to be amended by June 2020 alongside amendments to Section 36.0 to account for ORVR incompatibility with Stage II vapor recovery. Together, the proposed amendments will require (1) any new gasoline dispensing facility (GDF) to install a Stage I Enhanced Vapor Recovery (EVR) system, instead of a Stage II vapor recovery system, at construction, and (2) any existing GDF to decommission its Stage II vapor recovery system by December 31, 2021 and to install a Stage I EVR system by December 31, 2025.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
				The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 27.0 Gasoline Tank Trucks 01/11/1993	CTG for Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals. EPA-450/2-77-026, December 1977. (Group I) CTG for Control of Volatile Organic Compound Leaks from Gasoline Tank Trucks and Vapor Collection Systems. EPA-450/2-78-051, December 1978. (Group II)	Final Rule Federal Register Date: 05/03/1995 60 FR 21707	This section applies to gasoline tank trucks equipped for gasoline vapor collection. It requires that the covered gasoline tank trucks must be vapor-tight. It also sets up requirements of test methods and recordkeeping for the regulated tank trucks.	Yes. This section was developed in 1993 to fully implement the 1977/1978 CTG specified control in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 28.0 Petroleum Refinery Sources 01/11/1993	CTG for Control of Refinery Vacuum Producing Systems, Wastewater Separators, and Process Unit Turnarounds.	Final Rule Federal Register Date: 05/03/1995 60 FR 21707	This section applies to vacuum-producing systems, wastewater separators and process unit turnaround at petroleum refineries. Its requirements include (1) no uncompressed VOC emission from	Yes. This section was developed in 1993 to fully implement the 1977 CTG specified requirements in Delaware.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	EPA-450/2-77-025, October 1977. (Group I)		vacuum-producing systems, (2) covers, lids or seals for wastewater separators, and (3) depressurization of process unit or vessel to reduce its internal pressure to 136 kPa or less and then venting to vapor recovery system, flare or firebox.	It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 29.0 Leaks from Petroleum Refinery Equipment 11/29/1994	CTG for Control of Volatile Organic Compound Leaks from Petroleum Refinery Equipment. EPA-450/2-78-036, June 1978. (Group II)	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to equipment in VOC service in any process unit at petroleum refineries. The rule establishes standards for proper valve operations under various scenarios to prevent VOC leak emissions.	Yes. This section was developed in 1994 to fully implement the 1978 CTG specified requirements in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Section 30.0 Petroleum Liquid Storage in External Floating Roof Tanks 11/29/1994	CTG for Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks. EPA-450-2/78-047, December 1978. (Group II).	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to petroleum liquid storage tanks with external floating roofs and with capacity of 150,000 L or greater. It establishes sealing standards for a covered storage tank, including its openings, its connection structure between roof and tank wall, all seal closure devices, bleeder vents, rim vents, and emergency roof drains.	Yes. This section was developed in 1994 for fully implementing the 1978 CTG It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 31.0 Petroleum Liquid Storage in Fixed Roof Tanks 11/29/1994	CTG for Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed Roof Tanks. EPA-450/2-77-036, December 1977. (Group I)	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to petroleum liquid storage tanks with fixed roofs and with capacity of 150,000 L or greater. It establishes sealing standards for a covered storage tank, including its openings, its connection structure between roof edge and tank wall, bleeder vents, and rim vents.	Yes. This section was developed in 1994 for fully implementing the 1977 CTG specified controls. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
				source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 32.0 Leaks from Natural Gas/Gasoline Processing Equipment 11/29/1994	CTG for Control of Volatile Organic Compound Equipment Leaks from Natural Gas/Gasoline Processing Plants. EPA-450/2-83-007, December 1983. (Group III)	Final Federal Register Date: 01/26/1996 61 FR 2419	This section applies to equipment in VOC service in any process unit at onshore natural gas/gasoline processing facilities. It establishes standards for proper valve operations under various scenarios to prevent VOC leak emissions from the covered equipment.	Yes. This section was developed in 1994 to fully implement the 1983 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 33.0 Solvent Cleaning and Drying 11/11/2001	CTG for Industrial Cleaning Solvents: Final" EPA 453/R-06- 001 September 2006 CTG for Control of Volatile Organic Emissions from	Final Rule Federal Register Date: 11/22/2002 67 FR 70315	This section applies to any solvent cleaning machine that contains more than 1 liter of solvent in which VOC is more than 5% by weight. This rule establishes standards for (1) batch cold cleaning machines, (2) batch vapor cleaning machines, (3) in-line cleaning machines, (4)	Yes. This section was updated in 2001 based on an OTC model to implement more stringent standards than the 1977 CTG and 1989ACT control levels. It was approved by EPA as adequate under the 1997 8-hour ozone NAAQS.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Solvent Metal Cleaning. EPA-450/2-77-022, November 1977. (Group I) ACT for Halogenated Solvent Cleaners. EPA-450/3-89-030, August 1989.		and cleaning machines without a solvent-air interface. It also specifies an alternative standard for (2) and (3) above.	DAQ is currently amending Section 33.0 based upon a 2012 "Phase II" model rule for solvent cleaning, by the OTC. DAQ expects the amendments to be effective no later than 12/11/2020, with a compliance date of one year after the effective date of the regulation.
Section 34.0 Cutback and Emulsified Asphalt 01/11/1993	CTG for Control of Volatile Organic Compounds from Use of Cutback Asphalt. EPA-450/2-77-037, December 1977. (Group I)	Final Federal Register Date: 05/03/1995 60 FR 21707	This section applies to manufacture, mixing, storage, use, and application of cutback and emulsified asphalts in Delaware. It prohibits all above activities for cutback asphalt during the ozone season without approval. It also prohibits all above activities during the ozone season for emulsified asphalt that contain any VOC.	Yes. This section was developed in 1993 to fully implement the 1977 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 35.0 Manufacture of Synthesized	CTG for Control of Volatile Organic Emissions from	Final Federal Register Date: 01/26/1996 61 FR 2419	This section applies to 10 VOC sources at synthesized pharmaceutical manufacturing	Yes.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Pharmaceutical Products 11/29/1994	Manufacture of Synthesized Pharmaceutical Products, EPA-450/2-78-029, December 1978. (Group II)		facilities, including reactors, distillation operations, crystallizers, centrifuges, vacuum dryers, air dryers, production equipment exhaust systems, rotary vacuum filters and other filters, in-process tanks, and leaks. It establishes standards for controlling and reducing VOC emissions from all covered sources.	This section was developed in 1994 to fully implement the 1978 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 36.0 Control of VOC Emissions- Stage II Vapor Recovery 01/11/2002 (04/2015)	Non-CTG RACT, CAA Section 182(b)(3).	Final Rule Federal Register Date: 11/14/2003 68 FR 64540	This section applies to any gasoline dispensing facility (GDF) with a monthly throughput greater than 10,000 gallons. It requires that all covered GDFs install approved Stage II vapor recovery system. It was updated in 2002 to (1) increase inspection frequency, and (2) provide for compliance tester certification.	Yes. This section was updated in 2002 to fully implement the CAA required VOC emission control on GDFs in Delaware. It was approved by EPA as adequate under the 1997 ozone NAAQS. Since 1998, the federally-enforced control (Onboard Refueling Vapor Recovery, i.e., ORVR) has been phased in that affects VOC emissions from this source. However, DAQ has determined that the Stage II requirements in Section 36.0 achieve significant emission reductions and

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
				remain the lowest emission limitations that the covered GDFs are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility. This section is expected to be amended by June 2020 alongside amendments to Section 26.0 to account for ORVR incompatibility with Stage II vapor recovery. Together, the proposed amendments will require (1) any new gasoline dispensing facility (GDF) to install a Stage I Enhanced Vapor Recovery (EVR) system, instead of a Stage II vapor recovery system, at construction, and (2) any existing GDF to decommission its Stage II vapor recovery system by December 31, 2021 and to install a Stage I EVR system by December 31, 2025.
Section 37.0 Graphic Arts Systems 03/11/2011	CTG for Flexible Package Printing, EPA 453/R-06-003, September 2006. CTG for Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VIII: Graphic Arts-Rotogravure and Flexography, EPA-	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	This section allies to any packaging rotogravure, publication rotogravure, or flexographic printing process at a facility with potential uncontrolled VOC emission greater than 7.7 tons per year. It establishes the limits of VOC contents in coatings and inks used in the covered facilities, specifies standards for control devices for various printing processes, and set	Yes. This section was developed in 1994 to fully implement the 1978 CTG specified requirements for printing operations in graphic arts facilities. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was revised to implement the updated requirements specified in the 2006 CTG.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	450/2-78-033, December 1978. (Group II)		up requirements for testing and recordkeeping.	The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 38.0 Petroleum Solvent Dry Cleaners 01/11/1993	CTG for Control of Volatile Organic Compound Emissions from Large Petroleum Dry Cleaners. EPA-450/3-82-009, September 1982. (Group III)	Final Federal Register Date: 05/03/1995 60 FR 21707	This section applies to petroleum dry cleaning facilities that consume 123,000 L or more petroleum solvent per year. It establishes emission limits or reduction requirements for fugitive emissions, leak repairs, dryers, and filtration systems at covered facilities.	Yes. This section was developed in 1993 to fully implement the 1982 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 39.0 Reserved				
Section 40.0 Leaks from Synthetic Organic Chemical,	CTG for Control of Volatile Organic Compound Emissions	Final Rule Federal Register Date: 05/03/1995	This section applies to all equipment in VOC service in any process unit at a synthetic organic	Yes.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Polymer, and Resin Manufacturing Equipment 01/11/1993	from Reactor Processes and Distillation Operations in SOCM. EPA-450/4-91-031, August 1993. CTG for Control of Volatile Organic Compound Fugitive Emissions from Synthetic Organic Chemical Polymer and Resin Manufacturing Equipment. EPA- 450/3-83-006, March 1984 (Group III).	60 FR 21707	chemical, polymer, and resin production facility with an annual design production capacity equal to or greater than 1,000 mega grams of product. It establishes standards for proper valve operation, leak detection, repair, and reporting for synthetic organic chemical, polymer, and resin manufacturing equipment.	This section was developed in 1993 to fully implement the 1984/1993 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 41.0 Manufacture of High- Density Polyethylene, Polypropylene and Polystyrene Resins 01/11/1993	CTG for Control of Volatile Organic Compound Emissions from Manufacture of High-Density Polyethylene, Polypropylene, and Polystyrene Resins; EPA-450/3-83-008, November 1983. (Group III)	Final Rule Federal Register Date: 05/03/1995 60 FR 21707	This section applies to specific process sections (material recovery section, and production finishing section) at facilities engaged in manufacturing high-density polyethylene, polypropylene, and polystyrene. It establishes requirements for VOC emission limits, reductions and combustions for the covered process sections.	Yes. This section was developed in 1993 to fully implement the 1983 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS? is reasonably available considering current technological and economic feasibility.
Section 42.0 Air Oxidation Processes in the Synthetic Organic Chemical Manufacturing Industry 01/11/1993	CTG for Control of Volatile Organic Compound Emissions from Air Oxidation Processes in Synthetic Organic Chemical Manufacturing Industry. EPA-450/3-84-015, December 1984. (Group III)	Final Rule Federal Register Date: 05/03/1995 60 FR 21707	This section applies to 3 special air oxidation processes in synthetic organic chemical manufacturing industry. The rule establishes requirements for VOC emission reduction and emission combustion for the covered processes.	Yes. This section was developed in 1993 to fully implement the 1984 CTG specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 43.0 Bulk Gasoline Marine Tank Vessel Loading Facilities 08/08/1994	Non-CTG RACT control, based on CAA Section 183(f).	Final Rule Federal Register Date: 07/28/1995 60 FR 38710	This section applies to all loading berths at a bulk marine tank loading facility that (1) delivers gasoline into marine tank vessels, and (2) has an annual throughput equal to or greater than 15,000 gallons. It requires installation of a vapor collection system that is designed to collect all VOC vapors displaced from marine tank vessels during	Yes. This section was developed in 1994 to implement the CAA Section 183(f) requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no new CTG or significant change in RACT control technology for this section.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
			loading, ballasting, or housekeeping.	The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility
Section 44.0 Batch Processing Operations 11/29/1994	ACT for Control of Volatile Organic Compound Emissions from Batch Processes. EPA-453/R-93-017, February 1994.	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to process vents associated with batch processing operations in manufacturing facilities with Standard Industrial Classification (SIC) Codes of 2821, 2833, 2861, 2869, 2869, and 2879. It requires the affected sources to reduce VOC emissions by 90 percent by weight.	Yes. This section was developed in 1994 to implement the 1994 ACT specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 45.0 Control of VOC Emissions- Industrial Cleaning Solvents 03/11/2011	CTG for Industrial Cleaning Solvents. EPA 453/R-06-001, September 2006	Final Rule Federal Register Date: 04/13/2012 77 FR 22224	This section applies to all sources that use organic solvents for the purpose of cleaning. It establishes standards for the affected facilities to evaluate and	Yes. This section was developed in 1994 to implement the 1994 ACT specified requirements for using industrial cleaning solvents. It was approved by

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	ACT for Industrial Cleaning Solvents, EPA-453/R-94-015, February 1994.		test alternative cleaning solutions for the purpose of reducing VOC emissions.	EPA as adequate under the 1997 ozone NAAQS. In 2011, it was revised for necessary corrections for meeting the 2006 CTG requirements reflected in the updated Section 8.0 (See Columns 4 and 5 of Section 8.0). Together, Section 45.0 and Section 8.0 require the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 46.0 Crude Oil Lightering Operations 05/11/2007	Non-CTG RACT requirement, based on CAA Section 182(b)(2)(C).	Final Rule Federal Register Date: 09/13/2007 72 FR 52285	This section applies to the owner or operator of a lightering service that carries out crude oil lightering operations in the waters of the State. The owner of the crude oil being lightered is also affected by certain provisions in this section. It establishes: (a) requirements for using submerged filling pipes, vapor-tight vessel, and vapor balancing between the marine vessels during the transfer of crude oil during lightering operations; (b) progressive schedule limits the annual volume of crude oil that can be lightered without vapor balancing; and (c) limitations on	Yes. This section was not in Delaware's RACT SIP under the 1997 ozone NAAQS. It was developed in 2007 to implement effective VOC emission controls over lightering processes to meet the requirements of CAA Section 182(b)(2)(C). It represents the current non-CTG RACT control levels and the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
			conducting uncontrolled lightening operations on Ozone Action Days.	
Section 47.0 Offset Lithographic Printing and Letterpress Printing 04/11/2011	CTG for Offset Lithographic Printing and Letterpress Printing. EPA-453/R-06-002, September 2006. ACT for Offset Lithographic Printing- Supplemental Information Based on Public Comment on CTG Draft EPA- 453/D-95-001. EPA-453/R-94-054, June 1994. CTG for Control of Volatile Organic Compound Emissions from Offset Lithographic Printing (CTG Draft). EPA-453/D-95-001, September 1993.	Final Rule Federal Register Date: 11/25/2011 77 FR 72626	This section applies to any offset lithographic printing facility and letterpress printing facility, including any heatset and non-heatset web, non-heatset sheet-fed, and newspaper facility. It establishes VOC or alcohol content limits in fountain solutions, VOC limits in cleaning solutions, VOC control requirements for add-on control devices, and requirements for testing and recordkeeping, for the regulated facilities.	Yes. This section was developed in 1994 to fully implement the 1993 CTG (Draft) and 1994 ACT specified requirements for lithographic printing facilities. It was approved by EPA as adequate under the 1997 ozone NAAQS. In 2011, it was revised to implement the requirements specified in the 2006 CTG, by (1) adding letterpress printing facility, and (2) adopting more stringent control requirements. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 48.0 Reactor Processes and Distillation Operations in the Synthetic Organic Chemical	CTG for Control of Volatile Organic Compound Emissions from Reactor Processes and	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to any vent stream that originates from a process unit in which a reactor or distillation operation is located at a facility within the synthetic organic	Yes. This section was developed in 1994 to fully implement the 1993 CTG specified requirements.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Manufacturing Industry 11/29/1994	Distillation Operations in SOCMII. EPA-450/4-91-031, November 1993.		chemical manufacturing industry (SOCMI). It requires the affected sources to reduce VOC emissions by 98 weight-present or to 20 ppmv on a dry basis corrected to 3% oxygen, via combustion device, flare, or process modification.	It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
Section 49.0 Control of VOC Emissions- Control of Volatile Organic Compound Emissions from Volatile Organic Liquid Storage Vessels 11/29/1994	ACT for Volatile Organic Liquids Storage in Floating and Fixed Roof Tanks. EPA-453/R-94-001, February 1994.	Final Rule Federal Register Date: 01/26/1996 61 FR 2419	This section applies to each storage vessel with a capacity equal to or greater than 40,000 gallons that is used to store volatile organic liquids (VOLs). It establishes the venting and sealing standards for internal and external floating roofs, and specifies alternatives to installing internal or external floating roofs.	Yes. This section was developed in 1994 to fully implement the 1994 ACT specified requirements. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

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Column 1: Regulation 1124 Section	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Applicability and Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
Section 50.0 Control of VOC Emissions- Other Facilities that Emit Volatile Organic Compounds (VOCs) 11/29/1994	Non-CTG RACT requirement, based on CAA Section 182(b)(2)(C).	Final Rule Federal Register Date: 03/12/1997 62 FR 11329	This section applies to any facility that is not covered by Section 10.0 through Section 49.0 of Regulation 1124. In brief, it requires an affected source to achieve an overall VOC emission reduction of at least 81 percent by weight. Facilities may also comply with Section 50.0 by submitting an alternative control plan that is subject to approval.	Yes. This section was developed in 1994 to require non-CTG major sources to implement RACT, thus implementing requirements of the CAA Section 182(b)(2)(C). It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no new CTG or significant change in RACT control technology for this section. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

2.2. Implementation of Non-CTG Specified VOC Controls

As indicated in Table 1 above, Delaware has certified that Regulation 1124 contains adequate VOC RACT controls under the 2015 8-hour ozone NAAQS. In addition to Table 1, Delaware has implemented numerous non-CTG-ACT specified VOC controls to achieve further VOC emission reductions for attainment and maintenance of the ozone NAAQS. In general, those non-specified controls are developed for meeting requirements of the CAA Section 182(b)(2)(C)¹¹ and related federal regulations, or for fulfilling Delaware's commitments for model rules agreed upon by regional state affiliations such as the Ozone Transport Commission (OTC), in which Delaware is a member state. Although those controls are not included in the current CTG-ACT documents, they are based on recent technical information available in other forms. DAQ believes that those additional or more stringent controls will help Delaware attain the ozone NAAQS as expeditiously as practicable.¹² In its December 2017 final rule approving Delaware's 2008 SIP revision as adequate under the 2008 8-hour ozone NAAQS (82 FR 57849), the EPA determined that these rules are "beyond RACT." The non-CTG specified VOC rules are discussed below.

2.2.1. Regulation 1141 Section 1.0 "Architectural and Industrial Maintenance (AIM) Coatings" (as approved as a SIP revision by EPA on August 11, 2010, 75 FR 48566)

- 1) This rule became effective on 03/11/2002 to control VOC emission from AIM coating activities;
- 2) This rule was developed to fulfill Delaware's commitment for the OTC 2002 Model Rule-Architectural and Industrial Maintenance (AIM) Coatings;
- 3) It applies to any person who supplies, sells, offers for sale, blends, repackages for sale, or manufactures any architectural coating for use in Delaware;
- 4) It establishes VOC content limits in various coating materials;
- 5) It sets up requirements for container labeling, recordkeeping, reporting and testing;
- 6) This rule is currently under evaluation for more stringent requirements.

2.2.2. Regulation 1141 Section 2.0 "Consumer Products" (as approved as a SIP revision by EPA on October 20, 2010, 75 FR 64673)

- 1) This rule became effective on 04/11/2009 to control VOC emissions from using consumer products;
- 2) This rule was developed to fulfill commitments for the OTC 2006 Model Rule-Consumer Products;

¹¹ Section 182(b)(2) states: "The State shall submit a revision to the applicable implementation plan to include provisions to require the implementation of reasonably available control technology under section 7502(c)(1) of this title with respect to each of the following: (A) Each category of VOC sources in the area covered by a CTG document issued by the Administrator between November 15, 1990, and the date of attainment. (B) All VOC sources in the area covered by any CTG issued before November 15, 1990. (C) All other major stationary sources of VOCs that are located in the area."

¹² In its proposed implementation rule for the 2008 8-hour ozone NAAQS (78 FR 34180, June 6, 2013), EPA indicates that states may require VOC and NOx reductions that are even "beyond RACT" levels if such reductions are needed in order to provide for timely attainment of the ozone NAAQS.

- 3) It applies to any person who sells, supplies, offers for sale, or manufactures consumer products in Delaware;
- 4) It establishes VOC content limits for all covered consumer products;
- 5) It sets up requirements for container/package labeling, recordkeeping, reporting and testing, as well as for surplus reductions and trading;
- 6) This rule is currently under evaluation for more stringent requirements.

2.2.3. Regulation 1141 Section 4.0 “Adhesives and Sealants” (as approved as a SIP revision by EPA on December 22, 2011, 76 FR 79537)

- 1) This rule became effective on 04/11/2009 to control VOC emissions when using adhesives and sealants;
- 2) This rule was developed to fulfill commitments for the OTC 2006 Model Rule-Adhesives and Sealants (Note that this model rule was the basis for EPA’s 2008 updated CTG Miscellaneous Industrial Adhesives (EPA-453/R-08-005, September 2008));
- 3) It applies to any person who sells, supplies, offers for sale, or manufactures for sale adhesives, adhesive primers, sealants and sealant primers in Delaware;
- 4) It establishes VOC content limits in covered materials, and requirements for compliance and testing, as well as recordkeeping and reporting.

3. DETERMINATION OF COMPLIANCE OF NO_x RACT REQUIREMENTS

3.1. Certification of NO_x RACT Requirements

Delaware's NO_x RACT controls are applicable to specific groups of sources in 7 **DE Admin. Code** 1112, "Control of Nitrogen Oxides Emissions" (hereafter in this document referred to as Regulation 1112), which forms the basic NO_x RACT framework. Within this framework, other rules are developed and implemented for relevant subgroups, including:

- 7 **DE Admin. Code** 1144 "Control of Stationary Generator Emissions" (hereafter referred to as Regulation 1144);
- 7 **DE Admin. Code** 1146 "Electric Generating Units (EGUs) Multi-Pollutant Regulation" (hereafter referred to as Regulation 1146); and
- 7 **DE Admin. Code** 1148 "Control of Stationary Combustion Turbine Electric Generating Unit (EGU) Emissions" (hereafter referred to as Regulation 1148).

Sections in Regulation 1112 were first developed and implemented into Delaware SIP revisions under the 1-hour ozone NAAQS, and then included in Delaware's RACT SIP under the 1997 8-hour ozone NAAQS. All those sections were approved by EPA as adequate for meeting the RACT requirements under the 1997 8-hour ozone NAAQS (73 FR 42681, July 2008) and the 2008 8-hour ozone NAAQS (82 FR 57849, December 2017). Regulation 1144 was adopted in January 2006 to tighten the requirements covering internal combustion engines. Regulation 1146 was adopted in December 2006 to tighten the requirements covering EGUs. Regulation 1148 was adopted in July 2007 to tighten the requirements covering combustion turbines.

Certification of Delaware's NO_x RACT controls for meeting the 2015 8-hour ozone NAAQS is provided in Table 2, which is laid out by following the framework of source groups in Regulation 1112. Explanations for the columns of Table 2 are as follows:

Column 1: Identifies NO_x source groups being covered.

Regulation 1112, with an effective date of 11/24/1993, requires all major NO_x emission sources to comply with the relevant provisions by May 31, 1995. Regulations 1144, 1146 and 1148, covering relevant subgroups, have subsequent compliance dates (See Section 3.2 of this document).

Column 2: Identifies the underlying basis for the NO_x RACT control levels and compliance determination.

The fundamental basis of implementing NO_x RACT controls is CAA Sections 182(b)(2) and 182(f) (Citation of those CAA sections is not repeated in Column 2).

Column 3: Identifies the date the rule was approved by EPA into the Delaware SIP, along with the Federal Register citation.

Regulation 1112 was first implemented in November 1993, conditionally approved by EPA in June 1999, and EPA granted the final approval of Regulation 1112 on June 14, 2001 (66 FR 32231). Section 1.0 of Regulation 1142 was approved by EPA on August 11, 2010 (75 FR 48566) and Section 2.0 of the regulation was approved by EPA on May 15, 2012 (77 FR 28489). Regulation 1144 was approved by EPA on August 11, 2010 (75 FR 48566). Regulation 1146 was approved by EAP on March 16, 2010 (75 FR 12449). Regulation 1148 was approved by EPA on August 11, 2010 (75 FR 48566).

Column 4: Explains RACT control requirements.

Column 5: Certifies that the rule represents the RACT control level under the 2015 8-hour ozone NAAQS.

Relevant subgroups being covered in Regulation 1144, Regulation 1146, and Regulation 1148 are briefly discussed in Column 5. More detailed discussions of Regulations 1144, 1146 and 1148 are presented in Section 3.2 of this document.

Delaware's minor source permitting program under Regulation 1102 "Permits" requires a detailed administrative and technical review of Delaware NO_x sources that emit far below the "major" threshold" (i.e., permits are required for the emission of 10 pounds per day or more of "aggregate" air contaminants, and registrations for emissions between 0.2 and 10 lb/day of air contaminants). This permitting program gives confidence that all major NO_x sources are currently controlled by RACT-level controls or more stringent controls.

Effective August 13, 2001, EPA finalized approval of three source-specific NO_x RACT Determinations (66 FR 32231, 6/14/2001) in Delaware. The following three NO_x RACT determinations were removed from Delaware's SIP as part of Delaware's RACT SIP revision for the 2008 8-hour ozone NAAQS: (1) a sulfuric acid (H₂SO₄) and inter-stage absorption system (ISA) process, (2) a metallic nitrite process, and (3) a Polyhydrate Alcohol Catalyst Regenerative (PACR) process. Processes (1) and (2) were both at the General Chemical Corporation facility, Claymont, New Castle, Delaware, and process (3) was at SPI Polyols, Incorporated, Atlas Point Site, New Castle, Delaware. The General Chemical facility at Claymont was permanently shutdown. The PACR process at SPI was permanently shutdown. Therefore, these three NO_x RACT determinations were no longer required in Delaware's ozone SIP. The NO_x RACT determination at the fourth facility was for the electric arc furnace at CitiSteel USA, Incorporated in Claymont, Delaware. The CitiSteel facility permanently shutdown, effective December 31, 2013. Therefore, these three source-specific NO_x RACT determinations are no longer required in Delaware's ozone SIP.

Table 2. Delaware NOx RACT Control List and Determination of Compliance under the 2015 8-hour ozone NAAQS

Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
1. Fuel burning equipment with an input capacity of 100 mmBTU/hr or greater	Stationary Source Committee Recommendation on NOx RACT for Utility Boilers, NESCAUM, 8/12/1992. Stationary Source Committee Recommendation on NOx RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, NESCAUM, 9/18/1992. Controlling Emissions of Nitrogen Oxides from Existing Utility Boilers Under Title I of the Clean Air Act: Options and Recommendations, STAPPA/ALAPCO, 4/27/1992. State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, USEPA, 10/27/1995. Summary of NOx Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Alternative Control Techniques Document: NOx Emissions from Process Heaters (Revised), USEPA, September 1993. Alternative Control Techniques Document: NOx Emissions from	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Gas, oil and coal fired units are subject to 0.20, 0.25, or 0.38 lb/mmBTU emission limits, respectively; Or their emissions must be controlled by low NOx burner technology or flue gas circulation with excess air. And in general, equipment larger than 100 mmBTU is required to install NO_x continuous emission monitoring system (CEMS).	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source. In addition, Delaware has adopted more stringent NO_x limits in: (1) Regulation 1142, for two sub- groups of this source, i.e., industrial boilers greater than 100 mmBTU/hour and industrial boilers and heat processors greater than 200 mmBTU/hour at refineries; (2) Regulation 1146, for coal-fired and oil-fired electric generating units (EGUs) with capacity equal to or greater than 25 MW. See Section 3.2 of this document for details. Together, Regulations 1112, 1142, and 1146 require the lowest emission limitations that the covered sources are capable of meeting by the application of

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Industrial/Commercial/Institutional (ICI) Boilers, USEPA, March 1994. Alternative Control Techniques Document: NOx Emissions from Utility Boilers, USEPA, March 1994. State's Report on Electric Utility Nitrogen Oxides Reduction Technology Options for Application by the Ozone Transport Assessment Group, prepared for the OTAG Control Technology & Options Workgroup by Ken Colburn, 4/11/1996. Status Report on NOx Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, NESCAUM, December 2000. Summary of State/Local NOx Regulations for Stationary Sources, USEPA, 2004.			control technology that is reasonably available considering current technological and economic feasibility.
2. Fuel burning equipment with an input capacity of 50 mmBTU/hr or greater and less than 100 mmBTU/hr	Stationary Source Committee Recommendation on NOx RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, NESCAUM, 9/18/1992. Summary of NOx Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Alternative Control Techniques Document: NOx Emissions from Process	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Emission rates of the targeted sources are limited to those to be achieved by low excess air and low NO_x burners, or flue gas recirculation.	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source.

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Heaters (Revised), USEPA, September 1993. Alternative Control Techniques Document: NOx Emissions from Industrial-Commercial/Institutional (ICI) Boilers, USEPA, March 1994. Status Report on NOx Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, NESCAUM, December 2000. Summary of State/Local NOx Regulations for Stationary Sources, USEPA, 2004.			The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
3. Fuel burning equipment with an input capacity of less than 50 mmBTU/hr	Stationary Source Committee Recommendation on NOx RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, NESCAUM, 9/18/1992. Summary of NOx Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Alternative Control Techniques Document: NOx Emissions from Process Heaters (Revised), USEPA, September 1993. Alternative Control Techniques Document: NOx Emissions from Industrial/Commercial/Institutional (ICI) Boilers, USEPA, March 1994.	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	The rule requires the targeted sources to conduct annual tune-ups.	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is

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<u>Column 1:</u> NOx Emission Source Group	<u>Column 2:</u> Basis for RACT Control	<u>Column 3:</u> As SIP Revision Approved by EPA	<u>Column 4:</u> RACT Rule Requirements	<u>Column 5:</u> Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS? reasonably available considering current technological and economic feasibility.
	Summary of State/Local NO _x Regulations for Stationary Sources, USEPA, 2004.			
4. Alternative requirement for fuel burning equipment - Seasonal fuel switching (April 1 through October 31) to a low NO _x emitting fuel.	Memorandum, Fuel Switching to Meet the Reasonably Available Control Technology (RACT) Requirements for Nitrogen Oxides (NO_x), Michael H. Shapiro, Air and Radiation, US EPA, 7/30/1993. Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Memorandum, Nitrogen Oxides (NO_x) Questions from Ohio EPA, Tom Helms, Chief Ozone/Carbon Monoxide Programs Branch, US EPA (no date, referring to 11/30/1993 questions). Summary of State/Local NO_x Regulations for Stationary Sources, USEPA, 2004. Alternative Control Techniques Document: NO_x Emissions from Industrial-Commercial/Institutional (ICI) Boilers, USEPA, March 1994. State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, USEPA.	Final Rule Federal Register Date: 06/14/2001 66 FR 32234 For the covered sources, fuel switching is limited to the use of natural gas, liquid petroleum gas (LPG) or distillate oil. A 90% availability of the new fuel is required.	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source. The requirements are the lowest emission limitations that the covered source is capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.	

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
5. Gas turbines	Alternative Control Techniques Document: NO_x Emissions from Stationary Gas Turbines, USEPA, January 1993. Stationary Source Committee Recommendation on NO_x RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, NESCAUM, 9/18/1992. Status Report on NO_x Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, NESCAUM, December 2000. Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Summary of State/Local NO_x Regulations for Stationary Sources, USEPA, 2004.	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	The rule requires the covered gas turbines to meet 42ppm and 88 ppm NO_x limits for gas and oil fired units, respectively	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source group, except as explained below. In 2007, Delaware adopted Regulation 1148, setting forth additional requirements for a subgroup of combustion turbine electric generating units (EGUs), in particular to control NO_x emissions from the covered EGUs in high-electric-demand-days (HEDDs). See Section 3.2 of this document for details. Together, Regulations 1112 and 1148 require the lowest emission limitations that the covered source groups and subgroup are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

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Column 1: NO_x Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
6. Stationary internal combustion engines	Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA, February 1992. Stationary Source Committee Recommendation on NO_x RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, NESCAUM, 9/18/1992. Alternative Control Techniques Document: NO_x Emissions from Stationary Reciprocating Internal Combustion Engines, USEPA, 1993. NO_x Emissions from Stationary Internal Combustion Engines, USEPA, October 2003 Stationary Reciprocating Internal Combustion Engines – Updated Information on NO_x Emissions and Control Techniques – Revised Final Report, USEPA, 9/1/2000. Sourcebook: NO_x Control Technology Data, USEPA, July 1991. Status Report on NO_x Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, NESCAUM, December 2000. Summary of State/Local NO_x Regulations for Stationary Sources, USEPA, 2004	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	The rule establishes emission limits for the targeted engines to those achieved using pre-ignition chamber combustion or clean burn technology for gas fired units and those achieved using lean burn technology for diesel fired units.	Yes. This provision fully implements the required NO_x controls over the targeted sources. It was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source group, except as explained below. In 2006, Delaware adopted Regulation 1144, setting forth NO_x emission requirements for a subgroup of stationary generators that were generally exempted from Regulation 1112. See Section 3.2 of this document for details. Together, Regulations 1112 and 1144 require the lowest emission limitations that the covered source groups and subgroup are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
7. Fuel burning equipment used exclusively for providing residential comfort heating and hot water	Summary of NO _x Control Technologies and their Availability and Extent of Application, USEPA, February 1992. State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, USEPA.	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the targeted source group.	Yes. For this source group, DAQ determined that no cost effective RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source group.
8. Incinerator or thermal/catalytic oxidizer constructed before November 15, 1992, and used primarily for the control of air pollution.	Summary of NO _x Control Technologies and their Availability and Extent of Application, USEPA, February 1992,	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the targeted source group.	Yes. For this source group, DAQ determined that no cost effective RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source.

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
9. Fuel burning equipment with a rated heat input capacity of less than 15 MMBTU/hour.	Memorandum: De Minimis Values for NO _x RACT, from G.T. Helms, Ozone Policy and Strategies Group, USEPA, 1/1/1995. Alternative Control Techniques Document: NO _x Emissions from Industrial-Commercial/Institutional (ICI) Boilers, USEPA, March 1994	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the targeted source group.	Yes. For this source group, DAQ determined that no cost effective RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source.
10. Stationary internal combustion engine with a rated capacity of or less than 450 hp of output power.	Memorandum: De Minimis Values for NO _x RACT, from G.T. Helms, Ozone Policy and Strategies Group, USEPA, 1/1/1995. NO _x Emissions from Stationary Internal Combustion Engines, USEPA, October 2003. Stationary Reciprocating Internal Combustion Engines – Updated Information on NO _x Emissions and Control Techniques – Revised Final Report, USEPA, 9/1/2000. Alternative Control Techniques Document: NO _x Emissions from	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the targeted source group.	Yes. For this source group, DAQ determined that no cost effective RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source group, except as explained below.

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
	Stationary Reciprocating Internal Combustion Engines, USEPA, 1993.			In 2006, Delaware adopted Regulation 1144, setting forth NOx emission requirements for a subgroup of stationary generators that were generally exempted from Regulation 1112. See Section 3.2 of this document for details. Together, Regulations 1112 and 1144 require the lowest emission limitations that the covered source groups and subgroup are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
11. Any source operating during the month of November to the end of March and operating with a capacity factor of 5% or less from April 1 to October 31.	Memorandum, Nitrogen Oxides (NO_x) Questions from Ohio EPA, Tom Helms, Chief Ozone/Carbon Monoxide Programs Branch, US EPA (no date, referring to 11/30/1993 questions). Memorandum Subject: De Minimis Values for NOx RACT, from G.T. Helms, Ozone Policy and Strategies Group, 1/1/1995	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the targeted source group, based on EPA's Helms Memo.¹³ Delaware, however, determines that some units in this source group have high short	Yes. For this source group, DAQ determined that no cost effective RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated

¹³ The DAQ believes that the exemptions for this source group based on the 1995 Helms Memo should not continue because short term emissions from the source group impact adversely the ozone air quality in summer time. Delaware has adopted RACT controls in Regulation 1144 and Regulation 1148 to address the short term NOx emissions. The DAQ suggests that EPA revoke the 1995 memo to avoid continuous exemption for the related sources.

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
			term or daily NOx emissions that impact ozone air quality in the ozone season. Delaware has set forth RACT-level requirements outside Regulation 1112 (i.e., in Regulations 1144 and 1148). See Column 5, and Section 3.2 of this document.	CTG and no significant change in RACT control technology for the covered source, except as explained below. In 2006, Delaware adopted: (1) Regulation 1144, setting forth NOx emission requirements for a subgroup of stationary generators that were generally exempted from Regulation 1112; and (2) Regulation 1148 in 2007, setting forth additional requirements for a subgroup of combustion turbine electric generating units (EGUs), in particular to control NOx emissions from the covered EGUs in high-electric-demand-days (HEDDs). See Section 3.2 of this document for details. Together, Regulations 1112, 1144 and 1148 require the lowest emission limitations that the covered source groups and subgroup are capable of meeting by the application of control technology that is reasonably available considering current technological and economic feasibility.
12. Any fuel burning equipment, gas turbine, or internal combustion engine with an annual	Memorandum Subject: De Minimis Values for NO _x RACT, from G.T. Helms, Ozone Policy and Strategies Group, USEPA, 1/1/1995.	Final Rule Federal Register Date: 06/14/2001 66 FR 32231	Regulation 1112 specifies no emissions limits or control requirements for the	Yes. For this source group, DAQ determined that no cost effective

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS?
capacity factor of less than 5 percent.	Alternative Control Techniques Document: NO_x Emissions from Industrial-Commercial-Institutional (ICI) Boilers, USEPA, March 1994. Alternative Control Techniques Document: NO_x Emissions from Stationary Reciprocating Internal Combustion Engines, USEPA, 1993. Alternative Control Techniques Document: NO_x Emissions from Stationary Gas Turbines, USEPA, January 1993. Alternative Control Techniques Document: NO_x Emissions from Process Heaters (Revised), USEPA, September 1993.		targeted source group, based on EPA's Helms Memo.⁷ Delaware, however, determines that some units in this source group have high short term or daily NO_x emissions that impact ozone air quality in the ozone season. Delaware has set forth RACT-level requirements outside Regulation 1112 (i.e., in Regulations 1144 and 1148). See Column 5, and Section 3.2 of this document.	RACT controls existed under the 1-hour ozone NAAQS and under the 1997 ozone NAAQS. The determination was approved by EPA as adequate under the 1997 ozone NAAQS. After EPA's approval, there has been no updated CTG and no significant change in RACT control technology for the covered source group, except as explained below. In 2006, Delaware adopted: (1) Regulation 1144, setting forth NO_x emission requirements for a subgroup of stationary generators that were generally exempted from Regulation 1112; and (2) Regulation 1148 in 2007, setting forth additional requirements for a subgroup of combustion turbine electric generating units (EGUs), in particular to control NO_x emissions from the covered EGUs in high-electric-demand-days (HEDDs). See Section 3.2 of this document for details. Together, Regulations 1112, 1144 and 1148 require the lowest emission limitations that the covered source groups and subgroup are capable of meeting by the application of control technology that is reasonably

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Column 1: NOx Emission Source Group	Column 2: Basis for RACT Control	Column 3: As SIP Revision Approved by EPA	Column 4: RACT Rule Requirements	Column 5: Requirements at least as stringent as RACT level for the 2015 8-hour ozone NAAQS? available considering current technological and economic feasibility.

3.2. Implementation of Non-CTG Specified NO_x Controls

As indicated in Table 2 above, Delaware has certified that the framework of Regulation 1112, including Regulations 1112, 1142, 1144, 1146 and 1148 contains adequate NO_x RACT controls under the 2015 8-hour ozone NAAQS. As aforementioned, Regulation 1112 was developed following CTG-ACT guidelines under the 1-hour ozone NAAQS and maintained valid under the 1997 8-hour ozone NAAQS. Delaware has also developed Regulations 1142, 1144, 1146, 1148 and other controls to implement additional RACT-level rules and requirements to aid in maintenance of the 1-hour NAAQS and attainment of the NAAQS. In general, those non-CTG specified rules are developed for meeting requirements of the CAA Section 182(b)(2) and related federal regulations, or for fulfilling Delaware's commitments for model rules agreed upon by regional state affiliations such as the OTC, in which Delaware is a member state.

As aforementioned, EPA has defined RACT as the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility (44 FR 53762). EPA's definition indicates that the RACT requirements must include compliance with the lowest emission levels that were achieved in the past, are achieved at present, or will be achieved in the future under facility's operational limitations (such as operational permits) and equipment standards that were previously applicable, are presently applicable, or will become applicable in the future, respectively. The DAQ believes that the development of its non-CTG specified NO_x rules reflects exactly the EPA's RACT definition, as they were approved by the EPA as adequate under the 2008 8-hour ozone NAAQS. Further, the OTC document "White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NO_x) Emissions from Eight Source Categories"¹⁴ identifies emissions limits and regulations for NO_x emissions identified by OTC states as RACT. The NO_x emissions comparisons for boilers, stationary generators, and combustion turbines of this document provide justification for DAQ's assertion that the following rules reflect RACT.

The non-CTG NO_x rules are discussed in details below.

3.2.1. Regulation 1142 Section 1.0 "Control of NO_x Emissions from Industrial Boilers"

- 1) This rule became effective on 12/12/2001 to control NO_x emissions from large industrial boilers;¹⁵
- 2) It imposes controls on certain industrial boilers with heat input greater than 100 mmBTU/hour, by setting up a NO_x emission rate limit of 0.10 lb/mmBTU for the ozone season, and 0.25 lb/mmBTU for the non-ozone season months.
- 3) It also establishes the requirements of monitoring, recordkeeping and reporting for the covered boilers.

¹⁴ This document can be obtained on the OTC website at https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf, and is listed in in 5.7 of the Documentation section of this document.

¹⁵ Three boilers at Sunoco refining facility (Claymont, Delaware) used to be subject to Regulation 1142 Section 1.0. The boilers were shutdown in 2002. At present, no source in Delaware is subject to this rule.

3.2.2. Regulation 1142 Section 2.0 “Control of NO_x Emissions from Industrial Boilers and Heat Processers at Petroleum Refineries”

- 1) This rule became effective on 04/11/2011 to control NO_x emission from large industrial boilers and heat processor at petroleum refineries;
- 2) It was originally developed to fulfill requirements to attain the 1997 8-hour ozone NAAQS and was revised following a consent agreement of May 2010 between the Department and the covered refinery;
- 3) It imposes stringent NO_x emission rate limits, and corresponding compliance schedule, for 8 industrial boilers and heat processors with heat input greater than 200 mmBTU/hour at Delaware City refinery, operated by Delaware City Refinery Company (DCRC) (the only petroleum refinery in Delaware);
- 4) The emission rate limits include: 0.015 lb/mmBTU on a 24-hour rolling average basis for three boilers, 20 ppmvd@0% O₂ on a 365-day rolling average basis for a CO boiler, and 0.04 lb/mmBTU on a 24-hour rolling average basis process heaters;
- 5) It establishes an alternative facility-wide NO_x emission cap for the covered facility:
 - a) 2,525 tons in 2013;
 - b) 2,225 tons in 2014;
 - c) 1,650 tons in 2015;
- 6) It also establishes the requirements of compliance, recordkeeping and reporting for the covered refineries.

3.2.3. Regulation 1144 “Control of Stationary Generator Emissions”

- 1) This regulation became effective on 01/11/2006 to control NO_x emissions, as well as other pollutant emissions, from stationary generators;
- 2) It was developed from Delaware governor’s initiative for clean energy and clean air, and later became the template of the OTC Model Rule for Stationary Generator Control Measures (2009);
- 3) It addresses short term NO_x emissions from the covered sources and reduces their daily impacts on ozone air quality during the ozone season;
- 4) It sets up stringent NO_x emission rates for stationary distributed generators, with standby power ratings greater than 10kW, when used at times other than emergency times;
- 5) The NO_x emission rate limits include:
 - a) For existing distributed generators: 4.0 lb/MWh;
 - b) For new distributed generators:
 - i) Installed on or after 01/11/2006, 2.2lb/MWh;
 - ii) Installed on or after 01/01/2008, 1.0 lb/MWh;
 - iii) Installed on or after 01/01/2012, 0.6 lb/MWh;
- 6) For new distributed generators using waste/landfill/digester gases and installed on or after 01/11/2006: 2.2 lb/MWh;

- 7) It establishes requirements for recordkeeping and reporting, emission certification, compliance and enforcement, and emission credit calculations for the covered generators.
- 8) The stationary generators covered by Regulation 1144 are in general exempted from Regulation 1112 because of their small capacities. Delaware, however, determines that these units had high daily NO_x emissions and therefore should be controlled to aid in attainment and maintenance of the ozone NAAQS during the ozone season.

3.2.4. Regulation 1146 “Electric Generating Units (EGU) Multi-Pollutant Regulation”

- 1) This regulation became effective on 12/11/2006 to limit NO_x emission rates and to establish unit-specific annual NO_x mass emissions caps, as well as SO₂ and mercury emission rates and mass emissions caps, from coal and residual oil fired EGUs with a nameplate rating of 25 MW or greater;
- 2) It was developed to fulfill Delaware’s obligations under former EPA cap and trade programs and Clean Air Act (CAA) Section 110 transport restrictions.;
- 3) It sets up stringent NO_x emission rate limit of 0.15 lb/mmBTU for coal-fired and residual oil-fired EGUs with nameplate capacity ratings of greater than 25 MW during the period of May 1, 2009 through December 31, 2009, and a NO_x emissions rate limit of 0.125 lb/MMBTU for the period beginning January 1, 2010 and beyond;
- 4) It establishes standards for recordkeeping and reporting, compliance, and penalties for the covered EGUs.

3.2.5. Regulation 1148 “Control of Stationary Combustion Turbine Electric Generating Unit (EGU) Emissions”

- 1) This regulation became effective on 07/11/2007 to control NO_x emissions from stationary combustion turbine EGUs with base-load nameplate capacities of 1 MW or greater;
- 2) It was developed to fulfill requirements for controlling NO_x emissions in high-electric-demand-days (HEDDs) during the ozone season, as required in the OTC Model Rule for HEDD Turbines (2009);
- 3) It addresses short term NO_x emissions from the covered sources and reduces their daily impacts on ozone air quality during the ozone season;
- 4) It sets up RACT-level NO_x emission limits, 42 ppmv (parts per million by volume) for gaseous fuel and 88 ppmv for liquid fuel, for the covered EGUs;
- 5) It also implements NO_x emission requirements for covered combustion turbine EGUs in HEDDs during the ozone season;
- 6) It establishes standards for monitoring and reporting, recordkeeping for the covered EGUs;
- 7) The stationary combustion turbines covered by Regulation 1148 are in general exempted from Regulation 1112 because of their small capacities. Delaware, however, determines that these units had high daily NO_x emissions and therefore should be controlled to aid in attainment and maintenance of the ozone NAAQS in the ozone season.

3.3. Optimized Operation Limits as RACT Controls for Refinery Units

The DAQ has reviewed the 2017 Delaware emission inventory¹⁶ and has determined that the requirements of Regulation 1112, Section 2.0 of 1142, 1144, 1146, and 1148 continue to provide adequate NO_x RACT emissions controls under the 2015 8-hour ozone NAAQS for all NO_x emission units except for two units located at the Delaware City Refinery. These two units are the fluid-coking unit (FCU) and the fluid-catalytic-cracking unit (FCCU).

The Delaware City refinery currently complies with Section 2.0 of Regulation 1142 by compliance with a facility-wide NO_x emission cap.¹⁷ In addition, NO_x short-term and long-term emission limits from the FCU and the FCCU are covered under an EPA consent decree finalized in letters from EPA to the refinery dated May 21, 2014. In its 2008 RACT SIP Revision, Delaware established the consent decree limits as RACT limits for these two units as follows:

- 1) The FCU and FCCU each generate NO_x and carbon monoxide (CO), the latter being combusted in a downstream CO Boiler;
- 2) The FCU and FCCU NO_x limits are established as follows:
 - a) FCU: 152.0 ppmvd (parts per million by volume dry) @ 0% O₂ on a 7-day rolling average basis and 115.2 ppmvd @ 0% O₂ on a 365-day rolling average basis;
 - b) FCCU: 137.0 ppmvd @ 0% O₂ on a 7-day rolling average basis and 100.7 ppmvd @ 0% O₂ on a 365-day rolling average basis;
- 3) For days in which the units are not operating, no NO_x value shall be used in the average, and those periods shall be skipped in determining the 7-day and 365-day averages;
- 4) The DAQ finds the optimized limits described above to be the lowest emission limitation that the units are capable of meeting by the application of control technology that is reasonably available for the two units considering technological and economic feasibility;
- 5) The following were incorporated into Delaware's 2008 RACT SIP revision and approved by the EPA as adequate under the 2008 ozone NAAQS. The DAQ contends that these requirements for the FCU and FCCU meet the RACT requirements under the 2015 8-hour ozone NAAQS:
 - a) The optimized limits as described in (4) above;
 - b) The compliance requirements as specified in Section 2.4.1 of Regulation 1142.
 - c) The recordkeeping and reporting requirements as specified in Section 2.5 of Regulation 1142.

¹⁶ Delaware's 2017 emissions inventory has been prepared internally by DAQ. The emissions will be publicly available on the EPA's website for the 2017 National Emissions Inventory (NEI) <https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data>.

¹⁷ A facility-wide emissions cap incorporates an overall emissions limit for a pollutant on a plant-wide basis. The cap is designed to maintain compliance with all applicable emission limits, but provides the facility with some flexibility in the operation of individual emissions units.

4. NEGATIVE DECLARATIONS

Some RACT controls have not been adopted in Delaware because there are no targeted emission sources in Delaware. The DAQ makes the negative declarations for the following RACT controls:

- 1) Control of Volatile Organic Emissions from Manufacture of Pneumatic Rubber Tires, EPA-450/2-78-030, December 1978. (Group II).
- 2) Control of Volatile Organic Compound Emissions from Wood Furniture Manufacturing Operations, EPA-453/R-96-007, April 1996.
- 3) Control Techniques Guidelines for Shipbuilding and Ship Repair Operations (Surface Coating) - August 1996 (61 FR 44050), August 27, 1996.
- 4) Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials. EPA-453/R-08-004, September 2008.
- 5) Control Techniques Guidelines for the Oil and Natural Gas Industry. EPA-453/B-16-001, October 2016.

In addition, in its implementation rule for the 1997 8-hour ozone NAAQS (70 FR 71612, November 29, 2005), EPA identified that cement kilns and stationary internal combustion engines were two source categories for which additional NO_x control information was available since the RACT determinations under the 1-hour ozone NAAQS were made. However, Delaware declares that (1) it does not have cement kilns within its boundary and (2) the stationary internal combustion engines in Delaware are regulated by the National Emissions Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS) for reciprocating internal combustion engines (RICE) (Note that the subgroup of stationary generators is now covered by Regulation 1144).

Furthermore, Delaware declares that it does not have any new major stationary VOC and NO_x emission sources that fall outside the scope of the implemented RACT VOC rules (i.e., sections in Regulation 1124), RACT NO_x rules (i.e., source groups of Regulation 1112), and other VOC rules and NO_x rules discussed in 2.2 and 3.2 of this document, respectively.

5. DOCUMENTATION

5.1. List of EPA's Control Techniques Guidelines (CTG) documents, Alternative Control Techniques (ACT) documents, and Additional Reference Documents, cited in this RACT SIP revision.

- 1) Control Technology Guidance (CTG) document: Control of Volatile Organic Compound Emissions from Coating Operations at Aerospace Manufacturing and Rework Operations, EPA-453/R-97-004, December 1997.
- 2) Alternative Control Techniques (ACT) document: Reduction of Volatile Organic Compound Emissions from Automobile Refinishing, EPA-450/3-88-009, October 1988.
- 3) ACT: Automobile Refinishing, EPA-453/R-94-031, April 1994.
- 4) ACT: Surface Coating of Automotive/Transportation and Business Machine Plastic Parts, EPA-453/R-94-017, February 1994.
- 5) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume II: Surface Coating of Cans, Coils, Paper, Fabrics, Automobiles, and Light-Duty Trucks, EPA-450/2-77-008, May 1977 (Group I).
- 6) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume III: Surface Coating of Metal Furniture, EPA-450/2-77-032, December 1977.
- 7) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume V: Surface Coating of Large Appliances, EPA-450/2-77-034, December 1977 (Group I).
- 8) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume IV: Surface Coating of Insulation of Magnet Wire, EPA-450/2-77-033, December 1977 (Group I).
- 9) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VI: Surface Coating of Miscellaneous Metal Parts and Products, EPA-450/2-78-015, June 1978 (Group II).
- 10) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VII: Factory Surface Coating of Flat Wood Paneling, EPA-450/2-78-032, June 1978 (Group II).
- 11) CTG: Control of Volatile Organic Emissions from Bulk Gasoline Plants, EPA-450/2-77-035, December, 1977 (Group I).
- 12) CTG: Control of Volatile Organic Emissions from Bulk Gasoline Plants, EPA-450/2-77-035, December, 1977 (Group I).
- 13) CTG: Design Criteria for Stage I Vapor Control Systems - Gasoline Service Stations, November 1975 (Group I).
- 14) CTG: Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals, EPA-450/2-77-026, December 1977 (Group I).
- 15) CTG: Control of Volatile Organic Compound Leaks from Gasoline Tank Trucks and Vapor Collection Systems, EPA-450/2-78-051, December 1978 (Group II).
- 16) CTG: Control of Refinery Vacuum Producing Systems, Wastewater Separators, and Process Unit Turnarounds, EPA-450/2-77-025, October 1977 (Group I).
- 17) CTG: Control of Volatile Organic Compound Leaks from Petroleum Refinery Equipment, EPA-450/2-78-036, June 1978 (Group II).
- 18) CTG: Control of Volatile Organic Emissions from Petroleum Liquid Storage in External Floating Roof Tanks, EPA-450-2/78-047, December 1978 (Group II).

- 19) CTG: Control of Volatile Organic Emissions from Storage of Petroleum Liquids in Fixed Roof Tanks, EPA-450/2-77-036, December 1977 (Group I).
- 20) CTG: Control of Volatile Organic Compound Equipment Leaks from Natural Gas/Gasoline Processing Plants, EPA-450/2-83-007, December 1983 (Group III).
- 21) CTG: Control of Volatile Organic Emissions from Solvent Metal Cleaning, EPA-450/2-77-022 November 1977 (Group I).
- 22) ACT: Halogenated Solvent Cleaners, EPA-450/3-89-030, August 1989.
- 23) CTG: Control of Volatile Organic Compounds from Use of Cutback Asphalt, EPA-450/2-77-037, December 1977 (Group I).
- 24) CTG: Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products, EPA-450/2-78-029, December 1978 (Group II).
- 25) CAA Section 182(b)(3).
- 26) CTG: Control of Volatile Organic Emissions from Existing Stationary Sources, Volume VIII: Graphic Arts-Rotogravure and Flexography, EPA-450/2-78-033, December 1978 (Group II).
- 27) CTG: Control of Volatile Organic Compound Emissions from Large Petroleum Dry Cleaners, EPA-450/3-82-009, September 1982 (Group III).
- 28) CTG: Control of Volatile Organic Compound Emissions from Reactor Processes and Distillation Operations in SOCMI, November 15, 1993, EPA-450/4-91-031.
- 29) CTG: Control of Volatile Organic Compound Fugitive Emissions from Synthetic Organic Chemical Polymer and Resin Manufacturing Equipment, EPA-450/3-83-006, March 1984 (Group III).
- 30) CTG: Control of Volatile Organic Compound Emissions from Manufacture of High-Density Polyethylene, Polypropylene, and Polystyrene Resins, EPA-450/3-83-008, November 1983 (Group III).
- 31) CTG: Control of Volatile Organic Compound Emissions from Air Oxidation Processes in Synthetic Organic Chemical Manufacturing Industry, EPA-450/3-84-015, December 1984 (Group III).
- 32) CAA Section 183(f).
- 33) ACT: Control of Volatile Organic Compound Emissions from Batch Processes, EPA-453/R-93-017, February 1994.
- 34) ACT Document: Industrial Cleaning Solvents, EPA-453/R-94-015, February 1994.
- 35) CTG: Control of Volatile Organic Compound Emissions from Offset Lithographic Printing (CTG Draft), EPA-453/D-95-001, September 1993.
- 36) ACT: Offset Lithographic Printing, EPA-453/R-94-054, June 1994.
- 37) CTG: Control of Volatile Organic Compound Emissions from Reactor Processes and Distillation Operations in SOCMI, November 15, 1993, EPA-450/4-91-031.
- 38) ACT: Volatile Organic Liquids Storage in Floating and Fixed Roof Tanks, EPA-453/R-94-001, February 1994.
- 39) CAA Section 182(b)(2)(C).
- 40) Stationary Source Committee Recommendation on NO_x RACT for Utility Boilers, North-East States for Coordinated Air Use Management (NESCAUM), 8/12/1992.
- 41) Stationary Source Committee Recommendation on NO_x RACT for Industrial Boilers, Internal Combustion Engines and Combustion Turbines, North-East States for Coordinated Air Use Management (NESCAUM), 9/18/1992.

- 42) Controlling Emissions of Nitrogen Oxides from Existing Utility Boilers Under Title I of the Clean Air Act: Options and Recommendations, State and Territorial Air Pollution Program Administrators and Association of Local Air Pollutions Officials (STAPPA/ALAPCO), 4/27/1992.
- 43) State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, USEPA, 10/27/1995.
- 44) Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA, February 1992.
- 45) Alternative Control Techniques Document: NO_x Emissions from Process Heaters (Revised), USEPA, September 1993.
- 46) Alternative Control Techniques Document: NO_x Emissions from Industrial/Commercial/Institutional (ICI) Boilers, USEPA, March 1994.
- 47) Alternative Control Techniques Document: NO_x Emissions from Utility Boilers, USEPA, March 1994.
- 48) State's Report on Electric Utility Nitrogen Oxides Reduction Technology Options for Application by the Ozone Transport Assessment Group (OTAG), prepared for the OTAG Control Technology & Options Workgroup by Ken Colburn, 4/11/1996.
- 49) Status Report on NO_x Controls for Gas Turbines, Cement Kilns, Industrial Boilers, Internal Combustion Engines, NESCAUM, December 2000.
- 50) Summary of State/Local NO_x Regulations for Stationary Sources, USEPA, 2004.
- 51) Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA, February 1992.
- 52) Summary of NO_x Control Technologies and their Availability and Extent of Application, USEPA February 1992.
- 53) Memorandum subject, Fuel Switching to Meet the Reasonably Available Control Technology (RACT) Requirements for Nitrogen Oxides (NO_x), Michael H. Shapiro, Air and Radiation, 7/30/1993.
- 54) Memorandum subject, Nitrogen Oxides (NO_x) Questions from Ohio EPA, Tom Helms, Chief Ozone/Carbon Monoxide Programs Branch, (no date cited, references 11/30/1993 questions).
- 55) State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, USEPA.
- 56) Alternative Control Techniques Document: NO_x Emissions from Stationary Gas Turbines, USEPA, January 1993.
- 57) Alternative Control Techniques Document: NO_x Emissions from Stationary Reciprocating Internal Combustion Engines, USEPA 1993.
- 58) NO_x Emissions from Stationary Internal Combustion Engines, USEPA, October 2003.
- 59) Stationary Reciprocating Internal Combustion Engines – Updated Information on NO_x Emissions and Control Techniques – Revised Final Report, USEPA, 9/1/2000.
- 60) Sourcebook: NO_x Control Technology Data, USEPA, July 1991.
- 61) Memorandum Subject: De Minimis Values for NO_x RACT, from G.T. Helms, Ozone Policy and Strategies Group, dated 1/1/1995.
- 62) Alternative Control Techniques Document: NO_x Emissions from Iron and Steel Mills, USEPA, September 1994.

- 63) The “Blue Book,” i.e., “ISSUES RELATED TO VOC REGULATION CUTPOINTS, DEFICIENCIES AND DEVIATIONS, Clarification to Appendix D of November 24, 1987 FEDERAL REGISTER,” May 25, 1988.
https://www.epa.gov/sites/production/files/2016-08/documents/voc_bluebook_25may1988.pdf
- 64) Control Techniques Guidelines for Flat Wood Paneling Coatings. EPA 453/R-06-004, September 2006.
- 65) Control Techniques Guidelines for Industrial Cleaning Solvents. EPA 453/R-06-001, September 2006.
- 66) Control Techniques Guidelines for Flexible Package Printing. EPA 453/R-06-003, September 2006.
- 67) Control Techniques Guidelines for Offset Lithographic Printing and Letterpress Printing. EPA-453/R-06-002, September 2006.
- 68) Control Techniques Guidelines for Paper Film and Foil Coatings. EPA 453/R-07-003, September 2007.
- 69) Control Techniques Guidelines for Metal Furniture Coatings. EPA 453/R-07-005, September 2007.
- 70) Control Techniques Guidelines for Large Appliance Surface Coating. EPA 453-07-004, September 2007.
- 71) Control Techniques Guidelines for Auto and Light-duty Truck Assembly Coatings. EPA 453/R-08-006, September 2008.
- 72) Protocol for Determining the Daily Volatile Organic Compound Emission Rate of Automobile and Light-Duty Truck Primer-Surfacer and Topcoat Operations. EPA 453/R-08-002, September 2008.
- 73) Control Techniques Guidelines for Miscellaneous Metal and Plastic Parts Coatings. EPA-453/R-08-003, September 2008.
- 74) Control Techniques Guidelines for Fiberglass Boat Manufacturing Materials. EPA-453/R-08-004, September 2008.
- 75) Control Techniques Guidelines for Miscellaneous Industrial Adhesives. EPA-453/R-08-005, September 2008.
- 76) Model Rule for Architectural, Industrial and Maintenance Coatings (AIM), Ozone Transport Commission (OTC), 2002.
- 77) Model Rule for Consumer Products, Ozone Transport Commission (OTC), 2006.
- 78) Model Rule for Adhesives and Sealants, Ozone Transport Commission (OTC), 2006.
- 79) Model Rule for Large Above-Ground VOC Storage Tanks, Ozone Transport Commission (OTC), 2010.
- 80) Model Rule for Solvent Degreasing, Ozone Transport Commission (OTC), 2012.
- 81) Letter from U.S. EPA (Philip Brooks, Director of Air Enforcement Division) to the Delaware City Refining Company (John Deemer, HSE Manager) dated May 21, 2014, establishing NO_x limits for the fluid coking unit (FCU) under the consent decree.
- 82) Letter from U.S. EPA (Philip Brooks, Director of Air Enforcement Division) to the Delaware City Refining Company (John Deemer, HSE Manager) dated May 21, 2014, establishing NO_x limits for the fluidized catalytic cracking unit (FCCU) under the consent decree.

- 5.2. **Delaware Reasonably Available Control Technology (RACT) State Implementation Plan (SIP) under the 8-Hour Ozone National Ambient Air Quality Standard (NAAQS), September 2006. Approved by EPA in July 2008 (73 FR 42681).**
- 5.3. **Delaware Reasonably Available Control Technology (RACT) State Implementation Plan (SIP) Under the 2008 Ozone National Ambient Air Quality Standard (NAAQS), August 2014. Approved by EPA in December 2018 (82 FR 57849).**
- 5.4. **Delaware VOC RACT Regulation**
7 DE Admin. Code 1124 Control of Volatile Organic Compound Emissions
<http://regulations.delaware.gov/AdminCode/title7/1000/1100/Split1124/index.shtml#TopOfPage>
(Note: Hard copy of this regulation is available upon request.)
- 5.5. **Delaware NOx RACT Regulation**
7 DE Admin. Code 1112 Control of Nitrogen Oxides Emissions
<http://regulations.delaware.gov/AdminCode/title7/1000/1100/1112.shtml#TopOfPage>
(Note: Hard copy of this regulation is available upon request.)
- 5.6. **Other Delaware Regulations Included in This RACT SIP Document**
Regulations are available at:
<http://regulations.delaware.gov/AdminCode/title7/1000/1100/index.shtml#TopOfPage>
(Note: Hard copies of the regulations are available upon request.)
- 5.7. **White Paper on Control Technologies and OTC State Regulations for Nitrogen Oxides (NOx) Emissions from Eight Source Categories (2/10/2017), available at:**
https://otcair.org/upload/Documents/Reports/WhitePaper_NOx_Control_04052017.pdf

Appendix K

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

Ozone Transport Commission

1st Version

January 31, 2023



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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 (O₃) 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 (NO_x) 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
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NYC NY-NJ-CT Severe-15 2008 NAAQS Attainment Deadline	July 2027 ^a	--
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^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 (NO_x) 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 O₃ NAAQS. Therefore, a future analysis year of 2023 was selected to best meet the attainment planning needs of these jurisdictions.

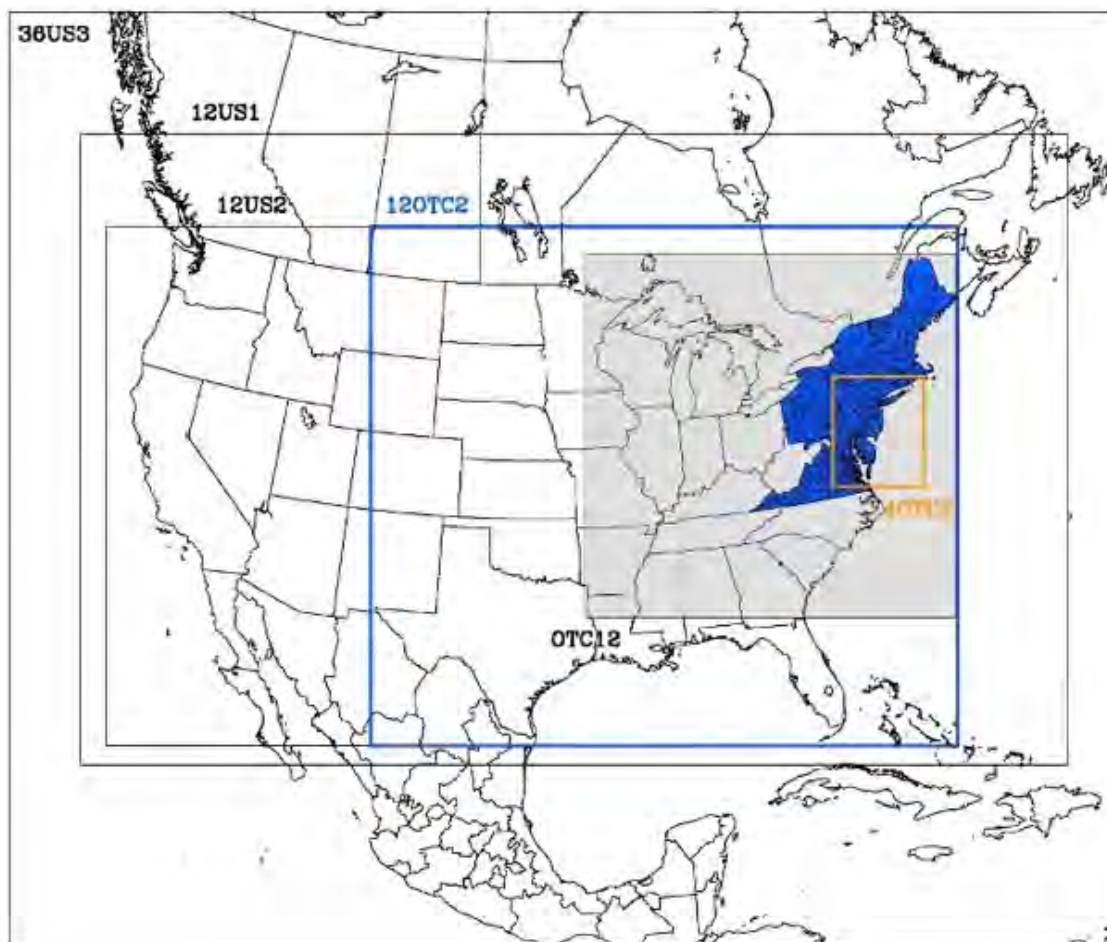
³ Base Year Selection Workgroup Final Report, www.wrapair2.org/pdf/2017-12-12_Base_Year_Selection_Report_V1.1.pdf

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 initial 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 center⁵ and the CAMx software was obtained from Ramboll⁶. Key model options are listed in **Table 2-1**.

⁴ <http://views.cira.colostate.edu/iwdw/>

⁵ <https://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_I SORROPIA

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 center⁵ 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 NO _x , M3dry, NH ₃ bidi (12 km), no NH ₃ bidi (4 km)	No NH ₃ 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 O₃ 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

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

Collaborative Meteorological TSD⁷ for observation locations). Shortwave downward radiation observations were taken from the seven sites in SURFRAD⁸ 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 TSD⁷).

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 TSD⁷.

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 TSD⁷ 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 TSD⁷.

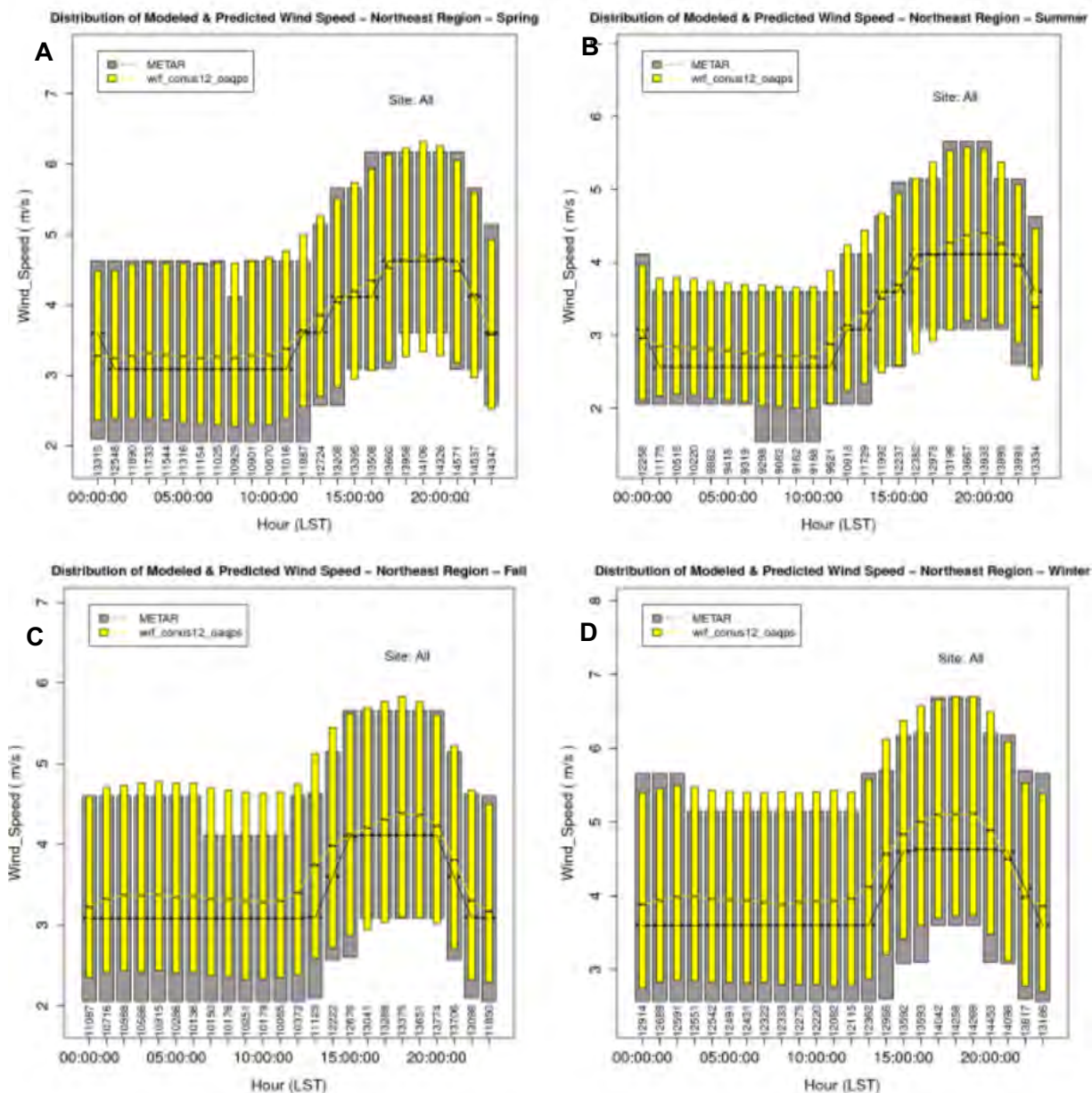


Figure 3-2 Panels from 2016 Collaborative Meteorology TSD Figure 3.2.19 showing the distribution of modeled and predicted temperatures for A) spring, B) summer, C) fall, and D) winter in the Northeastern U.S.. Additional regions can be found in the 2016 Collaborative Meteorology TSD⁷.

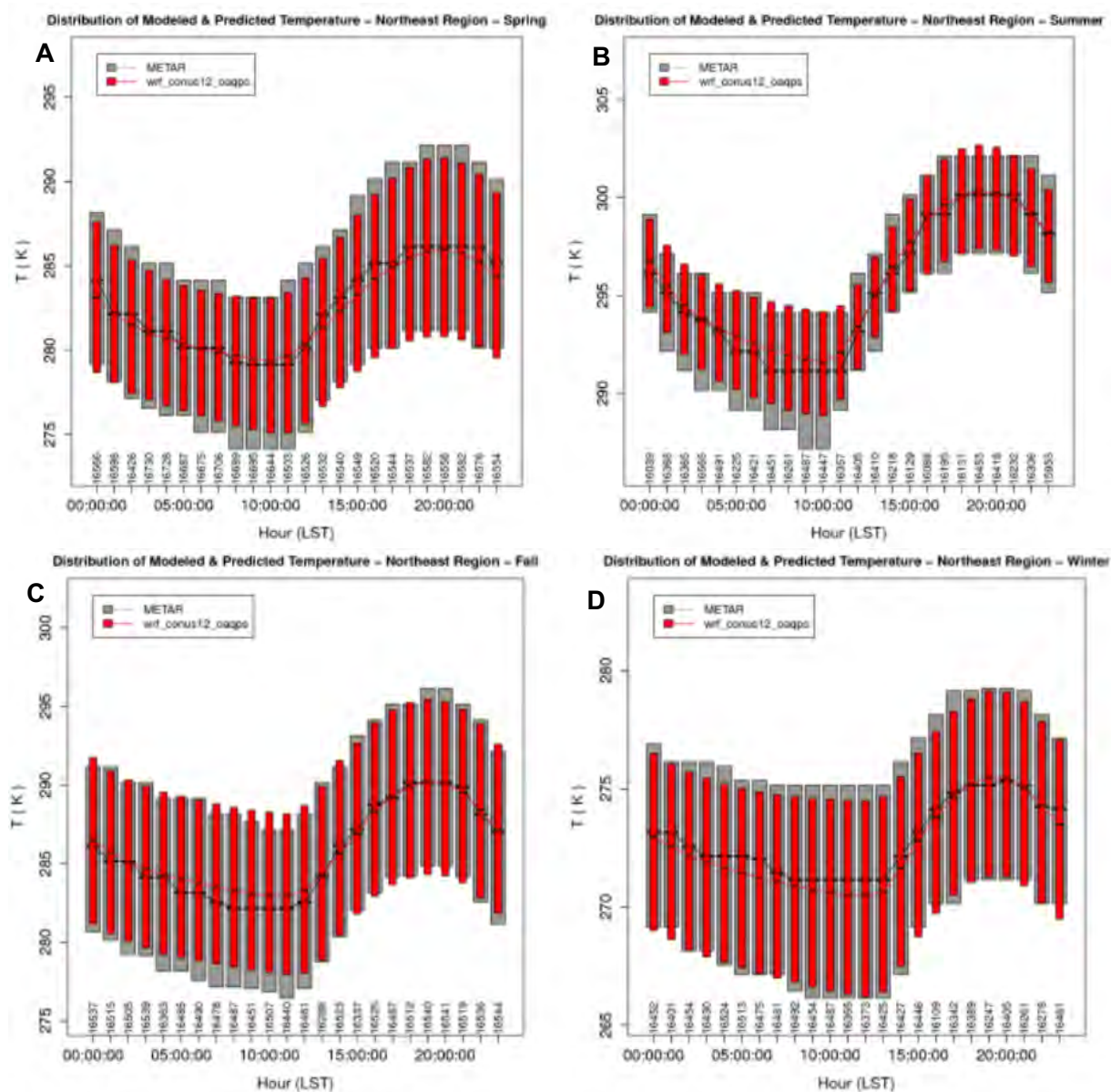


Figure 3-3. Panel plot of hourly average distributions of observed and modeled water vapor mixing ratio for the northeastern U.S. from Figure 3.3.19 of the 2016 Collaborative Meteorology TSD for A) spring, B) summer, C) fall, and D) winter.

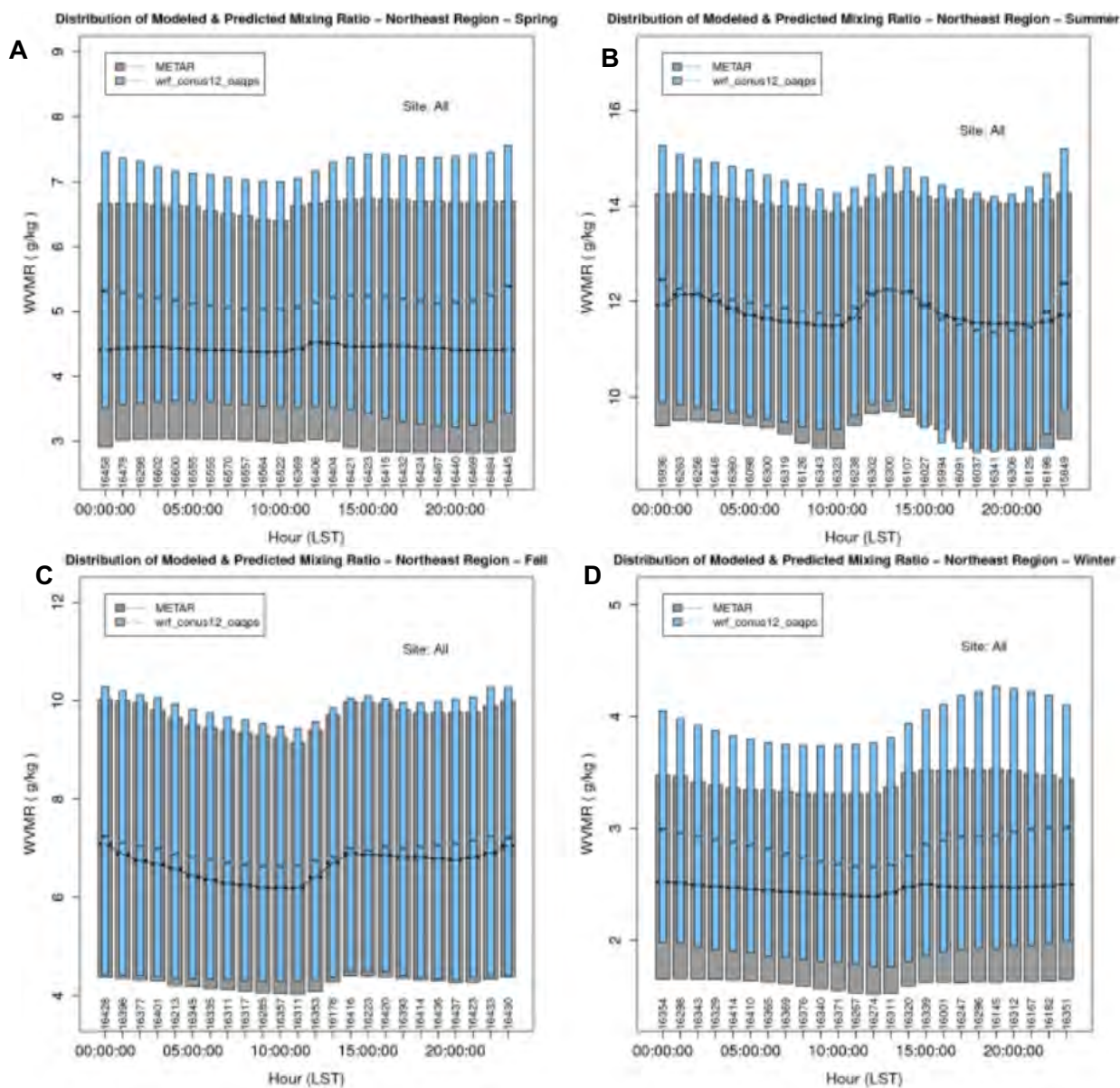


Table 3-4. Performance metrics for modeled water vapor mixing ratio in the Northeast from Table 3.3.1 from the 2016 Collaborative Meteorology TSD.

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 TSD⁷ for more detail.

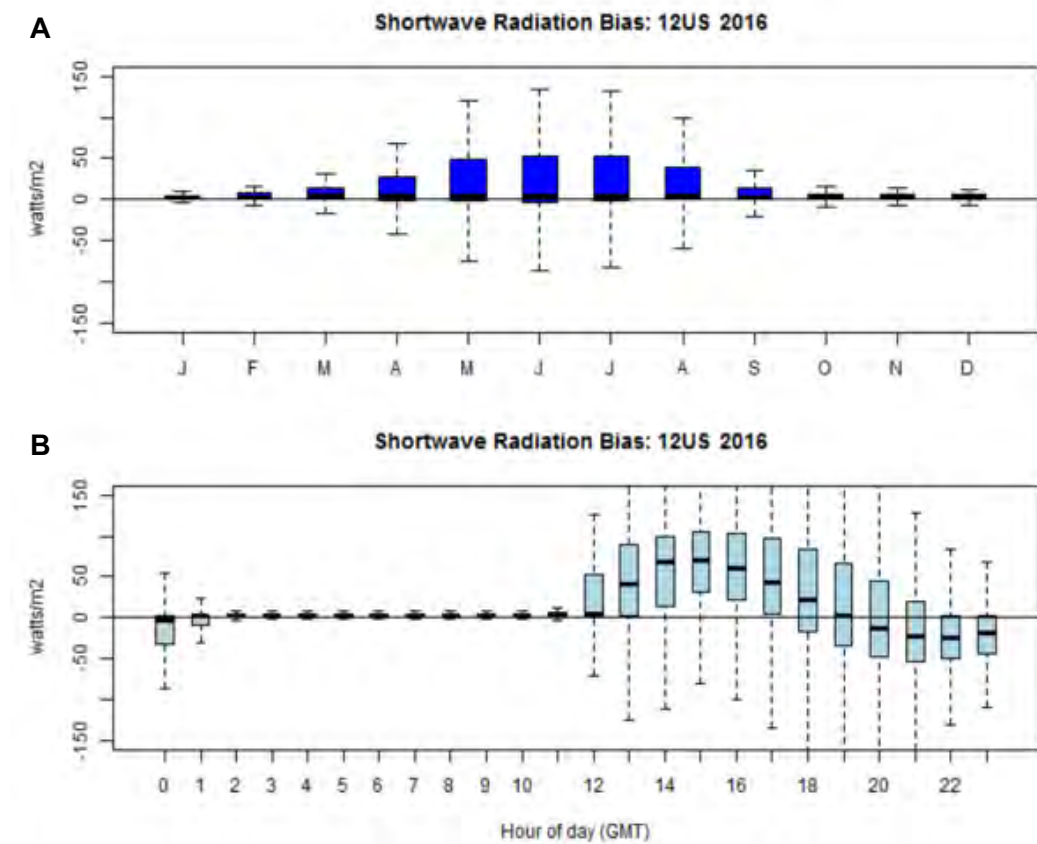
Modeled precipitation in the Northeast performs adequately in terms of spatial pattern and rainfall magnitudes. Yet model performance underpredicts precipitation June to October during periods of high convective activity and overpredicts during spring and fall. Modeled biases remain within plus or minus a few inches of rainfall. Figures 3.4.13 to 3.4.24 in the 2016 Collaborative Meteorology TSD⁷ 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/m². At the time of greatest incoming solar radiation, the model bias approaches 50 W/m². 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 TSD⁷.



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.

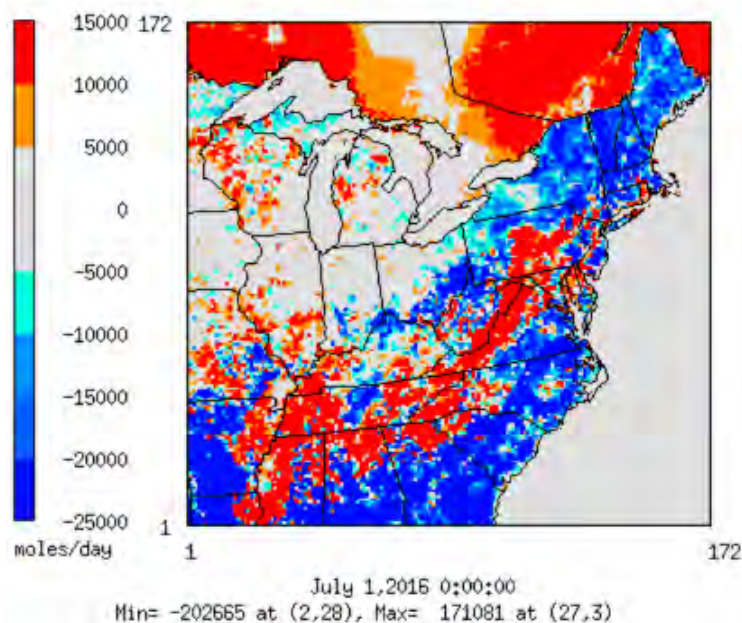
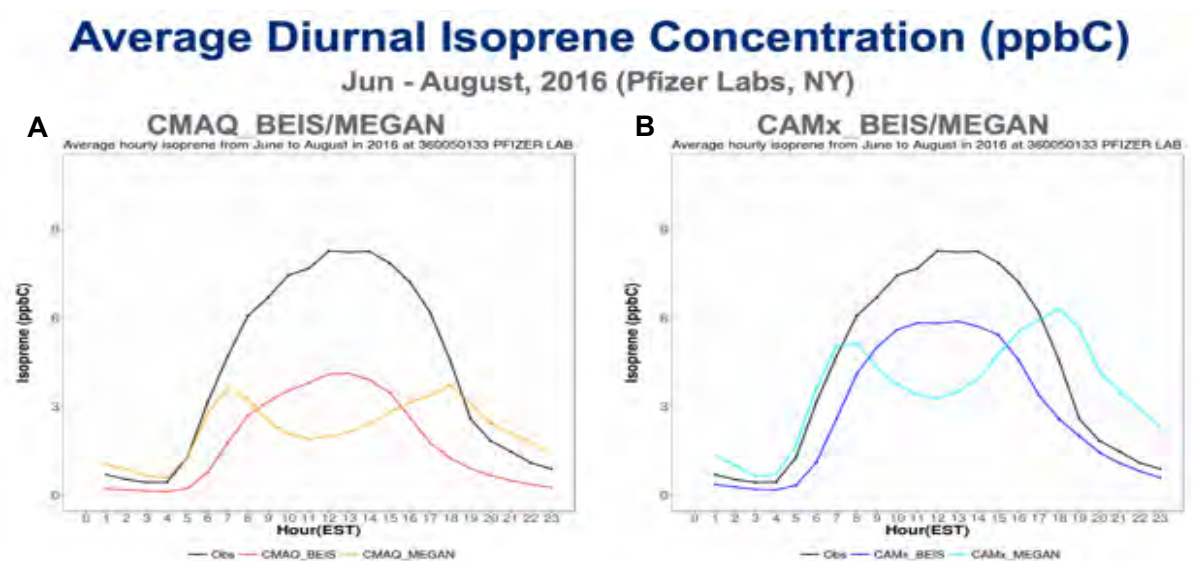


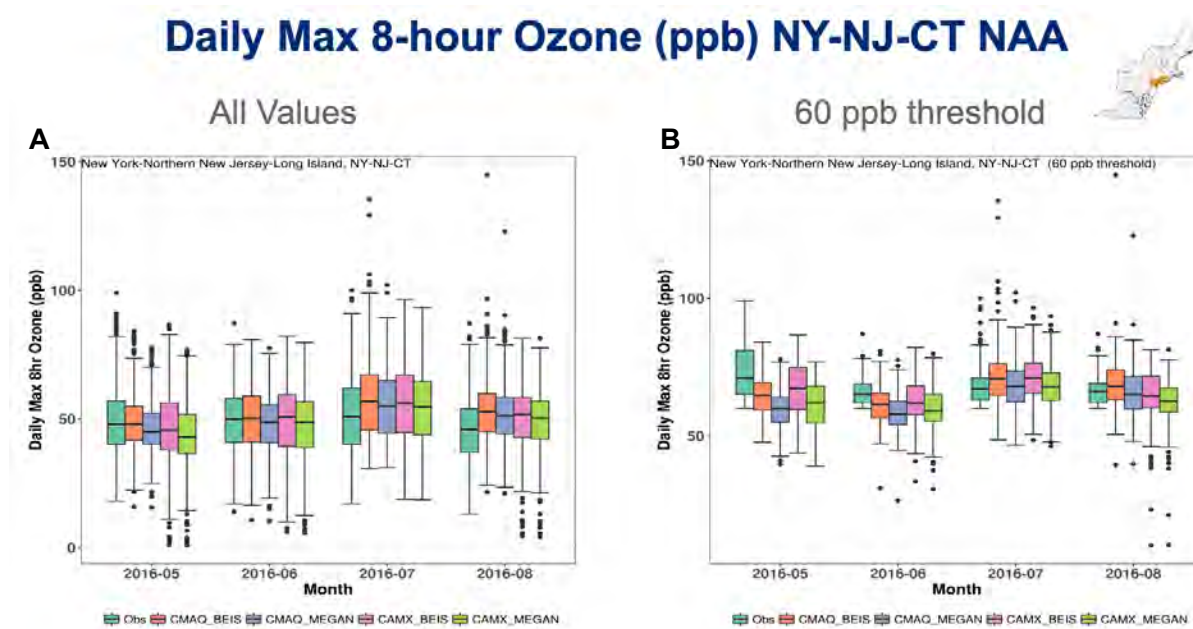
Figure 4-2. June to August 2016 average diurnal concentrations of isoprene as observed (black) and modeled in CMAQ (left) and CAMx (right) for BEIS (darker lines) and MEGAN (lighter lines).



4.1.2 Ozone Concentrations

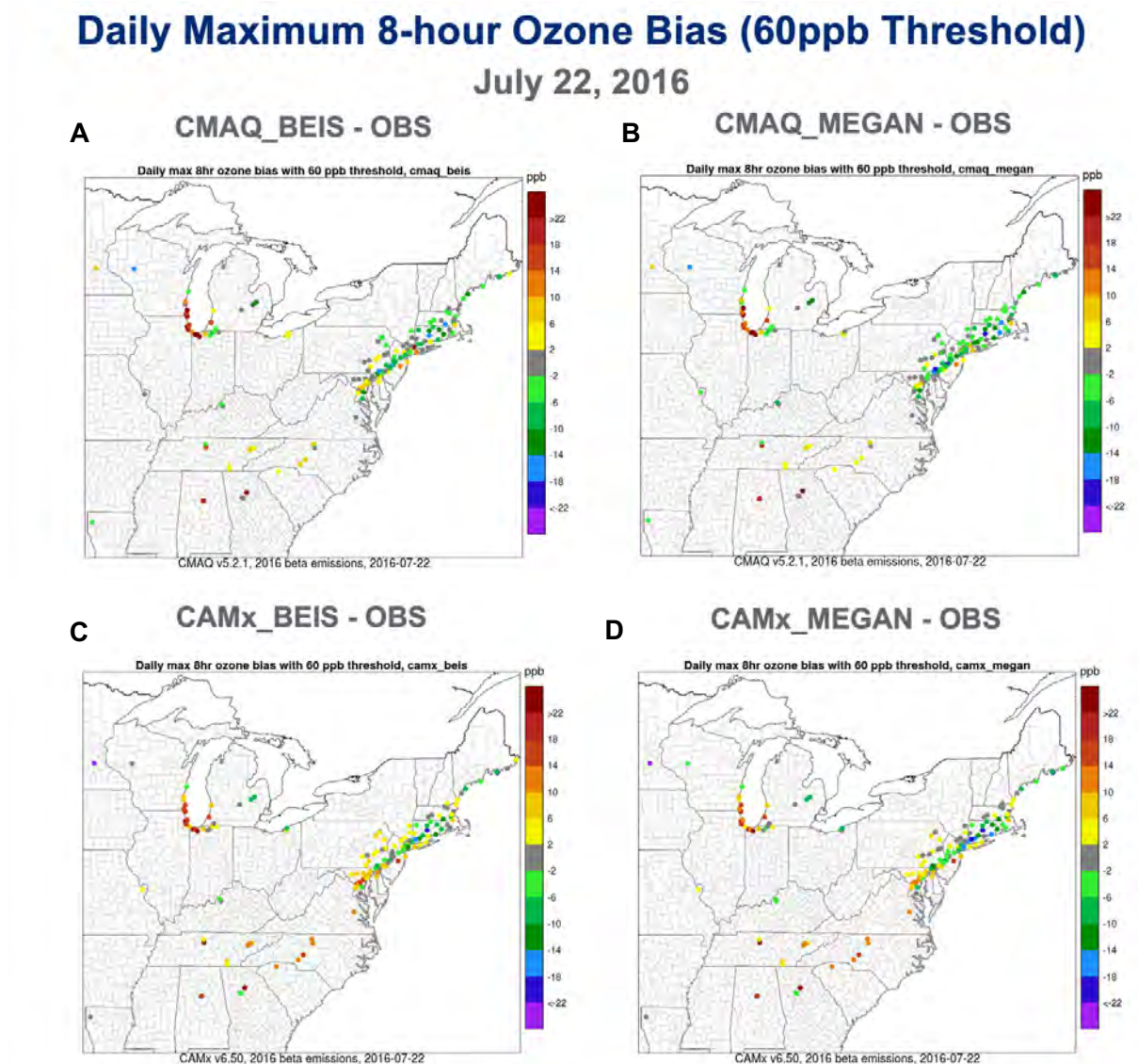
Monthly average daily maximum 8-hour observations and modeled concentrations in the NY-NJ-CT nonattainment area show on average, CMAQ with BEIS, CMAQ with MEGAN, CAMx with BEIS, and CAMx with MEGAN are generally similar to one another (**Figure 4-3**). Additionally, all model combinations perform generally 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).



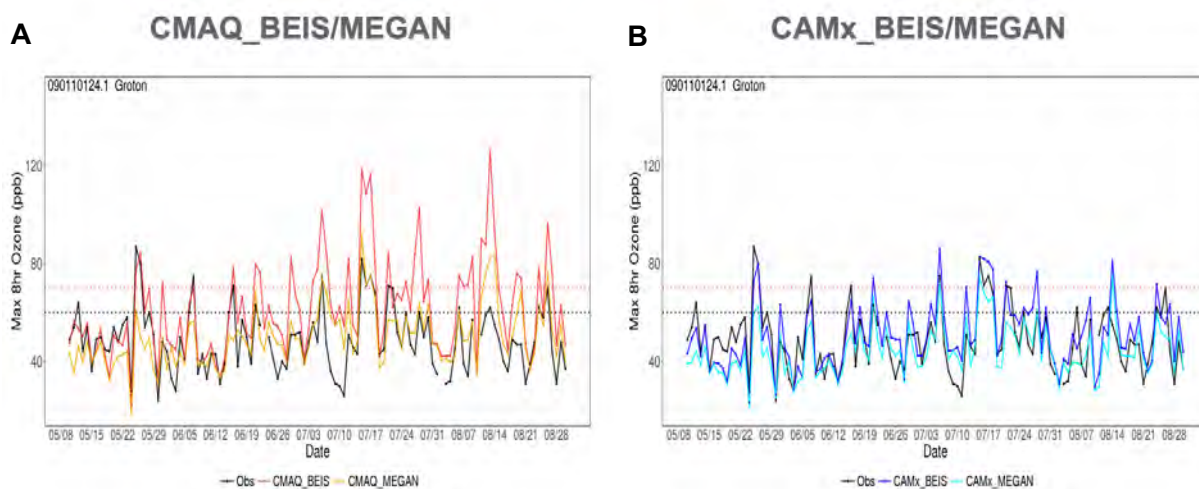
Observed and modeled daily maximum 8-hour ozone (MDA8) concentrations are compared for each model iteration from May through August at two monitor locations, Groton, CT and Edgewood, MD (**Figure 4-5**).¹⁰ Generally, models perform similarly compared to observations (black line) with a few notable exceptions. 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.

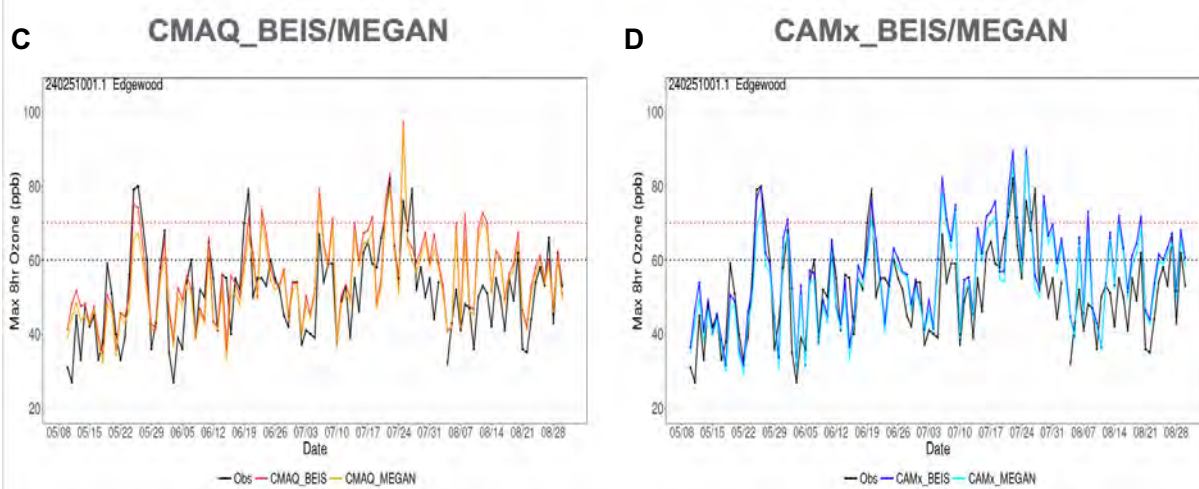
model results and observations tend to be more in-line with each other at the Edgewood, MD site except in August, when CMAQ overestimates MDA8 ozone concentrations. The CAMx performance is more consistent across all model iterations with observations at Groton, CT, but the model overestimated ozone during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

Daily Maximum 8-hour Ozone – Groton, CT



Daily Maximum 8-hour Ozone – Edgewood, MD



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 beta¹¹ 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 platform¹⁶.

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 (NH₃) 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 NH₃.¹⁷
2. **Airports (airports):** Emissions of all pollutants from aircraft and ground support equipment.¹⁸
3. **Biogenic**

¹⁶2016 V1 IWDW Documentation: <http://views.cira.colostate.edu/wiki/wiki/10202#Documentation>

¹⁷National 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

¹⁸National 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).

¹⁹National 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

²⁰National Emissions Inventory Collaborative (2019). Specification Sheet – MEGAN

http://views.cira.colostate.edu/wiki/Attachments/Inventory%20Collaborative/Documentation/2016v1/MEGAN3_Specification_Sheet_v2.pdf

²¹National 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

²²National 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

²³National 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

²⁴National 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

²⁶National 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 MOVES2014b²⁹, 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

²⁷National 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

³⁰National 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

³¹National 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

³²National 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

³³National 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

³⁴National 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

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 & Wildfires 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 database⁴⁴, 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 NO_x emissions (tons/day) for a typical summer weekday.

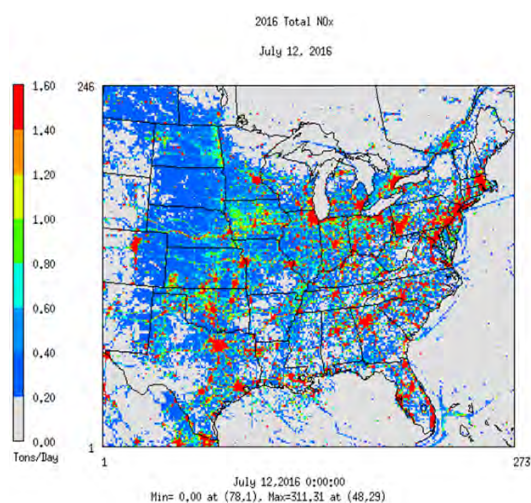


Figure 5-1. 2016 anthropogenic VOC emissions (tons/day) for a typical summer weekday.

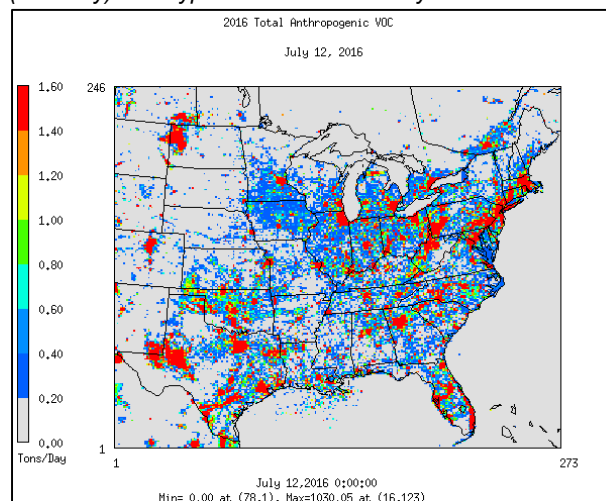


Table 5-2. 2016 V1 base case emissions in tons of each pollutant by RPO and sector from SMOKE processed emission reports (tons/day).

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 beta¹¹ and for V1¹².

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 NO_x 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 NO_x, 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.

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

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

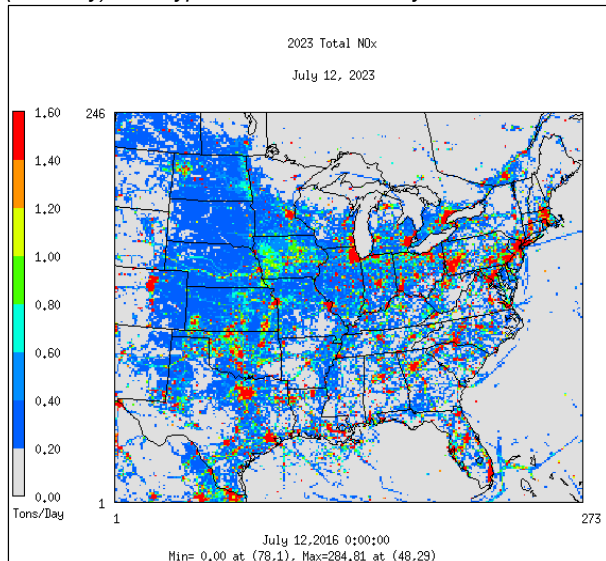


Figure 5-4. Projected 2023 total VOC emissions (tons/day) for a typical summer weekday.

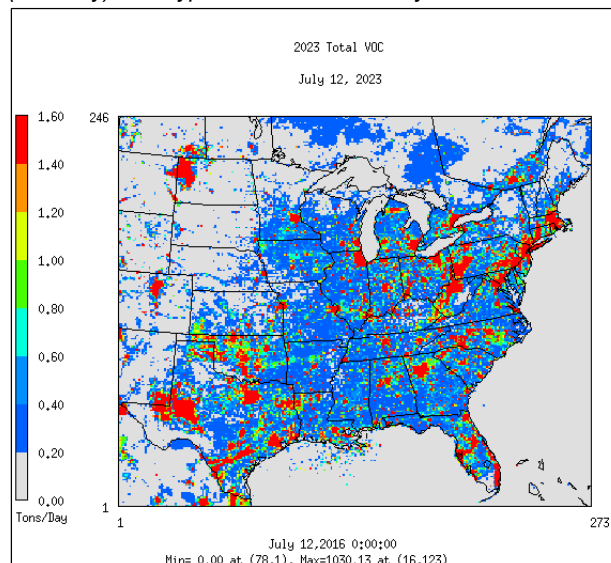


Figure 5-5. Projected 2023 anthropogenic VOC emissions (tons/day) for a typical summer weekday.

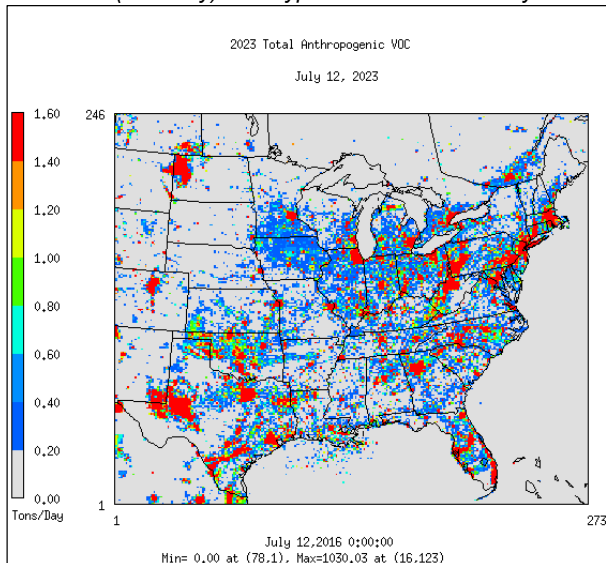


Figure 5-6. Projected 2028 total NO_x emissions (tons/day) for a typical summer weekday.

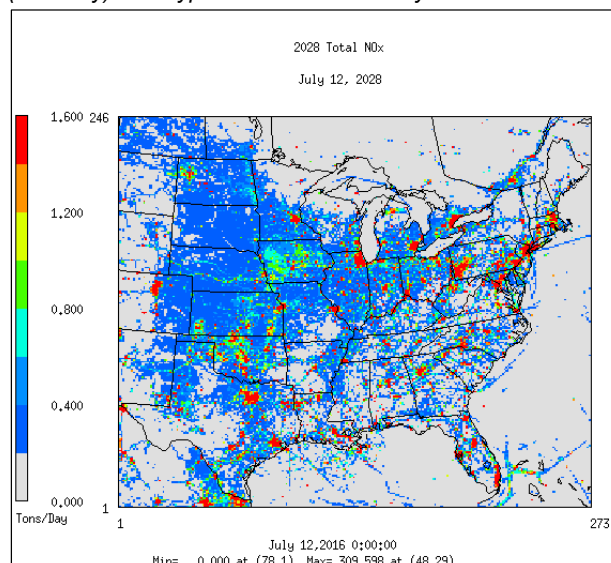
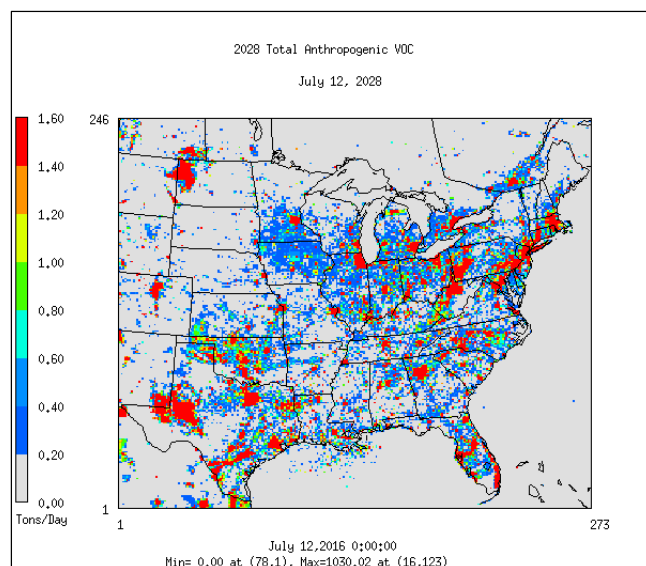


Figure 5-8 Projected 2028 anthropogenic VOC emissions (tons/day) for a typical summer weekday.



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

SO₂									
	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

NH₃									
	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

SO₂									
	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 O₃ 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 (NO₂) 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 NO₂ 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 NO₂ and formaldehyde (HCHO) are O₃ precursors, and the ratio HCHO/NO₂ has been used to infer regional patterns of VOC-limited versus NO_x-limited O₃ production regimes (e.g., Jin et al., 2017). A qualitative comparison with CMAQ and CAMx predictions is presented here.

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 O₃ concentrations

6.2.1 Time Series of Daily Maximum 8-hour O₃

Observed and predicted MDA8 O₃ concentrations were computed at each site across the 12OTC2 domain. Five sites in the OTR region were selected to illustrate the variation of MDA8 O₃ 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 O₃ 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).

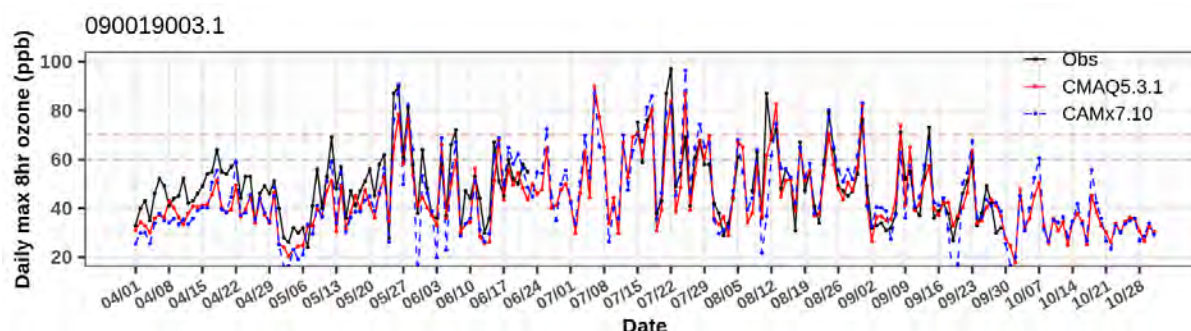


Figure 6-2. Observed and predicted MDA8 O₃ concentrations at Stratford, CT, April-October 2016 (090013007).

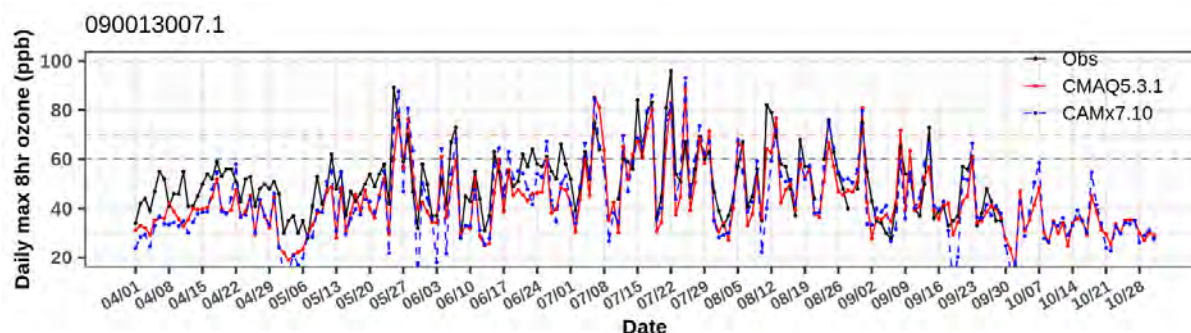


Figure 6-3. Observed and predicted MDA8 O₃ concentrations at Susan Wagner HS, NY, April-October 2016 (360850067).

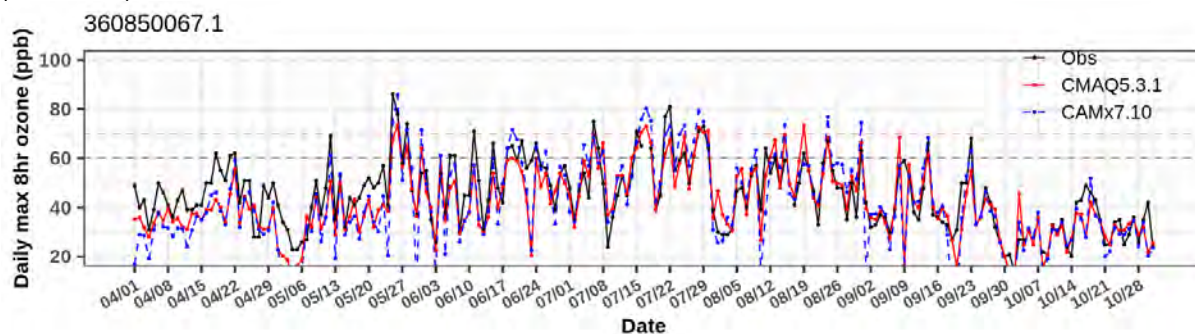


Figure 6-4. Observed and predicted MDA8 O₃ concentrations at Bucks County, PA, April-October 2016 (420170012).

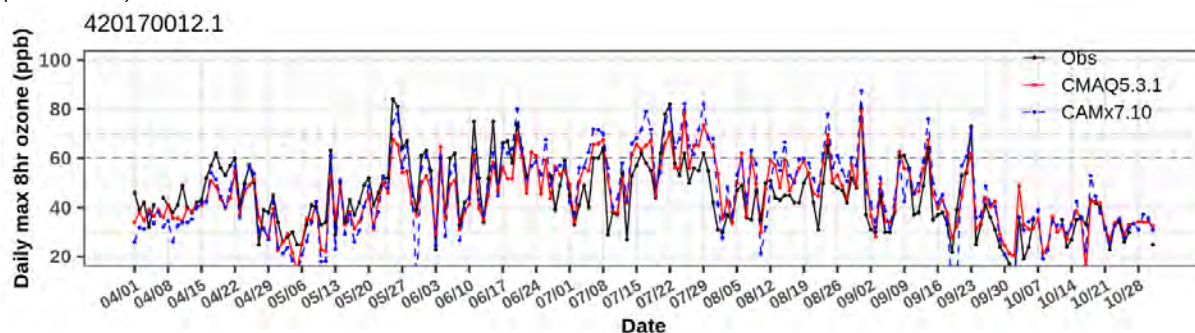


Figure 6-5. Observed and predicted MDA8 O₃ concentrations at Camden, NJ, April-October 2016 (340070002).

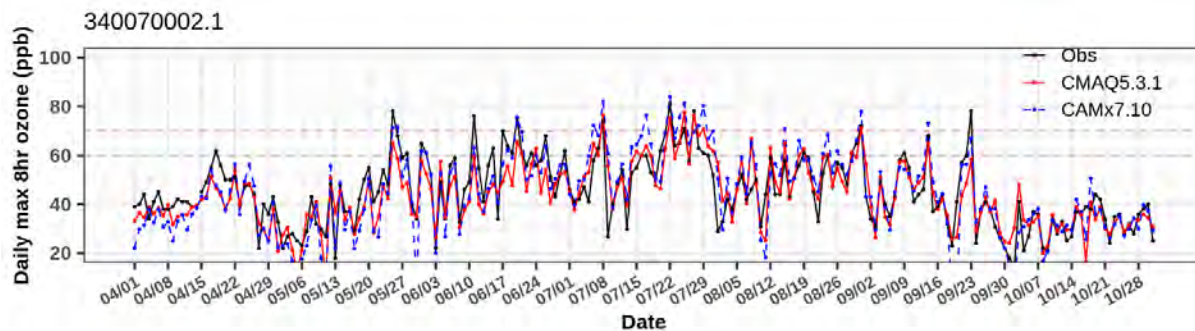


Figure 6-6. Observed and predicted MDA8 O₃ concentrations at Chester, NJ, April-October 2016 (340273001).

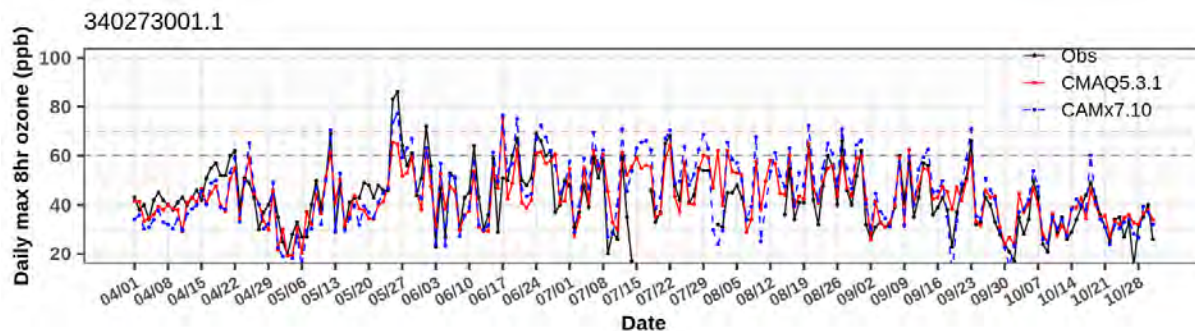
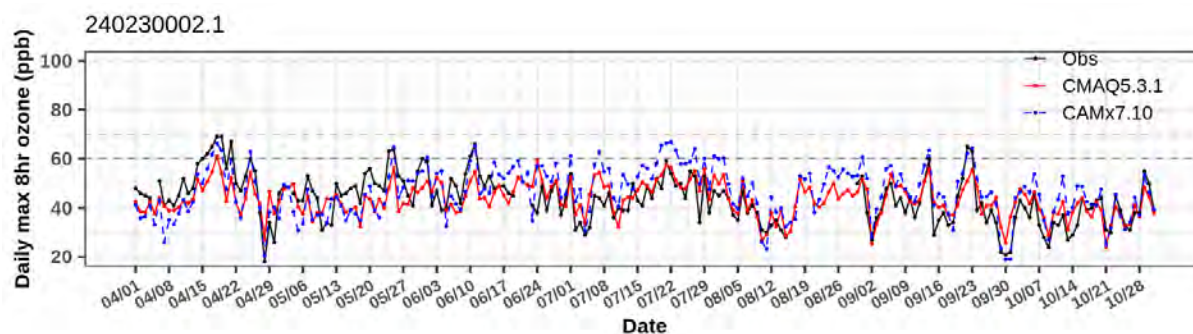
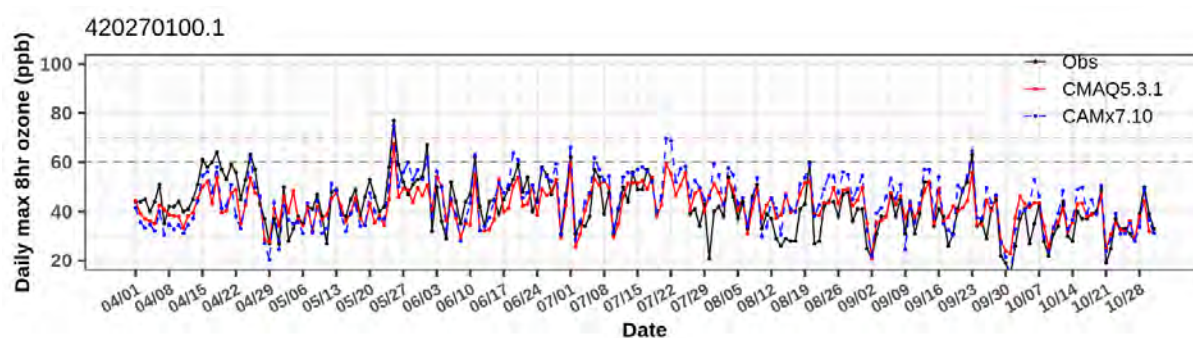


Figure 6-7. Observed and predicted MDA8 O₃ concentrations at Piney Run, MD, April-October 2016 (240230002).**Figure 6-8.** Observed and predicted MDA8 O₃ concentrations at State College, PA, April-October 2016 (420270100).

6.2.2 Comparison of observed and predicted daily maximum 8-hour O₃

Figure 6-9 displays the fourth highest observed and CMAQ-predicted MDA8 O₃ 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 O₃ 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 R² 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.

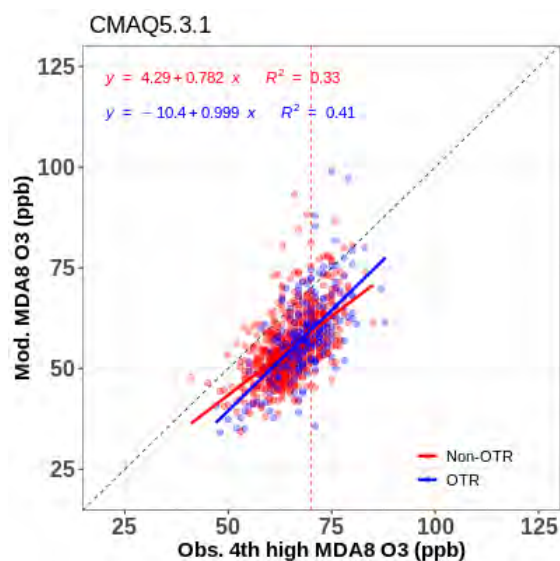
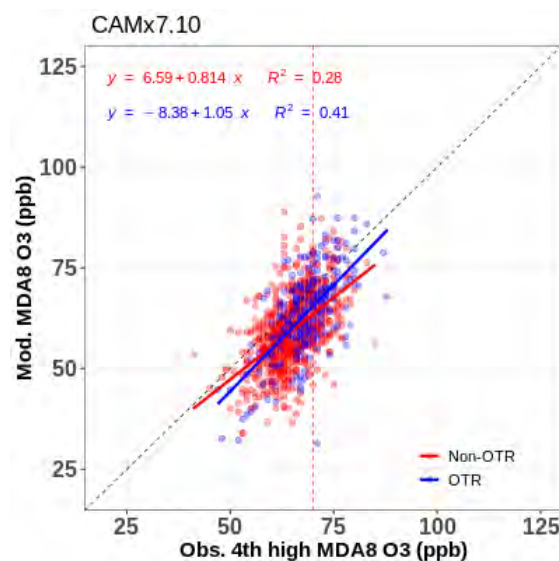


Figure 6-10. Comparison of 4th highest MDA8 O₃ at OTR and non-OTR sites, observed vs CAMx.



6.2.3 Distributions of Daily Maximum 8-hour O₃

Distributions of MDA8 O₃ 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 $\pm 1.5 \times$ the interquartile ranges (IQR); and the circles are outliers beyond $1.5 \times$ 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 O₃ 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.

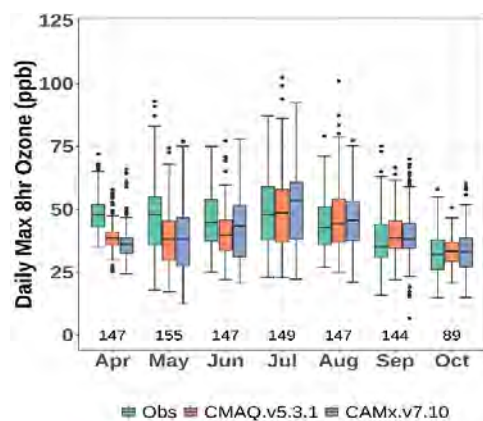


Figure 6-12. Monthly distributions of MDA8 O₃, New York-Northern New Jersey-Long Island, NY-NJ-CT.

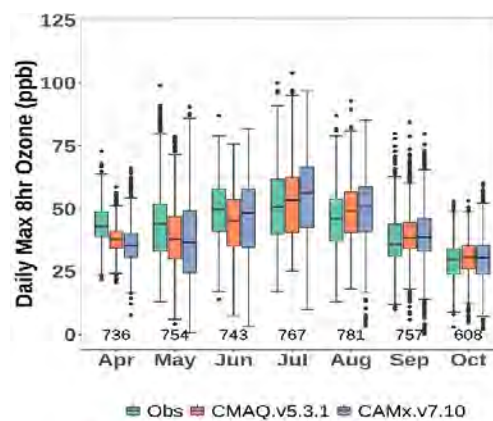


Figure 6-13. Monthly distributions of MDA8 O₃, Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE.

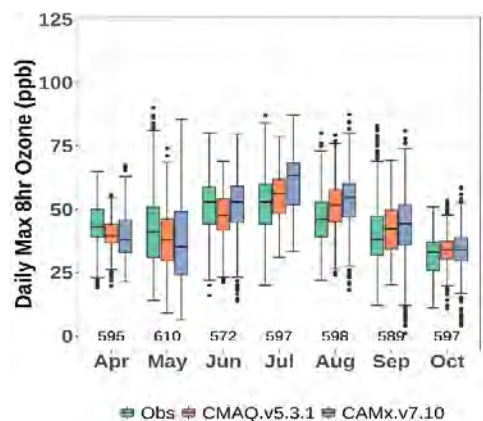


Figure 6-14. Monthly distributions of MDA8 O₃, Baltimore, MD.

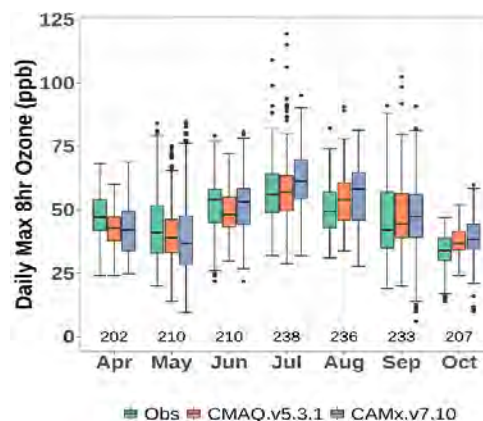
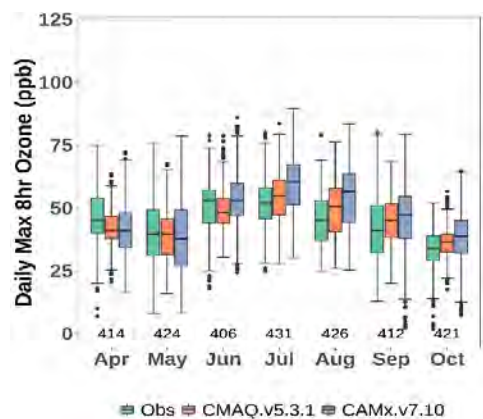


Figure 6-15. Monthly distributions of MDA8 O₃, Washington, DC-MD-VA.



6.2.4 Statistical Evaluation of Daily Maximum 8-hour O₃

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 O₃, with no lower cutoff threshold concentration, Emery et al. (2017) suggested the following: NMB goal $\leq \pm 5\%$, NMB criteria $\leq \pm 15\%$; 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 $\leq \pm 5\%$	586 (60%)	479 (49%)
NMB criteria $\leq \pm 15\%$	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 $\leq \pm 5\%$	115 (58%)	115 (58%)
NMB criteria $\leq \pm 15\%$	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 O₃ ≥ 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 O₃.

Figure 6-16. NMB of MDA8 O₃, April-October 2016, with CMAQ.

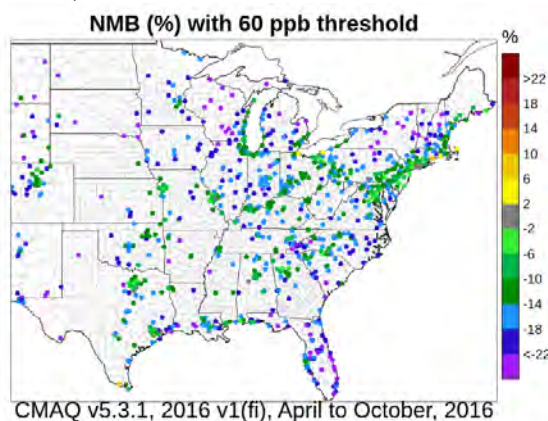


Figure 6-17. NMB of MDA8 O₃, April-October 2016, with CAMx.

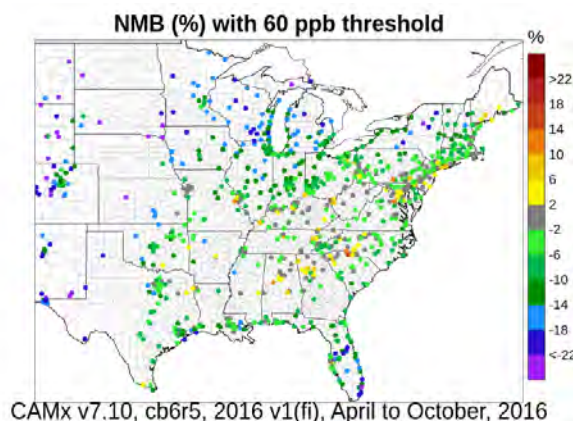


Figure 6-18. NME of MDA8 O₃, April-October 2016, with CMAQ.

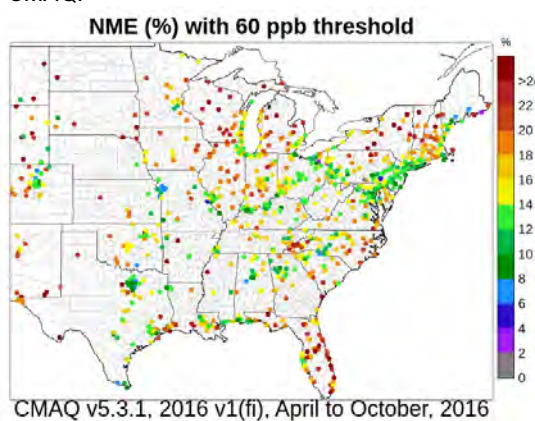
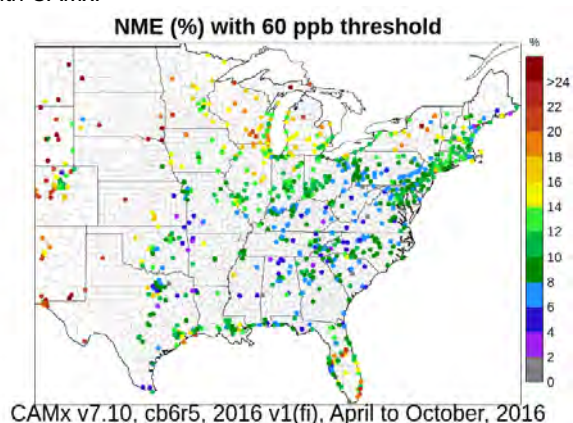
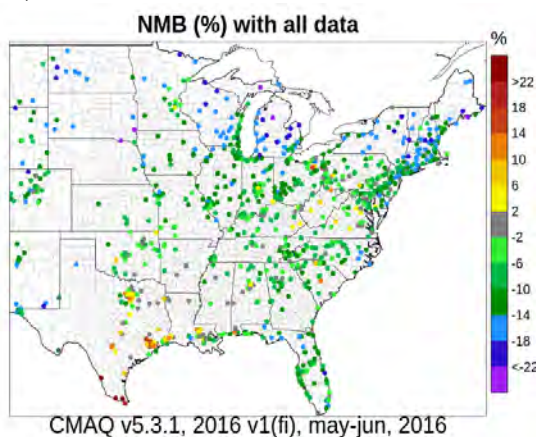
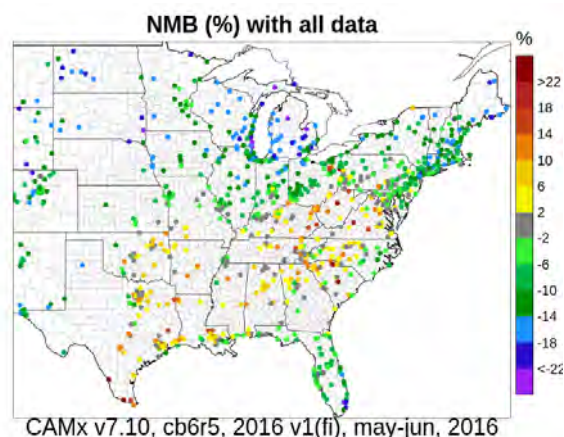
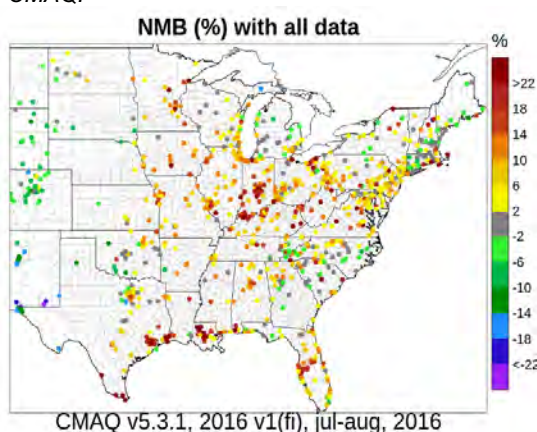
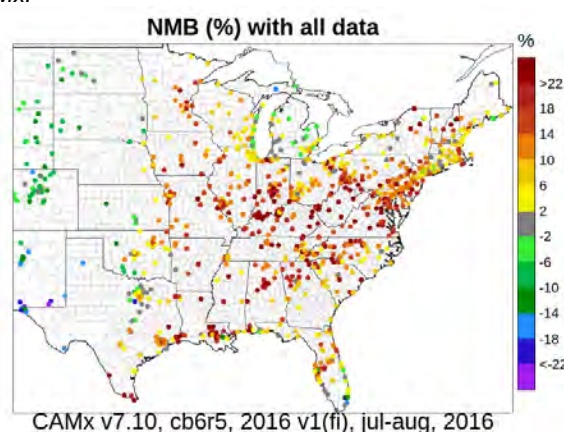


Figure 6-19. NME of MDA8 O₃, April-October 2016, with CAMx.



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 O₃, May-June 2016, with CMAQ.**Figure 6-21.** NMB of MDA8 O₃, May-June 2016, with CAMx.**Figure 6-22.** NMB of MDA8 O₃, July-August 2016, with CMAQ.**Figure 6-23.** NMB of MDA8 O₃, July-August 2016, with CAMx.

6.2.5 Diurnal Variations of O₃ and NO₂ 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 O₃ and NO₂ 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 NO₂ 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 NO₂, with maxima in the shallow nocturnal boundary layer and minima during enhanced photochemistry during the afternoon hours. Both models on average overpredict NO₂ during the early morning and nighttime observed peaks, especially CAMx at urban sites.

Figure 6-24. Observed and predicted O₃ at rural sites, May 2016.

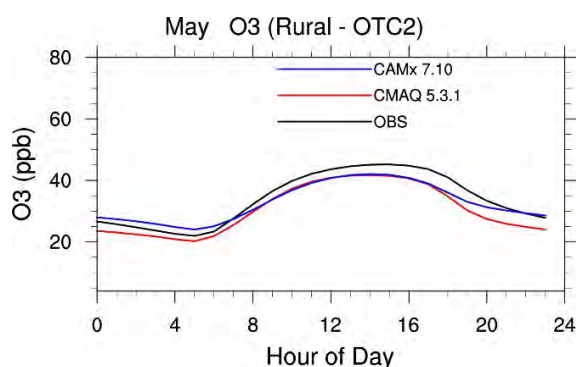


Figure 6-25. Observed and predicted NO₂ at rural sites, May 2016.

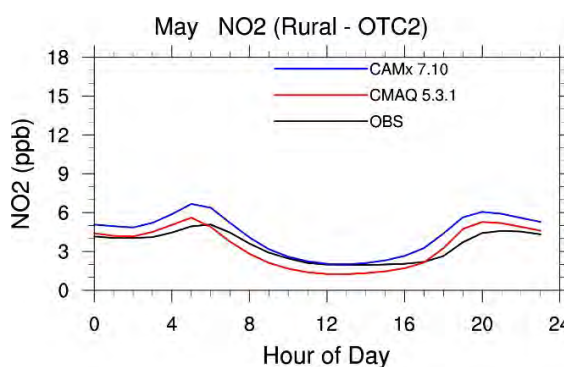


Figure 6-26. Observed and predicted O₃ at urban sites, May 2016.

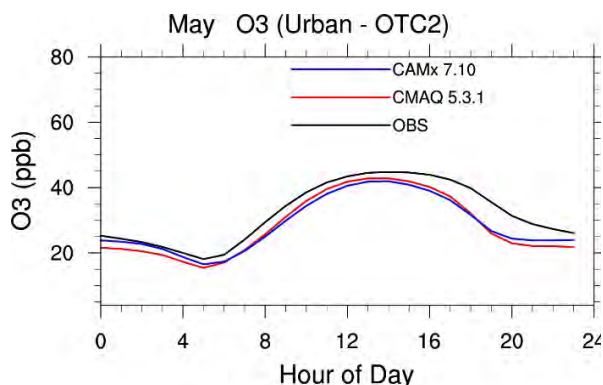
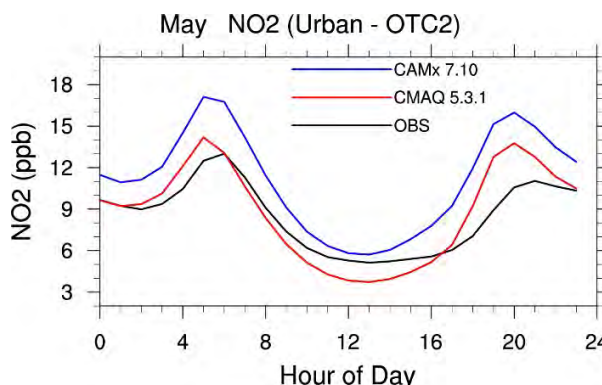
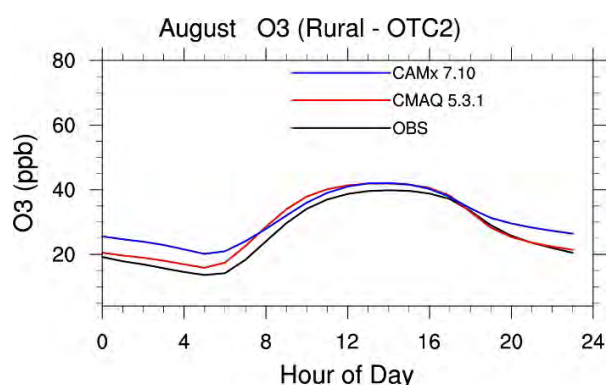
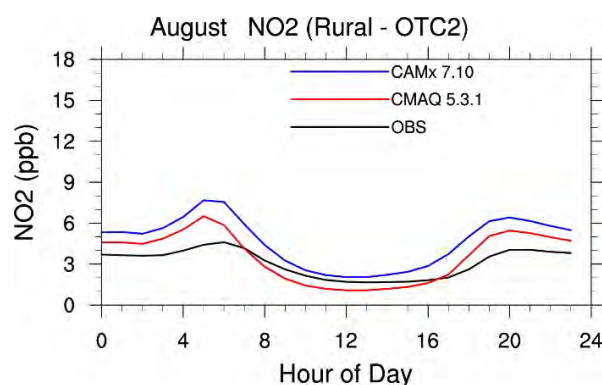
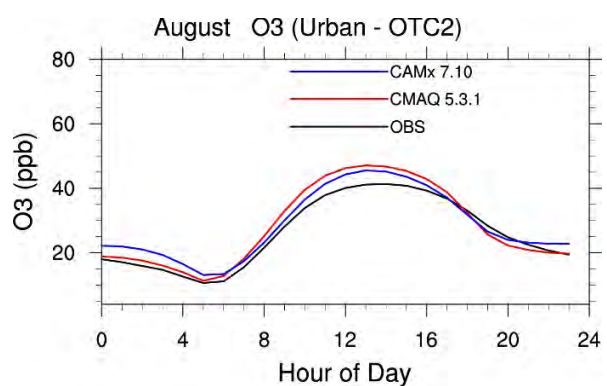
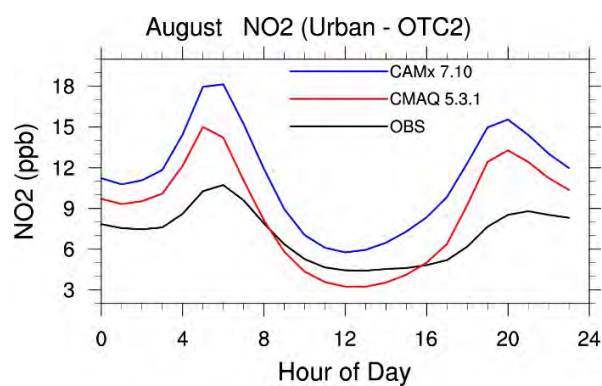


Figure 6-27. Observed and predicted NO₂ at urban sites, May 2016.



To illustrate model performance later in the season, the corresponding August average diurnal patterns of ozone and NO₂ 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 NO₂ than was observed; however, in August the early morning and nighttime peak overpredictions were considerably larger than in May, with modeled NO₂ 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- NO_x 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 $0.1^\circ \times 0.1^\circ$. 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** program⁴⁹ 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 NO₂ 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 NO₂ in rural regions of the domain but predicted higher NO₂ 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/NO₂ 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 NO₂ 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 NO₂ 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.

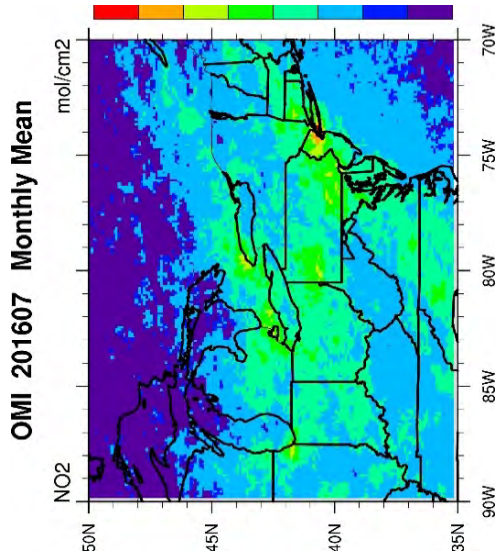


Figure 6-33. July 2016 column NO_2 from CMAQ.

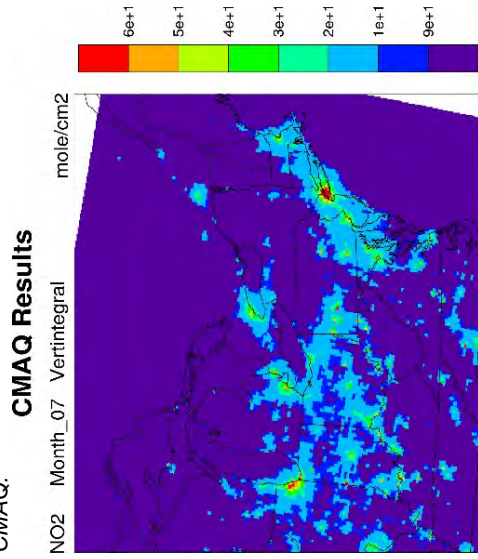


Figure 6-34. July 2016 column NO_2 from CAMx

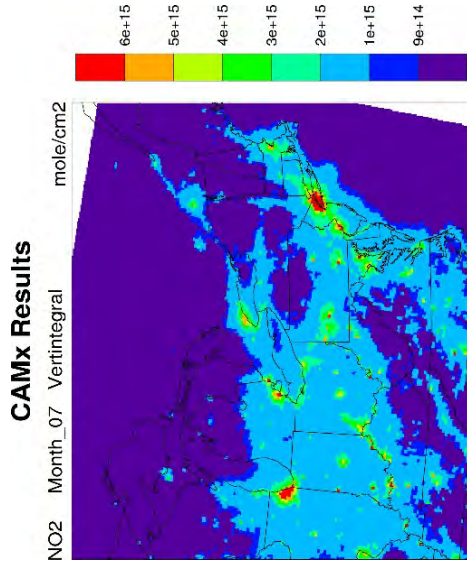


Figure 6-35. July 2016 column HCHO from OMI.

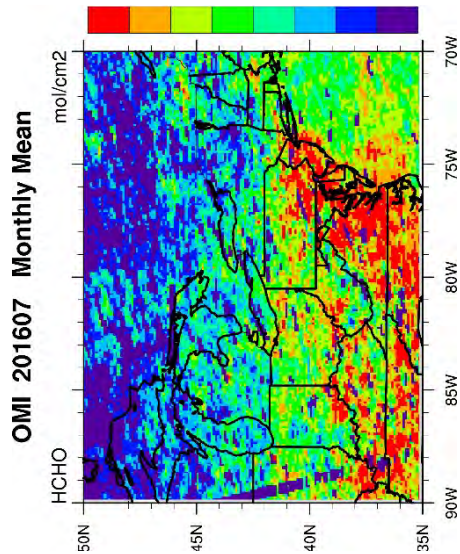


Figure 6-36. July 2016 column HCHO from CMAQ.

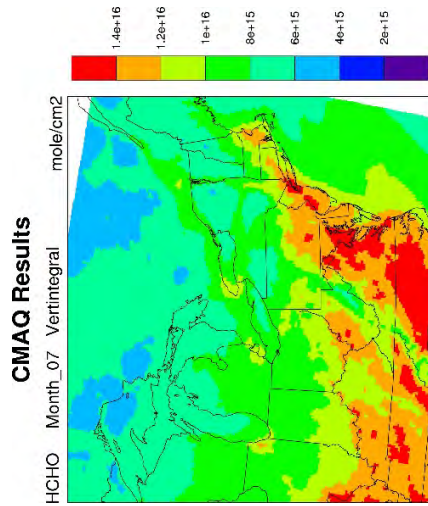


Figure 6-37. July 2016 column HCHO from CAMx.

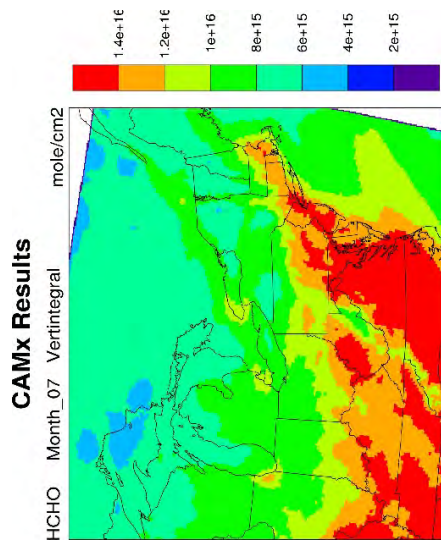


Figure 6-38. July 2016 HCHO/NO₂ ratio from OMI.

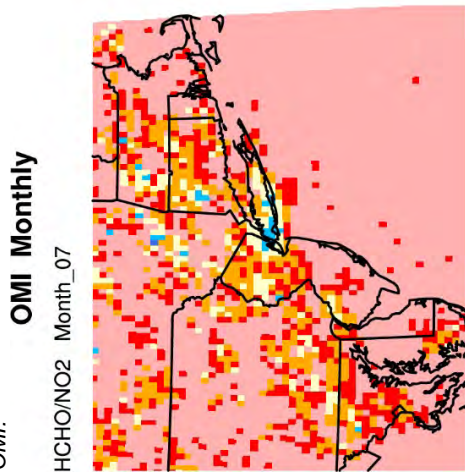


Figure 6-39. July 2016 HCHO/NO₂ ratio from CMAQ.

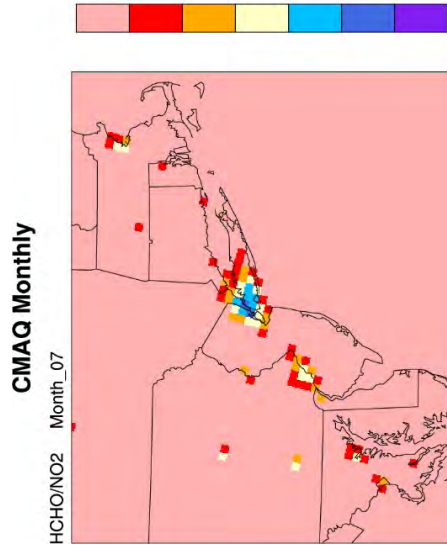
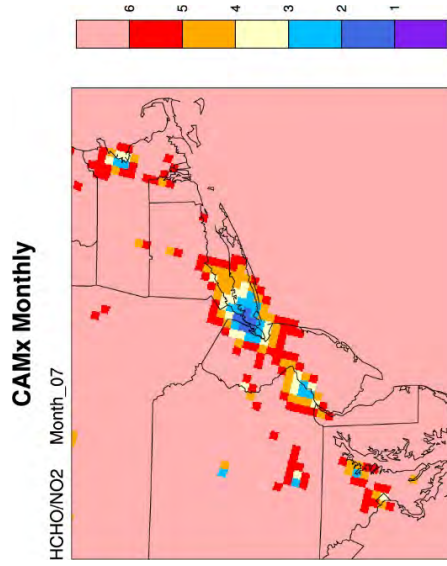


Figure 6-40. July 2016 HCHO/NO₂ ratio from CAMx.



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 (HNO₃), organic nitrates, etc.). The OPE can be expressed as:

$$OPE = \frac{\Delta Ox}{\Delta NO_z}$$

Equation 6-1

Where Ox = O₃ + NO₂, 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 O₃, NO, NO₂, and NO_y 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/m², as described in Ninneman et al. (2019), were included in this analysis.

Figures 6-38 and 6-41 plot Ox versus NO_z 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 NO_z, 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 NO_z 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 NO_y and NO_x 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-NO_x/NO_y/NO_z PSP site.

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.

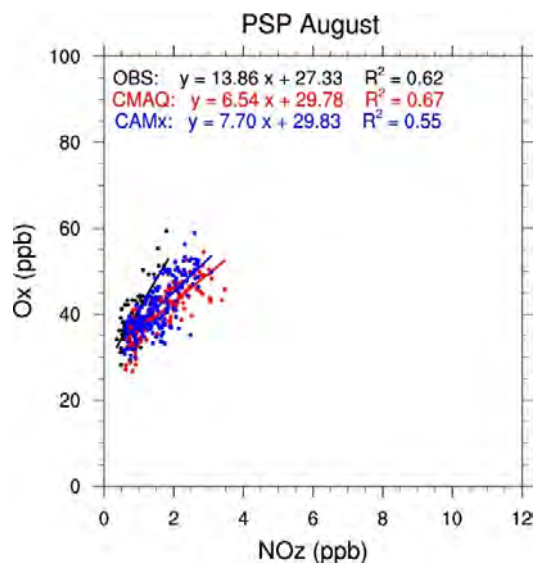


Figure 6-42. O_x vs. NO_z at Queens College, August 2016.

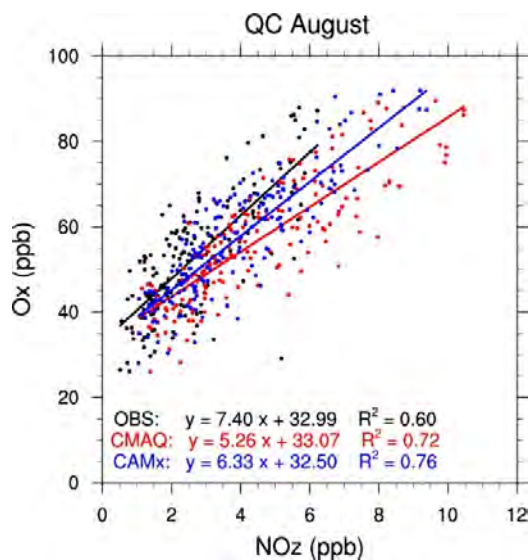


Figure 6-43. Monthly OPE at Pinnacle State Park, June-September 2016.

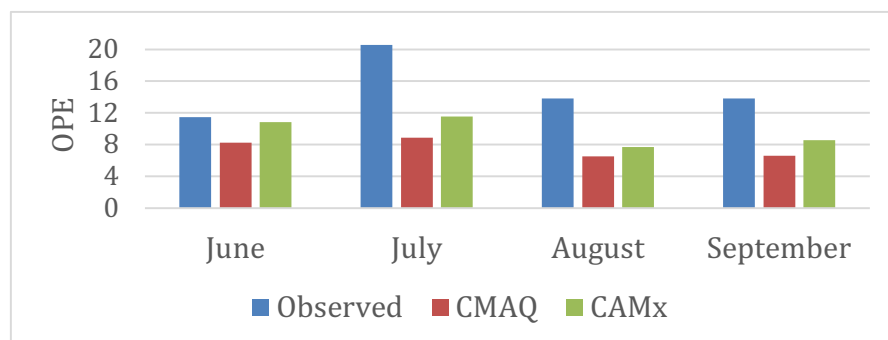
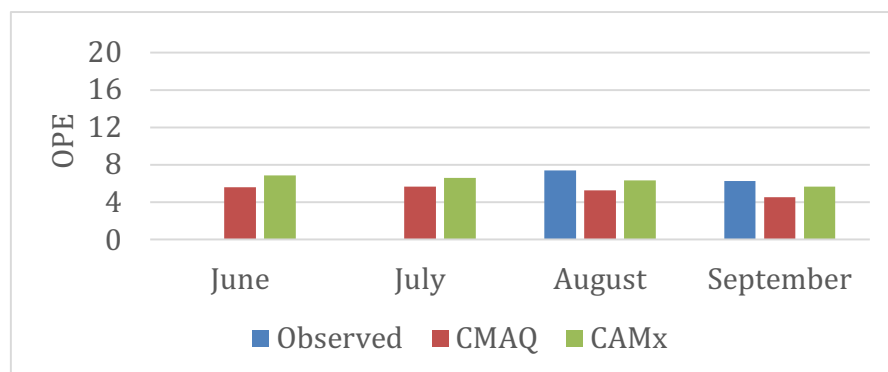


Figure 6-44. Monthly OPE at Queens College, June-September 2016.



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 O₃ 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 O₃ 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

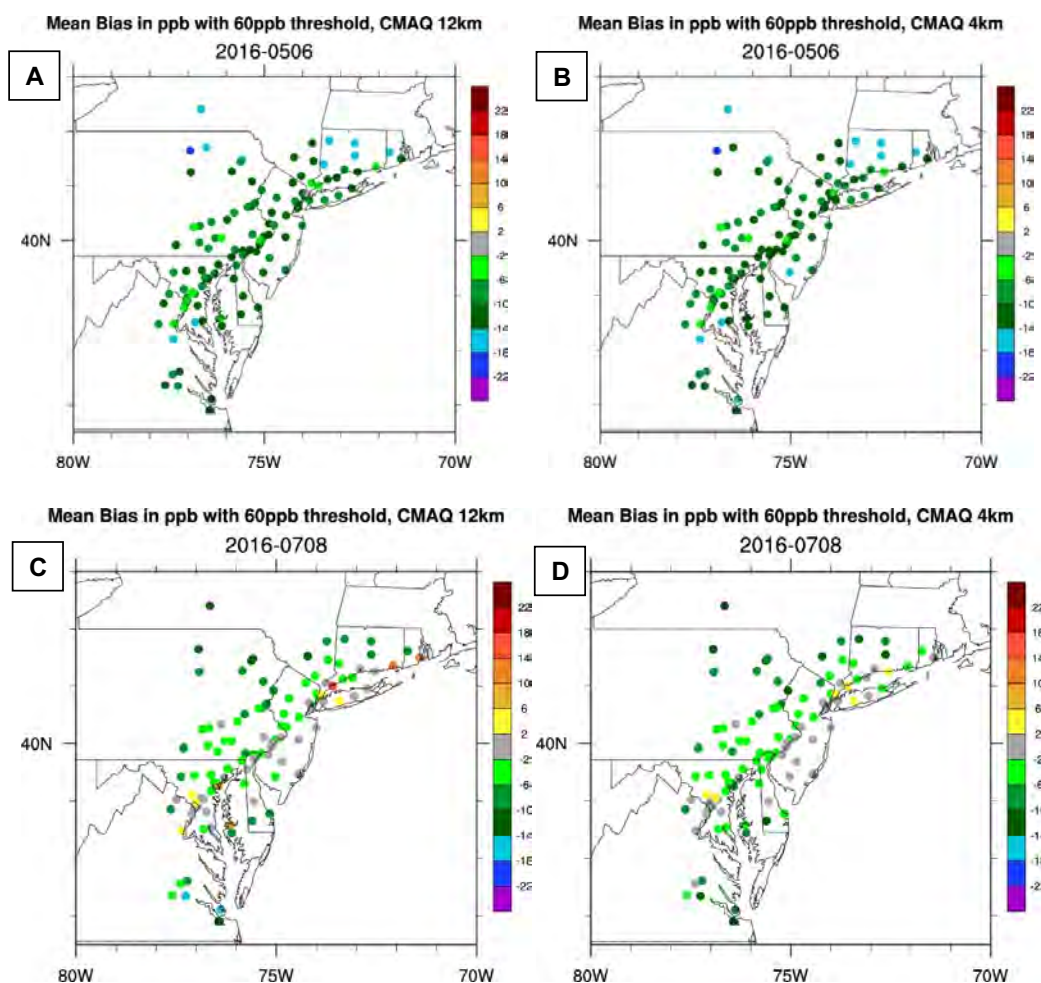
We relied on the latest emissions modeling platform (2016 V1) from the 2016 National Emission Inventory Collaborative for the nested grid modeling work. All sectors used in the 12 km modeling were re-processed through SMOKE to generate emissions for the 4 km domain. Sectors specific to Canada and Mexico (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 O₃ mean bias (top two panels of **Figure 7-1**) with a threshold of 60 ppb in the early part of the O₃ season (average of May and June) showed that CMAQ at both 12 km and 4 km underestimated O₃ in these two months. For most of these sites, the two simulations exhibited similar negative biases. The mean bias of MDA8 O₃ in the middle of the O₃ 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 O₃ 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 O₃ 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 O₃ 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 O₃ 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).

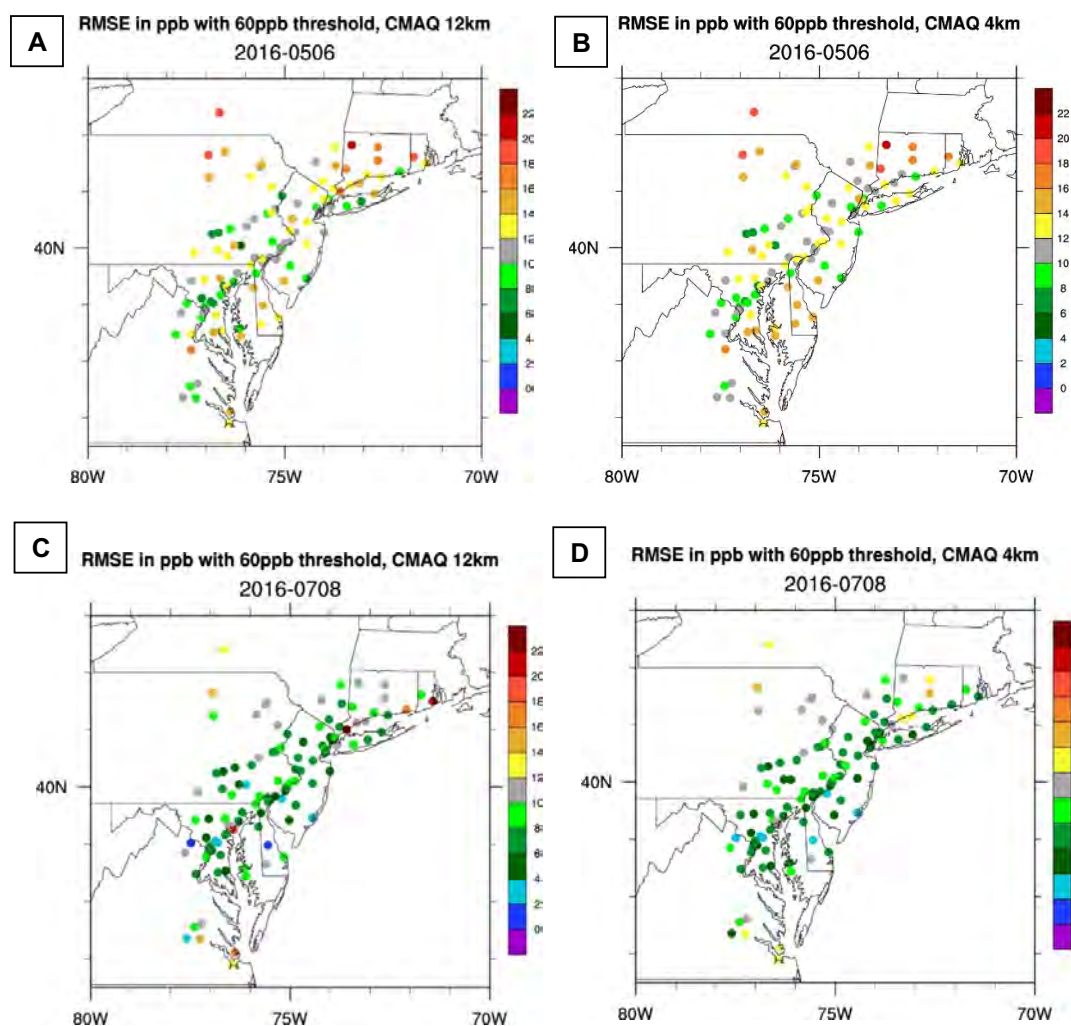


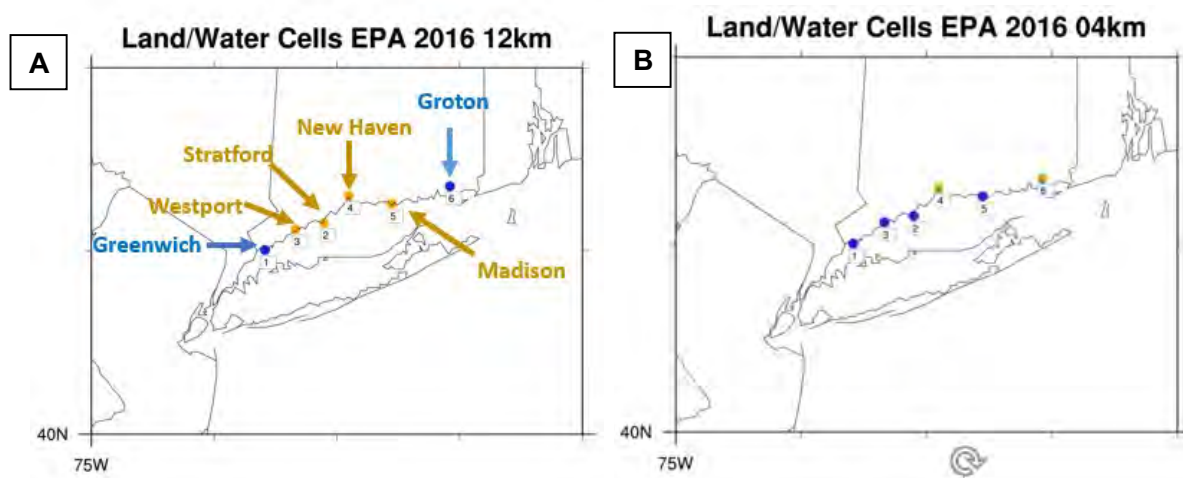
Table 7-1 shows the mean RMSEs for all 113 monitoring sites in the 4 km model domain and for the six CT monitoring sites along the north shore of Long Island Sound. These six monitoring sites are Greenwich, Stratford, Westport, New Haven, Madison, and Groton. **Figure 7-3** shows the locations of the 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

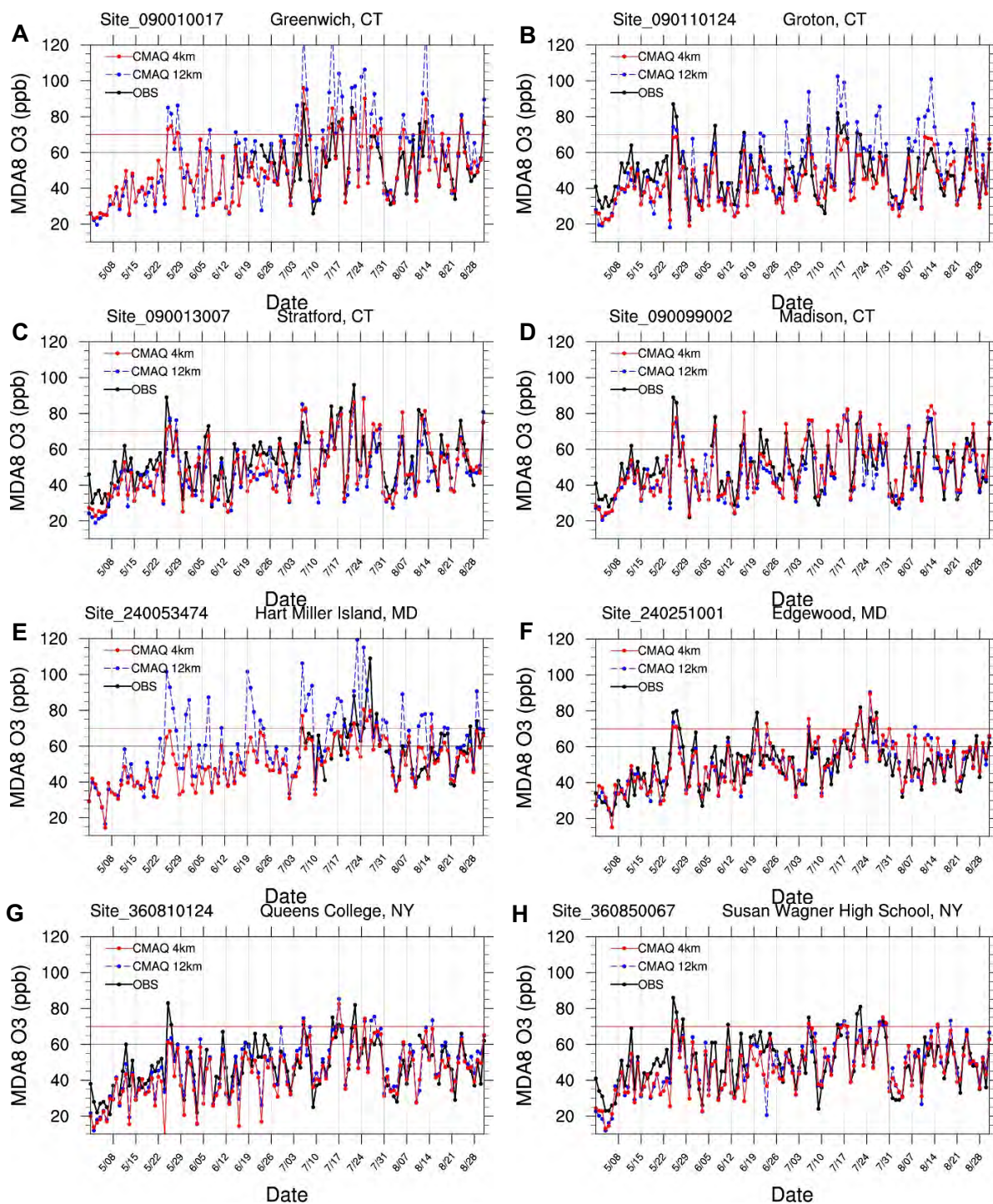
Figure 7-3 (A-B). The location of the six monitoring sites over CT coastal line and their land cover types at 12 km (left) and 4 km (right) domain. The blue colors represent water cells and the orange colors represent land cells.



7.3.3 MDA8 O₃ for Individual Sites

Figure 7-4 shows time series of MDA8 O₃ 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 O₃ 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 O₃ 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.

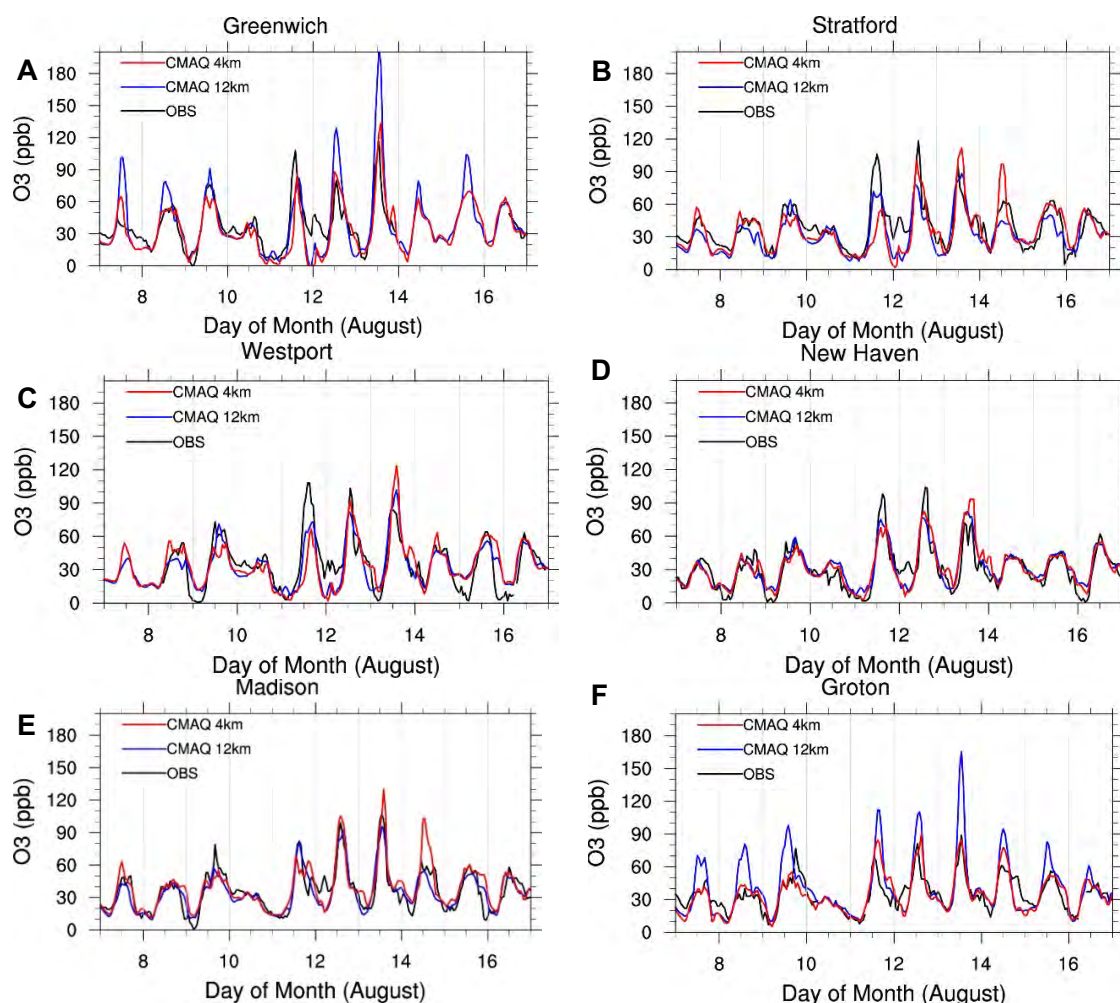
Table 7-2. Comparison of 4th highest MDA8 O₃ at OTR sites, observed vs modeled from 12 km and 4 km CMAQ. Sites where 12 km CMAQ exceeded observed values by >5 ppb are listed.

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 O₃ Variation for the Six Near-Coastal CT Monitoring Sites During a 10-Day Episode

Figure 7-5 shows the diurnal variation of O₃ 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 O₃ 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 NO₂ 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 NO₂, 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 NO₂ 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 NO₂ and VOC emissions, may cause unrealistic O₃ 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 NO₂, total VOC_BEIS and total VOC_INV during the time period of August 7-16, 2016 at Greenwich.

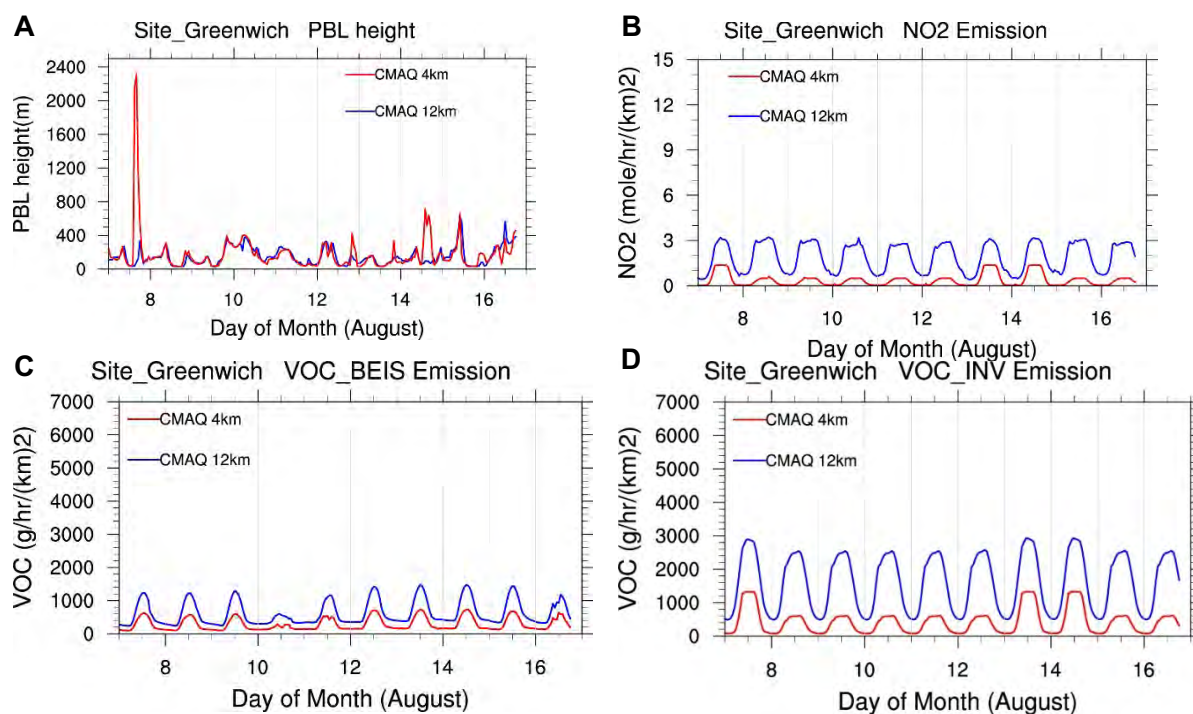
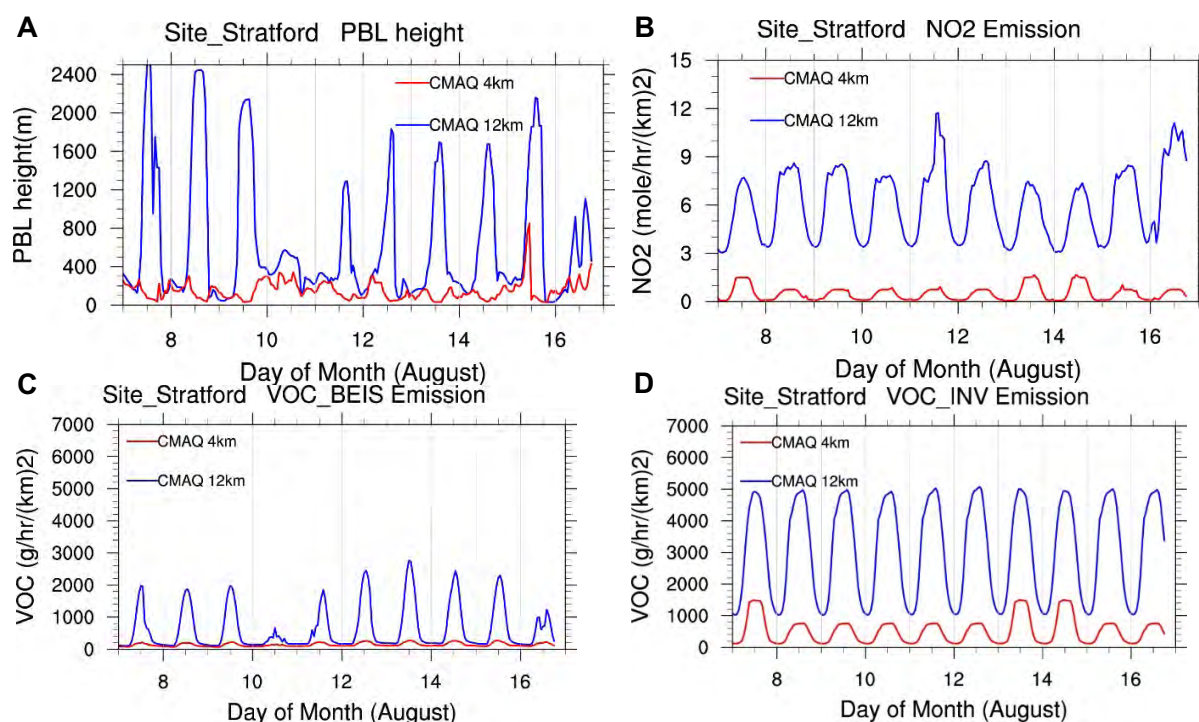


Figure 7-7 shows the results for Stratford. The Stratford monitor is located in a land cell at 12 km, but a water cell at 4 km resolution. Because of this land cover change, the PBL heights decrease

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 NO₂, total VOC_BEIS and total VOC_INV during the time period of August 7-16, 2016 at Groton.

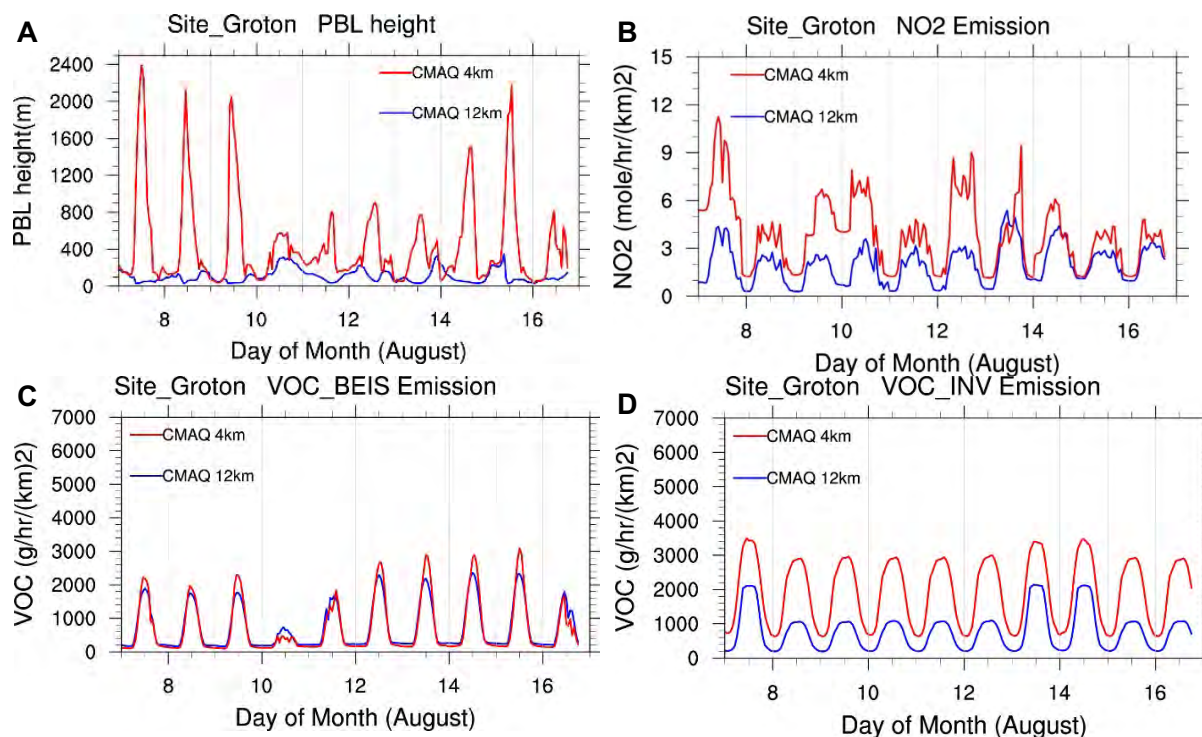
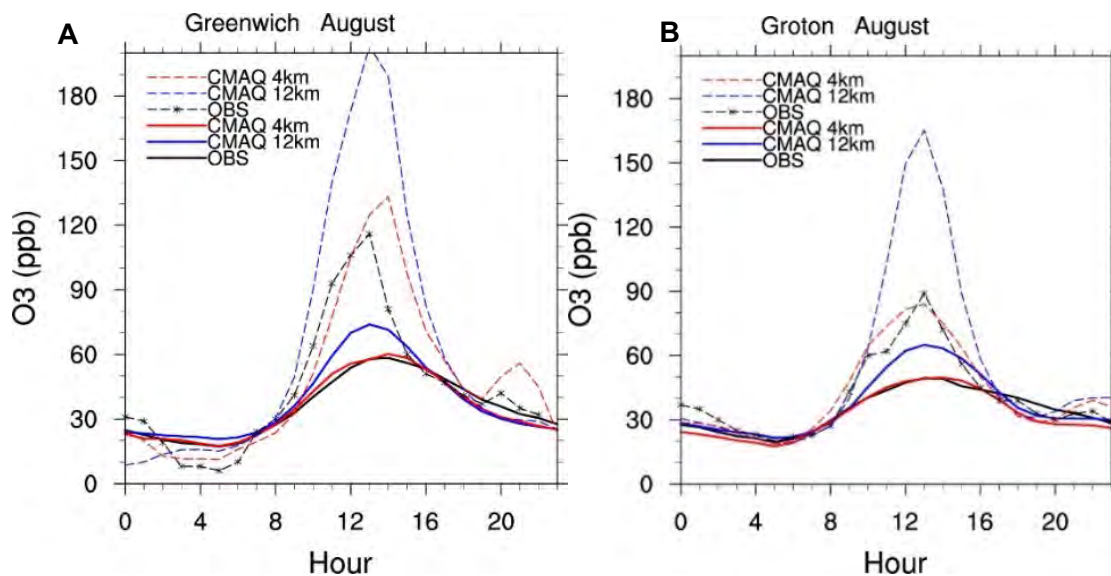


Figure 7-9 (A-B). Observed and modeled (12 km/4 km grids) ozone (ppb) for August 2016 at monitoring sites Greenwich and Groton (thick line: monthly average, thin line: August 13, a high O₃ day).



7.4 Projected Design Values in 2023

Sections 8 and 9 detail the methods for calculating the projected future design values at 12 km. O₃ 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 O₃ 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 O₃ 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 O₃ along the land-water interface where more accurate meteorological conditions and allocation of emissions can improve the O₃ estimates.

Table 7-3. Baseline (2014-2018) and projected 2023 O₃ 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 :

$$DVF_i = RRF_i * DVB_i \quad \text{Equation 8-1}$$

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 O₃ concentration to the baseline MDA8 O₃ 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 O₃ 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) tool⁵¹ 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 sure 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.

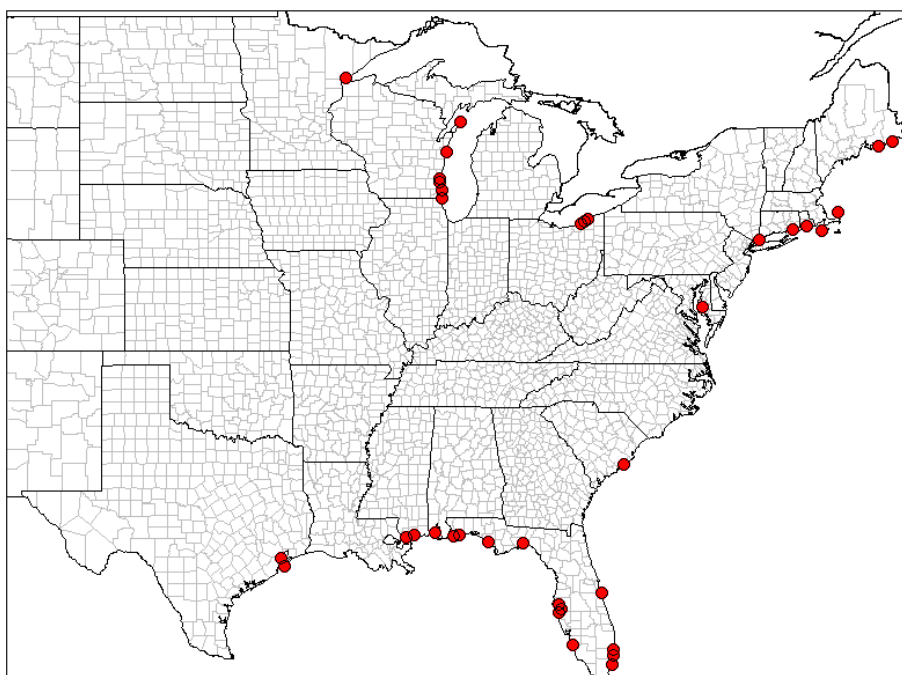


Table 8-1. List of Monitoring sites located in a water cell in the OTR in the 12OTC2 domain.

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 O₃ (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 O₃ 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 O₃ concentrations at each monitoring site. The MDA8 O₃ 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 O₃ 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 O₃ 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*:

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

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 O₃ 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 O₃ value ≥ 60 ppb at a site, but if there are at least 5 days with MDA8 O₃ ≥ 60 ppb, all of the days ≥ 60 ppb are used. If there are fewer than 5 days with MDA8 O₃ 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:

$$RRF = \frac{\text{average future year MDA8 O}_3 \text{ over selected high O}_3 \text{ days}}{\text{average base year MDA8 O}_3 \text{ over selected high O}_3 \text{ days}} \quad \text{Equation 8-3}$$

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

- a) Selecting O₃ concentrations from grid cells surrounding the monitor
 - 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 O₃ 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 O₃ value out of all nine grid cells in the base year. This is the MDA8 O₃ 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 O₃ 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 O₃ 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 O₃ 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 O₃ concentration ≥ 60 ppb. These were recorded with "-999.9."
- c) RRF calculations: Compute the RRF by averaging the MDA8 O₃ 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.

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

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

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

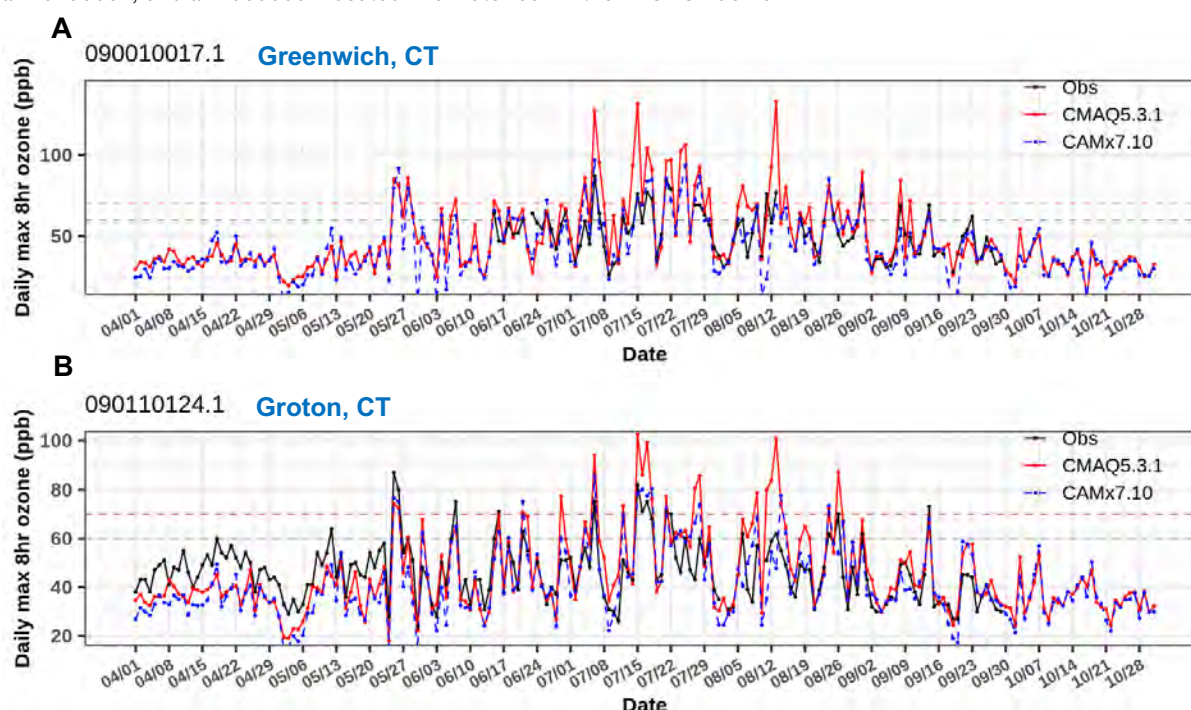
- a) DVs are truncated in accordance with 40 CFR Part 50 Appendix U. This applies to the 2016, 2017, and 2018 design values.
- b) DVBs are calculated in ppb and rounded to the nearest tenth of a ppb.
- c) Model estimates of MDA8 O₃ (in ppb) are calculated to at least four places to the right of the decimal, with the last digit truncated.
- d) Multi-day MDA8 O₃ (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 O₃ was compared to modeled MDA8 O₃ 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 O₃ levels at sites located in a water cell especially in July and August. Overprediction of O₃ 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 O₃ ≥ 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 O₃ 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 O₃ 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 O₃ 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 O₃ (ppb) for 2016 at monitors #090010017, #090110124, #240190004, and #440090007 located in a water cell in the 12OTC2 domain.



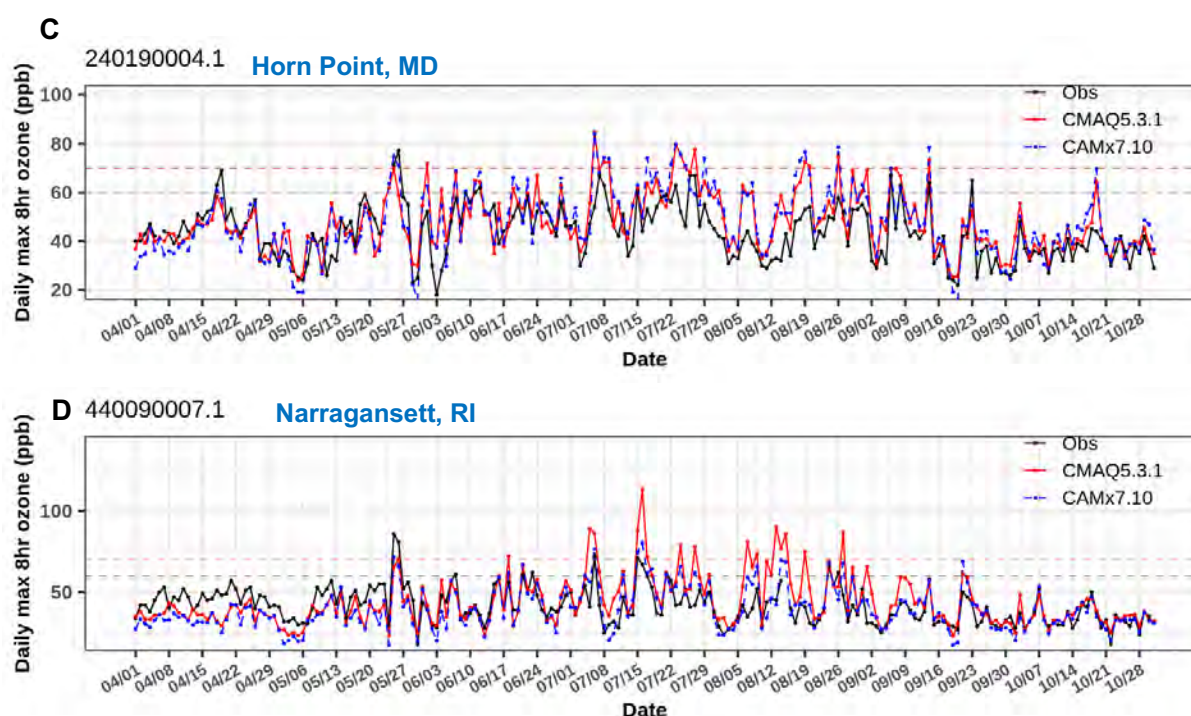


Table 8-2 Model performance statistics at monitoring sites located in a water cell in the OTR in the 12OTC2 domain (where observed MDA8 O₃ >= 60 ppb).

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 O₃ (ppb) at monitors #090010017, #090110124, #240190004, and #440090007 in the 12OTC2 domain.

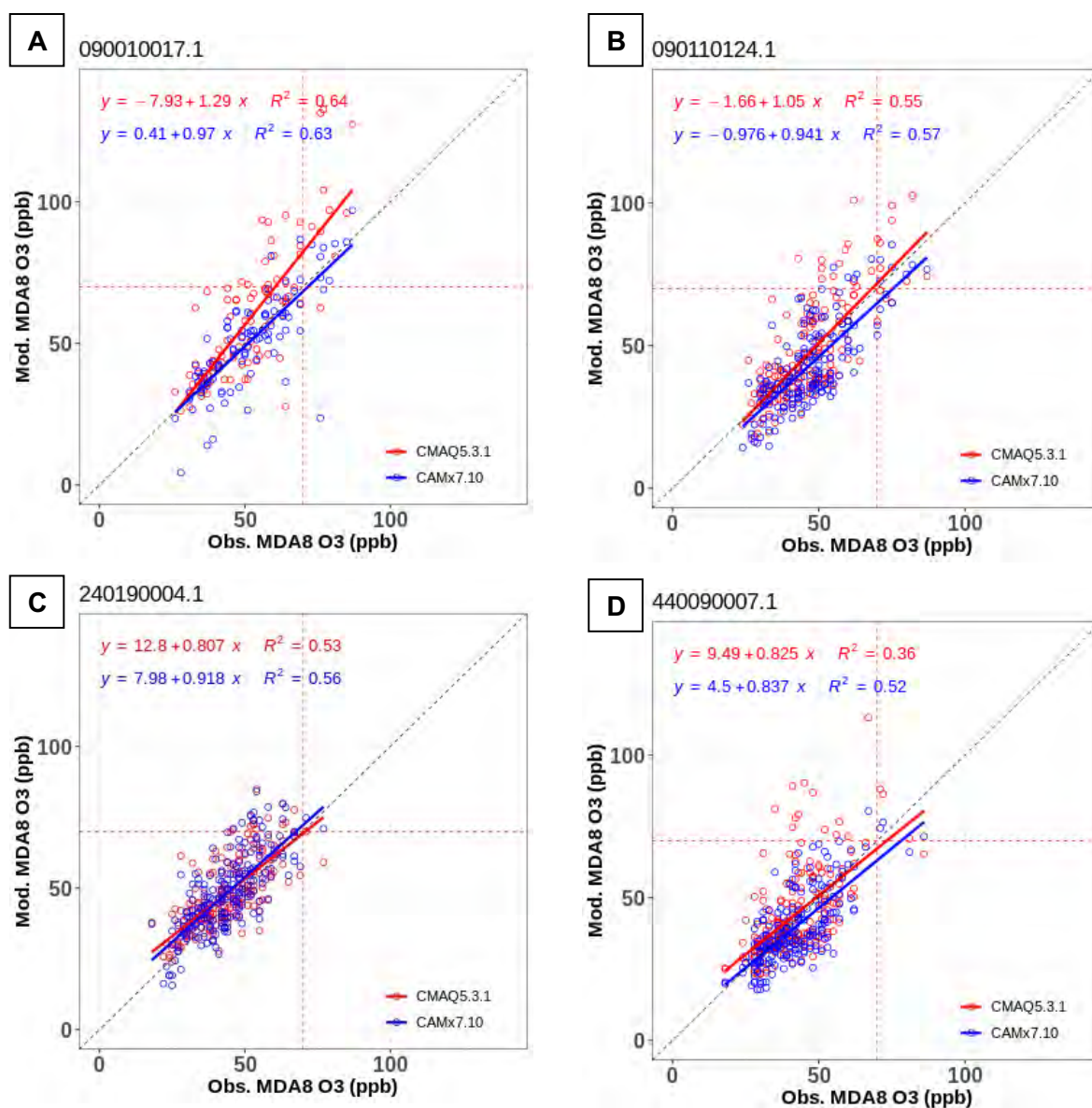


Figure 8-4 illustrates the 3x3 grid cell array centered over each monitoring site located in a water cell. Green shading indicates a grid cell classified as land, while blue shading indicates a grid cell classified as water. The grid cells used in the RRF calculation using the three methods are shown 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 O₃. 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 O₃ (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 O₃ 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 O₃ for the days used in the RRF calculation (**Figure 8-5C**).

Figure 8-6 illustrates observed and CAMx modeled MDA8 O₃ (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 O₃ 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 O₃ 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 O₃ ≥ 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 O₃. 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.

CMAQ			CAMx			
3x3	3x3 no water 1	3x3 no water 2	3x3	3x3 no water 1	3x3 no water 2	
90010017						Greenwich, CT
90110124						Groton, CT
230090102						Cadillac MT Summit, ME
230290019						Jonesport ME
240190004						Horn Point, MD
250010002						Truro, MA
250070001						Martha's Vineyard, MA
440090007						Narragansett, RI

Figure 8-5 Observed and CMAQ modeled MDA8 O₃ (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 O₃.

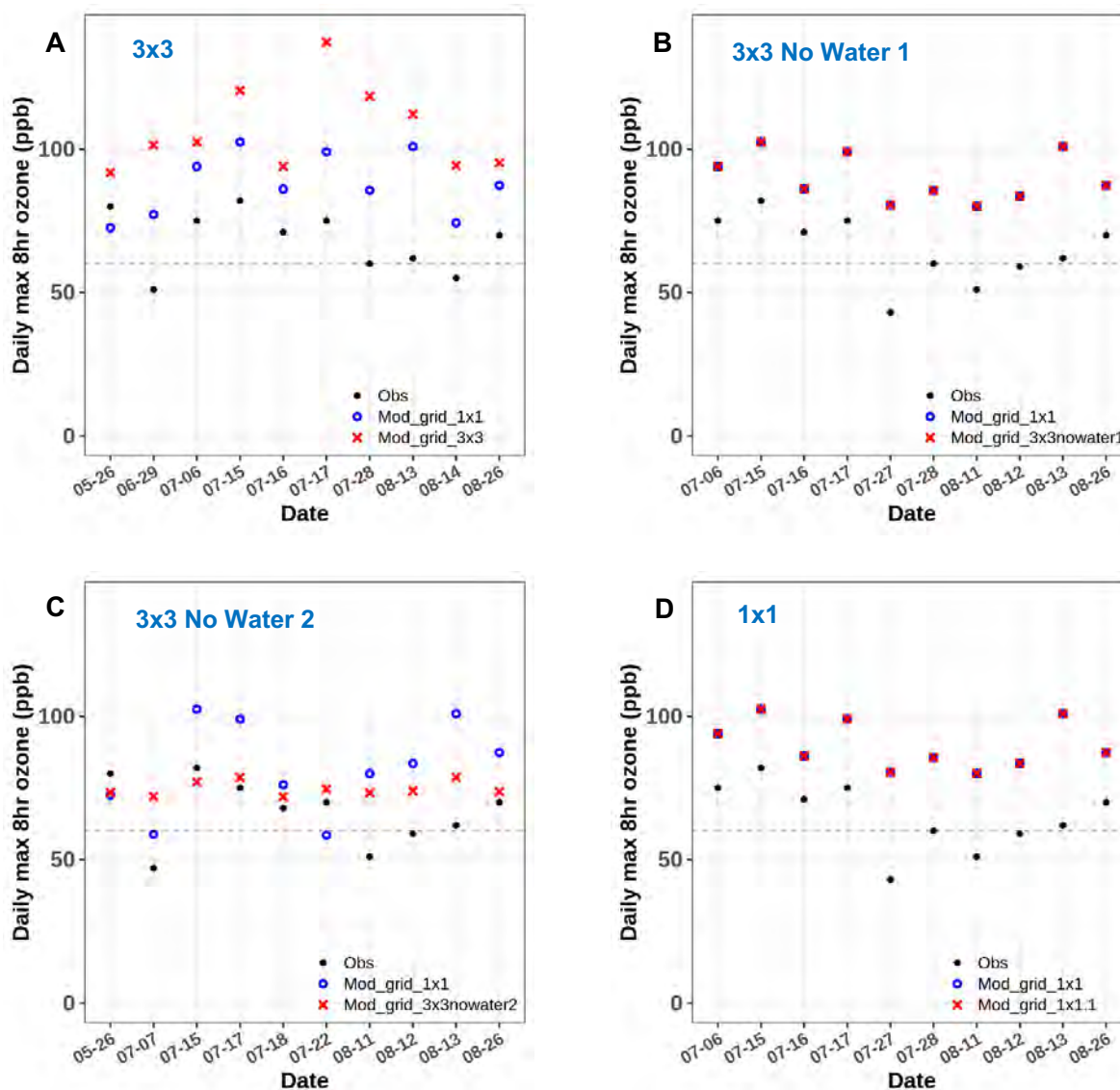


Figure 8-6 (A-D). Observed and CAMx modeled MDA8 O₃ (ppb) for 2016 at Groton, CT monitor #090110124 using the 3x3 (top left), 3x3 No Water 1 (top right), 3x3 No Water 2 (bottom left), and 1x1 method (bottom right) for 10 selected days used in the RRF calculation and associated observed O₃.

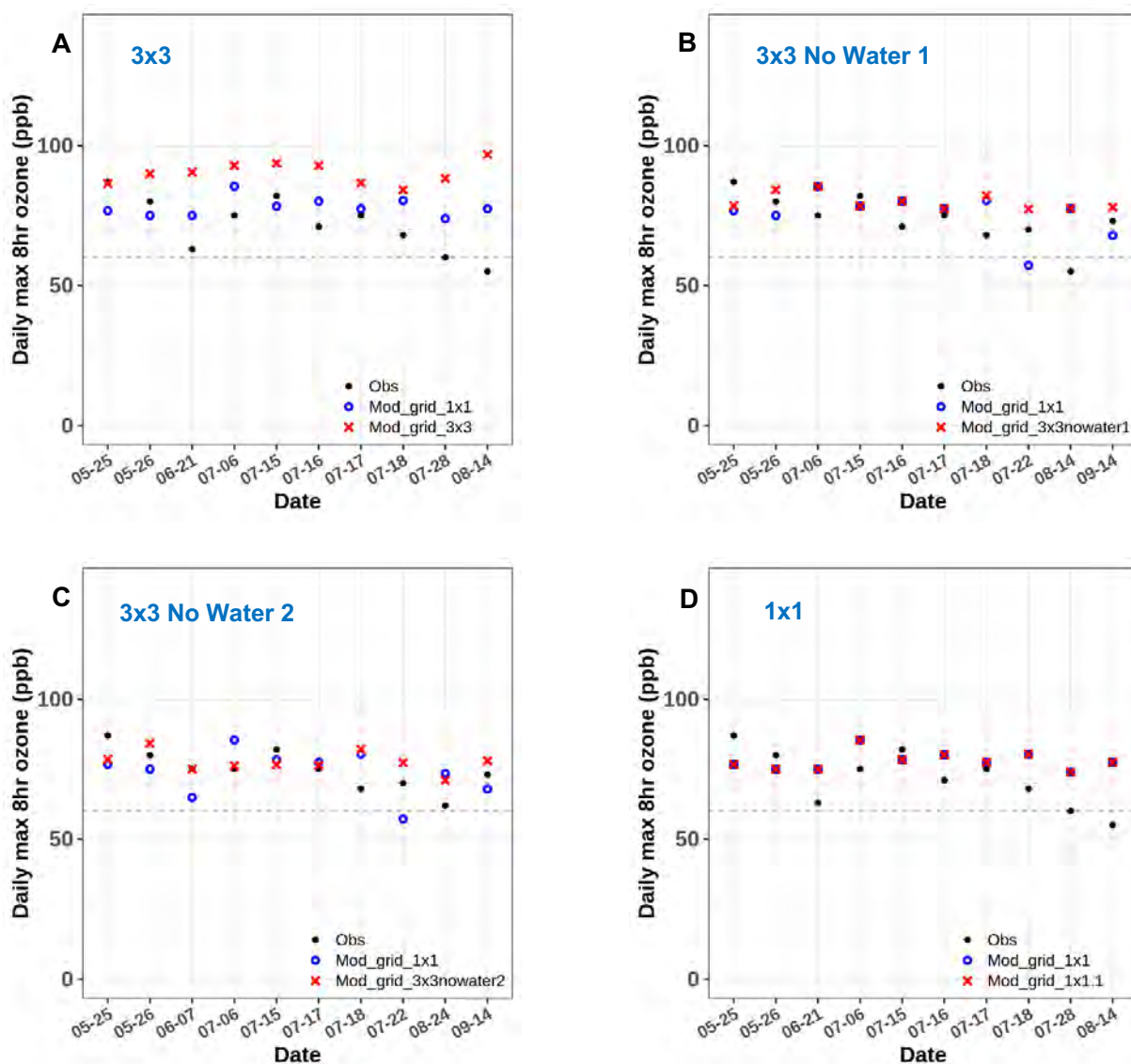


Table 8-3 NMB (%) for the days and grid cells used in the RRF calculation using the four methods in the OTR.

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 O₃ 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 O₃ 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 O₃ 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 $\geq$ 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 shown 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) O₃ design values across the 12OTC2 domain, using the standard 3x3 method, with A) CAMx (left) and B) CMAQ

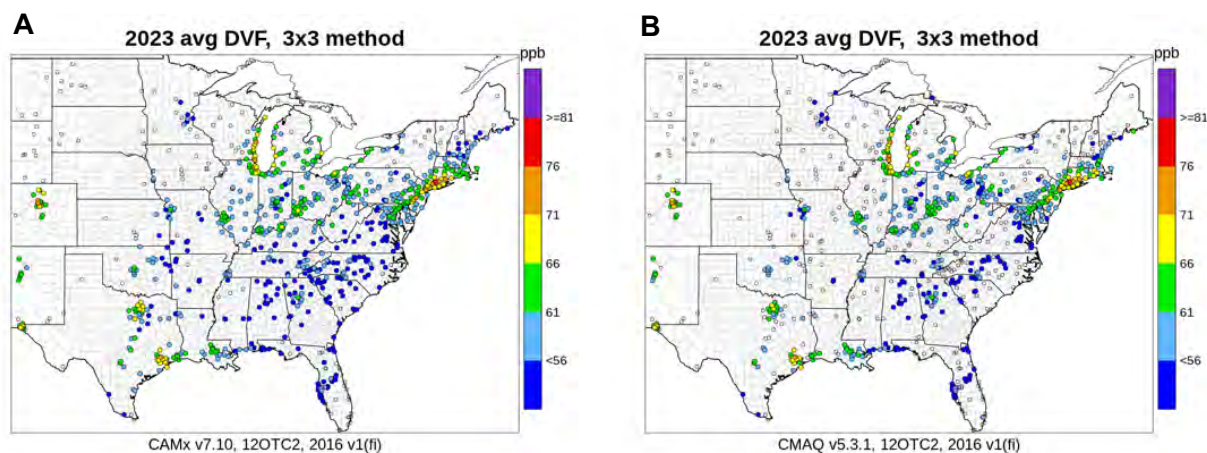


Figure 9-2 Full model domain projected 2023 V1 (fi) O₃ design values across the 12OTC2 domain, using the 3x3 No Water 1 method, with A) CAMx (left) and B) CMAQ (right).

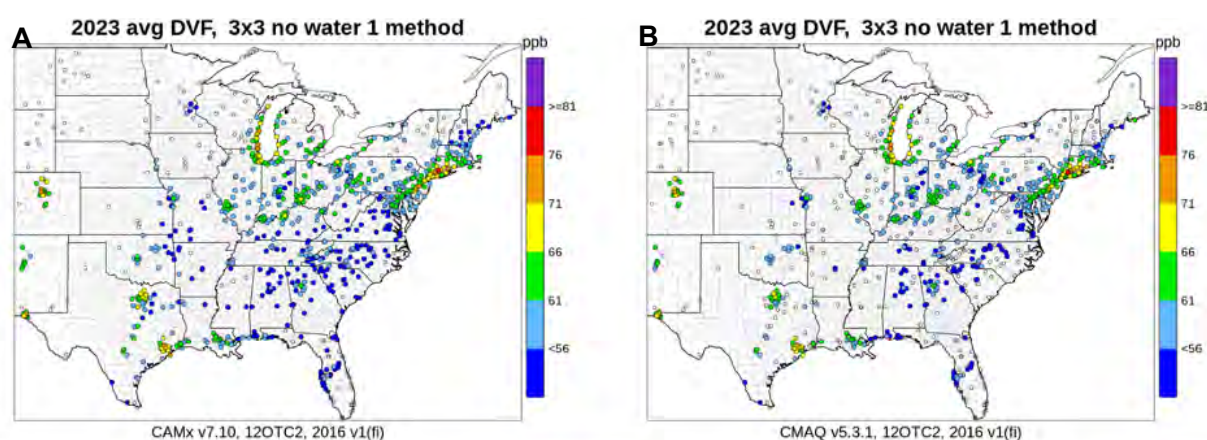


Figure 9-3 OTR projected 2023 V1 (fi) O₃ design values across the Northeast region, using the standard 3x3 method, with A) CAMx (left) and B) CMAQ (right).

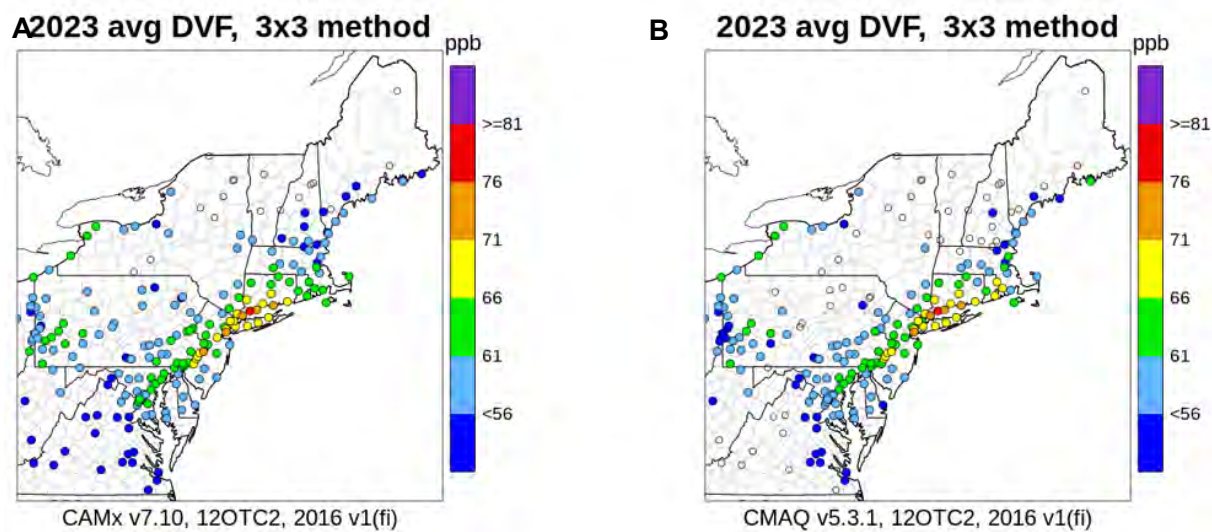


Figure 9-4 OTR projected 2023 V1 (fi) O₃ design values across the Northeast region, using the 3x3 No Water 1 method, with A) CAMx (left) and B) CMAQ (right).

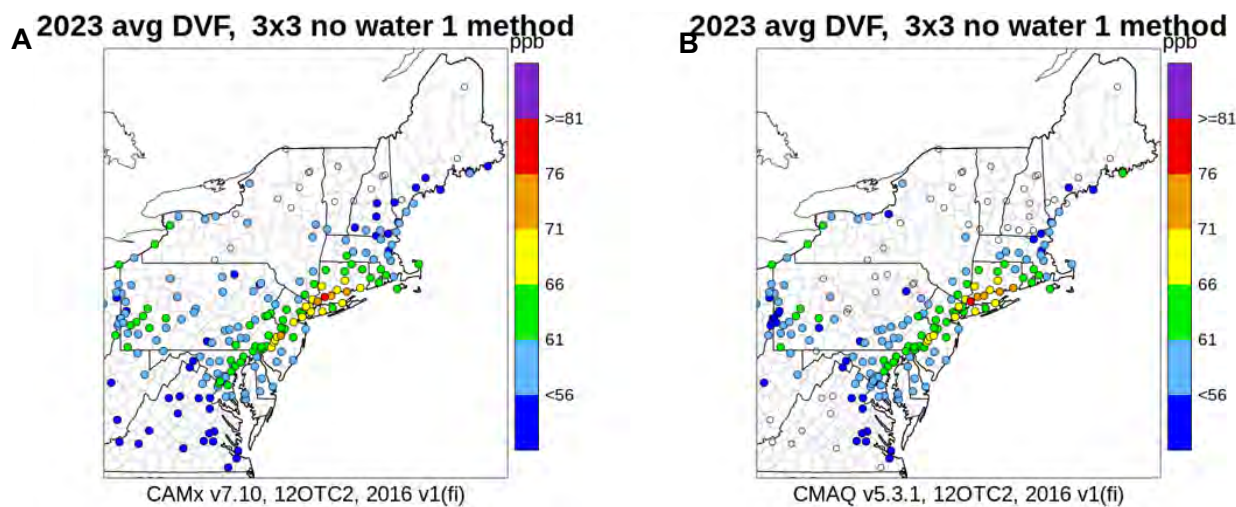


Table 9-1 Top 22 OTR Ozone Monitors - Baseline (2014-2018) and projected 2023 O₃ design values from CAMx and CMAQ, using the standard 3x3 method and the 3x3 No Water 1 method. Future design values that exceed 65 ppb are highlighted in yellow, values that exceed 70 ppb are highlighted in orange, and values 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 online⁵²). 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 O₃ 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 from 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 O₃ 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 NO _x		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 NO_x 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.

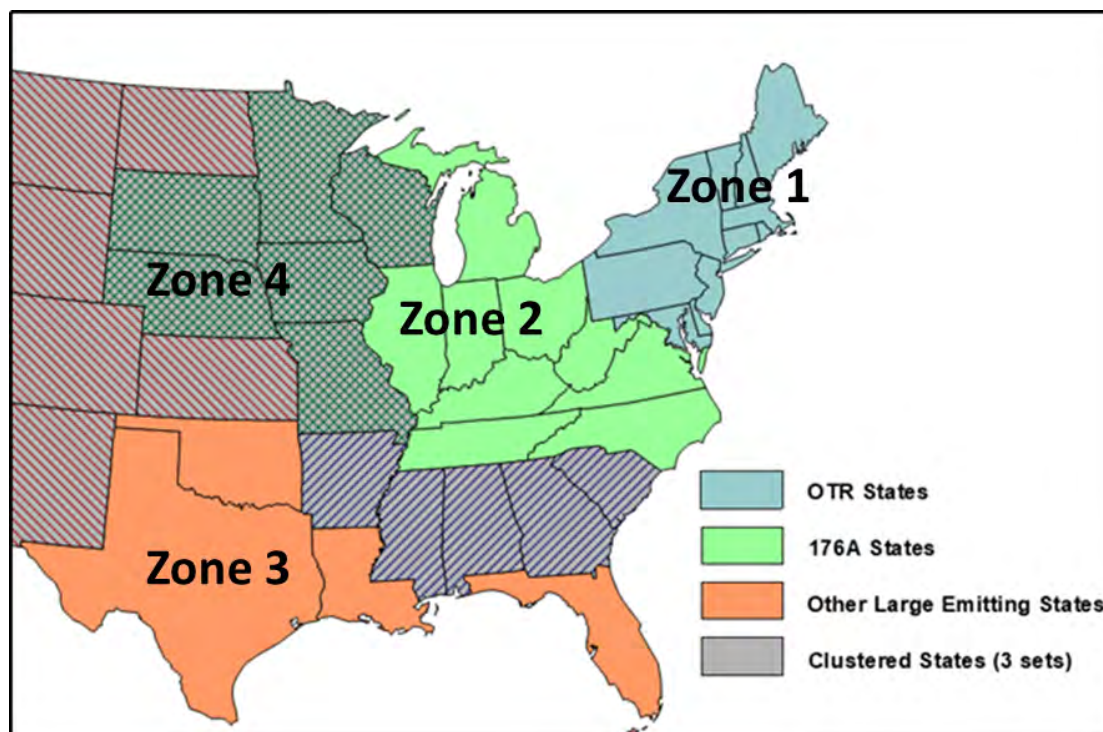


Table 10-2. Emission sectors for the tagged contribution modeling

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 NO _x 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 NO _x 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		
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																		
Biogenic																		
Offshore-CMV																		
Offshore-Rigs																		
RWC																		
Agriculture																		
Agricultural burning																		
Wildfire and prescribed fire																		

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 2016th 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 NO_x emissions per MWh of electricity produced. There is considerable interest in understanding the role that these units play in O₃ production during high O₃ 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 O₃ season,
- Average total heat input 2018 or 2019 O₃ 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 O₃ 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 "egunonccems_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-diesel	Nonroad-diesel	Ares-nonpoint	CMW	CLC3C3	Oligas-nonpoint	Oligas-point	Offshore-CMW	Offshore-Rgs	RWC	Agriculture	Agricultural burning	wildfire and prescribed fire	Others	EGU-etrac	NonEGU	Airport	Rail	Peakers															
CT	9Connecticut	2	30	58	86	2	30	30	58	86	99	100	101	102	103	104	105	2	30	58	73	88															
DE	10Delaware	3	31	59	87	3	31	31	59	87								3	31	59	74	89															
DC	11District of Columbia	4	32	60	88	4	32	32	60	88								4	32	60	75	90															
ME	23Maine	5	33	61	89	5	33	33	61	89								5	33	61	76	91															
MD	24Maryland	6	34	62	90	6	34	34	62	90								6	34	62	77	92															
MA	25Massachusetts	7	35	63	91	7	35	35	63	91								7	35	63	78	93															
NH	33New Hampshire	8	36	64	92	8	36	36	64	92								8	36	64	79	94															
NJ	34New Jersey	9	37	65	93	9	37	37	65	93								9	37	65	80	95															
NY	36New York	10	38	66	94	10	38	38	66	94								10	38	66	81	96															
PA	42Pennsylvania	11	39	67	95	11	39	39	67	95								11	39	67	82	97															
RI	44Rhode Island	12	40	68	96	12	40	40	68	96								12	40	68	83	98															
VT	50Vermont	13	41	69	97	13	41	41	69	97								13	41	69	84	99															
VA	51Virginia	14	42	70	98	14	42	42	70	98								14	42	70	85	100															
IL	17Illinois	15	43	71	99	15	43	43	71	99								15	43	71	86	101															
IN	18Indiana	16	44	72	100	16	44	44	72	100								16	44	71	86	101															
KY	21Kentucky	17	45	73	101	17	45	45	73	101								17	45	71	86	101															
MI	26Michigan	18	46	74	102	18	46	46	74	102								18	46	71	86	101															
NC	37North Carolina	19	47	75	103	19	47	47	75	103								19	47	71	86	101															
OH	39Ohio	20	48	76	104	20	48	48	76	104								20	48	71	86	101															
TN	47Tennessee	21	49	77	105	21	49	49	77	105								21	49	71	86	101															
WV	54West Virginia	22	50	78	106	22	50	50	78	106								22	50	71	86	101															
FL	12Florida	23	51	79	107	23	51	51	79	107								23	51	72	87	102															
LA	22Louisiana	24	52	80	108	24	52	52	80	108								24	52	72	87	102															
OK	40Oklahoma	25	53	81	109	25	53	53	81	109								25	53	72	87	102															
TX	48Texas	26	54	82	110	26	54	54	82	110								26	54	72	87	102															
GA	13Georgia	27	55	83	111	27	55	55	83	111								27	55	72	87	102															
SC	45South Carolina	27	55	83	111	27	55	55	83	111								27	55	72	87	102															
AL	1Alabama	27	55	83	111	27	55	55	83	111								27	55	72	87	102															
AR	5Arkansas	27	55	83	111	27	55	55	83	111								27	55	72	87	102															
MS	28Mississippi	27	55	83	111	27	55	55	83	111								27	55	72	87	102															
IA	19Iowa	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
MN	27Minnesota	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
MO	29Missouri	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
NE	31Nebraska	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
SD	46South Dakota	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
WI	55Wisconsin	28	56	84	112	28	56	56	84	112								28	56	72	87	102															
CO	8Colorado	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
KS	20Kansas	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
MT	30Montana	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
ND	38North Dakota	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
NM	35New Mexico	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
WY	56Wyoming	29	57	85	113	29	57	57	85	113								29	57	72	87	102															
																						106															
																						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 O₃ design values exceeding the 2015 O₃ NAAQS and one exceeded the 2008 O₃ NAAQS. **Tables 10-6** and **10-7** present monitors in the OTR failing to attain/maintain the O₃ 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 O₃ 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 O₃ 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 O₃ 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 O₃ 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 O₃ 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

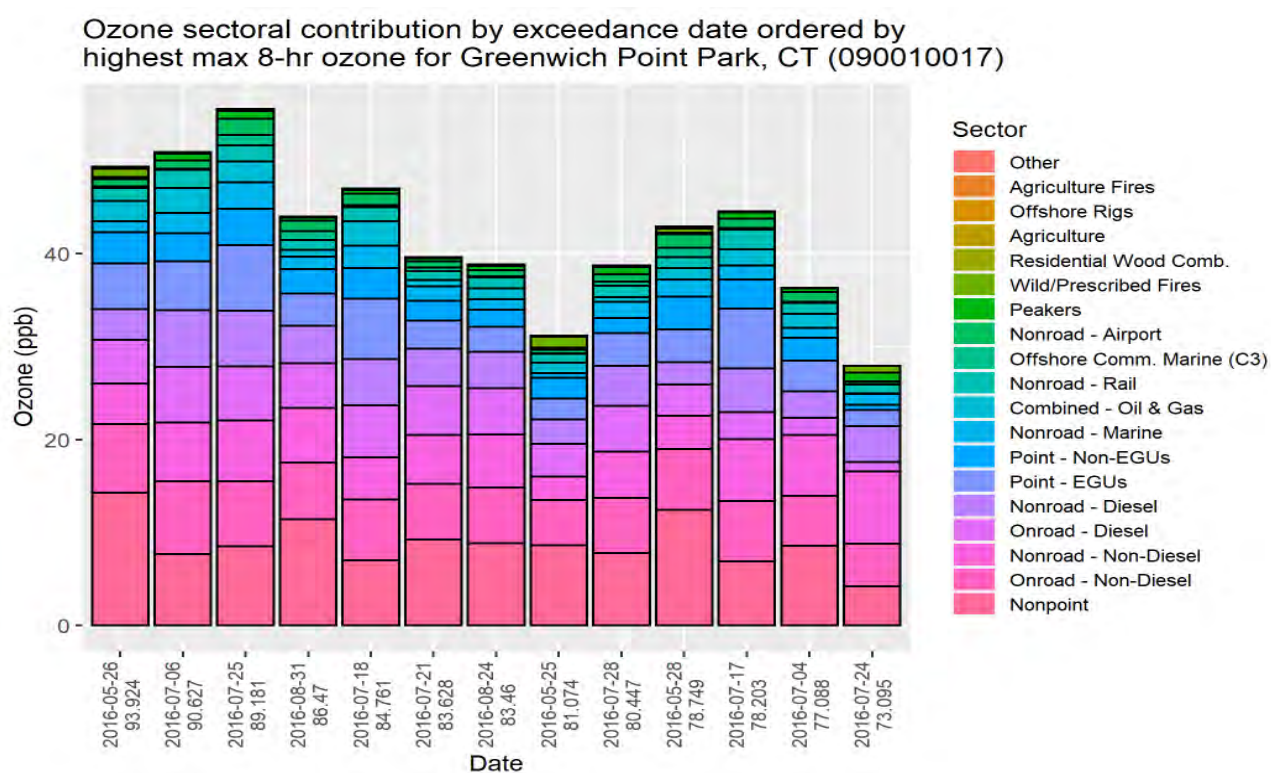


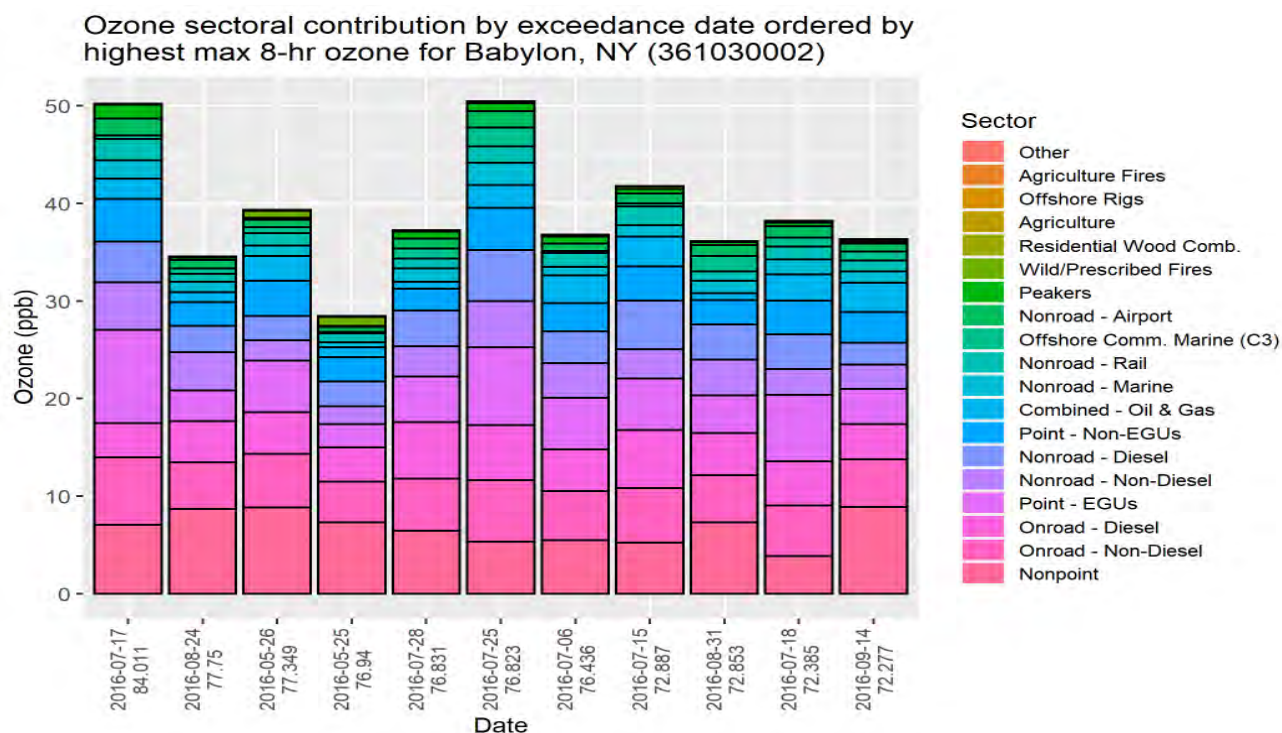
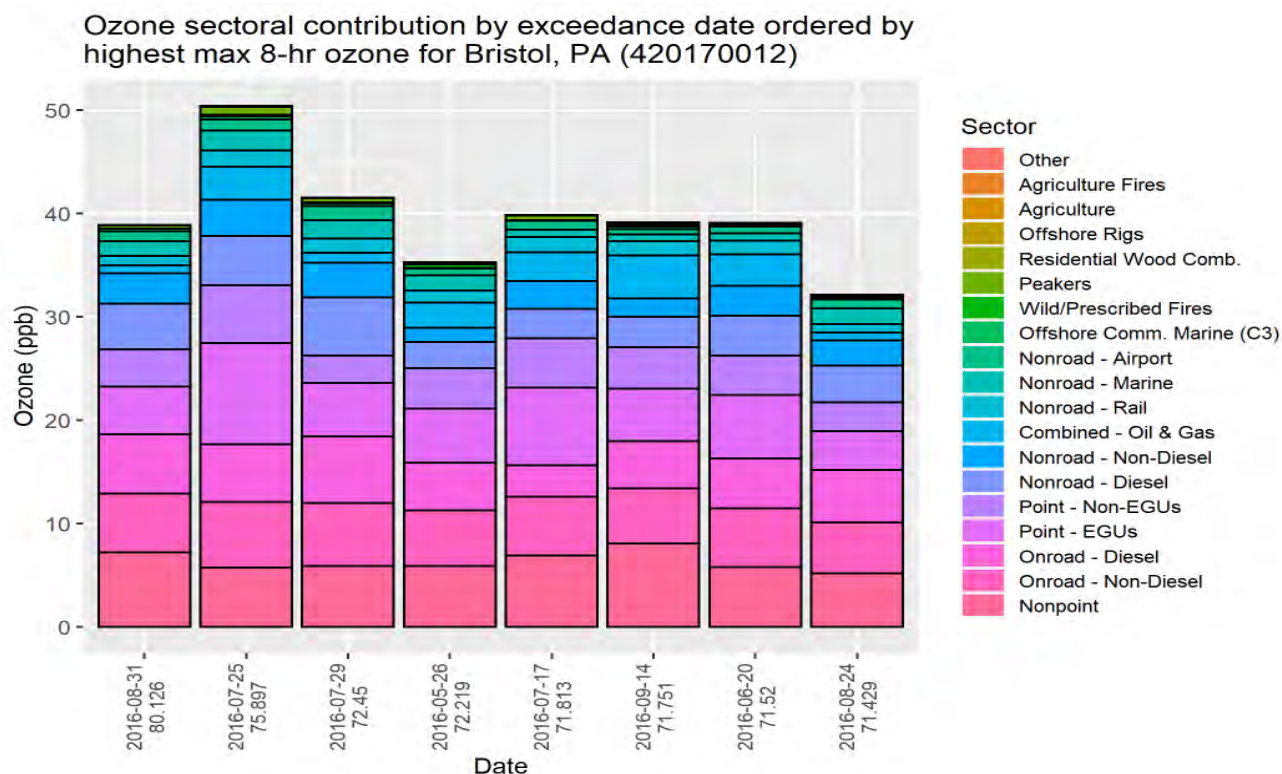
Figure 10-3. Emission Sector Contribution on Modeled Ozone Exceedance Day at Babylon, NY

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


Figure 10-5 through **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 remaining 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

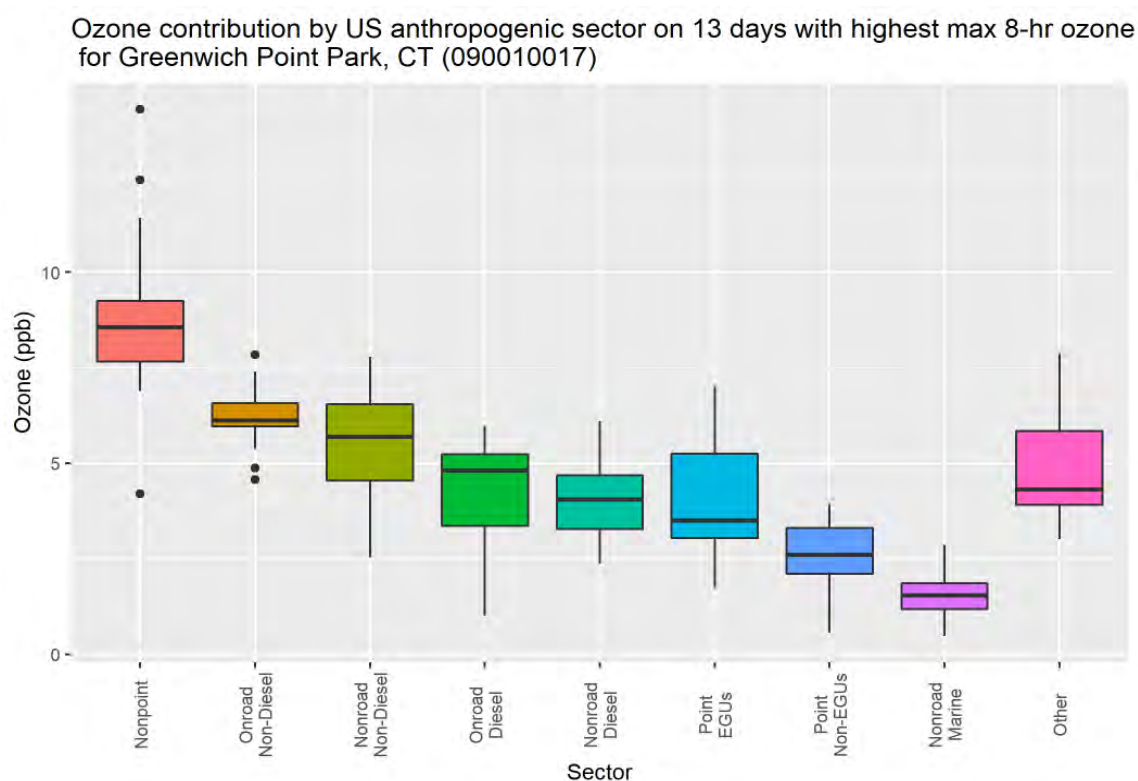


Figure 10-6. Emission Sector Contribution on 11 Highest Modeled Ozone Days at Babylon, NY

Ozone contribution by US anthropogenic sector on 11 days with highest max 8-hr ozone for Babylon, NY (361030002)

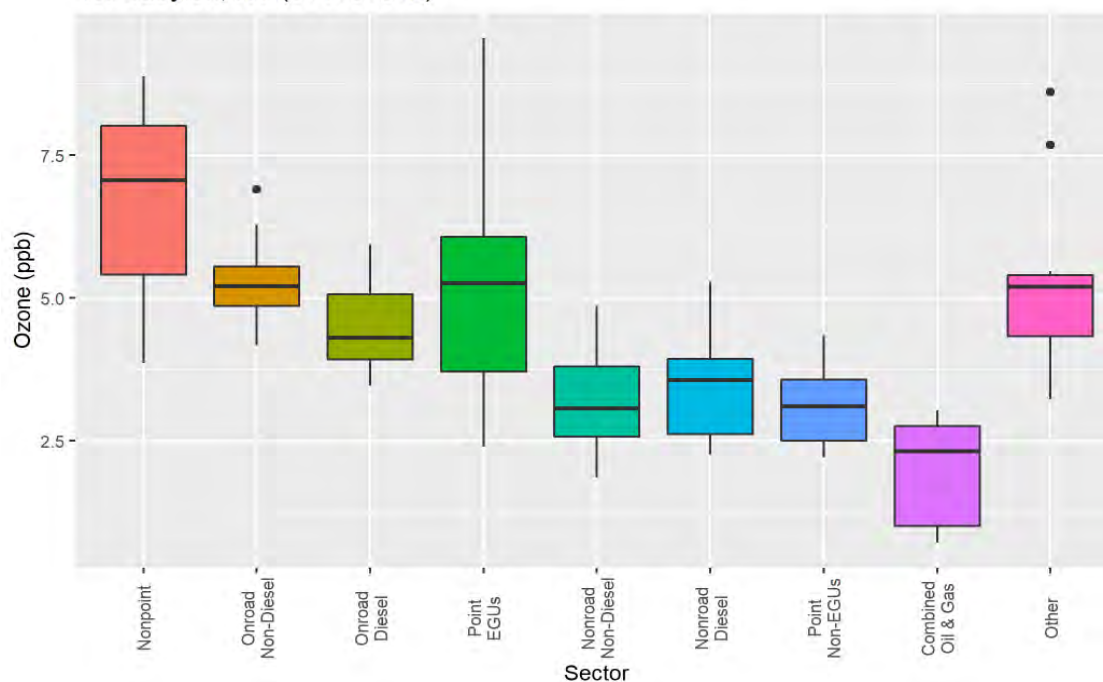
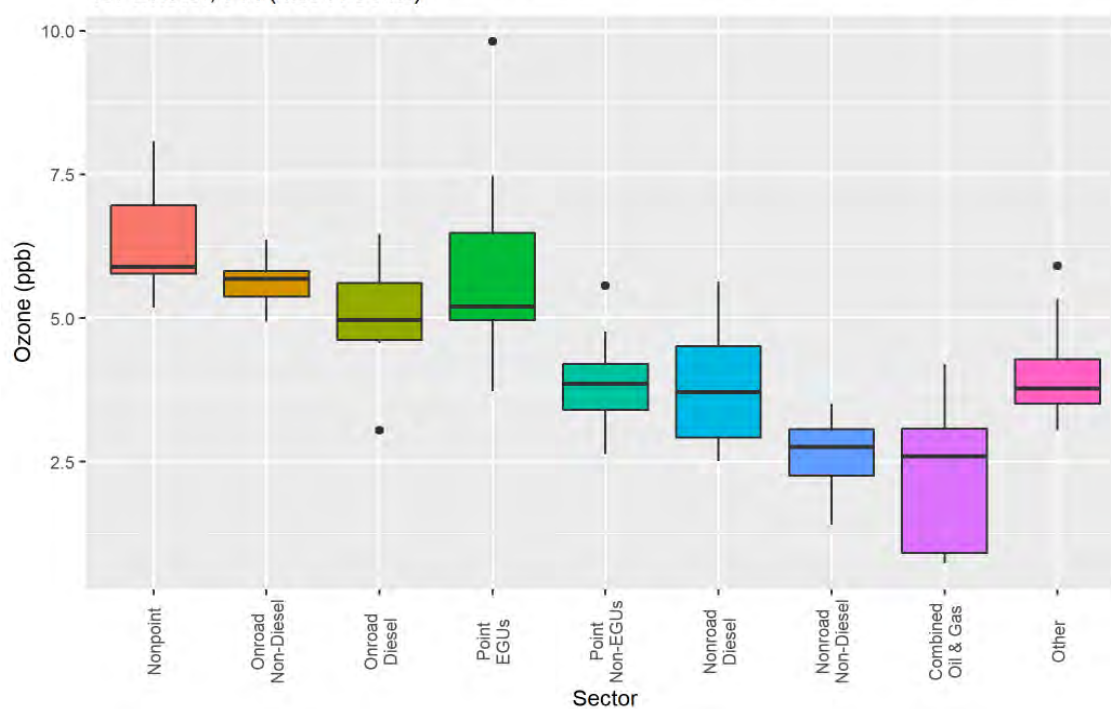


Figure 10-7. Emission Sector Contribution on 8 Highest Modeled Ozone Days at Bristol, PA

Ozone contribution by US anthropogenic sector on 8 days with highest max 8-hr ozone for Bristol, PA (420170012)



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 O₃ days. At both Sherwood Island and Stratford, CT, New Jersey and Pennsylvania were also consistently high contributors on exceedance 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

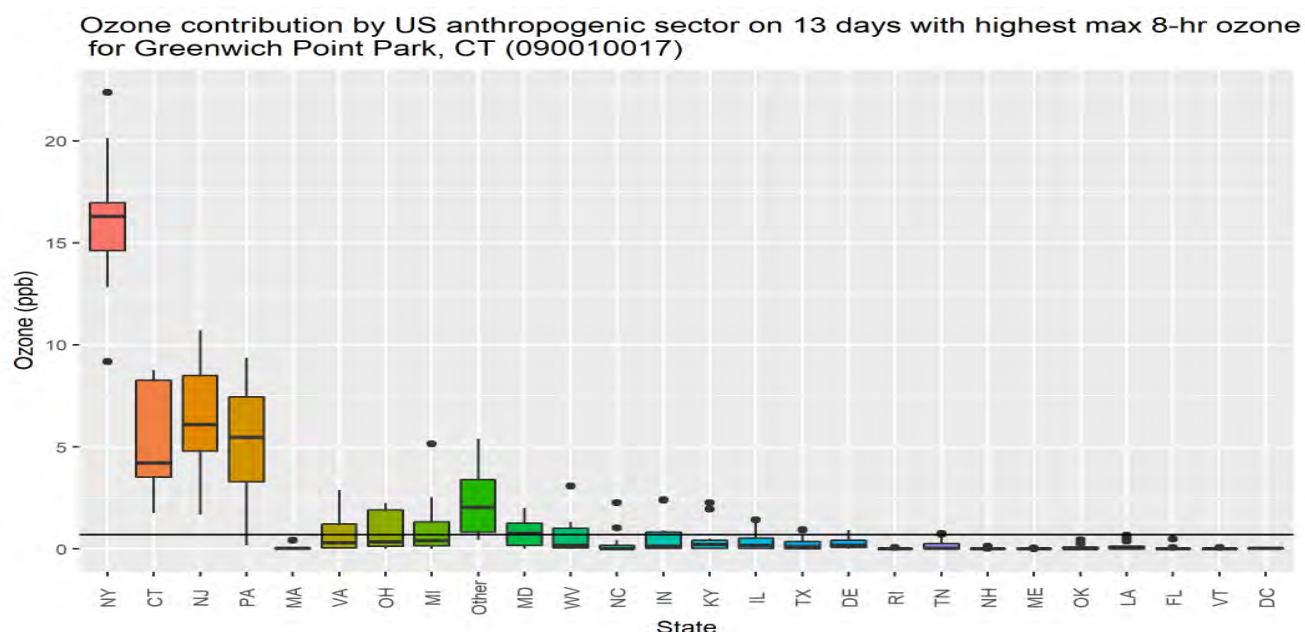


Figure 10-9 State Contribution on 11 Highest Modeled Ozone Days at Babylon, NY

Ozone contribution by US anthropogenic sector on 11 days with highest max 8-hr ozone for Babylon, NY (361030002)

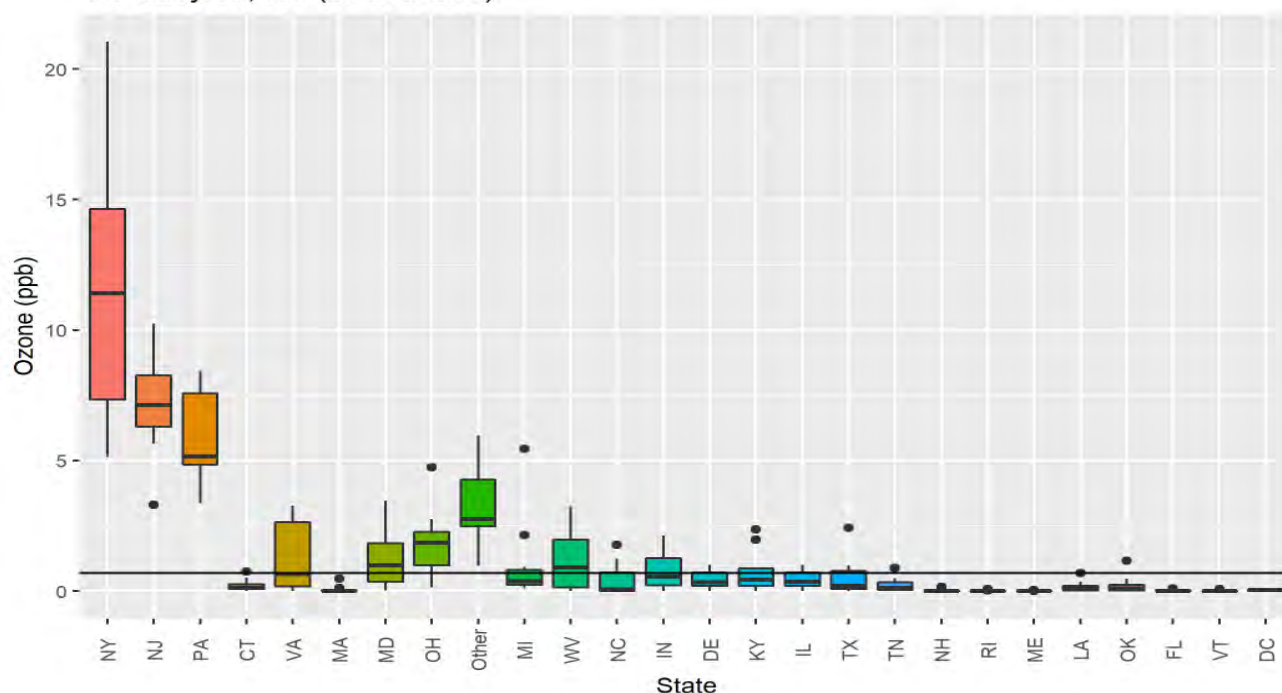
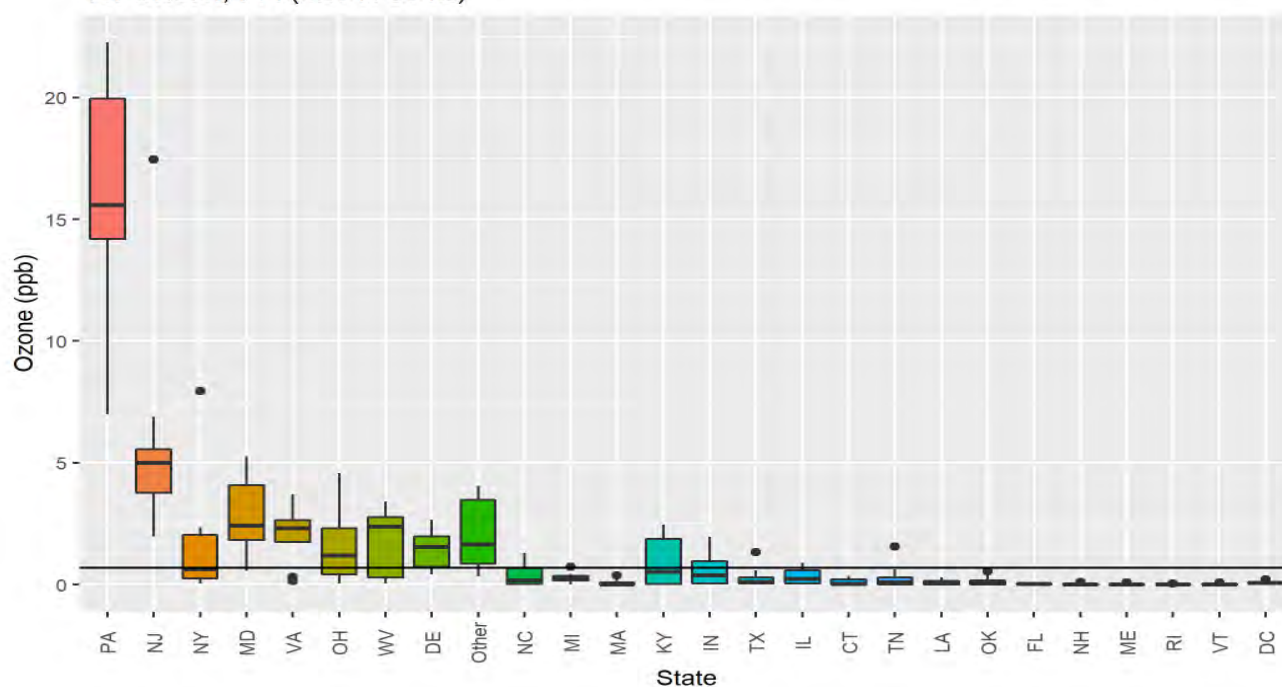


Figure 10-10. State Contribution on 8 Highest Modeled Ozone Days at Bristol, PA

Ozone contribution by US anthropogenic sector on 8 days with highest max 8-hr ozone for Bristol, PA (420170012)



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 O₃ 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 - EGU	Point - EGU	Point - EGU	Point - EGU	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Point - EGU
2	Point - EGU	Point - Non-EGU	Point - Non-EGU	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Combined - Oil & Gas
3	Onroad - Non-Diesel	Onroad - Diesel	Onroad - Diesel	Onroad - Diesel	Point - Non-EGU	Nonroad - Diesel	Point - EGU	Point - Non-EGU	Point - Non-EGU	Nonpoint	Point - Non-EGU

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 - EGU	Point - EGU	Onroad - Non-Diesel	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Point - EGU
2	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Combined - Oil & Gas
3	Nonroad - Non-Diesel	Point - Non-EGU	Onroad - Non-Diesel	Point - EGU	Nonroad - Diesel	Onroad - Diesel	Point - Non-EGU	Onroad - Diesel	Nonpoint	Point - Non-EGU

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 - EGU	Point - EGU	Point - EGU	Nonpoint	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Combined - Oil & Gas
2	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Point - Non-EGU	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Point - EGU
3	Nonroad - Diesel	Point - EGU	Point - Non-EGU	Onroad - Non-Diesel	Onroad - Diesel	Point - EGU	Onroad - Diesel	Onroad - Diesel	Point - Non-EGU	Point - Non-EGU	Onroad - Diesel	Point - Non-EGU

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 O₃ 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 O₃ 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 O₃ 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 O₃ 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 O₃ 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

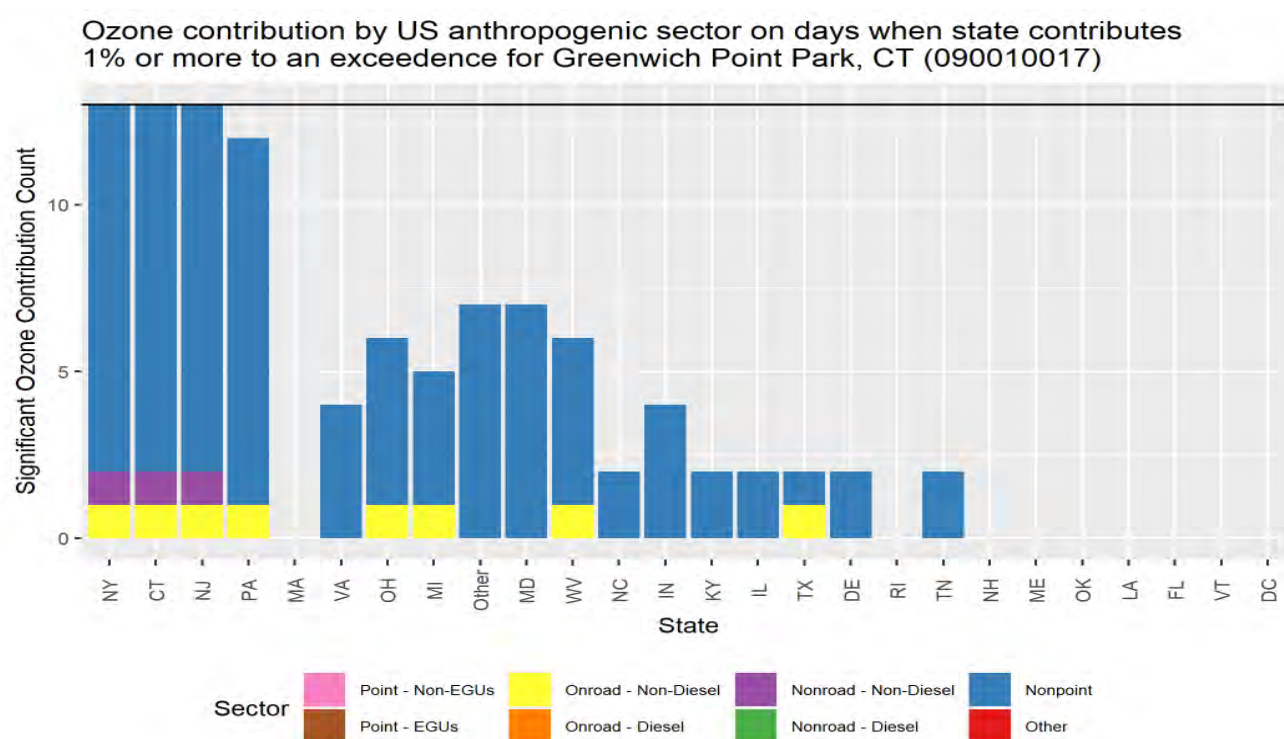


Figure 10-12. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Babylon

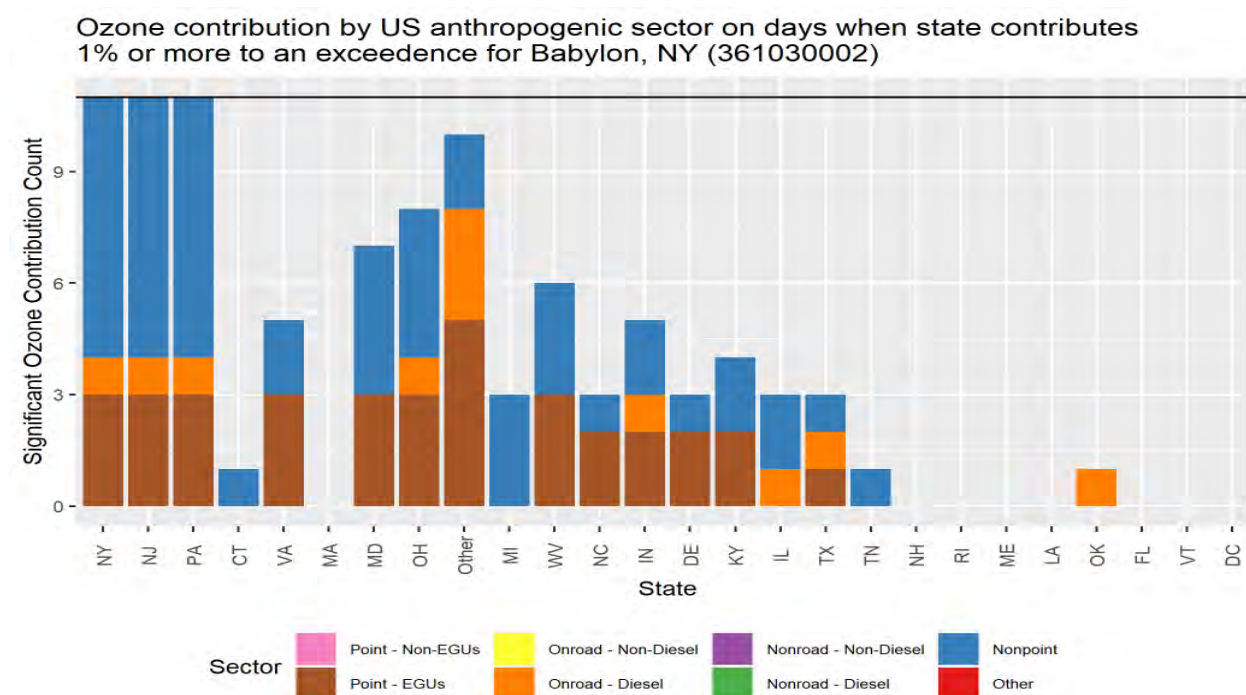


Figure 10-13. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Bristol, PA

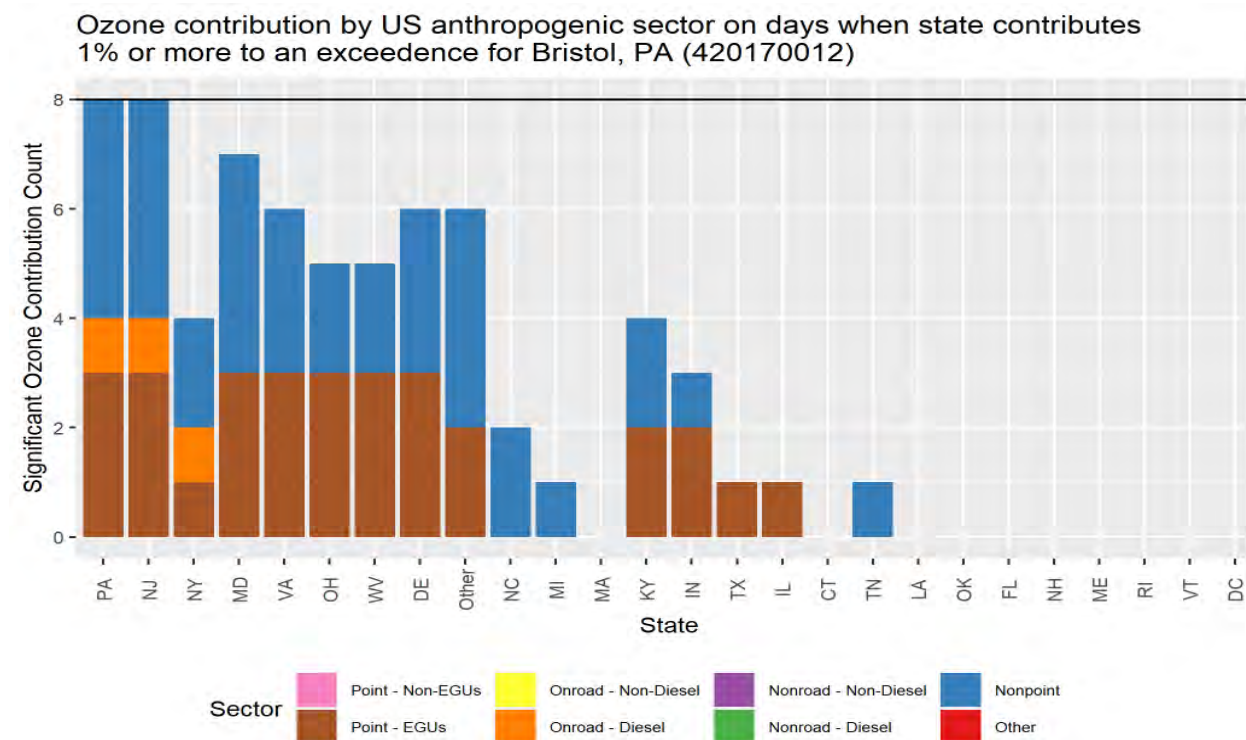


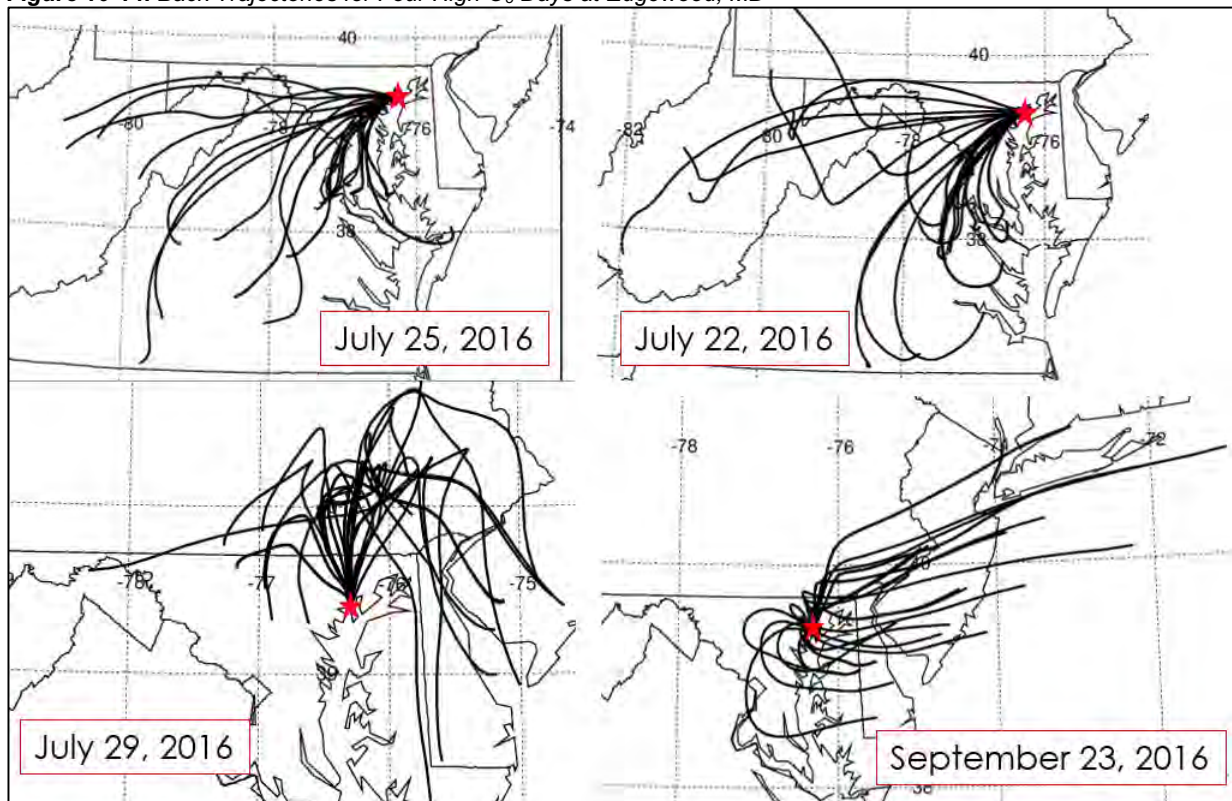
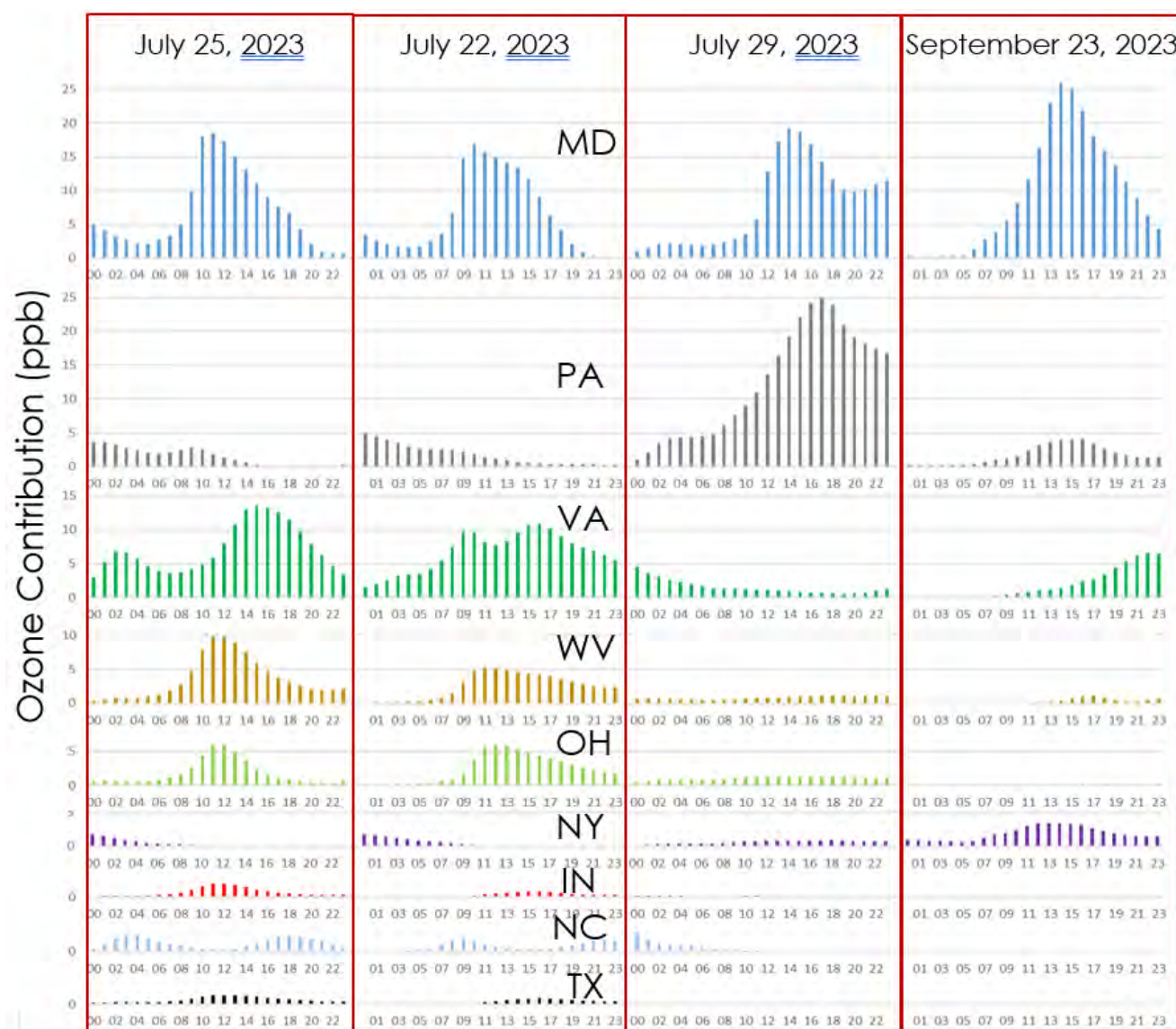
Figure 10-14. Back Trajectories for Four High O₃ Days at Edgewood, MD

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

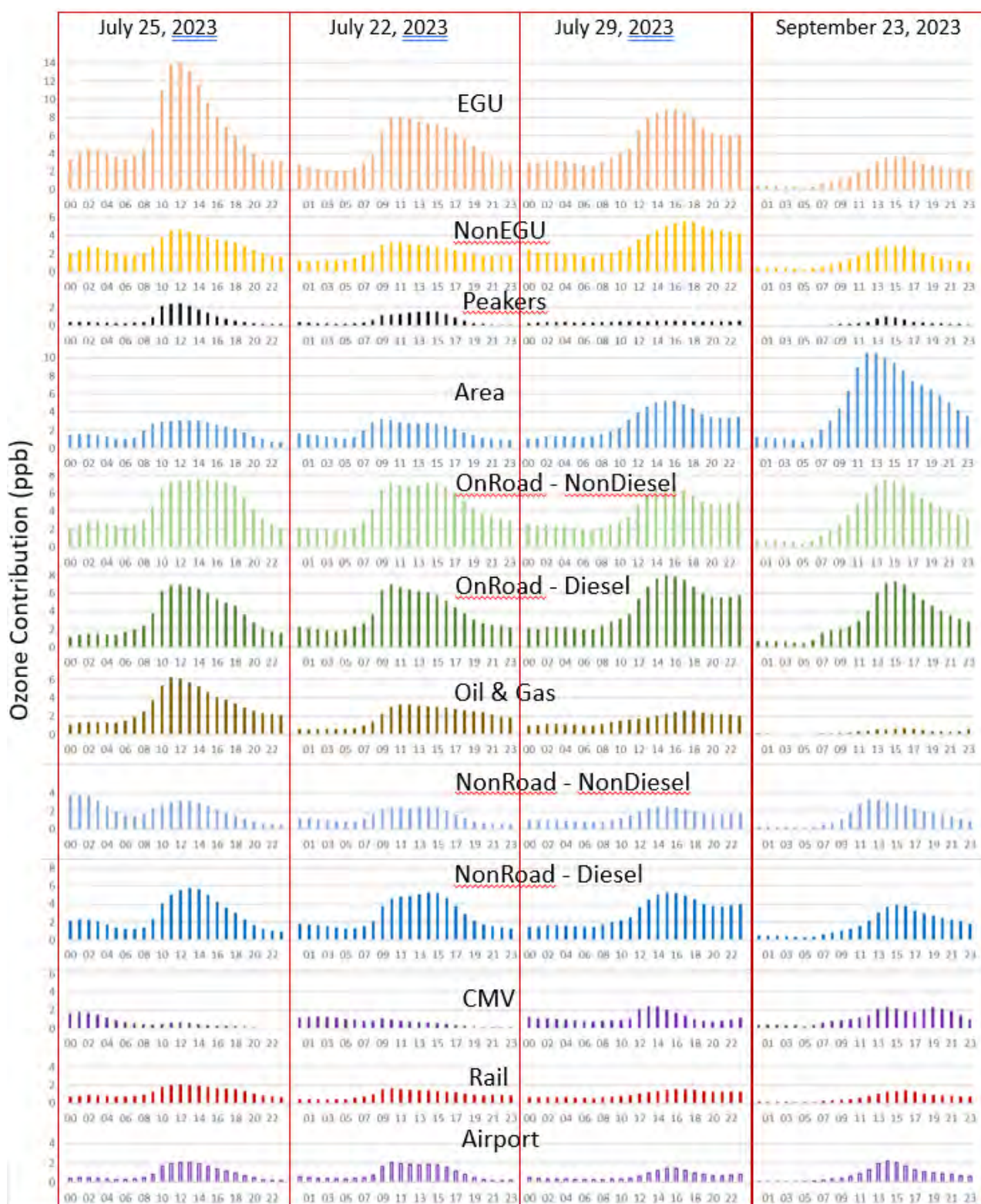
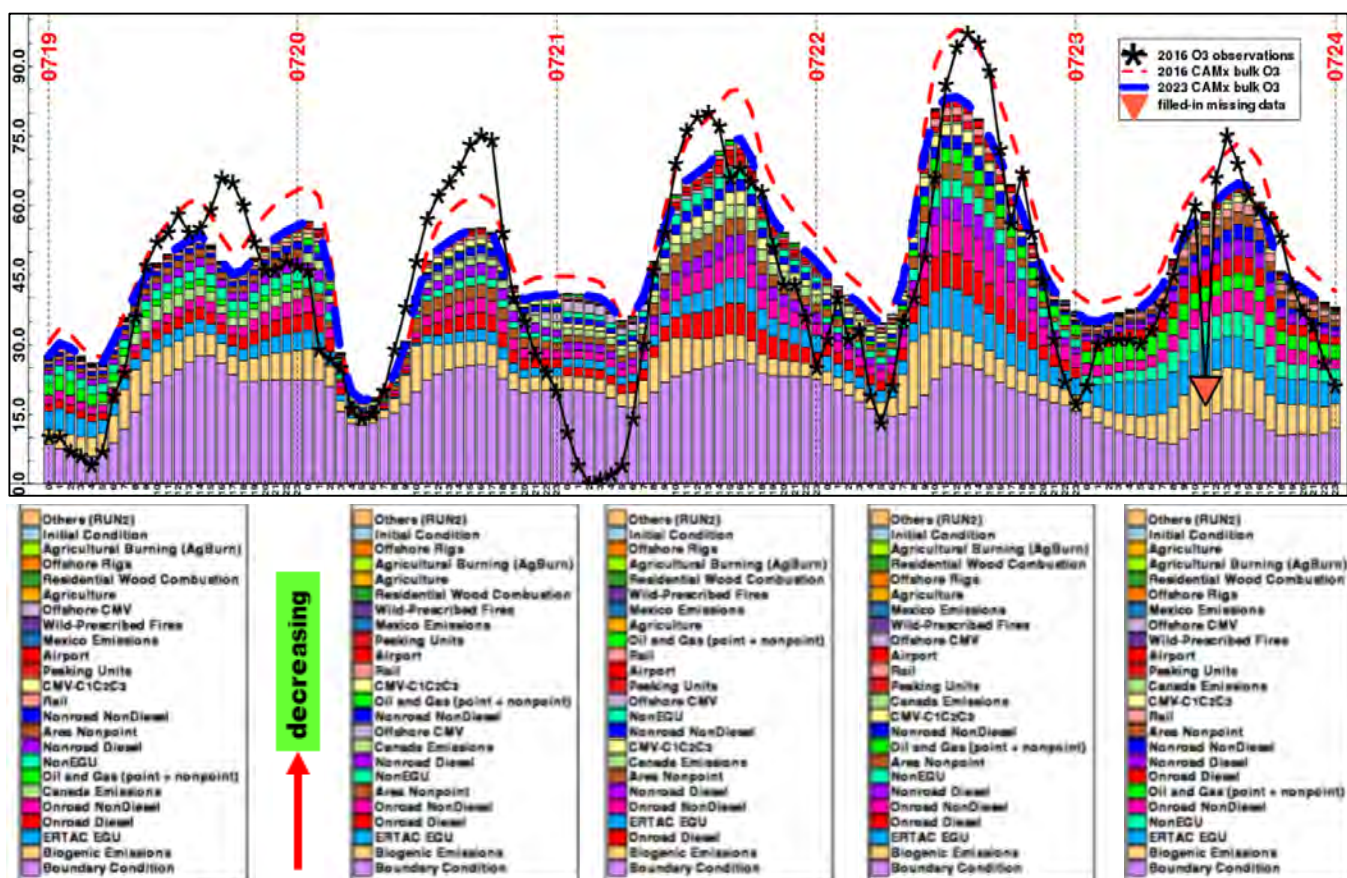
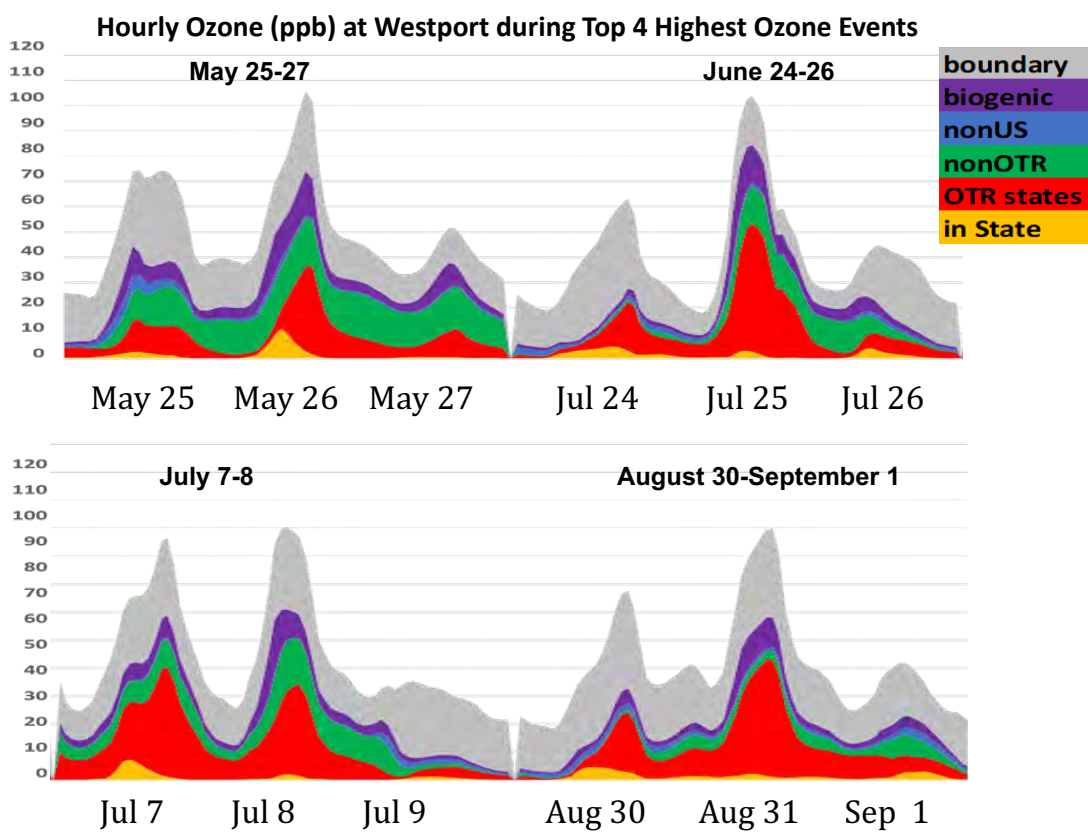


Figure 10-17 looks at hourly contribution in a period of five consecutive days. The different colors show different emission sector contributions. The black line represents monitored data for Edgewood, MD and the light purple bars at the bottom of the chart represents background contribution. Hourly 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

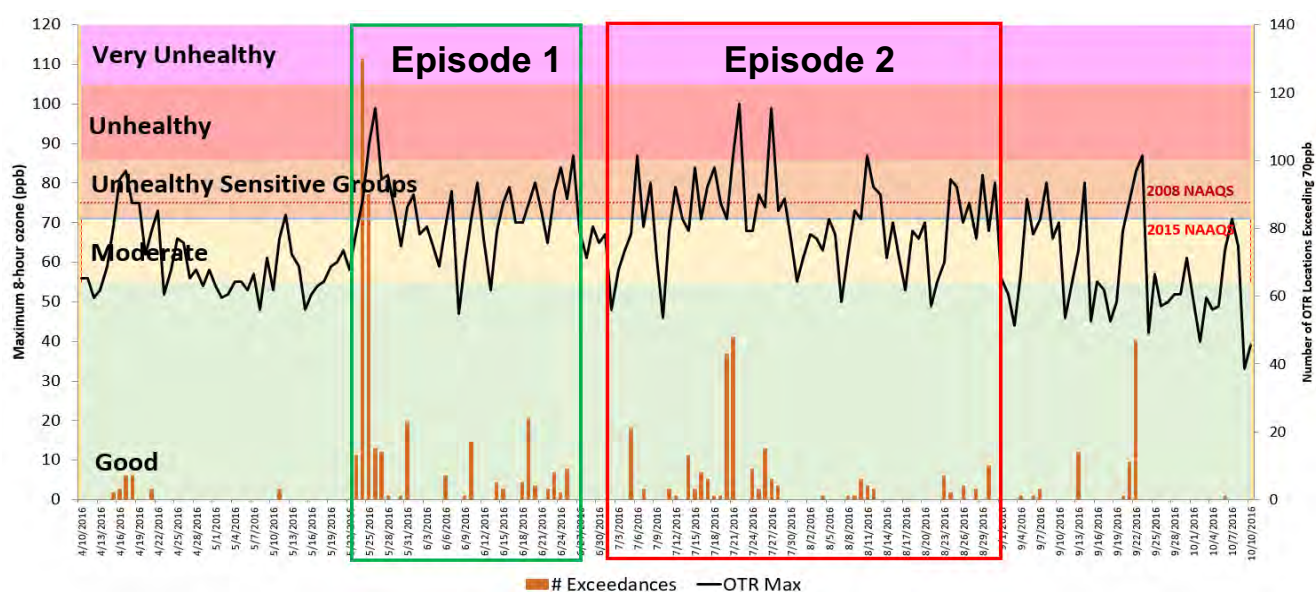
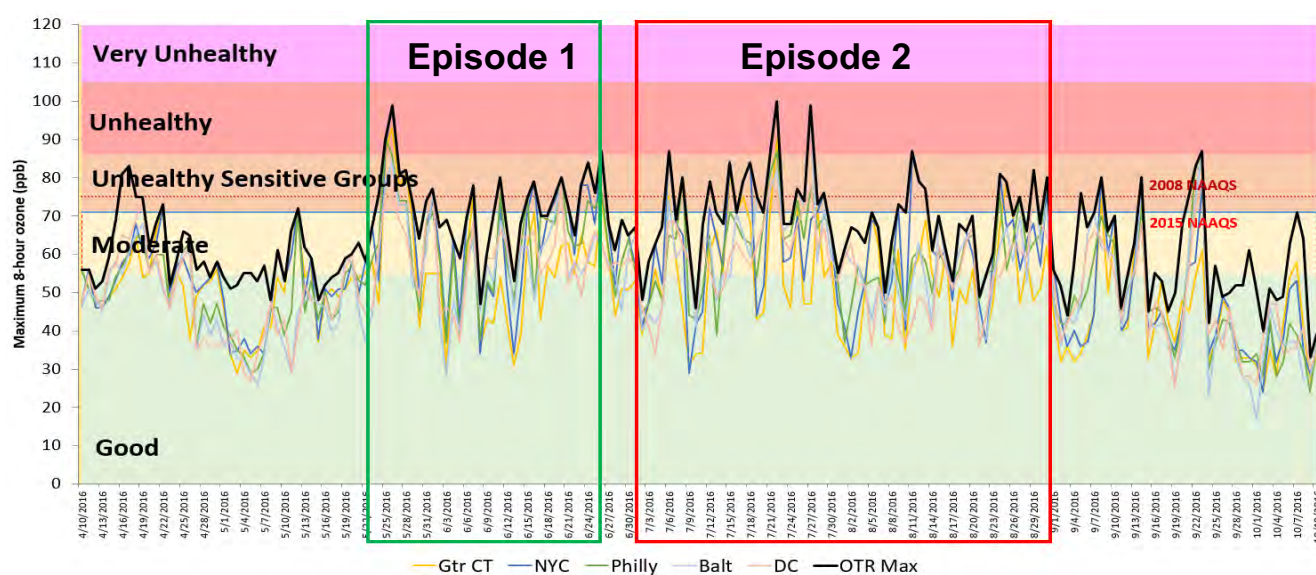


Figure 11-2. 2016 Ozone Season Summary for the OTR with Nonattainment Area Data



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 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 11-1. 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 11-2 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)

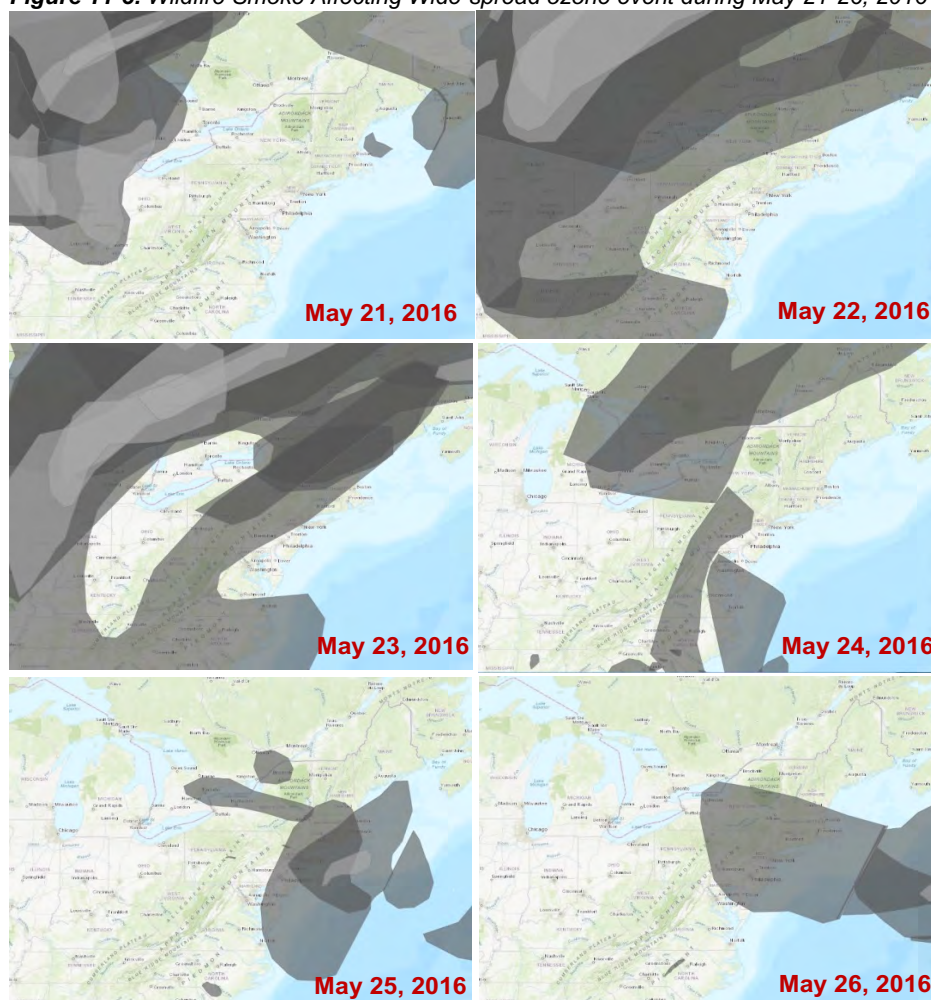
	5/24	5/25	5/26	5/27	5/28	5/29	5/31	6/1	6/7	6/10	6/11	6/15	6/16	6/19	6/20	6/21	6/23	6/24	6/25
OTR	13	130	90	15	14	1	1	23	7	1	17	5	3	5	24	4	3	8	2
CT	0	11	12	2	7	1	0	0	5	0	0	0	2	0	0	1	3	0	0
DE	0	6	5	0	0	0	0	0	0	0	4	0	0	0	2	0	0	0	0
DC	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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, NO_x, 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 NO_x 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).

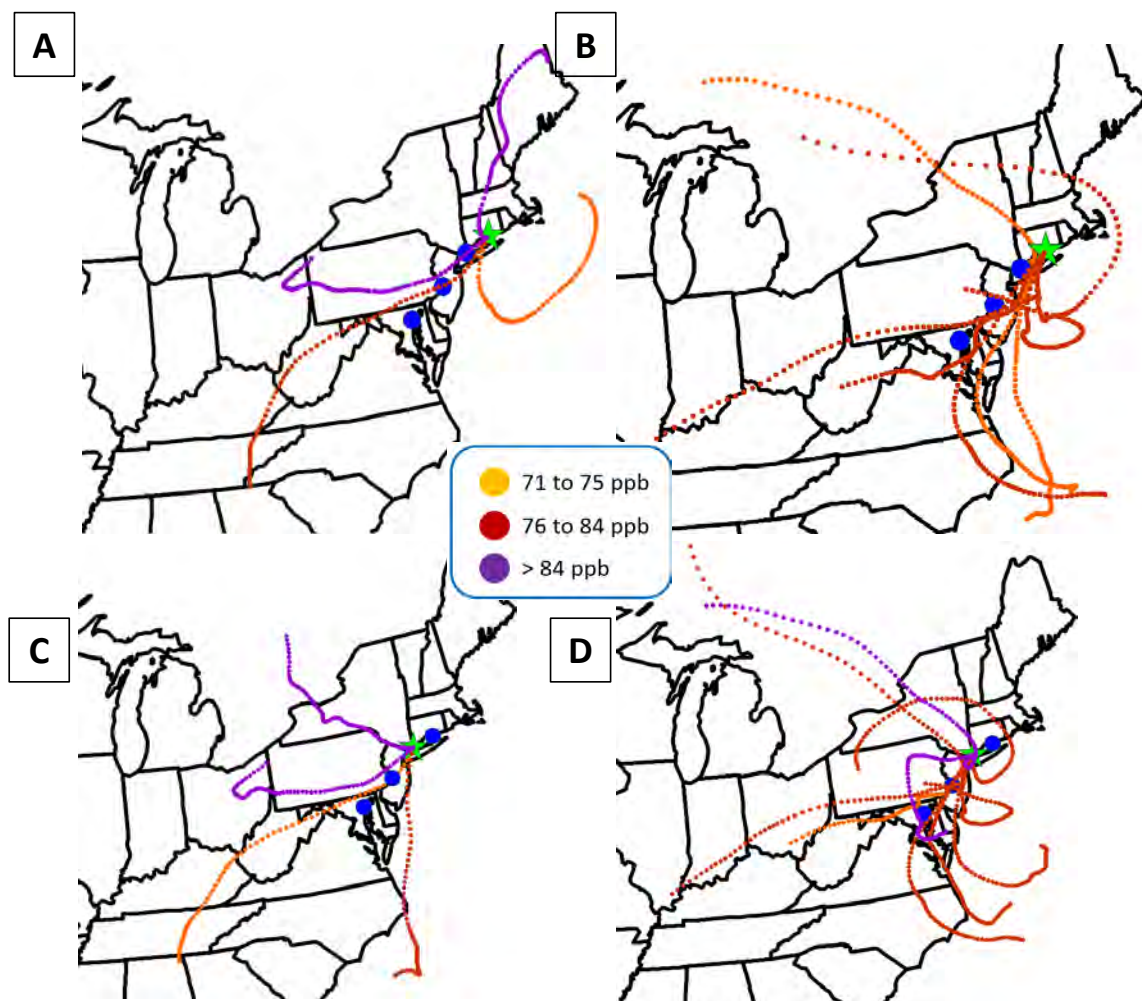
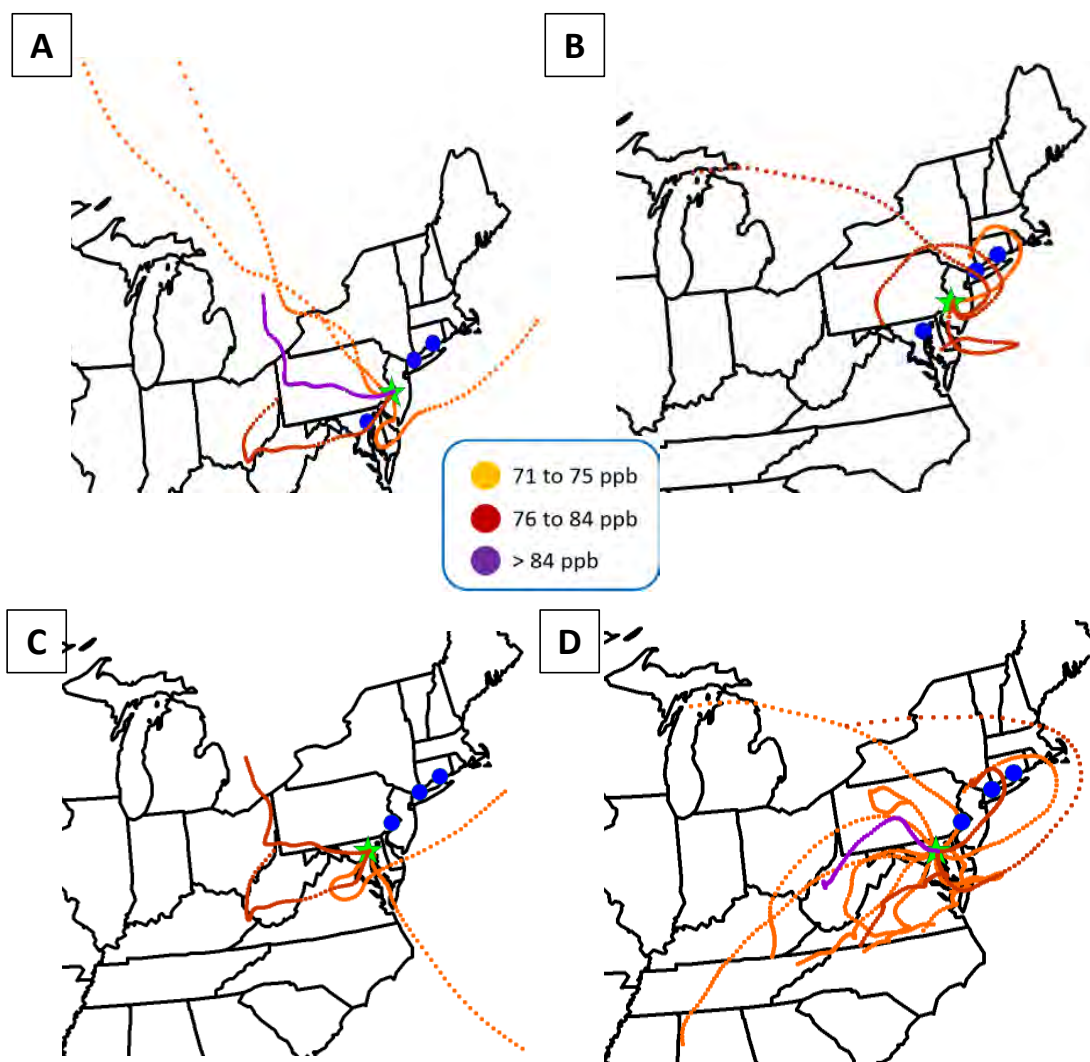


Figure 11-5. Same as Figure 11-4 for (A-B) Bristol, PA and (C-D) Essex, MD.



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

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

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 11-6 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)

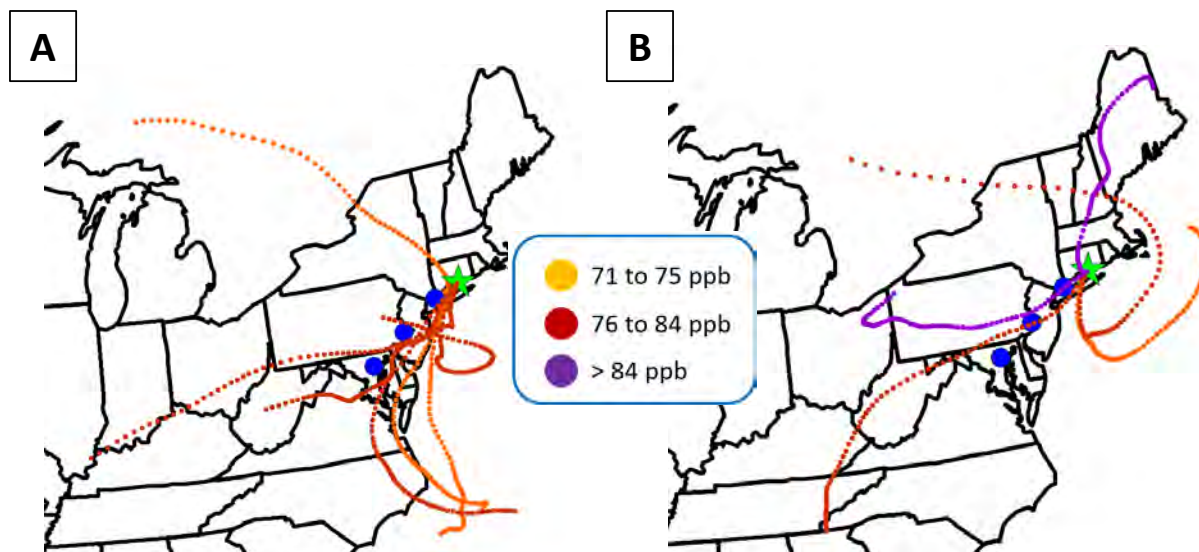


Figure 11-7. Same as Figure 11-6 except for Greenwich, CT.

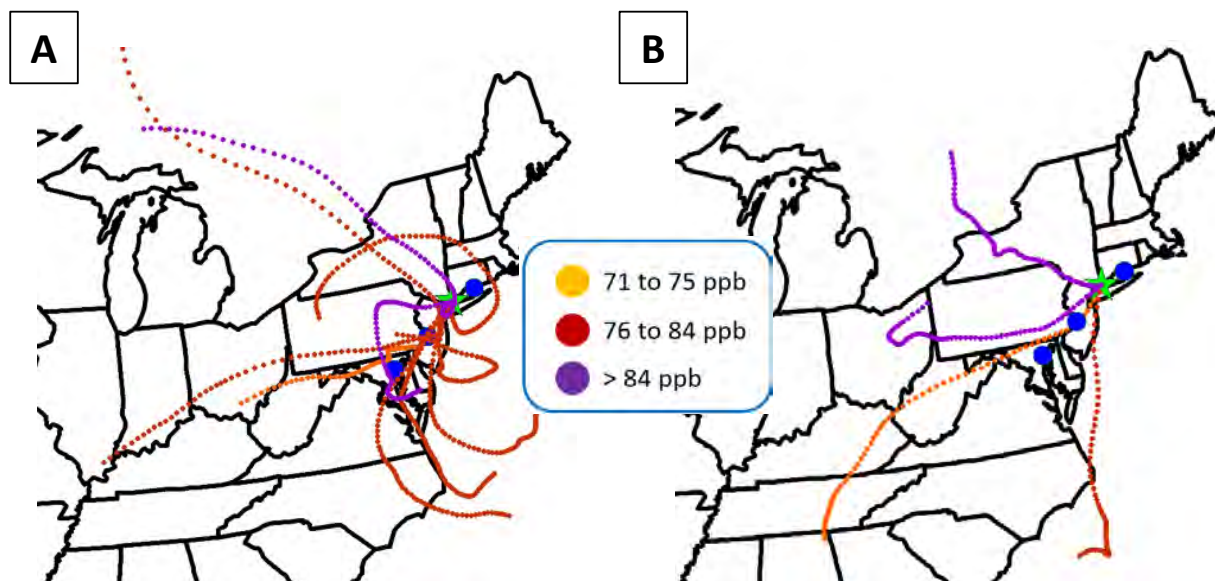


Figure 11-8. Same as Figure 11-6 except for Bristol, PA.

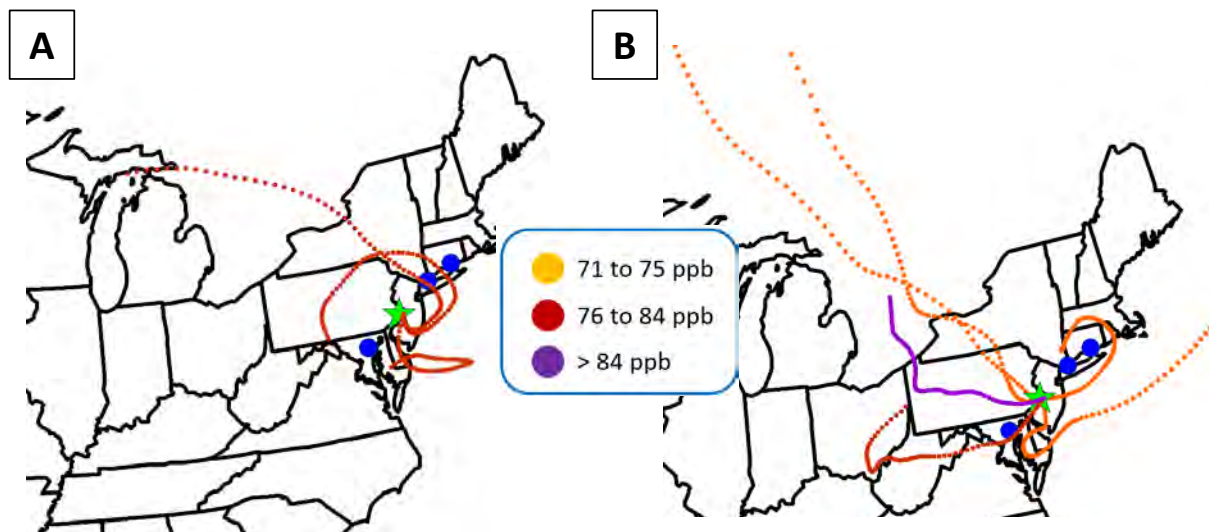
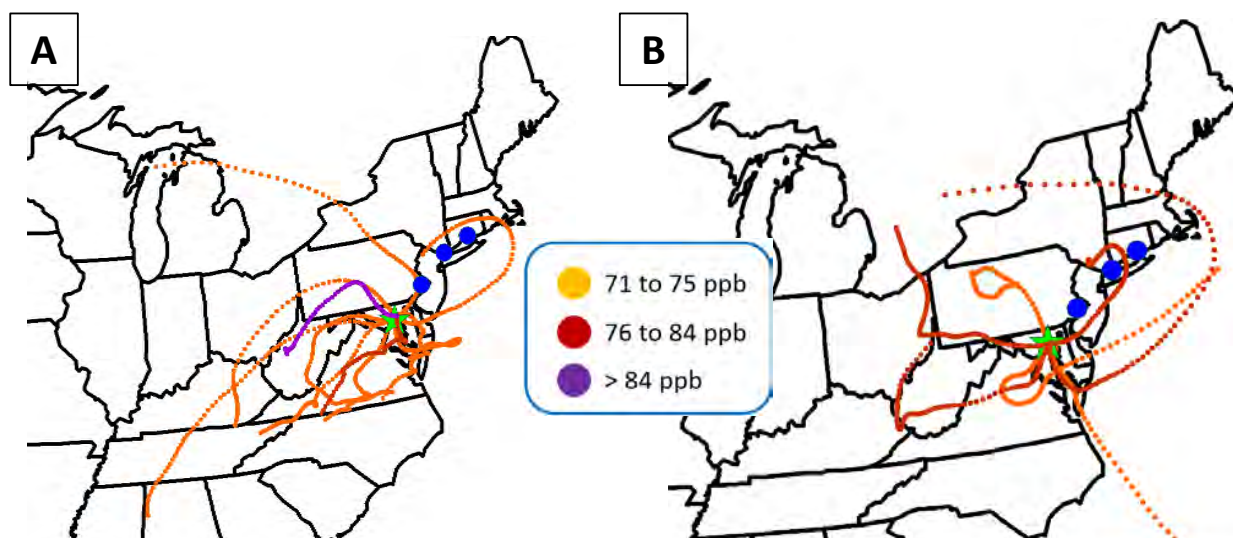


Figure 11-9. Same as Figure 11-6 but for Essex, MD.



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

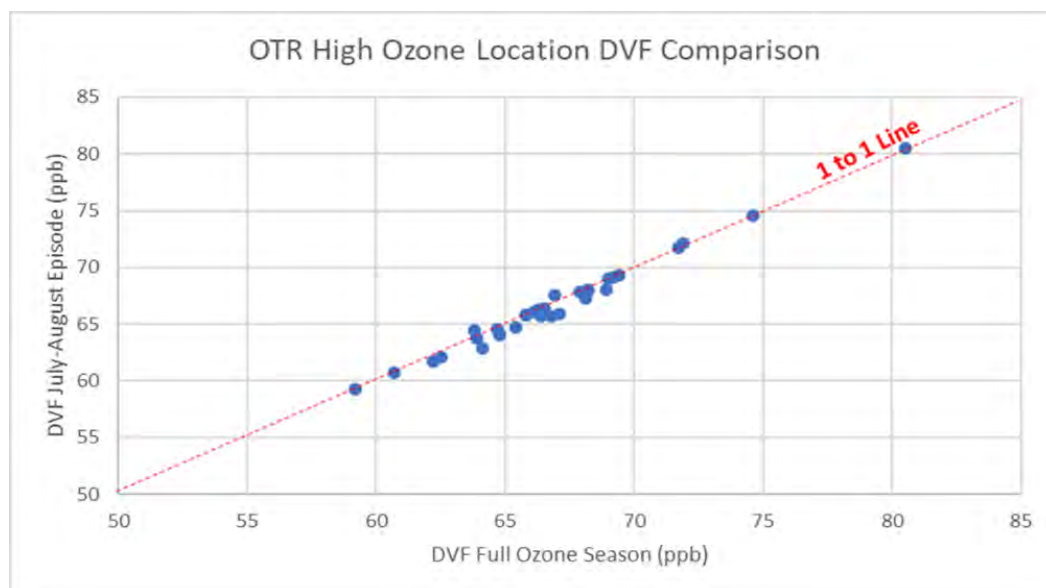


Table 11-11 summarizes modeling comparisons of the number and percentages of monitor locations in the OTR with valid predicted design values for the episodic period and the full ozone season periods. Episode 2 predicted results compare favorably to those produced by modeling the entire ozone season,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

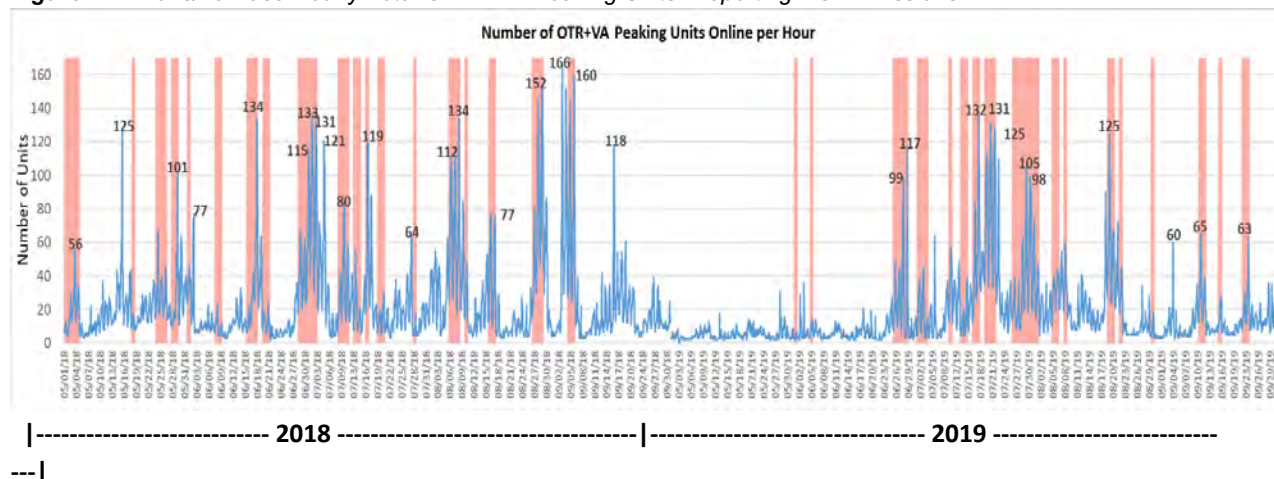


Figure 12-2. Hourly Total OTR+VA Hourly generation (MW) of Part-75 Listed and Peaking Units During the 2018 and 2019 Ozone Seasons

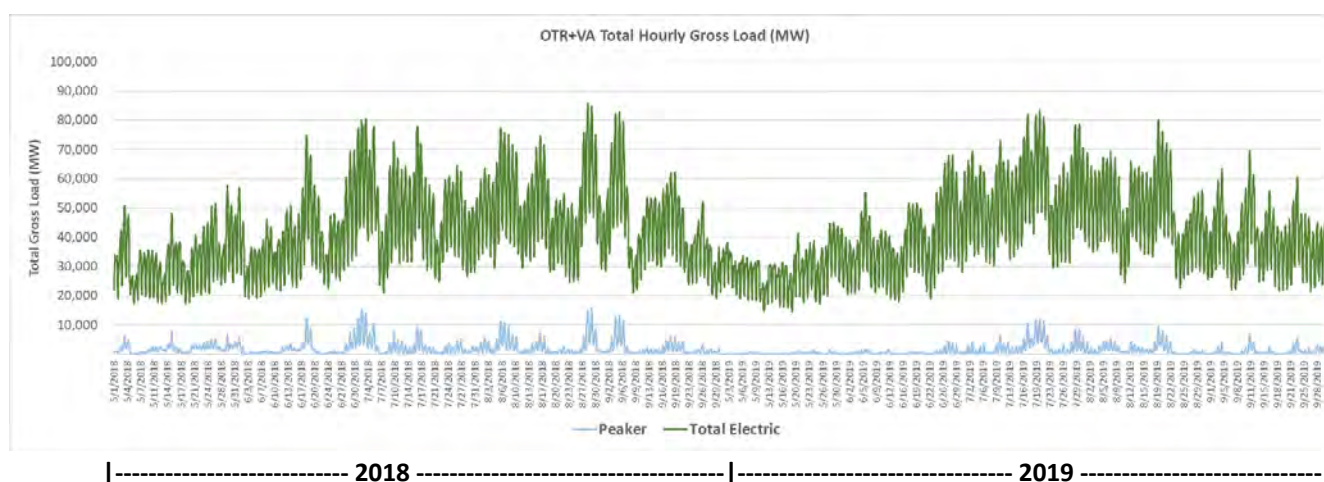
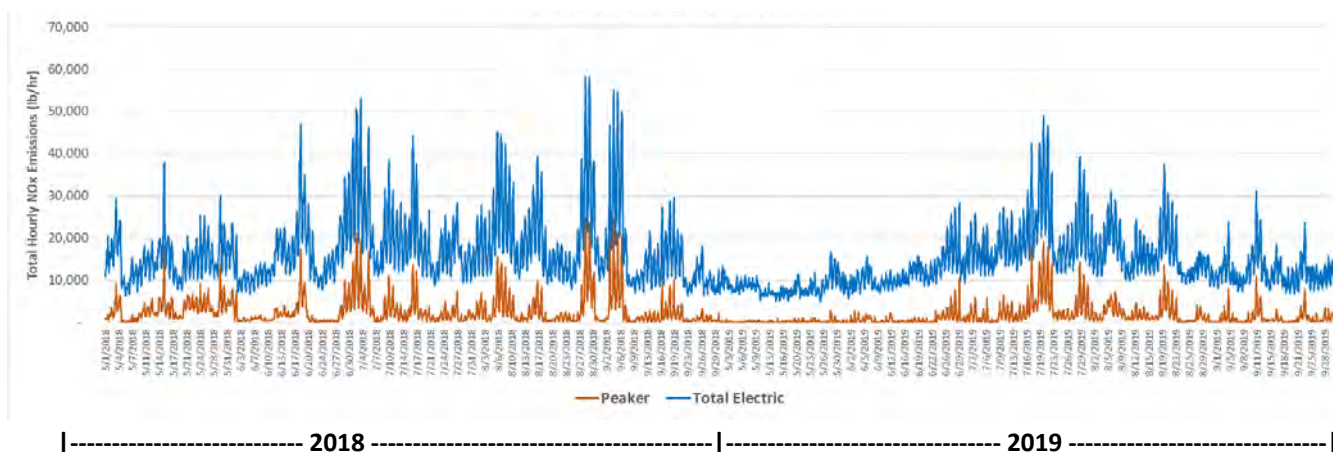


Figure 12-3 presents in green the hourly NO_x emissions (lbs NO_x/hour) for the same units and periods identified for **Figure 12-2**. Diurnal cycles again are present but the daytime emission peaks are sharper, especially on days with the highest emissions. Peaking unit hourly emissions shown by the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

comprise a substantially higher percentage (approximately 50-66%) of overall NO_x 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	Holtville 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

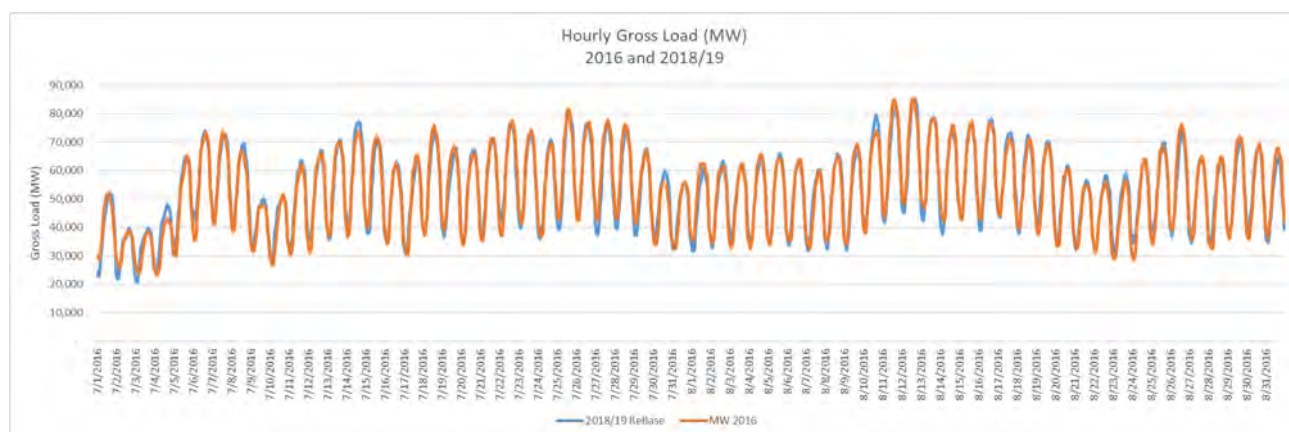
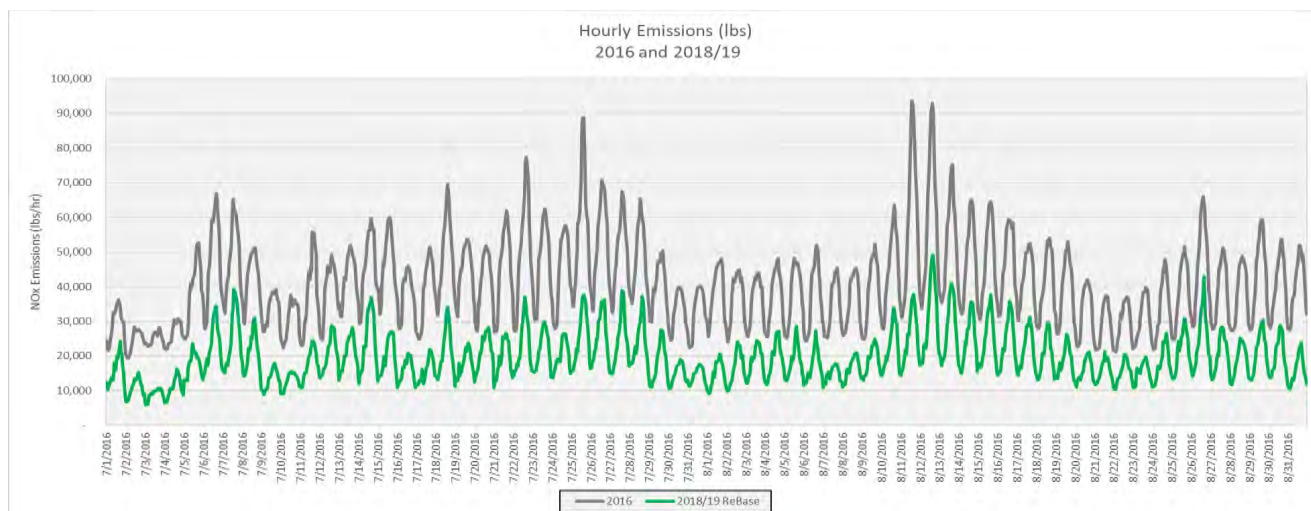


Figure 12-6 presents hourly emissions for 2016 actual compared to the emissions resulting from the 2018/19 ReBasing calculations for the entire OTR. It is clear that overall NO_x emissions from electric generation are down considerably from 2016 to 2018/19. The analysis found that emission rates for 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).

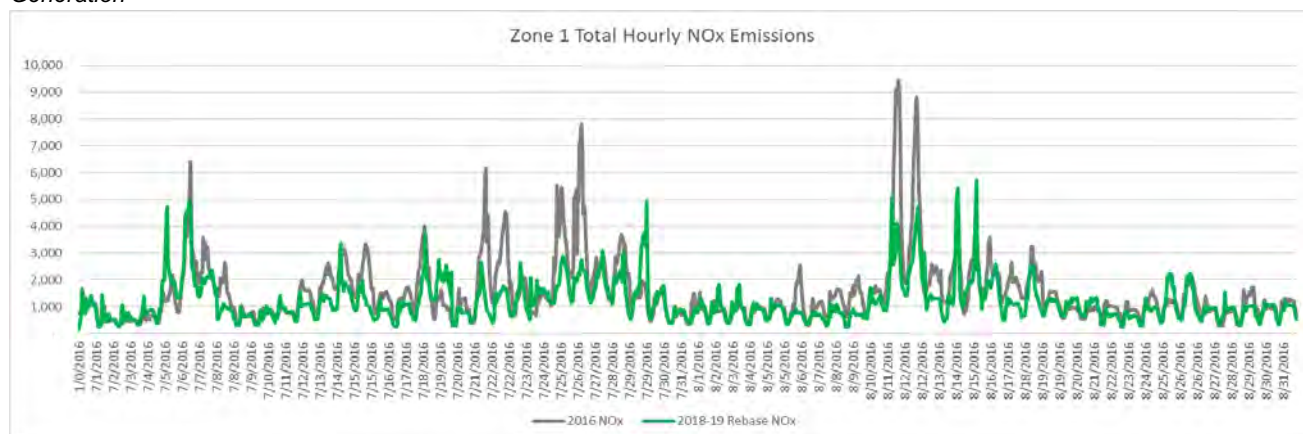
Figure 12-6. Zone 1 (New England) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation

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

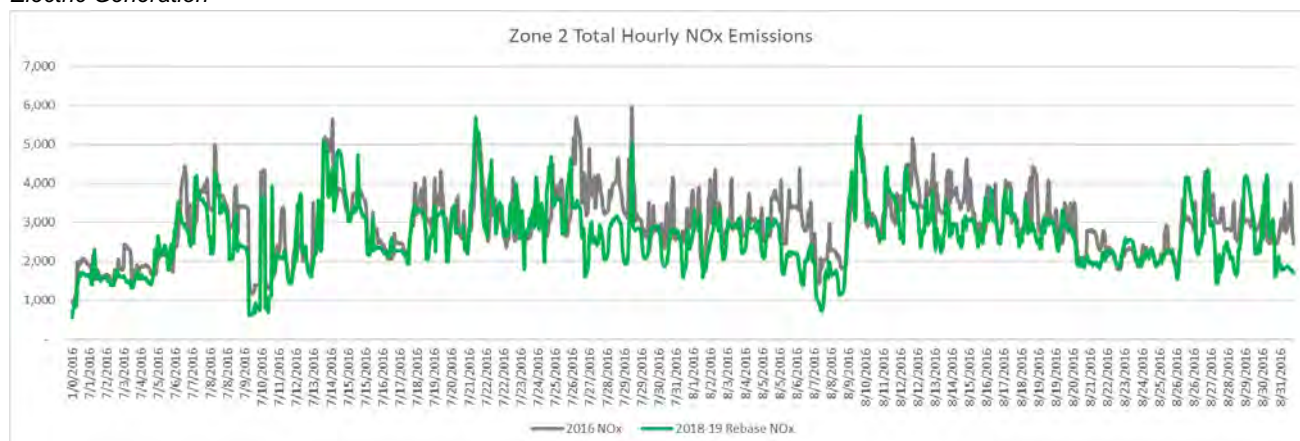


Figure 12-8. Zone 3 (Western and Central Pennsylvania) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation

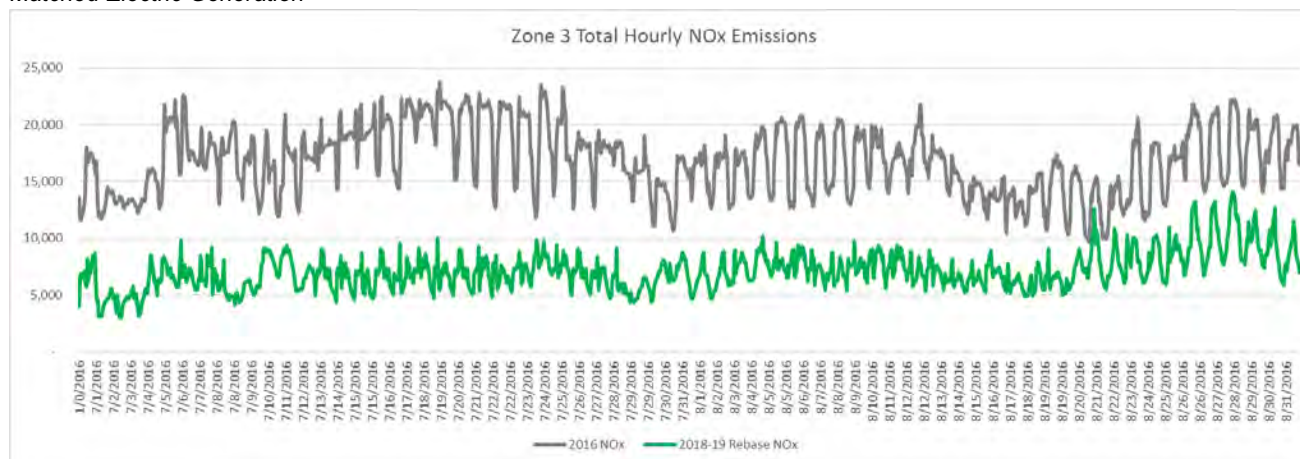


Figure 12-9. Zone 4 (Western Virginia) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation

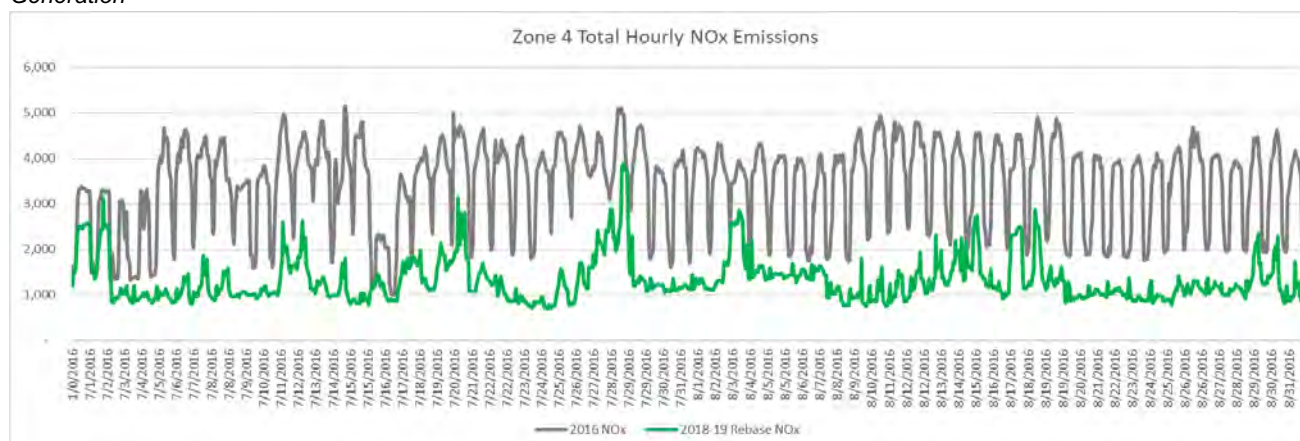


Figure 12-10. Zone 5 (New York City) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation

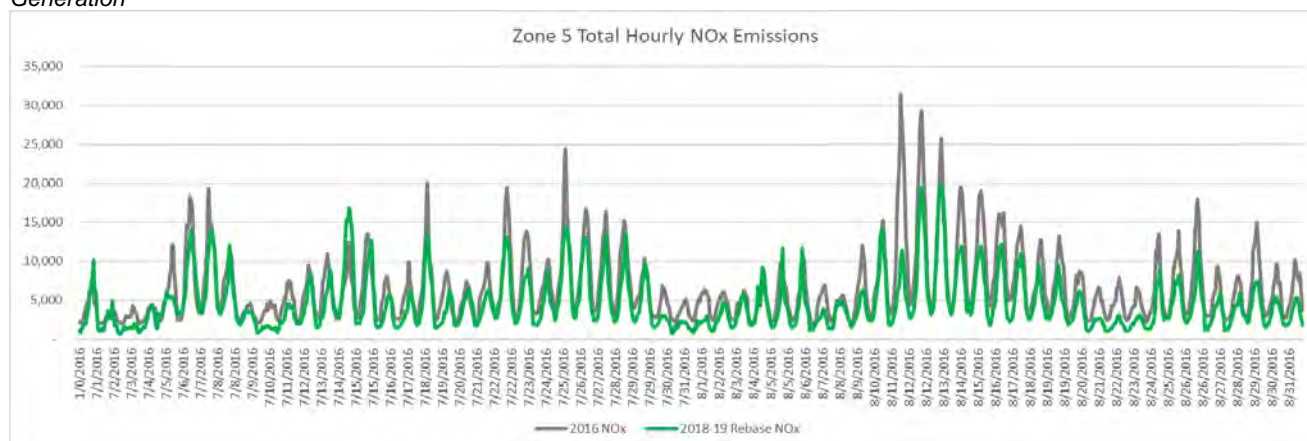


Figure 12-11. Zone 6 (Philadelphia) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation

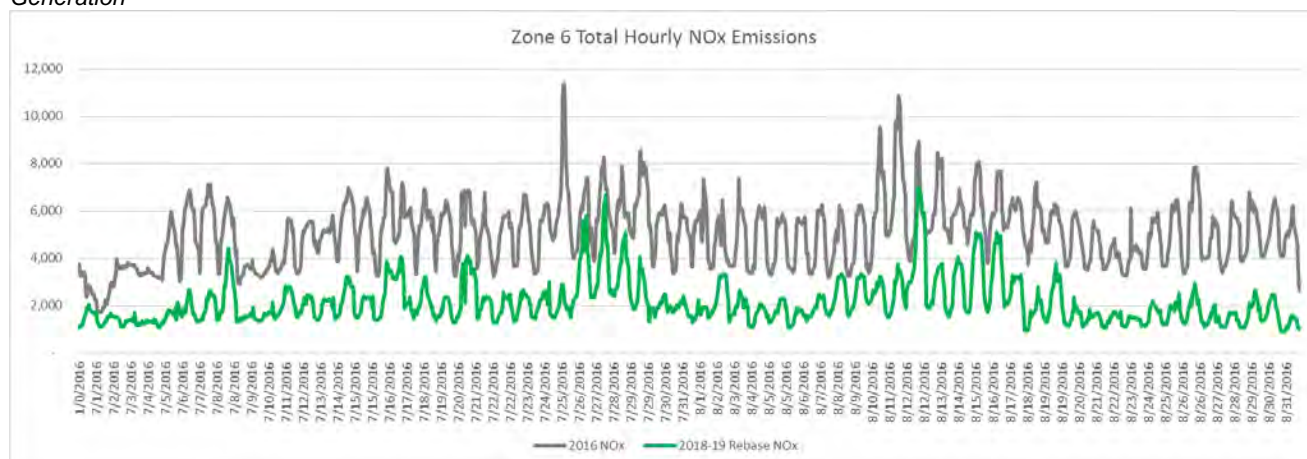
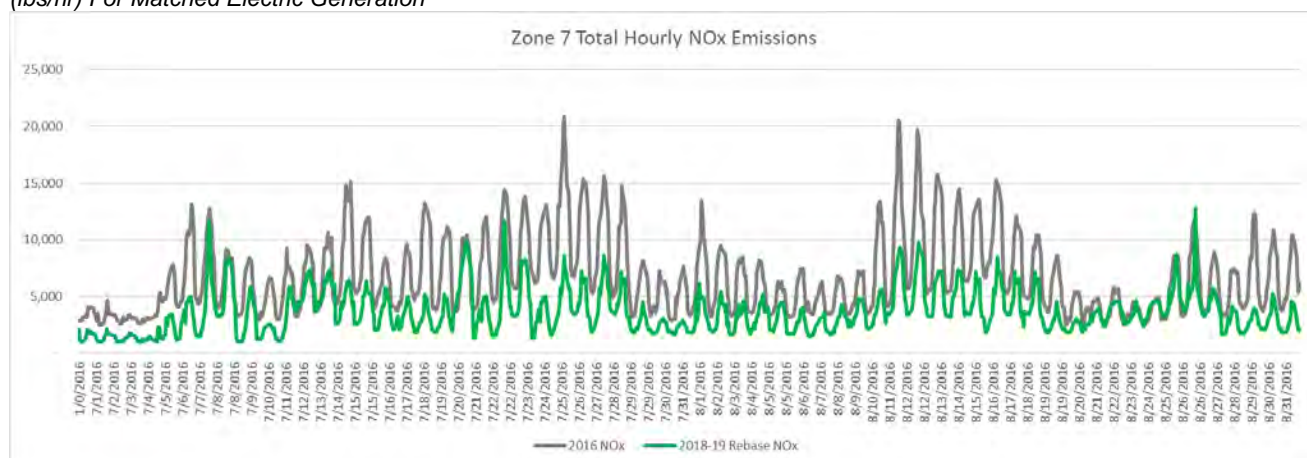


Figure 12-12. Zone 7 (Washington/Baltimore/Eastern Virginia) Comparison of 2016 to 2018/19 NO_x Emissions (lbs/hr) For Matched Electric Generation



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 NO_x 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 NO_x emissions is shown in gray and the peaker emissions are in blue in **Figure 12-15**. The maximum hourly peaker gross load and NO_x 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

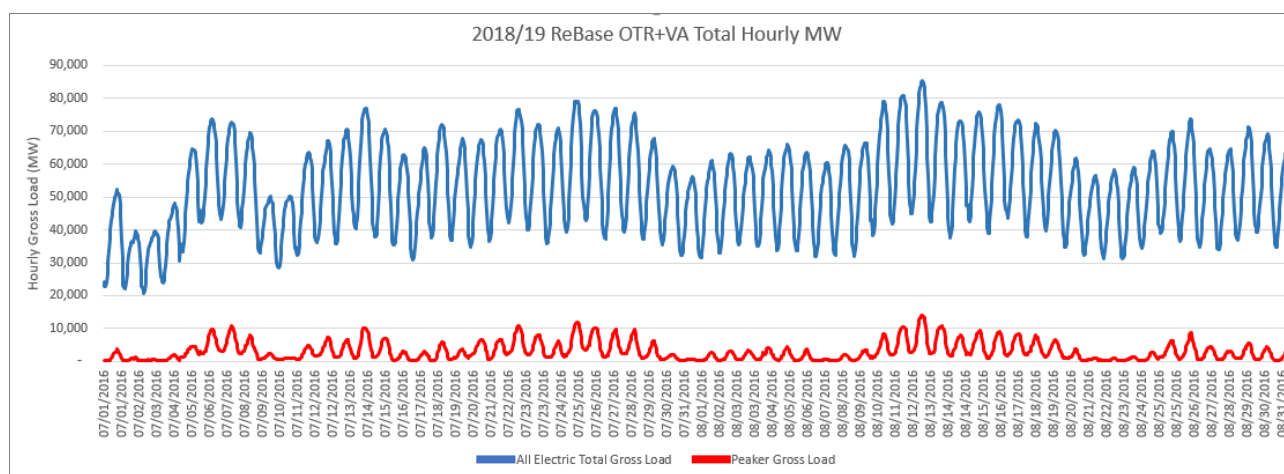
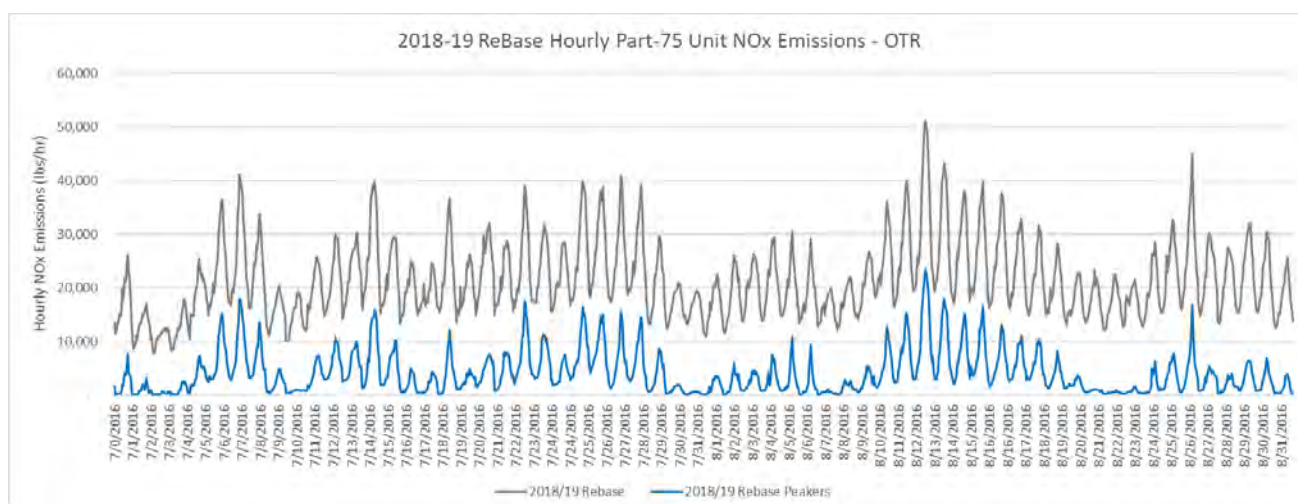


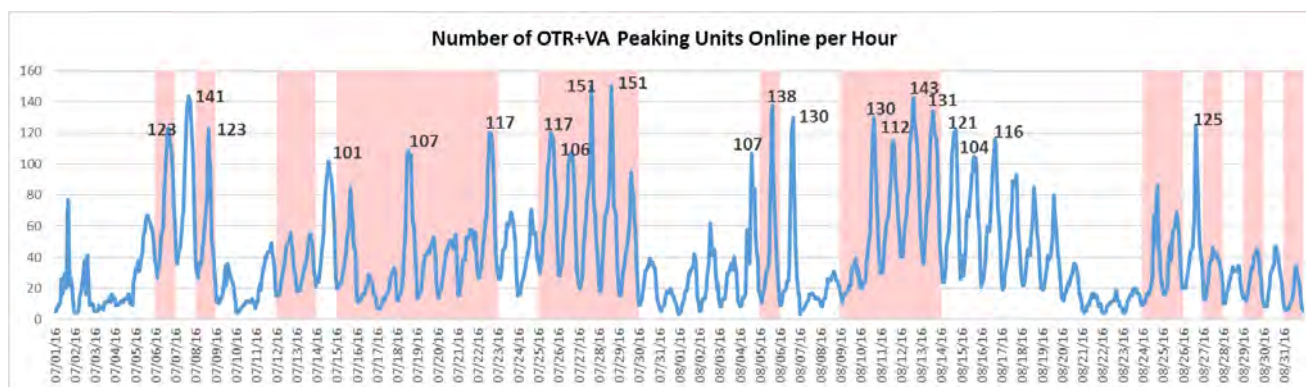
Figure 12-14. Hourly Total OTR+VA Emissions of NO_x from Part-75 Listed and Peaking Units During the 2018/19 ReBase Modeling Period



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 NO_x 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 NO_x 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 NO_x 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.

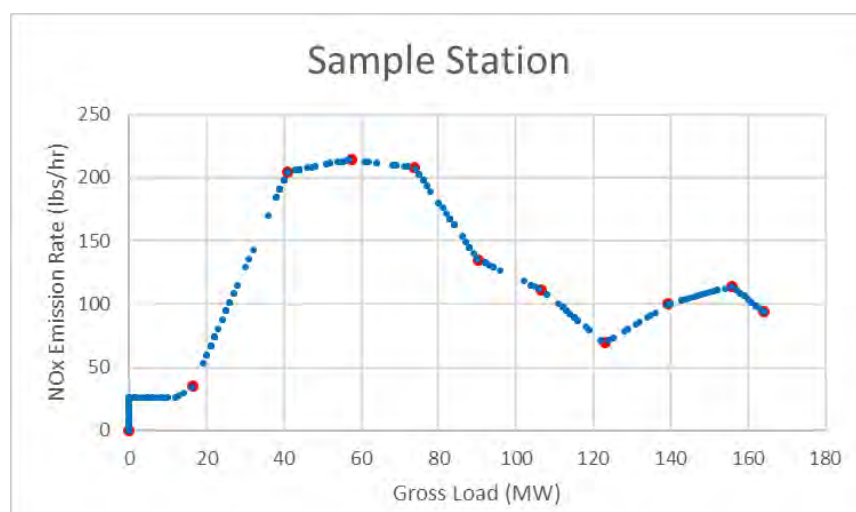
Runs 6 and 7 adjust dispatch priorities to create theoretical high and low bounds of NOx emissions in a way that meets electrical demand in the cleanest and dirtiest emitting operating unit configurations. Run 8 uses 2018/19 full ozone season that prioritizes operation of the actual most frequently operated 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 inefficiencies 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 NO_x 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.

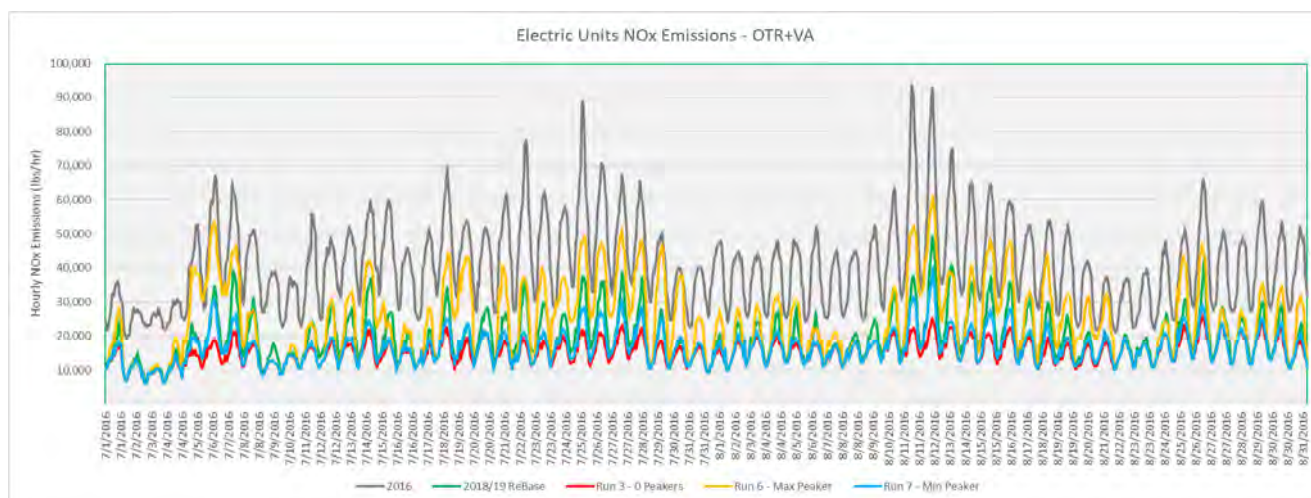
Run 6 prioritizes dispatch based on 2018/19 ozone season highest to lowest hourly average NO_x emission rates within each region (same as described in the ReBasing discussion above). The dirtiest emitting units will come online first and handle the load until it meets its maximum generation capacity, and then the next dirtiest unit is added. Tiebreakers were based on a lb NO_x/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 NO_x/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

Figure 12-16. Sample Emission Profile and Resulting Data



2018/19 ozone season total hours of operation from highest to lowest by region. The tiebreaker for Run 8 was based on a lb NO_x/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 12-17. 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:

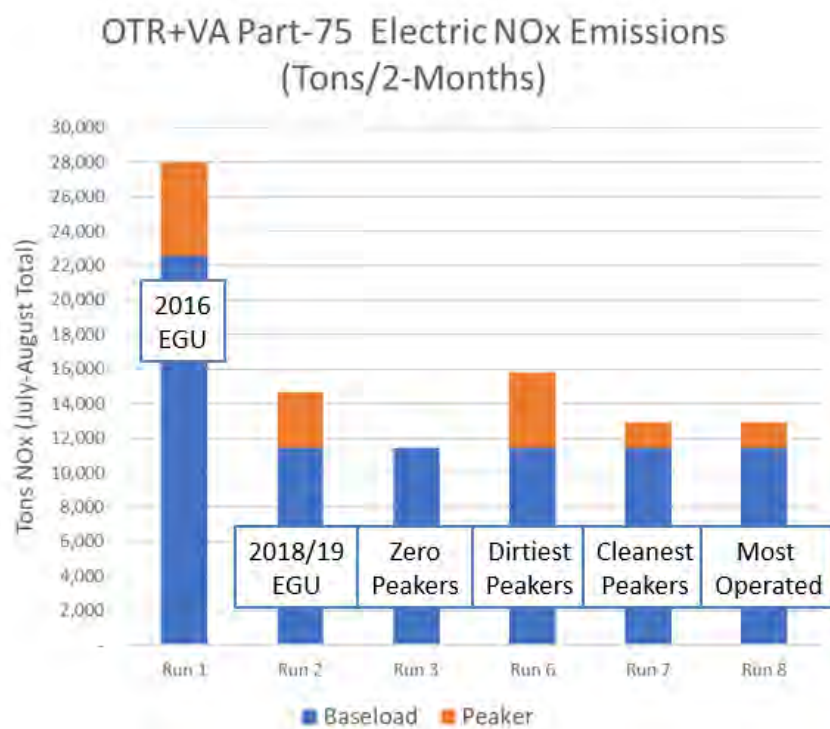
- Run 1 – 2023 emissions with 2016 Part-75 electricity generating units (EGUs) in the OTR,
- Run 2 – 2023 emissions with 2018/19 Part-75 EGUs in the OTR,
- Run 3 – Based on Run 2 with zeroed out OTC identified peaking units,
- Run 6 – Based on Run 2 and redispatches OTC identified peaking unit actual 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 NO_x 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 NO_x 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 NO_x emissions of peaking units by about 50% and

Figure 12-18. Scenario Changes in EGU NO_x Emission



dispatching the cleanest burning peaking units can reduce peaking unit NO_x emissions by about 30%. It is interesting that the NO_x emissions for dispatching the most frequently used peaking units first produces very similar NO_x emissions to dispatching the cleanest peaking units first.

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 NO_x emitting units first), 7 (lowest NO_x 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 NO_x 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 York 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 NO_x emitting units in high NO_x 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

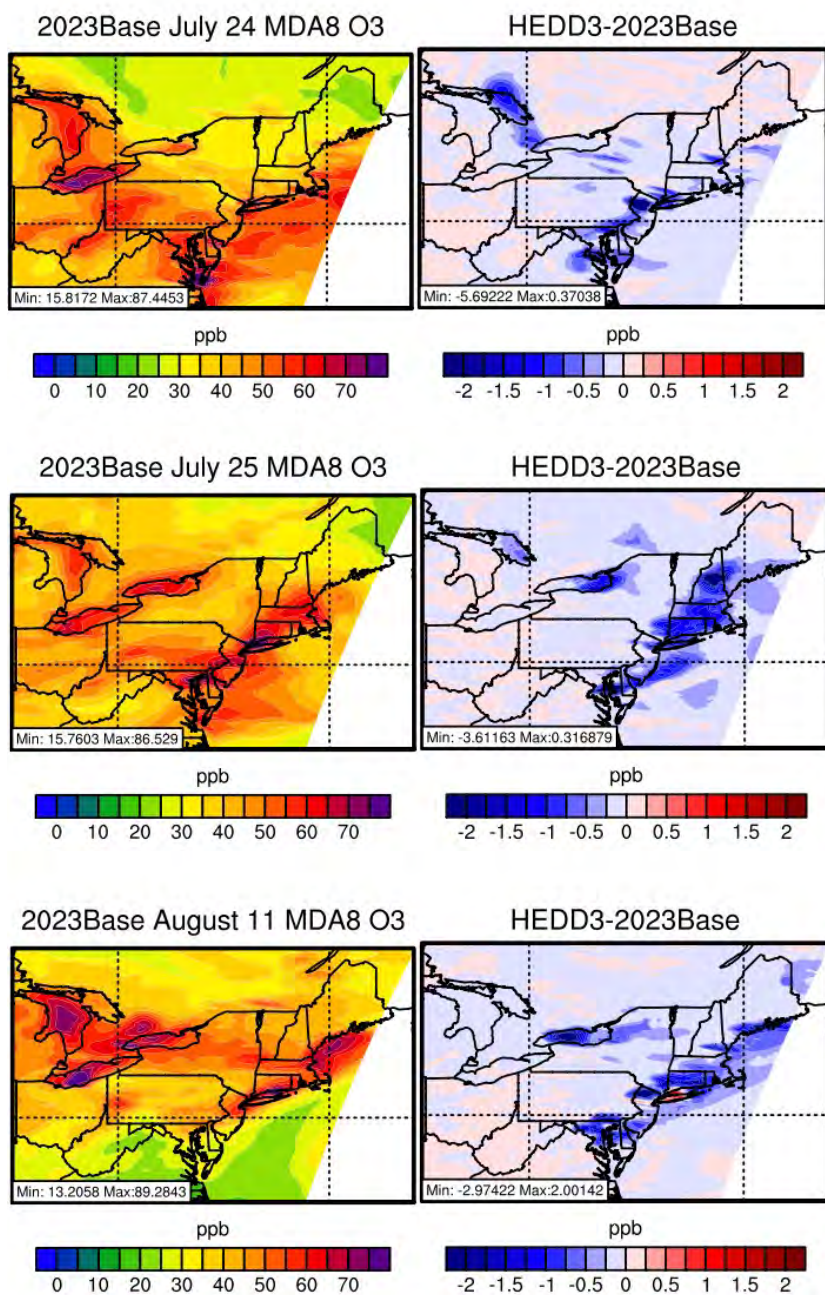


Figure 12-20 (Left) Predicted 8-hour peak ozone (ppb). (Middle) Predicted average 8-hour ozone differences 2018/19 – 2016. (Right) Predicted average 8-hour ozone differences when peaking units are turned off.

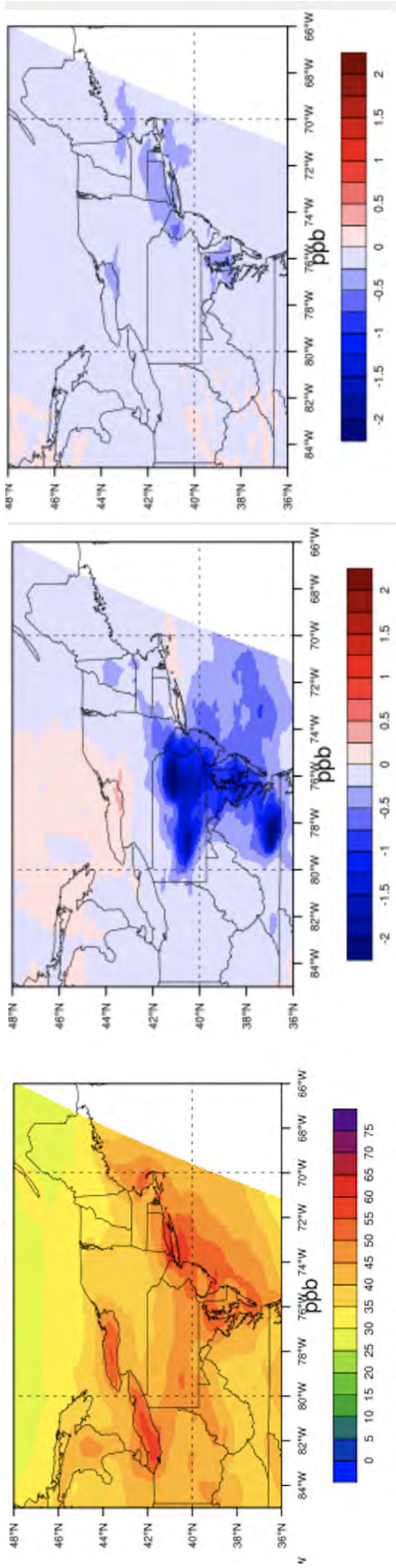


Figure 12-21. (Left) Predicted average 8-hour ozone difference when highest NO_x emitting units are dispatched first. (Middle) Same as (Left) except when lowest NO_x emitting units are dispatched first. (Right) Same as (Left) except for when typically used units are dispatched first.

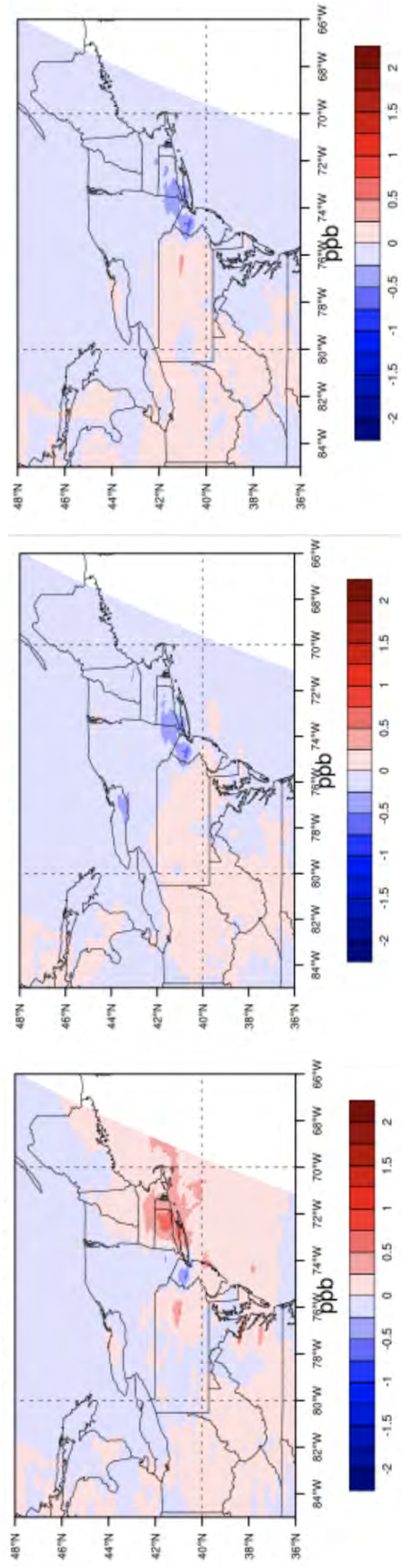


Table 12-6. Episodic Screening Modeling Maximum 8-Hour Ozone Summary for High Ozone Locations in the OTR

siteID	State	Location	DVF				Change in DVF						
			2019-21 DV	2023 DVF	2023 with	2023 with	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
					2016 Part-75 DVF	2018/19 Part-75 DVF							
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-Odiome	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 “O₃ 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 “O₃ Source,” displays a source apportionment analysis which includes the contribution of states and sectors in the projected year of 2023.

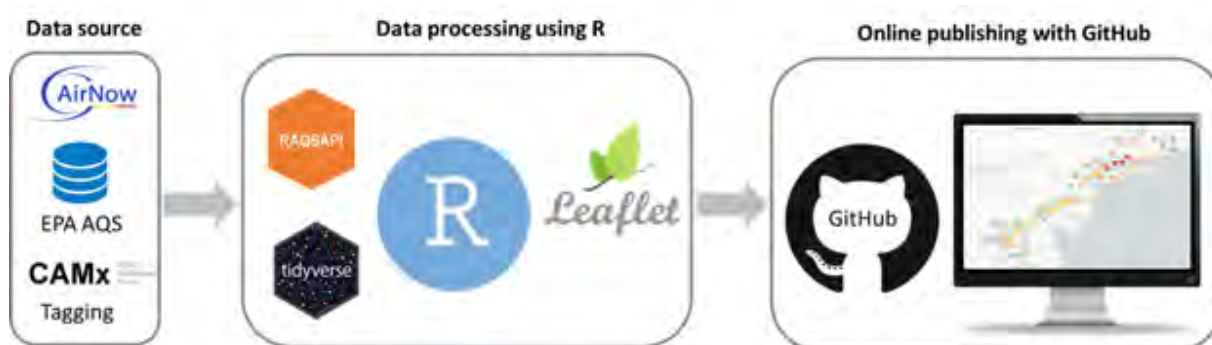
13.1 Data Sources

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 “O₃ 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 “O₃ 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 “O₃ 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 “O₃ 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.

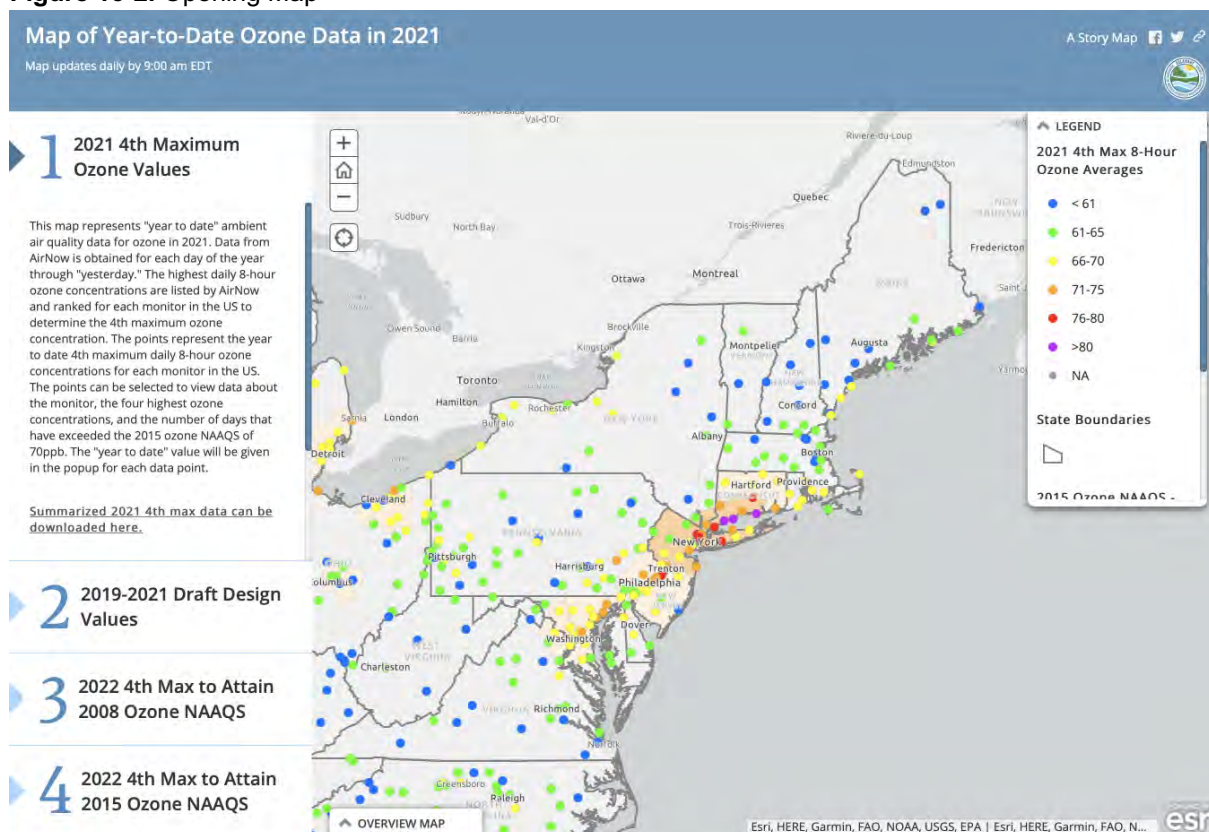
13.3 Quick Start Guide

The “Ozone DV Now” Map

Step 1: Open the map by clicking on the following URL link:

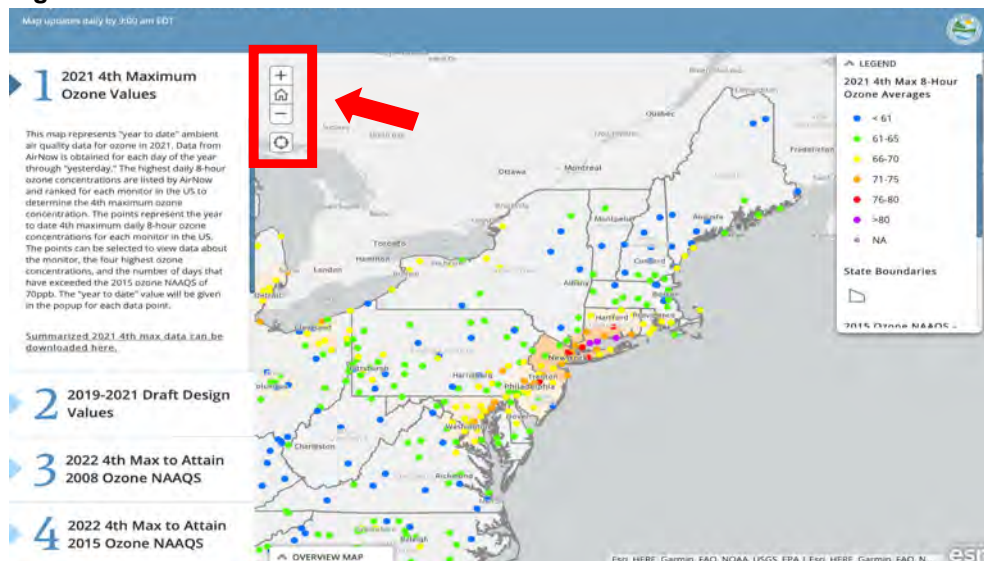
<https://dnrec.maps.arcgis.com/apps/MapSeries/index.html?appid=38e6bc52a8ad4c06b8cabcca0fa0f66d>.

Figure 13-2. Opening Map



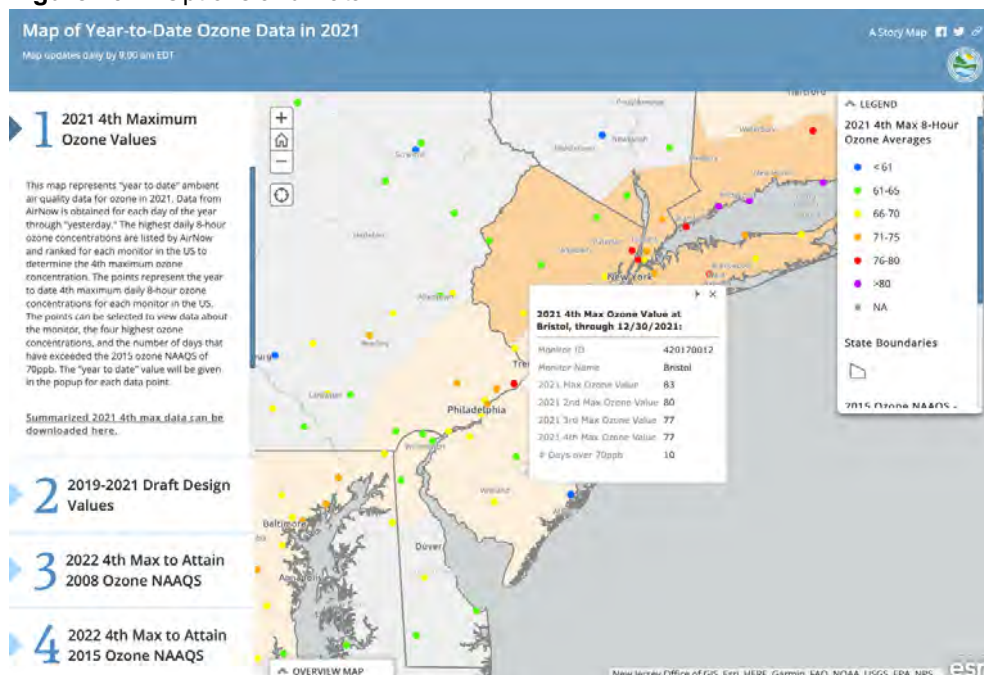
Step 2: Zoom in or out with + or - buttons on the top left corner or move the center wheel on the mouse.

Figure 13-3. Location of Zoom Buttons



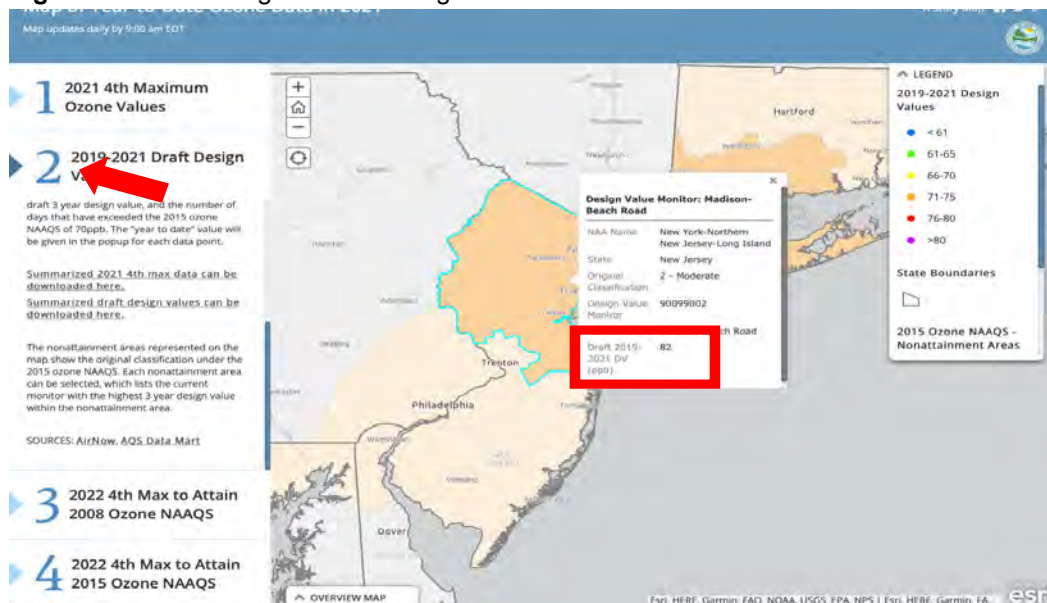
Step 3: View the top four highest ozone concentrations in the current year. The map shows these concentrations by default with the “2021 4th Max” button selected in the top right corner. Click on a dot, which represents an ozone monitoring site, to view the site ID, site name, highest MDA8 ozone concentration,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

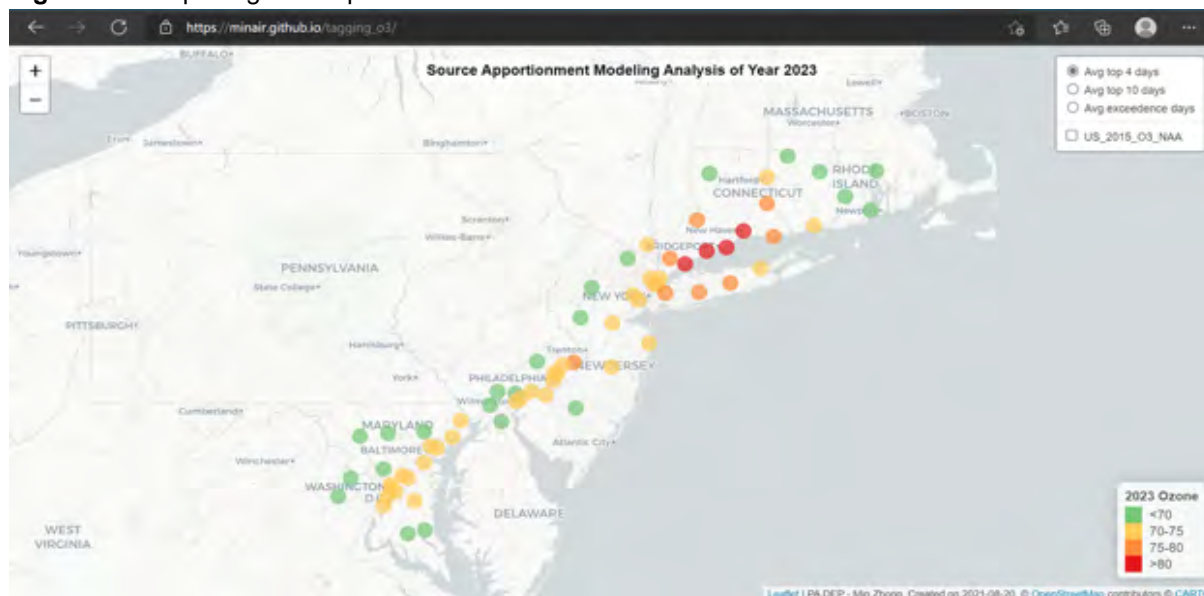
Figure 13-5. Choosing between Design Values and 4th Maximum



The Ozone Source Map

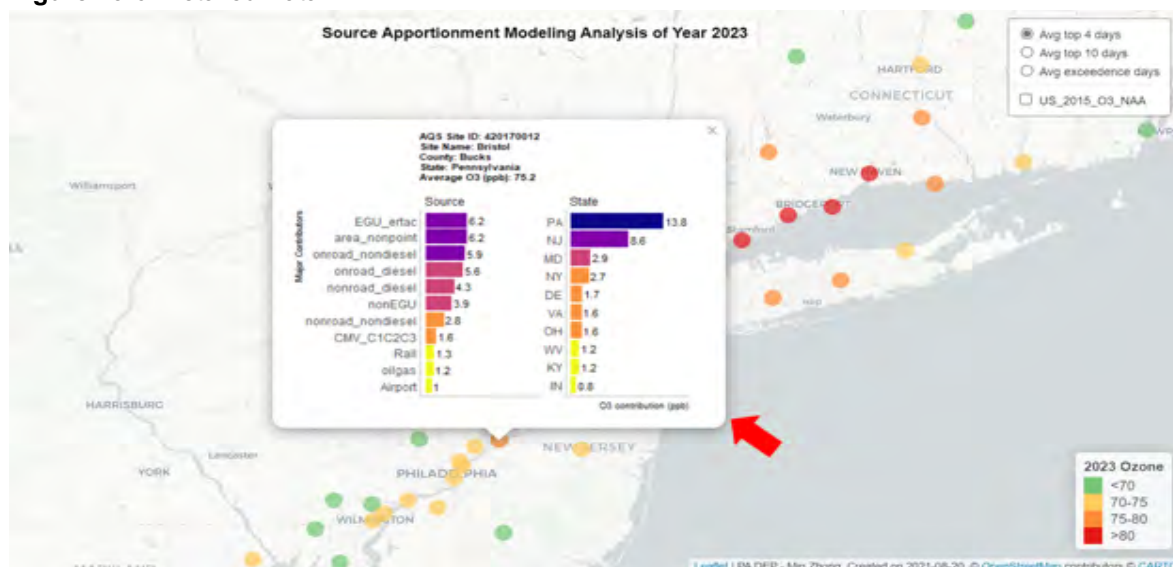
Step 1: Open the map by clicking on the following URL link: https://minair.github.io/tagging_o3/.

Figure 13-6. Opening the Map



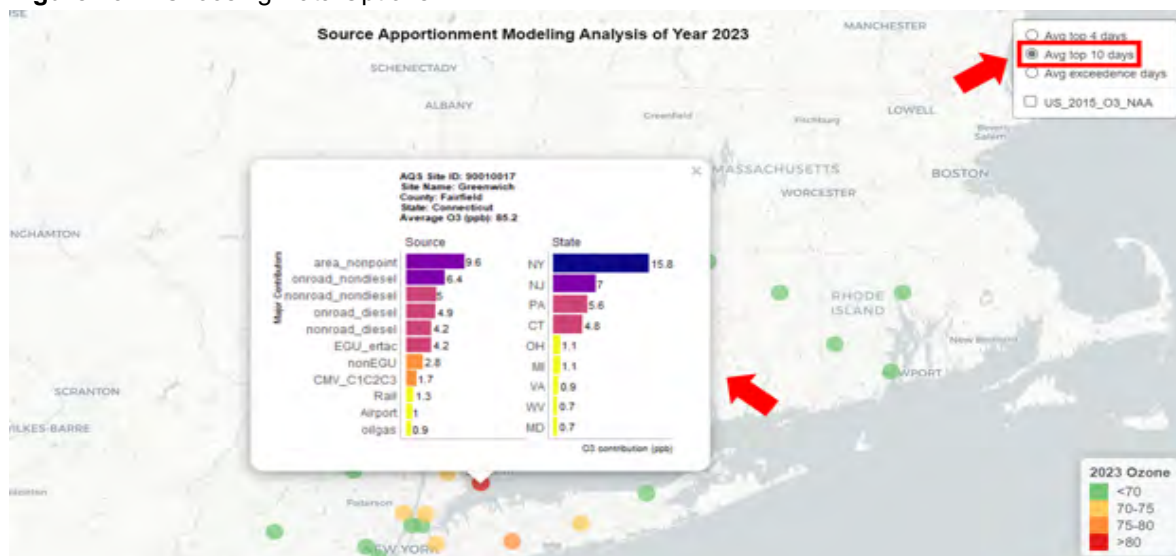
Step 2: View the average ozone contributions to a monitor calculated from the top four days, which the map shows by default as indicated by the button selected in the top right corner. After clicking on a monitoring site, a panel plot will pop up with the site ID, site name, county, state, and average 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



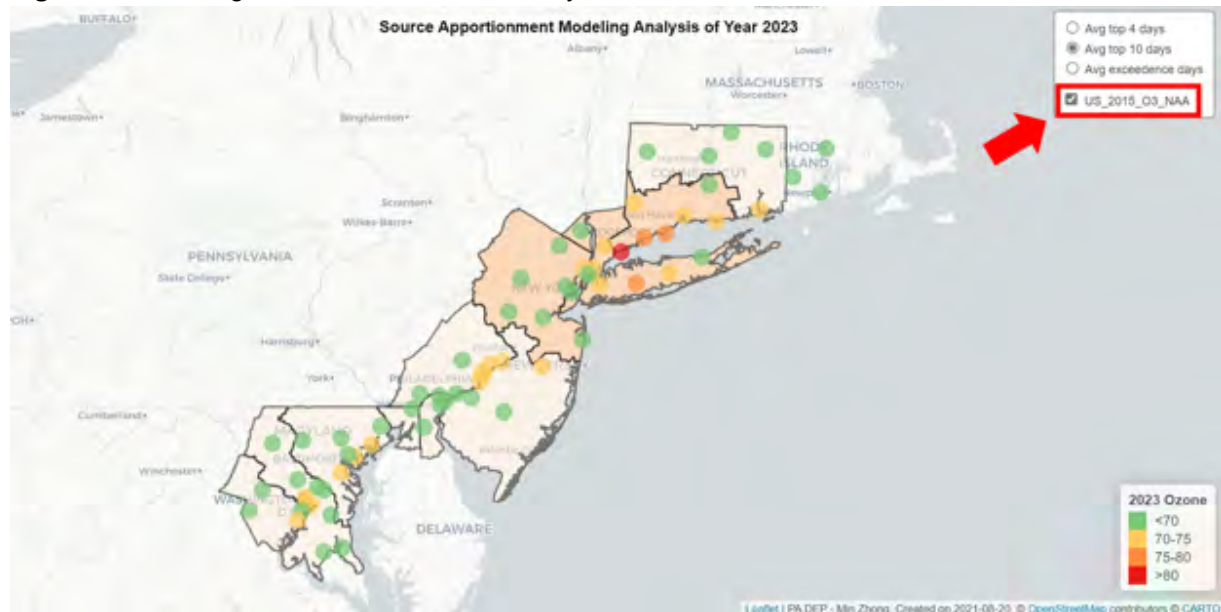
Step 3: View the average ozone contributions to a monitor based on top 10 or exceedance days. In the top right corner, select either the “Avg top 10 days” or “Avg exceedance days” button and click on a monitoring site to bring out the panel plot to view ozone contributions.

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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https://cmascenter.org/conference/2020/abstracts/CMAS2020_Extended%20Abstract_final_jyun.pdf.

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_2014NElv2_NONPOINT_final_20180119_monthly_livestock_05oct2018_v0.csv
 - 2016ff_proj_from_ag_not_nh3_2014NElv2_NONPOINT_final_20180119_monthly_05oct2018_v0.csv
 - Version 1:
 - 2016version1_ag_nh3_fertilizer_monthly_17jul2019_v0.csv
 - 2016fh_from_2017NEldraft_ag_livestock_20190722_05aug2019_v1.csv
- 2023
 - Beta:
 - Version 1:
 - 2016version1_ag_nh3_fertilizer_monthly_12sep2019_nf_v1.csv
 - 2023fh_from_2017NEldraft_ag_livestock_20190722_12sep2019_nf_v1.csv
 - 2023fh_proj_from_2016fh_ag_livestock_fertilizer_NOnly_18sep2019_v0.csv
- 2028
 - Beta:
 - Version 1:
 - 2016version1_ag_nh3_fertilizer_monthly_12sep2019_nf_v1.csv
 - 2028fh_from_2017NEldraft_ag_livestock_20190722_12sep2019_nf_v1.csv
 - 2028fh_proj_from_2016fh_ag_livestock_fertilizer_NOnly_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_2014NElv2_NONPOINT_penultimate_20171228_05oct2018_v0.csv
 - Version 1:
2016fh_proj_from_afdust_pm_2014NElv2_NONPOINT_penultimate_20171228_02aug2019_v0.csv
- 2023
 - Beta:
 - Version 1:
2023fh_proj_from_afdust_pm_2014NElv2_NONPOINT_penultimate_20171228_13sep2019_v0.csv
- 2028
 - Beta:
 - Version 1:
2028fh_proj_from_afdust_pm_2014NElv2_NONPOINT_penultimate_20171228_13sep2019_v0.csv

Area Source (nonpt)

- 2016
 - Beta:
2016ff_proj_from_2014NElv2_NONPOINT_final_20180119_08oct2018_v0.csv
2016ff_proj_from_pfc_2014NElv2_NONPOINT_final_20180119_08oct2018_v0.csv
 - Version 1:
nonpt_2016_version1_Alaska_additions_08aug2019_nf_v1.csv
2016fh_proj_from_pfc_2014NElv2_NONPOINT_final_20180119_06aug2019_v0.csv
2016fh_proj_from_2014NElv2_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_2014NElv2_NONPOINT_final_20180119_27sep2019_v0.csv
2023fh_proj_from_2014NElv2_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_2014NElv2_NONPOINT_final_20180119_25sep2019_v0.csv
2028fh_proj_from_2014NElv2_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_2014NElv2_NONPOINT_final_20180119_17oct2018_v0.csv
 - 2016ff_proj_from_c1c2_offshore_2014NElv2_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.c
sv

2023fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_CA_annual_22jan2020_v0.c
sv

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.c
sv

2028fh_proj_cmv_c1c2_2016adjust_2023_20200116_12US1_2017_CA_annual_22jan2020_v0.c
sv

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
 - v
 - 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_cmvm_c3_2016adjust_2028_20200116_12US1_2017_US_annual_27jan2020_v0.csv
 - v
 - 2028fh_proj_cmvm_c3_2016adjust_2028_20200116_12US1_2017_CA_annual_22jan2020_v0.csv
 - 2028fh_proj_canada_c3_point_2015_aisremoved_24sep2019_v0.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_1_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_2_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_3_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_4_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_5_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_6_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_7_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_8_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_9_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_10_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_11_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_12_US_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_12_US_nexthour.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_1_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_2_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_3_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_4_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_5_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_6_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_7_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_8_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_9_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_10_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_11_CA_hourly.csv
 - cmvm_c3_2016adjust_2028_20200116_12US1_2017_12_CA_hourly.csv
 - cmvm_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_2014NElv2_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_2014NElv2_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_2014NElv2_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_calcyar2014_19oct2018_v0.csv
oilgas_2016b_POINT_20180612_19oct2018_v2.csv
 - Version 1:
2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyar2014_06sep2019_nf_v2.csv
2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyar2014_WRAP_26jul2019_v0.csv
oilgas_2016b_POINT_20180612_calcyar2014_06sep2019_nf_v5.csv
oilgas_2016b_POINT_20180612_calcyar2014_WRAP_from_v2_26jul2019_v0.csv
- 2023
 - Beta:
 - Version 1:
2023fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyar2014_17sep2019_v0.csv
2023fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyar2014_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_calcyar2014_17sep2019_v0.csv
2028fh_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyar2014_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_ptfire_2016_ks_flinthills_15nov2018_v0
 - ptday_ptfire_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_ptfire_2016_ks_flinthills_15nov2018_v0.csv
- ptinv_ptfire_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_calcyar2014_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_calcyar2014_22jul2019_v0.csv
 - 2016fh_proj_from_nonegu_2016version1_POINT_20180612_calcyar2014_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_calcyar2014_27sep2019_v0.csv
 - 2023fh_proj_from_nonegu_2016version1_POINT_20180612_calcyar2014_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_calcyar2014_26sep2019_v0.csv
 - 2028fh_proj_from_nonegu_2016version1_POINT_20180612_calcyar2014_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_nonnegu_2016version1_POINT_20180612_biorefinery_calcyear2014_22jul2019_v0.csv
- 2016fh_proj_from_nonnegu_2016version1_ERTAC_Platform_POINT_calcyear2014_27oct2019.csv
- nonnegu_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_nonnegu_2016version1_POINT_20180612_biorefinery_calcyear2014_27sep2019_v0.csv
 - 2023fh_proj_from_nonnegu_2016version1_POINT_20180612_calcyear2014_27sep2019_ERTAC_Platform_07aug2020.csv
 - 2023fh_proj_nonnegu_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_nonnegu_2016version1_POINT_20180612_biorefinery_calcyear2014_26sep2019_v0.csv
 - 2028fh_proj_from_nonnegu_2016version1_POINT_20180612_calcyear2014_26sep2019_ERTAC_Platform_31may2020.csv
 - 2028fh_proj_nonnegu_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_2014NElv2_NONPOINT_penultimate_20171228_30oct2018_v0.csv
 - Version 1:
 - 2016fh_proj_from_rwc_2014NElv2_NONPOINT_penultimate_20171228_06aug2019_v0.csv
- 2023
 - Beta:
 - Version 1:
 - 2023fh_proj_from_rwc_2014NElv2_NONPOINT_penultimate_20171228_12sep2019_v0.csv
- 2028
 - Beta:
 - Version 1:

2028fh_proj_from_rwc_2014NElv2_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, $\bar{P}$ and $\bar{O}$ are the average concentrations, respectively, and N is the sample size.

Observed average, in ppb:

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

Correlation coefficient, R^2 :

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

Root mean square error (RMSE), in ppb:

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

Mean absolute gross error (MAGE), in ppb:

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

Mean bias (MB), in ppb:

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

Mean fractionalized bias (MFB), in %:

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

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

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

Normalized mean error (NME), in %:

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

Fractional error (FE), in %:

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

Mean normalized gross error (MNGE), in %:

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

Mean normalized bias (MNB), in %:

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

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 O₃ 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					59	59	59	59
					60	60	60	60				
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	62	59	61
					60	61	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	Hillsborough	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 facility	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 ammunition 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	Leonias	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	60 La Union	31.930659	-106.631103
NM	Dona Ana	350130020	62K Chaparral	32.041212	-106.40971
NM	Dona Ana	350130021	62M Desert View	31.796218	-106.584434
NM	Dona Ana	350130022	62N Santa Teresa	31.787885	-106.683324
NM	Dona Ana	350130023	62Q 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 O₃ 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	
Site ID	State	County	Site name	Lat	Lon	AVG	MAX	3x3 DVF	No Water 1	AVG	3x3 DVF	AVG	3x3 DVF	No Water 1	AVG	AVG
90010017	Connecticut	Fairfield	Greenwich Point Park - Greenwich	41.00	-73.59	79.3	80	74	74	74	71	78	71	78		
90011123	Connecticut	Fairfield	Western Conn State Univ - Danbury	41.40	-73.44	77	78	69	69	69	69	69	69	69		
90013007	Connecticut	Fairfield	Lighthouse - Stratford	41.15	-73.10	82	83	75	75	75	74	75	74	75		
90019003	Connecticut	Fairfield	Sherwood Island State Park - Westport	41.12	-73.34	82.7	83	78	76	78	80	75	80	75		
90031003	Connecticut	Hartford	McAuliffe Park	41.78	-72.63	71.7	74	63	63	63	62	62	62	62		
90050005	Connecticut	Litchfield	Mohawk Mt-Cornwall	41.82	-73.30	71.3	72	63	63	63	62	62	62	62		
90079007	Connecticut	Middlesex	Connecticut Valley Hospital - Middletown	41.55	-72.63	78.7	79	70	70	70	69	69	69	69		
90090027	Connecticut	New Haven	Criscuolo Park-New Haven	41.30	-72.90	75.7	77	69	68	69	69	68	69	68		
90099002	Connecticut	New Haven	Hammonasset State Park - Madison	41.26	-72.55	79.7	82	71	72	71	71	71	71	71		
90110124	Connecticut	New London	Fort Griswold Park - Groton	41.35	-72.08	74.3	76	67	68	67	67	71	67	71		
90131001	Connecticut	Tolland		41.98	-72.39	71.7	73	63	63	63	62	62	62	62		
90159991	Connecticut	Windham	Abington	41.84	-72.01	69.7	71	61	61	61	60	60	60	60		
100010002	Delaware	Kent	PROPERTY OF KILLENS POND STATE PARK; BEHIND FARM BUILDINGS	38.99	-75.56	66.3	67	58	57	58	58	57	58	57		
100031007	Delaware	New Castle	Lums Pond	39.55	-75.73	68	69	59	59	59	59	59	59	59		
100031010	Delaware	New Castle	BCSP	39.82	-75.56	73.7	74	65	65	65	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 WLBZ TV Transmitter Building - Summit of Rider Bluff	43.92	-69.26	63.3	64	56	55	55	55
230194008	Maine	Penobscot	Harbor Masters Office; Jonesport Public Landing	44.74	-68.67	58.3	60				
230290019	Maine	Washington	WBFD - West Buxton (Hollis) Fire Department	44.53	-67.60	59.3	61	52	52		
230310038	Maine	York	SBP - Shapleigh Ball Park	43.66	-70.63	58.7	59				
230310040	Maine	York	KPW - Kennebunkport Parson'd Way	43.59	-70.88	61.3	62	53	53		
230312002	Maine	York		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				
330115001	New Hampshire	Hillsborough	MILLER STATE PARK	42.86	-71.88	67	68	58				
330131007	New Hampshire	Merrimack	HAZEN DRIVE	43.22	-71.51	62	63	54				
330150014	New Hampshire	Rockingham	PORTSMOUTH - PERCE 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		59		57
330150018	New Hampshire	Rockingham	MOOSEHILL SCHOOL	42.86	-71.38	65.3	66	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	DRIVEWAY TO BAKEY RESIDENCE	40.56	-80.50	68.7	70	57	57	54	54
420070005	Pennsylvania	Beaver		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			
511630003	Virginia	Rockbridge	Natural Bridge Ranger Station	37.63	-79.51	58	59	50			
511650003	Virginia	Rockingham	ROCKINGHAM CO. VDOT	38.48	-78.82	60	60	53			
511790001	Virginia	Stafford	Widewater Elementary School	38.48	-77.37	62.3	63	53		53	53
511970002	Virginia	Wythe	Rural Retreat Sewage Treatment Plant	36.89	-81.25	60.7	61	54			
516500008	Virginia	Hampton City	NASA Langley Research Center	37.10	-76.39	64.3	65	55		55	53
518000004	Virginia	Suffolk City	Tidewater Community College	36.90	-76.44	61	62	53		53	52
518000005	Virginia	Suffolk City	VA Tech Agricultural Research Station: Holland	36.67	-76.73	59.7	61	52			
100300010	Alabama	Baldwin	FAIRHOPE: Alabama	30.50	-87.88	63.7	65	55		55	55
10331002	Alabama	Colbert	MUSCLE SHOALS	34.76	-87.64	58.7	59	50			
10499991	Alabama	DeKalb	Sand Mountain	34.29	-85.97	62.3	63	54			
105500011	Alabama	Etowah	SOUTHSIDE	33.90	-86.05	61.7	63	54			
106900004	Alabama	Houston	DOTHAN	31.19	-85.42	58.3	59	50			
107300023	Alabama	Jefferson	North Birmingham	33.55	-86.82	66.3	68	55		54	54
10731003	Alabama	Jefferson	Fairfield	33.49	-86.92	65.7	66	55		55	55
10731005	Alabama	Jefferson	McAdory	33.33	-87.00	65	65	55		55	53
10731010	Alabama	Jefferson	Leads	33.55	-86.55	64.3	66	54		53	53
10732006	Alabama	Jefferson	Hoover	33.39	-86.82	66	66	54		53	53
10735003	Alabama	Jefferson	Corner	33.80	-86.94	63.5	64	55		55	55
10736002	Alabama	Jefferson	Tarrant Elementary School	33.58	-86.77	67.7	68	56		56	56
108900014	Alabama	Madison	HUNTSVILLE OLD AIRPORT	34.69	-86.59	64	64	54		53	53
108900022	Alabama	Madison	HUNTSVILLE CAPSHAW ROAD	34.77	-86.76	62	62	53		51	51
10970003	Alabama	Mobile	CHICKASAW	30.77	-88.09	63	64	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

805900006	Colorado	Jefferson	ROCKY FLATS-N	39.91	-105.19	77.3	78	71	71	70	70
805900011	Colorado	Jefferson	NATIONAL RENEWABLE ENERGY LABS - NREL	39.74	-105.18	79.3	80	73	73	72	72
805900013	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				
806900007	Colorado	Larimer	Rocky Mountain NP - Long's Peak	40.28	-105.55	69	70	64	64	63	63
806900011	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 REGIONAL OFFICE BUILDING	41.86	-87.75	68.7	72	66	65	65	64
170314007	Illinois	Cook	NORTHBROOK WATER PLANT	42.06	-87.86	72	74	67	67	66	65
170314201	Illinois	Cook	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
			Perry Worth ELEMENTARY SCHOOL: WEST OF WHITESTOWN	40.00	-86.40	67	69	60	60	59	59
180110001	Indiana	Boone		40.54	-86.55	63.7	64	57	57	56	56
180150002	Indiana	Carroll	Flora-Flora Airport								
			Charlestown State Park- 1051.8 meters East of SR 62/ Indiana army	38.39	-85.66	70.3	71	62	62	61	61
180190008	Indiana	Clark		40.30	-85.25	62.3	66	55	55	54	54
180350010	Indiana	Delaware	Albany- Albany Elem. Sch.	41.72	-85.82	64.3	68	58	58	57	57
180390007	Indiana	Elkhart	Bristol- Bristol Elem. Sch.	38.31	-85.83	71	73	63	63	62	62
180431004	Indiana	Floyd	New Albany- Green Valley Elem. Sch.								
			Plummer: 2500 S. W- Citizens gas Plummer maintenance facility	38.99	-86.99	66.7	67	58	58	57	57
180550001	Indiana	Greene	Our Lady of Grace- Noblesville	40.07	-85.99	66.3	69	60	60	57	57
180570006	Indiana	Hamilton	AVON- 255 S. SR 267 (also 255 S. Avon Ave.) Avon: IN	39.76	-86.40	63.3	67	58	58	56	56
180630004	Indiana	Hendricks	Roanoke- Roanoke Elem. School	40.96	-85.38	60.7	64	54	54	53	53
180690002	Indiana	Huntington	Brownstown- 225 W & 200 N. Water facility	38.92	-86.08	65.7	66	58	58	57	57
180710001	Indiana	Jackson	Indian Creek Elementary School in Trafalgar: DUE								
180810002	Indiana	Johnson	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-ILTRI/ 1219.5 meters east of Tennessee St.- old ammunition 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	COGON 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	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	52	
211950002	Kentucky	Pike	PIKEVILLE PRIMARY	37.48	-82.54	59.3	60	54	54	54	
211990003	Kentucky	Pulaski	SOMERSET	37.10	-84.61	61	62	54	54	54	
212130004	Kentucky	Simpson	FRANKLIN	36.71	-86.57	63.7	64	56	56	56	
212219991	Kentucky	Trigg	Cadiz	36.78	-87.85	62	63	55	55	55	
212270009	Kentucky	Warren	ED SPEAR PARK (SMITHS GROVE)	37.05	-86.21	61.3	62	53	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	58	57
220170001	Louisiana	Caddo	Dixie	32.68	-93.86	63.3	64	57	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	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	61	60
220470009	Louisiana	Iberville	Bayou Plaquemine	30.22	-91.32	66	66	61	61	61	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	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	54	

220770001	Louisiana	Pointe Coupee	New Roads	30.68	-91.37	67	68	62	62	62	62	62
220870004	Louisiana	St. Bernard	Meraux	29.94	-89.92	65.3	66	59	59	59	59	59
220930002	Louisiana	St. James	Convent	29.99	-90.82	63.3	65	58	58	58	58	58
220950002	Louisiana	St. John the Baptist	Garyville	30.06	-90.62	65	66	60	60	59	59	59
220990001	Louisiana	St. Martin	St. Martinville	30.09	-91.87	65	65	59	59	59	59	59
221030002	Louisiana	St. Tammany	Madisonville	30.43	-90.20	66	68	58	59	57	57	57
221210001	Louisiana	West Baton Rouge	Port Allen	30.50	-91.21	67	68	61	61	60	60	60
260050003	Michigan	Allegan	Holland	42.77	-86.15	73.7	75	67	67	68	68	67
260190003	Michigan	Benzie		44.62	-86.11	68.3	69	62	62	62	62	61
260210014	Michigan	Berrien	Coloma	42.20	-86.31	73.3	74	67	67	68	68	66
260270003	Michigan	Cass	Cassopolis	41.90	-86.00	72	74	64	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	57
260490021	Michigan	Genesee		43.05	-83.67	67.7	68	61	61	59	59	59
260492001	Michigan	Genesee	Otisville	43.17	-83.46	68	69	60	60	59	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	57
260770008	Michigan	Kalamazoo	KALAMAZOO FAIRGROUNDS	42.28	-85.54	69.7	71	62	62	61	61	61
260810020	Michigan	Kent	GR-Monroe	42.98	-85.67	69	70	62	62	62	62	62
260810022	Michigan	Kent	APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE RD	43.18	-85.42	67.3	68	60				
260910007	Michigan	Lenawee	6792 RAISIN CENTER HWY: LENAWEE CO.RD.COMM.OWNER: TECUMSEH	42.00	-83.95	67	68	60	60	59	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 RESIDENTIAL - 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	Coffeerville	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	62	62
350010029	New Mexico	Bernalillo	SOUTH VALLEY	35.02	-106.66	65.3	66	61	61	60	60	60	60
350011012	New Mexico	Bernalillo	Foothills	35.19	-106.51	66.7	69	63	63	62	62	62	62
350130008	New Mexico	Dona Ana	60 La Union	31.93	-106.63	67.3	68	64	64	63	63	63	63
350130020	New Mexico	Dona Ana	62K Chaparral	32.04	-106.41	68.3	71	65	65	64	64	64	64
350130021	New Mexico	Dona Ana	62M Desert View	31.80	-106.58	72.7	74	69	69	69	69	69	69
350130022	New Mexico	Dona Ana	62N Santa Teresa	31.79	-106.68	71.3	74						
350130023	New Mexico	Dona Ana	62Q 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	52S 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	61	61
350431001	New Mexico	Sandoval		35.30	-106.55	65.7	68	61	61	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	60	60
370030005	North Carolina	Alexander	Taylorsville Liledoun	35.91	-81.19	64.3	65	52	52	51	51	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	60
390071001	Ohio	Ashtabula	Conneaut	41.96	-80.57	70	70	64	63	64	64	62
390170004	Ohio	Butler	HAMILTON	39.38	-84.54	72	72	65	65	63	63	63
390170018	Ohio	Butler	Middletown Airport	39.53	-84.39	71.3	73	64	64	62	62	62
390179991	Ohio	Butler	Oxford	39.53	-84.73	69.3	70	62	62	61	61	61
390230001	Ohio	Clark	Springfield Well Fd	40.00	-83.80	69.3	70	62	62	60	60	60
390230003	Ohio	Clark	Mud Run	39.86	-84.00	68.3	69	61	61	59	59	59
390250022	Ohio	Clermont	Batavia	39.08	-84.14	70	70	62	62	61	61	61
390271002	Ohio	Clinton	Wilmington	39.43	-83.79	69.7	70	62	62	61	61	61
390350034	Ohio	Cuyahoga	District 6	41.56	-81.58	69	70	63	63	66	66	64
390350060	Ohio	Cuyahoga	GT Craig NCore	41.49	-81.68	62.7	64	57	56	60	60	56
390350064	Ohio	Cuyahoga	Berea BOE	41.36	-81.86	65.3	66	59	59	59	59	59
390355002	Ohio	Cuyahoga	Mayfield	41.54	-81.46	69.3	71	63	62	64	64	61
390410002	Ohio	Delaware	Delaware	40.36	-83.06	65.3	67	57	57	56	56	56
390479991	Ohio	Fayette	Deer Creek	39.64	-83.26	66.7	68	60	60	58	58	58
390490029	Ohio	Franklin	New Albany	40.08	-82.82	70.3	71	63	63	61	61	61
390490037	Ohio	Franklin	FRANKLIN_PK	39.97	-82.96	65.5	66	59	59	56	56	56
390490081	Ohio	Franklin	Maple Canyon	40.09	-82.96	66.3	67	59	59	57	57	57
390550004	Ohio	Geauga	Notre Dame	41.52	-81.25	71.3	72	63	63	63	63	63
390570006	Ohio	Greene	Xenia	39.67	-83.94	67.3	68	60	60	59	59	59
390610006	Ohio	Hamilton	Sycamore	39.28	-84.37	73.3	75	66	66	65	65	65
390610010	Ohio	Hamilton	Colerain	39.21	-84.69	71.3	72	64	64	63	63	63
390610040	Ohio	Hamilton	Taft NCore	39.13	-84.50	71.3	72	64	64	63	63	63
390810017	Ohio	Jefferson	Stuebenville	40.37	-80.62	63	65	56	56	55	55	55
390830002	Ohio	Knox	CENTERBURG	40.31	-82.69	66.5	67	58	58	56	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	TCE	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	52	51	

450250001	South Carolina	Chesterfield	CHESTERFIELD	34.62	-80.20	60	60	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			
450370001	South Carolina	Edgefield	TRENTON	33.74	-81.85	59.7	61	51			
450450016	South Carolina	Greenville	Hillcrest Middle School	34.75	-82.26	63.3	65	54	53		53
450730001	South Carolina	Oconee	LONG CREEK	34.81	-83.24	63	63	54			
450770002	South Carolina	Pickens	CLEMSON CMS	34.65	-82.84	62.7	63	54	53		53
450770003	South Carolina	Pickens	Wolf Creek	34.85	-82.74	61	62	52	51		51
450790007	South Carolina	Richland	PARKLANE	34.09	-80.96	60	61	50	49		49
450790021	South Carolina	Richland	CONGAREE BLUFF	33.81	-80.78	55	55	47			
450791001	South Carolina	Richland	SANDHILL EXPERIMENTAL STATION	34.13	-80.87	64.3	65	54	52		52
450830009	South Carolina	Spartanburg	NORTH SPARTANBURG FIRE STATION #2	34.99	-82.08	66	67	56	55		55
450910008	South Carolina	York	YORK (LANDFILL)	34.98	-81.21	61.3	63	52	50		50
450918801	South Carolina	York		34.91	-80.87	64	64	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	57	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 HENDERSON	39.45	-77.96	62	63	54	54	54	54
540110006	West Virginia	Cabell	CENTER/MARSHALL	38.42	-82.43	64	64	60	60	59	59

550710007	Wisconsin	Manitowoc	MANITOWOC - WDLND DUNES	44.14	-87.62	73	74	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	61	60
550790026	Wisconsin	Milwaukee	MILWAUKEE - SER DNR HDQRS	43.06	-87.91	68	69	63	64	64
550790085	Wisconsin	Milwaukee	BAYSIDE	43.18	-87.90	71.7	73	66	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	67	65
550890009	Wisconsin	Ozaukee	HARRINGTON BEACH PARK	43.50	-87.81	73.3	74	68	68	67
551010020	Wisconsin	Racine	RACINE - PAYNE AND DOLAN	42.77	-87.80	76	78	70	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
551170009	Wisconsin	Sheboygan	SHEBOYGAN - HAVEN	43.82	-87.79	70	71	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
551330027	Wisconsin	Waukesha	WAUKESHA - CLEVELAND AVE	43.02	-88.22	65.7	66	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

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
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

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
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

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
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

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
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	88005 2	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	88002 4	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

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	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

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	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	88007 2	31601	Industrial Turbine	No	No	0	0	0	0.0000

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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	880093	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

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	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

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	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 Municipal 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

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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

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
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

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
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	SHELBYNA POWER PLANT	7405	G1	5052711	25601213	South Oil Peaking
MO	SHELBYNA POWER PLANT	7405	G2	5052711	25601113	South Oil Peaking
MO	SHELBYNA POWER PLANT	7406	G3	5052711	25600813	South Oil Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
MO	SHEL BINA POWER PLANT	7406	G4	5052711	25600913	South Oil Peaking
MO	SHEL BINA POWER PLANT	7406	G5	5052711	25601013	South Oil Peaking
MO	SHEL BINA POWER PLANT	7406	G6	5052711	25601413	South Oil Peaking
MO	SHEL BINA POWER PLANT	7860	G7	5052711	25601613	South Oil Peaking
MO	SHEL BINA 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

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
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	FREPORT POWER PLANT #1	2678	2	7221211	7565913	MANE-VU Oil Peaking
NY	FREPORT POWER PLANT #1	2678	3	7221211	7565813	MANE-VU Oil Peaking
NY	FREPORT 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 Gallion Generation Station (0317030060)	55263	CT2	9289211	55698413	LADCO Gas Peaking

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
OH	AMP Napoleon Peaking Plant (0335010056)	55264	CT2	9291911	55775113	LADCO Gas Peaking
OH	Cleveland Public Power - Service Center (13180000133)	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 ENRGY 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

State	Facility Name	ORIS	BOILER	facility_id	unit_id	DAILY PROFILE
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/ALLEN TOWN CTG SITE	3139	CTG3	5452111	27541813	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/ALLEN TOWN 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	3144	CTG1	6660711	17773313	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARWOOD CTS	3144	CTG2	4473111	27692413	MANE-VU Oil Peaking
PA	MARTINS CREEK LLC/HARWOOD CTS	3144	CTG1	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	CHANNEL VIEW COGENERATION FACILITY			4057511	33490113	South Gas Peaking
TX	CHANNEL VIEW COGENERATION FACILITY			4057511	33490413	South Gas Peaking
TX	CHANNEL VIEW 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 through **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

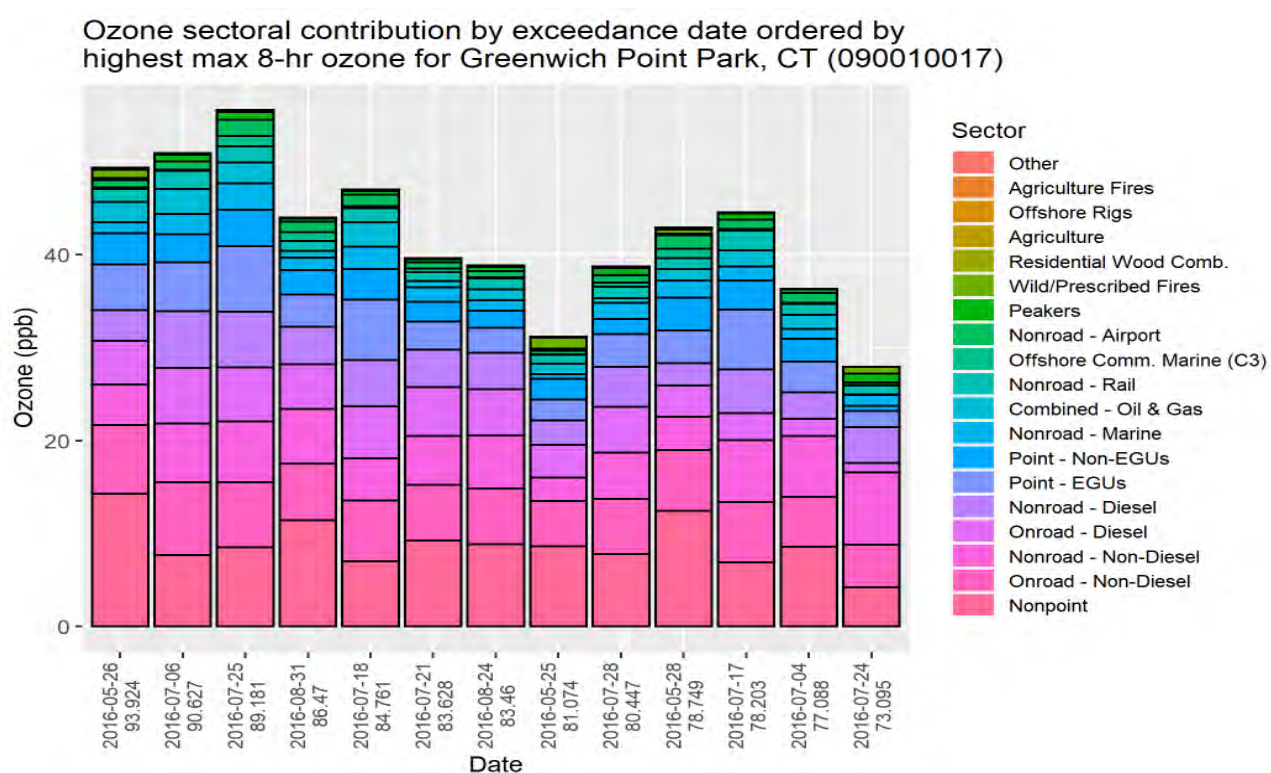


Figure H-2. Emission Sector Contribution on Modeled Ozone Exceedance Day at Stratford, CT.

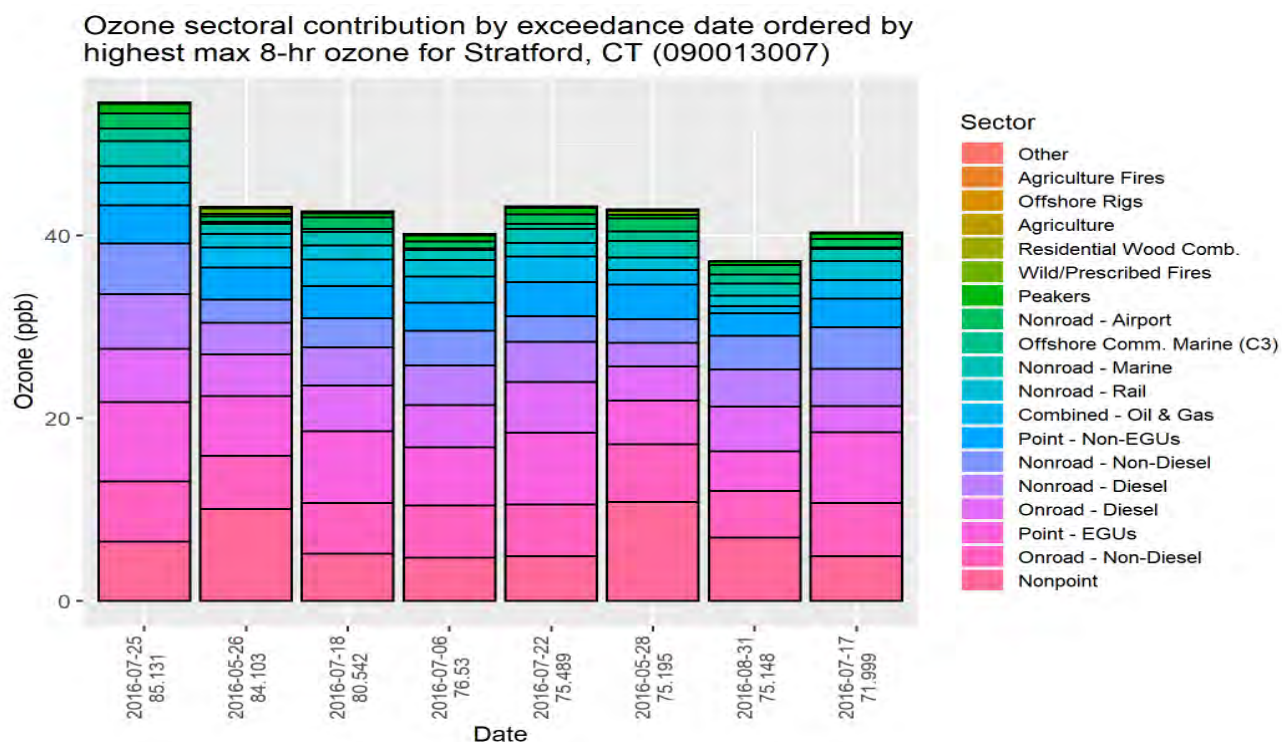


Figure H-3. Emission Sector Contribution on Modeled Ozone Exceedance Day at Westport, CT.

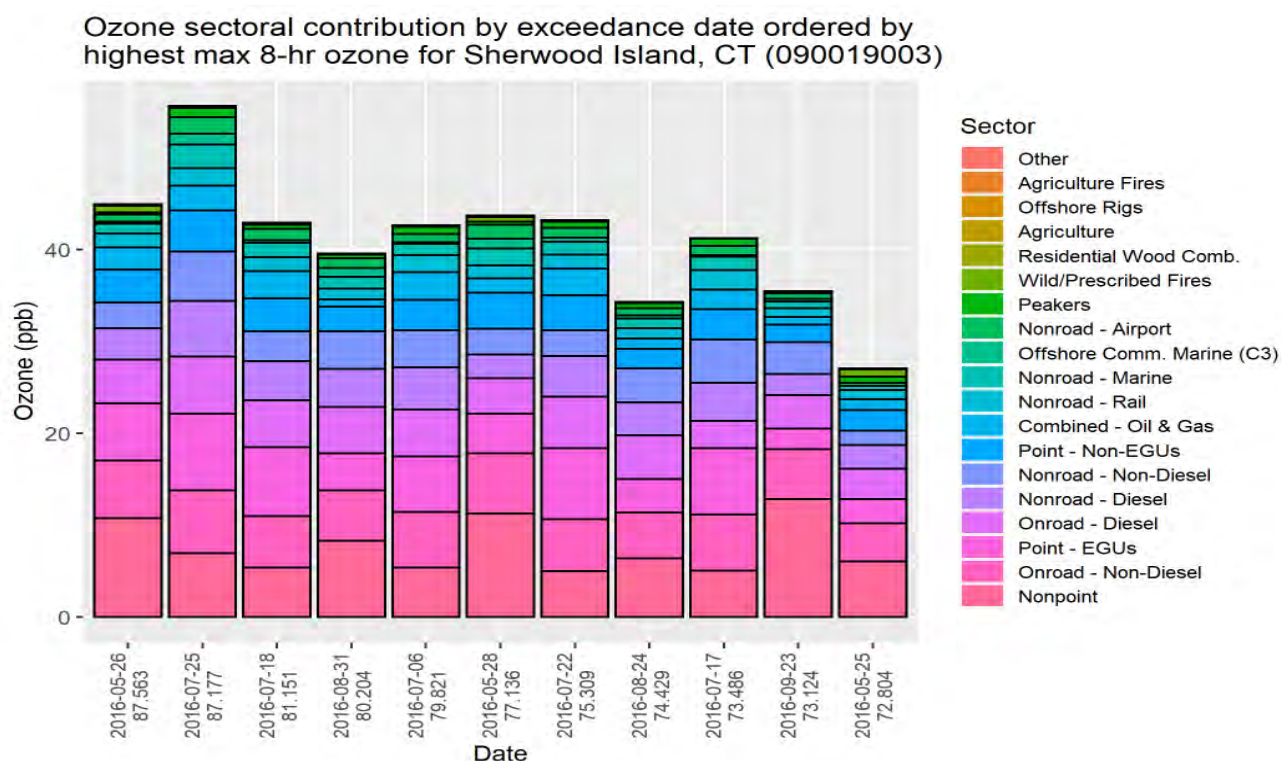


Figure H-4. Emission Sector Contribution on Modeled Ozone Exceedance Day at Madison, CT.

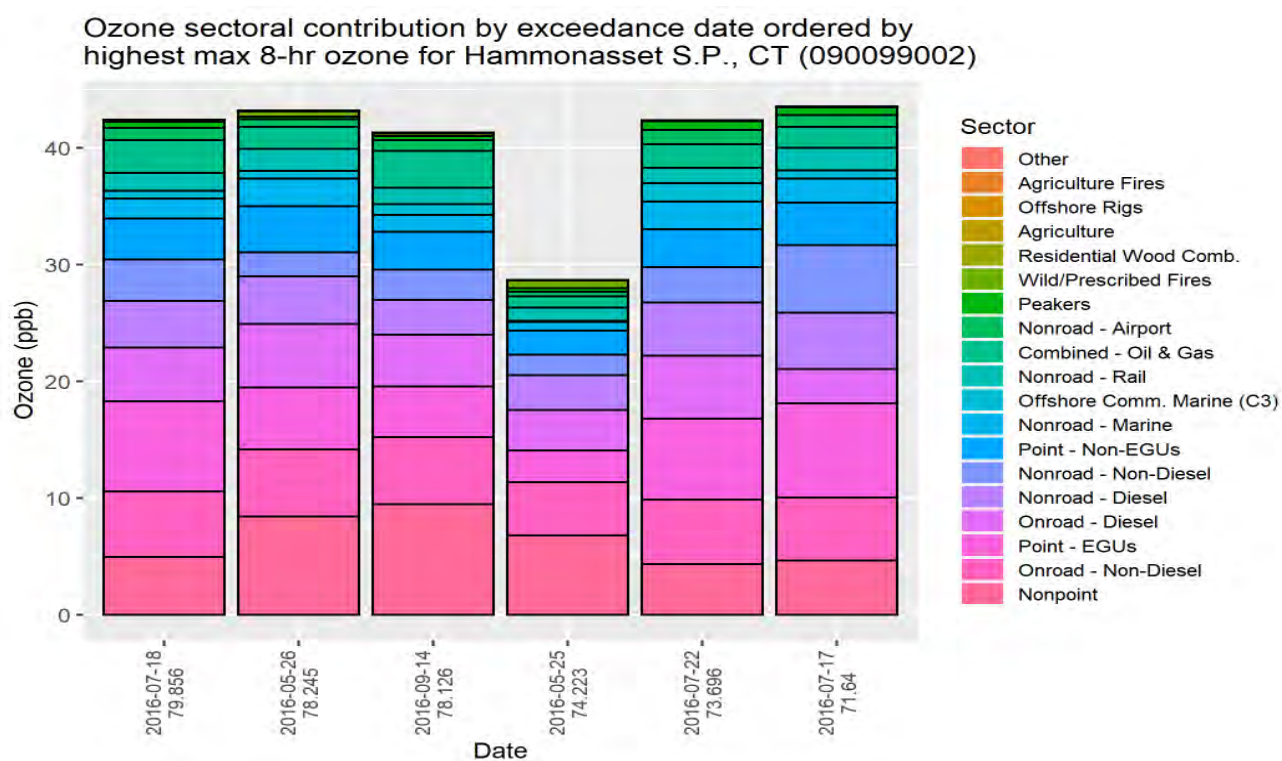


Figure H-5. Emission Sector Contribution on Modeled Ozone Exceedance Day at Groton, CT.

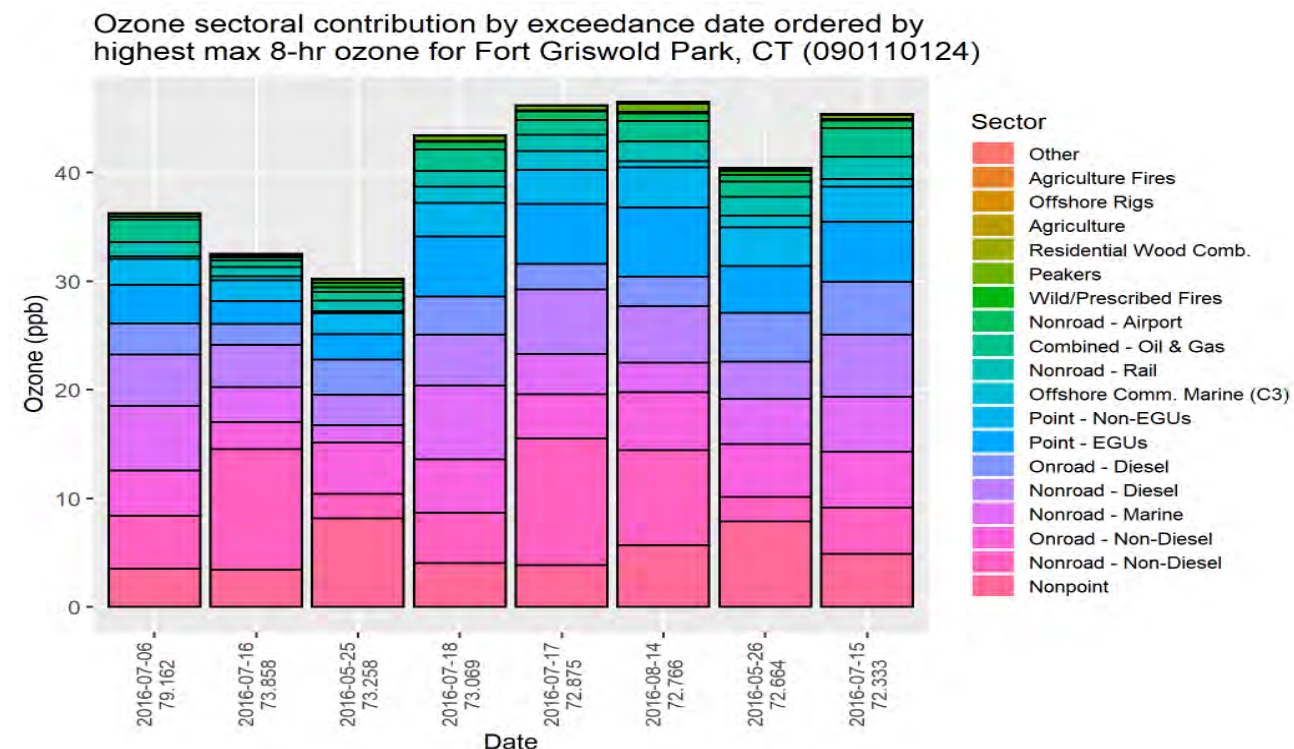


Figure H-6. Emission Sector Contribution on Modeled Ozone Exceedance Day at Susan Wagner H.S.

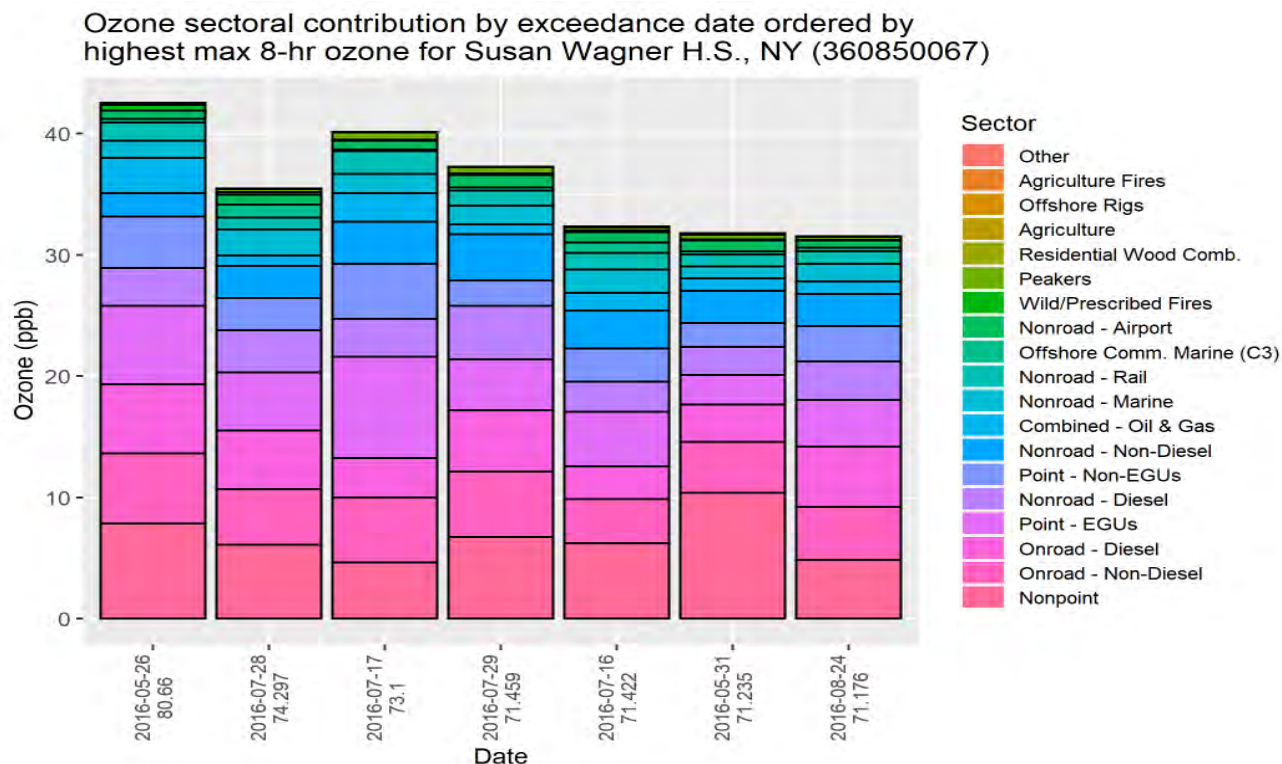


Figure H-7. Emission Sector Contribution on Modeled Ozone Exceedance Day at Babylon NY.

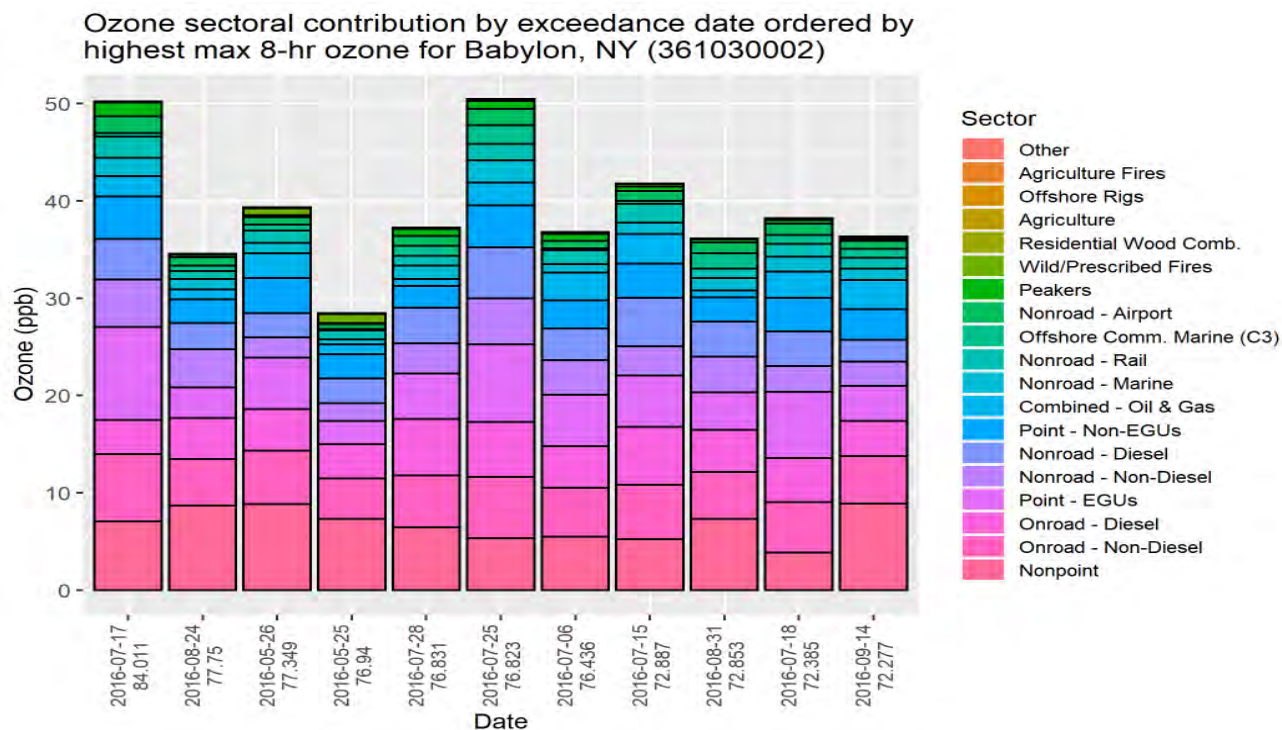


Figure H-8. Emission Sector Contribution on Modeled Ozone Exceedance Day at White Plains, NY.

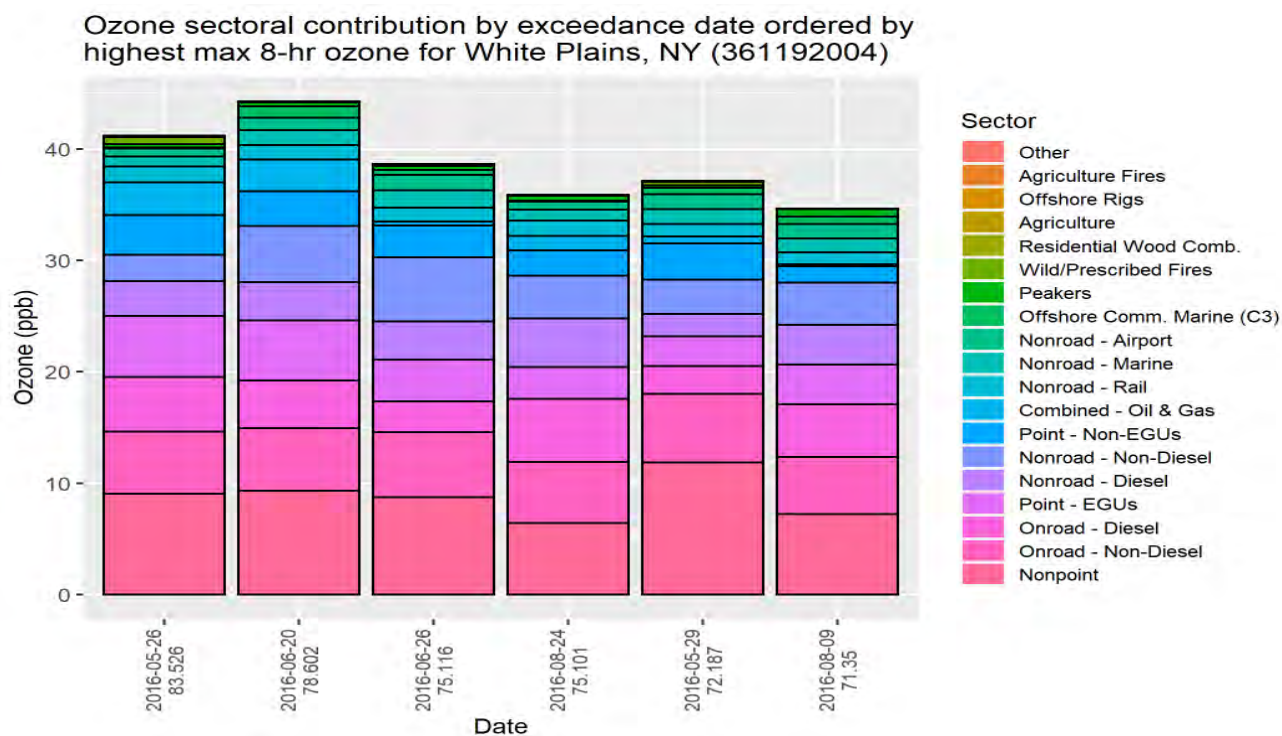
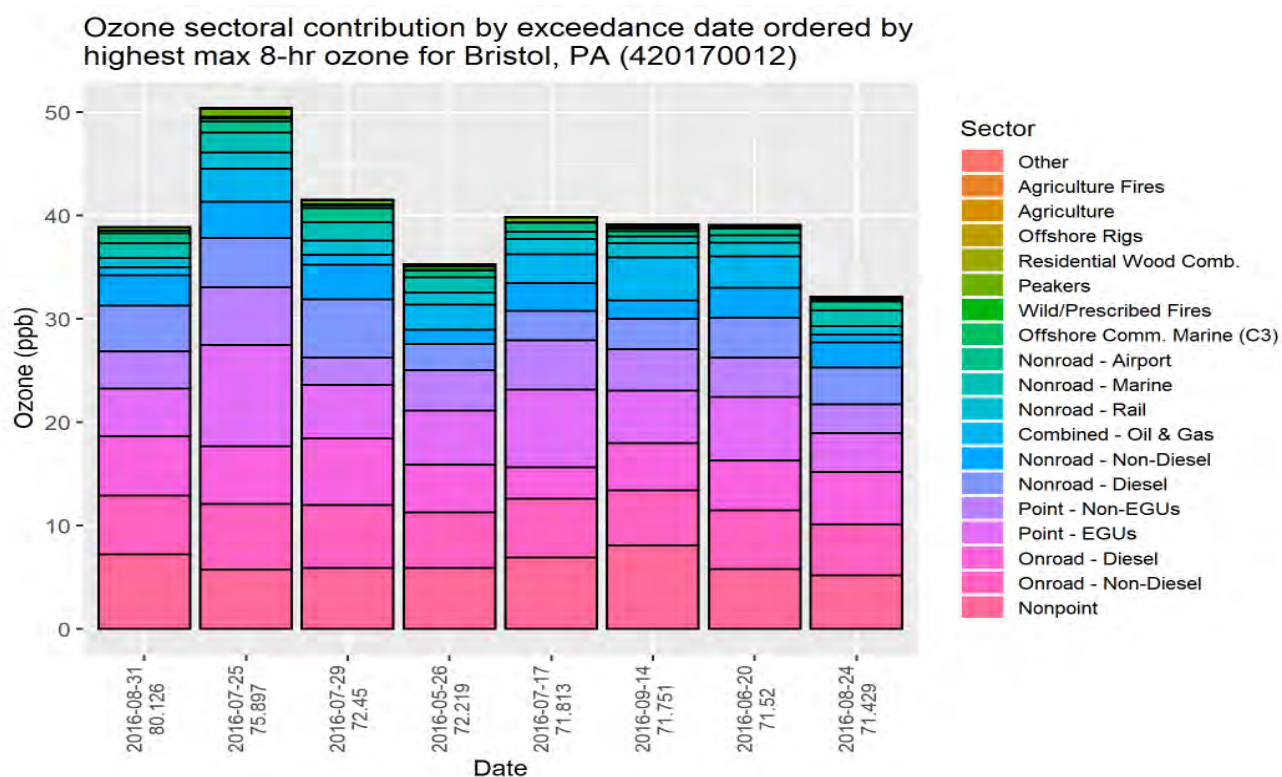


Figure H-9. Emission Sector Contribution on Modeled Ozone Exceedance Day at Bristol, PA.



Figures H-10 through 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

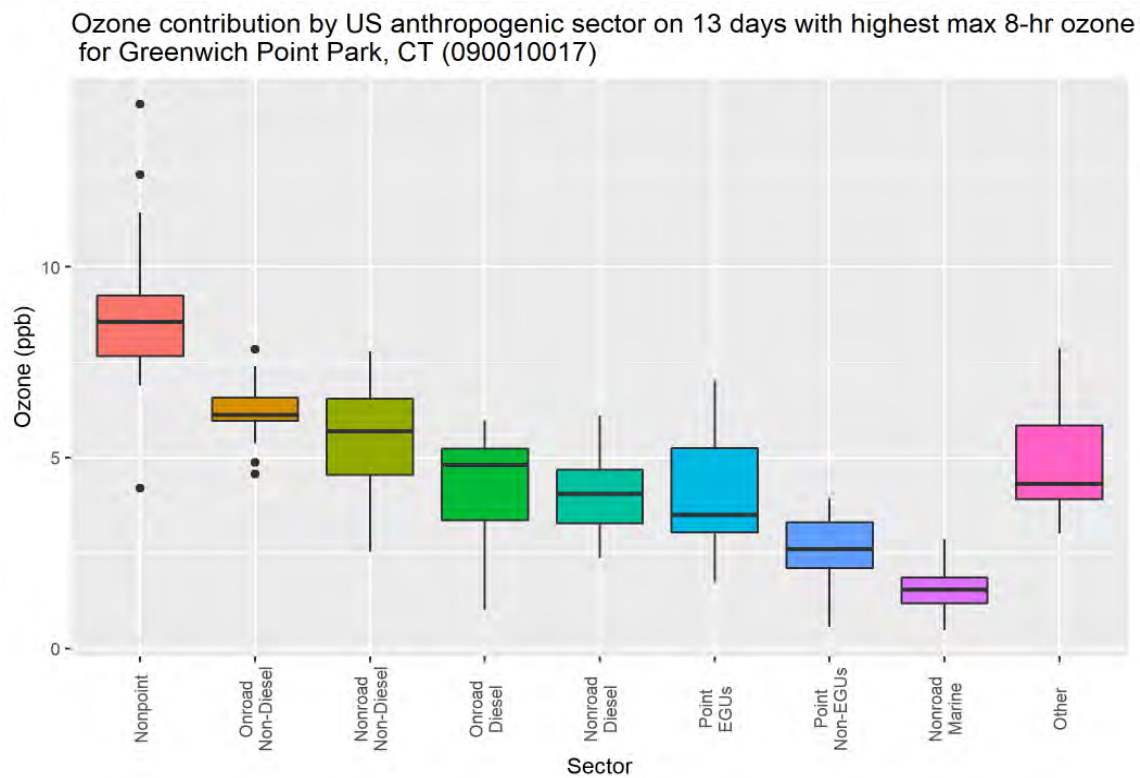


Figure H-11. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Stratford, CT

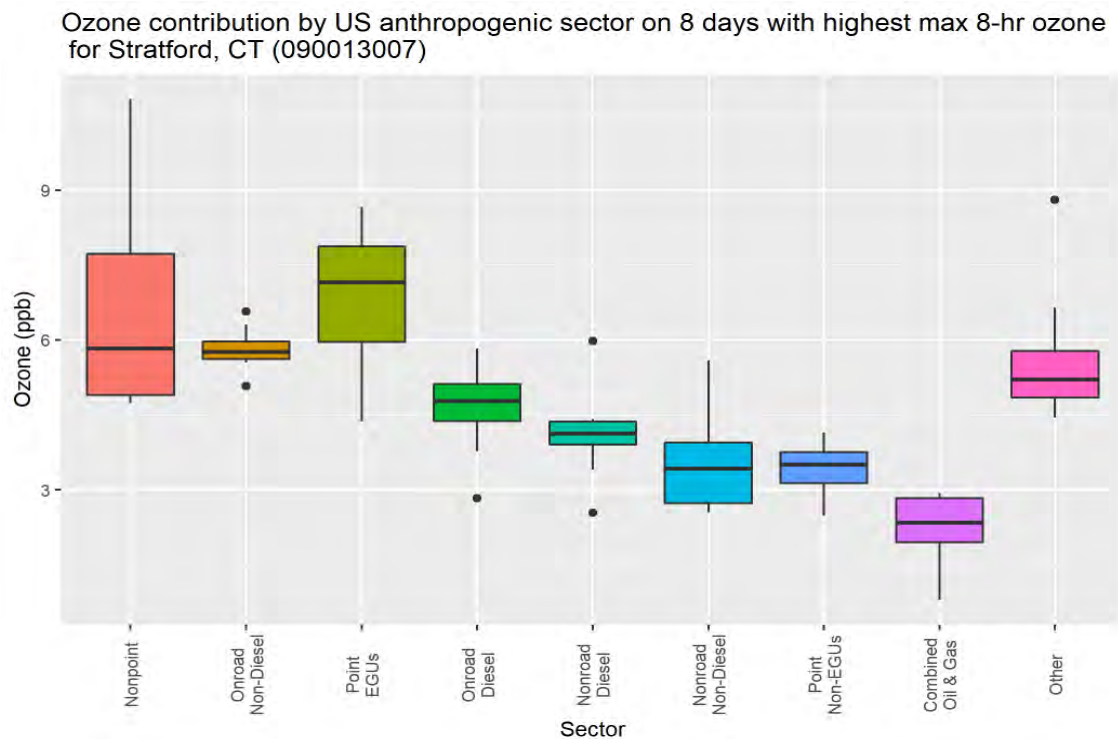


Figure H-11. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Westport, CT

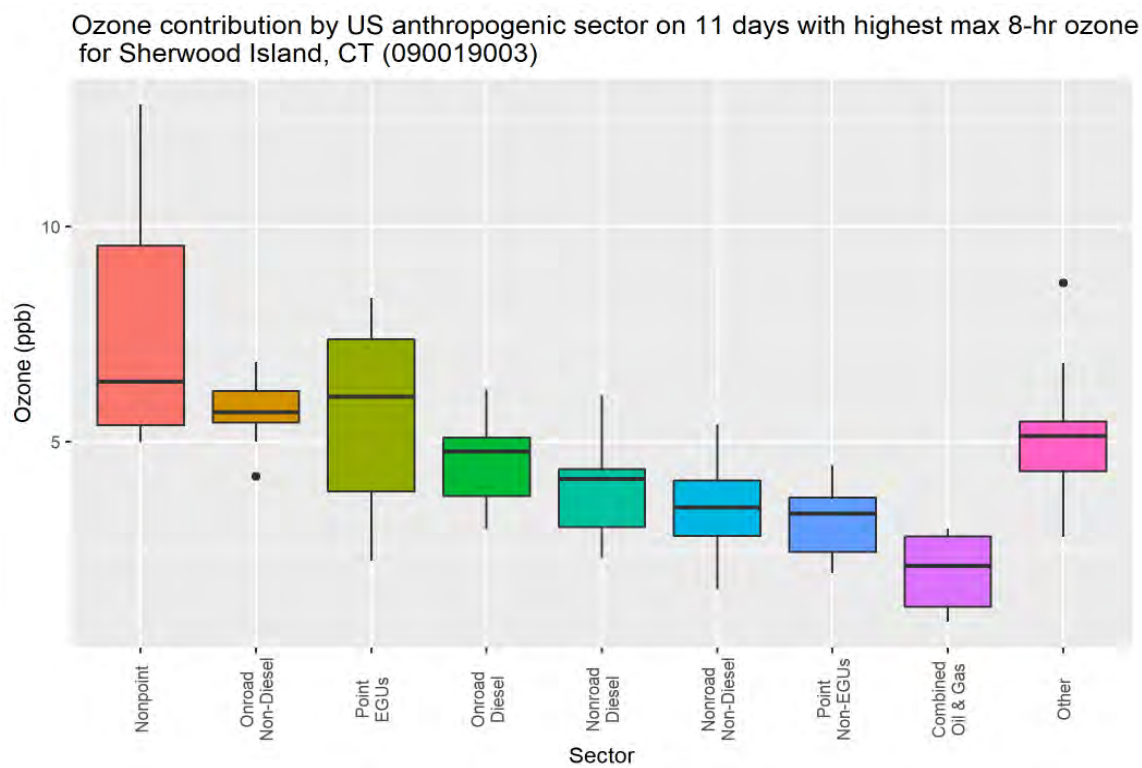


Figure H-13. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Madison, CT.

Ozone contribution by US anthropogenic sector on 6 days with highest max 8-hr ozone for Hammonasset S.P., CT (090099002)

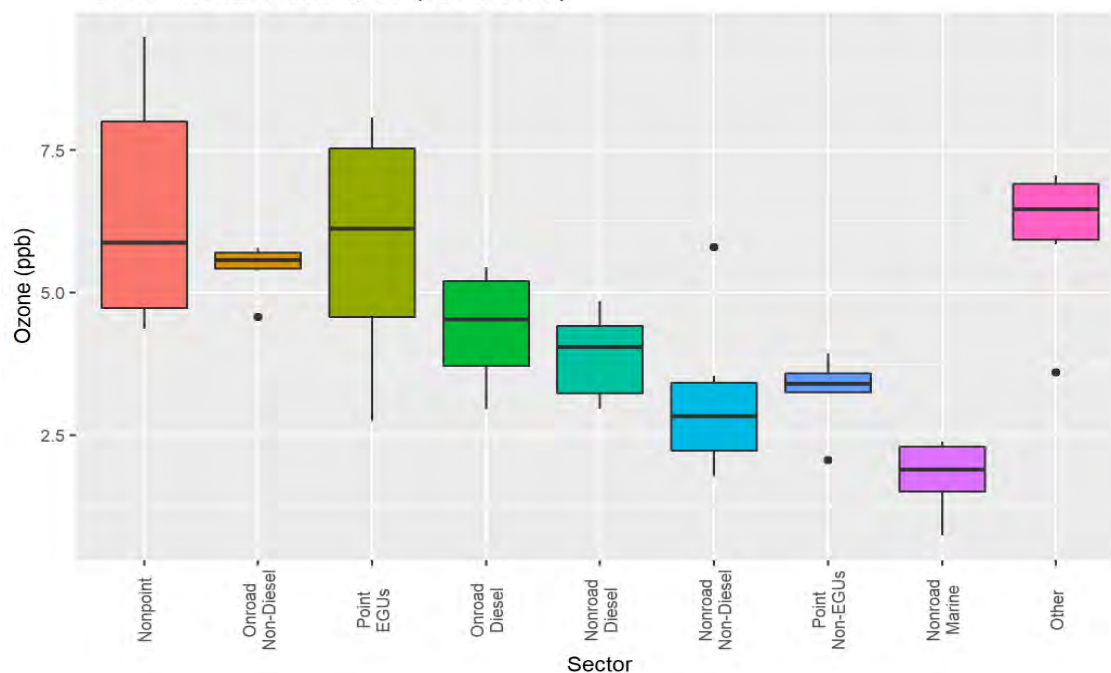


Figure H-14. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Groton, CT.

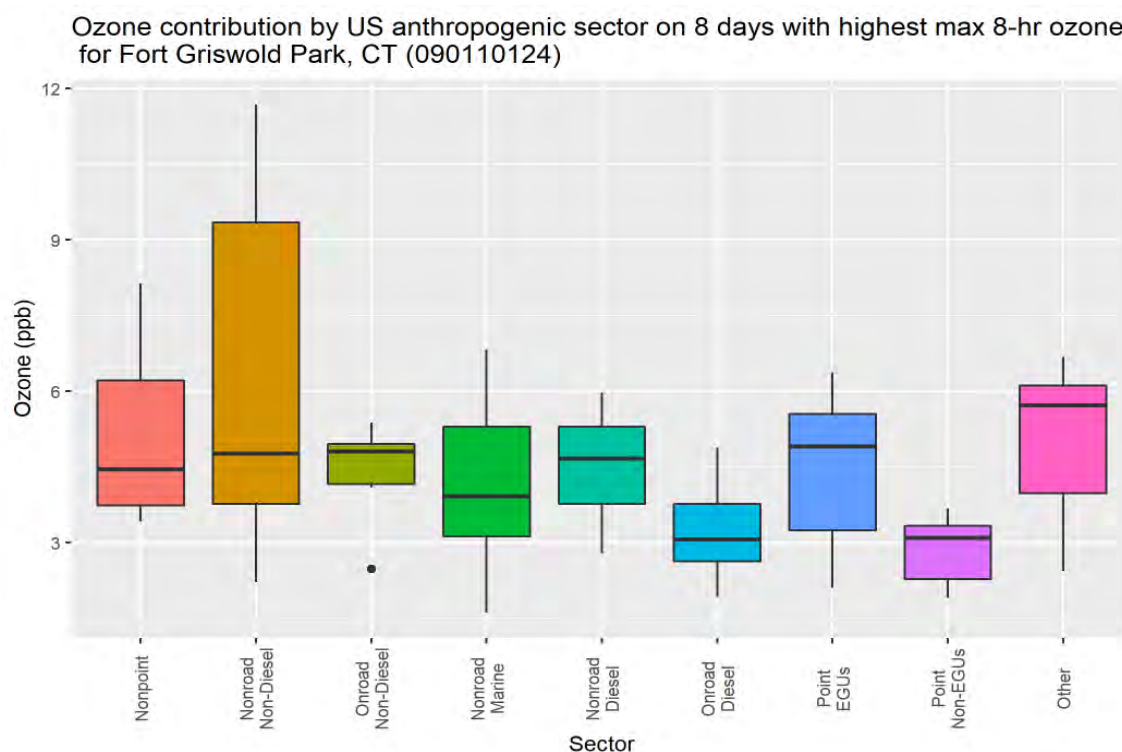


Figure H-15. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Susan Wagner H.S.

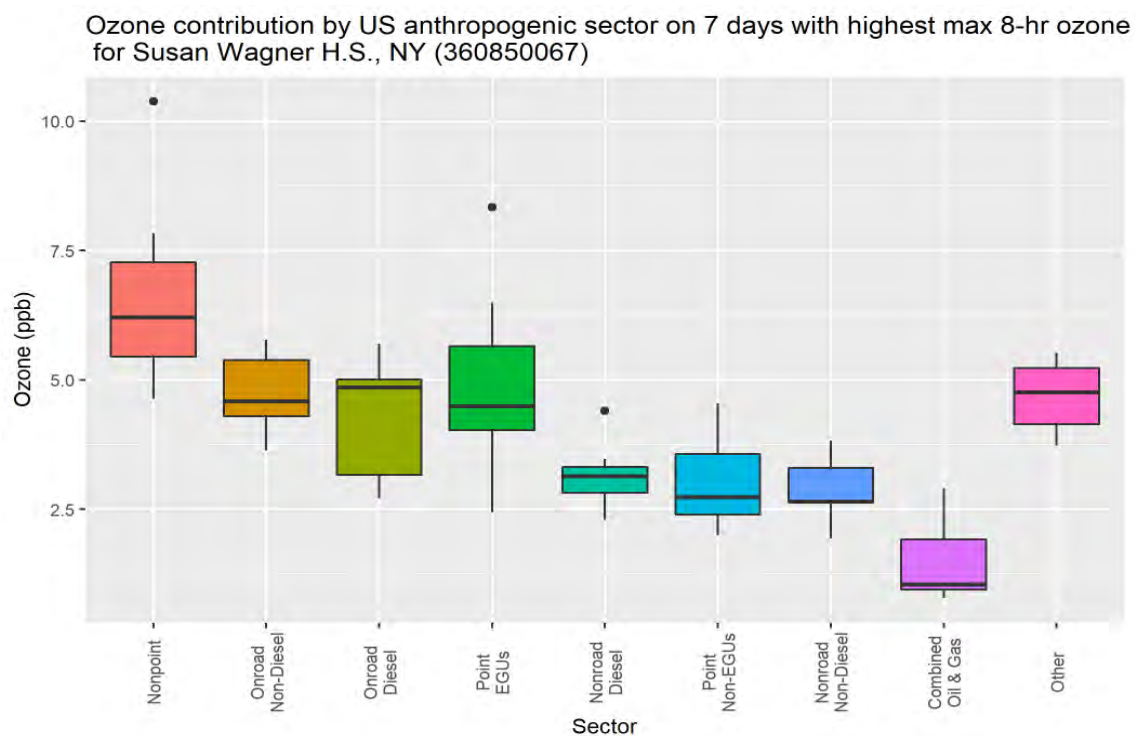


Figure H-16. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Babylon, NY.

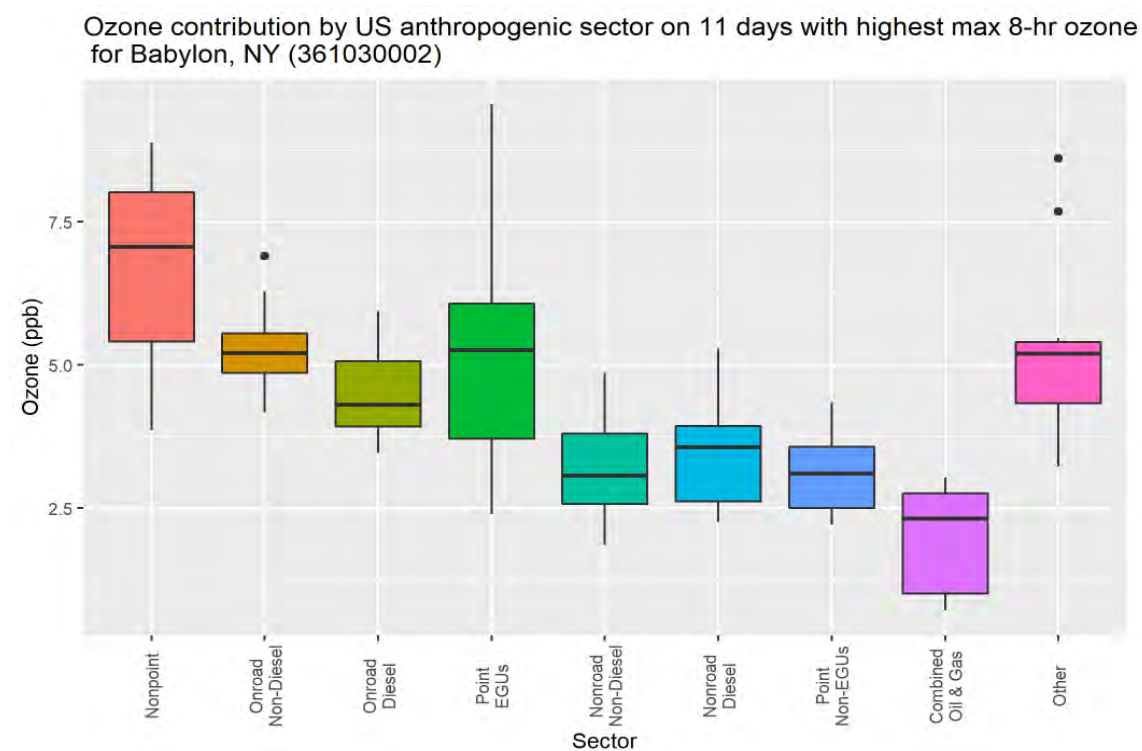


Figure H-17. Emission Sector Contribution on 13 Highest Modeled Ozone Days at White Plains, NY.

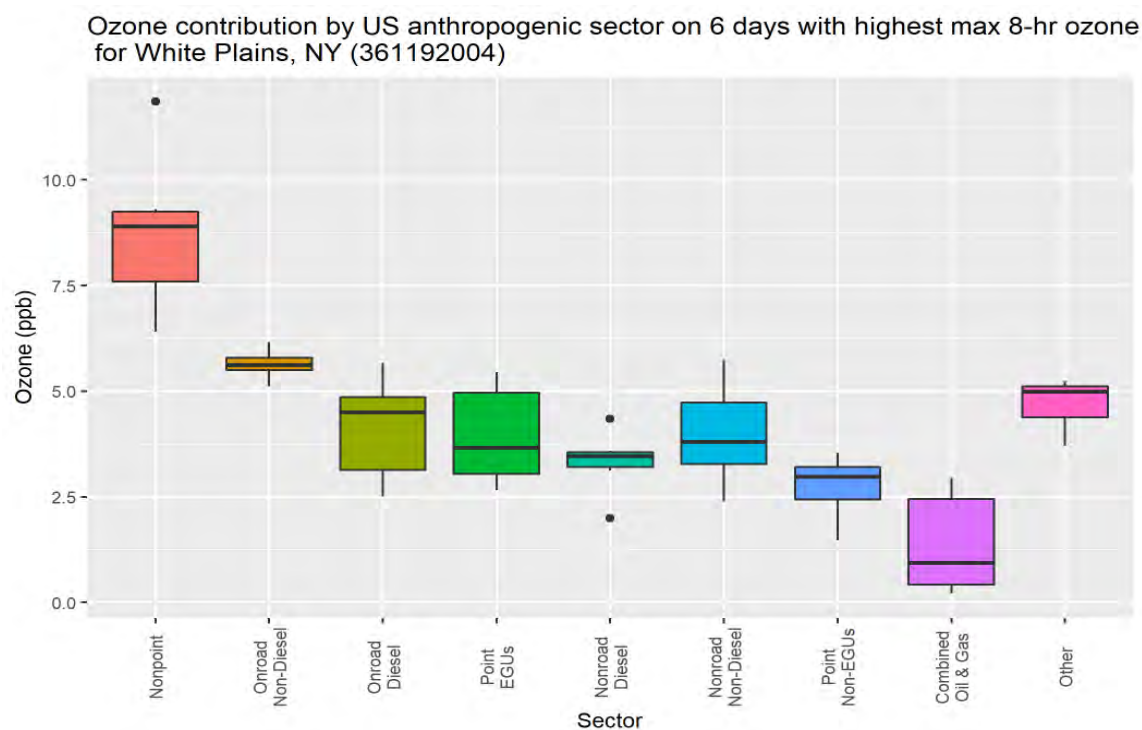
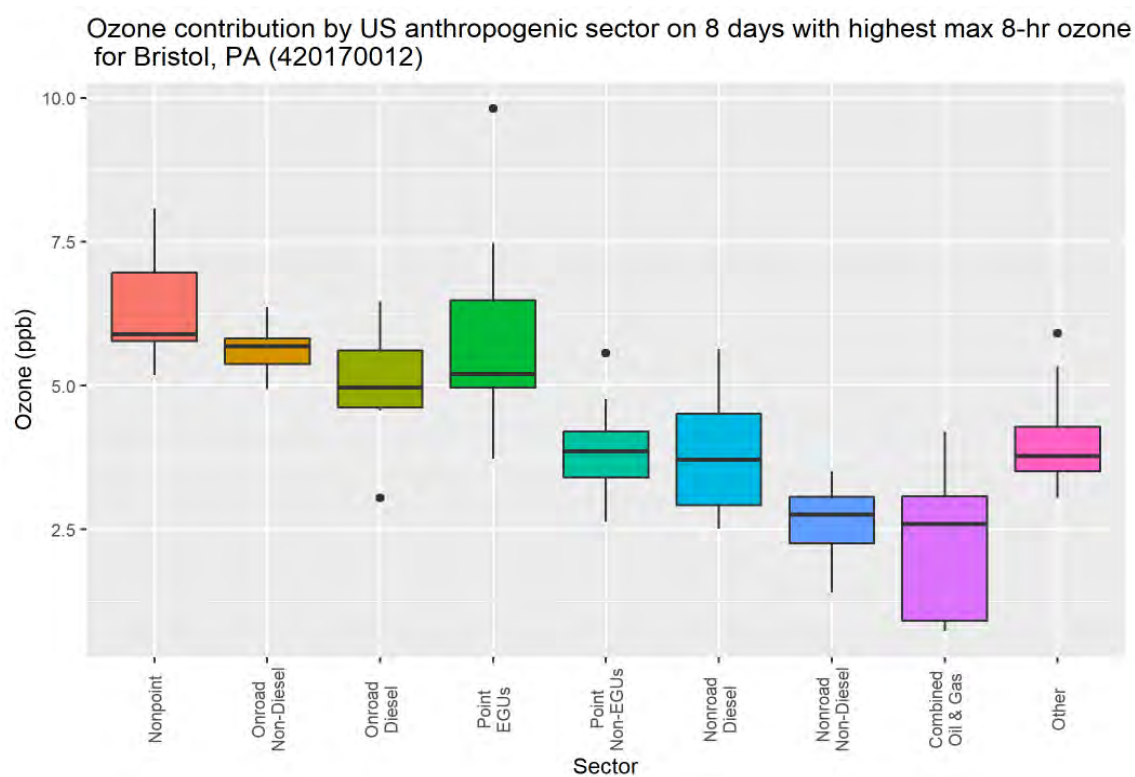


Figure H-17. Emission Sector Contribution on 13 Highest Modeled Ozone Days at Bristol, PA.



State Analysis

The next section bases the analysis on contribution by state level summaries.

Figures H-19 through 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

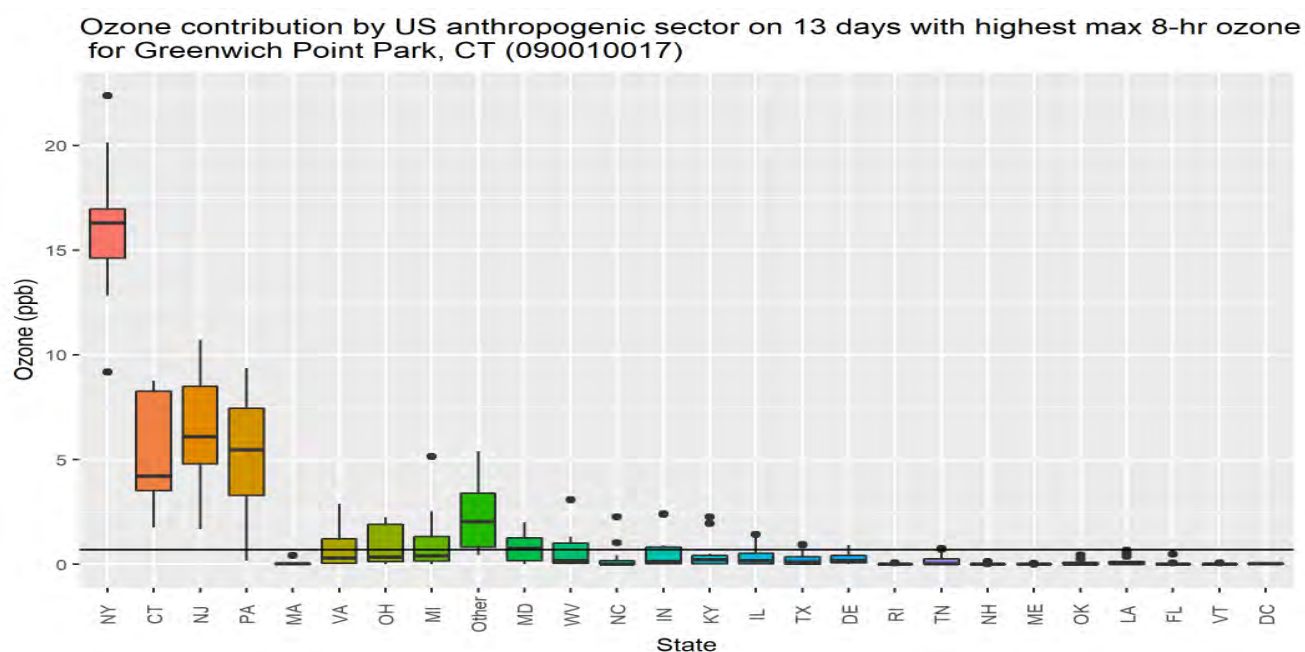


Figure H-20. State Contribution on 13 Highest Modeled Ozone Days at Stratford, CT

Ozone contribution by US anthropogenic sector on 8 days with highest max 8-hr ozone for Stratford, CT (090013007)

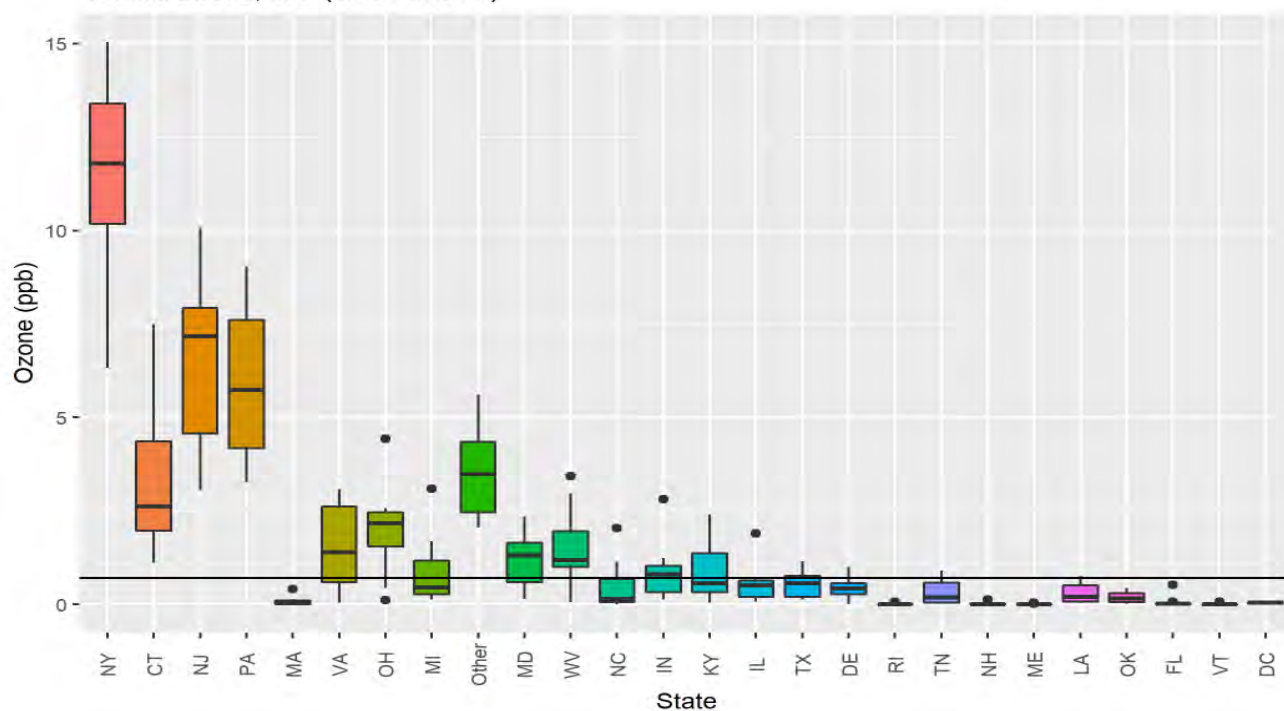


Figure H-20. State Contribution on 13 Highest Modeled Ozone Days at Westport, CT

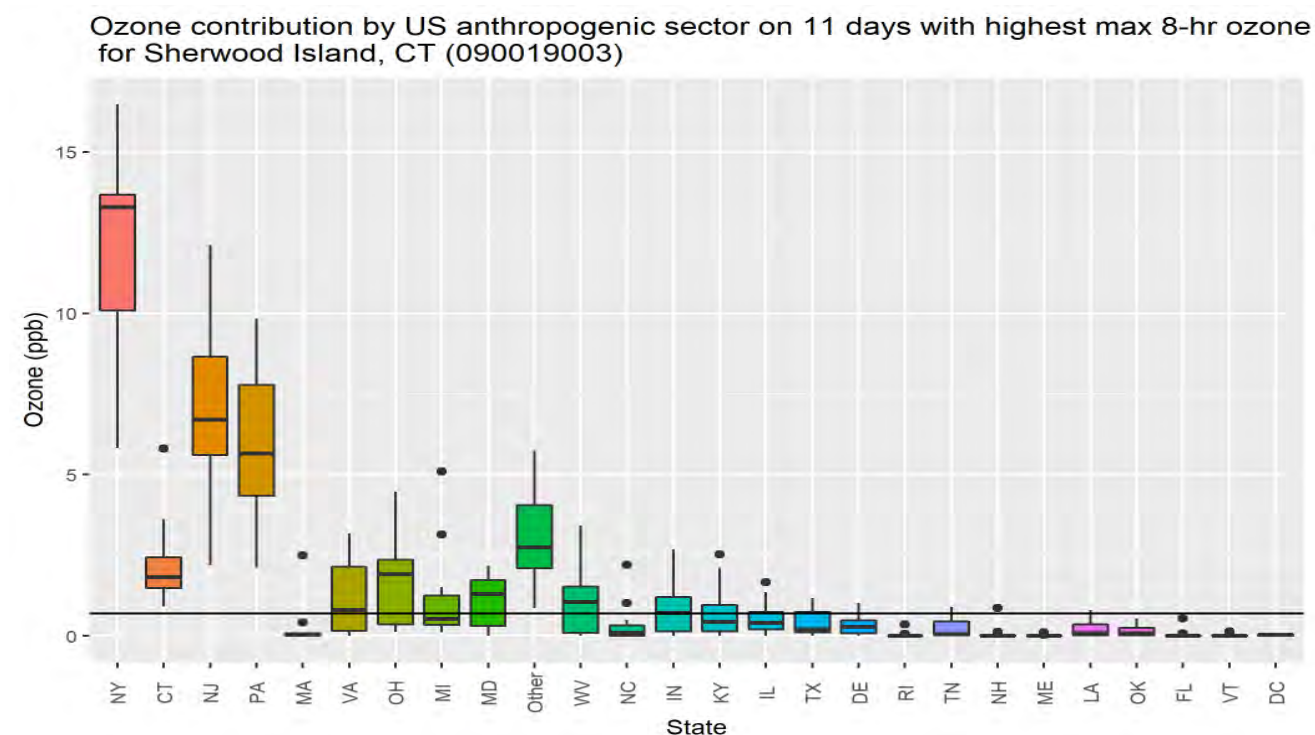


Figure H-22. State Contribution on 13 Highest Modeled Ozone Days at Madison, CT

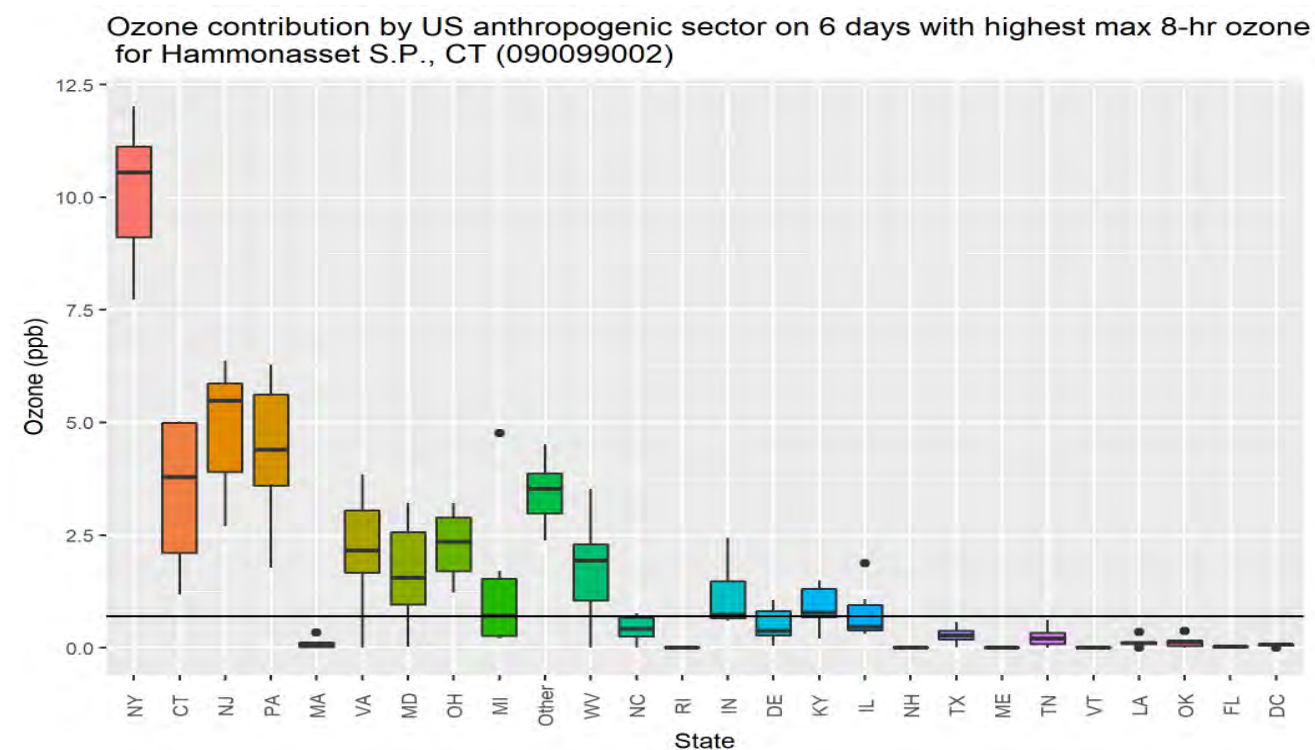


Figure H-23. State Contribution on 13 Highest Modeled Ozone Days at Groton, CT

Ozone contribution by US anthropogenic sector on 8 days with highest max 8-hr ozone for Fort Griswold Park, CT (090110124)

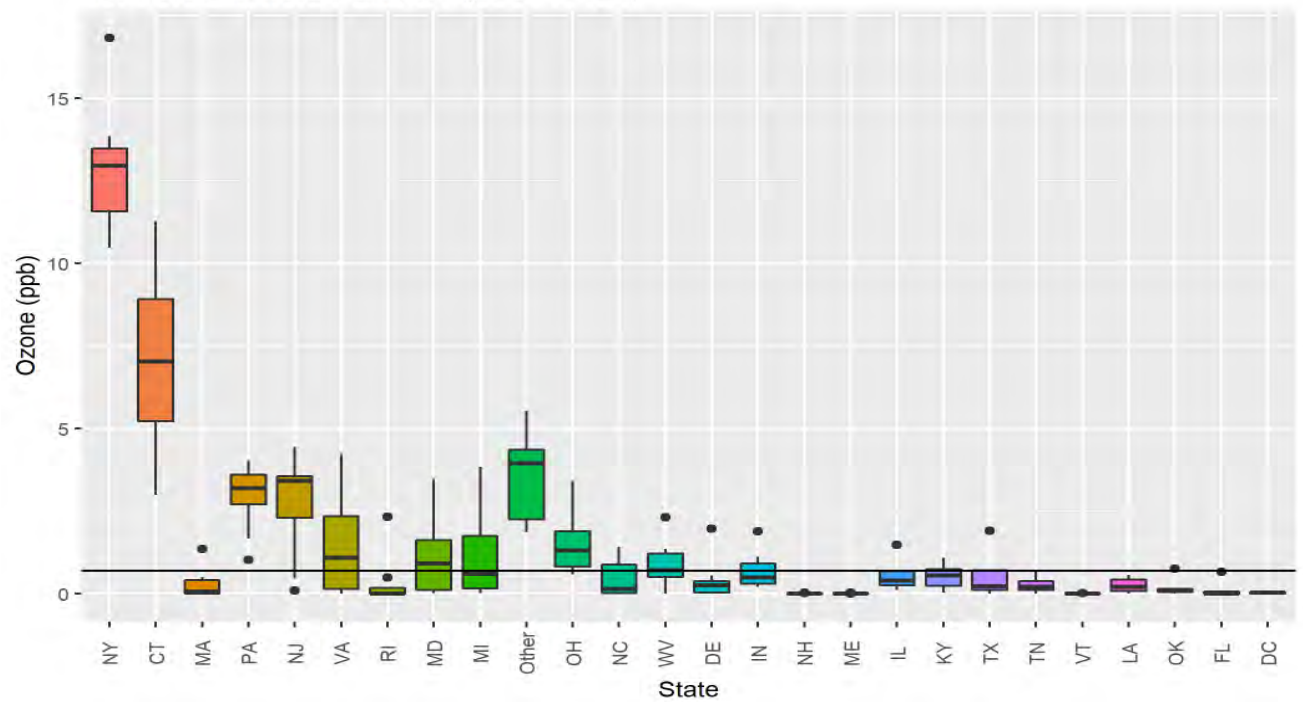


Figure H-24. State Contribution on 13 Highest Modeled Ozone Days at Susan Wagner H.S.

Ozone contribution by US anthropogenic sector on 7 days with highest max 8-hr ozone for Susan Wagner H.S., NY (360850067)

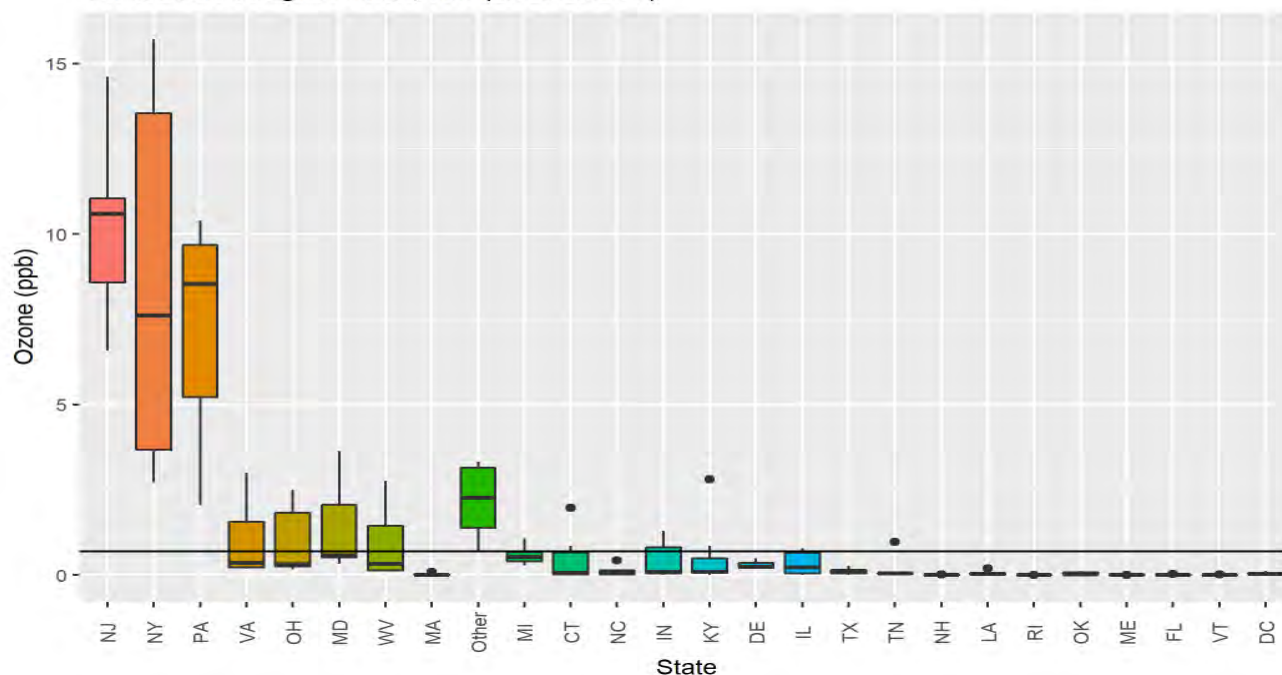
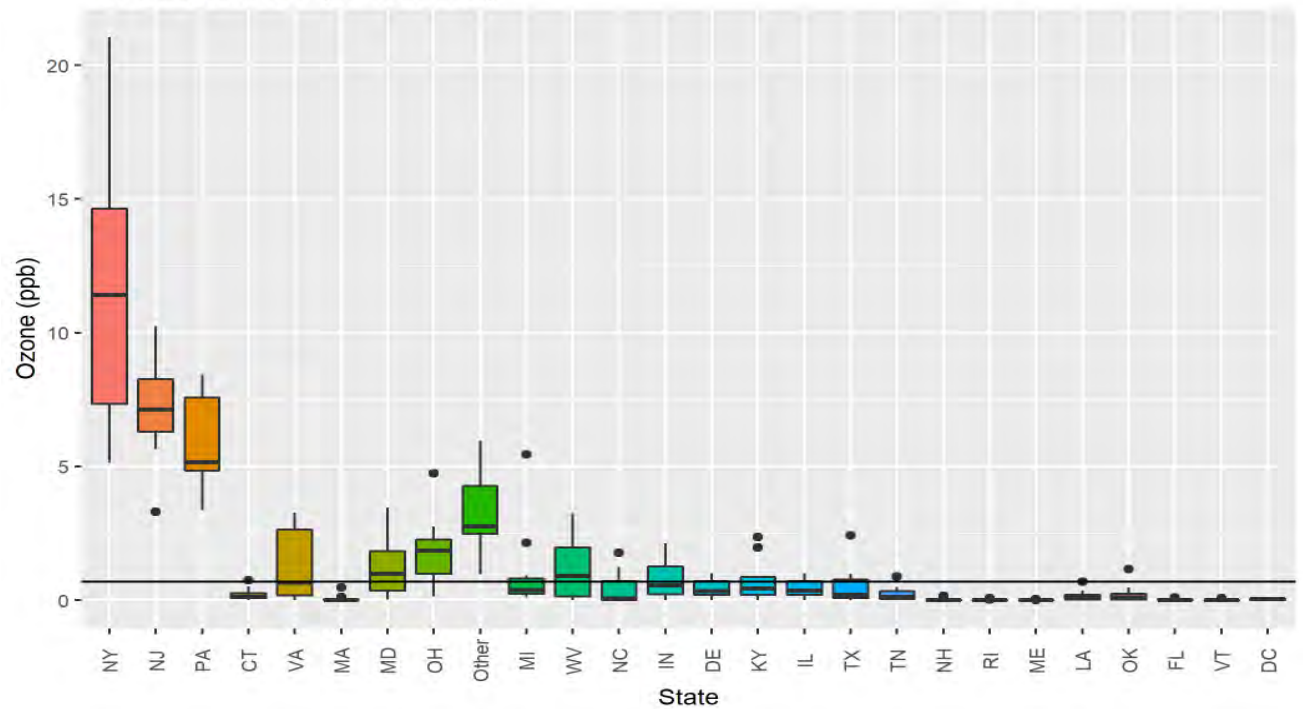


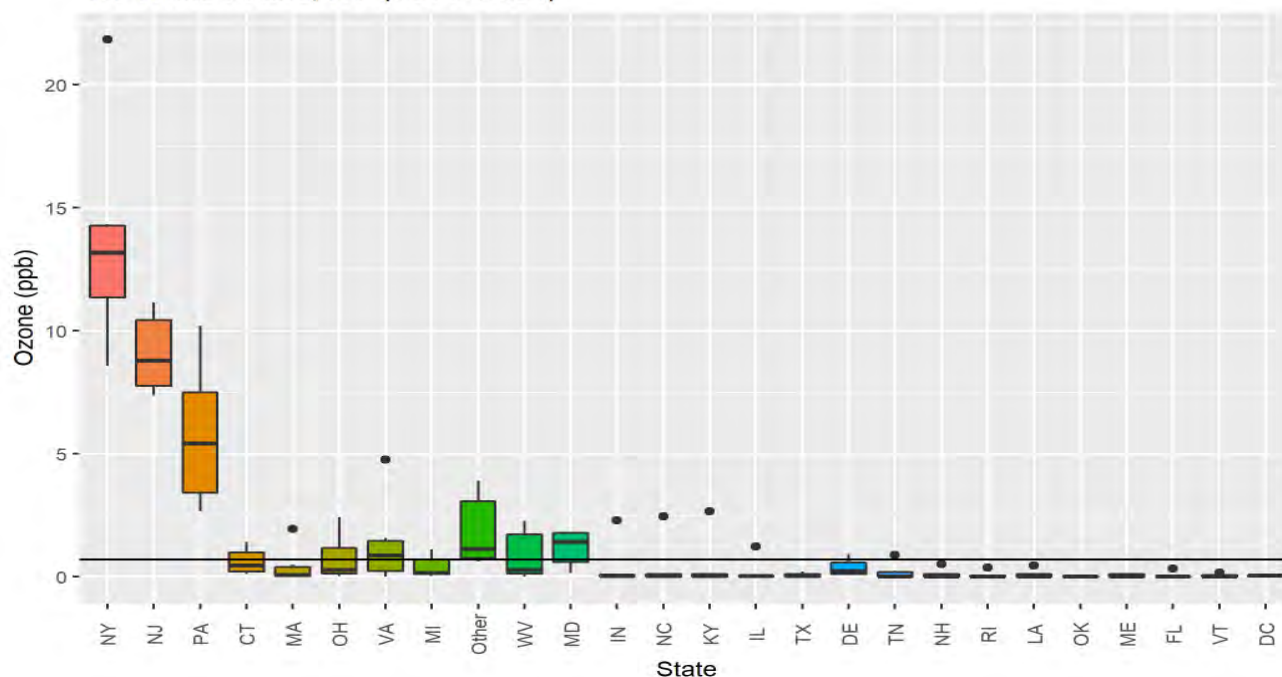
Figure H-25. State Contribution on 13 Highest Modeled Ozone Days at Babylon, NY.

Ozone contribution by US anthropogenic sector on 11 days with highest max 8-hr ozone for Babylon, NY (361030002)

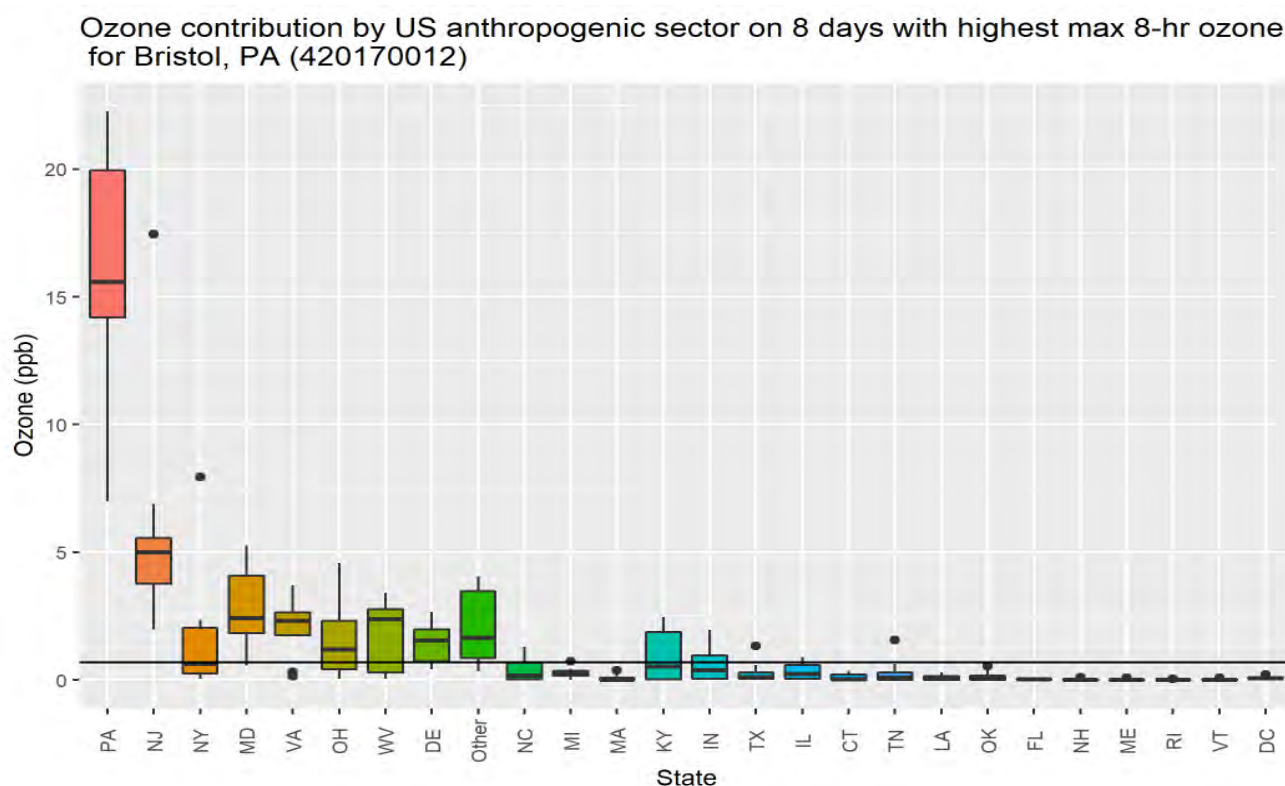


Figures H-26. State Contribution on 13 Highest Modeled Ozone Days at White Plains, NY

Ozone contribution by US anthropogenic sector on 6 days with highest max 8-hr ozone for White Plains, NY (361192004)



Figures H-27. State Contribution on 13 Highest Modeled Ozone Days at Bristol, PA



The states listed in **Tables H-1 through 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 - EGU	Point - EGU	Point - EGU	Point - EGU	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Point - EGU
2	Point - EGU	Point - Non-EGU	Point - Non-EGU	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Combined - Oil & Gas
3	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - Non-EGU	Nonroad - Diesel	Point - EGU	Point - Non-EGU	Point - Non-EGU	Nonpoint	Point - Non-EGU

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 - EGU	Point - EGU	Onroad - Non-Diesel	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Point - EGU
2	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Combined - Oil & Gas
3	Nonroad - Non-Diesel	Point - Non-EGU	Onroad - Non-Diesel	Point - EGU	Nonroad - Diesel	Onroad - Diesel	Point - Non-EGU	Onroad - Diesel	Nonpoint	Point - Non-EGU

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 - EGU	Point - EGU	Point - EGU	Nonpoint	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Combined - Oil & Gas
2	Onroad - Non-Diesel	Nonpoint	Onroad - Non-Diesel	Point - Non-EGU	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonpoint	Point - EGU	Point - EGU
3	Nonroad - Diesel	Point - EGU	Point - Non-EGU	Onroad - Non-Diesel	Onroad - Diesel	Point - EGU	Onroad - Diesel	Onroad - Diesel	Point - Non-EGU	Point - Non-EGU	Onroad - Diesel	Point - Non-EGU

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 - EGU	Onroad - Non-Diesel	Point - EGU
2	Nonroad - Non-Diesel	Point - EGU	Onroad - Non-Diesel	Onroad - Non-Diesel	Nonroad - Diesel	Point - EGU	Nonpoint	Point - EGU	Combined - Oil & Gas

Rank	CT	MD	MI	NJ	NY	OH	PA	VA	WV
3	Nonpoint	Onroad - Non-Diesel	Point - EGU	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 – EGU	Point - Non-EGUs	Nonpoint	Nonpoint	Point - EGU	Point - EGU	Onroad - Non-Diesel	Point - EGU
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 - EGU	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 - EGU	Point - EGU	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 - EGU	Point - EGU	Point - EGU	Point - EGU
3	Onroad - Non-Diesel	Onroad - Diesel	Point – EGU	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 - EGU	Nonpoint
3	Nonroad - Non-Diesel	Onroad - Non-Diesel	Point - EGU	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 - EGU	Point - EGU	Onroad - Diesel	Nonpoint	Onroad - Non-Diesel	Nonpoint	Point - EGU	Nonpoint	Onroad - Non-Diesel	Point - EGU
2	Point - EGU	Onroad - Non-Diesel	Point - Non-EGUs	Point - EGU	Onroad - Non-Diesel	Onroad - Diesel	Onroad - Diesel	Onroad - Non-Diesel	Onroad - Non-Diesel	Point - EGU	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 through 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

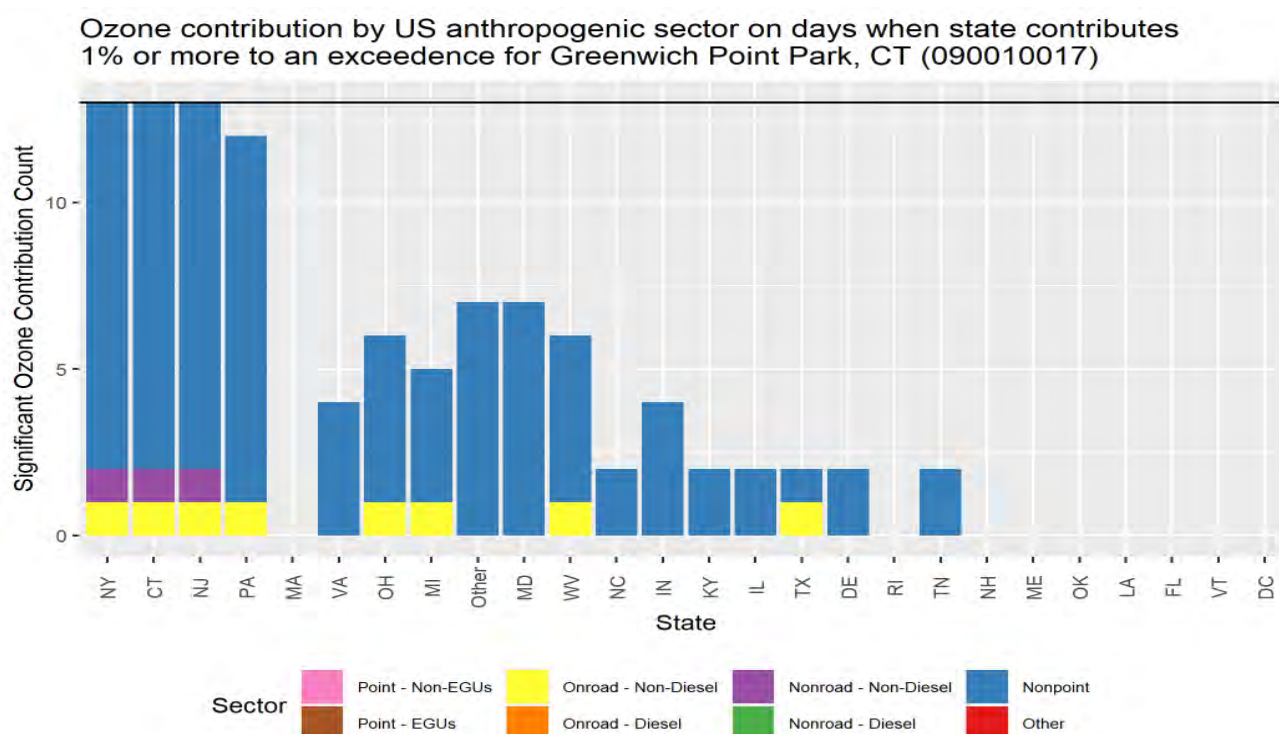


Figure H-29. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Stratford, CT.

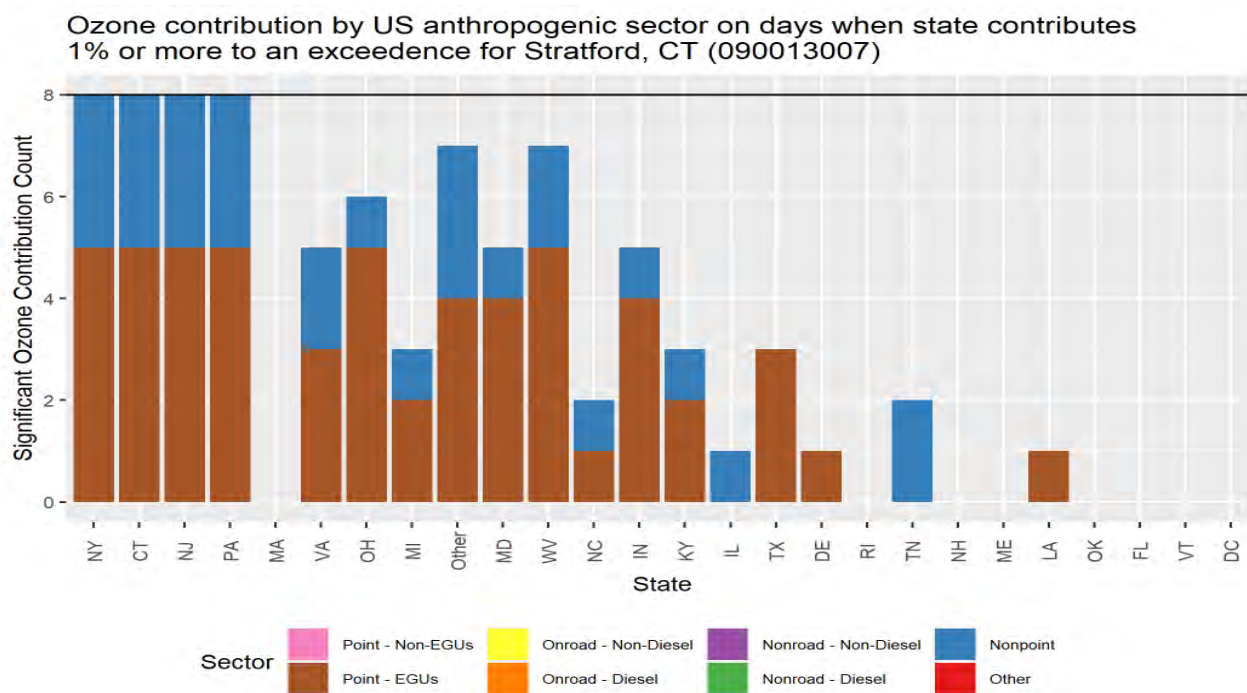


Figure H-30. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Westport, CT.

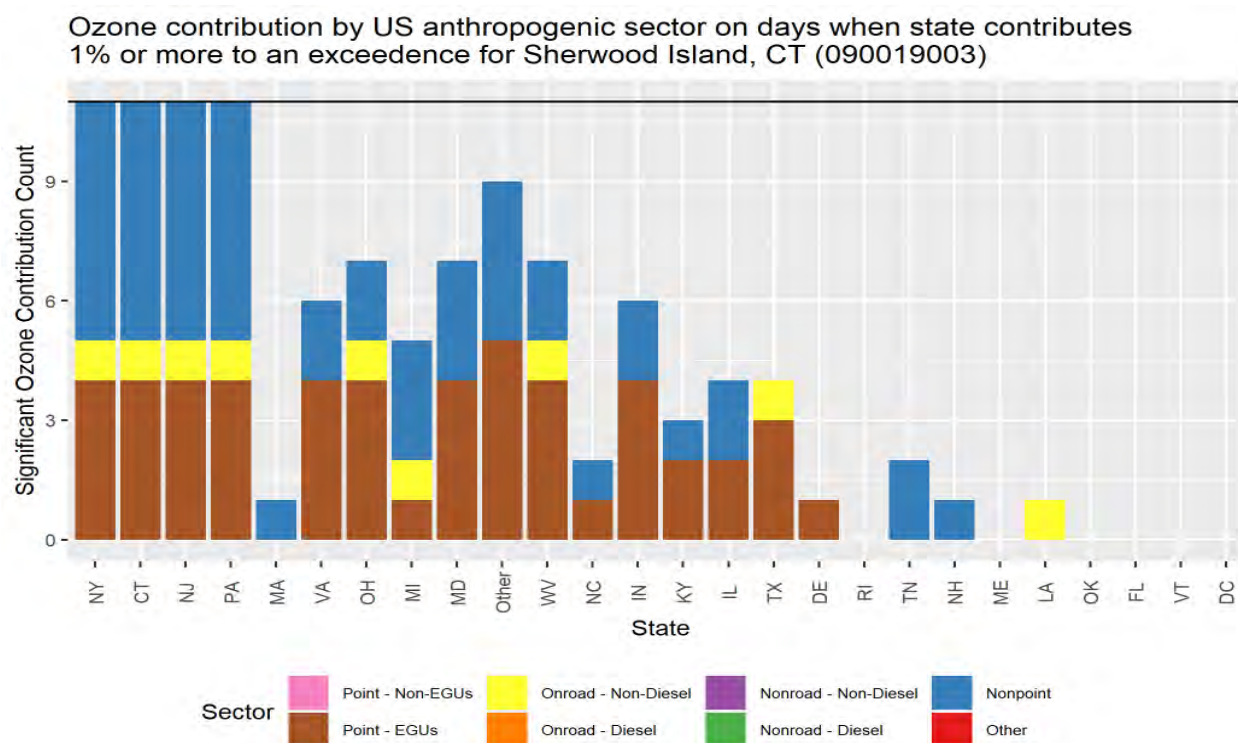


Figure H-31. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Madison, CT

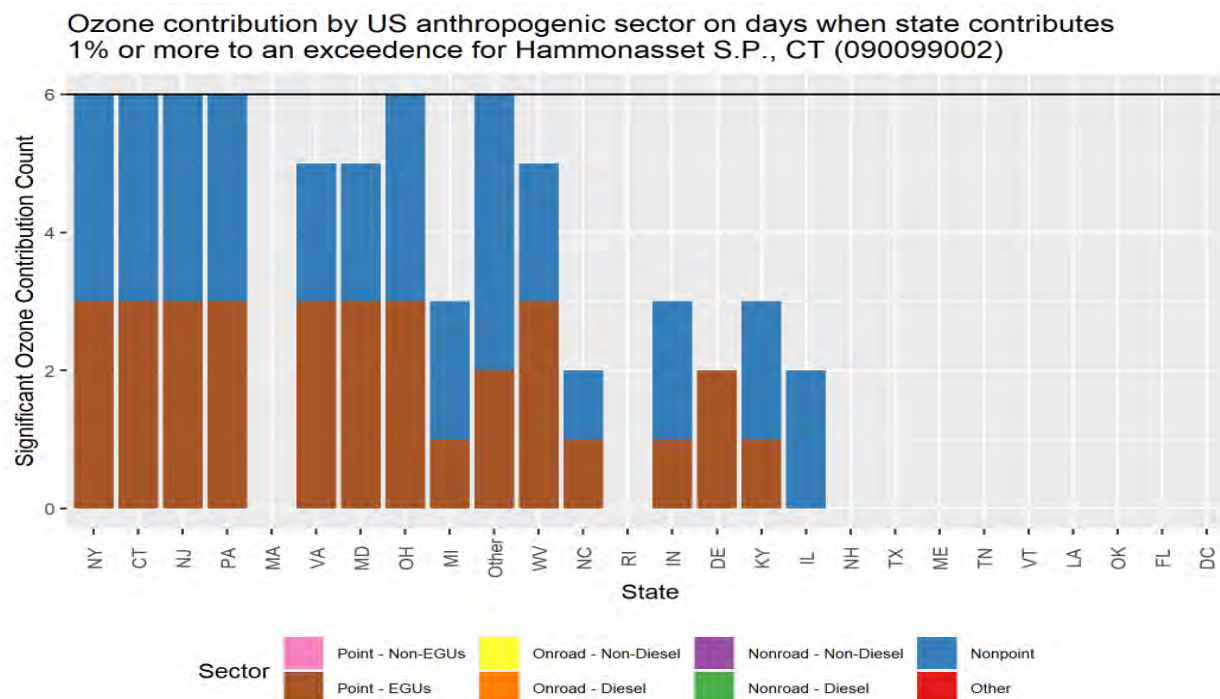


Figure H-32. Anthropogenic Emission Sector Contribution for States with >1% contribution of the

Ozone NAAQS at Groton, CT.

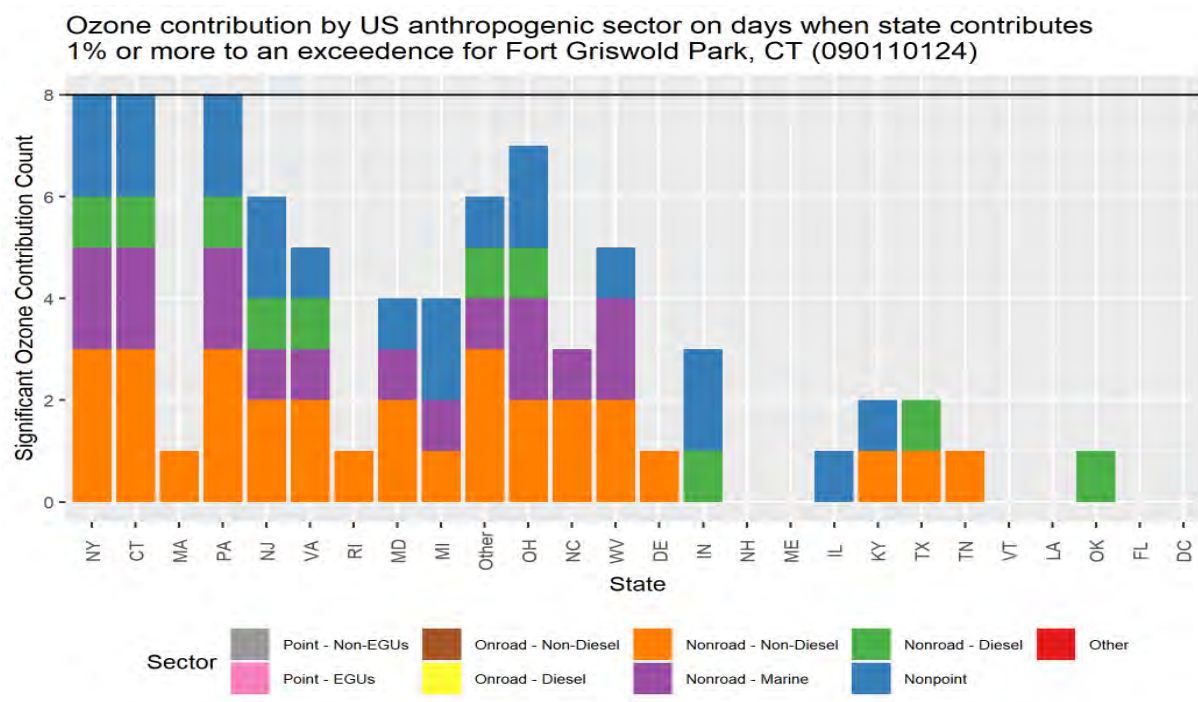


Figure H-34. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Susan Wagner H.S.

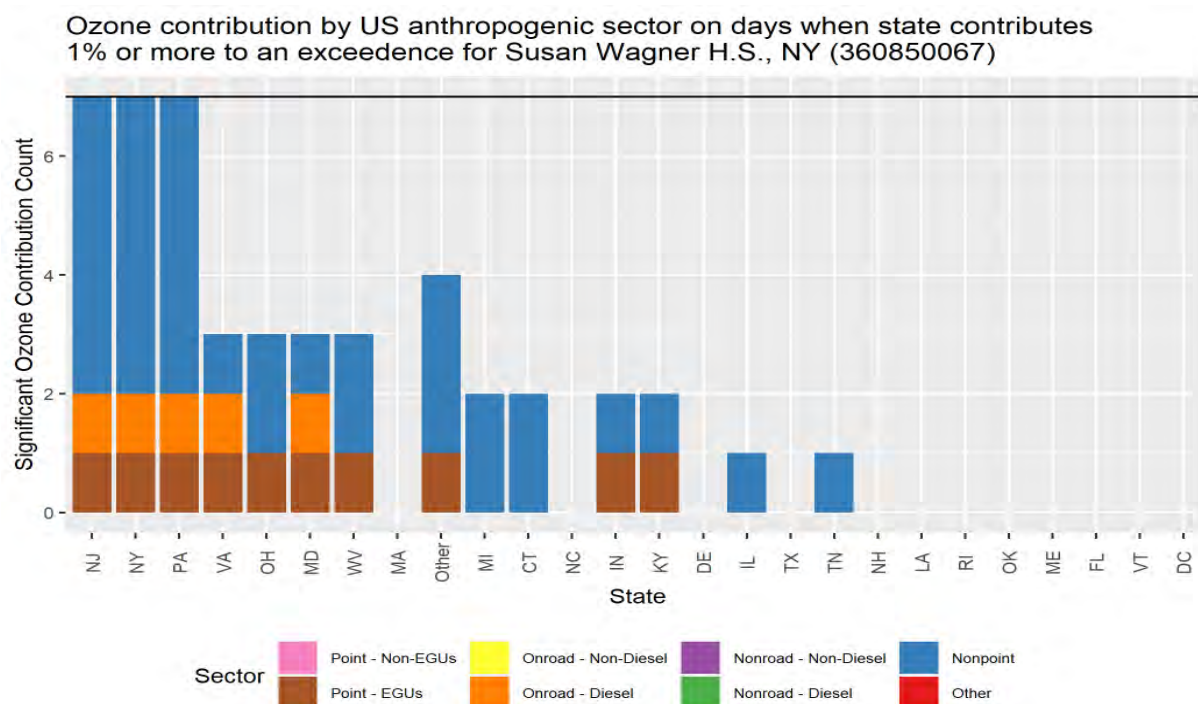


Figure H-35. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Babylon, NY.

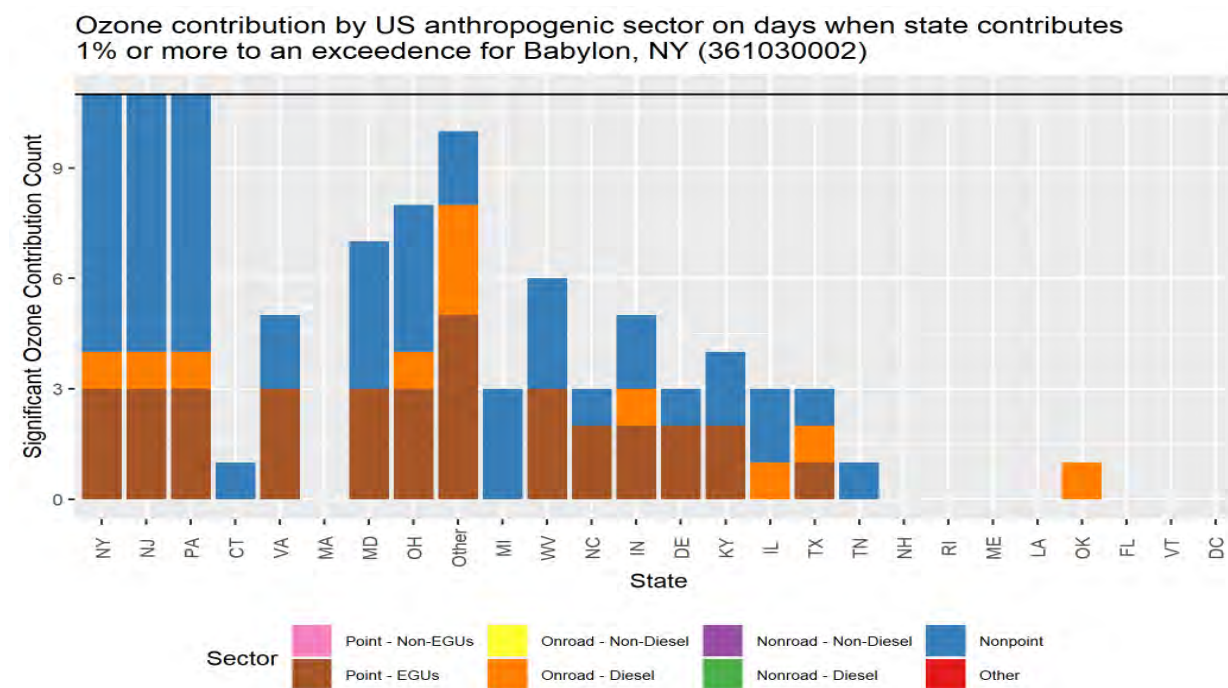


Figure H-36. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at White Plains, NY

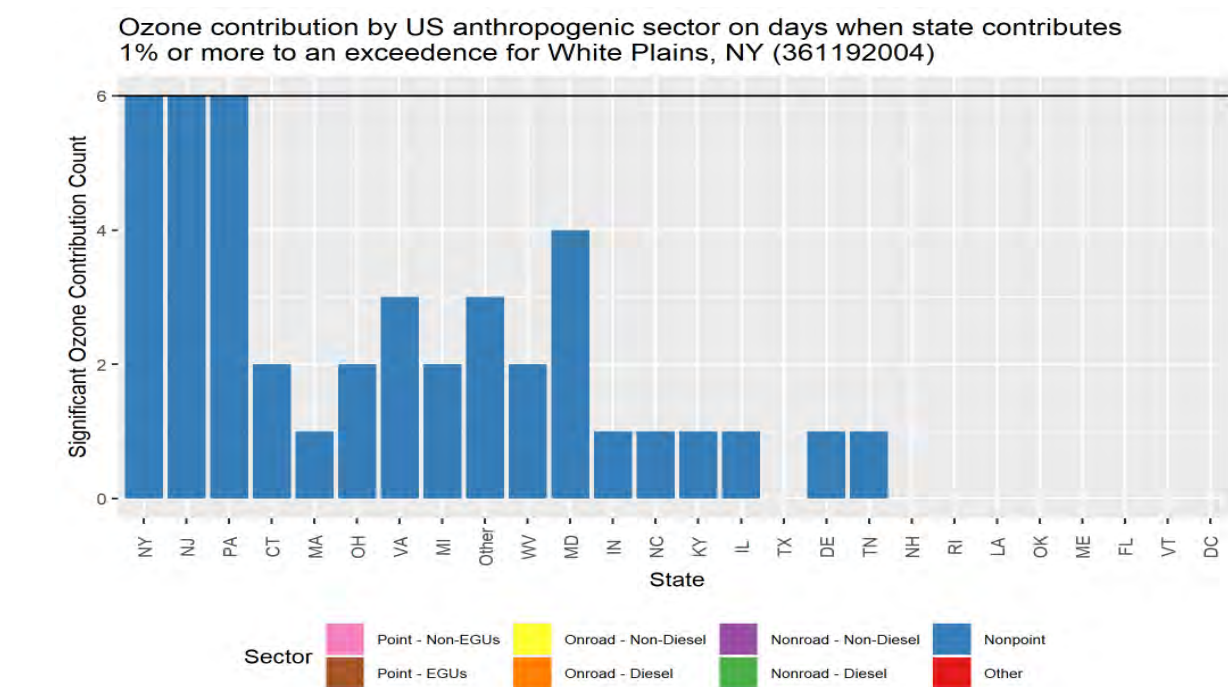
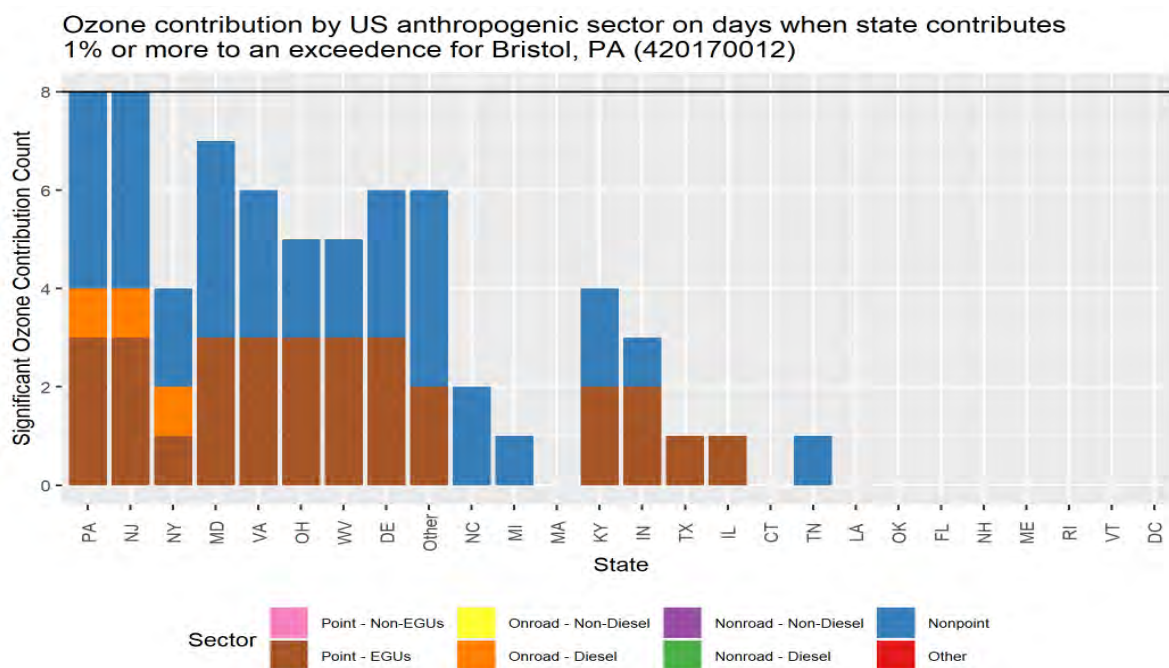


Figure H-37. Anthropogenic Emission Sector Contribution for States with >1% contribution of the Ozone NAAQS at Bristol, NY



Additional Modeling Detail for Select Monitors

		CT: Greenwich Point Park (090010017)				CT: Stratford (090013007)				CT: Sherwood Island (090019003)			
		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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	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 %
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)			
Region	State	Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg	
		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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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	Mexico	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 %

Region	State	MD: Edgewood (240251001)				MD: Beltsville (240339991)				MD: P.G. Equestrian Ctr. (240338003)			
		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg	
		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	Mexico	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)			
Region	State	Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg	
		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		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th 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	Mexico	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 %

Region	State	NY: Holtsville (361030009)				NY: Babylon (361030002)				NY: White Plains (361192004)			
		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg		Exceedance Avg		4 th High Avg	
		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 %

Region	State	PA: NEA (421010024)				PA: Harrison Twsp. (420031008)				PA: Bristol (420170012)			
		Exceedance Avg		4 th High Avg.		Exceedance Ave.		4 th High Avg.		Exceedance Avg.		4 th High Avg.	
		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	Mexico	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		4 th High Avg.		Exceedance Avg.		4 th High Avg.		Exceedance Avg.		4 th 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	Mexico	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 %

Appendix L

Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Technical Support Document: OTC V2/V3 Modeling Platform Update

Ozone Transport Commission

July 14, 2023



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Executive Summary

The purpose of this addendum to the “Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2016 Based Modeling Platform Support Document, dated January 31, 2023” (OTC 2023 TSD) is to describe recent modeling conducted that was not documented in the OTC 2023 TSD that may be used by OTC states for their State Implementation Plan (SIP) attainment demonstrations for the 2008 and 2015 Ozone National Ambient Air Quality Standard (NAAQS).

Because it is a long process and as a result of improving data and methods, EPA issued three versions of the 2016 emissions modeling platform throughout its development. Between releases of the three versions, interim changes to parts of the inventory were released which were later incorporated into the next version. The January 2023 TSD described OTC modeling based on version 1 (V1) of the 2016 emissions inventory platform, which included future year emission inventory projections to 2023 and 2028. Subsequent 2016 inventory platforms, V2 and V3, were released to reflect updates to underlying emissions data and methods for calculation of base and future year emissions as well as including projections for additional future years, including the addition of 2026.

This addendum documents attainment modeling using the 2016 V2 modeling platform updated with the early release of 2016 V3 emissions profiles for commercial marine vessels (CMV) and solvents. In addition, OTC-specific updates to the point source inventory from the Eastern Regional Technical Advisory Committee (ERTAC) EGU projection tool were used instead of emissions from the Integrated Planning Model (IPM) in the standard EPA 2016 V2 inventory. The information contained within this document includes:

- An overview of the updates in the OTC V2/V3 platform.
- A comparison of emission differences between OTC V1 and OTC V2/V3 modeling platforms.
- A comparison of model performance between the Community Multi-scale Air Quality model (CMAQ) and the Comprehensive Air Quality Model with Extensions (CAMx) using both the OTC V1 and OTC V2/V3 modeling platforms.

A summary of emissions inventory inputs and differences are provided in the OTC 2023 TSD, but greater detail on the development and differences in versions can be found in the Environmental Protection Agency’s (EPA) documentation of the 2016 emissions modeling platforms versions 1, 2 and 3.¹

¹ [2014-2016 Version 7 Air Emissions Modeling Platforms | US EPA](#)

1 OTC V2/V3 Platform Updates

The EPA 2016 V1 emissions platform was first released in October 2019 after several years of work by the National Emission Inventory Collaborative, a partnership between state emissions inventory staff, multi-jurisdictional organizations (MJOs), federal land managers (FLMs), EPA, and others. It included estimated emissions for base year 2016 and projected years 2023 and 2028. Detailed documentation of the OTC V1 modeling platform can be found in the OTC 2023 TSD.

Emissions are occasionally updated with improved information or estimation methods. Revisions for the EPA 2016 V1 emissions platform were released for commercial marine vessels (CMV), airports, EPA electricity generating units (EGU) point sources, and OTC EGU point sources subsequent the initial release of the V1 platform. These specific updates are summarized in the OTC 2023 TSD.

With model updates and improved emissions data and forecasts, EPA released the 2016 V2 emissions platform² in 2021. Further changes resulted in the release of the 2016 V3 emissions platform³ in the spring of 2023. The full EPA 2016 V3 emissions platform was not available for the modeling presented here, however portions of the EPA 2016 V3 platform have been incorporated into this version of the OTC modeling, specifically for CMV, solvents, and ERTAC. An overview of the major changes in this modeling platform is provided for the 2016 V2 emissions platform in Section 1.1 and the 2016 V3 emissions platform updates in Section 1.2.

1.1 V2 Emissions Updates

The EPA 2016 V2 emissions platform incorporates updated data, model versions, and methods. Specifically, it includes updated emissions from the Motor Vehicle Emission Simulator version 3 (MOVES3), anthropogenic and biogenic nonpoint source emissions from the 2017 National Emissions Inventory (NEI), and the Western Regional Air Partnership (WRAP) oil and gas inventory. It also includes updated inventory data for emissions from Canada and Mexico.

Projections from the EPA 2016 V2 emissions platform are available for 2023, 2026, and 2032. For future year EGU emissions, the OTC uses projections from the Eastern Regional Technical Advisory Committee (ERTAC) EGU tool in place of EPA's projections from the Integrated Planning Model (IPM). For the 2016 V2/V3 OTC platform, the ERTAC EGU modeled emissions incorporate impacts from the Revised Cross-state Air Pollution Rule Update (RCU). Because the universe of sources in

² <https://www.epa.gov/air-emissions-modeling/2016v2-platform>

³ <https://www.epa.gov/air-emissions-modeling/2016v3-platform>

ERTAC EGU and IPM is not an exact match, use of ERTAC EGU projections also involved adjustments to the non-EGU point inventory so that no sources are dropped or double-counted. Additional details are documented in EPA V2 modeling platform documentation referenced above.

1.2 V3 Emissions Updates

At the time the modeling for this document was performed, the complete EPA 2016 V3 emissions platform was not released. However, there were interim updates to the V2 CMV and solvents sectors for inclusion in V3 that were released early and used in the modeling and analysis presented in this addendum. A list of emissions files used by OTC in the V2/V3 platform are available in Appendix A.

For the CMV Category 1 and 2 engines (CMV_c1c2) and Category 3 engines (CMV_c3) sectors, spatial allocation to county boundaries was improved in response to comments from relevant stakeholders. Overall CMV emissions do not change from V2, but the spatial allocation was improved such that emissions are more accurately assigned to some counties.

For the solvents sector, a new methodology for calculating evaporative emissions from the volatile chemical products (VCP) category of the non-point solvents sector was incorporated into the EPA 2016 V2 platform. The updates improved the distribution and characterization of emissions and removed overlap with the point source sector. EPA responded to several significant comments on the solvents in the 2016 V2 modeling platform inventory, creating an early 2016 V3 platform for use by the OTC states in their modeling. This methodology had not yet been used in any version of the EPA NEI and was a first iteration.

These early interim updates were subsequently used in the final EPA 2016 V3 platform. Additional details are documented in the EPA 2016 V3 modeling platform Technical Support Document.⁴

2 2016 V1 and 2016 V2/3 Emissions Comparisons

2.1 Emissions Totals by State

Tables for emissions of carbon monoxide (CO), nitrogen oxides (NO_x), ammonia (NH₃), fine particulate matter (PM_{2.5}), volatile organic compounds (VOC), and sulfur dioxide (SO₂) per state per sector in the Ozone Transport Region (OTR) are shown below for V1 and V2/V3 2016 (Tables 1-6) and 2023 (Tables 7-12), with 2026 emissions totals

⁴ https://www.epa.gov/system/files/documents/2023-03/2016v3_EmisMod_TSD_January2023_1.pdf

available upon request. The majority of V2/V3 emissions are from V2, with the combined CMV (CMV_c1c2 and CMV_c3) and non-point solvents (NP_Solvents) coming from V3. However we refer to this inventory as V2/V3 throughout the report. Some sectors show no changes between V1 and V2/V3, for example CO emissions from nonroad, while other sectors show large changes between platform versions, for example CO emissions from airports. Specific differences between V1 and V2/V3 for each sector and state may vary, but in general most sectors and states see decreases with V2/V3 with some notable increases in Oil & Gas VOCs, On-road and Agriculture (AG) NH₃, and slight increases for SO₂, VOC, and NO_x from electricity generating units (PTERTAC).

Table 1 CO Emissions for 2016.

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	157,510	147,054	114,949	114,949	273	273	7,555	6,914	2,787	2,073	130	130	2,668	2,668	33,798	26,204
Delaware	65,412	47,888	52,149	52,149	428	428	3,713	2,216	1,085	1,084	43	43	1,292	1,292	3,525	5,679
District of Columbia	24,211	21,256	7,500	7,500	25	25	133	150	4	4	32	32	0	0	348	86
Maine	85,007	73,492	92,124	92,124	439	439	87,451	47,395	2,322	2,035	126	126	8,017	8,017	38,840	57,629
Maryland	288,389	266,896	211,115	211,115	1,184	1,184	19,921	14,709	8,777	6,385	447	447	5,655	5,655	16,945	40,539
Massachusetts	272,379	236,291	229,432	229,432	762	762	14,283	12,070	13,244	8,779	531	531	7,798	7,798	47,930	35,073
New Hampshire	79,401	70,066	67,910	67,910	42	42	19,328	14,144	2,987	2,162	39	39	4,473	4,473	28,987	33,617
New Jersey	384,083	331,955	297,888	297,888	1,988	1,988	14,738	10,782	14,706	9,349	720	720	36,022	36,022	35,165	41,948
New York	645,089	472,513	561,467	561,467	1,020	1,020	78,644	54,164	29,771	18,985	2,128	2,128	27,960	27,960	125,104	65,607
Pennsylvania	644,261	563,190	409,724	409,724	342	342	67,794	53,680	17,118	12,251	2,612	2,612	66,732	66,732	146,541	102,378
Rhode Island	45,232	39,527	29,129	29,129	238	238	1,922	1,730	1,774	1,103	7	7	221	221	8,657	6,366
Vermont	36,886	29,494	33,318	33,318	0	0	17,615	11,941	1,158	970	73	73	2,856	2,856	48,946	38,950
Virginia	578,911	553,613	299,518	299,518	1,738	1,738	94,464	70,243	27,547	16,743	1,820	1,820	163,352	163,352	40,454	66,896
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	123	123	959	1,136	516	515	-	-	11,357	7,993	-	-	-	-		
Delaware	11	11	826	902	1,774	1,741	-	-	2,784	3,040	-	-	-	-		
District of Columbia	0	0		19	224	199	-	-	1,334	1,103	-	-	-	-		
Maine	42	42	6,668	6,692	5,695	5,694	-	-	18,088	26,581	-	-	-	-		
Maryland	52	52	5,554	4,088	4,434	4,426	-	-	36,041	31,323	-	-	-	-		
Massachusetts	156	156	5,191	5,326	32,502	2,296	-	-	56,287	34,903	-	-	-	-		
New Hampshire	0	0	2,047	2,514	993	767	-	-	17,959	15,849	-	-	-	-		
New Jersey	104	104	4,814	4,781	3,924	3,872	-	-	20,560	16,954	-	-	-	-		
New York	1,920	1,960	9,637	8,546	25,196	24,680	-	-	107,802	78,367	-	-	-	-		
Pennsylvania	48,690	57,815	45,642	38,762	33,960	32,693	-	-	136,928	114,713	-	-	-	-		
Rhode Island	99	99	155	155	752	752	-	-	12,174	6,742	-	-	-	-		
Vermont	0	0	193	1,065	1,481	135	-	-	8,279	5,647	-	-	-	-		
Virginia	14,543	5,336	8,839	10,050	20,971	19,320	-	-	74,023	64,994	-	-	-	-		

CMV – commercial marine vessels

PTERTAC – electricity generating units

AG – agriculture

NP_Solvents – non-point solvent sources

RWC – residential wood combustion

PTNONERTAC – non-electricity generating point sources

NONPT – non-point area sources

AFDust - area fugitive dust

Table 2 NO_x Emissions for 2016

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	20,743	17,481	7,840	7,840	1,856	1,720	598	604	622	334	1,041	1,041	46	46	540	471
Delaware	9,327	9,194	3,741	3,741	3,182	3,636	736	1,093	233	232	251	251	18	18	56	90
District of Columbia	3,137	2,167	664	664	162	191	13	24	0	0	200	200	0	0	8	5
Maine	16,291	15,301	6,622	6,622	3,004	3,106	2,325	2,348	365	283	1,013	1,013	97	97	542	870
Maryland	50,604	47,924	10,930	10,930	8,380	8,573	2,970	4,195	3,041	2,131	2,735	2,735	87	87	271	658
Massachusetts	40,627	37,717	15,334	15,334	5,183	5,171	873	910	3,493	1,988	4,027	4,027	125	125	743	660
New Hampshire	11,943	10,490	4,452	4,452	286	222	683	618	625	395	313	313	69	69	421	513
New Jersey	67,673	58,183	21,115	21,115	14,178	10,445	1,283	1,988	6,099	3,227	5,344	5,344	473	473	610	802
New York	104,823	86,805	38,463	38,463	7,249	10,733	8,734	11,280	10,581	5,630	12,776	12,776	406	406	1,895	1,131
Pennsylvania	122,046	115,683	31,177	31,177	2,544	2,639	9,906	12,364	4,201	2,357	14,372	14,372	956	956	2,136	1,698
Rhode Island	8,404	8,099	2,327	2,327	1,642	1,785	149	160	365	220	54	54	4	4	143	121
Vermont	5,314	4,612	5,067	5,067	1	5	1,198	1,276	209	162	584	584	40	40	863	785
Virginia	94,572	85,665	22,137	22,137	12,705	12,648	9,166	11,373	7,801	4,222	9,821	9,821	2,863	2,863	642	1,067
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	214	214	4,057	4,064	745	745	-	-	10,619	10,615	-	-	-	-		
Delaware	19	19	1,407	1,493	1,951	1,867	-	-	2,648	2,657	-	-	-	-		
District of Columbia	0	0	0	68	365	285	-	-	1,650	1,643	-	-	-	-		
Maine	25	25	4,919	4,924	5,041	5,039	-	-	6,244	8,980	-	-	-	-		
Maryland	158	157	10,419	10,447	7,941	7,930	-	-	11,075	11,975	-	-	-	-		
Massachusetts	263	263	7,643	7,975	11,827	3,888	-	-	23,072	21,852	-	-	-	-		
New Hampshire	0	0	1,707	2,187	925	453	-	-	8,427	8,137	-	-	-	-		
New Jersey	233	233	6,852	6,442	4,655	4,606	-	-	20,116	20,142	-	-	-	-		
New York	1,984	2,014	16,177	19,358	17,324	14,154	-	-	53,415	51,475	-	-	-	-		
Pennsylvania	44,692	49,931	81,836	84,500	36,249	33,034	-	-	51,747	50,556	-	-	-	-		
Rhode Island	59	59	448	448	904	904	-	-	2,792	2,617	-	-	-	-		
Vermont	0	0	135	312	273	106	-	-	3,004	2,941	-	-	-	-		
Virginia	10,932	4,252	26,484	28,740	21,192	18,654	-	-	16,988	17,267	-	-	-	-		

Table 3 NH₃ Emissions for 2016

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut Delaware District of Columbia Maine Maryland Massachusetts New Hampshire New Jersey New York Pennsylvania Rhode Island Vermont Virginia	898	959	14	14	-	-	-	-	-	-	0	0	44	44	225	198
	309	324	7	7	-	-	-	-	-	-	0	0	21	21	25	47
	140	129	1	1	-	-	-	-	-	-	0	0	0	0	2	0
	442	475	14	14	-	-	-	-	-	-	0	0	131	131	267	400
	1,688	1,837	22	22	-	-	-	-	-	-	1	1	93	93	122	335
	1,700	1,808	28	28	-	-	-	-	-	-	2	2	128	128	343	274
	389	420	10	10	-	-	-	-	-	-	0	0	74	74	219	240
	2,240	2,365	43	43	-	-	-	-	-	-	2	2	591	591	241	350
	3,570	3,754	75	75	-	-	-	-	-	-	7	7	459	459	865	493
	3,209	3,478	61	61	-	-	-	-	-	-	8	8	1,096	1,096	978	785
237	256	4	4	-	-	-	-	-	-	0	0	4	4	58	50	
206	217	10	10	-	-	-	-	-	-	0	0	47	47	383	263	
2,782	2,939	40	40	-	-	-	-	-	-	6	6	2,693	2,693	289	517	
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut Delaware District of Columbia Maine Maryland Massachusetts New Hampshire New Jersey New York Pennsylvania Rhode Island Vermont Virginia	-	-	170	172	229	229	2,414	2,975	783	788	-	-	-	-		
	-	-	83	89	120	116	6,825	6,436	154	79	-	-	-	-		
	-	-	0	0	0	0	0	5	153	156	-	-	-	-		
	-	-	150	148	306	306	2,621	4,431	369	313	-	-	-	-		
	-	-	147	120	230	230	12,018	3,213	1,288	1,161	-	-	-	-		
	-	-	364	355	471	163	1,159	1,763	1,743	10,299	-	-	-	-		
	-	-	101	133	15	11	705	1,339	205	202	-	-	-	-		
	-	-	857	780	681	674	1,781	2,832	415	408	-	-	-	-		
	-	-	884	783	548	519	33,884	39,126	1,664	1,638	-	-	-	-		
	-	-	1,368	1,617	1,463	1,403	53,722	58,405	3,175	3,177	-	-	-	-		
-	-	24	24	17	16	164	269	253	254	-	-	-	-			
-	-	0	17	24	7	5,562	6,187	110	121	-	-	-	-			
-	-	1,195	695	2,213	1,991	33,138	37,186	1,140	1,157	-	-	-	-			

Table 4 PM_{2.5} Emissions for 2016

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	656	514	791	790	46	46	-	-	36	31	30	30	237	237	4,930	3,523
Delaware	264	284	293	293	66	66	-	-	29	29	7	7	112	112	505	767
District of Columbia	155	105	73	72	4	4	-	-	0	0	6	6	0	0	53	17
Maine	572	528	694	693	72	72	-	-	45	43	29	29	682	682	5,648	7,939
Maryland	1,814	1,583	1,287	1,285	172	172	-	-	147	133	78	78	495	495	2,422	5,449
Massachusetts	1,626	1,402	1,578	1,576	126	126	-	-	161	138	115	115	687	687	7,220	4,761
New Hampshire	427	348	506	505	7	7	-	-	42	36	9	9	392	392	4,258	4,578
New Jersey	2,298	1,946	2,099	2,092	322	322	-	-	171	131	152	152	3,092	3,092	5,014	5,702
New York	4,442	3,444	3,791	3,783	162	162	-	-	334	263	368	368	2,429	2,429	17,988	9,003
Pennsylvania	4,169	3,701	3,347	3,340	66	66	-	-	227	195	415	415	5,788	5,788	21,459	13,896
Rhode Island	325	288	216	216	40	40	-	-	18	15	2	2	20	20	1,263	866
Vermont	220	154	500	498	0	0	-	-	21	20	17	17	247	247	7,546	4,959
Virginia	2,626	2,322	2,372	2,368	268	268	-	-	406	278	285	285	14,563	14,563	5,766	8,825
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	16	16	318	305	142	141	-	-	3,143	2,917	-	-	3,371	4,007	-	-
Delaware	6	6	174	196	437	434	-	-	371	454	-	-	2,494	2,343	-	-
District of Columbia	0	0	0	6	29	23	-	-	434	433	-	-	378	406	-	-
Maine	1	1	697	694	1,266	1,265	-	-	3,305	9,602	-	-	5,941	8,669	-	-
Maryland	11	11	2,427	2,053	997	995	-	-	5,472	6,570	-	-	16,716	11,928	-	-
Massachusetts	14	14	536	569	3,653	733	-	-	8,832	8,820	-	-	18,148	9,355	-	-
New Hampshire	0	0	202	212	289	231	-	-	2,951	2,580	-	-	4,569	4,277	-	-
New Jersey	19	19	1,162	1,161	1,314	1,306	-	-	4,040	4,382	-	-	9,034	6,016	-	-
New York	105	107	1,371	1,616	2,218	1,915	-	-	20,436	17,025	-	-	43,956	33,524	-	-
Pennsylvania	1,136	1,213	5,734	5,033	11,258	10,483	-	-	24,407	25,524	-	-	37,698	24,363	-	-
Rhode Island	6	6	93	93	93	93	-	-	1,442	1,246	-	-	783	772	-	-
Vermont	0	0	1	49	135	87	-	-	1,295	1,354	-	-	3,265	8,439	-	-
Virginia	284	102	1,647	2,121	3,630	3,516	-	-	15,756	17,530	-	-	36,874	20,114	-	-

Table 5 VOC Emissions for 2016

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3
Connecticut	14,748	10,146	8,833	8,884	72	72	68,677	75,710	257	156	46	46	632	632	5,489	3,735
Delaware	5,764	3,126	7,152	7,226	207	207	25,255	13,972	132	132	12	12	305	305	569	849
District of Columbia	2,325	1,260	539	547	5	5	1,478	1,267	0	0	9	9	0	0	62	22
Maine	7,857	5,450	17,730	17,683	118	118	437,655	275,305	180	155	45	45	1,888	1,888	6,028	8,172
Maryland	23,013	17,666	17,994	18,134	514	514	157,380	127,237	1,264	955	125	125	1,337	1,337	2,732	6,044
Massachusetts	24,150	16,871	19,296	19,384	225	225	107,668	104,291	1,233	788	179	179	1,845	1,845	7,724	4,978
New Hampshire	6,870	4,869	9,103	9,137	14	14	113,453	95,220	542	325	14	14	1,058	1,058	4,405	4,716
New Jersey	30,779	21,706	24,843	25,031	703	703	114,470	97,617	2,041	1,150	237	237	8,494	8,494	5,694	5,837
New York	57,504	37,752	53,331	53,366	368	368	437,431	364,307	2,911	1,712	587	587	6,603	6,603	19,627	9,304
Pennsylvania	62,012	43,187	36,000	36,185	147	147	532,770	474,762	1,653	1,031	668	668	15,757	15,757	23,401	14,355
Rhode Island	4,301	3,059	2,443	2,457	71	71	18,303	18,623	154	100	2	2	52	52	1,415	910
Vermont	3,359	2,105	4,896	4,882	0	0	87,629	71,303	103	87	26	26	674	674	7,326	5,462
Virginia	50,020	36,093	26,631	26,853	729	729	899,017	754,378	6,593	3,519	460	460	38,717	38,717	6,504	10,181
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3		
Connecticut	86	86	111	116	666	536	181	181	8,923	5,254	33,206	26,778	-	-		
Delaware	5	5	103	107	850	766	540	471	1,488	1,429	4,659	6,768	-	-		
District of Columbia	0	0	0	2	55	15	0	0	425	285	4,404	4,464	-	-		
Maine	53	53	197	206	2,365	1,951	168	168	2,956	3,018	11,990	10,833	-	-		
Maryland	40	40	260	288	1,846	1,652	881	42	14,132	8,756	35,397	44,962	-	-		
Massachusetts	78	78	316	327	4,846	1,412	74	74	17,917	15,190	55,620	51,584	-	-		
New Hampshire	0	0	80	83	238	146	47	47	2,472	2,422	10,605	11,219	-	-		
New Jersey	125	125	222	223	6,616	5,562	118	118	46,372	18,538	32,507	68,267	-	-		
New York	7,018	6,087	950	1,150	6,380	4,851	2,309	2,309	37,117	37,599	169,342	147,231	-	-		
Pennsylvania	90,763	115,443	974	1,107	20,160	11,789	3,952	3,952	27,086	24,629	143,382	127,769	-	-		
Rhode Island	33	33	7	7	933	570	10	10	1,562	1,092	9,371	8,386	-	-		
Vermont	0	0	4	42	320	33	404	404	1,732	1,502	5,747	5,034	-	-		
Virginia	11,848	8,642	798	924	16,371	8,843	2,357	2,357	31,315	30,477	58,634	70,189	-	-		

Table 6 SO₂ Emissions for 2016

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	297	300	18	15	7	7	-	-	89	48	0	0	23	23	114	95
Delaware	104	100	9	8	84	84	-	-	23	23	0	0	10	10	10	19
District of Columbia	52	49	1	1	0	0	-	-	0	0	0	0	0	0	1	0
Maine	159	156	18	16	23	23	-	-	47	35	0	0	56	56	150	278
Maryland	616	594	28	26	153	153	-	-	389	254	2	2	45	45	49	134
Massachusetts	627	617	36	31	54	54	-	-	469	262	2	2	64	64	164	126
New Hampshire	142	139	12	11	4	4	-	-	82	50	0	0	36	36	105	154
New Jersey	774	753	52	41	227	227	-	-	713	377	3	3	265	265	107	141
New York	1,332	1,325	95	81	94	94	-	-	1,410	744	8	8	217	217	444	269
Pennsylvania	1,034	972	74	54	55	55	-	-	603	332	9	9	515	515	544	397
Rhode Island	84	79	5	4	15	15	-	-	51	29	0	0	2	2	28	21
Vermont	80	76	11	7	0	0	-	-	28	20	0	0	22	22	262	178
Virginia	908	883	49	40	260	260	-	-	1,060	566	6	6	1,422	1,422	119	228
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	3	3	517	521	94	94	-	-	7,882	7,878	-	-	-	-		
Delaware	0	0	568	579	753	745	-	-	425	399	-	-	-	-		
District of Columbia	0	0	0	0	21	21	-	-	40	40	-	-	-	-		
Maine	1	1	1,643	1,668	1,549	1,549	-	-	6,011	6,345	-	-	-	-		
Maryland	0	0	17,010	17,077	10,043	10,043	-	-	3,590	3,765	-	-	-	-		
Massachusetts	2	2	2,344	2,348	4,255	814	-	-	7,451	7,316	-	-	-	-		
New Hampshire	0	0	655	692	508	486	-	-	4,362	4,337	-	-	-	-		
New Jersey	6	6	1,924	1,932	834	834	-	-	1,062	1,076	-	-	-	-		
New York	23	28	4,919	4,943	16,459	7,153	-	-	6,282	6,022	-	-	-	-		
Pennsylvania	1,107	1,743	98,810	98,709	21,400	15,772	-	-	9,247	9,075	-	-	-	-		
Rhode Island	2	2	14	14	328	328	-	-	322	276	-	-	-	-		
Vermont	0	0	1	2	44	42	-	-	511	492	-	-	-	-		
Virginia	54	45	11,151	14,935	22,183	22,101	-	-	3,704	3,693	-	-	-	-		

Table 7 CO emissions for 2023

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	106,103	93,131	113,627	113,627	274	274	7,555	6,914	2,824	2,092	128	128	2,668	2,668	32,777	26,287
Delaware	45,935	34,267	53,899	53,899	499	499	3,713	2,216	1,144	1,154	43	43	1,292	1,292	3,499	5,629
District of Columbia	17,083	16,221	7,647	7,647	25	25	133	150	4	4	32	32	0	0	352	92
Maine	59,583	52,543	86,371	86,371	451	451	87,451	47,395	2,569	2,220	127	127	8,017	8,017	36,690	54,854
Maryland	202,542	188,137	215,559	215,559	1,340	1,340	19,921	14,709	9,355	7,062	443	443	5,655	5,655	16,830	40,230
Massachusetts	191,085	165,465	227,652	227,652	792	792	14,283	12,070	14,565	9,466	515	515	7,798	7,798	47,370	35,380
New Hampshire	56,935	52,566	66,049	66,049	45	45	19,328	14,144	2,752	2,097	39	39	4,473	4,473	28,026	32,360
New Jersey	256,511	210,903	296,604	296,604	2,144	2,144	14,738	10,782	16,915	10,406	693	693	36,022	36,022	34,099	42,888
New York	475,427	369,044	588,967	588,967	1,085	1,085	78,644	54,164	32,117	19,202	2,093	2,093	27,960	27,960	119,192	64,672
Pennsylvania	433,476	385,790	405,486	405,486	370	370	67,794	53,680	18,714	13,076	2,630	2,630	66,732	66,732	139,724	101,652
Rhode Island	30,722	26,391	28,491	28,491	247	247	1,922	1,730	1,881	1,074	7	7	221	221	8,446	6,484
Vermont	26,868	21,939	32,505	32,505	0	0	17,615	11,941	1,109	837	74	74	2,856	2,856	50,544	41,020
Virginia	411,777	401,467	293,639	293,639	1,958	1,958	94,464	70,243	28,700	16,425	1,833	1,833	163,352	163,352	40,070	65,578
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	179	155	3,776	1,297	535	532	-	-	11,606	8,703	-	-	-	-		
Delaware	11	11	972	945	1,878	1,842	-	-	3,075	3,390	-	-	-	-		
District of Columbia	0	0	1	466	239	209	-	-	1,441	1,236	-	-	-	-		
Maine	62	53	2,858	5,456	5,142	4,941	-	-	18,197	26,377	-	-	-	-		
Maryland	76	65	10,181	5,673	4,331	4,084	-	-	36,467	31,938	-	-	-	-		
Massachusetts	154	152	6,962	4,766	32,631	2,354	-	-	56,847	35,999	-	-	-	-		
New Hampshire	0	0	1,121	1,062	987	756	-	-	18,031	16,032	-	-	-	-		
New Jersey	132	118	14,513	5,827	4,092	4,096	-	-	20,976	17,236	-	-	-	-		
New York	2,143	2,027	21,837	18,208	25,153	23,672	-	-	107,886	78,406	-	-	-	-		
Pennsylvania	51,416	66,015	76,662	44,550	35,430	33,122	-	-	138,686	117,313	-	-	-	-		
Rhode Island	148	128	1,881	675	928	746	-	-	12,233	6,880	-	-	-	-		
Vermont	0	0	42	1,320	1,483	137	-	-	8,344	5,770	-	-	-	-		
Virginia	12,382	4,784	17,233	10,868	22,488	20,898	-	-	75,011	66,203	-	-	-	-		

Table 8 NO_x emissions for 2023

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	8,758	6,911	5,446	5,446	1,341	1,341	598	604	688	374	1,024	1,024	46	46	560	504
Delaware	4,051	4,084	3,018	3,018	774	774	736	1,093	231	232	216	216	18	18	58	94
District of Columbia	1,689	1,051	390	390	2,076	2,076	13	24	0	0	178	178	0	0	9	5
Maine	7,562	7,208	5,092	5,092	2,232	2,232	2,325	2,348	415	297	1,023	1,023	97	97	550	918
Maryland	22,746	22,815	7,895	7,895	6,975	6,975	2,970	4,195	3,264	2,297	2,398	2,398	87	87	283	691
Massachusetts	19,509	19,702	10,423	10,423	3,912	3,912	873	910	4,415	2,501	3,804	3,804	125	125	775	712
New Hampshire	5,661	4,942	3,334	3,334	221	221	683	618	564	396	317	317	69	69	432	543
New Jersey	26,747	24,014	15,233	15,233	11,213	11,213	1,283	1,988	7,484	3,881	4,959	4,959	473	473	634	868
New York	52,134	46,234	29,238	29,238	5,803	5,803	8,734	11,280	12,210	6,149	10,979	10,979	406	406	1,938	1,210
Pennsylvania	57,905	56,412	22,071	22,071	2,019	2,019	9,906	12,364	5,552	2,963	12,215	12,215	956	956	2,181	1,804
Rhode Island	3,783	3,931	1,586	1,586	1,234	1,234	149	160	446	241	55	55	4	4	149	129
Vermont	2,670	2,251	3,481	3,481	1	1	1,198	1,276	215	171	591	591	40	40	963	903
Virginia	42,759	39,482	14,235	14,235	10,544	10,544	9,166	11,373	8,950	4,651	8,265	8,265	2,863	2,863	672	1,115

State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	237	219	4,777	4,026	791	789	-	-	10,546	11,327	-	-	-	-
Delaware	19	19	1,198	1,011	2,006	1,955	-	-	2,968	3,123	-	-	-	-
District of Columbia	0	0	1	93	390	292	-	-	1,788	1,881	-	-	-	-
Maine	26	24	3,056	3,417	4,727	4,606	-	-	6,033	8,757	-	-	-	-
Maryland	209	185	9,706	4,792	7,661	5,532	-	-	11,516	12,815	-	-	-	-
Massachusetts	254	248	5,559	4,658	12,008	3,577	-	-	22,821	22,564	-	-	-	-
New Hampshire	0	0	597	1,103	907	430	-	-	8,253	8,254	-	-	-	-
New Jersey	297	266	8,203	6,185	4,721	4,652	-	-	20,047	20,068	-	-	-	-
New York	2,190	2,068	22,147	18,866	15,840	12,105	-	-	53,417	51,476	-	-	-	-
Pennsylvania	48,843	56,920	47,762	34,026	44,494	31,244	-	-	52,918	54,018	-	-	-	-
Rhode Island	87	75	890	554	945	876	-	-	2,787	2,785	-	-	-	-
Vermont	0	0	21	298	274	108	-	-	2,990	3,010	-	-	-	-
Virginia	11,587	4,698	15,314	16,189	16,051	13,995	-	-	17,824	19,014	-	-	-	-

Table 9 NH₃ emissions for 2023

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3
Connecticut	769	816	16	16	-	-	-	-	-	-	0	0	44	44	215	198
Delaware	272	311	7	7	-	-	-	-	-	-	0	0	21	21	25	46
District of Columbia	142	126	1	1	-	-	-	-	-	-	0	0	0	0	2	0
Maine	398	454	15	15	-	-	-	-	-	-	0	0	131	131	246	373
Maryland	1,550	1,797	25	25	-	-	-	-	-	-	1	1	93	93	122	334
Massachusetts	1,529	1,623	31	31	-	-	-	-	-	-	2	2	128	128	339	276
New Hampshire	368	422	11	11	-	-	-	-	-	-	0	0	74	74	211	228
New Jersey	1,916	2,046	50	50	-	-	-	-	-	-	2	2	591	591	230	359
New York	3,312	3,770	86	86	-	-	-	-	-	-	7	7	459	459	809	484
Pennsylvania	2,812	3,225	68	68	-	-	-	-	-	-	8	8	1,096	1,096	913	777
Rhode Island	208	224	5	5	-	-	-	-	-	-	0	0	4	4	56	51
Vermont	195	214	12	12	-	-	-	-	-	-	0	0	47	47	399	281
Virginia	2,416	2,761	43	43	-	-	-	-	-	-	6	6	2,693	2,693	286	507
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3	V1	V2/N3		
Connecticut	-	-	399	210	233	233	2,520	3,060	790	839	-	-	-	-		
Delaware	-	-	102	84	79	64	7,524	7,004	164	91	-	-	-	-		
District of Columbia	-	-	0	8	0	0	0	5	171	174	-	-	-	-		
Maine	-	-	65	45	277	277	2,732	4,520	363	312	-	-	-	-		
Maryland	-	-	883	879	231	231	12,599	3,214	1,336	1,212	-	-	-	-		
Massachusetts	-	-	474	272	462	156	1,174	1,778	1,774	10,422	-	-	-	-		
New Hampshire	-	-	98	126	15	11	719	1,352	201	208	-	-	-	-		
New Jersey	-	-	1,690	983	703	697	1,697	2,747	409	401	-	-	-	-		
New York	-	-	1,708	1,552	537	518	34,236	39,382	1,664	1,638	-	-	-	-		
Pennsylvania	-	-	3,718	3,631	1,552	1,489	55,791	60,476	3,210	3,397	-	-	-	-		
Rhode Island	-	-	99	19	17	17	170	274	258	273	-	-	-	-		
Vermont	-	-	0	21	23	6	5,539	6,151	108	124	-	-	-	-		
Virginia	-	-	2,564	1,784	1,829	1,646	34,353	38,457	1,207	1,278	-	-	-	-		

Table 10 PM_{2.5} emissions for 2023

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	435	354	568	565	35	35	-	-	35	30	30	30	237	237	4,717	3,472
Delaware	164	147	213	212	68	68	-	-	30	30	6	6	112	112	495	750
District of Columbia	109	81	40	40	3	3	-	-	0	0	5	5	0	0	53	18
Maine	331	290	454	451	57	57	-	-	48	46	29	29	682	682	5,253	7,410
Maryland	1,107	914	976	972	165	165	-	-	148	140	66	66	495	495	2,375	5,334
Massachusetts	1,035	895	1,084	1,077	101	101	-	-	164	136	108	108	687	687	7,080	4,729
New Hampshire	255	209	362	360	6	6	-	-	38	35	9	9	392	392	4,069	4,318
New Jersey	1,187	980	1,507	1,493	282	282	-	-	183	138	139	139	3,092	3,092	4,785	5,753
New York	2,735	2,119	2,702	2,683	137	137	-	-	340	250	302	302	2,429	2,429	16,860	8,730
Pennsylvania	2,451	2,051	2,396	2,378	58	58	-	-	236	195	330	330	5,788	5,788	20,186	13,558
Rhode Island	185	154	144	143	31	31	-	-	18	14	2	2	20	20	1,217	869
Vermont	145	108	334	330	0	0	-	-	18	17	17	17	247	247	7,736	5,123
Virginia	1,624	1,394	1,626	1,616	258	258	-	-	400	251	224	224	14,563	14,563	5,635	8,498
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	23	20	645	568	146	145	-	-	3,100	2,869	-	-	3,477	4,119		
Delaware	6	6	198	157	460	441	-	-	390	477	-	-	2,626	2,592		
District of Columbia	0	0	17	57	32	25	-	-	464	467	-	-	398	454		
Maine	1	1	344	451	1,187	1,181	-	-	3,279	9,314	-	-	6,069	8,923		
Maryland	16	14	3,204	1,676	967	682	-	-	5,558	6,661	-	-	17,616	12,951		
Massachusetts	18	16	587	481	3,682	639	-	-	8,810	8,740	-	-	18,374	9,610		
New Hampshire	0	0	93	187	285	227	-	-	2,936	2,584	-	-	4,951	4,837		
New Jersey	29	25	2,145	1,369	1,338	1,323	-	-	4,110	4,452	-	-	9,257	6,120		
New York	136	126	2,891	2,824	2,089	1,668	-	-	20,478	17,066	-	-	44,946	35,150		
Pennsylvania	1,718	1,799	7,959	5,930	12,043	10,371	-	-	24,370	25,364	-	-	38,770	26,310		
Rhode Island	9	8	214	93	116	92	-	-	1,436	1,248	-	-	832	836		
Vermont	0	0	4	80	129	81	-	-	1,289	1,349	-	-	3,317	8,553		
Virginia	287	110	2,929	2,899	3,617	3,540	-	-	15,949	17,751	-	-	37,490	21,240		

Table 11 VOC emissions for 2023

State	Onroad			Nonroad			CMV			Biogenic			Airports			Rail			Fires			RWC		
	V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3	
Connecticut	8,781	6,390		7,185	7,233		55	55		68,677	75,710		267	161		48	48		632	632		5,268	3,744	
Delaware	3,524	1,982		4,694	4,756		242	242		25,255	13,972		133	133		10	10		305	305		549	832	
District of Columbia	1,664	874		439	447		3	3		1,478	1,267		0	0		8	8		0	0		62	24	
Maine	4,599	3,537		11,597	11,561		99	99		437,655	275,305		186	159		47	47		1,888	1,888		5,701	7,933	
Maryland	13,746	11,515		14,531	14,667		581	581		157,380	127,237		1,333	1,017		107	107		1,337	1,337		2,636	5,917	
Massachusetts	15,242	11,061		14,750	14,832		204	204		107,668	104,291		1,439	900		175	175		1,845	1,845		7,542	5,014	
New Hampshire	4,408	3,444		6,542	6,574		14	14		113,453	95,220		507	322		15	15		1,058	1,058		4,237	4,603	
New Jersey	17,677	12,973		19,152	19,323		707	707		114,470	97,617		2,311	1,279		227	227		8,494	8,494		5,446	5,932	
New York	36,864	26,960		42,839	42,896		359	359		437,431	364,307		3,143	1,756		490	490		6,603	6,603		18,611	9,240	
Pennsylvania	36,570	27,189		29,070	29,350		142	142		532,770	474,762		1,796	1,099		536	536		15,757	15,757		22,258	14,300	
Rhode Island	2,593	1,968		1,815	1,827		63	63		18,303	18,623		173	103		3	3		52	52		1,363	923	
Vermont	2,178	1,470		3,667	3,653		0	0		87,629	71,303		81	81		28	28		674	674		7,518	5,678	
Virginia	29,306	23,056		20,662	20,878		811	811		899,017	754,378		6,711	3,508		363	363		38,717	38,717		6,265	9,860	
State	Oil & Gas			PTERTAC			PTNONERTAC			AG			NONPT			NP_Solvents			AFDust					
	V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3		V1	V2/N3	
Connecticut	128	111		160	173		698	561		-	-		38,638	27,211		30,317	21,171		-	-		-	-	
Delaware	5	5		91	92		820	685		-	-		6,229	8,491		4,823	5,077		-	-		-	-	
District of Columbia	0	0		14	60		56	16		-	-		5,321	5,268		4,905	4,008		-	-		-	-	
Maine	79	68		267	292		2,213	1,798		-	-		14,812	13,547		11,938	9,947		-	-		-	-	
Maryland	59	50		451	1,489		1,832	1,349		-	-		45,842	47,525		32,398	34,092		-	-		-	-	
Massachusetts	79	79		341	476		4,767	1,400		-	-		73,868	67,759		56,850	43,214		-	-		-	-	
New Hampshire	0	0		72	97		248	157		-	-		13,072	13,621		10,664	9,436		-	-		-	-	
New Jersey	187	161		571	413		6,405	5,324		-	-		79,787	87,879		33,370	61,436		-	-		-	-	
New York	6,416	5,442		1,598	2,372		6,507	4,842		-	-		203,924	181,407		170,675	106,445		-	-		-	-	
Pennsylvania	104,903	130,059		1,820	2,244		20,004	11,503		-	-		172,353	155,658		146,649	97,887		-	-		-	-	
Rhode Island	49	42		116	54		1,004	588		-	-		10,968	9,391		9,488	6,224		-	-		-	-	
Vermont	0	0		5	101		290	32		-	-		7,416	6,492		5,770	4,745		-	-		-	-	
Virginia	10,997	7,329		987	1,599		15,121	8,732		-	-		90,601	103,651		61,346	64,490		-	-		-	-	

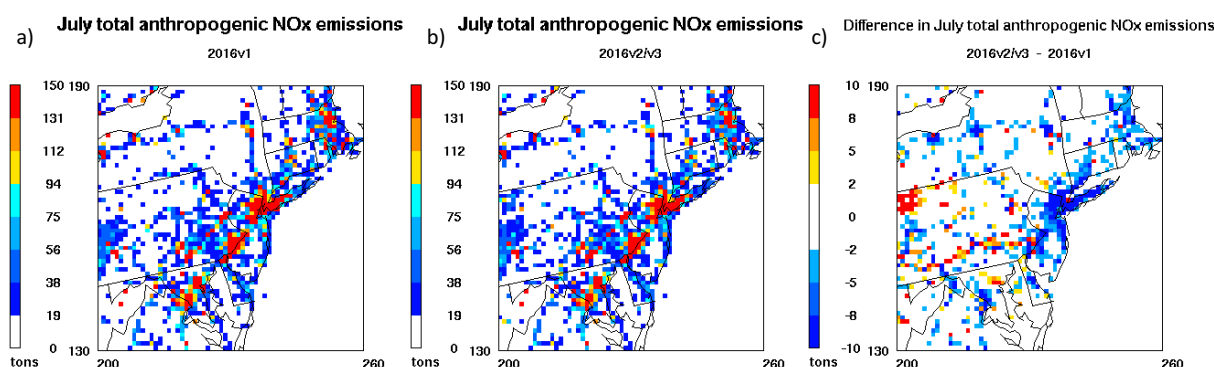
Table 12 SO₂ emissions for 2023.

State	Onroad		Nonroad		CMV		Biogenic		Airports		Rail		Fires		RWC	
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3
Connecticut	88	83	12	8	7	7	-	-	98	53	0	0	23	23	105	89
Delaware	34	32	5	4	105	105	-	-	23	23	0	0	10	10	10	18
District of Columbia	15	15	1	1	0	0	-	-	0	0	0	0	0	0	1	0
Maine	56	49	10	7	25	25	-	-	55	37	0	0	56	56	131	242
Maryland	213	190	17	12	192	192	-	-	423	278	2	2	45	45	49	127
Massachusetts	198	175	23	15	61	61	-	-	592	330	2	2	64	64	157	120
New Hampshire	46	43	7	5	5	5	-	-	74	49	0	0	36	36	95	136
New Jersey	245	213	38	23	270	270	-	-	882	454	2	2	265	265	98	139
New York	425	405	65	43	100	100	-	-	1,616	809	7	7	217	217	392	246
Pennsylvania	408	345	53	31	63	63	-	-	767	408	9	9	515	515	485	366
Rhode Island	31	25	4	2	16	16	-	-	63	32	0	0	2	2	26	20
Vermont	25	22	10	5	0	0	-	-	31	21	0	0	22	22	272	190
Virginia	311	280	31	20	322	322	-	-	1,201	619	6	6	1,422	1,422	119	213
State	Oil & Gas		PTERTAC		PTNONERTAC		AG		NONPT		NP_Solvents		AFDust			
	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3	V1	V2/V3		
Connecticut	4	3	868	898	91	91	-	-	362	372	-	-	-	-		
Delaware	0	0	577	397	733	712	-	-	81	55	-	-	-	-		
District of Columbia	0	0	0	0	17	17	-	-	43	50	-	-	-	-		
Maine	1	1	760	1,297	1,127	1,121	-	-	272	585	-	-	-	-		
Maryland	0	0	8,646	3,430	9,334	389	-	-	3,788	4,062	-	-	-	-		
Massachusetts	2	2	1,254	1,096	3,955	447	-	-	769	652	-	-	-	-		
New Hampshire	0	0	181	194	205	182	-	-	194	171	-	-	-	-		
New Jersey	9	8	2,480	1,970	813	811	-	-	353	367	-	-	-	-		
New York	67	64	2,379	2,253	11,326	5,994	-	-	6,282	6,022	-	-	-	-		
Pennsylvania	998	2,131	69,095	40,546	21,519	15,516	-	-	3,674	3,685	-	-	-	-		
Rhode Island	3	2	10	6	160	160	-	-	131	86	-	-	-	-		
Vermont	0	0	0	2	14	12	-	-	129	107	-	-	-	-		
Virginia	133	67	3,256	8,190	11,273	11,164	-	-	3,860	4,291	-	-	-	-		

2.2 Spatial Variations in Emissions Differences

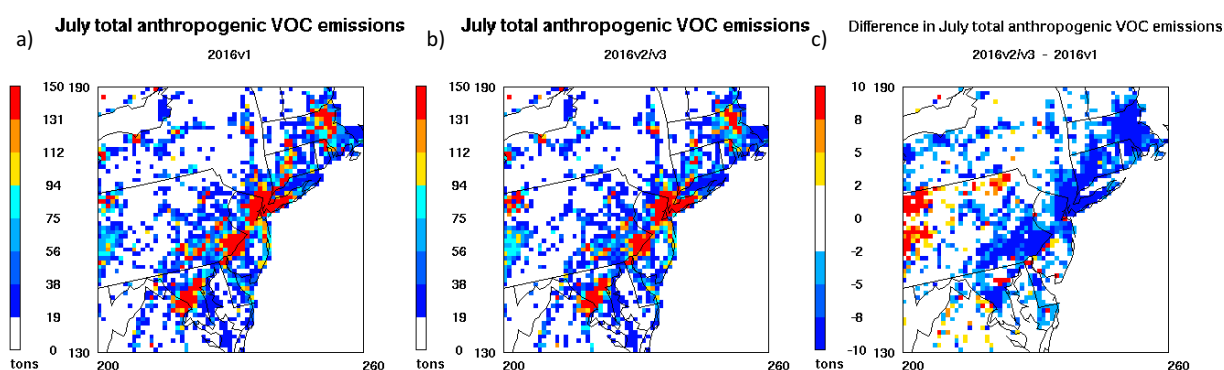
As the emissions totals changed from V1 to V2/V3, so did the spatial allocation. Examples of these changes in anthropogenic NO_x emissions totals are shown in Figure 1 for July 2016.

Figure 1 July 2016 total anthropogenic NO_x emissions for (a) V1, (b) CMAQ with V2/V3, and (c) the difference, V2/V3-V1.



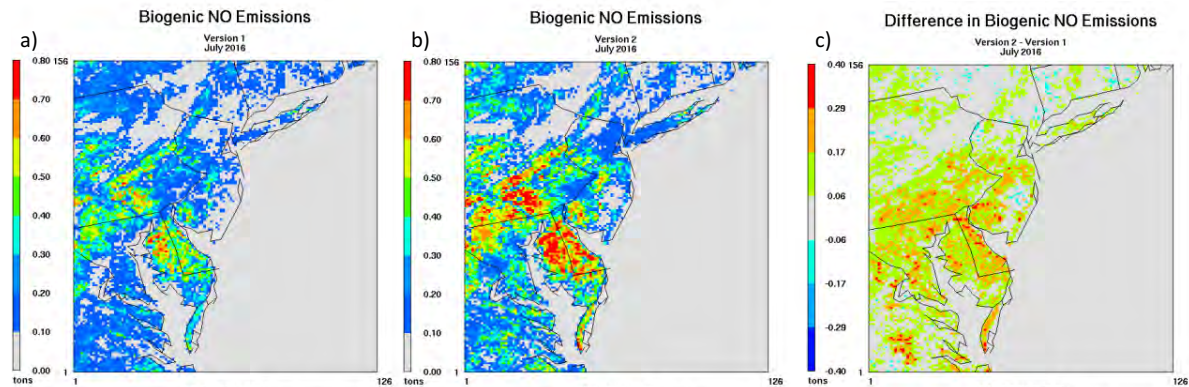
Anthropogenic NO_x emissions decrease across the OTR between V1 and V2/V3, especially in urban areas (Figure 1c). Large decreases of more than 10 tons per month per grid cell can be found around Washington, D.C. and Philadelphia, and in New Jersey and Long Island, NY. Increases of approximately 10 tons per month between V1 and V2/V3 trace I-76 in Pennsylvania, are common in western Pennsylvania, and are scattered elsewhere in the domain.

Figure 2 July 2016 total anthropogenic VOC emissions for (a) 2016 V1, (b) V2/V3, and (c) the difference, V2/V3-V1.



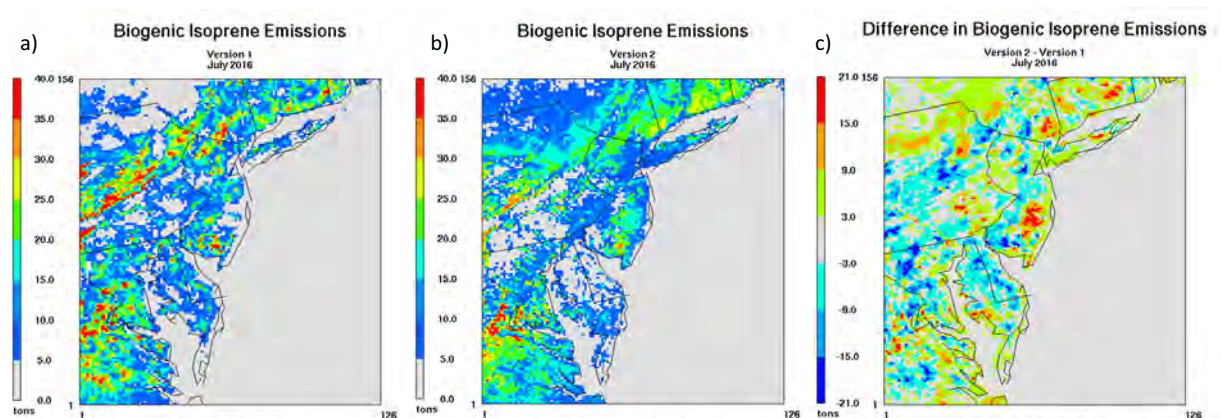
Similarly, anthropogenic VOC emissions are largely reduced in the eastern part of the OTR with increases common in western Pennsylvania (Figure 2). The largest decreases in VOC emissions are found around Baltimore; Philadelphia; New York City and Long Island, New York; Connecticut; and Massachusetts.

Figure 3 July 2016 total biogenic NO emissions for (a) V1, (b) V2/V3, and (c) the difference, V2/V3-V1.



Biogenic emissions also changed from V1 to V2/V3. Monthly total emissions from the inventory for July 2016 are shown in Figure 3 for biogenic NO emissions and Figure 4 for biogenic isoprene emissions. Biogenic NO emissions show an increase in parts of Maryland, Pennsylvania, and Delaware in the V2/V3 inventory as compared to the V1 inventory (Figure 3), with darker reds indicating greater increases. This is contrary to what happens with isoprene between the V1 and V2/V3 inventories. Figure 4 shows a general decrease in isoprene emissions in the southern part of the domain, with increases of 30-60% across grid cells more towards the Northeast.

Figure 4 July 2016 total biogenic isoprene emissions for (a) V1, (b) V2/V3, and (c) the difference, V2/V3-V1.



3 Modeled Concentration Differences from V1

3.1 Model Performance Statistics

Emissions for V1 and V2/V3 were used to model ozone concentrations using the Community Multi-scale Air Quality (CMAQ) model and the Comprehensive Air Quality Model with Extensions (CAMx). More detail on the V1 modeling and set up can be

found in OTC 2023 TSD. Generally, the same model specifications were used for the V2/V3 modeling reported here, but with the following model upgrades:

- CAMx model version upgrade from v7.1.0 to v7.2.0. This update reflected modifications including using the Piecewise Parabolic Method vertical advection solver, which is less numerically diffusive than the original implicit scheme. Additional updates and modifications can be found in the CAMx User Guide.⁵
- CMAQ model version upgrade from v5.3.1 to v5.3.3. This is a minor update including bug fixes. Detailed information can be found in the CMAQv5.3.3 User Guide.⁶
- Boundary conditions for 2023 and 2026 were updated from an in-house 36 km by 36 km contiguous U.S. domain using EPA 2016 V2 emissions and EPA-produced boundary conditions from the hemispheric CMAQ model.

Table 13 and Table 14 show model performance statistics mean bias (MB), mean error (ME), normalized mean bias (NMB), and normalized mean error (NME) for CMAQ and CAMx, respectively, when observed maximum daily 8-hour ozone concentrations (MDA8) are equal to or exceed 60 ppb. Model data are evaluated against available observations, indicated in the second column, and are grouped by non-attainment areas as indicated in the first column.

Overall, upgrading to the V2/V3 emissions platform slightly degrades model performance from an average mean bias of -6 ppb to about -8 ppb for CMAQ, and about -1 ppb to -4.3 ppb for CAMx. Mean errors slightly worsened, with average mean errors growing from 9.3 ppb to 10 ppb for CMAQ and from 7 ppb to 7.6 ppb for CAMx. However, model performance varies by individual monitoring location.

Table 13 Performance statistics for the CMAQ model when Maximum Daily 8-hour Observations are greater than or equal to 60 ppb by OTR Non-Attainment Area (NAA) for April to October 2016.

		V1_CMAQ531				V2/V3_CMAQ533			
NAA area	# of Observations	MB	ME	NMB	NME	MB	ME	NMB	NME
CT	116	-7.6	12	-11.3	17.8	-10.1	12.2	-15	18
NY-NJ-CT	685	-5.2	9	-7.7	13.2	-7.3	9.9	-10.7	14.6
PA-NJ-MD-DE	519	-6.6	8.2	-9.9	12.3	-8.3	9.2	-12.5	13.8
MD	278	-5.3	9.1	-7.9	13.4	-6.7	10.2	-9.9	15.1
DC-MD-VA	323	-5.6	8	-8.5	12.2	-7.4	8.8	-11.3	13.5

Table 14 Performance statistics for the CAMx model when Maximum Daily 8-hour Observations are greater than or equal to 60 ppb by OTR Non-Attainment Area (NAA) for April to October 2016.

		V1_CAMx710				V2/V3_CAMx720			
NAA area	# of Observations	MB	ME	NMB	NME	MB	ME	NMB	NME

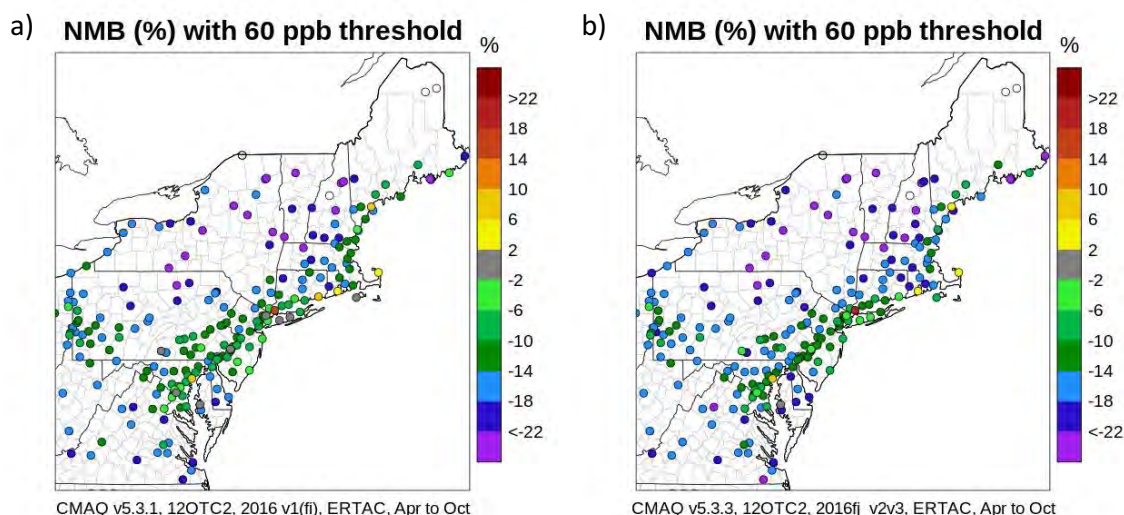
⁵ https://camx-wp.azurewebsites.net/Files/CAMxUsersGuide_v7.20.pdf

⁶ <https://github.com/USEPA/CMAQ/tree/5.3.3/DOCS>

CT	116	-4.6	8.4	-2.3	11.1	-7.5	9.7	-11.1	14.4
NY-NJ-CT	685	-1.6	7.5	-0.6	9.2	-4.9	7.9	-7.2	11.6
PA-NJ-MD-DE	519	-0.4	6.1	-0.8	9.5	-3.4	6.6	-5.1	9.9
MD	278	-0.5	6.4	2.2	10.7	-3.7	7	-5.5	10.4
DC-MD-VA	323	1.5	7	-6.8	12.4	-2	7	-3.1	10.7

Using model output compared at surface observations for ozone concentrations greater than or equal to 60 ppb, we can see where NMB changes occur across the domain between V1 and V2/V3 for CMAQ and CAMx (Figure 5 and 6). For CMAQ, NMB values fall between greater than -22% to +18%, with nearly all monitors showing negative biases in the model data (Figure 5). Coastal monitor locations show more consistent increased negative biases in V2/V3 than in V1 as compared to in-land monitors. In general, NMB values change by a few percent or less at individual monitor locations.

Figure 5 Normalized Mean Bias in CMAQ for (a) V1 and (b) V2/V3



For CAMx, NMBs are considerably smaller than those from CMAQ, with most values falling between -22% and +18% (Figure 6). Differences between V1 and V2/V3 are most prominent near urban and coastal areas, where many positive biases turn negative between emissions platform versions.

Figure 6 Normalized Mean Bias in CAMx for (a) V1 and (b) V2/V3

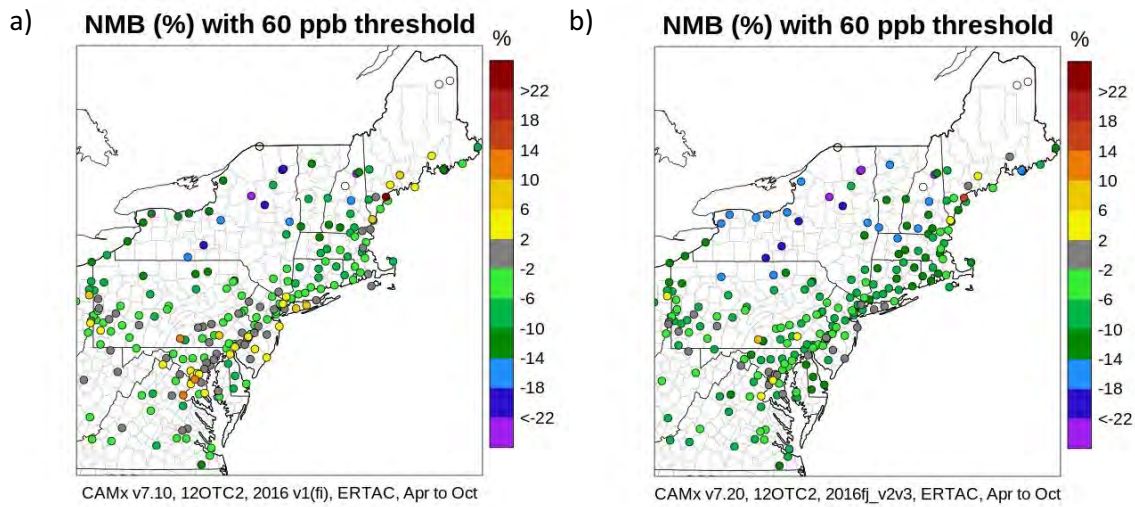
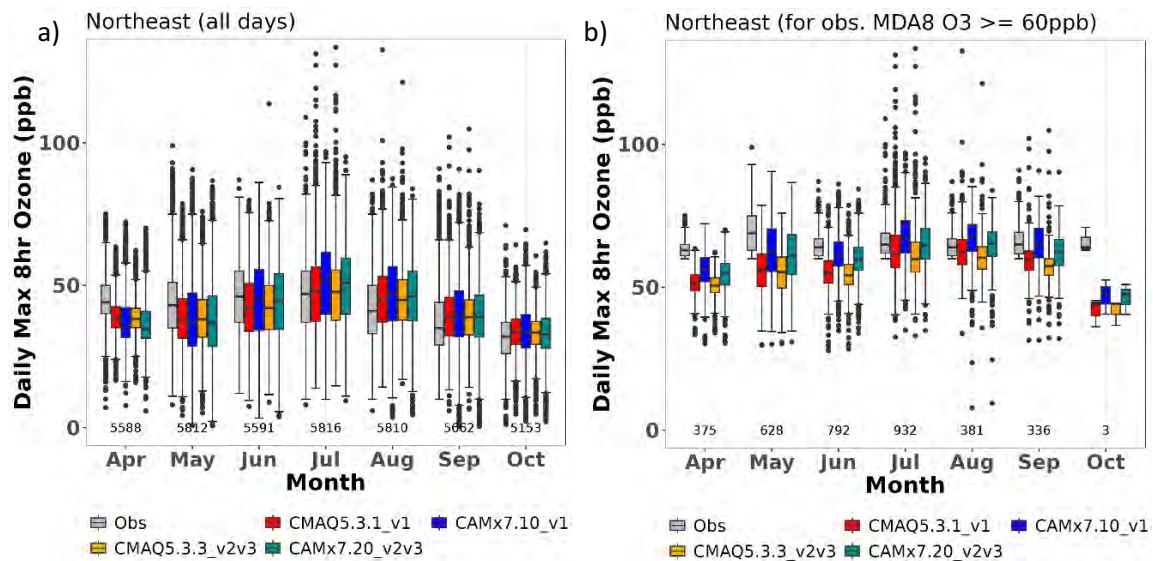


Figure 7 Monthly boxplot distributions for (a) all days and (b) days when MDA8 Ozone is greater than or equal to 60 ppb comparing observations (gray), CMAQ with V1 (red), CAMx with V1 (blue), CMAQ with V2/V3 (orange), and CAMx with V2/V3 (green), April-October 2016.

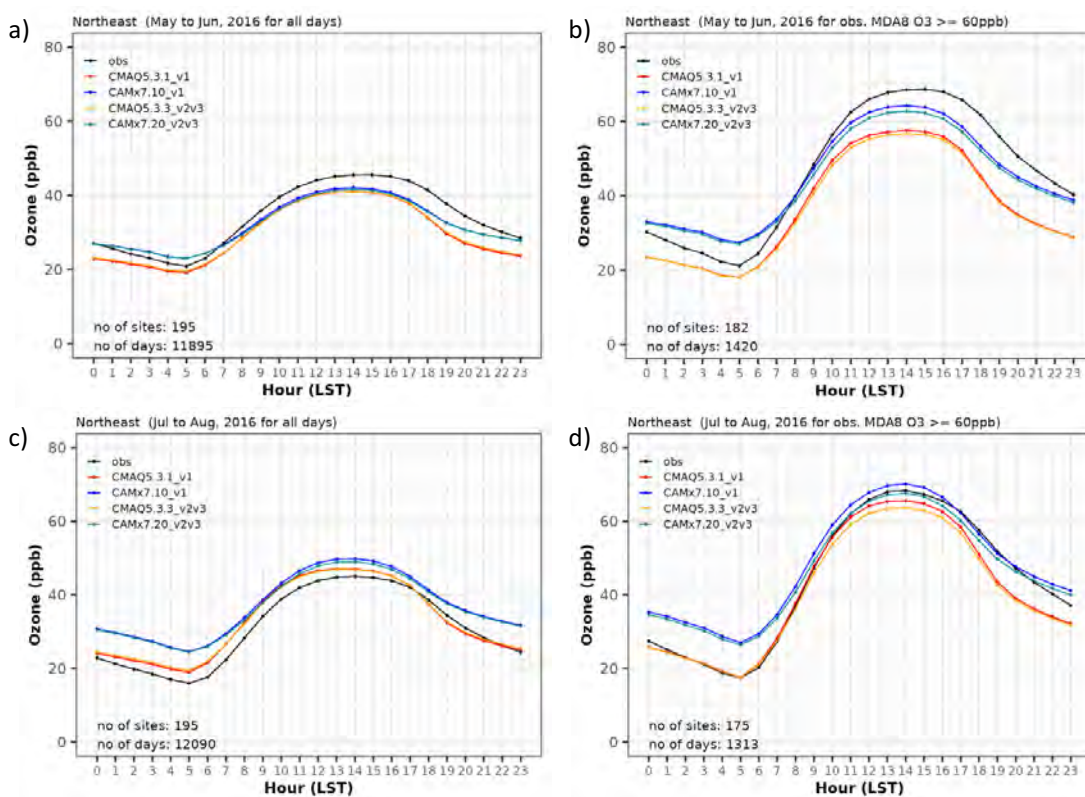


We also show model evaluation at monitors in the Northeast NOAA Climate Region⁷ broken down by month, comparing observations (gray), CMAQ with V1 (red), CAMx with V1 (blue), CMAQ with V2/V3 (orange), and CAMx with V2/V3 (green) distributions for all days (Figure 7a) and days with observed MDA8 ozone concentrations greater than or equal to 60 ppb (Figure 7b). For all days, the models consistently underestimate

⁷ <https://www.ncei.noaa.gov/access/monitoring/reference-maps/us-climate-regions>

concentrations in the springtime (April and May) and tend to overestimate concentrations in late summer and fall (July through October). Each model and emissions platform model prediction and spread are similar, with the upper bounds of springtime CAMx predictions more in-line with observed values. Model performance is similar between V1 and V2/V3 when ozone is greater than 60 ppb, though CAMx is better able to capture higher concentrations than CMAQ overall (Figure 7b).

Figure 8 Diurnal pattern at monitors in the Northeast for (a) all days May to June, (b) days when MDA8 Ozone is greater than or equal to 60 ppb for May and June, (c) all days July and August, and (d) same as (b) except for July to August for observations (black), CMAQ with V1 (red), CAMx with V1 (blue), CMAQ with V2/V3 (orange), and CAMx with V2/V3 (green).

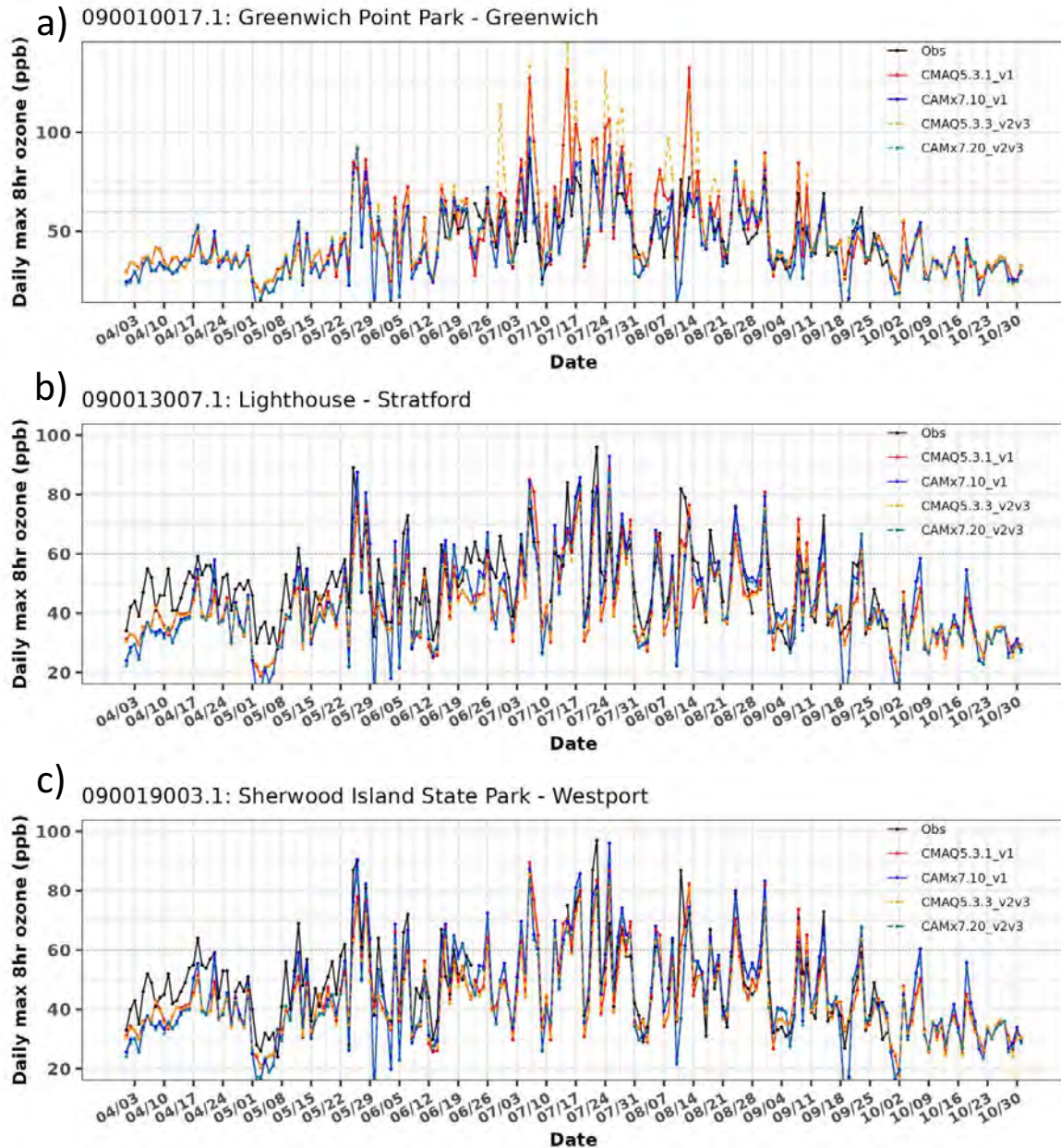


Further, investigating the diurnal profile at monitor locations can indicate model performance with respect to ozone production and loss on average (Figure 8). Splitting the high ozone season into two segments, May to June 2016 and July to August 2016, observations (black) are used to evaluate CMAQ with V1 (red), CAMx with V1 (blue), CMAQ with V2/V3 (orange), and CAMx with V2/V3 (green) for all days and for days when observed MDA8 is greater than or equal to 60 ppb. For all days in May and June, CAMx tends to better predict concentrations in the morning. However, both CMAQ and CAMx underestimate daytime concentrations (Figure 8a). At MDA8 concentrations greater than 60 ppb, CMAQ underestimates and CAMx overestimates morning concentrations, but they both underestimate daytime concentrations, with CMAQ having

greater low biases during the day and into the overnight hours, regardless of emissions platform (Figure 8b). For July and August, both models tend to overestimate concentrations on average across all days, with CAMx overestimating concentrations more than those from CMAQ (Figure 8c). When observed MDA8 concentrations exceed 60 ppb, CMAQ with both emissions platforms tends to match observations very well during the first half of the day, before underestimating observed concentrations during the evening rush hour and into the evening, while CAMx is the opposite and overestimates observations in the morning and performs better in the evening (Figure 8d).

Finally, we show model evaluation at individual monitor locations to indicate performance and changes in emissions platform at key nonattainment monitors (Figure 9). As before, observations (black solid) are compared with CMAQ with V1 (red solid), CAMx with V1 (blue solid), CMAQ with V2/V3 (orange dashed) and CAMx with V2/V3 (green dashed). While early season monitored data is missing for Greenwich Point Park (Figure 9a), all model iterations track available observations quite well except for several July and August days where there was a divergence between the models and emissions platform versions and CMAQ greatly overestimated observed concentrations. These extreme mid-season daily deviations are not seen at the nearby sites of Stratford (Figure 9b) and Westport (Figure 9c). However, these sites show model underestimates that are strong in the early part of the ozone season and become more sporadic in later, warmer months. This coincides with the tendency of the models to underestimate on average in springtime and propensity to overestimate concentrations in July and August.

Figure 9 Time series plot from April-October 2016 for (a) Greenwich, CT, (b) Stratford, CT, and (c) Westport, CT comparing observations (black), CMAQ with V1 (red), CAMx with V1 (blue), CMAQ with V2/V3 (orange), and CAMx with V2/V3 (green).



3.2 Future Design Values

Future Design Values (DVs) for the ozone season calculated from 2023 model output are presented in Figure 10 for CMAQ and Figure 11 for CAMx. Both figures show DVs determined using the 3x3 and 3x3 No Water 1 methodologies comparing the V1 and V2/V3 platforms. Details on DV calculations including the differences in the water-cell exclusion methodology are in Section 8 of the OTC 2023 TSD. Predicted 2026 DVs for CMAQ and CAMx are included in Appendix B.

With CMAQ, DVs are greatest, and predicted monitor DVs exceed 66 ppb in New York City, coastal Connecticut, on Long Island, and at locations in New Jersey and near Philadelphia, Pennsylvania (Figure 10). For the V1 platform, there are some slight changes in DVs between the 3x3 (Figure 10a) and the 3x3 No Water 1 (Figure 10b) methodology. With 3x3 No Water 1, there are more monitors in coastal Connecticut exceeding 71 ppb while one New Jersey and several Long Island monitors fall below 71 ppb that otherwise exceed with the 3x3 method. With the V2/V3 platform, CMAQ predicts the same number of monitors where DVs exceed 71 ppb with the 3x3 methodology (Figure 10c) as with the 3x3 No Water 1 methodology (Figure 10d).

DV calculations with CAMx model output reflect similar distributions to those from CMAQ, where the greatest DVs are in New York City, coastal Connecticut, Long Island, and scattered across New Jersey (Figure 11). However, there is a reduction in coastal DVs greater than 71 ppb from six when using the 3x3 (Figure 11a) methodology to five with the 3x3 No Water 1 (Figure 11b). When using the 2016 V2/V3 platform, several monitors in the New York City area that exceed 76 ppb with the 3x3 methodology (Figure 11c) decrease but still fall above 71 ppb with the 3x3 No Water 1 methodology (Figure 11d). Additionally, CAMx predicts the Bristol, Pennsylvania monitor to exceed 71 ppb.

Additional details of modeled design values for the top 21 OTR monitoring sites using the V2/V3 platform are shown in Table 15. DVs for all monitors in the modeling domain for 2023 can be found in Appendix C and for 2026 for the top 21 OTR monitoring sites and all monitors in the modeling domain can be found in Appendix D.

Figure 10 Future Design Values (DVF) for 2023 for (a) CMAQ with V1 and 3x3 methodology, (b) CMAQ with V1 platform with 3x3 No Water 1 methodology, (c) CMAQ with V2/V3 and 3x3 methodology, and (d) CMAQ with V2/V3 platform with 3x3 No Water 1 methodology.

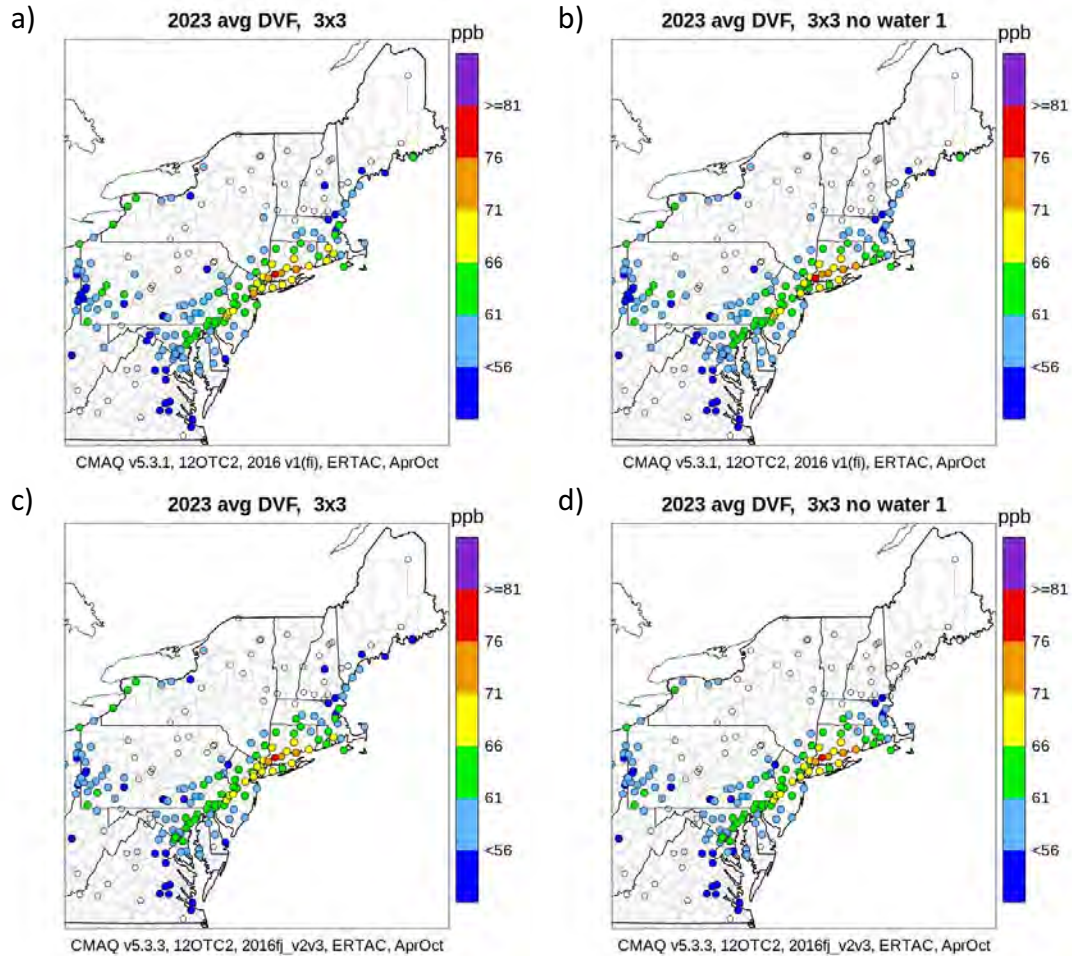


Figure 11 Future Design Values (DVF) for 2023 for (a) CAMx with V1 and 3x3 methodology, (b) CAMx with V1 platform with 3x3 No Water 1 methodology, (c) CAMx with V2/V3 and 3x3 methodology, and (d) CAMx with V2/V3 platform with 3x3 No Water 1 methodology.

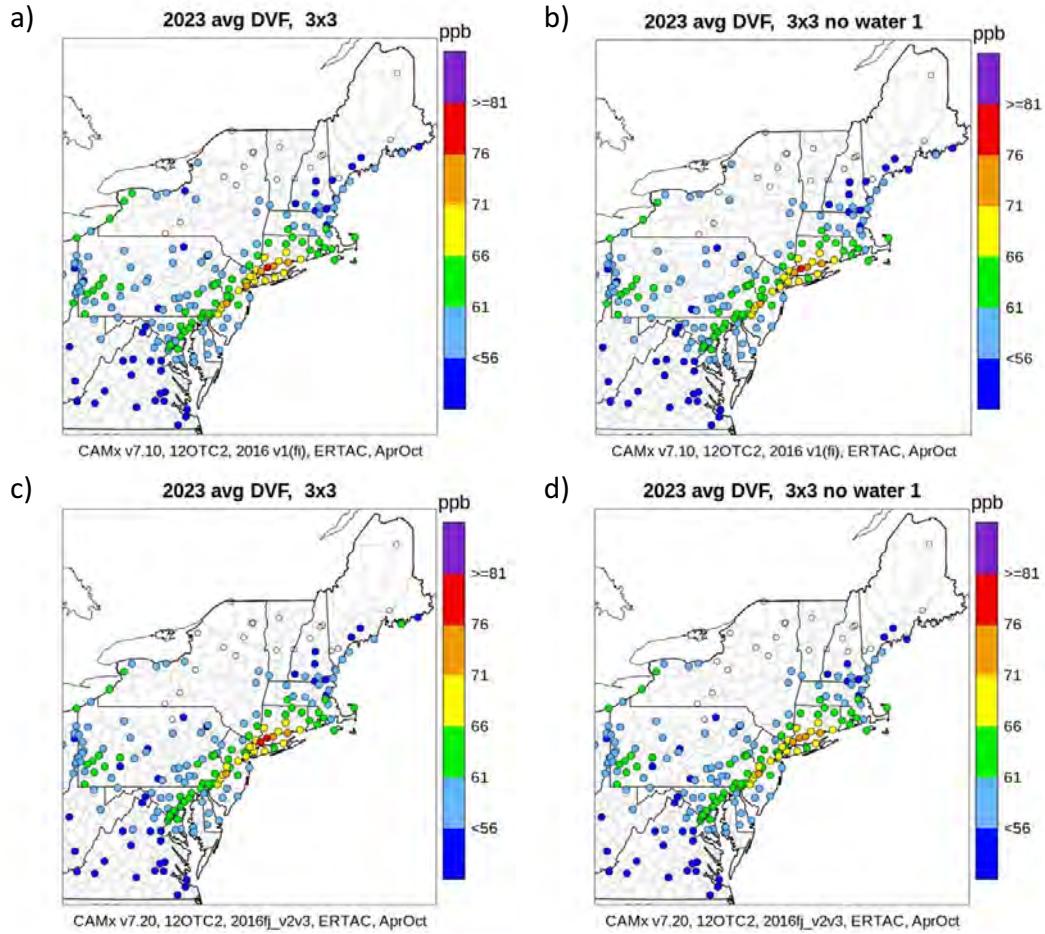


Table 15 Top 21 OTR ozone monitors showing the 2016 (2014-2018) base observed design value (DVB) compared to the 2019-2021 and 2020-2022 preliminary monitored DVs and 2023 modeling future predicted design values (DVF) for 3x3 and 3x3 No Water 1 methodology for CMAQ (green header) and CAMx (blue header) using the V2/V3 inventory.

			Monitored DVs				Modeled DVs							
			2016 (2014-2018) DVB	2019-2021 DV	2020-2022 DV	2023 CMAQ v5.3. 3				2023 CAMx v7.20				
						3x3		3x3 No Water 1		3x3		3x3 No Water 1		
Site ID	State	County	AVG	MAX		Prelim	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
90013007	CT	Fairfield	82	83	81	81	74.7	75.6	74.7	75.6	75.3	76.2	75.1	76.1
90019003	CT	Fairfield	82.7	83	80	80	77.4	77.6	76	76.3	76.8	77	75.6	75.9
90099002	CT	New Haven	79.7	82	82	79	72.8	74.9	71.1	73.2	72.3	74.3	72.7	74.8
420170012	PA	Bucks	79.3	81	71	72	70.2	71.7	70.2	71.7	71.6	73.1	71.6	73.1
90010017	CT	Fairfield	79.3	80	79	77	75.5	76.2	74.6	75.3	76.3	76.9	73.4	74.1
90079007	CT	Middlesex	78.7	79	74	73	69.6	69.9	69.6	69.9	70.5	70.8	70.5	70.8
90011123	CT	Fairfield	77	78	70	71	69.3	70.2	69.3	70.2	69.5	70.4	69.5	70.4
421010024	PA	Philadelphia	77.7	78	71	70	69	69.3	69	69.3	70.4	70.7	70.4	70.7
90090027	CT	New Haven	75.7	77	72	70	69.5	70.7	68.4	69.6	69.1	70.3	68.8	70
340070002	NJ	Camden	75.3	77	66	64	67.2	68.7	67.2	68.7	68.3	69.8	68.3	69.8
361030002	NY	Suffolk	74	76	73	74	69.5	71.4	67.7	69.5	68.5	70.3	68.5	70.3
90110124	CT	New London	74.3	76	73	72	68.5	70.1	71	72.7	67.6	69.2	67.8	69.3
361030004	NY	Suffolk	74.3	76	69	68	67.8	69.4	67.1	68.6	68.2	69.8	67.6	69.1
421010048	PA	Philadelphia	75.3	76	70	68	66.9	67.5	66.9	67.5	68.1	68.7	68.1	68.7
240251001	MD	Harford	74	75	72	68	65.4	66.3	63.9	64.8	65.4	66.2	64.8	65.7
340030006	NJ	Bergen	74.3	75	71	68	68.7	69.3	68.7	69.3	68.6	69.3	68.6	69.3
340230011	NJ	Middlesex	74.7	75	68	68	66.9	67.2	66.9	67.2	66.7	66.9	66.7	66.9
361192004	NY	Westchester	74	75	69	68	70.5	71.4	68.8	69.7	69.9	70.8	67.5	68.4
360810124	NY	Queens	72.3	74	71	70	67.4	69	66.4	68	68.9	70.5	68	69.6
90031003	CT	Hartford	71.7	74	67	68	62.4	64.4	62.4	64.4	63.7	65.7	63.7	65.7
240031003	MD	Anne Arundel	74	74	70	66	65.3	65.3	64.3	64.3	65.4	65.4	64.8	64.8

4 Summary of Major Changes in Model Platform Updates

This OTC 2023 TSD addendum provides an overview of ozone design values and model performance based on emission and model upgrades. Generally, emissions decline from V1 to V2/V3 except for a few sectors and/or pollutants including PTERTAC. Model performance evaluation shows that switching to the V2 platform and upgrading to later CMAQ and CAMx model versions results in slight increases in model

biases and errors on average compared to the V1 platform and earlier model versions. However, this degradation in base year ozone modeled performance statistics results in minor changes to the predicted DVF outcomes at individual monitors for the 2023 ozone season when compared to those from V1 (Table 16).

Table 16 Top 21 OTR ozone monitors showing the 2016 (2014-2018) base observed design value (DVB) compared to the 2019-2021 and 2020-2022 preliminary monitored DVs and average 2023 modeling future predicted design values (DVs) for 3x3 and 3x3 No Water 1 methodology for CMAQ (green header) and CAMx (blue header) comparing using the V1 and the V2/V3 inventories for each model.

			Monitored DVs			Modeled DVs Avg							
			2016 (2014- 2018) DVB	2019- 2021 DV	2020- 2022 DV	2023 CMAQ				2023 CAMx			
						V1 (CMAQ v5.3.1)		V2/V3 (CMAQ v5.3.3)		V1 (CAMx v7.10)		V2/V3 (CAMx v7.20)	
Site ID	State	County	AVG		Prelim	3x3	NW1	3x3	NW1	3x3	NW1	3x3	NW1
90013007	CT	Fairfield	82	81	81	74	75	74.7	74.7	75	75	75.3	75.1
90019003	CT	Fairfield	82.7	80	80	80	75	77.4	76	78	76	76.8	75.6
90099002	CT	New Haven	79.7	82	79	71	71	72.8	71.1	71	72	72.3	72.7
420170012	PA	Bucks	79.3	71	72	69	69	70.2	70.2	71	71	71.6	71.6
90010017	CT	Fairfield	79.3	79	77	71	78	75.5	74.6	74	74	76.3	73.4
90079007	CT	Middlesex	78.7	74	73	69	69	69.6	69.6	70	70	70.5	70.5
90011123	CT	Fairfield	77	70	71	69	69	69.3	69.3	69	69	69.5	69.5
421010024	PA	Philadelphia	77.7	71	70	68	68	69	69	69	69	70.4	70.4
90090027	CT	New Haven	75.7	72	70	69	68	69.5	68.4	69	68	69.1	68.8
340070002	NJ	Camden	75.3	66	64	66	66	67.2	67.2	67	67	68.3	68.3
361030002	NY	Suffolk	74	73	74	68	67	69.5	67.7	69	68	68.5	68.5
90110124	CT	New London	74.3	73	72	67	71	68.5	71	67	68	67.6	67.8
361030004	NY	Suffolk	74.3	69	68	66	66	67.8	67.1	68	67	68.2	67.6
421010048	PA	Philadelphia	75.3	70	68	66	66	66.9	66.9	67	67	68.1	68.1
240251001	MD	Harford	74	72	68	63	64	65.4	63.9	65	64	65.4	64.8
340030006	NJ	Bergen	74.3	71	68	68	68	68.7	68.7	69	69	68.6	68.6
340230011	NJ	Middlesex	74.7	68	68	65	65	66.9	66.9	66	66	66.7	66.7
361192004	NY	Westchester	74	69	68	66	68	70.5	68.8	70	67	69.9	67.5
360810124	NY	Queens	72.3	71	70	66	65	67.4	66.4	67	68	68.9	68
90031003	CT	Hartford	71.7	67	68	62	62	62.4	62.4	63	63	63.7	63.7
240031003	MD	Anne Arundel	74	70	66	65	63	65.3	64.3	64	64	65.4	64.8

Fugitive Dust (afdust_adj)

- 2016

2016_MY_from_afdust_2017NEI_NONPOINT_20200415_06jul2020_v0.csv

- 2023

2023fj_from_2016_MY_from_afdust_2017NEI_NONPOINT_20200415_24jun2021_v0.csv

- 2026

2026fj_from_2016_MY_from_afdust_2017NEI_NONPOINT_20200415_20jul2021_v0.csv

Airports (airports)

- 2016

2016_from_airports_2017NEIpost_POINT_20200618_21apr2021_nf_v3.csv

- 2023

2023fj_from_airports_2017NEIpost_POINT_20200618_09jun2021_v0.csv

- 2026

2026fj_from_airports_2017NEIpost_POINT_20200618_14jul2021_v0.csv

Biogenic (beis)

- 2016

BELD5_12US1_FIA6.1_2017CLD_Canada.ncf
beld5_facs_csv_fmt_2017NEI_CDC_21apr2020_v0
bioseason.cmaq.2016j_12US1.ncf_full

- 2023

BELD5_12US1_FIA6.1_2017CLD_Canada.ncf
beld5_facs_csv_fmt_2017NEI_CDC_21apr2020_v0
bioseason.cmaq.2016j_12US1.ncf_full

- 2026

BELD5_12US1_FIA6.1_2017CLD_Canada.ncf
beld5_facs_csv_fmt_2017NEI_CDC_21apr2020_v0
bioseason.cmaq.2016j_12US1.ncf_full

Fertilizer (fertilizer)

- 2016

2016fj_fertilizer_NH3_monthly_19may2021_v0.csv

- 2023

2016fj_fertilizer_NH3_monthly_19may2021_v0.csv

- 2026

2016fj_fertilizer_NH3_monthly_19may2021_v0.csv

Livestock (livestock)

- 2016

ag_livestock_2017NEI_NONPOINT_20200307_backcast_2016_MYR_21apr2021_nf_v1.csv

- 2023

2023fj_from_ag_livestock_2017NEI_NONPOINT_20200307_23jun2021_nf_v1.csv

2023fj_from_2016fj_ag_livestock_2017NEI_NONPOINT_20200307_NOnly_23jun2021_v0.csv

- 2026

2026fj_from_ag_livestock_2017NEI_NONPOINT_20200307_16jul2021_v1.csv

2026fj_from_2016fj_ag_livestock_2017NEI_NONPOINT_20200307_NOnly_16jul2021_v0.csv

Nonpoint (nonpt)

- 2016

MYR_nonpt_2016only_08sep2020_v0.csv

composting_2014_2017MYR_from_2017NEI_NONPOINT_20200415_19aug2020_v0.csv

biomass_combustion_2016MYR_from_2017NEI_NONPOINT_20200415_26aug2020_v0.csv

MYR_NONPOINT_gas_stations_interpolation_2016only_09sep2020_v0.csv

MYR_nonpt_constant_2017NEI_NONPOINT_20200415_28sep2020_v1.csv

- 2023

2023fj_from_MYR_NONPOINT_gas_stations_interpolation_2016only_02jul2021_v0.csv

cellulosic_v1platform_2023fh_nonpt_fromVolpe_02jul2021_nf_v1.csv

2023fj_from_composting_2014_2017MYR_from_2017NEI_NONPOINT_20200415_02jul2021_v0.csv

2023fj_from_MYR_nonpt_constant_2017NEI_NONPOINT_20200415_02jul2021_v0.csv

2023fj_from_biomass_combustion_2016MYR_from_2017NEI_NONPOINT_20200415_02jul2021_v0.csv

2023fj_from_MYR_nonpt_2016only_02jul2021_v0.csv

- 2026

2026fj_proj_MYR_nonpt_constant_2017NEI_NONPOINT_20200415_19jul2021_v0.csv

2026fj_proj_MYR_NONPOINT_gas_stations_interpolation_2016only_19jul2021_v0.csv

2026fj_proj_composting_2014_2017MYR_from_2017NEI_NONPOINT_20200415_19jul2021_v0.csv

cellulosic_v1platform_2026fj_nonpt_fromVolpe_16jul2021_v0.csv
2026fj_proj_biomass_combustion_2016MYR_from_2017NEI_NONPOINT_20200415_19jul
2021_v0.csv
2026fj_proj_MYR_nonpt_2016only_19jul2021_v0.csv

Non-Point Oil & Gas (np_oilgas)

- 2016
2014_oil_gas_nonpoint_fromWRAP_20190913_12may2021_nf_v2.csv
MYR_np_oilgas_2016_12may2021_nf_v3.csv
2016ff_np_oilgas_Oklahoma_21dec2018_v2.csv
MYR_np_oilgas_2016_WRAP_exploration_12may2021_v0.csv
- 2023
2023fj_from_MYR_np_oilgas_2016_23jun2021_v0.csv
2016_version1_2028_oil_gas_nonpoint_fromWRAP_20200211_23jun2021_nf_v3.csv
2023fj_from_2016v2_np_oilgas_exploration_average_2014_2017_23jun2021_v0.csv
2023fj_from_2016ff_np_oilgas_Oklahoma_23jun2021_v0.csv
- 2026
2016_version1_2028_oil_gas_nonpoint_fromWRAP_20200211_23jun2021_nf_v3.csv
2026fj_proj_2016ff_np_oilgas_Oklahoma_14jul2021_v0.csv
2026fj_proj_2016v2_np_oilgas_exploration_average_2014_2017_14jul2021_v0.csv
2026fj_proj_MYR_np_oilgas_2016_14jul2021_v0.csv

Rail (rail)

- 2016
2016beta_rail_class1_ERTAC_15jul2019_v2.csv
2016beta_rail_passenger_ERTAC_15jul2019_v3.csv
2016version1_rail_class2_class3_ERTAC_15jul2019_v1.csv
- 2023
2016version1_2023_rail_class1_ERTAC_16sep2019_nf_v1.csv
2016version1_2023_rail_class2_class3_ERTAC_16sep2019_nf_v1.csv
2023fh_proj_from_2016version1_2016_rail_allNC_16sep2019_v0.csv
2016version1_2023_rail_passenger_ERTAC_16sep2019_nf_v1.csv
- 2026
2016version2_2026interp_rail_passenger_ERTAC_15jul2021_v0.csv
2016version2_2026interp_rail_class2_class3_ERTAC_15jul2021_v0.csv
2016version2_2026interp_rail_class1_ERTAC_15jul2021_v0.csv
2016version2_2026interp_rail_allNC_15jul2021_v0.csv

Residential Wood Combustion (rwc)

- 2016

rwc_2016MYR_from_2017NEI_NONPOINT_20200415_26aug2020_v0.csv

- 2023

2023fj_from_rwc_2017NEI_NONPOINT_20200415_22jun2021_v0.csv

- 2026

2026fj_from_rwc_2017NEI_NONPOINT_20200415_19jul2021_v0.csv

Nonroad (nonroad)

- 2016

2016fj_v2platform_nonroad_from_MOVES_aggSCC_27apr2021_nf_v1.csv

2016v1platform_2016_california_nonroad_27apr2021_nf_v6.csv

2016v1platform_2016_texas_nonroad_27apr2021_nf_v5.csv

- 2023

2016v1platform_2023_california_nonroad_11jun2021_nf_v2.csv

2016v1platform_2023_texas_nonroad_11jun2021_nf_v1.csv

2023fj_v2platform_nonroad_from_MOVES_aggSCC_11jun2021_nf_v1.csv

- 2026

2016v2platform_2026interp_california_nonroad_12jul2021_nf_v1.csv

2016v2platform_2026interp_texas_nonroad_12jul2021_nf_v1.csv

2026fj_v2platform_nonroad_from_MOVES_aggSCC_12jul2021_nf_v1.csv

Mobile Source (onroad)

- 2016

HOTELING_2016fj_17may2021_nf_v4.csv

ONI_IDLING_2016fj_MOVES3_fromOTAQ_18may2021_nf_v1.csv

SPEED_2017NEI_from_CDBs_MOVES3_fuels_03may2021_v8.csv

STARTS_2016fj_MOVES3_17may2021_nf_v4.csv

VMT_2016fj_MOVES3_20may2021_v6.csv

VPOP_2016fj_MOVES3_17may2021_nf_v5.csv

- 2023

VMT_2023fj_MOVES3_03jun2021_nf_v2.csv

SPEED_2017NEI_from_CDBs_MOVES3_fuels_03may2021_v8.csv

ONI_IDLING_2023fj_MOVES3_03jun2021_nf_v1.csv

HOTELING_2023fj_03jun2021_nf_v1.csv

VPOP_2023fj_MOVES3_03jun2021_nf_v2.csv

STARTS_2023fj_MOVES3_03jun2021_nf_v1.csv

- 2026

HOTELING_2026fj_13jul2021_nf_v1.csv
ONI_IDLING_2026fj_MOVES3_13jul2021_nf_v1.csv
SPEED_2017NEI_from_CDBs_MOVES3_fuels_03may2021_v8.csv
STARTS_2026fj_MOVES3_13jul2021_nf_v1.csv
VMT_2026fj_MOVES3_13jul2021_nf_v1.csv
VPOP_2026fj_MOVES3_13jul2021_nf_v1.csv

Wildfire (ptfire-wild)

- 2016

ptinv_sf2_2016v1_split_haps_22apr2021_nf_v6.csv
ptday_2016v2_ptfire_all_prevdec_22apr2021_nf_v3
ptday_sf2_2016v1_22apr2021_nf_v4
ptinv_ptfire_2016beta_GADNR_caps_ff10_reapportion_12jul2019_nf_v2.csv
ptday_ptfire_2016beta_GADNR_haps_ff10_reapportion_csv_16jul2019_nf_v3
ptday_ptfire_2016beta_GADNR_caps_ff10_reapportion_csv_12jul2019_nf_v2
ptday_sf2_2016v1_split_haps_22apr2021_nf_v5
ptinv_sf2_2016v1_split_22apr2021_nf_v4.csv
ptinv_ptfire_2016beta_GADNR_haps_ff10_reapportion_12jul2019_nf_v3.csv

Prescribed Fires (ptfire-rx)

- 2016

ptinv_ptfire_2016beta_GADNR_haps_ff10_reapportion_12jul2019_nf_v2.csv
ptinv_sf2_2016v1_split_haps_22apr2021_nf_v5.csv
ptinv_sf2_2016v1_split_22apr2021_nf_v3.csv
ptday_ptfire_2016beta_GADNR_caps_ff10_reapportion_csv_12jul2019_nf_v1
ptday_sf2_2016v1_ak_22apr2021_nf_v1
ptday_ptfire_2016_ks_flinthills_reapportion_ff10_26mar2019_v0
ptday_sf2_2016v1_split_haps_22apr2021_nf_v4
ptinv_ptfire_2016_ks_flinthills_reapportion_ff10_26mar2019_v0.csv
ptday_sf2_2016v1_22apr2021_nf_v3
ptday_2016v2_ptfire_all_prevdec_22apr2021_nf_v2
ptinv_ptfire_2016beta_GADNR_caps_ff10_reapportion_12jul2019_nf_v1.csv
ptday_ptfire_2016_ks_flinthills_haps_reapportion_ff10_26mar2019_v0
ptday_sf2_2016v1_ak_haps_22apr2021_nf_v1
ptinv_ptfire_2016_ks_flinthills_haps_reapportion_ff10_26mar2019_v0.csv
ptday_ptfire_2016beta_GADNR_haps_ff10_reapportion_csv_12jul2019_nf_v2

Fires Canada & Mexico (ptfire_othna)

- 2016

ptinv_finn_ONA_finn_2016_ff10_24Aug2020_25aug2020_v0.csv
ptday_finn_MX_finn_2016b_prevdec_13nov2018_v0
ptday_finn_MX_finn_2016b_25sep2018_v0
ptinv_finn_MX_finn_2016b_ff10_25sep2018_v0.csv

ptday_finn_ONA_finn_2016_ff10_24Aug2020_prevdec_csv_09sep2020_v0
 ptday_finn_CA_finn_2016b_19oct2018_v1
 ptday_finn_ONA_finn_2016_ff10_24Aug2020_csv_25aug2020_v0
 ptday_ptfire_canada_2016_EC_shortfac_ff10_csv_07aug2018_v0
 ptday_finn_CA_finn_2016b_prevdec_noECoverlap_13nov2018_v0
 ptinv_finn_CA_finn_2016b_ff10_25sep2018_v0.csv

Agricultural Burning (ptagfire)

- 2016

ptinv_agburn_2016_hi_05apr2019_v0.csv
 ptday_2016v1_agburn_caps_28apr2021_nf_v1
 ptday_2016_GA_agburn_haps_reapportion_19jul2019_v0
 ptday_2016v1_agburn_haps_28apr2021_nf_v1
 ptday_agburn_WA_2016_supplemental_01nov2018_v0
 ptday_2016_GA_agburn_caps_reapportion_prevdec_19jul2019_v0
 ptday_2016_GA_agburn_caps_reapportion_19jul2019_v0
 ptday_agburn_WA_2016_supplemental_prevdec_14nov2018_v0
 ptinv_2016_GA_agburn_caps_reapportion_16jul2019_v0.csv
 ptinv_2016beta_agburn_ID_caps_17oct2018_v0.csv
 ptday_2016v1_agburn_caps_prevdec_19jul2019_v0
 ptday_2016beta_agburn_MN_caps_17oct2018_v0
 ptinv_2016beta_agburn_MN_caps_17oct2018_v0.csv
 agburn_WA_2016_supplemental_01nov2018_v0.csv
 ptinv_2016v1_agburn_haps_28apr2021_nf_v1.csv
 ptinv_2016_GA_agburn_haps_reapportion_16jul2019_v0.csv
 ptday_2016v1_agburn_haps_prevdec_19jul2019_v0
 ptday_agburn_2016_hi_05apr2019_v0
 ptday_2016_GA_agburn_haps_reapportion_prevdec_19jul2019_v0
 ptday_2016beta_agburn_ID_caps_17oct2018_v0
 ptinv_2016v1_agburn_caps_28apr2021_nf_v1.csv

Point Source Oil & Gas (pt_oilgas)

- 2016

2016_version1_oil_gas_point_fromWRAP_20200117_27feb2020_v1.csv
 2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_19may2021_nf_v4.csv
 oilgas_2016b_POINT_20180612_19may2021_nf_v7.csv

- 2023

2016_version1_2028_oil_gas_point_fromWRAP_20200213_04mar2020_v1.csv
 2023fj_from_oilgas_2016b_POINT_20180612_01jul2021_nf_v1.csv
 2023fj_from_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_01jul2021_
 nf_v1.csv
 2023fj_oilgas_override_from_2018gc_01jul2021_v0.csv

- 2026

2016_version1_2028_oil_gas_point_fromWRAP_20200213_04mar2020_v1.csv

2026fj_proj_oilgas_2016b_POINT_20180612_23jul2021_nf_v1.csv

2026fj_proj_2016ff_proj_from_oilgas_2016b_POINT_20180612_calcyear2014_23jul2021_nf_v1.csv

2023fj_oilgas_override_from_2018gc_01jul2021_v0.csv

EGU Point Source -ERTAC Platform (ptertac)

- 2016

2016fh_proj_from_egunonccems_2016b_ERTAC_Platform_POINT_20180612_2016v1_calcyear2014_17may2021_v1.csv

C2.2CONUSv16.2_BYFYHRLY_fs_ff10_future.csv

C2.2CONUSv16.2_BYFYHRLY_fs_ff10_hourly_future.csv

egunonccems_2016b_ERTAC_Platform_POINT_20180612_12nov2019_v11.csv

- 2023

C3.0CONUSv16.2_2023-RCU_fs_ff10_future.csv

C3.0CONUSv16.2_2023-RCU_fs_ff10_hourly_future.csv

ERTAC_egunonccems_epa620_2023_20210528_summer_09jul2021_v1_03aug2022_nf_v1.csv

ERTAC_egunonccems_epa620_2023_20210528_winter_09jul2021_v1_03aug2022_nf_v1.csv

ERTAC_egunonccems_epa620_2023_20210528_wintershld_09jul2021_v1_03aug2022_nf_v1.csv

- 2026

C3.0CONUSv16.2_2026-RCU1_fs_ff10_future.csv

C3.0CONUSv16.2_2026-RCU1_fs_ff10_hourly_future.csv

egunonccems_epa620_2026_ERTAC_Platform_20210609_summer_26jul2021_v0.csv

egunonccems_epa620_2026_ERTAC_Platform_20210609_winter_26jul2021_v0.csv

egunonccems_epa620_2026_ERTAC_Platform_20210609_wintershld_26jul2021_v0.csv

Industrial Point Sources – ERTAC platform (ptnonertac)

- 2016

2016fh_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_20may2021_nf_v1.csv

2016fh_proj_from_nonegu_2016version1_ERTAC_Platform_POINT_20180612_calcyear2014_17jun2021_nf_v6_v0.csv

2016fj_nonegu_additions_from_2017_2018_17jun2021_nf_v1.csv

nonegu_2016version1_ERTAC_Platform_POINT_20180612_25may2021_nf_v6_v0.csv

point_railyards_2016version1_21may2021_nf_v3.csv

pt_biorefinery_OTAQ_supplemental_2016version1_12nov2019_v1.csv

- 2023

2023fj_from_2016fh_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_28jun2021_v0.csv
 2023fj_from_2016fj_nonegu_additions_from_2017_2018_28jun2021_v0.csv
 2023fj_from_pt_biorefinery_OTAQ_supplemental_2016version1_28jun2021_v0.csv
 2023fj_nonegu_override_from_2017NEIpost_POINT_20200514_29jun2021_nf_v1.csv
 2023fj_nonegu_override_from_2019_draft_POINT_20210524_30jun2021_nf_v1.csv
 ERTAC_2023fj_from_2016fh_proj_from_nonegu_2016version1_POINT_20180612_calcyear2014_29jun2021_nf_v1_03aug2022_nf_v1.csv
 ERTAC_2023fj_from_nonegu_2016version1_POINT_20180612_01jul2021_nf_v1_03aug2022_nf_v1.csv
 ERTAC_2023fj_nonegu_override_from_2018platform_POINT_20201206_01jul2021_nf_v1_17jul2022_nf_v1.csv
 ERTAC_egunonccems_epa620_2023_20210528_summer_09jul2021_v1_03aug2022_nf_v1.csv
 ERTAC_egunonccems_epa620_2023_20210528_winter_09jul2021_v1_03aug2022_nf_v1.csv
 ERTAC_egunonccems_epa620_2023_20210528_wintershld_09jul2021_v1_03aug2022_nf_v1.csv
 point_railyards_2016version1_2023fh_12aug2020_v1.csv

- 2026

2026fj_from_2016fh_from_nonegu_2016version1_POINT_20180612_biorefinery_calcyear2014_23jul2021_v0.csv
 2026fj_from_2016fh_proj_from_nonegu_2016version1_ERTAC_Platform_POINT_20180612_calcyear2014_23jul2021_v0.csv
 2026fj_from_nonegu_2016version1_ERTAC_Platform_POINT_20180612_23jul2021_v0.csv
 2026fj_from_nonegu_override_from_2017NEIpost_POINT_20200514_23jul2021_v0.csv
 2026fj_from_nonegu_override_from_2018platform_ERTAC_Platform_POINT_20201206_23jul2021_v0.csv
 2026fj_from_nonegu_override_from_2019_draft_POINT_20210524_23jul2021_v0.csv
 2026fj_from_pt_biorefinery_OTAQ_supplemental_2016version1_23jul2021_v0.csv
 point_railyards_2016version2_2026interp_15jul2021_nf_v1.csv

Commercial Marine Vessels - Category 1 & 2 (cmv_c1c2)

- 2016

canada_c1c2_point_2015_aisremoved_07aug2019_v0.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_10_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_10_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_11_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_11_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_12_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_12_CA_nexthour.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_12_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_12_US_nexthour.csv

cmv_c1c2_2016adjust_20220127_sa_12US1_2017_1_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_1_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_2_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_2_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_3_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_3_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_4_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_4_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_5_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_5_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_6_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_6_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_7_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_7_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_8_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_8_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_9_CA_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_9_US_hourly.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_CA_annual_26jan2022_v0.csv
 cmv_c1c2_2016adjust_20220127_sa_12US1_2017_US_annual_26jan2022_v0.cs

- 2023

cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_5_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_8_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_2_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_9_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_7_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_11_CA_hourly.csv
 cmv_c1c2/cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_2_US_hourly.csv
 cmv_c1c2/cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_9_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_12_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_6_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_3_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_6_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_5_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_12_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_11_US_hourly.csv
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 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_8_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_3_US_hourly.csv
 2023_from_cmv_c1c2_2016adjust_20220127_sa_12US1_2017_CA_annual_31jan2022_v0.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_4_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_12_CA_nexthour.csv

cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_1_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_4_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_10_CA_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_12_US_nexthour.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_7_US_hourly.csv
 cmv_c1c2_2016adjust_2023_20220127_sa_12US1_2017_10_US_hourly.csv
 2023_from_cmv_c1c2_2016adjust_20220127_sa_12US1_2017_US_annual_31jan2022_v0.csv

- 2026

cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_5_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_12_CA_nexthour.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_4_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_7_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_12_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_12_US_nexthour.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_1_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_12_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_10_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_10_CA_hourly.csv
 2026_from_cmv_c1c2_2016adjust_20220127_sa_12US1_2017_US_annual_01feb2022_v0.csv

cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_8_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_6_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_8_US_hourly.csv
 2026_from_cmv_c1c2_2016adjust_20220127_sa_12US1_2017_CA_annual_01feb2022_v0.csv

cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_4_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_2_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_6_CA_hourly.csv
 2026fj_proj_canada_c1c2_point_2015_aisremoved_15jul2021_v0.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_3_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_9_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_11_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_5_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_11_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_2_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_3_CA_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_9_US_hourly.csv
 cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_1_CA_hourly.csv
 /cmv_c1c2_2016adjust_2026_20220127_sa_12US1_2017_7_US_hourly.csv

Commercial Marine Vessels - Category 3 (cmv_c3)

- 2016

canada_c3_point_2015_aisremoved_05aug2019_v0.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_10_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_10_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_11_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_11_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_12_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_12_CA_nexthour.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_12_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_12_US_nexthour.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_1_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_1_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_2_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_2_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_3_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_3_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_4_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_4_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_5_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_5_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_6_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_6_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_7_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_7_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_8_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_8_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_9_CA_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_9_US_hourly.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_CA_annual_03feb2022_v0.csv
 cmv_c3_2016adjust_20220203_sa_12US1_2017_US_annual_03feb2022_v0.csv

- 2023

cmv_c3/2023fh_proj_canada_c3_point_2015_aisremoved_24sep2019_v0.csv
 2023_from_cmv_c3_2016adjust_20220203_sa_12US1_2017_US_annual_03feb2022_v0.c
 sv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_10_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_1_US_hourly.csv
 2023fh_proj_Mexico_2014v1_CMV_point_aisremoved_24sep2019_v0.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_11_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_12_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_8_US_hourly.csv
 2023fh_proj2_ptinv_2016ff_proj_from_eca_imo_nonUS_nonCANADA_caps_vochaps_2011
 _aisremoved_27jan2020_v0.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_7_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_11_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_2_US_hourly.csv

cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_4_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_12_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_4_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_6_CA_hourly.csv
 2023_from_cmv_c3_2016adjust_20220203_sa_12US1_2017_CA_annual_03feb2022_v0.c
 SV
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_9_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_5_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_3_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_5_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_6_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_8_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_3_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_12_CA_nexthour.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_10_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_9_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_12_US_nexthour.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_7_US_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_2_CA_hourly.csv
 cmv_c3_2016adjust_2023_20220203_sa_12US1_2017_1_CA_hourly.csv
 • 2026
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_11_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_10_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_3_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_4_US_hourly.csv
 2026_from_cmv_c3_2016adjust_20220203_sa_12US1_2017_US_annual_03feb2022_v0.c
 SV
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_6_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_8_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_1_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_6_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_2_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_7_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_10_CA_hourly.csv
 2026fj_proj_ptinv_2016ff_proj_from_eca_imo_nonUS_nonCANADA_caps_vochaps_2011_
 aisremoved_15jul2021_v0.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_4_CA_hourly.csv
 2026fj_proj_canada_c3_point_2015_aisremoved_15jul2021_v0.csv
 2026_from_cmv_c3_2016adjust_20220203_sa_12US1_2017_CA_annual_03feb2022_v0.c
 SV
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_7_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_3_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_5_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_11_US_hourly.csv

cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_9_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_8_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_12_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_12_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_5_CA_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_9_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_12_US_nexthour.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_12_CA_nexthour.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_2_US_hourly.csv
 cmv_c3_2016adjust_2026_20220203_sa_12US1_2017_1_CA_hourly.csv

Canadian Agricultural (canada_ag)

- 2016

canada_MYR_2016_ag_fertilizer_NH3_monthly_12km_16apr2021_v0.csv
 canada_MYR_2016_ag_animal_NH3_VOC_monthly_12km_aggregated_09jun2021_v0.csv

- 2023

canada_MYR_2023proj_ag_animal_NH3_VOC_monthly_12km_aggregated_01jul2021_v0.csv

canada_MYR_2023proj_ag_fertilizer_NH3_monthly_12km_01jul2021_v0.csv

- 2026

canada_MYR_2026proj_ag_animal_NH3_VOC_monthly_12km_aggregated_20jul2021_v0.csv

canada_MYR_2026proj_ag_fertilizer_NH3_monthly_12km_20jul2021_v0.csv

Canadian Oil & Gas (canada_og2D)

- 2016

canada_MYR_2016_point_UOG_15jun2021_nf_v1.csv

- 2023

canada_MYR_2023proj_point_UOG_2D_01jul2021_v0.csv

- 2026

canada_MYR_2026proj_point_UOG_2D_20jul2021_v0.csv

Canadian Non-Point Fugitive Dust (othaf dust)

- 2016

canada_MYR_2016_area_dust_27dec2020_v0.csv

- 2023

canada_MYR_2023proj_area_dust_02jul2021_v0.csv

- 2026

canada_MYR_2026proj_area_dust_20jul2021_v0.csv

Canadian & Mexican Nonpoint (othar)

- 2016

Mexico_2016INEM_nonroad_27apr2020_v1.csv
canada_MYR_2016_T5_rail_27dec2020_v0.csv
canada_MYR_2016_area_other_27dec2020_v0.csv
canada_MYR_2016_T4_nonroad_monthly_27dec2020_v0.csv
Mexico_2016INEM_nonpoint_27may2020_v1.csv

- 2023

2023_proj_from_Mexico_2016INEM_nonroad_01jul2021_v0.csv
canada_2023_area_EPG_svn70_11apr2019_v1.csv
canada_MYR_2023proj_T5_rail_01jul2021_v0.csv
canada_MYR_2023proj_T4_nonroad_monthly_01jul2021_v0.csv
canada_MYR_2023proj_area_other_02jul2021_v0.csv
2023_proj_from_Mexico_2016INEM_nonpoint_01jul2021_v0.csv

- 2026

canada_2026interp_area_EPG_svn70_21jul2021_v0.csv
canada_MYR_2026proj_area_other_21jul2021_v0.csv
canada_MYR_2026proj_T4_nonroad_monthly_20jul2021_v0.csv
2026_proj_from_Mexico_2016INEM_nonpoint_21jul2021_v0.csv
2026_proj_from_Mexico_2016INEM_nonroad_21jul2021_v0.csv
canada_MYR_2026proj_T5_rail_20jul2021_v0.csv

Canadian & Mexican Point Sources (othpt)

- 2016

canada_MYR_2016_point_UOG_15jun2021_nf_v2.csv
canada_MYR_2016_point_nodust_noVOC_monthly_27dec2020_v0.csv
canada_MYR_2016_point_CB6VOC_monthly_27dec2020_v0.csv
canada_MYR_2016_point_VOC_INV_monthly_27dec2020_v0.csv
canada_MYR_2016_T1_airports_monthly_27dec2020_v0.csv
Mexico_2016_point_20191209_15may2023_nf_v4.csv

- 2023

canada_MYR_2023proj_point_UOG_3D_01jul2021_v0.csv
2023_proj_from_canada_MYR_2016_point_VOC_INV_monthly_02jul2021_v0.csv
2023_proj_from_canada_MYR_2016_point_CB6VOC_monthly_02jul2021_v0.csv
2023_proj_from_Mexico_2016_point_20191209_01jul2021_v0.csv
2023_proj_from_canada_MYR_2016_point_nodust_noVOC_monthly_02jul2021_v0.csv
2023_proj_from_canada_MYR_2016_T1_airports_monthly_02jul2021_v0.csv

- 2026

2026_proj_from_canada_MYR_2016_point_VOC_INV_monthly_21jul2021_v0.csv
2026_proj_from_canada_MYR_2016_point_nodust_noVOC_monthly_21jul2021_v0.csv
canada_MYR_2026proj_point_UOG_3D_20jul2021_v0.csv
2026_proj_from_canada_MYR_2016_T1_airports_monthly_21jul2021_v0.csv
2026_proj_from_Mexico_2016_point_20191209_21jul2021_v0.csv
2026_proj_from_canada_MYR_2016_point_CB6VOC_monthly_21jul2021_v0.csv

Canadian Point Source Fugitive Dust (othptdust_adj)

- 2016

canada_MYR_2016_ag_harvest_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_point_source_dust_monthly_27dec2020_v0.csv
canada_MYR_2016_ag_tillage_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM25_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM10_monthly_12km_27dec2020_v0.csv

- 2023

canada_MYR_2016_ag_harvest_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_point_source_dust_monthly_27dec2020_v0.csv
canada_MYR_2016_ag_tillage_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM25_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM10_monthly_12km_27dec2020_v0.csv

- 2026

canada_MYR_2016_ag_harvest_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_point_source_dust_monthly_27dec2020_v0.csv
canada_MYR_2016_ag_tillage_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM25_monthly_12km_27dec2020_v0.csv
canada_MYR_2016_ag_animal_PM10_monthly_12km_27dec2020_v0.csv

Canadian Mobile Source (onroad_can)

- 2016

canada_MYR_2016_T3_onroad_monthly_27dec2020_v0.csv
canada_MYR_2016_T3_onroad_refueling_27dec2020_v0.csv

- 2023

canada_MYR_2023proj_T3_onroad_monthly_01jul2021_v0.csv
canada_MYR_2023proj_T3_onroad_refueling_01jul2021_v0.csv

- 2026

canada_MYR_2026proj_T3_onroad_refueling_20jul2021_v0.csv
canada_MYR_2026proj_T3_onroad_monthly_20jul2021_v0.csv

Mexican Mobile Source (onroad_mex)

- 2016

Mexico_2016_onroad_MOVES_interpolated_02mar2018_v0.csv

- 2023

Mexico_2023_onroad_MOVES_aggSCC_21sep2016_v1.csv

- 2026

Mexico_2026interp_onroad_MOVES_aggSCC_13jul2021_v0.csv

Non-Point Solvents (np_solvents)

- 2016

VCPy_plus_other_solvents_2016v3_PSS_20220621_07jul2022_nf_v2.csv

nonVCPy_solvents_2017NEIpost_NONPOINT_20210129_07jul2022_nf_v2.csv

solvents_2017NEIpost_NONPOINT_20210129_nonVCPy_polls_for2016v3_2019ge_07jul2022_nf_v2.csv

- 2023

2023gf_from_VCPy_plus_other_solvents_2016v3_PSS_20220621_08jul2022_v0.csv

2023gf_from_nonVCPy_solvents_2017NEIpost_NONPOINT_20210129_08jul2022_v0.csv

2023gf_from_solvents_2017NEIpost_NONPOINT_20210129_nonVCPy_polls_for2016v3_2019ge_08jul2022_v0.csv

- 2026

2026gf_from_VCPy_plus_other_solvents_2016v3_PSS_20220621_08jul2022_v0.csv

2026gf_from_nonVCPy_solvents_2017NEIpost_NONPOINT_20210129_08jul2022_v0.csv

2026gf_from_solvents_2017NEIpost_NONPOINT_20210129_nonVCPy_polls_for2016v3_2019ge_08jul2022_v0.csv

Point Source Solvent (pt_solvents)

- 2016

2016fh_ptnonipm_all_point_solvents_23feb2022_v0.csv

- 2023

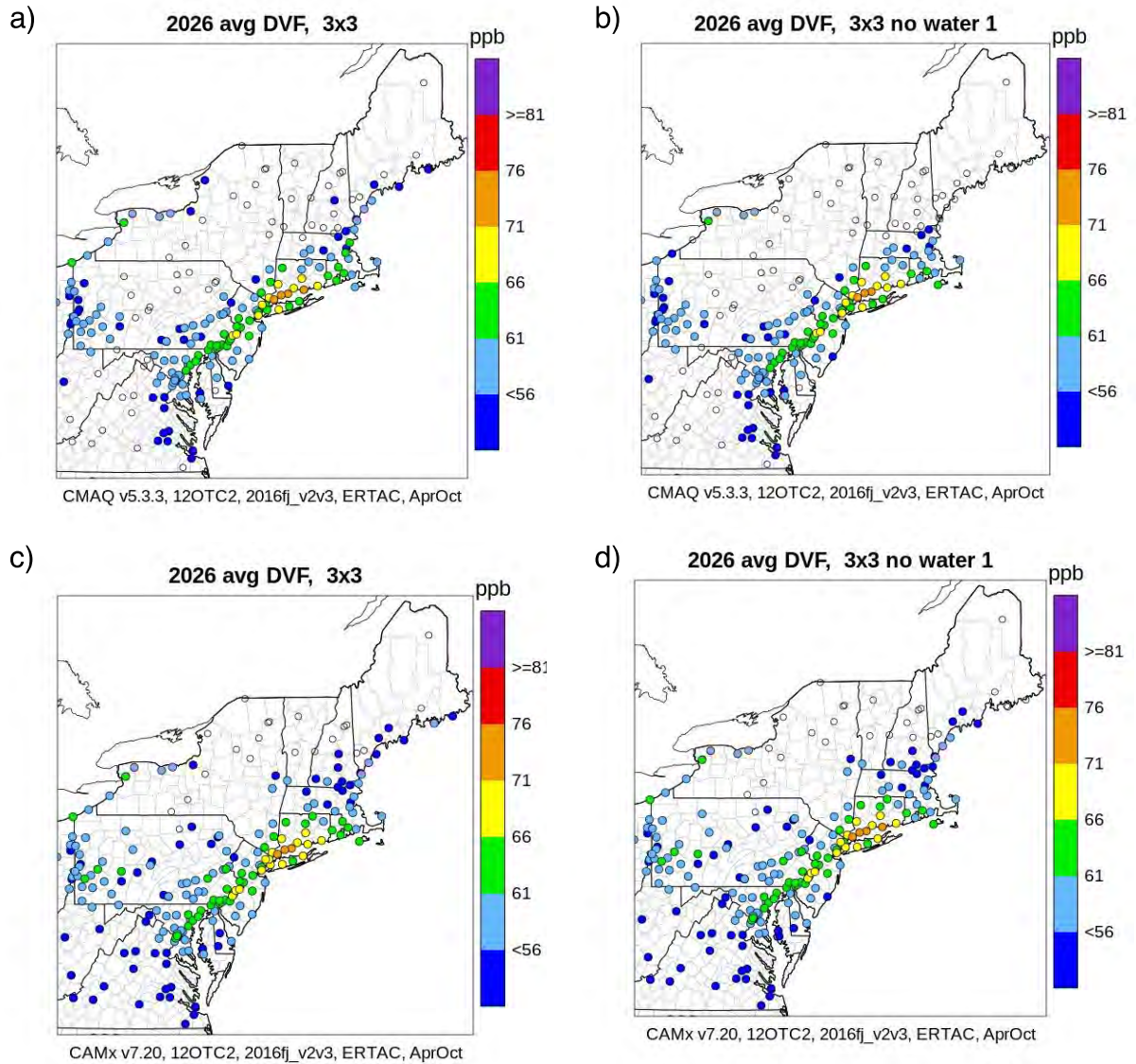
2023_v2platform_from_2016fh_ptnonipm_all_point_solvents_23feb2022_v0.csv

- 2026

2026_v2platform_from_2016fh_ptnonipm_all_point_solvents_23feb2022_v0.csv

Appendix B: Future Design Values for 2026 with the V2/V3 Inventory

Figure B1. Future Design Values (DVF) for 2026 for (a) CMAQ with V2/V3 and 3x3 methodology; (b) CMAQ with V2/V3 and 3x3 No Water 1 methodology; (c) CAMx with V2/V3 and 3x3 methodology; and (d) CAMx with V2/V3 and 3x3 No Water 1 methodology.



Appendix C: 2023 DVFs for All Monitors

Table C1: All monitors in the domain showing the 2016 (2014-2018) base observed design value (DVB) compared to the 2019-2021 and 2020-2022 preliminary monitored DVs and 2023 modeling future predicted design values (DVFs) for 3x3 and 3x3 No Water 1 methodology for CMAQ (green header) and CAMx (blue header) using the V2/V3 inventory. See Table 15 for Top 21 OTR Monitors.

										2014-2018 DVB		2019- 2021 DV		2020- 2022 DV		CAMx v7.20				CMAQ v5.3.3			
Site ID	State	County	Site name	Lat	Lon	AVG	MAX									AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
90010017	Connecticut	Fairfield	Greenwich Point Park - Greenwich	41.00466	-73.58511	79.3	80	79	77	76.3	76.9	73.4	74.1	75.5	76.2	74.6	75.3						
90011123	Connecticut	Fairfield	Western Conn State Univ - Danbury	41.39917	-73.4431	77	78	70	71	69.5	70.4	69.5	70.4	69.3	70.2	69.3	70.2						
90013007	Connecticut	Fairfield	Lighthouse - Stratford	41.1525	-73.1031	82	83	81	81	75.3	76.2	75.1	76.1	74.7	75.6	74.7	75.6						
90019003	Connecticut	Fairfield	Sherwood Island State Park - Westport	41.11833	-73.3367	82.7	83	80	80	76.8	77	75.6	75.9	77.4	77.6	76	76.3						
90031003	Connecticut	Hartford	McAuliffe Park	41.78472	-72.6317	71.7	74	67	68	63.7	65.7	63.7	65.7	62.4	64.4	62.4	64.4						
90050005	Connecticut	Litchfield	Mohawk Mt-Cornwall Hospital - Middletown	41.82134	-73.2973	71.3	72	64	67	63.2	63.8	63.2	63.8	63.2	63.8	63.2	63.8						
90079007	Connecticut	Middlesex	Connecticut Valley Hospital - Middletown	41.55	-72.626	78.7	79	74	73	70.5	70.8	70.5	70.8	69.6	69.9	69.6	69.9						
90090027	Connecticut	New Haven	Criscuolo Park-New Haven	41.3014	-72.9029	75.7	77	72	70	69.1	70.3	68.8	70	69.5	70.7	68.4	69.6						
90099002	Connecticut	New Haven	Hammonasset State Park - Madison	41.25679	-72.5533	79.7	82	82	79	72.3	74.3	72.7	74.8	72.8	74.9	71.1	73.2						
90110124	Connecticut	New London	Fort Griswold Park - Groton	41.35362	-72.0788	74.3	76	73	72	67.6	69.2	67.8	69.3	68.5	70.1	71	72.7						
90131001	Connecticut	Tolland		41.97639	-72.3881	71.7	73	67	66	63.4	64.6	63.4	64.6	62.3	63.4	62.3	63.4						
90159991	Connecticut	Windham	Abington	41.84046	-72.0104	69.7	71	65	64	61.6	62.8	61.6	62.8	60.6	61.7	60.6	61.7						
100010002	Delaware	Kent	PROPERTY OF KILLENS POND STATE PARK; BEHIND FARM BUILDINGS	38.98667	-75.5568	66.3	67	NA	63	57.2	57.8	57.7	58.3	58	58.7	57.9	58.5						
100031007	Delaware	New Castle	Lums Pond	39.5513	-75.732	68	69	NA	NA	59.4	60.3	59.4	60.3	58.9	59.8	58.9	59.8						
100031010	Delaware	New Castle	BCSP	39.81722	-75.5639	73.7	74	NA	62	65.4	65.7	65.4	65.7	65.5	65.8	65.5	65.8						

100031013	Delaware	New Castle	BELLEVUE STATE PARK: FIELD IN SE PORTION OF PARK	39.77389	-75.4964	71	72	NA	63	62.6	63.5	62.6	63.5	62.8	63.7	62.8	63.7
100032004	Delaware	New Castle	MLK CORNER OF MLK BLVD AND JUSTISON ST	39.73944	-75.5581	71.3	72	NA	NA	62.9	63.5	62.9	63.5	63.1	63.7	63.1	63.7
100051002	Delaware	Sussex	Seaford Shipley State Service Center	38.6539	-75.6106	65.3	66	NA	61	56.9	57.5	56.9	57.5				
100051003	Delaware	Sussex	Lewes SPM SITE: NEAR UD ACID RAIN/MERCURY COLLECTORS	38.7791	-75.1632	67.7	69	NA	NA	59.4	60.6	60.2	61.4	55.1	56.1		
110010041	District Of Columbia	District of Columbia	RIVER TERRACE	38.89557	-76.9581	57	57	60	59	50.4	50.4	50.4	50.4	49.3	49.3	49.3	49.3
110010043	District Of Columbia	District of Columbia	MCMILLAN NCore- PAMS	38.92185	-77.0132	71	72	68	67	62.8	63.7	62.8	63.7	61.4	62.3	61.4	62.3
110010050	District Of Columbia	District of Columbia	Takoma Rec Center	38.97009	-77.0167	70	70	66	61	61.7	61.7	61.7	61.7	60.4	60.4	60.4	60.4
230010014	Maine	Androscoggin	DURHAM FIRE STATION	43.97462	-70.1246	59.3	60	53	56	52.3	52.9	51.9	52.5	53.1	53.7		
230039991	Maine	Aroostook	Ashland	46.6041	-68.4135	52	52	52	50								
230052003	Maine	Cumberland	CETL - Cape Elizabeth Two Lights (State Park)	43.56104	-70.2073	64.7	65	62	62	57.2	57.5	57.4	57.7	59	59.3		
230090102	Maine	Hancock	TOP OF CADILLAC MTN (FENCED ENCLOSURE)	44.3517	-68.227	69	71	67	67	61	62.7						
230090103	Maine	Hancock	MCFARLAND HILL Air Pollutant Research Site	44.37705	-68.2609	63	64	60	61					55.7	56.6		
230112005	Maine	Kennebec	Gardiner: Pray Street School (GPSS)	44.23062	-69.785	61.3	63	NA	NA	53.7	55.2	53.7	55.2				
230130004	Maine	Knox	Marshall Point Lighthouse	43.91796	-69.2606	63.3	64	60	59	56	56.6	55.6	56.2	55.4	56		
230194008	Maine	Penobscot	WLBZ TV Transmitter Building - Summit of Rider Bluff	44.73598	-68.6708	58.3	60	57	59								
230290019	Maine	Washington	Harbor Masters Office; Jonesport Public Landing	44.53191	-67.5959	59.3	61	55	55	52.6	54.1						
230310038	Maine	York	WBFD - West Buxton (Hollis) Fire Department	43.65676	-70.6291	58.7	59	NA	NA								

230310040	Maine	York	SBP - Shapleigh Ball Park	43.58889	-70.8773	61.3	62	56	57										
230312002	Maine	York	KPW - Kennebunkport Parson's Way	43.34317	-70.471	66.5	67	64	64	59.4	59.8	59	59.5	59.6	60				
240031003	Maryland	Anne Arundel	GLEN BURNIE	39.16953	-76.6279	74	74	70	66	65.4	65.4	64.8	64.8	65.3	65.3	64.3	64.3		
240051007	Maryland	Baltimore	Padonia	39.46048	-76.6335	72	72	69	68	63.3	63.3	63.3	63.3	62.2	62.2	62.2	62.2		
240053001	Maryland	Baltimore	Essex	39.31083	-76.4744	72.7	73	70	68	64.6	64.9	63.8	64.1	64.2	64.4	63	63.2		
240090011	Maryland	Calvert	Calvert	38.53672	-76.6172	67.7	69	58	58	59.6	60.7	58.1	59.2	58.6	59.7	55.8	56.9		
240130001	Maryland	Carroll	South Carroll	39.44429	-77.0423	68.3	69	64	64	59.6	60.2	59.6	60.2	58.4	59	58.4	59		
			Fair Hill Natural Resource Management Area																
240150003	Maryland	Cecil		39.70144	-75.8601	74	74	67	65	64.4	64.4	64.4	64.4	64.4	64.4	64.4	64.4		
240170010	Maryland	Charles	Southern Maryland	38.50855	-76.8119	69.3	70	59	59	60.5	61.1	60.5	61.1	59.3	59.9	59.3	59.9		
240190004	Maryland	Dorchester	Horn Point	38.58753	-76.141	64.7	66	64	63	56.6	57.7	56.2	57.4	57	58.2	56.3	57.5		
240199991	Maryland	Dorchester	Blackwater NWR	38.44497	-76.1113	65.7	66	62	61	57.8	58.1	56.5	56.8	58.6	58.8	57.5	57.8		
240210037	Maryland	Frederick	Frederick Airport	39.42276	-77.3752	68	69	65	63	59.2	60	59.2	60	58.4	59.3	58.4	59.3		
240230002	Maryland	Garrett	Piney Run	39.70595	-79.012	65.3	66	58	58	59.5	60.1	59.5	60.1						
240251001	Maryland	Harford	Edgewood	39.41019	-76.2969	74	75	72	68	65.4	66.2	64.8	65.7	65.4	66.3	63.9	64.8		
240259001	Maryland	Harford	Aldino	39.56333	-76.2039	73	73	68	67	63.6	63.6	63.6	63.6	63.6	63.6	62.6	62.6		
240290002	Maryland	Kent	Millington	39.30502	-75.7973	69.3	70	64	64	60.6	61.2	60.6	61.2	59.8	60.4	59.8	60.4		
240313001	Maryland	Montgomery	Rockville	39.11431	-77.1069	67.7	68	63	63	59.9	60.2	59.9	60.2	58.4	58.6	58.4	58.6		
240330030	Maryland	Prince George's	HU-Beltsville	39.05528	-76.8783	69.3	70	67	64	61	61.6	61	61.6	59.5	60.1	59.5	60.1		
		Prince																	
240338003	Maryland	George's	PG Equestrian Center	38.81194	-76.7442	70.7	71	65	64	62.1	62.3	62.1	62.3	61.2	61.4	61.2	61.4		
		Prince																	
240339991	Maryland	George's	Beltsville	39.0284	-76.8171	69.3	71	70	67	60.6	62.1	60.6	62.1	59.4	60.9	59.4	60.9		
240430009	Maryland	Washington	Hagerstown	39.56418	-77.7202	66.7	67	60	61	59.4	59.7	59.4	59.7	58.5	58.8	58.5	58.8		
		Baltimore																	
245100054	Maryland	(City)	Furley	39.32881	-76.5531	68.3	70	NA	NA	60.8	62.3	59.8	61.3	60.3	61.8	59.2	60.6		
			TRURO NATIONAL SEASHORE																
250010002	Massachusetts	Barnstable		41.9758	-70.0236	69	69	64	64	61.6	61.6	61.5	61.5	60.8	60.8	60.3	60.3		
250051004	Massachusetts	Bristol	FALL RIVER	41.68571	-71.1692	71.7	74	NA	65	64.9	66.9	64.6	66.7	66.7	68.8	63.6	65.6		
250051006	Massachusetts	Bristol	FAIRHAVEN2	41.64538	-70.8975	67.3	69	63	62	60.8	62.3	60.9	62.4	60	61.5	59.6	61.1		

250070001	Massachusetts	Dukes	1 HERRING CREEK RD: AQUINNAH (WAMPANOAG TRIBAL SITE)	41.33047	-70.7852	70	70	65	62	63	63	63	62.3	62.3	63	63
250092006	Massachusetts	Essex	LYNN WATER TREATMENT PLANT	42.47464	-70.9708	66.3	68	62	64	60.4	62	59.5	61.1	62	63.6	59.4
250094005	Massachusetts	Essex	NEWBURYPORT HARBOR ST PARKING LOT	42.81441	-70.8178	64.5	65	NA	NA	57.7	58.2	57	57.4	58.1	58.5	
250095005	Massachusetts	Essex	CONSENTINO SCHOOL.	42.77084	-71.1023	62.7	64	58	60	55.6	56.8	55.6	56.8	55.2	56.3	56.3
250112005	Massachusetts	Franklin	Greenfield 16 Barr Ave	42.60582	-72.5967	64.7	66	55	56	57.2	58.4	57.2	58.4			
250130008	Massachusetts	Hampden	WESTOVER AFB	42.19438	-72.5551	70	71	63	64	61.6	62.5	61.6	62.5	61	61.9	61.9
250154002	Massachusetts	Hampshire	QUABBIN RES	42.29849	-72.3341	69	70	NA	62	60.4	61.3	60.4	61.3	59.5	60.3	60.3
250170009	Massachusetts	Middlesex	USEPA REGION 1 LAB	42.62668	-71.3621	64	65	58	60	56	56.9	56	56.9	55.8	56.7	56.7
250213003	Massachusetts	Norfolk	BLUE HILL OBSERVATORY	42.21177	-71.114	69	70	56	58	61.3	62.2	61	61.8	62.8	63.7	61.6
250230005	Massachusetts	Plymouth	Brockton Buckley	42.06511	-71.0121	67	69	60	61	59.1	60.8	59.1	60.8	58.3	60	60
250250042	Massachusetts	Suffolk	DUDLEY SQUARE ROXBURY	42.3295	-71.0826	60.3	64	59	61	54.4	57.7	53.4	56.7	55.2	58.6	52.6
250270015	Massachusetts	Worcester	WORCESTER AIRPORT	42.27432	-71.8755	65	66	62	62	57.1	58	57.1	58	56	56.9	56.9
250270024	Massachusetts	Worcester	UXBRIDGE	42.0997	-71.6194	66.3	69	60	59	58.5	60.9	58.5	60.9	57.8	60.2	60.2
330012004	New Hampshire	Belknap	FIELD OFFICE ON THE GROUNDS OF THE FORMER STATE PRISON	43.56612	-71.4963	58.7	59	53	55	51.5	51.8			52.3	52.5	
330050007	New Hampshire	Cheshire	WATER STREET	42.93052	-72.2723	62.3	63	54	56	54.6	55.2	54.6	55.2			
330074001	New Hampshire	Coos		44.27009	-71.3038	67.3	68	NA	58							
330074002	New Hampshire	Coos	CAMP DODGE: GREENS GRANT	44.30813	-71.2176	58.3	59	53	55							
330090010	New Hampshire	Grafton	LEBANON AIRPORT ROAD	43.62961	-72.3095	57.7	59	52	53							
330099991	New Hampshire	Grafton	Woodstock	43.94452	-71.7008	54.7	56	51	52							
330111011	New Hampshire	Hillsborough	GILSON ROAD	42.71865	-71.5224	63	64	56	58	55.2	56.1	55.2	56.1			

330115001	New Hampshire	Hillsborough	MILLER STATE PARK	42.86183	-71.8786	67	68	59	60	58.5	59.4	58.5	59.4				
330131007	New Hampshire	Merrimack	HAZEN DRIVE	43.2185	-71.5145	62	63	56	57	54.5	55.4	54.5	55.4				
330150014	New Hampshire	Rockingham	PORTSMOUTH - PEIRCE ISLAND	43.07537	-70.748	63.3	65	54	59	56.6	58.1	56.1	57.6	58.5			
330150016	New Hampshire	Rockingham	SEACOAST SCIENCE CENTER	43.04527	-70.714	66.7	67	62	65	59.7	59.9	59.1	59.4	60	60.3		
330150018	New Hampshire	Rockingham	MOOSEHILL SCHOOL	42.86253	-71.3801	65.3	66	57	58	57.3	58	57.3	58				
340010006	New Jersey	Atlantic	Brigantine	39.46487	-74.4487	63.7	64	59	59	57.6	57.9	57	57.3	58.4	58.7	56.7	56.9
340030006	New Jersey	Bergen	Leonla	40.87044	-73.992	74.3	75	71	68	68.6	69.3	68.6	69.3	68.7	69.3	68.7	69.3
340070002	New Jersey	Camden	Camden Spruce Street	39.93456	-75.1252	75.3	77	66	64	68.3	69.8	68.3	69.8	67.2	68.7	67.2	68.7
340071001	New Jersey	Camden	Ancora State Hospital	39.68425	-74.8615	67.3	68	62	61	60.4	61	60.4	61	59.2	59.9	59.2	59.9
340110007	New Jersey	Cumberland	Millville	39.42227	-75.0252	65.7	67	65	63	58.6	59.7	58.6	59.7	58.1	59.3	58.1	59.3
340130003	New Jersey	Essex	Newark Firehouse	40.72099	-74.1929	68.3	70	65	64	62	63.6	62	63.6	61.8	63.3	61.8	63.3
340150002	New Jersey	Gloucester	Clarksboro	39.80034	-75.2121	73.7	74	66	66	66.2	66.4	66.2	66.4	65.8	66	65.8	66
340170006	New Jersey	Hudson	Bayonne	40.67025	-74.1261	71	72	66	66	65.1	66	65.1	66	66.1	67	65.6	66.6
340190001	New Jersey	Hunterdon	Flemington	40.51526	-74.8067	71.3	72	63	62	64	64.6	64	64.6	63.3	64	63.3	64
340210005	New Jersey	Mercer	Rider University	40.28309	-74.7426	71.3	72	69	69	64.5	65.1	64.5	65.1	63.3	63.9	63.3	63.9
340219991	New Jersey	Mercer	Wash. Crossing	40.3125	-74.8729	73.3	74	66	65	66.4	67.1	66.4	67.1	65.5	66.1	65.5	66.1
340230011	New Jersey	Middlesex	Rutgers University	40.46218	-74.4294	74.7	75	68	68	66.7	66.9	66.7	66.9	67.2	66.9	67.2	67.2
340250005	New Jersey	Monmouth	Monmouth University	40.27765	-74.0051	67.3	69	66	67	60.2	61.7	60.2	61.7	59.1	60.5	59.2	60.7
340273001	New Jersey	Morris	Chester	40.78763	-74.6763	69	70	62	62	61.6	62.5	61.6	62.5	61.2	62	61.2	62
340290006	New Jersey	Ocean	Colliers Mills	40.06483	-74.4441	72.7	73	66	66	65.5	65.8	65.5	65.8	64.6	64.9	64.6	64.9
340315001	New Jersey	Passaic	Ramapo	41.05862	-74.2555	67.7	68	62	60	60.5	60.8	60.5	60.8	60.5	60.8	60.5	60.8
340410007	New Jersey	Warren	Columbia	40.92458	-75.0678	64.3	65	58	58	56.2	56.8	56.2	56.8	55	55.6	55	55.6
360010012	New York	Albany	LOUDONVILLE	42.68075	-73.7573	64	64	57	57	57.5	57.5	57.5	57.5				
360050110	New York	Bronx	IS 52	40.816	-73.902	67.7	69	68	66	65	66.2	62.7	63.9	63.2	64.4	63.3	64.6
360050133	New York	Bronx	PFIZER LAB SITE	40.8679	-73.8781	70.7	72	70	69	68.4	69.7	65.7	66.9	66.3	67.5	65.9	67.1
360130006	New York	Chautauqua	DUNKIRK	42.49963	-79.3188	68	68	65	67	61.6	61.6	61.3	61.3	61.4	61.4		
360270007	New York	Dutchess	MILLBROOK	41.78555	-73.7414	67	68	60	61	59.6	60.5	59.6	60.5	59.9	60.8	59.9	60.8

360290002	New York	Erie	AMHERST	42.99328	-78.7715	69.3	70	65	66	62.7	63.3	62.6	63.2	62.4	63	62.5	63.1
360310002	New York	Essex	WHITEFACE SUMMIT	44.36608	-73.9031	64	66	62	60								
360310003	New York	Essex	WHITEFACE BASE	44.39308	-73.8589	64.7	65	59	58								
360319991	New York	Essex	Huntington Wildlife Forest	43.9731	-74.2232	57	58	52	52								
360337003	New York	Franklin	Y001	44.98058	-74.695	58	58	NA	NA								
360410005	New York	Hamilton	PISECO LAKE	43.44957	-74.5163	61.3	62	56	56								
360430005	New York	Herkimer	NICKS LAKE	43.68578	-74.9854	63	63	NA	NA								
360450002	New York	Jefferson	PERCH RIVER	44.08747	-75.9732	63	63	61	62					56.6	56.6		
360551007	New York	Monroe	ROCHESTER 2	43.14618	-77.5482	65.7	68	62	65	59.9	62	59.9	62	59.3	61.3	59.3	61.3
360610135	New York	New York	CCNY	40.81976	-73.9483	70.3	72	70	70	67.5	69.1	65.1	66.7	65.6	67.2	65.8	67.4
360631006	New York	Niagara	MIDDLEPORT	43.22386	-78.4789	66.3	67	63	66	60.4	61	60.4	61	61.6	62.3	60.2	60.8
360671015	New York	Onondaga	EAST SYRACUSE	43.05235	-76.0592	64.3	65	61	60								
360715001	New York	Orange	VALLEY CENTRAL HIGH SCHOOL	41.52375	-74.2153	64.3	66	58	57	57.6	59.2	57.6	59.2	56.8	58.3	56.8	58.3
360750003	New York	Oswego	FULTON	43.28428	-76.4632	61	63	59	59	56.1	57.9			55.6	57.4		
360790005	New York	Putnam	MT NINHAM	41.45589	-73.7098	69	70	61	61	62.2	63.1	62.2	63.1	62.2	63.1	62.2	63.1
360810124	New York	Queens	QUEENS COLLEGE 2	40.73614	-73.8215	72.3	74	71	70	68.9	70.5	68	69.6	67.4	69	66.4	68
360850067	New York	Richmond	SUSAN WAGNER HS	40.59664	-74.1253	76	76	NA	NA	70	70	70.2	70.2	70.7	70.7	70.3	70.3
360870005	New York	Rockland	Rockland County	41.18208	-74.0282	71.3	72	63	62	65	65.6	65	65.6	64.7	65.3	64.7	65.3
360910004	New York	Saratoga	STILLWATER	43.01209	-73.6489	63	64	56	58	56.5	57.4	56.5	57.4				
361010003	New York	Streuben	PINNACLE STATE PARK	42.09142	-77.2098	59.7	61	55	56								
361030002	New York	Suffolk	BABYLON	40.74529	-73.4192	74	76	73	74	68.5	70.3	68.5	70.3	69.5	71.4	67.7	69.5
361030004	New York	Suffolk	RIVERHEAD	40.96078	-72.7124	74.3	76	69	68	68.2	69.8	67.6	69.1	67.8	69.4	67.1	68.6
361030009	New York	Suffolk	HOLTSVILLE	40.82799	-73.0575	71	73	70	70	65.3	67.1	64.8	66.6	65	66.8	64.4	66.2
361099991	New York	Tompkins	Connecticut Hill	42.4006	-76.6538	62.7	63	58	59								
361173001	New York	Wayne	WILLIAMSON	43.23086	-77.1714	65	67	61	61	59.6	61.5	59	60.8	59.4	61.2	58.9	60.7
361192004	New York	Westchester	WHITE PLAINS	41.05192	-73.7637	74	75	69	68	69.9	70.8	67.5	68.4	70.5	71.4	68.8	69.7
420010001	Pennsylvania	Adams	NARSTO SITE	39.92002	-77.3097	66.5	67	62	61	59.3	59.8	59.3	59.8	59.1	59.5	59.1	59.5
420019991	Pennsylvania	Adams	Arendtsville	39.9231	-77.3078	66.3	67	61	62	59.1	59.8	59.1	59.8	58.9	59.5	58.9	59.5

420030008	Pennsylvania	Allegheny	Lawrenceville	40.46542	-79.9608	68	69	64	63	61.9	62.8	61.9	62.8	59.9	60.8	59.9	60.8
420030067	Pennsylvania	Allegheny	South Fayette	40.37564	-80.1699	69.7	71	66	66	63.3	64.5	63.3	64.5	60.9	62	60.9	62
420031008	Pennsylvania	Allegheny	Harrison	40.61749	-79.7277	69	70	65	67	62.1	63	62.1	63	60.2	61.1	60.2	61.1
420050001	Pennsylvania	Armstrong	LAT/LON IS CENTER OF TRAILER	40.81418	-79.5648	69	70	64	66	60.7	61.6	60.7	61.6	59.8	60.7	59.8	60.7
420070002	Pennsylvania	Beaver	DRIVEWAY TO BAKEY RESIDENCE	40.56252	-80.5039	68.7	70	64	64	59.9	61	59.9	61	58.3	59.4	58.3	59.4
420070005	Pennsylvania	Beaver		40.68472	-80.3597	67.3	68	63	64	57.6	58.2	57.6	58.2	54.8	55.3	54.8	55.3
420070014	Pennsylvania	Beaver		40.74778	-80.3164	65.7	67	63	64	56.4	57.6	56.4	57.6	53.4	54.5	53.4	54.5
420110006	Pennsylvania	Berks	Kutztown	40.51408	-75.7897	65.7	66	59	60	58.5	58.8	58.5	58.8	57.8	58.1	57.8	58.1
420110011	Pennsylvania	Berks	Reading Airport	40.38335	-75.9686	70	70	NA	67	62.5	62.5	62.5	62.5	61.2	61.2	61.2	61.2
420130801	Pennsylvania	Blair		40.53528	-78.3708	63.5	64	NA	NA	56	56.4	56	56.4				
420150011	Pennsylvania	Bradford	Towanda	41.70523	-76.5127	57.3	59	56	58	50.9	52.5	50.9	52.5				
420170012	Pennsylvania	Bucks	A420170012LAT/LONG POINT IS OF SAMPLING INLET	40.10722	-74.8822	79.3	81	71	72	71.6	73.1	71.6	73.1	70.2	71.7	70.2	71.7
420210011	Pennsylvania	Cambria		40.30972	-78.915	62.3	63	59	62	55.2	55.8	55.2	55.8	53.4	54	53.4	54
420270100	Pennsylvania	Centre	LAT/LON=POINT SW CORNER OF TRAILER	40.81139	-77.877	62.3	63	55	56	55.2	55.9	55.2	55.9				
420279991	Pennsylvania	Centre	Penn State	40.7208	-77.9319	64.7	65	61	61	57.3	57.6	57.3	57.6				
420290100	Pennsylvania	Chester	CHESTER COUNTY TRANSPORT SITE INTO PHILADELPHIA	39.83446	-75.7682	72.7	73	NA	60	63.8	64	63.8	64	63.8	64.1	63.8	64.1
420334000	Pennsylvania	Clearfield	MOSHANNON STATE FOREST	41.1175	-78.5262	64.7	66	53	54	57.9	59.1	57.9	59.1				
420430401	Pennsylvania	Dauphin	A420430401LAT/LON POINT IS AT CORNER OF TRAILER	40.24699	-76.847	65.3	66	62	61	57.1	57.7	57.1	57.7	56.8	57.4	56.8	57.4
420431100	Pennsylvania	Dauphin	A420431100LAT/LON POINT IS AT CORNER OF TRAILER	40.27222	-76.6814	66	67	60	60	57.7	58.5	57.7	58.5	57.1	57.9	57.1	57.9
420450002	Pennsylvania	Delaware	A420450002LAT/LON POINT IS OF CORNER OF TRAILER	39.83556	-75.3725	71.3	72	66	65	63.3	63.9	63.3	63.9	63.4	64.1	63.4	64.1
420479991	Pennsylvania	Elk	Kane Exp. Forest	41.59812	-78.7679	65.7	66	57	58	59.5	59.7	59.5	59.7				
420490003	Pennsylvania	Erie		42.14175	-80.0386	65	66	60	59	58.9	59.8	58.3	59.2	59.3	60.2	57.1	58

420550001	Pennsylvania	Franklin	HIGH ELEVATION OZONE SITE	39.96111	-77.4756	59.3	60	56	56	53.1	53.7	53.1	53.7	52.1	52.8	52.1	52.8
			75 KM SSW OF PITTSBURGH RURAL SITE ON A KNOLL WITHIN A LARGE CLEARIN														
420590002	Pennsylvania	Greene		39.80933	-80.2657	67	68	NA	61	61.5	62.4	61.5	62.4	61.3	62.2	61.3	62.2
420630004	Pennsylvania	Indiana		40.56333	-78.92	69.7	70	65	63	62.3	62.5	62.3	62.5	60.5	60.8	60.5	60.8
			A420690101LAT/LON POINT IS AT CORNER OF TRAILER	41.47912	-75.5782	66	67	58	60	58.6	59.5	58.6	59.5				
420690101	Pennsylvania	Lackawanna															
			A420692006LAT/LON POINT IS AT CORNER OF TRAILER	41.44278	-75.6231	62.5	64	58	55	55.5	56.8	55.5	56.8				
420692006	Pennsylvania	Lackawanna															
			A420710007LAT/LON POINT AT CORNER OF TRAILER	40.04667	-76.2833	69.3	70	64	62	60.4	61	60.4	61	60.1	60.7	60.1	60.7
420710007	Pennsylvania	Lancaster		40.04383	-76.1124	65	66	63	61	58	58.9	58	58.9	56.9	57.8	56.9	57.8
420710012	Pennsylvania	Lancaster	Lancaster DW	40.99585	-80.3464	66.3	68	59	61	57.5	58.9	57.5	58.9	56.5	57.9	56.5	57.9
420730015	Pennsylvania	Lawrence		40.33733	-76.3834	69	70	NA	NA	60.6	61.5	60.6	61.5	60	60.9	60	60.9
420750100	Pennsylvania	Lebanon															
			A420770004LAT/LONG POINT IS OF SAMPLING INLET	40.61194	-75.4325	69.7	70	63	61	62.1	62.4	62.1	62.4	61	61.3	61	61.3
420770004	Pennsylvania	Lehigh															
			A420791101LAT/LON POINT IS AT CORNER OF TRAILER	41.26556	-75.8464	64	64	NA	58	56.3	56.3	56.3	56.3				
420791101	Pennsylvania	Luzerne		41.08306	-75.3233	66.7	68	NA	NA	58.9	60	58.9	60	58	59.1	58	59.1
420810100	Pennsylvania	Lycoming	MONTOURSVILLE	41.2508	-76.9238	63.7	64	57	57	56.6	56.8	56.6	56.8				
420850100	Pennsylvania	Mercer		41.21501	-80.4848	68.7	69	63	65	60.3	60.6	60.3	60.6	59.4	59.7	59.4	59.7
420859991	Pennsylvania	Mercer	M.K. Goddard	41.4271	-80.1451	65.3	66	62	62	57.8	58.4	57.8	58.4	56.7	57.4	56.7	57.4
420890002	Pennsylvania	Monroe	SWIFTWATER	41.08306	-75.3233	66.7	68	NA	NA	58.9	60	58.9	60	58	59.1	58	59.1
			A420910013LAT/LON POINT IS OF CORNER OF TRAILER	40.11222	-75.3092	71.3	72	NA	67	64.5	65.1	64.5	65.1	64	64.6	64	64.6
420910013	Pennsylvania	Montgomery															
			LAT/LON POINT IS CENTER OF TRAILER	40.62806	-75.3411	70	71	64	64	62.4	63.3	62.4	63.3	60.9	61.7	60.9	61.7
420950025	Pennsylvania	Northampton															
420958000	Pennsylvania	Northampton	COMBINED EASTON SITE (420950100) AND	40.69222	-75.2372	69	69	NA	NA	60.9	60.9	60.9	60.9	59.8	59.8	59.8	59.8

510360002	Virginia	Charles	Shirley Plantation	37.34438	-77.2593	62.3	63	58	57	52.6	53.2	52.6	53.2	52.4	53	52.4	53
510410004	Virginia	Chesterfield	VDOT Chesterfield Residency Shop	37.35748	-77.5936	61.3	62	58	58	51.8	52.4	51.8	52.4	51.6	52.1	51.6	52.1
510590030	Virginia	Fairfax	Lee District Park	38.77335	-77.1047	70	71	65	62	61.1	62	61.1	62	60.4	61.3	60.4	61.3
			Chester Phelps Wildlife Management Area:														
510610002	Virginia	Fauquier	Sumerduck	38.47367	-77.7677	58.7	59	54	55	51.4	51.7	51.4	51.7	51.8	52.1	51.8	52.1
510690010	Virginia	Frederick	Rest	39.28102	-78.0816	61.3	62	55	55	54.9	55.6	54.9	55.6				
510719991	Virginia	Giles	Horton Station	37.3297	-80.5578	62	62	NA	NA	55.1	55.1	55.1	55.1				
510850003	Virginia	Hanover	Turner Property: Old Church	37.60613	-77.2188	63.3	65	58	58	53.4	54.8	53.4	54.8	52.8	54.3	52.8	54.3
			MathScience														
510870014	Virginia	Henrico	Innovation Center	37.55652	-77.4003	65.5	66	60	59	54.9	55.3	54.9	55.3	54.9	55.4	54.9	55.4
511071005	Virginia	Loudoun	Broad Run High School: Ashburn	39.02473	-77.4893	67	68	62	62	59.1	59.9	59.1	59.9	58.1	58.9	58.1	58.9
511130003	Virginia	Madison	Shenandoah NP - Big Meadows	38.5231	-78.4347	63	63	57	58	56	56	56	56				
511479991	Virginia	Prince Edward	Prince Edward	37.1655	-78.3069	59.3	60	56	55	50.5	51.1	50.5	51.1				
511530009	Virginia	Prince William	James S. Long Park	38.85287	-77.6346	65.3	66	59	59	57.9	58.6	57.9	58.6	57.7	58.3	57.7	58.3
511611004	Virginia	Roanoke	East Vinton Elementary School	37.28342	-79.8845	61.3	62	57	57	54.3	54.9	54.3	54.9				
511630003	Virginia	Rockbridge	Natural Bridge Ranger Station	37.62668	-79.5126	58	59	54	53	51.6	52.4	51.6	52.4				
511650003	Virginia	Rockingham	ROCKINGHAM CO. VDOT	38.47753	-78.8195	60	60	56	57	53.7	53.7	53.7	53.7				
511790001	Virginia	Stafford	Widewater Elementary School	38.48123	-77.3704	62.3	63	59	58	54.2	54.8	54	54.6	53.6	54.2	53.9	54.6
511970002	Virginia	Wythe	Rural Retreat Sewage Treatment Plant	36.89117	-81.2542	60.7	61	56	57	54.1	54.4	54.1	54.4				
516500008	Virginia	Hampton City	NASA Langley Research Center	37.10373	-76.387	64.3	65	58	58	55.9	56.5	55.1	55.7	55.4	56	53.8	54.4
518000004	Virginia	Suffolk City	Tidewater Community College	36.90118	-76.4381	61	62	56	55	54	54.9	54	54.9	55	55.9	53.7	54.6
			VA Tech Agricultural Research Station:														
518000005	Virginia	Suffolk City	Holland	36.66525	-76.7308	59.7	61	56	56	52.8	53.9	52.8	53.9				
100300010	Alabama	Baldwin	FAIRHOPE: Alabama	30.49748	-87.8803	63.7	65	58	58	56.9	58.1	56.6	57.7	56.1	57.3	55.9	57.1
10331002	Alabama	Colbert	MUSCLE SHOALS	34.76262	-87.6381	58.7	59	NA	NA	51.7	52	51.7	52				

10499991	Alabama	DeKalb	Sand Mountain		34.289	-85.9701	62.3	63	59	58	55.6	56.2	55.6	56.2	56.2				
10550011	Alabama	Etowah	SOUTHSIDE		33.90404	-86.0539	61.7	63	58	57	55.4	56.5	55.4	56.5	56.5				
10690004	Alabama	Houston	DOTHAN		31.18893	-85.4231	58.3	59	NA	NA									
10730023	Alabama	Jefferson	North Birmingham		33.55306	-86.815	66.3	68	65	63	56.4	57.9	56.4	57.9	55.9	57.3	55.9	57.3	57.3
10731003	Alabama	Jefferson	Fairfield		33.48556	-86.915	65.7	66	66	63	55.7	56	55.7	56	55.8	56.1	55.8	56.1	56.1
10731005	Alabama	Jefferson	McAdory		33.33111	-87.0036	65	65	65	62	55.5	55.5	55.5	55.5	54.7	54.7	54.7	54.7	54.7
10731010	Alabama	Jefferson	Leeds		33.54528	-86.5492	64.3	66	NA	61	54.8	56.3	54.8	56.3	53.9	55.3	53.9	55.3	55.3
10732006	Alabama	Jefferson	Hoover		33.38639	-86.8167	66	66	NA	NA	55.5	55.5	55.5	55.5	55.3	55.3	55.3	55.3	55.3
10735003	Alabama	Jefferson	Corner		33.80167	-86.9425	63.5	64	60	59	55.5	55.5	55.5	55.5	55.3	55.8	55.3	55.8	55.8
10736002	Alabama	Jefferson	Tarrant Elementary School		33.57833	-86.7739	67.7	68	62	60	57.4	57.7	57.4	57.7	57.9	58.2	57.9	58.2	58.2
10890014	Alabama	Madison	HUNTSVILLE OLD AIRPORT		34.68776	-86.5864	64	64	60	61	55.7	55.7	55.7	55.7	55.7				
10890022	Alabama	Madison	HUNTSVILLE CAPSHAW ROAD		34.77273	-86.7562	62	62	59	58	54.3	54.3	54.3	54.3	54.3				
10970003	Alabama	Mobile	CHICKASAW		30.77018	-88.0878	63	64	56	57	55.8	56.7	55.8	56.7	55.6	56.5	55.6	56.5	56.5
10972005	Alabama	Mobile	BAY ROAD		30.47431	-88.141	63.7	65	NA	NA	57.4	58.6	57.8	59	57.7	58.9	57.1	58.3	58.3
11011002	Alabama	Montgomery	MOMS: ADEM		32.41281	-86.2634	61	62	58	58	53.2	54.1	53.2	54.1	52.6	53.4	52.6	53.4	53.4
11030011	Alabama	Morgan	DECATUR: Alabama		34.53072	-86.9675	63.7	64	60	60	56.2	56.5	56.2	56.5	56.7	56.9	56.7	56.9	56.9
11130002	Alabama	Russell	LADONIA: PHENIX CITY		32.46735	-85.0834	62	62	NA	NA	54.1	54.1	54.1	54.1	54	54	54	54	54
11170004	Alabama	Shelby	HELENA		33.31714	-86.8258	66.7	67	63	61	56.9	57.1	56.9	57.1	56.1	56.4	56.1	56.4	56.4
11190003	Alabama	Sumter	Ward: Sumter Co.		32.36261	-88.278	57	57	54	53	52.4	52.4	52.4	52.4	52.4				
11250010	Alabama	Tuscaloosa	DUNCANVILLE: TUSCALOOSA		33.08977	-87.4597	60	60	55	NA	52.2	52.2	52.2	52.2	51.5	51.5	51.5	51.5	51.5
50199991	Arkansas	Clark	Caddo Valley		34.1795	-93.0988	57.7	58	56	57	50.6	50.8	50.6	50.8					
50350005	Arkansas	Crittenden	MARION		35.19729	-90.1931	67	68	68	70	61	61.9	61	61.9	60.1	61	60.1	61	61
51010002	Arkansas	Newton	DEER		35.83273	-93.2083	58	59	58	60									
51130003	Arkansas	Polk	EAGLE MOUNTAIN		34.45451	-94.1435	61.7	62	61	61	56.6	56.9	56.6	56.9					
51190007	Arkansas	Pulaski	PARR		34.75619	-92.2813	62.3	64	60	62	54.8	56.3	54.8	56.3	54.3	55.8	54.3	55.8	55.8
51191002	Arkansas	Pulaski	NLR AIRPORT		34.83572	-92.2606	63.7	64	63	63	55.8	56.1	55.8	56.1	54.8	55	54.8	55	55
51430005	Arkansas	Washington	SPRINGDALE		36.1797	-94.1168	59.7	60	60	62	52.9	53.2	52.9	53.2					
51430006	Arkansas	Washington	Fayetteville Airport		36.0117	-94.1674	59.7	60	59	61									

80013001	Colorado	Adams	Welby	39.83812	-104.95	67	67	72	77	63.5	63.5	63.5	63.5	63.5	62.9	62.9	62.9	62.9
80050002	Colorado	Arapahoe	HIGHLAND RESERVOIR	39.56789	-104.957	73	73	80	80	68.9	68.9	67.6	67.6	67.6	67.6	67.6	67.6	67.6
80050006	Colorado	Arapahoe	Aurora East	39.63852	-104.569	67.7	69	73	74	63.9	65.1	63.9	64.5	63.3	64.5	63.3	64.5	64.5
80310002	Colorado	Denver	DENVER - CAMP	39.75118	-104.988	67.7	69	72	74	64.1	65.4	64.1	65.4	63.5	64.8	63.5	64.8	64.8
80310026	Colorado	Denver	La Casa	39.77949	-105.005	68.7	69	75	77	65.1	65.4	65.1	65.4	64.5	64.8	64.5	64.8	64.8
80350004	Colorado	Douglas	Chatfield State Park	39.53449	-105.07	77.3	78	83	83	72.2	72.8	72.2	72.8	70.4	71	70.4	71	71
80410013	Colorado	El Paso	U.S. AIR FORCE ACADEMY	38.95834	-104.817	68	70	73	74	64.6	66.5	64.6	66.5	64	65.9	64	65.9	65.9
80410016	Colorado	El Paso	MANITOU SPRINGS	38.8531	-104.901	66.7	69	73	74					63.2	65.4	63.2	65.4	65.4
80450012	Colorado	Garfield	Rifle-Health Dept	39.54182	-107.784	62	63	61	62									
80519991	Colorado	Gunnison	Gothic	38.9564	-106.986	64.7	65	65	65									
80590005	Colorado	Jefferson	WELCH	39.63878	-105.139	73	75	NA	NA	68.1	70	68.1	70	67.5	69.3	67.5	69.3	69.3
80590006	Colorado	Jefferson	ROCKY FLATS-N	39.9128	-105.189	77.3	78	81	83	72.7	73.4	72.7	73.4	72.7	73.4	72.7	73.4	73.4
80590011	Colorado	Jefferson	NATIONAL RENEWABLE ENERGY LABS - NREL	39.74372	-105.178	79.3	80	83	84	74	74.6	74	74.6	73.6	74.2	73.6	74.2	74.2
80590013	Colorado	Jefferson	Aspen Park	39.54152	-105.298	70	70	NA	NA	65.3	65.3	65.3	65.3	63.7	63.7	63.7	63.7	63.7
80671004	Colorado	La Plata		37.30389	-107.484	67	67	NA	NA									
80677001	Colorado	La Plata	LOCATED IN PINE RIVER VALLEY: THE MOST DENSELY POPULATED AREA.	37.13678	-107.629	68.7	69	NA	66									
80690007	Colorado	Larimer	Rocky Mountain NP - Long's Peak	40.27813	-105.546	69	70	71	72	64.7	65.7	64.7	65.7	64.1	65	64.1	65	65
80690011	Colorado	Larimer	FORT COLLINS - WEST	40.59254	-105.141	75.7	77	77	77	71.4	72.6	71.4	72.6	71.1	72.3	71.1	72.3	72.3
80691004	Colorado	Larimer	Fort Collins - CSU - S. Mason	40.57747	-105.079	69	70	69	71	65.1	66	65.1	66	64.6	65.6	64.6	65.6	65.6
81030005	Colorado	Rio Blanco		40.03889	-107.848	60.3	61	NA	NA									
81230009	Colorado	Weld	Greeley - Weld County Tower	40.38637	-104.737	70	70	71	72	66.1	66.1	66.1	66.1	65.9	65.9	65.9	65.9	65.9
120013012	Florida	Alachua	Paynes Prairie Farm	29.56611	-82.2661	59.3	61	59	57									
120030002	Florida	Baker	OLUSTEE	30.20111	-82.4411	60	61	58	56									

120050006	Florida	Bay	ST. ANDREWS STATE PARK: PANAMA CITY BEACH	30.13043	-85.7315	60.7	62	58	56	55.1	56.3	55.2	56.4	55.4	56.6		
120090007	Florida	Brevard	Melbourne	28.05361	-80.6286	58.3	59	NA	56								
120094001	Florida	Brevard	Cocoa Beach	28.31084	-80.6153	61	62	58	56								
120110033	Florida	Broward	Vista View Park	26.07354	-80.3385	59	59	59	59					51.6	51.6	51.6	51.6
120110034	Florida	Broward	Daniela Banu NCORE	26.05389	-80.2569	63	63	57	58	57	57	57	57	56.5	56.5		
120112003	Florida	Broward	Pompano Highlands	26.29203	-80.0965	61	62	57	57								
			Dr. Von Mizell-Eula Johnson State Park (prev. John U Lloyd State Park)	26.08842	-80.1112	62.3	63	57	58								
120118002	Florida	Broward	LAURAL OAKS ELEMENTARY	26.27008	-81.711	58.7	60	58	53								
120210004	Florida	Collier	Lake City - Veteran's Domicile	30.17806	-82.6192	60.3	62	NA	NA								
120230002	Florida	Columbia	Sheffield	30.47773	-81.5873	58	58	60	60	49.8	49.8	50.3	50.3	46.4	46.4		
120310077	Florida	Duval	Mayo Clinic	30.26028	-81.4536	60	60	59	59	52.1	52.1	51.8	51.8	52.5	52.5		
120310100	Florida	Duval	Cisco Drive	30.37822	-81.8409	61	61	59	58	53	53	53	53	52.1	52.1	52.1	52.1
120330004	Florida	Escambia	Ellyson Industrial Park	30.52537	-87.2036	64	65	58	55	56.9	57.8	56.3	57.2	55.8	56.7	54.9	55.8
120330018	Florida	Escambia	Pensacola NAS	30.36805	-87.271	63	64	59	59	55.5	56.4	56.8	57.7	55.2	56.1	55	55.9
120350004	Florida	Flagler	Flagler	29.48908	-81.2768	59.3	60	NA	53								
			Archbold Biological Station	27.18922	-81.3404	60.3	61	NA	56								
120550003	Florida	Highlands	Simmons Park	27.74003	-82.4651	67.7	68	64	63	61.8	62.1	61.1	61.4	61.6	61.9	61.9	62.2
120570081	Florida	Hillsborough	Davis Island	27.92836	-82.4545	65.7	67	58	58	59.8	61	59.1	60.2	59.8	61	57.1	58.2
120571035	Florida	Hillsborough	USMC Reserve Center (Gandy)	27.89252	-82.5384	66.3	67	66	65	60.2	60.8	59.9	60.5	60.2	60.8	62.2	62.8
120573002	Florida	Hillsborough	SYDNEY	27.96565	-82.2304	66.3	67	62	59	59.5	60.1	59.5	60.1	57.6	58.2	57.6	58.2
120590004	Florida	Holmes	Bonifay	30.84861	-85.6039	58.7	60	56	54								
120619991	Florida	Indian River	Indian River Lagoon	27.8492	-80.4554	62	63	59	59								
120690002	Florida	Lake	Clermont	28.52389	-81.7233	63.7	65	63	59	56.4	57.6	56.4	57.6	54.4	55.6		
120712002	Florida	Lee	Cape Coral - Rotary Park	26.54821	-81.9815	60.3	62	59	55								

120713002	Florida	Lee	Bay Oaks Park	26.44925	-81.9393	60.3	62	NA	NA										
120730012	Florida	Leon	Tallahassee Community College	30.43972	-84.3464	60.7	61	58	55	54.1	54.4	54.1	54.4						
120779991	Florida	Liberty	Sumatra	30.1103	-84.9903	56.3	57	56	56										
120813002	Florida	Manatee	Port Manatee	27.63309	-82.5459	61	63	59	54	55.6	57.4	55.3	57.2	54	55.8	54.2		56	
120814012	Florida	Manatee	G.T. BRAY PARK	27.48087	-82.6187	63	64	61	56	56.9	57.8	56.4	57.3	55.9	56.8				
120814013	Florida	Manatee	39TH STREET SITE	27.44976	-82.522	61	62	59	57	54.9	55.8	54.7	55.6	54.1	55				
120830003	Florida	Marion	Ocala YMCA	29.17053	-82.1006	61.3	62	62	60										
120830004	Florida	Marion	Marion County Sheriff	29.19275	-82.1731	58.7	60	58	57										
120850007	Florida	Martin	Stuart	27.17246	-80.2407	61.7	63	57	54										
120860027	Florida	Miami-Dade	Rosenstiel	25.73288	-80.1618	63	64	56	60					57.6	58.5	57.7		58.6	
120860029	Florida	Miami-Dade	Perdue	25.58733	-80.3259	61.5	62	58	60										
120910002	Florida	Okaloosa	Ft. Walton Beach	30.42653	-86.6662	61	62	58	51	54.3	55.2	53.8	54.7	53.7	54.5				
120950008	Florida	Orange	Winegard Elementary School	28.45445	-81.3812	63	64	NA	NA	56.3	57.2	56.3	57.2	55	55.9	55		55.9	
120952002	Florida	Orange	WINTER PARK	28.59639	-81.3625	63	64	62	62	55.6	56.5	55.6	56.5	54.9	55.7	54.9		55.7	
120972002	Florida	Osceola	Osceola County Fire Station	28.34751	-81.6365	64.3	66	64	59	56.3	57.8	56.3	57.8	55	56.4	55		56.4	
121010005	Florida	Pasco	San Antonio	28.33223	-82.3056	61.3	62	59	56										
121012001	Florida	Pasco	Holiday	28.19557	-82.7563	62	63	62	59	55.7	56.6	55.5	56.4	55.4	56.3				
121030004	Florida	Pinellas	St. Petersburg College	27.94669	-82.7318	62.7	65	64	61	56.5	58.6	56.5	58.6	56.1	58.1	54.8		56.9	
121030018	Florida	Pinellas	Azalea Park	27.78587	-82.7399	60.7	61	61	58	55.3	55.6	55.3	55.6	54.4	54.7				
121035002	Florida	Pinellas	John Chesnut Sr. Park - East Lake	28.0903	-82.7007	59.7	61	61	60	53.5	54.7	53.5	54.6	53.4	54.6	52		53.1	
121056005	Florida	Polk	Sikes Elementary School	27.93975	-82.0001	65.3	67	62	60	57.5	59	57.5	59						
121056006	Florida	Polk	Baptist Childrens' Home	28.02889	-81.9722	64.3	66	62	60										
121110013	Florida	St. Lucie	Savannas	27.38908	-80.311	61.3	62	58	55										
121130015	Florida	Santa Rosa	Woodlawn Beach Middle School	30.39413	-87.008	62	64	60	57	55.4	57.2	55.3	57.1	54.2	56	54.4		56.1	
121151005	Florida	Sarasota	Lido Park	27.30727	-82.5704	62.7	63	59	57	56.2	56.4								
121151006	Florida	Sarasota	Paw Park	27.35028	-82.4797	63	64	61	58	56.4	57.3	56.5	57.4						

121152002	Florida	Sarasota	Jackson Road	27.08919	-82.3626	61	61	58	55										
121171002	Florida	Seminole	Sanford (Seminole Community College)	28.74611	-81.3106	62.7	64	61	59	55.1	56.3	55.1	56.3	53.5	54.6	53.5	54.6	54.6	54.6
121272001	Florida	Volusia	Port Orange	29.10915	-80.9937	59	59	NA	NA					51.7	51.7				
121275002	Florida	Volusia	DAYTONA BLIND SERVICES	29.20667	-81.0525	59.7	61	57	56										
121290001	Florida	Wakulla	St. Marks Wildlife Refuge	30.0925	-84.1611	59	59	55	53										
130210012	Georgia	Bibb	Macon-Forestry	32.80526	-83.5435	65	65	61	58	55.2	55.2	55.2	55.2	53.3	53.3	53.3	53.3	53.3	53.3
130510021	Georgia	Chatham	Savannah-E. President	32.06848	-81.0494	57	57	57	56	50.9	50.9	50.9	50.9						
130550001	Georgia	Chattooga	Summerville	34.47453	-85.4088	61	62	56	56	52.8	53.6	52.8	53.6	52.3	53.1	52.3	52.3	53.1	53.1
130590002	Georgia	Clarke	Athens	33.91814	-83.3444	64.3	65	59	59	55.1	55.7	55.1	55.7	55.4	56	55.4	56	55.4	56
130670003	Georgia	Cobb	Kennesaw	34.01544	-84.6074	66.5	67	61	61	56.5	56.9	56.5	56.9	56.9	57.3	56.9	57.3	56.9	57.3
130730001	Georgia	Columbia	Evans	33.58204	-82.1312	60	61	56	55	52.3	53.2	52.3	53.2	51.6	52.4	51.6	52.4	51.6	52.4
130770002	Georgia	Coweta	Newnan	33.40405	-84.7457	64.5	66	NA	NA	55.6	56.9	55.6	56.9	55.2	56.4	55.2	56.4	55.2	56.4
130850001	Georgia	Dawson	Dawsonville	34.37623	-84.0595	65	65	60	59	54.6	54.6	54.6	54.6	53.8	53.8	53.8	53.8	53.8	53.8
130890002	Georgia	DeKalb	South DeKalb	33.6878	-84.2905	70.3	71	67	64	61.6	62.2	61.6	62.2	61.6	62.2	61.6	62.2	61.6	62.2
130970004	Georgia	Douglas	Douglasville	33.74124	-84.7764	68	69	66	63	59.5	60.4	59.5	60.4	59.7	60.5	59.7	60.5	59.7	60.5
131210055	Georgia	Fulton	United Avenue	33.72074	-84.3573	74.3	75	68	65	66	66.7	66	66.7	65.1	65.7	65.1	65.7	65.1	65.7
131270006	Georgia	Glynn	Brunswick	31.16981	-81.495	56.3	57	55	54					48.6	49.2				
131350002	Georgia	Gwinnett	Gwinnett	33.9632	-84.0691	70.7	72	66	64	59.6	60.7	59.6	60.7	59.6	60.7	59.6	60.7	59.6	60.7
131510002	Georgia	Henry	McDonough	33.43395	-84.1618	72	74	66	64	62.6	64.4	62.6	64.4	61.9	63.6	61.9	63.6	61.9	63.6
132130003	Georgia	Murray	Fort Mountain	34.78522	-84.6264	65	65	62	62	56.2	56.2	56.2	56.2	55.1	55.1	55.1	55.1	55.1	55.1
132150008	Georgia	Muscogee	Columbus-Airport	32.52127	-84.9446	61	62	59	57	53.1	54	53.1	54	53	53.8	53	53.8	53	53.8
132230003	Georgia	Paulding	Yorkville: King Farm	33.9285	-85.0453	63	63	NA	NA	53.8	53.8	53.8	53.8	52.9	52.9	52.9	52.9	52.9	52.9
132319991	Georgia	Pike	Georgia Station	33.1787	-84.4052	67.5	68	61	58	58.9	59.3	58.9	59.3	59	59.5	59	59.5	59	59.5
132450091	Georgia	Richmond	Augusta	33.4339	-82.0224	61.7	62	62	60	53.7	54	53.7	54	53.3	53.6	53.3	53.6	53.3	53.6
132470001	Georgia	Rockdale	Conyers	33.58855	-84.0696	71	74	65	62	62	64.6	62	64.6	61.1	63.7	61.1	63.7	61.1	63.7
132610001	Georgia	Sumter	Leslie	31.95429	-84.081	60.3	61	58	57	53.7	54.3	53.7	54.3						
170010007	Illinois	Adams	JOHN WOOD COMMUNITY COLLEGE	39.91541	-91.3359	62.7	63	63	61										
170190007	Illinois	Champaign	Thomasboro	40.24491	-88.1885	65.3	68	65	65										

171191009	Illinois	Madison	SOUTHWEST CABLE TV	38.72657	-89.96	69	72	67	63	62.8	65.5	62.8	65.5	62.1	64.8	62.1	64.8
171193007	Illinois	Madison	WATER PLANT	38.86067	-90.1059	70.7	71	69	70	64.5	64.8	64.5	64.8	64.6	64.9	64.6	64.9
171199991	Illinois	Madison	Alhambra	38.869	-89.6228	67.3	68	64	67	61.1	61.7	61.1	61.7				
171430024	Illinois	Peoria	FIRESTATION	40.68742	-89.6069	65	67	63	62								
171431001	Illinois	Peoria	PEORIA HEIGHTS HS	40.7455	-89.5859	66	67	65	65								
171570001	Illinois	Randolph	IEPA TRAILER	38.17628	-89.7885	66.3	67	62	64	60.2	60.8	60.2	60.8	61.2	60.6	61.2	61.2
171613002	Illinois	Rock Island	ROCK ISLAND ARSENAL	41.51473	-90.5174	63.3	65	65	63								
171630010	Illinois	Saint Clair	IEPA-RAPS TRAILER	38.61203	-90.1605	69	71	65	66	62.9	64.8	62.9	64.8	63	64.8	63	64.8
171670014	Illinois	Sangamon	Illinois Building State Fairgrounds	39.83152	-89.6409	66	68	62	62								
171971011	Illinois	Will	COM ED TRAINING CENTER	41.22154	-88.191	65.3	67	64	65								
172012001	Illinois	Winnebago	MAPLE ELEMENTARY SCHOOL	42.33498	-89.0378	67.3	68	66	66								
180030002	Indiana	Allen	Leo High School	41.22142	-85.0168	64.7	67	64	66	59	61.1	59	61.1	59.2	57.1	59.2	59.2
180030004	Indiana	Allen	Ft. Wayne- Beacon St.	41.09497	-85.1018	64	66	61	NA	58.3	60.1	58.3	60.1	56.5	58.3	56.5	58.3
180050007	Indiana	Bartholomew	Hope- Hauser Jr-Sr High School	39.29432	-85.7668	67.7	68	63	64	60.6	60.9	60.6	60.9				
			Perry Worth ELEMENTARY SCHOOL: WEST OF														
180110001	Indiana	Boone	WHITESTOWN	39.99773	-86.3954	67	69	66	67	61.4	63.2	61.4	63.2	59.3	61	59.3	61
180150002	Indiana	Carroll	Flora-Flora Airport	40.54046	-86.553	63.7	64	63	64	57.7	57.9	57.7	57.9				
			Charlestown State Park- 1051.8 meters East of SR 62/ Indiana armory														
180190008	Indiana	Clark		38.39382	-85.6641	70.3	71	63	63	62.8	63.4	62.8	63.4	61.4	62	61.4	62
180350010	Indiana	Delaware	Albany- Albany Elem. Sch.	40.30039	-85.2459	62.3	66	61	64	55.6	58.9	55.6	58.9				
180390007	Indiana	Elkhart	Bristol- Bristol Elem. Sch.	41.71696	-85.8247	64.3	68	61	62	58.5	61.9	58.5	61.9	57.4	60.7	57.4	60.7
180431004	Indiana	Floyd	New Albany- Green Valley Elem. Sch.	38.30791	-85.8343	71	73	64	64	64.1	65.9	64.1	65.9	62.5	64.3	62.5	64.3
			Plummer: 2500 S. W- Citizens gas Plummer maintenance facility														
180550001	Indiana	Greene		38.98558	-86.9901	66.7	67	64	64	58.7	59	58.7	59				

180570006	Indiana	Hamilton	Our Lady of Grace- Noblesville	40.0683	-85.9925	66.3	69	64	64	60.3	62.7	60.3	62.7	58.1	60.5	58.1	60.5
			AVON- 255 S. SR 267 (also 255 S. Avon Ave.)														
180630004	Indiana	Hendricks	Avon: IN	39.75889	-86.3986	63.3	67	61	62	58.5	61.9	58.5	61.9	56.6	59.9	56.6	59.9
180690002	Indiana	Huntington	Roanoke- Roanoke Elem. School	40.9596	-85.3796	60.7	64	NA	NA	55.1	58	55.1	58	53.3	56.2	53.3	56.2
180710001	Indiana	Jackson	Brownstown- 225 W & 200 N. Water facility	38.92084	-86.0805	65.7	66	NA	NA	58.3	58.5	58.3	58.5				
			Indian Creek Elementary School in Trafalgar: DUE SOUTH OF INDIANAPOLIS														
180810002	Indiana	Johnson		39.41724	-86.1524	61	62	NA	NA	55	55.9	55	55.9	54.4	55.3	54.4	55.3
180839991	Indiana	Knox	Vincennes	38.7408	-87.4853	66.7	69	65	66	59.5	61.5	59.5	61.5	57.9	59.9	57.9	59.9
			Gary-ITRI/ 1219.5 meters east of Tennessee St.- old ammunition bunker														
180890022	Indiana	Lake		41.60667	-87.3047	68.3	70	69	71	65.2	66.8	65.4	67	64.2	65.8	64.8	66.4
180892008	Indiana	Lake	HAMMOND CAAP- Hammond- 141st St.	41.63944	-87.4936	65.5	66	68	69	63.2	63.6	63.1	63.6	61.9	62.4	62	62.5
			LAPORTE OZONE SITE AT WATER														
180910010	Indiana	LaPorte	TREATMENT PLANT	41.62917	-86.6844	65	67	63	64	60.7	62.6	60.3	62.1	61.5	63.4	60.5	62.4
			SCHOOL LOCATED ON THE SW CORNER OF US 36 AND IND 109														
180950010	Indiana	Madison		40.00251	-85.6564	62.3	68	NA	NA	56.1	61.3	56.1	61.3	54.6	59.6	54.6	59.6
180970050	Indiana	Marion	Indpls.- Ft. Harrison	39.85889	-86.0214	70.3	72	65	65	65.2	66.7	65.2	66.7	61.9	63.4	61.9	63.4
180970057	Indiana	Marion	Indpls- Harding St.	39.74903	-86.1863	66	69	66	68	62.2	65	62.2	65	58.7	61.4	58.7	61.4
180970073	Indiana	Marion	Indpls.- E. 16th St.	39.78949	-86.0609	65.5	66	NA	NA	61.3	61.7	61.3	61.7	58	58.5	58	58.5
			Indpls- Washington Park/ in parking lot next to police station														
180970078	Indiana	Marion		39.81083	-86.1144	68.5	69	64	66	64.6	65	64.6	65	60.9	61.4	60.9	61.4
180970087	Indiana	Marion	Indpls.- I 70	39.78793	-86.1309	65.3	67	59	62	61.5	63.2	61.5	63.2	58.1	59.6	58.1	59.6
181090005	Indiana	Morgan	Monrovia- Monrovia HS.	39.57563	-86.4779	63	64	NA	NA	56.8	57.7	56.8	57.7				
181230009	Indiana	Perry	Leopold- Perry Central HS	38.11515	-86.6033	66.7	67	64	64	58.9	59.2	58.9	59.2	57.8	58	57.8	58
181270024	Indiana	Porter	Ogden Dunes- Water Treatment Plant	41.6175	-87.1992	69.7	71	72	73	65.9	67.1	65.3	66.6	65.8	67	65.4	66.6

181270026	Indiana	Porter	VALPARAISO	41.51212	-87.0362	69.3	73	68	66	64.7	68.1	64.7	68.1	64.7	68.2	64.7	68.2
181290003	Indiana	Posey	ST. PHILLIPS- St. Phillips road CAAP trailer	38.00641	-87.7184	66.7	67	61	61	59.2	59.5	59.2	59.5	57.6	57.9	57.6	57.9
181410010	Indiana	St. Joseph	Potato Creek State Park	41.55167	-86.3706	65	68	63	63	59.6	62.4	59.6	62.4	58.6	61.3	58.6	61.3
181410015	Indiana	St. Joseph	South Bend-Shields Dr.	41.69666	-86.2147	70	72	65	67	64	65.8	64	65.8	63	64.8	63	64.8
181410016	Indiana	St. Joseph	Granger-Beckley St.	41.75472	-86.11	67.3	69	64	66	61.5	63.1	61.5	63.1	60.6	62.1	60.6	62.1
181450001	Indiana	Shelby	TRITON Middle SCHOOL: NORTH OF FAIRLAND	39.61337	-85.8707	64.7	68	63	64	59.4	62.4	59.4	62.4	57.4	60.3	57.4	60.3
181630013	Indiana	Vanderburgh	Ingfield/ Scott School	38.11389	-87.5367	68.3	69	62	64	60.4	61.1	60.4	61.1	59	59.7	59	59.7
181630021	Indiana	Vanderburgh	Evansville- Buena Vista	38.01333	-87.5772	69	70	65	66	60.9	61.8	60.9	61.8	59.5	60.3	59.5	60.3
181670018	Indiana	Vigo	TERRE HAUTE CAAP/ McLean High School	39.48599	-87.4013	66.7	68	63	65	59.6	60.8	59.6	60.8				
181670024	Indiana	Vigo	Sandcut/ SITE LOCATED BY HOME BEHIND SHED.	39.55853	-87.3129	64.3	67	61	62	57.5	59.9	57.5	59.9				
181699991	Indiana	Wabash	Salamonie Reservoir	40.81604	-85.6614	68.7	70	64	65	61.8	63	61.8	63				
181730008	Indiana	Warrick	Boonville- Boonville HS	38.05167	-87.2781	68.7	69	64	66	59.9	60.2	59.9	60.2	59.2	59.4	59.2	59.4
181730009	Indiana	Warrick	Lynnville- Tecumseh HS	38.1945	-87.3414	66	66	NA	NA	57.5	57.5	57.5	57.5	57.1	57.1	57.1	57.1
181730011	Indiana	Warrick	Dayville WAVERLY AIRPORT SITE	37.95444	-87.3217	67.7	68	63	65	59.8	60.1	59.8	60.1	58.3	58.6	58.3	58.6
190170011	Iowa	Bremer	CLINTON: RAINBOW PARK	42.74304	-92.5132	61	63	61	60								
190450021	Iowa	Clinton		41.875	-90.1776	63	64	61	63								
190850007	Iowa	Harrison		41.83226	-95.9282	62.7	64	62	61								
190851101	Iowa	Harrison	PISGAH: HIGHWAY MAINTENANCE	41.78026	-95.9484	62	62	NA	NA								
191130028	Iowa	Linn	KIRKWOOD	41.91056	-91.6521	61	61	NA	NA								
191130033	Iowa	Linn	COGCON ELEMENTARY SCHOOL BLDG. NORTHERN LIMITS OF LINN COUNTY	42.28101	-91.5269	62.3	65	62	61								
191130040	Iowa	Linn	Public Health	41.97677	-91.6877	61.7	63	59	60								

210610501	Kentucky	Edmonson	Mammoth Cave NP - Houchin Meadow	37.13179	-86.143	63.7	64	59	59	56.4	56.7	56.4	56.7	56.7	56.7				
210670012	Kentucky	Fayette	LEXINGTON PRIMARY	38.06503	-84.4976	65.7	67	60	63	58.2	59.4	58.2	59.4	57.7	58.8	57.7	58.8	58.8	
210890007	Kentucky	Greenup	WORTHINGTON	38.54814	-82.7312	61.7	63	54	55	55.4	56.6	56.6	55.4	54.4	55.5	54.4	55.5	55.5	
210910012	Kentucky	Hancock	LEWISPORT	37.93829	-86.8972	67.5	68	63	65	59.1	59.5	59.5	59.1	57.2	57.6	57.2	57.6	57.6	
210930006	Kentucky	Hardin	ELIZABETHTOWN	37.70561	-85.8526	64.7	65	60	61	57.1	57.4	57.1	57.4	57.1	57.4	57.1	57.4	57.4	
211010014	Kentucky	Henderson	BASKETT	37.8712	-87.4638	68.3	69	NA	NA	60.1	60.7	60.1	60.7	59.1	59.8	59.1	59.8	59.8	
211110027	Kentucky	Jefferson	Bates	38.13784	-85.5765	69	69	NA	NA	62.4	62.4	62.4	62.4	61.5	61.5	61.5	61.5	61.5	
211110051	Kentucky	Jefferson	Watson Lane	38.06091	-85.898	68.3	69	65	65	61.9	62.5	61.9	62.5	60.3	60.9	60.3	60.9	60.9	
211110067	Kentucky	Jefferson	CANNONS LANE	38.22876	-85.6545	74.3	75	69	70	66.7	67.3	66.7	67.3	65.2	65.8	65.2	65.8	65.8	
211130001	Kentucky	Jessamine	NICHOLASVILLE	37.89147	-84.5883	64	65	60	62	56.1	56.9	56.1	56.9	55.4	56.3	55.4	56.3	56.3	
211390003	Kentucky	Livingston	SMITHLAND	37.15539	-88.394	65	66	62	64	57.9	58.8	57.9	58.8	58.2	59.1	58.2	59.1	59.1	
211451024	Kentucky	McCracken	JACKSON PURCHASE (PADUCAH PRIMARY)	37.05822	-88.5725	62.7	63	63	65	56.4	56.7	56.4	56.7	56	56.3	56	56.3	56.3	
211759991	Kentucky	Morgan	Crockett	37.9214	-83.0662	64	64	57	57	57.7	57.7	57.7	57.7						
211850004	Kentucky	Oldham	BUCKNER	38.4002	-85.4443	68.3	70	63	63	60.6	62.1	60.6	62.1	59.3	60.7	59.3	60.7	60.7	
211930003	Kentucky	Perry	HAZARD	37.28329	-83.2093	58	58	56	56	52.1	52.1	52.1	52.1						
211950002	Kentucky	Pike	PIKEVILLE PRIMARY	37.4826	-82.5353	59.3	60	54	55	54	54.6	54	54.6						
211990003	Kentucky	Pulaski	SOMERSET	37.09798	-84.6115	61	62	57	58	54.2	55.1	54.2	55.1						
212130004	Kentucky	Simpson	FRANKLIN	36.70861	-86.5663	63.7	64	59	60	56.6	56.8	56.6	56.8						
21219991	Kentucky	Trigg	Cadiz	36.7841	-87.8499	62	63	60	59	55.4	56.2	55.4	56.2						
212270009	Kentucky	Warren	ED SPEAR PARK (SMITHS GROVE)	37.04926	-86.2149	61.3	62	57	60	54.2	54.9	54.2	54.9						
212299991	Kentucky	Washington	Mackville	37.7046	-85.0485	64	64	60	60	56.5	56.5	56.5	56.5						
220050004	Louisiana	Ascension	Dutchtown	30.22965	-90.9656	70	71	64	64	65.4	66.4	65.4	66.4	64.8	65.8	64.8	65.8	65.8	
220150008	Louisiana	Bossier	Shreveport / Airport	32.53627	-93.7489	65.3	66	58	58	58.9	59.5	58.9	59.5	56.8	57.4	56.8	57.4	57.4	
220170001	Louisiana	Caddo	Dixie	32.68336	-93.8616	63.3	64	59	60	57.3	57.9	57.3	57.9	54.9	55.5	54.9	55.5	55.5	
220190002	Louisiana	Calcasieu	Carlyss	30.14027	-93.3684	66.3	68	61	61	62.3	63.9	62.3	63.9						
220190009	Louisiana	Calcasieu	Vinton	30.2278	-93.58	64	64	63	63	59.5	59.5	59.5	59.5						
220330003	Louisiana	East Baton Rouge	LSU	30.41981	-91.182	71	72	64	63	65.6	66.5	65.6	66.5	64.9	65.9	64.9	65.9	65.9	

260810022	Michigan	Kent	APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE RD	43.17667	-85.4166	67.3	68	65	67	61.3	61.9	61.3	61.9				
			6792 RAISIN CENTER HWY: LENAWEЕ CO.RD.COMM.OWNER: TECUMSEH														
260910007	Michigan	Lenawee		41.99557	-83.9466	67	68	64	66								
260990009	Michigan	Macomb	New Haven	42.73139	-82.7935	71.7	72	68	69	65	65.3	64.9	65.1	64	64.3	63.5	63.8
260991003	Michigan	Macomb		42.51334	-83.006	67.3	69	66	68	60.9	62.4	60.9	62.4	59.7	61.3	59.7	61.3
261010922	Michigan	Manistee		44.307	-86.2426	67	68	NA	NA	61.5	62.4	61.4	62.3	61.6	62.5	61.3	62.2
261050007	Michigan	Mason	LOCATED 550 FT NORTH OF US10	43.95333	-86.2944	68.7	70	64	67	63.4	64.6	63.4	64.6	62.6	63.8	62.6	63.8
261130001	Michigan	Missaukee	LOCATED ABOUT 1/4 MILE WEST OF SITE	44.31056	-84.8919	66.7	67	63	65								
261210039	Michigan	Muskegon		43.27806	-86.3111	75	76	74	79	70	70.9	69.3	70.2	69	70	68.7	69.6
261250001	Michigan	Oakland	Oak Park	42.46306	-83.1832	70.7	73	69	69	65	67.1	65	67.1	63.3	65.3	63.3	65.3
261390005	Michigan	Ottawa	Jenison	42.89445	-85.8527	69.3	70	69	71	63.8	64.5	63.8	64.5	63.2	63.8	63.2	63.8
261470005	Michigan	St. Clair	Port Huron	42.95334	-82.4562	72	73	70	69	66.7	67.6	66.3	67.2	66.8	67.7	65.7	66.6
261530001	Michigan	Schoolcraft	Seney	46.28888	-85.9502	67	70	64	66								
261579991	Michigan	Tuscola	Unionville	43.6138	-83.3591	65.7	66	64	66								
			TOWNER ST: SOUTH; 2 LANE RESIDENIAL - HOSPITAL														
261610008	Michigan	Washtenaw		42.24057	-83.5996	67.7	69	66	68	62.8	64	62.8	64	61.4	62.6	61.4	62.6
261619991	Michigan	Washtenaw	Ann Arbor	42.41664	-83.9022	69.3	71	62	65	63.7	65.3	63.7	65.3	62.1	63.6	62.1	63.6
261630001	Michigan	Wayne	Allen Park	42.22862	-83.2082	66.3	68	67	70	60.6	62.2	60.6	62.2	60.3	61.8	60.3	61.8
261630019	Michigan	Wayne	East 7 Mile	42.43084	-83.0001	73	74	70	71	66.1	67	66.1	67	65.1	66	65.1	66
261659991	Michigan	Wexford	Hoxeyville	44.18089	-85.739	66.7	67	64	68								
270031001	Minnesota	Anoka	Cedar Creek	45.40184	-93.2031	60	61	NA	59								
270031002	Minnesota	Anoka	Anoka County Airport	45.13768	-93.2076	62.7	63	64	63	59.7	60	59.7	60	59.9	60.2	59.9	60.2
270052013	Minnesota	Becker	FWS Wetland Management District	46.85181	-95.8463	58.7	59	NA	60								
270177417	Minnesota	Carlton	Fond du Lac Band	46.71369	-92.5117	59	59	NA	55								
270353204	Minnesota	Crow Wing	Brainerd Lakes Regional Airport	46.39674	-94.1303	59	59	NA	57								

290470003	Missouri	Clay	Watkins Mill State Park	39.40745	-94.2654	66.7	69	64	65	61	63.1	61	63.1	61	63.1	61	63.1
290470005	Missouri	Clay	Liberty	39.30317	-94.377	66	69	64	66	62	64.8	62	64.8	61.2	64	61.2	64
290470006	Missouri	Clay	Rocky Creek	39.33191	-94.5809	68.7	70	66	68	64.2	65.4	64.2	65.4	63.3	64.5	63.3	64.5
290490001	Missouri	Clinton	Trimble	39.53063	-94.5559	67.3	68	62	63	61.8	62.5	61.8	62.5	60.8	61.4	60.8	61.4
290770036	Missouri	Greene	Hillcrest High School	37.25614	-93.2999	60	61	59	61								
290770042	Missouri	Greene	Fellows Lake	37.31919	-93.2044	60.3	61	57	59								
290970004	Missouri	Jasper	Alba	37.2385	-94.4247	60.7	61	60	63	54.5	54.8	54.5	54.8				
290990019	Missouri	Jefferson	Arnold West	38.44857	-90.3987	69	70	68	68	62.3	63.3	62.3	63.3	61.5	62.4	61.5	62.4
291130003	Missouri	Lincoln	Foley	39.04512	-90.8663	65	65	NA	NA	58.7	58.7	58.7	58.7	57.5	57.5	57.5	57.5
291370001	Missouri	Monroe	MTSP	39.47498	-91.789	59.3	60	55	54								
291570001	Missouri	Perry		37.70264	-89.6986	67	67	62	64	60.1	60.1	60.1	60.1				
291831002	Missouri	Saint Charles	West Alton	38.87255	-90.2265	72.7	74	NA	69	67	68.1	67	68.1	66.2	67.4	66.2	67.4
291831004	Missouri	Saint Charles	Orchard Farm	38.8994	-90.4492	71	72	66	65	64.8	65.8	64.8	65.8	63.6	64.5	63.6	64.5
291860005	Missouri	Sainte Genevieve	Bonne Terre	37.90084	-90.4239	65.3	66	62	63	59.9	60.6	59.9	60.6	60.4	61.1	60.4	61.1
291890005	Missouri	Saint Louis	Pacific	38.49015	-90.7051	65	66	64	63	58.6	59.5	58.6	59.5	57.7	58.6	57.7	58.6
291890014	Missouri	Saint Louis	Maryland Heights	38.71085	-90.4761	70	71	69	68	63.9	64.8	63.9	64.8	62.9	63.8	62.9	63.8
292130004	Missouri	Taney	Branson	36.70773	-93.222	57	57	NA	NA	51.2	51.2	51.2	51.2				
295100085	Missouri	St. Louis City	Blair Street	38.65643	-90.1983	67.3	71	65	67	62.5	66	62.5	66	60.6	64	60.6	64
300710010	Montana	Phillips	Malta	48.31751	-107.862	55.3	56	57	55								
300750001	Montana	Powder River	BROADUS	45.4403	-105.37	58.5	60	NA	62								
300830001	Montana	Richland	Sidney Oil Field	47.80339	-104.486	55	55	NA	NA								
300870001	Montana	Rosebud	Birney - Tongue river	45.36615	-106.49	57	58	NA	NA								
			4102 Woolworth Ave. on Healthcenter Warehouse	41.24749	-95.9731	62.7	64	61	61								
310550019	Nebraska	Douglas		41.20796	-95.9459	60	62	NA	NA								
310550028	Nebraska	Douglas		41.32251	-95.9386	63.5	64	60	58								
310550053	Nebraska	Douglas	Whitmore	42.82915	-97.8541	64	65	65	67								
311079991	Nebraska	Knox	Santee Sioux	40.98472	-96.6775	60	60	56	56								
311090016	Nebraska	Lancaster		35.1343	-106.585	67.3	70	68	69	63.8	66.4	63.8	66.4	62.9	65.4	62.9	65.4
350010023	New Mexico	Bernalillo	DEL NORTE HIGH SCHOOL														

350010029	New Mexico	Bernalillo	SOUTH VALLEY	35.01708	-106.657	65.3	66	66	67	61.7	62.3	61.7	62.3	60.9	61.6	60.9	61.6
350011012	New Mexico	Bernalillo	Foothills	35.1852	-106.508	66.7	69	72	73	64	66.2	64	66.2	63.2	65.4	63.2	65.4
350130008	New Mexico	Dona Ana	60 La Union	31.93066	-106.631	67.3	68	72	76					64.5	65.2	64.5	65.2
350130020	New Mexico	Dona Ana	62K Chaparral	32.04121	-106.41	68.3	71	70	71	65.9	68.6	65.9	68.6	65.3	67.8	65.3	67.8
350130021	New Mexico	Dona Ana	62M Desert View	31.79622	-106.584	72.7	74	80	81					70	71.2	70	71.2
350130022	New Mexico	Dona Ana	62N Santa Teresa	31.78789	-106.683	71.3	74	75	75								
350130023	New Mexico	Dona Ana	62Q Solano	32.31759	-106.768	66	67	70	66								
350151005	New Mexico	Eddy	5ZR ON BLM LAND BORDERING RESIDENTIAL AREA OUTSIDE CARLSBAD CITY LIM	32.38012	-104.263	69.7	74	77	77								
350153001	New Mexico	Eddy	Carlsbad Caverns NP - Maintenance Area	32.1783	-104.441	71	71	NA	NA								
350250008	New Mexico	Lea	52S Hobbs Jefferson	32.72666	-103.123	67.7	70	66	66								
350390026	New Mexico	Rio Arriba	3CRD Coyote Ranger District	36.18774	-106.698	65.3	67	64	64	61.9	63.5	61.9	63.5	61.8	63.4	61.8	63.4
350431001	New Mexico	Sandoval		35.29948	-106.549	65.7	68	68	70	62.8	65	62.8	65	62.2	64.3	62.2	64.3
350490021	New Mexico	Santa Fe		35.61975	-106.08	64	66	66	67	61	62.9	61	62.9	60.9	62.8	60.9	62.8
350610008	New Mexico	Valencia		34.8147	-106.74	65.3	67	66	66	62	63.6	62	63.6	61.4	63	61.4	63
370030005	North Carolina	Alexander	Taylorsville Liledoun	35.9138	-81.191	64.3	65	58	58	56.3	56.9	56.3	56.9				
370110002	North Carolina	Avery	Linville Falls	35.97235	-81.9331	61.7	62	57	57	54.7	55	54.7	55				
370119991	North Carolina	Avery	Cranberry	36.1058	-82.0454	64	64	59	59	56.8	56.8	56.8	56.8				
370210030	North Carolina	Buncombe	Bent Creek	35.5001	-82.5999	62	63	58	58	54.7	55.6	54.7	55.6				
370270003	North Carolina	Caldwell	Lenoir (city)	35.9359	-81.5306	64	64	57	57	55.7	55.7	55.7	55.7				
370330001	North Carolina	Caswell	Cherry Grove	36.30703	-79.4674	62	63	56	57	53.8	54.7	53.8	54.7				
370510008	North Carolina	Cumberland	Wade	35.15869	-78.728	62	63	59	NA	55.1	56	55.1	56				
370510010	North Carolina	Cumberland	Honeycutt School	35.0023	-78.9917	63.3	64	60	63	56.2	56.8	56.2	56.8				
370630015	North Carolina	Durham	Durham Armory	36.03296	-78.904	61.7	62	58	58	53	53.3	53	53.3	52.4	52.7	52.4	52.7
370650099	North Carolina	Edgecombe	Leggett	35.98828	-77.5843	62	62	59	59	54	54	54	54				
370670022	North Carolina	Forsyth	Hattie Avenue	36.11069	-80.2264	66.7	67	64	63	58	58.3	58	58.3	57.1	57.4	57.1	57.4
370670030	North Carolina	Forsyth	Clemmons Middle	36.026	-80.342	67.3	68	59	59	58.4	59	58.4	59	57.5	58.1	57.5	58.1

370671008	North Carolina	Forsyth	Union Cross		36.05097	-80.1437	66.3	67	60	59	57.6	58.2	57.6	58.2	56.5	57.1	56.5	57.1
370750001	North Carolina	Graham	Joanna Bald		35.25793	-83.7956	63.5	64	62	62	56.1	56.5	56.1	56.5				
370770001	North Carolina	Granville	Butner		36.14111	-78.7681	64.3	65	57	57	56.1	56.7	56.1	56.7				
370810013	North Carolina	Guilford	Mendenhall School		36.10901	-79.8023	65.3	66	62	62	56.4	57	56.4	57	55.7	56.3	55.7	56.3
370870008	North Carolina	Haywood	Waynesville School		35.50716	-82.9634	61.3	62	58	59	54.5	55.1	54.5	55.1				
370870035	North Carolina	Haywood	Frying Pan Mountain		35.37917	-82.7925	64.3	66	61	61	57	58.5	57	58.5				
370870036	North Carolina	Haywood	Purchase Knob		35.58714	-83.0742	64.3	65	61	62	57.2	57.9	57.2	57.9				
371010002	North Carolina	Johnston	West Johnston Co.		35.59095	-78.4622	63.7	65	60	60	55.5	56.7	55.5	56.7	53.6	54.7	53.6	54.7
371050002	North Carolina	Lee	Blackstone		35.4325	-79.2887	61.5	62	NA	NA	53.7	54.2	53.7	54.2				
371070004	North Carolina	Lenoir	Lenoir Co. Comm. Coll.		35.23146	-77.5688	62.7	63	60	61								
371090004	North Carolina	Lincoln	Crouse		35.43856	-81.2768	66.3	67	61	61	58	58.6	58	58.6	57.7	58.3	57.7	58.3
371139991	North Carolina	Macon	Coweeta		35.0608	-83.4306	61.3	62	55	55	53.6	54.2	53.6	54.2				
371170001	North Carolina	Martin	Jamesville School		35.81066	-76.9062	60	60	56	54								
371190041	North Carolina	Mecklenburg	Garinger High School		35.2401	-80.7857	68.7	69	66	64	61.3	61.5	61.3	61.5	60.5	60.8	60.5	60.8
371190046	North Carolina	Mecklenburg	University Meadows		35.31416	-80.7135	70	70	66	64	61.3	61.3	61.3	61.3	61.1	61.1	61.1	61.1
371239991	North Carolina	Montgomery	Candor		35.2632	-79.8365	61	61	57	58	53.3	53.3	53.3	53.3				
371290002	North Carolina	New Hanover	Castle Hayne		34.36417	-77.8386	59	60	58	58					50.2	51.1		
371450003	North Carolina	Person	Bushy Fork		36.30697	-79.092	62	63	59	57	54.9	55.8	54.9	55.8				
371470006	North Carolina	Pitt	Pitt Agri. Center		35.64128	-77.3601	62.7	64	59	59								
371570099	North Carolina	Rockingham	Bethany sch.		36.30889	-79.8592	65.3	66	60	60	57.3	58	57.3	58	56.7	57.4	56.7	57.4
371590021	North Carolina	Rowan	Rockwell		35.55187	-80.395	63.7	65	62	61	55.2	56.4	55.2	56.4	55.1	56.2	55.1	56.2
371730002	North Carolina	Swain	Bryson City		35.43477	-83.4421	60	60	56	57	53.2	53.2	53.2	53.2				
371730007	North Carolina	Swain			35.49871	-83.3102	59	61	58	NA	52.2	54	52.2	54				
371790003	North Carolina	Union	Monroe School		34.97404	-80.5406	67.7	68	62	61	60.7	61	60.7	61	60	60.2	60	60.2
371830014	North Carolina	Wake	Millbrook School		35.85611	-78.5742	65.7	66	60	60	57.2	57.4	57.2	57.4	55.7	55.9	55.7	55.9
371990004	North Carolina	Yancey	Mt. Mitchell		35.76541	-82.2649	65	65	62	62	57.5	57.5	57.5	57.5				
380070002	North Dakota	Billings	PAINTED CANYON		46.8943	-103.379	59	60	60	58								
380130004	North Dakota	Burke	LOSTWOOD NWR		48.64193	-102.402	58.3	59	56	56								
380171004	North Dakota	Cass	FARGO NW		46.93375	-96.8554	58	59	60	58								
380250003	North Dakota	Dunn	DUNN CENTER		47.3132	-102.527	58	58	NA	NA								

380530002	North Dakota	McKenzie	TRNP-NU	47.5812	-103.3	57.7	58	58	56										
380570004	North Dakota	Mercer	BEULAH NORTH	47.29861	-101.767	57	58	58	57										
380650002	North Dakota	Oliver	HANNOVER	47.18583	-101.428	59.3	60	60	58										
381050003	North Dakota	Williams	Williston	48.15278	-103.64	57	58	NA	NA										
390030009	Ohio	Allen	Lima	40.77094	-84.0539	67.7	70	64	65	61	63.1	61	63.1	59.3	61.3	59.3	61	61.3	61.3
390071001	Ohio	Ashtabula	Conneaut	41.9597	-80.5728	70	70	65	67	63.5	63.5	62.5	62.5	63	63	63	61	61	61
390170004	Ohio	Butler	HAMILTON	39.38338	-84.5444	72	72	NA	NA	64	64	64	64	61.9	61.9	61.9	61.9	61.9	61.9
390170018	Ohio	Butler	Middletown Airport	39.52944	-84.3935	71.3	73	67	67	63.3	64.8	63.3	64.8	61.2	62.7	61.2	61.2	62.7	62.7
390179991	Ohio	Butler	Oxford	39.5327	-84.7286	69.3	70	64	64	61.4	62	61.4	62	59.9	60.5	59.9	60.5	60.5	60.5
390230001	Ohio	Clark	Springfield Well Fd	40.00103	-83.8046	69.3	70	63	64	61.8	62.4	61.8	62.4	59.6	60.2	59.6	60.2	60.2	60.2
390230003	Ohio	Clark	Mud Run	39.85567	-83.9977	68.3	69	65	65	61.3	61.9	61.3	61.9	59	59.6	59	59.6	59.6	59.6
390250022	Ohio	Clermont	Batavia	39.0828	-84.1441	70	70	66	64	60.6	60.6	60.6	60.6	58.5	58.5	58.5	58.5	58.5	58.5
390271002	Ohio	Clinton	Wilmington	39.43004	-83.7885	69.7	70	63	63	60.5	60.8	60.5	60.8	59.3	59.5	59.3	59.5	59.5	59.5
390350034	Ohio	Cuyahoga	District 6	41.55523	-81.5753	69	70	70	72	62.1	63	62.4	63.3	66.8	67.7	62.2	62.2	63.1	63.1
390350060	Ohio	Cuyahoga	GT Craig NCore	41.49212	-81.6784	62.7	64	63	62	55.9	57	55.5	56.7	62.2	63.4	55	56.1	56.1	56.1
390350064	Ohio	Cuyahoga	Berea BOE	41.36186	-81.8646	65.3	66	66	66	66	66	66	66	64.5	65.2	57.3	57.3	57.9	57.9
390355002	Ohio	Cuyahoga	Mayfield	41.53707	-81.4588	69.3	71	68	67	62.3	63.8	61.4	62.9	63.2	64.7	60.5	62	62	62
390410002	Ohio	Delaware	Delaware	40.35669	-83.064	65.3	67	62	61	57.4	58.9	57.4	58.9	55.7	57.2	55.7	57.2	57.2	57.2
390479991	Ohio	Fayette	Deer Creek	39.6359	-83.2605	66.7	68	61	58	59.4	60.6	59.4	60.6	57.3	58.5	57.3	58.5	58.5	58.5
390490029	Ohio	Franklin	New Albany	40.08451	-82.8156	70.3	71	66	66	63.3	64	63.3	64	60.3	60.9	60.3	60.9	60.9	60.9
390490037	Ohio	Franklin	FRANKLIN_PK	39.96523	-82.9555	65.5	66	NA	NA	59.3	59.8	59.3	59.8	56.5	56.9	56.5	56.9	56.9	56.9
390490081	Ohio	Franklin	Maple Canyon	40.0877	-82.9598	66.3	67	62	62	60	60.7	60	60.7	57	57.6	57	57.6	57.6	57.6
390550004	Ohio	Geauga	Notre Dame	41.51505	-81.2499	71.3	72	66	65	62.7	63.4	62.7	63.4	61.3	61.9	61.3	61.9	61.9	61.9
390570006	Ohio	Greene	Xenia	39.66575	-83.9427	67.3	68	62	63	59.4	60	59.4	60	57.5	58.1	57.5	58.1	58.1	58.1
390610006	Ohio	Hamilton	Sycamore	39.2787	-84.3663	73.3	75	70	69	65.1	66.6	65.1	66.6	62.9	64.3	62.9	64.3	64.3	64.3
390610010	Ohio	Hamilton	Colerain	39.21487	-84.6909	71.3	72	67	67	63.1	63.7	63.1	63.7	61	61.6	61	61.6	61.6	61.6
390610040	Ohio	Hamilton	Taft NCore	39.12886	-84.504	71.3	72	69	68	63.3	63.9	63.3	63.9	61.3	61.9	61.3	61.9	61.9	61.9
390810017	Ohio	Jefferson	Stuebenville	40.36644	-80.6156	63	65	60	62	56.5	58.3	56.5	58.3	55.7	57.4	55.7	57.4	57.4	57.4
390830002	Ohio	Knox	CENTERBURG	40.31003	-82.6917	66.5	67	NA	NA	57.6	58.1	57.6	58.1	56.2	56.7	56.2	56.7	56.7	56.7
390850003	Ohio	Lake	Eastlake	41.67301	-81.4225	73.7	74	72	74	65.8	66.1	66.1	66.3	67.4	67.7	66.8	67.7	67.7	67.7

390850007	Ohio		Painesville		41.72681	-81.2422	69	70	66	64	62.4	63.3	62.3	63.2	63.6	64.5	64.2	65.1
390870011	Ohio	Lawrence	Wilgus		38.62901	-82.4589	63.7	64	56	57	57.1	57.4	57.1	57.4	56.9	57.2	56.9	57.2
390870012	Ohio	Lawrence	ODOT Ironton		38.50808	-82.6592	66	67	58	58	59.3	60.2	59.3	60.2	58.2	59.1	58.2	59.1
390890005	Ohio	Licking	Heath		40.02604	-82.433	65.7	67	59	60	57.3	58.4	57.3	58.4	55.5	56.6	55.5	56.6
390930018	Ohio	Lorain	Sheffield		41.42088	-82.0957	65.7	67	58	60	59.3	60.5	59.1	60.3	60.3	61.5	57.6	58.8
390950024	Ohio	Lucas	Erie		41.64407	-83.5462	67.5	69	64	67	61.4	62.8	62.1	63.5	59.7	61	60.1	61.5
390950027	Ohio	Lucas	Waterville		41.4942	-83.7189	64.7	66	63	64	59.4	60.6	59.4	60.6	58.3	59.5	58.3	59.5
390970007	Ohio	Madison	London		39.78819	-83.4761	67.3	68	61	61	59.6	60.2	59.6	60.2	58.4	59	58.4	59
390990013	Ohio	Mahoning	Oakhill		41.09619	-80.6589	59.7	63	64	NA	52.4	55.3	52.4	55.3	51.3	54.2	51.3	54.2
391030004	Ohio	Medina	Chippewa		41.0604	-81.9239	64.3	65	61	65	57.1	57.8	57.1	57.8	56.2	56.8	56.2	56.8
391090005	Ohio	Miami	Miami East HS		40.08502	-84.1138	67.7	68	61	63	59.8	60	59.8	60	58.4	58.7	58.4	58.7
391130037	Ohio	Montgomery	Eastwood		39.78564	-84.1344	70.3	71	67	68	62.5	63.1	62.5	63.1	60.7	61.3	60.7	61.3
391219991	Ohio	Noble	Quaker City		39.9428	-81.3373	64.7	66	61	61	57.8	58.9	57.8	58.9				
391331001	Ohio	Portage	Lake Rockwell		41.18247	-81.3305	62	63	62	67	55.2	56.1	55.2	56.1	53.5	54.4	53.5	54.4
391351001	Ohio	Preble	Preble NCore		39.83562	-84.7205	67	67	63	64	59.5	59.5	59.5	59.5	58.4	58.4	58.4	58.4
391510016	Ohio	Stark	Malone Univ		40.82812	-81.3785	68.3	69	65	65	60.3	60.9	60.3	60.9	59.8	60.4	59.8	60.4
391510022	Ohio	Stark	Brewster		40.71278	-81.5983	65	66	61	62	57.2	58.1	57.2	58.1				
391514005	Ohio	Stark	Alliance		40.93133	-81.1235	68.3	70	64	65	60.5	62	60.5	62	59.8	61.3	59.8	61.3
391530020	Ohio	Summit	Patterson Park		41.10649	-81.5035	63.3	65	64	NA	56.1	57.6	56.1	57.6	55.2	56.6	55.2	56.6
391550011	Ohio	Trumbull	TCSE		41.24045	-80.6627	68.3	69	65	65	59.9	60.5	59.9	60.5	58.8	59.4	58.8	59.4
391550013	Ohio	Trumbull	Kinsman Maintenance		41.4546	-80.5896	66	66	64	65	58.5	58.5	58.5	58.5	57.1	57.1	57.1	57.1
391650007	Ohio	Warren	Lebanon		39.42689	-84.2008	71.7	72	70	69	63.7	63.9	63.7	63.9	61.7	61.9	61.7	61.9
391670004	Ohio	Washington	Marietta WTP		39.43212	-81.4604	64.3	65	60	60	57.4	58	57.4	58	57.1	57.7	57.1	57.7
391730003	Ohio	Wood	Bowling Green		41.37769	-83.6111	64.3	66	62	63	57.9	59.4	57.9	59.4	57.2	58.7	57.2	58.7
400019009	Oklahoma	Adair	STILWELL		35.75074	-94.6697	59.7	61	NA	61	53.1	54.3	53.1	54.3				
400170101	Oklahoma	Canadian	OKC WEST-(YUKON)		35.47922	-97.7515	66.3	69	65	67					58.1	60.5	58.1	60.5
400219002	Oklahoma	Cherokee	TAHLEQUAH SHELTER		35.85408	-94.986	59.5	60	NA	NA	54.4	54.9	54.4	54.9				
400270049	Oklahoma	Cleveland	MOORE WATER TOWER		35.32011	-97.4841	66.7	68	64	66								
400310651	Oklahoma	Comanche	LAWTON NORTH		34.63298	-98.4288	65	66	65	66								

400370144	Oklahoma	Creek	MANNFORD		36.10548	-96.3612	64	65	63	65	57.8	58.7	57.8	58.7	57.6	58.5	57.6	58.5
400430860	Oklahoma	Dewey	SEILING MUNICIPAL AIRPORT		36.15841	-98.932	66	68	61	64								
400719010	Oklahoma	Kay	NEWKIRK IMPROVE		36.95622	-97.0314	62	63	NA	NA								
400871073	Oklahoma	McClain	GOLDSBY		35.15965	-97.4738	66.3	67	NA	NA								
400979014	Oklahoma	Mayes	CHEROKEE HEIGHTS		36.22841	-95.2499	62	62	59	61	56.2	56.2	56.2	56.2	54.8	54.8	54.8	54.8
401090033	Oklahoma	Oklahoma	OKC CENTRAL-OSDH		35.47704	-97.4943	67.3	68	NA	NA	61.9	62.5	61.9	62.5	60	60.6	60	60.6
401090096	Oklahoma	Oklahoma	CHOCTAW		35.4778	-97.303	66.3	67	65	67	61.3	61.9	61.3	61.9				
401091037	Oklahoma	Oklahoma	OKC NORTH		35.61413	-97.4751	69	70	68	70	62.7	63.6	62.7	63.6	61.6	62.5	61.6	62.5
401159004	Oklahoma	Ottawa	QUAPAW SHELTER		36.92222	-94.8389	55.7	57	NA	NA	50.2	51.4	50.2	51.4				
401210415	Oklahoma	Pittsburg	McALESTER MUNICIPAL AIRPORT		34.88561	-95.7844	61	63	62	62								
401359021	Oklahoma	Sequoyah			35.40814	-94.5244	59.3	60	57	58	53	53.6	53	53.6				
401430174	Oklahoma	Tulsa	TULSA SOUTH		35.95371	-96.005	65	65	62	64	60.4	60.4	60.4	60.4	59.5	59.5	59.5	59.5
401430178	Oklahoma	Tulsa	TULSA EAST		36.1338	-95.7645	64	65	64	66	59.7	60.6	59.7	60.6	58.5	59.4	58.5	59.4
401431127	Oklahoma	Tulsa	NORTH TULSA - FIRE STATION#24		36.2049	-95.9765	65	65	61	65	59.7	59.7	59.7	59.7	59.5	59.5	59.5	59.5
450010001	South Carolina	Abbeville	DUE WEST		34.32532	-82.3864	58	58	NA	NA	50.9	50.9	50.9	50.9				
450030003	South Carolina	Aiken	JACKSON MIDDLE SCHOOL		33.34223	-81.7887	60.3	62	60	58	52.9	54.4	52.9	54.4				
450070005	South Carolina	Anderson	Big Creek		34.62324	-82.5321	58.7	60	NA	NA	51.4	52.5	51.4	52.5	50.6	51.7	50.6	51.7
450150002	South Carolina	Berkeley	BUSHY PARK PUMP STATION		32.98725	-79.9367	57.3	58	NA	NA	50.8	51.5	50.8	51.5				
450190046	South Carolina	Charleston	CAPE ROMAIN		32.94102	-79.6572	59	61	NA	57	52.6	54.4	52.5	54.3				
450250001	South Carolina	Chesterfield	CHESTERFIELD		34.61537	-80.1988	60	60	60	59	53.3	53.3	53.3	53.3				
450290002	South Carolina	Colleton	ASHTON		33.00787	-80.965	56.3	57	NA	NA								
450310003	South Carolina	Darlington	Pee Dee Experimental Station		34.2857	-79.7449	61	62	58	57	52.9	53.7	52.9	53.7				
450370001	South Carolina	Edgefield	TRENTON		33.73996	-81.8536	59.7	61	60	58	51.8	53	51.8	53				
450450016	South Carolina	Greenville	Hillcrest Middle School		34.75185	-82.2567	63.3	65	64	64	55.5	57	55.5	57	54.6	56.1	54.6	56.1
450730001	South Carolina	Oconee	LONG CREEK		34.80526	-83.2377	63	63	NA	NA	54.8	54.8	54.8	54.8				
450770002	South Carolina	Pickens	CLEMSON CMS		34.65361	-82.8387	62.7	63	NA	NA	54.9	55.1	54.9	55.1	54.4	54.7	54.4	54.7
450770003	South Carolina	Pickens	Wolf Creek		34.85154	-82.7446	61	62	NA	NA	53.1	53.9	53.1	53.9	52.9	53.8	52.9	53.8

450790007	South Carolina	Richland	PARKLANE		34.09396	-80.9623	60	61	60	58	52.1	53	52.1	53	50.8	51.7	50.8	51.7
450790021	South Carolina	Richland	CONGAREE BLUFF		33.81468	-80.7811	55	55	55	55	48.6	48.6	48.6	48.6				
450791001	South Carolina	Richland	SANDHILL EXPERIMENTAL STATION		34.13126	-80.8683	64.3	65	62	61	55.8	56.5	55.8	56.5	54.5	55.1	54.5	55.1
450830009	South Carolina	Spartanburg	NORTH SPARTANBURG FIRE STATION #2		34.98871	-82.0758	66	67	65	63	57.2	58.1	57.2	58.1	57	57.8	57	57.8
450910008	South Carolina	York	YORK (LANDFILL)		34.977	-81.207	61.3	63	62	59	54	55.5	54	55.5	53.8	55.2	53.8	55.2
450918801	South Carolina	York			34.9127	-80.8745	64	64	62	NA	57.3	57.3	57.3	57.3	56.3	56.3	56.3	56.3
460110003	South Dakota	Brookings	Research Farm		44.3486	-96.8073	62	63	68	66								
460330132	South Dakota		Wind Cave NP - Visitor Center		43.55764	-103.484	60.3	62	61	63								
460710001	South Dakota	Jackson	SOUTH OF BADLANDS NP HEADQUARTERS		43.74561	-101.941	60.7	63	57	60								
460930001	South Dakota	Meade	BLACK HAWK ELEMENTARY SCHOOL GROUNDS		44.15564	-103.316	53.3	57	63	64								
460990008	South Dakota	Minnehaha	SD School for the Deaf		43.54792	-96.7008	65	67	NA	NA								
461270001	South Dakota	Union	Union County #1 Jensen		42.75152	-96.7072	62.3	64	64	NA								
470010101	Tennessee	Anderson	Freel's Bend O3 and SO2 monitoring		35.96497	-84.2232	63.7	64	60	58	55.7	55.9	55.7	55.9	54.2	54.4	54.2	54.4
470090101	Tennessee	Blount	Great Smoky Mountains NP - Look Rock		35.63348	-83.9416	67	67	62	63	58.6	58.6	58.6	58.6	58.4	58.4	58.4	58.4
470090102	Tennessee	Blount	Great Smoky Mountains NP - Cade's Cove		35.60306	-83.7836	61	62	56	58	53.3	54.2	53.3	54.2				
470259991	Tennessee	Claiborne	Speedwell		36.46983	-83.8265	62.7	63	57	56	55.2	55.4	55.2	55.4				
470370011	Tennessee	Davidson	East Health		36.20506	-86.7447	66	66	63	64	57.8	57.8	57.8	57.8	56.9	56.9	56.9	56.9
470370026	Tennessee	Davidson	Percy Priest Dam		36.1508	-86.6233	66	67	62	63	57.6	58.5	57.6	58.5	56.9	57.7	56.9	57.7
470419991	Tennessee	DeKalb	Edgar Evans		36.0388	-85.7331	61.3	62	57	57	53.7	54.3	53.7	54.3				
470651011	Tennessee	Hamilton	Soddy-Daisy High School		35.23348	-85.1816	64.7	65	60	61	56.3	56.6	56.3	56.6	55.7	56	55.7	56
470654003	Tennessee	Hamilton	Eastside Utility		35.10264	-85.1622	67	68	61	63	57.9	58.7	57.9	58.7	57.1	58	57.1	58
470890002	Tennessee	Jefferson	New Market ozone monitor		36.10563	-83.6021	67	68	63	61	58.9	59.8	58.9	59.8	58.3	59.2	58.3	59.2

470930021	Tennessee	Knox	East Knox Elementary School	36.08551	-83.7648	64.3	65	59	58	56.7	57.3	56.7	57.3	56.7	57.3	56	56.6	56	56.6
470931020	Tennessee	Knox	Spring Hill Elementary School	36.01919	-83.8738	66.7	67	57	57	58.4	58.7	58.4	58.7	58.4	58.7	57.9	58.2	57.9	58.2
471050109	Tennessee	Loudon	Loudon Middle School ozone monitor	35.7211	-84.343	68	69	62	60	59.3	60.2	59.3	60.2	59.3	60.2	58.2	59.1	58.2	59.1
471550101	Tennessee	Sevier	Great Smoky Mountains NP - Cove Mountain	35.69676	-83.6096	67.3	68	60	61	58.9	59.6	58.9	59.6	58.9	59.6				
471570021	Tennessee	Shelby	Frayser Ozone Monitor	35.2175	-90.0197	66.7	67	65	65	60.7	61	60.7	61	60.7	61	60.1	60.4	60.1	60.4
471570075	Tennessee	Shelby	Memphis NCORE site	35.1517	-89.8502	67.3	69	66	69	61.4	62.9	61.4	62.9	61.4	62.9	60.9	62.5	60.9	62.5
471571004	Tennessee	Shelby	Edmund Orgill Park Ozone	35.37815	-89.8345	65.7	66	61	64	59	59.3	59	59.3	59	59.3	58.4	58.7	58.4	58.7
471632002	Tennessee	Sullivan	Blountville Ozone Monitor	36.54137	-82.4246	66	66	61	60	58.1	58.1	58.1	58.1	58.1	58.1	58.2	58.2	58.2	58.2
471632003	Tennessee	Sullivan	Kingsport ozone monitor	36.58211	-82.4857	64.7	65	60	59	56.8	57.1	56.8	57.1	56.8	57.1	57.1	57.3	57.1	57.3
471650007	Tennessee	Sumner	Hendersonville Ozone Site at Old Hickory Dam	36.29756	-86.6531	66.3	67	65	64	57.6	58.2	57.6	58.2	57.6	58.2	56	56.6	56	56.6
471870106	Tennessee	Williamson	FAIRVIEW MIDDLE SCHOOL ozone monitor	35.94977	-87.1382	60.3	61	58	61	52.2	52.8	52.2	52.8	52.2	52.8	51.6	52.2	51.6	52.2
471890103	Tennessee	Wilson	Cedars of Lebanon Ozone Monitor	36.0609	-86.2863	63.5	64	59	60	54.7	55.1	54.7	55.1	54.7	55.1	54	54.4	54	54.4
480271045	Texas	Bell	Temple Georgia	31.12242	-97.4311	68	69	64	66										
480271047	Texas	Bell	Killeen Skylark Field	31.088	-97.6797	67.3	68	66	67										
480290032	Texas	Bexar	San Antonio Northwest	29.51509	-98.6202	73	74	71	71	68	68.9	68	68.9	68	68.9	67.1	68	67.1	68
480290052	Texas	Bexar	Camp Bullis	29.63206	-98.5649	72.3	73	73	75	68.4	69.1	68.4	69.1	68.4	69.1	66.8	67.4	66.8	67.4
480290059	Texas	Bexar	Calaveras Lake	29.27538	-98.3117	65	66	65	67	60.9	61.9	60.9	61.9	60.9	61.9				
480391004	Texas	Brazoria	Manvel Croix Park	29.52044	-95.3925	74.7	77	75	73	71.5	73.7	71.5	73.7	71.5	73.7	69.1	71.3	69.1	71.3
480391016	Texas	Brazoria	Lake Jackson	29.04376	-95.4729	65	66	65	68	60	61	60	61	60	61				
480430101	Texas	Brewster	Big Bend NP - K-Bar Ranch Road	29.30265	-103.178	62.3	63	61	61										
480610006	Texas	Cameron	Brownsville	25.89252	-97.4938	56.5	57	NA	NA										
480611023	Texas	Cameron	Harlingen Teege	26.20034	-97.7127	57	57	56	55										

480850005	Texas	Collin	Frisco		33.1324	-96.7864	74.3	75	75	74	67.1	67.7	67.1	67.7	65.9	66.5	65.9	66.5
481130069	Texas	Dallas	Dallas Hinton		32.82006	-96.8601	73	74	67	67	66.1	67	66.1	67	64.9	65.8	64.9	65.8
481130075	Texas	Dallas	Dallas North #2		32.91921	-96.8085	73.7	75	71	71	66.9	68.1	66.9	68.1	65.5	66.7	65.5	66.7
481130087	Texas	Dallas	Dallas Redbird Airport Executive		32.67645	-96.8721	64.7	66	68	71	58.5	59.7	58.5	59.7	58.3	59.5	58.3	59.5
481210034	Texas	Denton	Denton Airport South		33.21907	-97.1963	78	80	74	76	71.2	73	71.2	73	70.2	72	70.2	72
481211032	Texas	Denton	Pilot Point		33.41065	-96.9446	74	76	76	77	67.6	69.5	67.6	69.5	66.2	68	66.2	68
481390016	Texas	Ellis	Midlothian OFW		32.48208	-97.0269	64.3	65	62	62	58	58.7	58	58.7	57.4	58	57.4	58
481391044	Texas	Ellis	Italy		32.17542	-96.8702	63.7	65	61	63								
481410029	Texas	El Paso	Ivanhoe		31.78577	-106.324	63.7	66	67	65	62.3	64.5	62.3	64.5	61.9	64.2	61.9	64.2
481410037	Texas	El Paso	El Paso UTEP		31.76829	-106.501	71.3	73	75	NA	69.6	71.3	69.6	71.3	69	70.7	69	70.7
481410044	Texas	El Paso	El Paso Chamizal		31.76569	-106.455	69	71	71	69	67.4	69.3	67.4	69.3	66.8	68.7	66.8	68.7
481410055	Texas	El Paso	Ascarate Park SE		31.74678	-106.403	66	69	NA	64	64.4	67.4	64.4	67.4	63.9	66.8	63.9	66.8
481410057	Texas	El Paso	Socorro Hueco		31.6675	-106.288	65.3	66	70	73					63.2	63.9	63.2	63.9
481410058	Texas	El Paso	Skyline Park		31.89391	-106.426	70	72	70	70	68.1	70	68.1	70	67.5	69.4	67.5	69.4
481671034	Texas	Galveston	Galveston 99th Street		29.25447	-94.8613	75.7	77	72	70	71.8	73	71.9	73.1	71.5	72.7	71.3	72.5
481830001	Texas	Gregg	Longview		32.37868	-94.7118	65.3	66	62	61	58.8	59.4	58.8	59.4	58.2	58.8	58.2	58.8
482010024	Texas	Harris	Houston Aldine		29.90104	-95.3261	79.3	81	74	69	76.5	78.1	76.5	78.1	74.3	75.9	74.3	75.9
482010026	Texas	Harris	Channelview		29.80271	-95.1255	68.3	69	65	64	65	65.7	65	65.7	64.7	65.3	65.1	65.8
482010029	Texas	Harris	Northwest Harris County		30.03952	-95.674	71.3	73	71	70	66.4	68	66.4	68	64.4	65.9	64.4	65.9
482010046	Texas	Harris	Houston North Wayside		29.82809	-95.2841	67	69	64	62	64.6	66.5	64.6	66.5	62.7	64.6	62.7	64.6
482010047	Texas	Harris	Lang		29.83417	-95.4892	73.7	76	71	70	70.6	72.8	70.6	72.8	68	70.1	68	70.1
482010051	Texas	Harris	Houston Croquet		29.62389	-95.4742	70	71	74	73	66.5	67.4	66.5	67.4	64.2	65.1	64.2	65.1
482010055	Texas	Harris	Houston Bayland Park		29.69573	-95.4992	76	77	77	78	72.2	73.1	72.2	73.1	69.7	70.6	69.7	70.6
482010062	Texas	Harris	Houston Monroe		29.62556	-95.2672	63	65	67	63	61.4	63.3	61.4	63.3	59.6	61.5	59.6	61.5
482010066	Texas	Harris	Houston Westhollow		29.72333	-95.6358	75	76	70	70	70.5	71.4	70.5	71.4	68	68.9	68	68.9
482010416	Texas	Harris	Park Place		29.68639	-95.2947	72.3	74	73	73	69.7	71.4	69.7	71.4	67.6	69.2	67.6	69.2
482011015	Texas	Harris	Lynchburg Ferry		29.75889	-95.0794	65	65	64	63	61.9	61.9	61.9	61.9	61.6	61.6	62	62
482011017	Texas	Harris	Baytown Garth		29.82332	-94.9838	71	73	68	69	67.7	69.6	67.7	69.6				

482011034	Texas	Harris	Houston East	29.768	-95.2206	73.7	75	71	72	71	72.3	71	72.3	69.9	71.1	69.9	71.1
482011035	Texas	Harris	Clinton	29.73373	-95.2576	71.3	75	71	72	68.7	72.3	68.7	72.3	67.6	71.1	67.6	71.1
482011039	Texas	Harris	Houston Deer Park #2	29.67003	-95.1285	68.7	71	74	71	65.7	67.9	65.7	67.9	65.2	67.4	65.6	67.8
482011050	Texas	Harris	Seabrook Friendship Park	29.58305	-95.0155	70.7	71	62	61	67	67.3	67.2	67.4	66.7	67	67	67.3
482030002	Texas	Harrison	Karnack	32.66899	-94.1675	61.3	62	59	61	55.8	56.4	55.8	56.4				
482150043	Texas	Hidalgo	Mission	26.22621	-98.2911	55	55	56	60								
482210001	Texas	Hood	Granbury	32.4423	-97.8035	67.3	69	64	69								
482311006	Texas	Hunt	Greenville	33.15309	-96.1156	62.3	65	62	63	55.7	58.1	55.7	58.1				
482450009	Texas	Jefferson	Beaumont Downtown	30.03642	-94.0711	64.7	65	65	63	61	61.3	61	61.3				
482450011	Texas	Jefferson	Port Arthur West	29.89752	-93.9911	66.7	67	62	60	63.3	63.6	62.9	63.2	65.2	65.5		
482450022	Texas	Jefferson	Hamshire	29.86396	-94.3178	67	68	63	62	62.6	63.6	62.6	63.6				
482450101	Texas	Jefferson	SETRPC 40 Sabine Pass	29.72793	-93.8941	65.7	67	NA	61	61.6	62.8			62.1	63.4		
482450102	Texas	Jefferson	SETRPC 43 Jefferson Co Airport	29.9425	-94.0006	63	65	66	63	60.2	62.1	59.9	61.8	61.4	63.3	60.1	62
482451035	Texas	Jefferson	Nederland High School	29.97893	-94.0109	66.7	68	61	62	63.7	65	63.4	64.7	65	66.3	63.6	64.8
482510003	Texas	Johnson	Cleburne Airport	32.3536	-97.4367	73.7	76	71	74								
482570005	Texas	Kaufman	Kaufman	32.56497	-96.3177	61	61	64	66								
483091037	Texas	McLennan	Waco Mazanec	31.65307	-97.0707	63	63	64	64								
483390078	Texas	Montgomery	Conroe Relocated	30.3503	-95.4251	73.7	75	73	72	68.5	69.7	68.5	69.7	68.4	69.6	68.4	69.6
483491051	Texas	Navarro	Corsicana Airport	32.03193	-96.3991	62.7	64	63	65								
483550025	Texas	Nueces	Corpus Christi West	27.76534	-97.4343	62.3	64	62	62								
483550026	Texas	Nueces	Corpus Christi Tuloso	27.83241	-97.5554	61.3	63	62	61								
483611001	Texas	Orange	West Orange	30.08526	-93.7613	61.7	64	62	61	58.3	60.5	58.4	60.6	60.7	62.9		
483670081	Texas	Parker	Parker County	32.86877	-97.9059	70.7	73	67	69								
483739991	Texas	Polk	Alabama-Coushatta	30.7017	-94.6742	60.3	61	57	57								
483819991	Texas	Randall	Palo Duro	34.8803	-101.665	65.7	68	66	67								
483970001	Texas	Rockwall	Rockwall Heath	32.93652	-96.4592	66	66	63	63	60.4	60.4	60.4	60.4				
484230007	Texas	Smith	Tyler Airport Relocated	32.34401	-95.4158	64.7	65	64	65	58.2	58.4	58.2	58.4				
484390075	Texas	Tarrant	Eagle Mountain Lake	32.98789	-97.4772	71	72	75	76	64.7	65.6	64.7	65.6	64.2	65.1	64.2	65.1

484391002	Texas	Tarrant	Fort Worth Northwest	32.80582	-97.3566	72.3	74	72	77	65.7	67.2	65.7	67.2	65	66.5	65	66.5
484392003	Texas	Tarrant	Keller	32.92247	-97.2821	73.3	74	72	72	67.2	67.9	67.2	67.9	66.4	67	66.4	67
484393009	Texas	Tarrant	Grapevine Fairway	32.98426	-97.0637	75.3	76	74	76	68.8	69.4	68.8	69.4	68.3	68.9	68.3	68.9
484393011	Texas	Tarrant	Arlington Municipal Airport	32.65636	-97.0886	67	69	NA	72	60.6	62.4	60.6	62.4	60.3	62.1	60.3	62.1
484530014	Texas	Travis	Austin Northwest	30.35444	-97.7603	67.7	69	NA	NA	62.2	63.4	62.2	63.4	62.1	63.3	62.1	63.3
484530020	Texas	Travis	Austin Audubon Society	30.48317	-97.8723	66.3	67	63	64	61.2	61.8	61.2	61.8	60.7	61.3	60.7	61.3
484690003	Texas	Victoria	Victoria	28.83617	-97.0055	65	65	61	60								
484790016	Texas	Webb	Laredo Vidaurri	27.51746	-99.5152	54	54	NA	NA								
540030003	West Virginia	Berkeley	MARTINSBURG BALL FIELD	39.44811	-77.9638	62	63	57	56	55.3	56.2	55.3	56.2				
			HENDERSON CENTER/MARSHALL UNIVERSITY - MOVED FROM WATER CO. 5/98														
540110006	West Virginia	Cabell		38.42413	-82.4259	64	64	NA	NA	57.6	57.6	57.6	57.6	56.7	56.7	56.7	56.7
540219991	West Virginia	Gilmer	Cedar Creek	38.8795	-80.8477	58	59	54	53	54.1	55.1	54.1	55.1	52.9	53.8	52.9	53.8
			SAM BLACK CHURCH - DOH GARAGE - GREENBRIER COUNTY					56	54	54.7	55	54.7	55				
540250003	West Virginia	Greenbrier		37.90853	-80.6326	59.7	60	NA	NA	58.1	58.5	58.1	58.5	57	57.4	57	57.4
540290009	West Virginia	Hancock		40.42737	-80.5923	65.5	66	NA	NA	61.1	61.1	61.1	61.1	61.3	61.3	61.3	61.3
540390020	West Virginia	Kanawha		38.34626	-81.6212	67	67	NA	NA	61	61.1	61.1	61.1	59.3	59.3	59.3	59.3
540610003	West Virginia	Monongalia		39.64937	-79.9209	62.3	64	61	60	57.8	59.4	57.8	59.4	57.7	59.3	57.7	59.3
540690010	West Virginia	Ohio		40.11488	-80.701	67	68	61	60	60.4	61.3	60.4	61.3	60.2	61.1	60.2	61.1
540939991	West Virginia	Tucker	Parsons	39.0905	-79.6617	61.7	62	56	58	56.6	56.8	56.6	56.8				
541071002	West Virginia	Wood	Neale Elementary School	39.32353	-81.5524	65	68	NA	59	58	60.7	58	60.7	57.9	60.5	57.9	60.5
550030010	Wisconsin	Ashland	BAD RIVER TRIBAL SCHOOL - ODANAH	46.60225	-90.6561	58.3	59	58	57								
550090026	Wisconsin	Brown	GREEN BAY - UW	44.53098	-87.908	65.3	66	62	64								
550210015	Wisconsin	Columbia	COLUMBUS	43.3156	-89.1089	66	67	64	66								
550250041	Wisconsin	Dane	MADISON EAST	43.10084	-89.3573	65	65	64	65								
550270001	Wisconsin	Dodge	HORICON WILDLIFE AREA	43.46611	-88.6211	66.3	68	65	66								

550290004	Wisconsin	Door	NEWPORT PARK	45.2384	-86.994	72.7	73	70	73	66.6	66.9	66.7	67	66.4	66.7	66.2	66.4
550350014	Wisconsin	Eau Claire	EAU CLAIRE - DOT SIGN SHOP	44.7614	-91.143	62	64	62	62								
550390006	Wisconsin	Fond du Lac	FOND DU LAC	43.6874	-88.422	64.7	66	62	64								
550410007	Wisconsin	Forest	POTAWATOMI	45.565	-88.8086	62.7	63	59	59								
550550009	Wisconsin	Jefferson	JEFFERSON - LAATSCH	43.0034	-88.8283	68	69	66	66								
550590019	Wisconsin	Kenosha	CHIAWUKEE PRAIRIE STATELINE	42.50472	-87.8093	78	79	74	75	73.5	74.4	73.5	74.4	74.5	75.5	76.1	77.1
550590025	Wisconsin	Kenosha	KENOSHA - WATER TOWER	42.5958	-87.8858	73.7	77	72	73	69.8	72.9	68.7	71.8	71	74.2	67.2	70.2
550610002	Wisconsin	Kewaunee	KEWAUNEE	44.44312	-87.5052	69.3	70	64	67	64.3	65	63.8	64.5	63.7	64.3	63.6	64.2
550630012	Wisconsin	La Crosse	LACROSSE - DOT BUILDING	43.7775	-91.2269	62	62	60	59								
550710007	Wisconsin	Manitowoc	MANITOWOC - WDLND DUNES	44.13862	-87.6161	73	74	68	73	67.8	68.7	67.1	68	67.5	68.4	67.4	68.3
550730012	Wisconsin	Marathon	LAKE DUBAY	44.70735	-89.7718	64	65	58	57								
			MILWAUKEE - SIXTEENTH ST. HEALTH CENTER														
550790010	Wisconsin	Milwaukee		43.01667	-87.9333	65.3	67	61	NA	61.2	62.8	61.1	62.7	62.9	64.5	60	61.6
550790026	Wisconsin	Milwaukee	MILWAUKEE - SER DNR HDQRS	43.06098	-87.9135	68	69	NA	NA	63.7	64.6	64.1	65	64.8	65.7	66.2	67.2
550790085	Wisconsin	Milwaukee	BAYSIDE	43.1818	-87.901	71.7	73	70	73	67.4	68.6	67.8	69.1	67.8	69.1	70.2	71.4
550870009	Wisconsin	Outagamie	APPLETON - AAL	44.30738	-88.3932	65.7	67	62	64								
550890008	Wisconsin	Ozaukee	GRAFTON	43.343	-87.92	71.3	72	71	72	66.9	67.6	66.5	67.1	68.7	69.4	65.5	66.1
550890009	Wisconsin	Ozaukee	HARRINGTON BEACH PARK	43.4981	-87.81	73.3	74	70	71	69.3	69.9	68.6	69.3	69.1	69.8	68.2	68.8
551010020	Wisconsin	Racine	RACINE - PAYNE AND DOLAN	42.77368	-87.7963	76	78	73	75	71.4	73.3	72	73.9	72.1	74	73.6	75.5
551050030	Wisconsin	Rock	BELOIT - CONVERSE	42.51831	-89.0635	67.7	69	65	67								
551110007	Wisconsin	Sauk	DEVILS LAKE PARK	43.4351	-89.6797	63.7	64	63	63								
551170006	Wisconsin	Sheboygan	SHEBOYGAN - KOHLER ANDRAE	43.66742	-87.7162	80	81	72	75	75	75.9	74.5	75.4	74.8	75.8	73.5	74.4
551170009	Wisconsin	Sheboygan	SHEBOYGAN - HAVEN	43.8156	-87.7922	70	71	65	69	65.1	66	64.7	65.6	65.3	66.2	64.3	65.2
551199991	Wisconsin	Taylor	Perkinstown	45.2066	-90.5969	61	62	59	58								
551250001	Wisconsin	Vilas	TROUT LAKE	46.0519	-89.654	61.3	62	58	58								

Appendix D: 2026 DVF Tables

Table D1. Top 21 OTR ozone monitors showing the 2016 (2014-2018) base observed design value (DVB) compared to the 2019-2021 and 2020-2022 preliminary monitored DVs and 2026 modeling future predicted design values (DVF) for 3x3 and 3x3 No Water 1 methodology for CMAQ (green header) and CAMx (blue header) using the V2/V3 inventory.

				Monitored DVs			Modeled DVs							
							2026 CMAQ v5.3.3				2026 CAMx v7.20			
				2014-2018 DVB		2019-2021 DV	2020-2022 DV	Prelim	3x3		3x3 no water 1		3x3	
Site ID	State	County		AVG	MAX				AVG	MAX	AVG	MAX	AVG	MAX
90013007	CT	Fairfield		82	83	81	81	81	73.4	74.3	73.2	74.1	74	74.9
90019003	CT	Fairfield		82.7	83	80	80	80	75.6	75.9	74.6	74.8	75.5	75.8
90099002	CT	New Haven		79.7	82	82	82	79	71.2	73.2	69.5	71.5	70.8	72.8
420170012	PA	Bucks		79.3	81	71	71	72	68.7	70.2	68.7	70.2	70.3	71.8
90010017	CT	Fairfield		79.3	80	79	77	77	73.8	74.5	73	73.7	75.3	76
90079007	CT	Middlesex		78.7	79	74	73	73	68	68.2	68	68.2	69	69.2
90011123	CT	Fairfield		77	78	70	71	71	67.9	68.8	67.9	68.8	68.1	69
421010024	PA	Philadelphia		77.7	78	71	70	70	67.6	67.8	67.6	67.8	69.1	69.4
90090027	CT	New Haven		75.7	77	72	70	70	68.2	69.4	67	68.2	67.8	68.9
340070002	NJ	Camden		75.3	77	66	64	64	65.9	67.4	65.9	67.4	67	68.5
361030002	NY	Suffolk		74	76	73	74	74	68.3	70.2	66.4	68.2	67.4	69.2
90110124	CT	New London		74.3	76	73	72	72	67.4	69	70.9	72.5	66.3	67.8
361030004	NY	Suffolk		74.3	76	69	68	68	65.9	67.4	65.7	67.2	66.8	68.4
421010048	PA	Philadelphia		75.3	76	70	68	68	65.6	66.2	65.6	66.2	66.9	67.5
240251001	MD	Harford		74	75	72	68	68	63.9	64.8	62.3	63.2	63.8	64.7
340030006	NJ	Bergen		74.3	75	71	68	68	67.5	68.1	67.5	68.1	67.6	68.2
340230011	NJ	Middlesex		74.7	75	68	68	68	65.5	65.8	65.5	65.8	65.3	65.6
361192004	NY	Westchester		74	75	69	68	68	68.9	69.8	67.6	68.5	68.9	69.8

360810124	NY	Queens	72.3	74	71	70	65.8	67.4	65.1	66.6	67.9	69.5	67.2	68.7
90031003	CT	Hartford	71.7	74	67	68	60.9	62.9	60.9	62.9	62.3	64.3	62.3	64.3
240031003	MD	Arundel	74	74	70	66	63.6	63.6	62.8	62.8	63.8	63.8	63.1	63.1

Table D2. All monitors in the domain showing the 2016 (2014-2018) base observed design value (DVB) compared to the 2019-2021 and 2020-2022 preliminary monitored DVs and 2026 modeling future predicted design values (DVs) for 3x3 and 3x3 No Water 1 methodology for CMAQ (green header) and CAMx (blue header) using the V2/V3 inventory. See Table D1 for DVFs at Top 21 OTR monitors.

Site ID	State	County	Site name	Lat	Lon	2014-2018 DVB		2019- 2021 DV	2020- 2022 DV	CAMx V7.20				CMAQ v5.3.3			
										3x3		3x3 no water 1		3x3		3x3 no water 1	
						AVG	MAX			AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX
								Prelim									
90010017	Connecticut	Fairfield	Greenwich Point Park - Greenwich	41.00466	-73.5851	79.3	80	79	77	75.3	76	72.2	72.8	73.8	74.5	73	73.7
90011123	Connecticut	Fairfield	Western Conn State Univ - Danbury	41.39917	-73.4431	77	78	70	71	68.1	69	68.1	69	67.9	68.8	67.9	68.8
90013007	Connecticut	Fairfield	Lighthouse - Stratford	41.1525	-73.1031	82	83	81	81	74	74.9	73.8	74.7	73.4	74.3	73.2	74.1
90019003	Connecticut	Fairfield	Sherwood Island State Park - Westport	41.11833	-73.3367	82.7	83	80	80	75.5	75.8	74.2	74.5	75.6	75.9	74.6	74.8
90031003	Connecticut	Hartford	McAuliffe Park	41.78472	-72.6317	71.7	74	67	68	62.3	64.3	62.3	64.3	60.9	62.9	60.9	62.9
90050005	Connecticut	Litchfield	Mohawk Mt-Cornwall	41.82134	-73.2973	71.3	72	64	67	61.9	62.5	61.9	62.5	61.9	62.5	61.9	62.5
90079007	Connecticut	Middlesex	Connecticut Valley Hospital - Middletown	41.55	-72.626	78.7	79	74	73	69	69.2	69	69.2	68	68.2	68	68.2
90090027	Connecticut	New Haven	Criscuolo Park-New Haven	41.3014	-72.9029	75.7	77	72	70	67.8	68.9	67.5	68.6	68.2	69.4	67	68.2
90099002	Connecticut	New Haven	Hammonasset State Park - Madison	41.25679	-72.5533	79.7	82	82	79	70.8	72.8	71.3	73.3	71.2	73.2	69.5	71.5
90110124	Connecticut	New London	Fort Griswold Park - Groton	41.35362	-72.0788	74.3	76	73	72	66.3	67.8	66.5	68	67.4	69	70.9	72.5
90131001	Connecticut	Tolland		41.97639	-72.3881	71.7	73	67	66	62	63.1	62	63.1	60.7	61.8	60.7	61.8
90159991	Connecticut	Windham	Abington	41.84046	-72.0104	69.7	71	65	64	60.2	61.3	60.2	61.3	59.1	60.2	59.1	60.2

100010002	Delaware	Kent	PROPERTY OF KILLENS POND STATE PARK; BEHIND FARM BUILDINGS	38.98667	-75.5568	66.3	67	NA	63	55.8	56.4	56.4	57	56.9	57.5	56.6	57.2
100031007	Delaware	New Castle	Lums Pond	39.5513	-75.732	68	69	NA	NA	58	58.9	58	58.9	57.5	58.3	57.5	58.3
100031010	Delaware	New Castle	BCSP	39.81722	-75.5639	73.7	74	NA	62	64	64.3	64	64.3	64.1	64.4	64.1	64.4
100031013	Delaware	New Castle	BELLEVUE STATE PARK; FIELD IN SE PORTION OF PARK	39.77389	-75.4964	71	72	NA	63	61.3	62.2	61.3	62.2	61.6	62.5	61.6	62.5
100032004	Delaware	New Castle	MLK CORNER OF MLK BLVD AND JUSTISON ST	39.73944	-75.5581	71.3	72	NA	NA	61.6	62.2	61.6	62.2	61.8	62.5	61.8	62.5
100051002	Delaware	Sussex	Seaford Shipley State Service Center	38.6539	-75.6106	65.3	66	NA	61	55.5	56.1	55.5	56.1				
100051003	Delaware	Sussex	Lewes SPM SITE: NEAR UD ACID RAIN/MERCURY COLLECTORS	38.7791	-75.1632	67.7	69	NA	NA	58	59.1	59	60.1	53.5	54.5		
110010041	District Of Columbia	District of Columbia	RIVER TERRACE	38.89557	-76.9581	57	57	60	59	49.1	49.1	49.1	49.1	47.9	47.9	47.9	47.9
110010043	District Of Columbia	District of Columbia	MCMILLAN NCore- PAMS	38.92185	-77.0132	71	72	68	67	61.1	62	61.1	62	59.6	60.5	59.6	60.5
110010050	District Of Columbia	District of Columbia	Takoma Rec Center	38.97009	-77.0167	70	70	66	61	60	60	60	60	58.6	58.6	58.6	58.6
230010014	Maine	Androscog in	DURHAM FIRE STATION	43.97462	-70.1246	59.3	60	53	56	51	51.6	50.5	51.1	51.7	52.3		
230039991	Maine	Aroostook	Ashland	46.6041	-68.4135	52	52	52	50								
230052003	Maine	Cumberland	CETL - Cape Elizabeth Two Lights (State Park)	43.56104	-70.2073	64.7	65	62	62	55.8	56	56	56.3	57.6	57.9		
230090102	Maine	Hancock	TOP OF CADILLAC MTN (FENCED ENCLOSURE)	44.3517	-68.227	69	71	67	67	59.5	61.2						
230090103	Maine	Hancock	MCFARLAND HILL Air Pollutant Research Site	44.37705	-68.2609	63	64	60	61					54.1	55		
230112005	Maine	Kennebec	Gardiner: Pray Street School (GPSS)	44.23062	-69.785	61.3	63	NA	NA	52.3	53.7	52.3	53.7				
230130004	Maine	Knox	Marshall Point Lighthouse	43.91796	-69.2606	63.3	64	60	59	54.6	55.2	54.1	54.7	54	54.6		
230194008	Maine	Penobscot	WLBZ TV Transmitter Building - Summit of Rider Bluff	44.73598	-68.6708	58.3	60	57	59								

230290019	Maine	Washington	Harbor Masters Office; Jonesport Public Landing	44.53191	-67.5959	59.3	61	55	55	51.4	52.8						
230310038	Maine	York	WBFD - West Buxton (Hollis) Fire Department	43.65676	-70.6291	58.7	59	NA	NA								
230310040	Maine	York	SBP - Shapleigh Ball Park	43.58889	-70.8773	61.3	62	56	57								
230312002	Maine	York	KPW - Kennebunkport Parson's Way	43.34317	-70.471	66.5	67	64	64	57.9	58.4	57.5	58	58.2	58.6		
240031003	Maryland	Anne Arundel	GLEN BURNIE	39.16953	-76.6279	74	74	70	66	63.8	63.8	63.1	63.1	63.6	63.6	62.8	62.8
240051007	Maryland	Baltimore	Padonia	39.46048	-76.6335	72	72	69	68	61.8	61.8	61.8	61.8	60.7	60.7	60.7	60.7
240053001	Maryland	Baltimore	Essex	39.31083	-76.4744	72.7	73	70	68	63.1	63.4	62.3	62.6	62.6	62.8	61.5	61.7
240090011	Maryland	Calvert	Calvert	38.53672	-76.6172	67.7	69	58	58	58.3	59.4	56.9	58	57.6	58.7	55.1	56.2
240130001	Maryland	Carroll	South Carroll	39.44429	-77.0423	68.3	69	64	64	58.1	58.7	58.1	58.7	56.8	57.4	56.8	57.4
240150003	Maryland	Cecil	Fair Hill Natural Resource Management Area	39.70144	-75.8601	74	74	67	65	62.8	62.8	62.8	62.8	62.8	62.8	62.8	62.8
240170010	Maryland	Charles	Southern Maryland	38.50855	-76.8119	69.3	70	59	59	58.9	59.5	58.9	59.5	57.9	58.5	57.9	58.5
240190004	Maryland	Dorchester	Horn Point	38.58753	-76.141	64.7	66	64	63	55.3	56.4	54.9	56	55.8	56.9	55.2	56.3
240199991	Maryland	Dorchester	Blackwater NWR	38.44497	-76.1113	65.7	66	62	61	56.6	56.8	55.3	55.6	57.2	57.5	56.3	56.5
240210037	Maryland	Frederick	Frederick Airport	39.42276	-77.3752	68	69	65	63	57.7	58.5	57.7	58.5	56.8	57.6	56.8	57.6
240230002	Maryland	Garrett	Piney Run	39.70595	-79.012	65.3	66	58	58	58.1	58.7	58.1	58.7				
240251001	Maryland	Harford	Edgewood	39.41019	-76.2969	74	75	72	68	63.8	64.7	63.4	64.2	63.9	64.8	62.3	63.2
240259001	Maryland	Harford	Aldino	39.56333	-76.2039	73	73	68	67	62	62	62.1	62.1	62.1	62.1	61	61
240290002	Maryland	Kent	Millington	39.30502	-75.7973	69.3	70	64	64	59.2	59.8	59.2	59.8	58.4	59	58.4	59
240313001	Maryland	Montgomery	Rockville	39.11431	-77.1069	67.7	68	63	63	58.4	58.6	58.4	58.6	56.7	57	56.7	57
240330030	Maryland	Prince George's	HU-Beltsville	39.05528	-76.8783	69.3	70	67	64	59.3	59.9	59.3	59.9	57.9	58.5	57.9	58.5
240338003	Maryland	Prince George's	PG Equestrian Center	38.81194	-76.7442	70.7	71	65	64	60.4	60.6	60.4	60.6	59.3	59.6	59.3	59.6
240339991	Maryland	Prince George's	Beltsville	39.0284	-76.8171	69.3	71	70	67	59	60.4	59	60.4	57.8	59.2	57.8	59.2
240430009	Maryland	Washington	Hagerstown	39.56418	-77.7202	66.7	67	60	61	58.1	58.3	58.1	58.3	57.1	57.4	57.1	57.4

245100054	Maryland	Baltimore (City)	Furley		39.32881	-76.5531	68.3	70	NA	NA	59.4	60.8	58.4	59.8	58.7	60.2	57.7	59.1
250010002	Massachusetts	Barnstable	TRURO NATIONAL SEASHORE		41.9758	-70.0236	69	69	64	64	60.1	60.1	59.8	59.8	58.9	58.9	58.4	58.4
250051004	Massachusetts	Bristol	FALL RIVER		41.68571	-71.1692	71.7	74	NA	65	63.5	65.5	63.3	65.3	65.2	67.3	62	64
250051006	Massachusetts	Bristol	FAIRHAVEN2		41.64538	-70.8975	67.3	69	63	62	59.5	61	59.7	61.2	58.5	60	58.2	59.7
			1 HERRING CREEK RD: AQUINNAH (WAMPANOAG TRIBAL SITE)															
250070001	Massachusetts	Dukes	LYNN WATER TREATMENT PLANT		41.33047	-70.7852	70	70	65	62	61.5	61.5	61.5	61.5	60.3	60.3	61.5	61.5
250092006	Massachusetts	Essex	NEWBURYPORT HARBOR ST PARKING LOT		42.47464	-70.9708	66.3	68	62	64	59.3	60.8	58.3	59.7	61.1	62.7	58.1	59.6
250094005	Massachusetts	Essex			42.81441	-70.8178	64.5	65	NA	NA	56.4	56.8	55.7	56.1	56.8	57.2		
250095005	Massachusetts	Essex	CONSENTINO SCHOOL.		42.77084	-71.1023	62.7	64	58	60	54.4	55.5	54.4	55.5	53.9	55	53.9	55
250112005	Massachusetts	Franklin	Greenfield 16 Barr Ave		42.60582	-72.5967	64.7	66	55	56	55.9	57.1	55.9	57.1				
250130008	Massachusetts	Hampden	WESTOVER AFB		42.19438	-72.5551	70	71	63	64	60.2	61	60.2	61	59.5	60.3	59.5	60.3
250154002	Massachusetts	Hampshire	QUABBIN RES		42.29849	-72.3341	69	70	NA	62	59	59.8	59	59.8	57.9	58.7	57.9	58.7
250170009	Massachusetts	Middlesex	USEPA REGION 1 LAB		42.62668	-71.3621	64	65	58	60	54.6	55.5	54.6	55.5	54.4	55.3	54.4	55.3
250213003	Massachusetts	Norfolk	BLUE HILL OBSERVATORY		42.21177	-71.114	69	70	56	58	59.8	60.7	59.5	60.3	61.7	62.6	59.2	60.1
250230005	Massachusetts	Plymouth	Brockton Buckley		42.06511	-71.0121	67	69	60	61	57.6	59.3	57.6	59.3	56.7	58.4	56.7	58.4
250250042	Massachusetts	Suffolk	DUDLEY SQUARE ROXBURY		42.3295	-71.0826	60.3	64	59	61	53.3	56.6	52.2	55.4	54.2	57.5	51.3	54.5
250270015	Massachusetts	Worcester	WORCESTER AIRPORT		42.27432	-71.8755	65	66	62	62	55.7	56.6	55.7	56.6	54.6	55.4	54.6	55.4
250270024	Massachusetts	Worcester	UXBRIDGE		42.0997	-71.6194	66.3	69	60	59	57.1	59.5	57.1	59.5	56.5	58.8	56.5	58.8
330012004	New Hampshire	Belknap	FIELD OFFICE ON THE GROUNDS OF THE FORMER STATE PRISON		43.56612	-71.4963	58.7	59	53	55	50.4	50.7			51.2	51.4		

330050007	New Hampshire	Cheshire	WATER STREET	42.93052	-72.2723	62.3	63	54	56	53.3	53.9	53.3	53.9				
330074001	New Hampshire	Coos		44.27009	-71.3038	67.3	68	NA	58								
330074002	New Hampshire	Coos	CAMP DODGE: GREENS GRANT	44.30813	-71.2176	58.3	59	53	55								
330090010	New Hampshire	Grafton	LEBANON AIRPORT ROAD	43.62961	-72.3095	57.7	59	52	53								
330099991	New Hampshire	Grafton	Woodstock	43.94452	-71.7008	54.7	56	51	52								
330111011	New Hampshire	Hillsborough	GILSON ROAD	42.71865	-71.5224	63	64	56	58	53.8	54.7	53.8	54.7	54.7			
330115001	New Hampshire	Hillsborough	MILLER STATE PARK	42.86183	-71.8786	67	68	59	60	57.1	58	57.1	58	58			
330131007	New Hampshire	Merrimack	HAZEN DRIVE	43.2185	-71.5145	62	63	56	57	53.2	54.1	53.2	54.1	54.1			
330150014	New Hampshire	Rockingham	PORTSMOUTH - PEIRCE ISLAND	43.07537	-70.748	63.3	65	54	59	55.3	56.8	54.8	56.2	55.7	57.2		
330150016	New Hampshire	Rockingham	SEACOAST SCIENCE CENTER	43.04527	-70.714	66.7	67	62	65	58.3	58.5	57.7	58	58.7	59		
330150018	New Hampshire	Rockingham	MOOSEHILL SCHOOL	42.86253	-71.3801	65.3	66	57	58	55.9	56.5	55.9	56.5				
340010006	New Jersey	Atlantic	Brigantine	39.46487	-74.4487	63.7	64	59	59	56.5	56.7	55.9	56.1	57.4	57.7	55.4	55.7
340030006	New Jersey	Bergen	Leonia	40.87044	-73.992	74.3	75	71	68	67.6	68.2	67.6	68.2	67.5	68.1	67.5	68.1
340070002	New Jersey	Camden	Camden Spruce Street	39.93456	-75.1252	75.3	77	66	64	67	68.5	67	68.5	65.9	67.4	65.9	67.4
340071001	New Jersey	Camden	Ancora State Hospital	39.68425	-74.8615	67.3	68	62	61	59.1	59.8	59.1	59.8	57.9	58.5	57.9	58.5
340110007	New Jersey	Cumberland	Millville	39.42227	-75.0252	65.7	67	65	63	57.3	58.5	57.3	58.5	56.9	58	56.9	58
340130003	New Jersey	Essex	Newark Firehouse	40.72099	-74.1929	68.3	70	65	64	60.9	62.4	60.9	62.4	60.7	62.2	60.7	62.2
340150002	New Jersey	Gloucester	Clarksboro	39.80034	-75.2121	73.7	74	66	66	64.9	65.2	64.9	65.2	64.5	64.7	64.5	64.7
340170006	New Jersey	Hudson	Bayonne	40.67025	-74.1261	71	72	66	66	64.1	65	64.1	65	65.2	66.1	64.7	65.6
340190001	New Jersey	Hunterdon	Flemington	40.51526	-74.8067	71.3	72	63	62	62.7	63.3	62.7	63.3	61.9	62.6	61.9	62.6
340210005	New Jersey	Mercer	Rider University	40.28309	-74.7426	71.3	72	69	69	63.3	63.9	63.3	63.9	62	62.6	62	62.6
340219991	New Jersey	Mercer	Wash. Crossing	40.3125	-74.8729	73.3	74	66	65	65.2	65.8	65.2	65.8	64.1	64.8	64.1	64.8
340230011	New Jersey	Middlesex	Rutgers University	40.46218	-74.4294	74.7	75	68	68	65.3	65.6	65.3	65.6	65.5	65.8	65.5	65.8
340250005	New Jersey	Monmouth	Monmouth University	40.27765	-74.0051	67.3	69	66	67	59	60.4	59	60.4	57.6	59.1	57.9	59.4

340273001	New Jersey	Morris	Chester		40.78763	-74.6763	69	70	62	62	60.3	61.1	60.3	61.1	59.8	60.6	59.8	60.6
340290006	New Jersey	Ocean	Colliers Mills		40.06483	-74.4441	72.7	73	66	66	64.2	64.5	64.2	64.5	63.3	63.5	63.3	63.5
340315001	New Jersey	Passaic	Ramapo		41.05862	-74.2555	67.7	68	62	60	59.3	59.6	59.3	59.6	59.2	59.5	59.2	59.5
340410007	New Jersey	Warren	Columbia		40.92458	-75.0678	64.3	65	58	58	54.9	55.5	54.9	55.5	53.6	54.2	53.6	54.2
360010012	New York	Albany	LOUDONVILLE		42.68075	-73.7573	64	64	57	57	56.3	56.3	56.3	56.3				
360050110	New York	Bronx	IS 52		40.816	-73.902	67.7	69	68	66	64.1	65.4	61.8	63	61.6	62.8	62.2	63.4
360050133	New York	Bronx	PFIZER LAB SITE		40.8679	-73.8781	70.7	72	70	69	67.6	68.9	64.7	65.9	64.6	65.8	64.8	66
360130006	New York	Chautauqu a	DUNKIRK		42.49963	-79.3188	68	68	65	67	60.6	60.6	60.2	60.2	60.2	60.2		
360270007	New York	Dutchess	MILLBROOK		41.78555	-73.7414	67	68	60	61	58.5	59.3	58.5	59.3	58.7	59.6	58.7	59.6
360290002	New York	Erie	AMHERST		42.99328	-78.7715	69.3	70	65	66	61.6	62.2	61.4	62.1	61.4	62	61.3	61.9
360310002	New York	Essex	WHITEFACE SUMMIT		44.36608	-73.9031	64	66	62	60								
360310003	New York	Essex	WHITEFACE BASE		44.39308	-73.8589	64.7	65	59	58								
360319991	New York	Essex	Huntington Wildlife Forest		43.9731	-74.2232	57	58	52	52								
360337003	New York	Franklin	Y001		44.98058	-74.695	58	58	NA	NA								
360410005	New York	Hamilton	PISECO LAKE		43.44957	-74.5163	61.3	62	56	56								
360430005	New York	Herkimer	NICKS LAKE		43.68578	-74.9854	63	63	NA	NA								
360450002	New York	Jefferson	PERCH RIVER		44.08747	-75.9732	63	63	61	62					55.6	55.6		
360551007	New York	Monroe	ROCHESTER 2		43.14618	-77.5482	65.7	68	62	65	58.9	60.9	58.9	60.9	58.1	60.1	58.1	60.1
360610135	New York	New York	CCNY		40.81976	-73.9483	70.3	72	70	70	66.6	68.2	64.2	65.8	64	65.6	64.6	66.2
360631006	New York	Niagara	MIDDLEPORT		43.22386	-78.4789	66.3	67	63	66	59.2	59.9	59.2	59.9	60.7	61.3	59	59.7
360671015	New York	Onondaga	EAST SYRACUSE		43.05235	-76.0592	64.3	65	61	60								
360715001	New York	Orange	VALLEY CENTRAL HIGH SCHOOL		41.52375	-74.2153	64.3	66	58	57	56.5	58	56.5	58	55.4	56.8	55.4	56.8
360750003	New York	Oswego	FULTON		43.28428	-76.4632	61	63	59	59	55.1	56.9			54.5	56.3		
360790005	New York	Putnam	MT NINHAM		41.45589	-73.7098	69	70	61	61	61.2	62.1	61.2	62.1	61.2	62	61.2	62
360810124	New York	Queens	QUEENS COLLEGE 2		40.73614	-73.8215	72.3	74	71	70	67.9	69.5	67.2	68.7	65.8	67.4	65.1	66.6
360850067	New York	Richmond	SUSAN WAGNER HS		40.59664	-74.1253	76	76	NA	NA	68.9	68.9	69.2	69.2	69.7	69.7	69.3	69.3
360870005	New York	Rockland	Rockland County		41.18208	-74.0282	71.3	72	63	62	63.8	64.4	63.8	64.4	63.5	64.1	63.5	64.1
360910004	New York	Saratoga	STILLWATER		43.01209	-73.6489	63	64	56	58	55.3	56.1	55.3	56.1				

361010003	New York	Steuben	PINNACLE STATE PARK	42.09142	-77.2098	59.7	61	55	56										
361030002	New York	Suffolk	BABYLON	40.74529	-73.4192	74	76	73	74	67.4	69.2	67.4	69.2	68.3	70.2	66.4	68.2		
361030004	New York	Suffolk	RIVERHEAD	40.96078	-72.7124	74.3	76	69	68	66.8	68.4	66.4	67.9	65.9	67.4	65.7	67.2		
361030009	New York	Suffolk	HOLTSVILLE	40.82799	-73.0575	71	73	70	70	64.2	66	63.6	65.4	63.8	65.6	63.1	64.9		
361099991	New York	Tompkins	Connecticut Hill	42.4006	-76.6538	62.7	63	58	59										
361173001	New York	Wayne	WILLIAMSON	43.23086	-77.1714	65	67	61	61	58.6	60.5	57.9	59.6	58.2	60	57.7	59.5		
361192004	New York	Westchester	WHITE PLAINS	41.05192	-73.7637	74	75	69	68	68.9	69.8	66.2	67.1	68.9	69.8	67.6	68.5		
420010001	Pennsylvania	Adams	NARSTO SITE	39.92002	-77.3097	66.5	67	62	61	58.3	58.7	58.3	58.7	57.9	58.4	57.9	58.4		
420019991	Pennsylvania	Adams	ARENDTSTVILLE	39.9231	-77.3078	66.3	67	61	62	58.1	58.7	58.1	58.7	57.8	58.4	57.8	58.4		
420030008	Pennsylvania	Allegheny	Lawrenceville	40.46542	-79.9608	68	69	64	63	60.9	61.8	60.9	61.8	58.9	59.8	58.9	59.8		
420030067	Pennsylvania	Allegheny	South Fayette	40.37564	-80.1699	69.7	71	66	66	62.2	63.3	62.2	63.3	59.7	60.8	59.7	60.8		
420031008	Pennsylvania	Allegheny	Harrison	40.61749	-79.7277	69	70	65	67	61.1	61.9	61.1	61.9	59.1	60	59.1	60		
420050001	Pennsylvania	Armstrong	LAT/LON IS CENTER OF TRAILER	40.81418	-79.5648	69	70	64	66	59.6	60.5	59.6	60.5	58.8	59.6	58.8	59.6		
420070002	Pennsylvania	Beaver		40.56252	-80.5039	68.7	70	64	64	58.5	59.6	58.5	59.6	56.8	57.8	56.8	57.8		
420070005	Pennsylvania	Beaver	DRIVEWAY TO BAKEY RESIDENCE	40.68472	-80.3597	67.3	68	63	64	56.3	56.9	56.3	56.9	53.4	53.9	53.4	53.9		
420070014	Pennsylvania	Beaver		40.7478	-80.3164	65.7	67	63	64	55.2	56.3	55.2	56.3	52.1	53.1	52.1	53.1		
420110006	Pennsylvania	Berks	Kutztown	40.51408	-75.7897	65.7	66	59	60	57.2	57.5	57.2	57.5	56.5	56.8	56.5	56.8		
420110011	Pennsylvania	Berks	Reading Airport	40.38335	-75.9686	70	70	NA	67	61.2	61.2	61.2	61.2	59.8	59.8	59.8	59.8		
420130801	Pennsylvania	Blair		40.53528	-78.3708	63.5	64	NA	NA	55.1	55.6	55.1	55.6						
420150011	Pennsylvania	Bradford	Towanda	41.70523	-76.5127	57.3	59	56	58	50.1	51.6	50.1	51.6						
420170012	Pennsylvania	Bucks	A420170012LAT/LONG POINT IS OF SAMPLING INLET	40.10722	-74.8822	79.3	81	71	72	70.3	71.8	70.3	71.8	68.7	70.2	68.7	70.2		
420210011	Pennsylvania	Cambria		40.30972	-78.915	62.3	63	59	62	54.4	55	54.4	55	52.5	53.1	52.5	53.1		
420270100	Pennsylvania	Centre	LAT/LON=POINT SW CORNER OF TRAILER	40.81139	-77.877	62.3	63	55	56	54.3	54.9	54.3	54.9						
420279991	Pennsylvania	Centre	Penn State	40.7208	-77.9319	64.7	65	61	61	56.3	56.6	56.3	56.6						
420290100	Pennsylvania	Chester	CHESTER COUNTY TRANSPORT SITE INTO PHILADELPHIA	39.83446	-75.7682	72.7	73	NA	60	62.2	62.5	62.2	62.5	62.3	62.5	62.3	62.5	62.3	62.5

420334000	Pennsylvania	Clearfield	MOSHANNON STATE FOREST	41.1175	-78.5262	64.7	66	53	54	56.9	58	58					
			A420430401LAT/LON POINT IS AT CORNER OF TRAILER														
420430401	Pennsylvania	Dauphin		40.24699	-76.847	65.3	66	62	61	56.1	56.7	56.1	56.7	55.8	56.4	55.8	56.4
			A420431100LAT/LON POINT IS AT CORNER OF TRAILER	40.27222	-76.6814	66	67	60	60	56.6	57.4	56.6	57.4	56	56.9	56	56.9
420431100	Pennsylvania	Dauphin															
			A420450002LAT/LON POINT IS OF CORNER OF TRAILER	39.83556	-75.3725	71.3	72	66	65	62.1	62.7	62.1	62.7	62.2	62.8	62.2	62.8
420450002	Pennsylvania	Delaware		41.59812	-78.7679	65.7	66	57	58	58.5	58.8	58.5	58.8				
420479991	Pennsylvania	Elk	Kane Exp. Forest	42.14175	-80.0386	65	66	60	59	57.9	58.8	57.3	58.2	58.3	59.2	55.9	56.8
420490003	Pennsylvania	Erie		39.96111	-77.4756	59.3	60	56	56	52.2	52.8	52.2	52.8	51.2	51.8	51.2	51.8
420550001	Pennsylvania	Franklin	HIGH ELEVATION OZONE SITE														
			75 KM SSW OF PITTSBURGH RURAL SITE ON A KNOIL WITHIN A LARGE CLEARIN	39.80933	-80.2657	67	68	NA	61	60.3	61.2	60.3	61.2	60	60.9	60	60.9
420590002	Pennsylvania	Greene		40.56333	-78.92	69.7	70	65	63	61.3	61.5	61.3	61.5	59.2	59.5	59.2	59.5
420630004	Pennsylvania	Indiana															
			A420690101LAT/LON POINT IS AT CORNER OF TRAILER	41.47912	-75.5782	66	67	58	60	57.5	58.4	57.5	58.4				
420690101	Pennsylvania	Lackawanna															
			A420692006LAT/LON POINT IS AT CORNER OF TRAILER	41.44278	-75.6231	62.5	64	58	55	54.5	55.8	54.5	55.8				
420692006	Pennsylvania	Lackawanna															
			A420710007LAT/LON POINT AT CORNER OF TRAILER	40.04667	-76.2833	69.3	70	64	62	59.1	59.7	59.1	59.7	58.8	59.4	58.8	59.4
420710007	Pennsylvania	Lancaster		40.04383	-76.1124	65	66	63	61	56.8	57.6	56.8	57.6	55.6	56.4	55.6	56.4
420710012	Pennsylvania	Lancaster	Lancaster DW	40.99585	-80.3464	66.3	68	59	61	56.3	57.7	56.3	57.7	55.2	56.7	55.2	56.7
420730015	Pennsylvania	Lawrence		40.33733	-76.3834	69	70	NA	NA	59.4	60.3	59.4	60.3	58.7	59.6	58.7	59.6
420750100	Pennsylvania	Lebanon	Lebanon														
			A420770004LAT/LONG POINT IS OF SAMPLING INLET	40.61194	-75.4325	69.7	70	63	61	60.8	61.1	60.8	61.1	59.6	59.9	59.6	59.9
420770004	Pennsylvania	Lehigh															

420791101	Pennsylvania	Luzerne	A420791101LAT/LON POINT IS AT CORNER OF TRAILER	41.26556	-75.8464	64	64	NA	58	55.2	55.2	55.2	55.2					
420810100	Pennsylvania	Lycoming	MONTOURSVILLE	41.2508	-76.9238	63.7	64	57	57	55.5	55.5	55.5	55.8					
420850100	Pennsylvania	Mercer		41.21501	-80.4848	68.7	69	63	65	59	59.3	59	59.3	58.1	58.4	58.1	58.4	
420859991	Pennsylvania	Mercer	M.K. Goddard	41.4271	-80.1451	65.3	66	62	62	56.6	57.2	56.6	57.2	55.5	56.1	55.5	56.1	
420890002	Pennsylvania	Monroe	SWIFTWATER	41.08306	-75.3233	66.7	68	NA	NA	57.6	58.8	57.6	58.8	56.7	57.8	56.7	57.8	
			A420910013LAT/LON POINT IS OF CORNER OF TRAILER															
420910013	Pennsylvania	Montgomery		40.11222	-75.3092	71.3	72	NA	67	63.3	63.9	63.3	63.9	62.7	63.4	62.7	63.4	63.4
420950025	Pennsylvania	Northampton	LAT/LON POINT IS CENTER OF TRAILER	40.62806	-75.3411	70	71	64	64	61	61.9	61	61.9	59.4	60.2	59.4	60.2	60.2
			COMBINED EASTON SITE (420950100) AND EASTON H2S SPECIAL STUDY SITES															
420958000	Pennsylvania	Northampton		40.69222	-75.2372	69	69	NA	NA	59.5	59.5	59.5	59.5	58.3	58.3	58.3	58.3	58.3
			Air Management Services Laboratory (AMS LAB)															
421010004	Pennsylvania	Philadelphia		40.00889	-75.0978	61	61	66	64	54.1	54.1	54.1	54.1	53.1	53.1	53.1	53.1	53.1
421010024	Pennsylvania	Philadelphia	North East Airport (NEA)	40.07639	-75.0119	77.7	78	71	70	69.1	69.4	69.1	69.4	67.6	67.8	67.6	67.8	67.8
421010048	Pennsylvania	Philadelphia	North East Waste (NEW)	39.99139	-75.0808	75.3	76	70	68	66.9	67.5	66.9	67.5	65.6	66.2	65.6	66.2	66.2
421119991	Pennsylvania	Somerset	Laurel Hill	39.9878	-79.2515	65	65	59	59	57.8	57.8	57.8	57.8	57.5	57.5	57.5	57.5	57.5
			PENN STATE OZONE MONITORING SITE															
421174000	Pennsylvania	Tioga		41.64472	-76.9392	63.7	64	57	59									
421250005	Pennsylvania	Washington		40.14667	-79.9022	67	68	62	63	60.2	61.1	60.2	61.1	60.1	61	60.1	61	61
421250200	Pennsylvania	Washington		40.17056	-80.2614	65	65	NA	NA	57.5	57.5	57.5	57.5	56.9	56.9	56.9	56.9	56.9
421255001	Pennsylvania	Washington		40.44528	-80.4208	68	68	53	55	58.9	58.9	58.9	58.9	57.4	57.4	57.4	57.4	57.4
421290008	Pennsylvania	Westmoreland	LAT/LON POINT IS TRAILER	40.30469	-79.5057	67	68	55	51	59.9	60.8	59.9	60.8	59	59.8	59	59.8	59.8
			A421330008LAT/LON POINT AT CORNER OF TRAILER															
421330008	Pennsylvania	York		39.96528	-76.6994	65.7	66	60	60	56.5	56.7	56.5	56.7	54.4	54.7	54.4	54.7	54.7
421330011	Pennsylvania	York	York DW	39.86097	-76.4621	69	70	NA	NA	58.6	59.4	58.6	59.4	57.7	58.6	57.7	58.6	58.6

440030002	Rhode Island	Kent	AJ	41.61524	-71.72	71.3	73	65	64	62.8	64.3	62.8	64.3	61.8	63.2	61.8	63.2
440071010	Rhode Island	Providence	FRANCIS SCHOOL East Providence	41.84104	-71.361	69.7	73	65	65	61.2	64.1	60.7	63.5	63.3	66.4	59.7	62.5
440090007	Rhode Island	Washington	US-EPA Laboratory	41.49511	-71.4237	69.3	71	67	66	62.1	63.7	60.8	62.3	61.7	63.2	60.2	61.6
500030004	Vermont	Bennington	Morse Airport - State of Vermont Property	42.88759	-73.2498	64.3	65	57	57	56.4	57	56.4	57				
500070007	Vermont	Chittenden	PROCTOR MAPLE RESEARCH CTR	44.52839	-72.8688	61	62	57	58								
500210002	Vermont	Rutland	State of Vermont District Court Parking Lot	43.60806	-72.9828	63	63	53	54								
510030001	Virginia	Albemarle	Albemarle High School	38.07657	-78.504	60.5	61	57	57	52.7	53.1	52.7	53.1				
510130020	Virginia	Arlington	Aurora Hills Visitors Center	38.8577	-77.0592	71	72	66	64	61.1	62	61.1	62	59.7	60.5	59.7	60.5
510330001	Virginia	Caroline	USGS Geomagnetic Center: Corbin	38.20087	-77.3774	61	61	59	58	51.3	51.3	51.3	51.3	50.4	50.4	50.4	50.4
510360002	Virginia	Charles	Shirley Plantation	37.34438	-77.2593	62.3	63	58	57	51.3	51.9	51.3	51.9	51.4	52	51.4	52
510410004	Virginia	Chesterfield	VDOT Chesterfield Residency Shop	37.35748	-77.5936	61.3	62	58	58	50.3	50.8	50.3	50.8	50.1	50.6	50.1	50.6
510590030	Virginia	Fairfax	Lee District Park	38.77335	-77.1047	70	71	65	62	59.3	60.1	59.3	60.1	58.6	59.4	58.6	59.4
510610002	Virginia	Fauquier	Chester Phelps Wildlife Management Area: Sumerduck	38.47367	-77.7677	58.7	59	54	55	50.2	50.4	50.2	50.4	50.5	50.8	50.5	50.8
510690010	Virginia	Frederick	Rest	39.28102	-78.0816	61.3	62	55	55	53.8	54.4	53.8	54.4				
510719991	Virginia	Giles	Horton Station	37.3297	-80.5578	62	62	NA	NA	53.9	53.9	53.9	53.9				
510850003	Virginia	Hanover	Turner Property: Old Church	37.60613	-77.2188	63.3	65	58	58	51.8	53.2	51.8	53.2	51.2	52.6	51.2	52.6
510870014	Virginia	Henrico	MathScience Innovation Center	37.55652	-77.4003	65.5	66	60	59	53.1	53.5	53.1	53.5	53.3	53.7	53.3	53.7
511071005	Virginia	Loudoun	Broad Run High School: Ashburn	39.02473	-77.4893	67	68	62	62	57.5	58.4	57.5	58.4	56.5	57.4	56.5	57.4
511130003	Virginia	Madison	Shenandoah NP - Big Meadows	38.5231	-78.4347	63	63	57	58	54.8	54.8	54.8	54.8				
511479991	Virginia	Prince Edward	Prince Edward	37.1655	-78.3069	59.3	60	56	55	48.1	48.7	48.1	48.7				
511530009	Virginia	Prince William	James S. Long Park	38.85287	-77.6346	65.3	66	59	59	56.6	57.2	56.6	57.2	56.4	57	56.4	57

511611004	Virginia	Roanoke	East Vinton Elementary School	37.28342	-79.8845	61.3	62	57	57	52.9	53.5	52.9	53.5					
511630003	Virginia	Rockbridge	Natural Bridge Ranger Station	37.62668	-79.5126	58	59	54	53	50.3	51.2	50.3	51.2					
511650003	Virginia	Rockingham	ROCKINGHAM CO. VDOT	38.47753	-78.8195	60	60	56	57	52.5	52.5	52.5	52.5					
511790001	Virginia	Stafford	Widewater Elementary School	38.48123	-77.3704	62.3	63	59	58	52.7	53.3	52.5	53.1	51.9	52.5	52.4	53	
511970002	Virginia	Wythe	Rural Retreat Sewage Treatment Plant	36.89117	-81.2542	60.7	61	56	57	53.2	53.4	53.2	53.4					
516500008	Virginia	Hampton City	NASA Langley Research Center	37.10373	-76.387	64.3	65	58	58	54.3	54.9	53.6	54.2	53.7	54.3	52.3	52.8	
518000004	Virginia	Suffolk City	Tidewater Community College	36.90118	-76.4381	61	62	56	55	52.6	53.5	52.6	53.5	53.9	54.8	52.3	53.1	
518000005	Virginia	Suffolk City	VA Tech Agricultural Research Station: Holland	36.66525	-76.7308	59.7	61	56	56	51.6	52.7	51.6	52.7					
10030010	Alabama	Baldwin	FAIRHOPE: Alabama	30.49748	-87.8803	63.7	65	58	58	55.5	56.6	55.2	56.3	54.5	55.6	54.3	55.5	
10331002	Alabama	Colbert	MUSCLE SHOALS	34.76262	-87.6381	58.7	59	NA	NA	50.4	50.6	50.4	50.6					
10499991	Alabama	DeKalb	Sand Mountain	34.289	-85.9701	62.3	63	59	58	54.2	54.8	54.2	54.8					
10550011	Alabama	Etowah	SOUTHSIDE	33.90404	-86.0539	61.7	63	58	57	54.1	55.2	54.1	55.2					
10690004	Alabama	Houston	DOTHAN	31.18893	-85.4231	58.3	59	NA	NA									
10730023	Alabama	Jefferson	North Birmingham	33.55306	-86.815	66.3	68	65	63	54.3	55.7	54.3	55.7	53.6	55	53.6	55	
10731003	Alabama	Jefferson	Fairfield	33.48556	-86.915	65.7	66	66	63	53.8	54.1	53.8	54.1	54	54.2	54	54.2	
10731005	Alabama	Jefferson	McAdory	33.33111	-87.0036	65	65	65	62	53.7	53.7	53.7	53.7	52.7	52.7	52.7	52.7	
10731010	Alabama	Jefferson	Leeds	33.54528	-86.5492	64.3	66	NA	61	53.1	54.5	53.1	54.5	52.1	53.5	52.1	53.5	
10732006	Alabama	Jefferson	Hoover	33.38639	-86.8167	66	66	NA	NA	53.4	53.4	53.4	53.4	52.9	52.9	52.9	52.9	
10735003	Alabama	Jefferson	Corner	33.80167	-86.9425	63.5	64	60	59	54.1	54.5	54.1	54.5	54	54.4	54	54.4	
10736002	Alabama	Jefferson	Tarrant Elementary School	33.57833	-86.7739	67.7	68	62	60	55.4	55.7	55.4	55.7	55.9	56.2	55.9	56.2	
10890014	Alabama	Madison	HUNTSVILLE OLD AIRPORT	34.68776	-86.5864	64	64	60	61	53.8	53.8	53.8	53.8					
10890022	Alabama	Madison	HUNTSVILLE CAPSHAW ROAD	34.77273	-86.7562	62	62	59	58	52.6	52.6	52.6	52.6					
10970003	Alabama	Mobile	CHICKASAW	30.77018	-88.0878	63	64	56	57	54.3	55.2	54.3	55.2	53.9	54.7	53.9	54.7	
10972005	Alabama	Mobile	BAY ROAD	30.47431	-88.141	63.7	65	NA	NA	55.9	57	56.4	57.6	56.3	57.5	55.9	57	

1101002	Alabama	Montgome ry	MOMS: ADEM	32.41281	-86.2634	61	62	58	58	51.4	52.2	51.4	52.2	51.4	52.2	50.5	51.3	50.5	51.3
11030011	Alabama	Morgan	DECATUR: Alabama	34.53072	-86.9675	63.7	64	60	60	54.7	55	54.7	55	54.7	55	55	55.2	55	55.2
11130002	Alabama	Russell	LADONIA: PHENIX CITY	32.46735	-85.0834	62	62	NA	NA	52.2	52.2	52.2	52.2	52.2	52.2	52	52	52	52
11170004	Alabama	Shelby	HELENA	33.31714	-86.8258	66.7	67	63	61	54.9	55.1	54.9	55.1	54.9	55.1	53.9	54.2	53.9	54.2
11190003	Alabama	Sumter	Ward: Sumter Co.	32.36261	-88.278	57	57	54	53	51.5	51.5	51.5	51.5	51.5	51.5				
11250010	Alabama	Tuscaloosa	DUNCANVILLE: TUSCALOOSA	33.08977	-87.4597	60	60	55	NA	50.6	50.6	50.6	50.6	50.6	50.6	49.9	49.9	49.9	49.9
50199991	Arkansas	Clark	Caddo Valley	34.1795	-93.0988	57.7	58	56	57	49.5	49.7	49.5	49.7	49.5	49.7				
50350005	Arkansas	Crittenden	MARION	35.19729	-90.1931	67	68	68	70	59.9	60.8	59.9	60.8	59.9	60.8	59	59.9	59	59.9
51010002	Arkansas	Newton	DEER	35.83273	-93.2083	58	59	58	60										
51130003	Arkansas	Polk	EAGLE MOUNTAIN	34.45451	-94.1435	61.7	62	61	61	55.9	56.1	55.9	56.1	55.9	56.1				
51190007	Arkansas	Pulaski	PARR	34.75619	-92.2813	62.3	64	60	62	53.6	55.1	53.6	55.1	53.6	55.1	53	54.4	53	54.4
51191002	Arkansas	Pulaski	NLR AIRPORT	34.83572	-92.2606	63.7	64	63	63	54.5	54.7	54.5	54.7	54.5	54.7	53.2	53.5	53.2	53.5
51430005	Arkansas	Washington		36.1797	-94.1168	59.7	60	60	62	51.6	51.8	51.6	51.8	51.6	51.8				
51430006	Arkansas	Washington	Fayetteville Airport	36.0117	-94.1674	59.7	60	59	61										
80013001	Colorado	Adams	Welby	39.83812	-104.95	67	67	72	77	62.8	62.8	62.8	62.8	62.8	62.8	62.1	62.1	62.1	62.1
80050002	Colorado	Arapahoe	HIGHLAND RESERVOIR	39.56789	-104.957	73	73	80	80	68.1	68.1	68.1	68.1	68.1	68.1	66.7	66.7	66.7	66.7
80050006	Colorado	Arapahoe	Aurora East	39.63852	-104.569	67.7	69	73	74	63.4	64.6	63.4	64.6	63.4	64.6	62.7	63.9	62.7	63.9
80310002	Colorado	Denver	DENVER - CAMP	39.75118	-104.988	67.7	69	72	74	63.5	64.7	63.5	64.7	63.5	64.7	62.7	63.9	62.7	63.9
80310026	Colorado	Denver	La Casa	39.77949	-105.005	68.7	69	75	77	64.4	64.7	64.4	64.7	64.4	64.7	63.7	63.9	63.7	63.9
80350004	Colorado	Douglas	Chatfield State Park	39.53449	-105.07	77.3	78	83	83	71.3	71.9	71.3	71.9	71.3	71.9	69.2	69.8	69.2	69.8
80410013	Colorado	El Paso	U.S. AIR FORCE ACADEMY	38.95834	-104.817	68	70	73	74	64.2	66.1	64.2	66.1	64.2	66.1	63.5	65.4	63.5	65.4
80410016	Colorado	El Paso	MANITOU SPRINGS	38.8531	-104.901	66.7	69	73	74							62.9	65.1	62.9	65.1
80450012	Colorado	Garfield	Rifle-Health Dept	39.54182	-107.784	62	63	61	62										
80519991	Colorado	Gunnison	Gothic	38.9564	-106.986	64.7	65	65	65										
80590005	Colorado	Jefferson	WELCH	39.63878	-105.139	73	75	NA	NA	67.3	69.1	67.3	69.1	67.3	69.1	66.5	68.3	66.5	68.3
80590006	Colorado	Jefferson	ROCKY FLATS-N	39.9128	-105.189	77.3	78	81	83	72	72.6	72	72.6	72	72.6	72	72.6	72	72.6
80590011	Colorado	Jefferson	NATIONAL RENEWABLE ENERGY LABS - NREL	39.74372	-105.178	79.3	80	83	84	73	73.7	73	73.7	73	73.7	72.5	73.2	72.5	73.2

80590013	Colorado	Jefferson	Aspen Park		39.54152	-105.298	70	70	NA	NA	64.4	64.4	64.4	64.4	62.7	62.7	62.7
80671004	Colorado	La Plata			37.30389	-107.484	67	67	NA	NA							
			LOCATED IN PINE RIVER VALLEY: THE MOST DENSELY POPULATED AREA.														
80677001	Colorado	La Plata			37.13678	-107.629	68.7	69	NA	66							
80690007	Colorado	Larimer	Rocky Mountain NP - Long's Peak		40.27813	-105.546	69	70	71	72	64.2	65.1	64.2	63.4	64.3	63.4	64.3
80690011	Colorado	Larimer	FORT COLLINS - WEST		40.59254	-105.141	75.7	77	77	77	70.8	72	70.8	70.4	71.6	70.4	71.6
			Fort Collins - CSU - S. Mason														
80691004	Colorado	Larimer			40.57747	-105.079	69	70	69	71	64.6	65.5	64.6	65.5	64	65	65
81030005	Colorado	Rio Blanco			40.03889	-107.848	60.3	61	NA	NA							
			Greeley - Weld County Tower														
81230009	Colorado	Weld			40.38637	-104.737	70	70	71	72	65.9	65.9	65.9	65.4	65.4	65.4	65.4
120013012	Florida	Alachua	Paynes Prairie Farm		29.56611	-82.2661	59.3	61	59	57							
120030002	Florida	Baker	OLUSTEE		30.20111	-82.4411	60	61	58	56							
			ST. ANDREWS STATE PARK: PANAMA CITY BEACH														
120050006	Florida	Bay			30.13043	-85.7315	60.7	62	58	56	53.7	54.9	53.7	54.1	55.3		
120090007	Florida	Brevard	Melbourne		28.05361	-80.6286	58.3	59	NA	56							
120094001	Florida	Brevard	Cocoa Beach		28.31084	-80.6153	61	62	58	56							
120110033	Florida	Broward	Vista View Park		26.07354	-80.3385	59	59	59	59				50.3	50.3	50.3	50.3
120110034	Florida	Broward	Daniela Banu NCORE		26.05389	-80.2569	63	63	57	58	55.7	55.7	55.7	55.2	55.2		
120112003	Florida	Broward	Pompano Highlands		26.29203	-80.0965	61	62	57	57							
			Dr. Von Mizell-Eula Johnson State Park (prev. John U Lloyd State Park)														
120118002	Florida	Broward			26.08842	-80.1112	62.3	63	57	58							
120210004	Florida	Collier	LAURAL OAKS ELEMENTARY		26.27008	-81.711	58.7	60	58	53							
120230002	Florida	Columbia	Lake City - Veteran's Domicile		30.17806	-82.6192	60.3	62	NA	NA							
120310077	Florida	Duval	Sheffield		30.47773	-81.5873	58	58	60	60	48.8	48.8	49.3	45.2	45.2		
120310100	Florida	Duval	Mayo Clinic		30.26028	-81.4536	60	60	59	59	50.9	50.9	50.6	51.4	51.4		
120310106	Florida	Duval	Cisco Drive		30.37822	-81.8409	61	61	59	58	52	52	52	51	51	51	51

120330004	Florida	Escambia	Ellyson Industrial Park	30.52537	-87.2036	64	65	58	55	55.6	56.4	55.2	56	54.3	55.1	53.7	54.6
120330018	Florida	Escambia	Pensacola NAS	30.36805	-87.271	63	64	59	59	54.1	55	55.4	56.3	53.8	54.6	53.5	54.3
120350004	Florida	Flagler	Flagler	29.48908	-81.2768	59.3	60	NA	53								
120550003	Florida	Highlands	Archbold Biological Station	27.18922	-81.3404	60.3	61	NA	56								
120570081	Florida	Hillsborough	Simmons Park	27.74003	-82.4651	67.7	68	64	63	60.5	60.8	59.9	60.2	60.3	60.5	60.6	60.8
120571035	Florida	Hillsborough	Davis Island	27.92836	-82.4545	65.7	67	58	58	58.5	59.6	57.7	58.9	58.5	59.6	55.6	56.7
120571065	Florida	Hillsborough	USMC Reserve Center (Gandy)	27.89252	-82.5384	66.3	67	66	65	58.9	59.5	58.5	59.2	58.7	59.3	60.9	61.6
120573002	Florida	Hillsborough	SYDNEY	27.96565	-82.2304	66.3	67	62	59	58.1	58.7	58.1	58.7	55.9	56.5	55.9	56.5
120590004	Florida	Holmes	Bonifay	30.84861	-85.6039	58.7	60	56	54								
120619991	Florida	Indian River	Indian River Lagoon	27.8492	-80.4554	62	63	59	59								
120690002	Florida	Lake	Clermont	28.52389	-81.7233	63.7	65	63	59	55.1	56.2	55.1	56.2	52.8	53.9		
120712002	Florida	Lee	Cape Coral - Rotary Park	26.54821	-81.9815	60.3	62	59	55								
120713002	Florida	Lee	Bay Oaks Park	26.44925	-81.9393	60.3	62	NA	NA								
120730012	Florida	Leon	Tallahassee Community College	30.43972	-84.3464	60.7	61	58	55	52.7	53	52.7	53				
120779991	Florida	Liberty	Sumatra	30.1103	-84.9903	56.3	57	56	56								
120813002	Florida	Manatee	Port Manatee	27.63309	-82.5459	61	63	59	54	54.5	56.3	54.2	56	52.7	54.4	52.8	54.6
120814012	Florida	Manatee	G.T. BRAY PARK	27.48087	-82.6187	63	64	61	56	55.6	56.5	55.1	56	54.4	55.3		
120814013	Florida	Manatee	39TH STREET SITE	27.44976	-82.522	61	62	59	57	53.6	54.5	53.4	54.2	52.6	53.5		
120830003	Florida	Marion	Ocala YMCA	29.17053	-82.1006	61.3	62	62	60								
120830004	Florida	Marion	Marion County Sheriff	29.19275	-82.1731	58.7	60	58	57								
120850007	Florida	Martin	Stuart	27.17246	-80.2407	61.7	63	57	54								
120860027	Florida	Miami-Dade	Rosenstiel	25.73288	-80.1618	63	64	56	60					56.5	57.4	56.7	57.6
120860029	Florida	Miami-Dade	Perdue	25.58733	-80.3259	61.5	62	58	60								
120910002	Florida	Okaloosa	Ft. Walton Beach	30.42653	-86.6662	61	62	58	51	53.1	54	52.7	53.6	52.3	53.2		
120950008	Florida	Orange	Winegard Elementary School	28.45445	-81.3812	63	64	NA	NA	55.2	56	55.2	56	54.1	55	54.1	55

120952002	Florida	Orange	WINTER PARK	28.59639	-81.3625	63	64	62	62	54.4	55.3	54.4	55.3	53.4	54.2	53.4	54.2
120972002	Florida	Osceola	Osceola County Fire Station	28.34751	-81.6365	64.3	66	64	59	54.7	56.1	54.7	56.1	53.1	54.5	53.1	54.5
121010005	Florida	Pasco	San Antonio	28.33223	-82.3056	61.3	62	59	56								
121012001	Florida	Pasco	Holiday	28.19557	-82.7563	62	63	62	59	54.5	55.4	54.3	55.2	54.1	54.9		
121030004	Florida	Pinellas	St. Petersburg College	27.94669	-82.7318	62.7	65	64	61	55.4	57.4	55.4	57.4	54.7	56.8	53.4	55.4
121030018	Florida	Pinellas	Azalea Park	27.78587	-82.7399	60.7	61	61	58	54.3	54.5	54.3	54.5	53.2	53.4		
121035002	Florida	Pinellas	John Chesnut Sr. Park - East Lake	28.0903	-82.7007	59.7	61	61	60	52.4	53.5	52.4	53.5	52.1	53.2	50.6	51.7
121056005	Florida	Polk	Sikes Elementary School	27.93975	-82.0001	65.3	67	62	60	55.1	56.5	55.1	56.5				
121056006	Florida	Polk	Baptist Childrens' Home	28.02889	-81.9722	64.3	66	62	60								
121110013	Florida	St. Lucie	Savannas	27.38908	-80.311	61.3	62	58	55								
121130015	Florida	Santa Rosa	Woodlawn Beach Middle School	30.39413	-87.008	62	64	60	57	54.1	55.8	54	55.8	52.7	54.4	53	54.7
121151005	Florida	Sarasota	Lido Park	27.30727	-82.5704	62.7	63	59	57	54.8	55						
121151006	Florida	Sarasota	Paw Park	27.35028	-82.4797	63	64	61	58	55	55.8	55.1	56				
121152002	Florida	Sarasota	Jackson Road	27.08919	-82.3626	61	61	58	55								
121171002	Florida	Seminole	Sanford (Seminole Community College)	28.74611	-81.3106	62.7	64	61	59	53.5	54.6	53.5	54.6	51.7	52.8	51.7	52.8
121272001	Florida	Volusia	Port Orange	29.10915	-80.9937	59	59	NA	NA					50.3	50.3		
121275002	Florida	Volusia	DAYTONA BLIND SERVICES	29.20667	-81.0525	59.7	61	57	56								
121290001	Florida	Wakulla	St. Marks Wildlife Refuge	30.0925	-84.1611	59	59	55	53								
130210012	Georgia	Bibb	Macon-Forestry	32.80526	-83.5435	65	65	61	58	53.5	53.5	53.5	53.5	51.4	51.4	51.4	51.4
130510021	Georgia	Chatham	Savannah-E. President	32.06848	-81.0494	57	57	57	56	49.7	49.7	49.7	49.7				
130550001	Georgia	Chattooga	Summerville	34.47453	-85.4088	61	62	56	56	51.2	52	51.2	52	50.5	51.3	50.5	51.3
130590002	Georgia	Clarke	Athens	33.91814	-83.3444	64.3	65	59	59	53.2	53.8	53.2	53.8	53.4	54	53.4	54
130670003	Georgia	Cobb	Kennesaw	34.01544	-84.6074	66.5	67	61	61	54.3	54.7	54.3	54.7	54.6	55	54.6	55
130730001	Georgia	Columbia	Evans	33.58204	-82.1312	60	61	56	55	50.8	51.7	50.8	51.7	49.9	50.7	49.9	50.7
130770002	Georgia	Coweta	Newnan	33.40405	-84.7457	64.5	66	NA	NA	53.9	55.2	53.9	55.2	53.3	54.5	53.3	54.5
130850001	Georgia	Dawson	Dawsonville	34.37623	-84.0595	65	65	60	59	52.3	52.3	52.3	52.3	51.5	51.5	51.5	51.5
130890002	Georgia	DeKalb	South DeKalb	33.6878	-84.2905	70.3	71	67	64	59.7	60.3	59.7	60.3	59.7	60.3	59.7	60.3

130970004	Georgia	Douglas	Douglasville	33.74124	-84.7764	68	69	66	63	57.7	58.6	57.7	58.6	57.9	58.7	57.9	58.7
131210055	Georgia	Fulton	United Avenue	33.72074	-84.3573	74.3	75	68	65	64.1	64.8	64.1	64.8	63.1	63.6	63.1	63.6
131270006	Georgia	Glynn	Brunswick	31.16981	-81.495	56.3	57	55	54					47.3	47.9		
131350002	Georgia	Gwinnett	Gwinnett	33.9632	-84.0691	70.7	72	66	64	57.1	58.1	57.1	58.1	57.1	58.1	57.1	58.1
131510002	Georgia	Henry	McDonough	33.43395	-84.1618	72	74	66	64	60.8	62.5	60.8	62.5	60	61.6	60	61.6
132130003	Georgia	Murray	Fort Mountain	34.78522	-84.6264	65	65	62	62	54.4	54.4	54.4	54.4	53.1	53.1	53.1	53.1
132150008	Georgia	Muscogee	Columbus-Airport	32.52127	-84.9446	61	62	59	57	51.2	52.1	51.2	52.1	51	51.9	51	51.9
132230003	Georgia	Paulding	Yorkville: King Farm	33.9285	-85.0453	63	63	NA	NA	52.1	52.1	52.1	52.1	51.1	51.1	51.1	51.1
132319991	Georgia	Pike	Georgia Station	33.1787	-84.4052	67.5	68	61	58	57.3	57.7	57.3	57.7	57.4	57.9	57.4	57.9
132450091	Georgia	Richmond	Augusta	33.4339	-82.0224	61.7	62	62	60	52.1	52.4	52.1	52.4	51.7	51.9	51.7	51.9
132470001	Georgia	Rockdale	Conyers	33.58855	-84.0696	71	74	65	62	60.1	62.7	60.1	62.7	59.1	61.6	59.1	61.6
132611001	Georgia	Sumter	Leslie	31.95429	-84.081	60.3	61	58	57	52.6	53.2	52.6	53.2				
170010007	Illinois	Adams	JOHN WOOD COMMUNITY COLLEGE	39.91541	-91.3359	62.7	63	63	61								
170190007	Illinois	Champaign	Thomasboro	40.24491	-88.1885	65.3	68	65	65								
170191001	Illinois	Champaign	ISWS CLIMATE STATION	40.05278	-88.3725	65.7	66	60	59								
170230001	Illinois	Clark	416 S. State St. Hwy 1- West Union	39.21086	-87.6683	65	66	60	61	56.6	57.5	56.6	57.5				
170310001	Illinois	Cook	VILLAGE GARAGE	41.67099	-87.7325	73	77	71	72	69.6	73.4	69.6	73.4	68.2	71.9	68.2	71.9
170310032	Illinois	Cook	SOUTH WATER FILTRATION PLANT	41.75583	-87.5454	72.3	75	75	74	69.6	72.2	69.9	72.5	68.6	71.2	68	70.6
170310076	Illinois	Cook	COM ED MAINTENANCE BLDG	41.7514	-87.7135	72	75	NA	70	69.3	72.2	69.3	72.2	67.4	70.3	67.4	70.3
170311003	Illinois	Cook	TAFT HS	41.98433	-87.792	68.3	69	71	71	66	66.7	65.2	65.8	64.8	65.5	63.4	64
170311601	Illinois	Cook	COOK COUNTY TRAILER	41.66812	-87.9906	69.3	70	72	73	65.1	65.8	65.1	65.8	63.1	63.8	63.1	63.8
170313103	Illinois	Cook	IEPA TRAILER	41.96519	-87.8763	62.7	64	64	63	59.4	60.7	59.4	60.7	57.9	59.1	57.9	59.1
170314002	Illinois	Cook	COOK COUNTY TRAILER	41.85524	-87.7525	68.7	72	70	71	67.2	70.5	66.3	69.5	66.2	69.4	64.2	67.2
170314007	Illinois	Cook	REGIONAL OFFICE BUILDING	42.06029	-87.8632	72	74	69	70							66	67.9
170314201	Illinois	Cook	NORTHBROOK WATER PLANT	42.14	-87.7992	73.3	77	74	74	69.7	73.3	69.2	72.7	68.4	71.8	67.2	70.6
170317002	Illinois	Cook	WATER PLANT	42.06205	-87.6753	74	77	73	74	70.6	73.5	69.7	72.6	69.8	72.7	69.4	72.2
170436001	Illinois	DuPage	MORTON ARBORETUM	41.81305	-88.0728	69.7	71	70	70	66	67.2	66	67.2	64.6	65.8	64.6	65.8

170491001	Illinois	Effingham	CENTRAL JR HIGH	39.06716	-88.5489	65.7	67	NA	NA	58.4	59.6	58.4	59.6				
170650002	Illinois	Hamilton	TEN MILE CREEK DNR OFFICE	38.08216	-88.6249	65.7	67	65	65	58.3	59.4	58.3	59.4				
170831001	Illinois	Jersey	ILLINI JR HIGH	39.11054	-90.3241	68	68	NA	NA	61.4	61.4	61.4	61.4	61.2	61.2	61.2	61.2
170859991	Illinois	Jo Daviess	Stockton	42.2869	-89.9997	64.7	65	62	62								
170890005	Illinois	Kane	LARSEN JUNIOR HIGH	42.04915	-88.273	69.3	71	70	70	64.3	65.8	64.3	65.8	62.1	63.6	62.1	63.6
170971007	Illinois	Lake	CAMP LOGAN TRAILER	42.46757	-87.81	73.7	75	73	74	68.7	69.9	68.4	69.6	70.7	71.9	67.9	69.1
171111001	Illinois	McHenry	CARY GROVE HS	42.22144	-88.2422	69.7	72	71	71	64.2	66.3	64.2	66.3	62.4	64.4	62.4	64.4
171132003	Illinois	McLean	ISU HARRIS PHYSICAL PLANT	40.51874	-88.9969	64.3	65	65	67								
171150013	Illinois	Macon	IEPA TRAILER	39.86683	-88.9256	66.3	67	64	64								
171170002	Illinois	Macoupin	IEPA TRAILER	39.39608	-89.8097	65	66	62	62	57.9	58.8	57.9	58.8				
171190008	Illinois	Madison	CLARA BARTON SCHOOL	38.89019	-90.148	70	71	NA	NA	63	63.9	63	63.9	63	63.9	63	63.9
171191009	Illinois	Madison	SOUTHWEST CABLE TV	38.72657	-89.96	69	72	67	63	61.8	64.5	61.8	64.5	61.1	63.8	61.1	63.8
171193007	Illinois	Madison	WATER PLANT	38.86067	-90.1059	70.7	71	69	70	63.6	63.9	63.6	63.9	63.6	63.9	63.6	63.9
171199991	Illinois	Madison	Alhambra	38.869	-89.6228	67.3	68	64	67	60.2	60.9	60.2	60.9				
171430024	Illinois	Peoria	FIRESTATION	40.68742	-89.6069	65	67	63	62								
171431001	Illinois	Peoria	PEORIA HEIGHTS HS	40.7455	-89.5859	66	67	65	65								
171570001	Illinois	Randolph	IEPA TRAILER	38.17628	-89.7885	66.3	67	62	64	58.1	58.7	58.1	58.7	56.4	57	56.4	57
171613002	Illinois	Rock Island	ROCK ISLAND ARSENAL	41.51473	-90.5174	63.3	65	65	63								
171630010	Illinois	Saint Clair	IEPA-RAPS TRAILER	38.61203	-90.1605	69	71	65	66	61.8	63.6	61.8	63.6	61.7	63.5	61.7	63.5
171670014	Illinois	Sangamon	Illinois Building State Fairgrounds	39.83152	-89.6409	66	68	62	62								
171971011	Illinois	Will	COM ED TRAINING CENTER	41.22154	-88.191	65.3	67	64	65								
172012001	Illinois	Winnebago	MAPLE ELEMENTARY SCHOOL	42.33498	-89.0378	67.3	68	66	66								
180030002	Indiana	Allen	Leo High School	41.22142	-85.0168	64.7	67	64	66	57.9	59.9	57.9	59.9	55.7	57.6	55.7	57.6
180030004	Indiana	Allen	Ft. Wayne- Beacon St.	41.09497	-85.1018	64	66	61	NA	57.1	58.9	57.1	58.9	55	56.7	55	56.7
180050007	Indiana	Bartholome w	Hope- Hauser Jr-Sr High School	39.29432	-85.7668	67.7	68	63	64	59.5	59.8	59.5	59.8				

180110001	Indiana	Boone	Perry Worth ELEMENTARY SCHOOL: WEST OF WHITETOWN	39.99773	-86.3954	67	69	66	67	60.2	62	57.8	59.5	57.8	59.5
180150002	Indiana	Carroll	Flora-Flora Airport	40.54046	-86.553	63.7	64	63	64	56.6	56.9	56.9			
180190008	Indiana	Clark	Charlestown State Park- 1051.8 meters East of SR 62/ Indiana armory	38.39382	-85.6641	70.3	71	63	63	61.4	62.1	59.9	60.5	59.9	60.5
180350010	Indiana	Delaware	Albany- Albany Elem. Sch.	40.30039	-85.2459	62.3	66	61	64	54.4	57.7	54.4	57.7		
180390007	Indiana	Elkhart	Bristol- Bristol Elem. Sch.	41.71696	-85.8247	64.3	68	61	62	57.4	60.8	56.2	59.5	56.2	59.5
180431004	Indiana	Floyd	New Albany- Green Valley Elem. Sch.	38.30791	-85.8343	71	73	64	64	62.9	64.6	61.1	62.8	61.1	62.8
180550001	Indiana	Greene	Plummer: 2500 S. W- Citizens gas Plummer maintenance facility	38.98558	-86.9901	66.7	67	64	64	58.2	58.4				
180570006	Indiana	Hamilton	Our Lady of Grace- Noblesville	40.0683	-85.9925	66.3	69	64	64	59.1	61.5	56.5	58.8	56.5	58.8
180630004	Indiana	Hendricks	AVON- 255 S. SR 267 (also 255 S. Avon Ave.) Avon: IN	39.75889	-86.3986	63.3	67	61	62	57.5	60.9	55.3	58.6	55.3	58.6
180690002	Indiana	Huntington	Roanoke- Roanoke Elem. School	40.9596	-85.3796	60.7	64	NA	NA	54	57	52	54.8	52	54.8
180710001	Indiana	Jackson	Brownstown- 225 W & 200 N. Water facility	38.92084	-86.0805	65.7	66	NA	NA	57.3	57.6				
180810002	Indiana	Johnson	Indian Creek Elementary School in Trafalgar: DUE SOUTH OF INDIANAPOLIS	39.41724	-86.1524	61	62	NA	NA	54	54.9	53.3	54.2	53.3	54.2
180839991	Indiana	Knox	Vincennes	38.7408	-87.4853	66.7	69	65	66	58.8	60.8	58	60	58	60
180890022	Indiana	Lake	Gary-ITRI/ 1219.5 meters east of Tennessee St.- old ammunition bunker	41.60667	-87.3047	68.3	70	69	71	64.5	66.1	63.4	65	64	65.6
180892008	Indiana	Lake	HAMMOND CAAP- Hammond- 141st St.	41.63944	-87.4936	65.5	66	68	69	62.5	63	61.2	61.6	61.2	61.6
180910010	Indiana	LaPorte	LAPORTE OZONE SITE AT WATER TREATMENT PLANT	41.62917	-86.6844	65	67	63	64	59.9	61.7	60.8	62.6	59.9	61.7

181730011	Indiana	Warrick	Dayville	37.95444	-87.3217	67.7	68	63	65	58.6	58.9	58.6	58.9	57.2	57.5	57.2	57.5
190170011	Iowa	Bremer	WAVERLY AIRPORT SITE	42.74304	-92.5132	61	63	61	60								
190450021	Iowa	Clinton	CLINTON: RAINBOW PARK	41.875	-90.1776	63	64	61	63								
190850007	Iowa	Harrison		41.83226	-95.9282	62.7	64	62	61								
190851101	Iowa	Harrison	PISGAH: HIGHWAY MAINTENANCE	41.78026	-95.9484	62	62	NA	NA								
191130028	Iowa	Linn	KIRKWOOD	41.91056	-91.6521	61	61	NA	NA								
			COGON ELEMENTARY SCHOOL BLDG. NORTHERN LIMITS OF LINN COUNTY	42.28101	-91.5269	62.3	65	62	61								
191130033	Iowa	Linn		42.28101	-91.5269	62.3	65	62	61								
191130040	Iowa	Linn	Public Health	41.97677	-91.6877	61.7	63	59	60								
191370002	Iowa	Montgomery	VIKING LAKE STATE PARK	40.96911	-95.045	60.3	61	57	57								
			EMMETSBURG: IOWA LAKES COMMUNITY COLL.	43.1237	-94.6935	61.3	62	63	61								
191471002	Iowa	Palo Alto		41.60316	-93.6431	60	61	59	58								
191530030	Iowa	Polk	CARPENTER	41.60316	-93.6431	60	61	59	58								
191630014	Iowa	Scott	SCOTT COUNTY PARK	41.69917	-90.5219	63.3	65	60	60								
191630015	Iowa	Scott	DAVENPORT: JEFFERSON SCH.	41.53001	-90.5876	61.3	63	61	60								
191690011	Iowa	Story	SLATER CITY HALL	41.88287	-93.6878	60	60	NA	NA								
			LAKE SUGEMA STATE PARK II	40.69508	-92.0063	60	61	58	56								
191770006	Iowa	Van Buren		40.69508	-92.0063	60	61	58	56								
191810022	Iowa	Warren	GRAVEL ROAD IN LAKE AQUABI STATE PARK	41.28553	-93.584	58	58	NA	NA								
200910010	Kansas	Johnson	HERITAGE PARK	38.83858	-94.7464	60	61	57	60	54.6	55.5	54.6	55.5				
201030003	Kansas	Leavenworth	Leavenworth	39.32739	-94.951	61.3	63	61	61	55.1	56.6	55.1	56.6	53.9	55.4	53.9	55.4
201330003	Kansas	Neosho	CHANUTE	37.67696	-95.4759	61	61	59	60								
201730010	Kansas	Sedgwick	WICHITA HD	37.70207	-97.3148	63.7	65	60	64								
201730018	Kansas	Sedgwick	Sedgwick Ozone	37.89751	-97.4921	64	65	62	64								
201770013	Kansas	Shawnee	KNI	39.02427	-95.7113	62.3	63	60	59								
201910002	Kansas	Sumner	PECK	37.47689	-97.3664	63.7	64	61	63								

201950001	Kansas	Trego	CEDAR BLUFF	38.77008	-99.7634	61.7	63	60	62										
202090021	Kansas	Wyandotte	JFK	39.11722	-94.6356	63	64	63	65	57.5	58.4	57.5	58.4	56.4	57.3	56.4	57.3		
210130002	Kentucky	Bell	MIDDLESBORO	36.60843	-83.7369	60.7	61	56	56	52.7	52.9	52.7	52.9						
210150003	Kentucky	Boone	EAST BEND	38.91833	-84.8526	63	64	61	NA	54.1	55	54.1	55	53.7	54.6	53.7	54.6		
210190017	Kentucky	Boyd	ASHLAND PRIMARY (FIVCO)	38.45934	-82.6404	65	66	59	59	57.5	58.4	57.5	58.4	56.4	57.3	56.4	57.3		
210290006	Kentucky	Bullitt	SHEPHERDSVILLE	37.98629	-85.7119	65.7	66	64	64	58.1	58.3	58.1	58.3	57.5	57.8	57.5	57.8		
210373002	Kentucky	Campbell	NORTHERN KENTUCKY UNIVERSITY (NKU)	39.02188	-84.4745	68.7	70	63	63	59	60.1	59	60.1	57.7	58.8	57.7	58.8		
210430500	Kentucky	Carter	GRAYSON LAKE	38.23887	-82.9881	62	63	55	56	54.6	55.5	54.6	55.5	53.7	54.5	53.7	54.5		
210470006	Kentucky	Christian	HOPKINSVILLE	36.91171	-87.3233	61	62	58	59	53.5	54.3	53.5	54.3						
210590005	Kentucky	Daviess	OWENSBORO PRIMARY	37.78078	-87.0753	65	65	64	64	55.7	55.7	55.7	55.7	53.4	53.4	53.4	53.4		
210610501	Kentucky	Edmonson	Mammoth Cave NP - Houchin Meadow	37.13179	-86.143	63.7	64	59	59	55.2	55.5	55.2	55.5						
210670012	Kentucky	Fayette	LEXINGTON PRIMARY	38.06503	-84.4976	65.7	67	60	63	56.9	58	56.9	58	56.1	57.2	56.1	57.2		
210890007	Kentucky	Greenup	WORTHINGTON	38.54814	-82.7312	61.7	63	54	55	54.3	55.4	54.3	55.4	53.2	54.4	53.2	54.4		
210910012	Kentucky	Hancock	LEWISPORT	37.93829	-86.8972	67.5	68	63	65	58	58.4	58	58.4	55.9	56.4	55.9	56.4		
210930006	Kentucky	Hardin	ELIZABETHTOWN	37.70561	-85.8526	64.7	65	60	61	55.9	56.2	55.9	56.2	56	56.3	56	56.3		
211010014	Kentucky	Henderson	BASKETT	37.8712	-87.4638	68.3	69	NA	NA	58.8	59.4	58.8	59.4	58	58.6	58	58.6		
211110027	Kentucky	Jefferson	Bates	38.13784	-85.5765	69	69	NA	NA	61.2	61.2	61.2	61.2	60.2	60.2	60.2	60.2		
211110051	Kentucky	Jefferson	Watson Lane	38.06091	-85.898	68.3	69	65	65	60.8	61.4	60.8	61.4	59	59.6	59	59.6		
211110067	Kentucky	Jefferson	CANNONS LANE	38.22876	-85.6545	74.3	75	69	70	65.4	66	65.4	66	63.7	64.3	63.7	64.3		
211130001	Kentucky	Jessamine	NICHOLASVILLE	37.89147	-84.5883	64	65	60	62	55.2	56.1	55.2	56.1	54.7	55.6	54.7	55.6		
211390003	Kentucky	Livingston	SMITHLAND	37.15539	-88.394	65	66	62	64	56.1	57	56.1	57	56.3	57.2	56.3	57.2		
211451024	Kentucky	McCracken	JACKSON PURCHASE (PADUCAH PRIMARY)	37.05822	-88.5725	62.7	63	63	65	54.3	54.5	54.3	54.5	53.6	53.9	53.6	53.9		
211759991	Kentucky	Morgan	Crockett	37.9214	-83.0662	64	64	57	57	56.5	56.5	56.5	56.5						
211850004	Kentucky	Oldham	BUCKNER	38.4002	-85.4443	68.3	70	63	63	59.3	60.7	59.3	60.7	58	59.4	58	59.4		
211930003	Kentucky	Perry	HAZARD	37.28329	-83.2093	58	58	56	56	51.2	51.2	51.2	51.2						
211950002	Kentucky	Pike	PIKEVILLE PRIMARY	37.4826	-82.5353	59.3	60	54	55	52.9	53.5	52.9	53.5						
211990003	Kentucky	Pulaski	SOMERSET	37.09798	-84.6115	61	62	57	58	53	53.9	53	53.9						
212130004	Kentucky	Simpson	FRANKLIN	36.70861	-86.5663	63.7	64	59	60	55.4	55.7	55.4	55.7						

212219991	Kentucky	Trigg	Cadiz		36.7841	-87.8499	62	63	60	59	54.2	55.1	54.2	55.1				
212270009	Kentucky	Warren	ED SPEAR PARK (SMITHS GROVE)		37.04926	-86.2149	61.3	62	57	60	53.1	53.7	53.1	53.7				
212299991	Kentucky	Washington	Mackville		37.7046	-85.0485	64	64	60	60	55.6	55.6	55.6	55.6				
220050004	Louisiana	Ascension	Dutchtown		30.22965	-90.9656	70	71	64	64	64.6	65.5	64.6	65.5	63.7	64.6	63.7	64.6
220150008	Louisiana	Bossier	Shreveport / Airport		32.53627	-93.7489	65.3	66	58	58	57.7	58.3	57.7	58.3	55.4	56	55.4	56
220170001	Louisiana	Caddo	Dixie		32.68336	-93.8616	63.3	64	59	60	56.2	56.9	56.2	56.9	53.5	54	53.5	54
220190002	Louisiana	Calcasieu	Carlyss		30.14027	-93.3684	66.3	68	61	61	61.9	63.4	61.9	63.4				
220190009	Louisiana	Calcasieu	Vinton		30.2278	-93.58	64	64	63	63	59	59	59	59				
220330003	Louisiana	East Baton Rouge	LSU		30.41981	-91.182	71	72	64	63	64.6	65.5	64.6	65.5	63.7	64.6	63.7	64.6
220330009	Louisiana	East Baton Rouge	Capitol		30.46198	-91.1792	67.3	69	65	65	60.8	62.4	60.8	62.4	59.8	61.3	59.8	61.3
220470009	Louisiana	Iberville	Bayou Plaquemine		30.22126	-91.3154	66	66	65	67	61.1	61.1	61.1	61.1	59.9	59.9	59.9	59.9
220511001	Louisiana	Jefferson	Kenner		30.04124	-90.2728	66.7	68	63	62	60.9	62.1	61.2	62.4	61.8	63	61.9	63.1
220550007	Louisiana	Lafayette	Lafayette / USGS		30.22611	-92.0429	65	66	60	61	59	59.9	59	59.9				
220570004	Louisiana	Lafourche	Thibodaux		29.7641	-90.7653	63.7	65	61	59	58.1	59.3	58.1	59.3	57.6	58.8	57.6	58.8
220630002	Louisiana	Livingston	French Settlement		30.31541	-90.8114	68	70	61	62	62.5	64.3	62.5	64.3	61.4	63.2	61.4	63.2
220730004	Louisiana	Ouachita	Monroe / Airport		32.50996	-92.0462	59	59	58	58	53.7	53.7	53.7	53.7				
220770001	Louisiana	Pointe Coupee	New Roads		30.68172	-91.3662	67	68	66	64	60.5	61.4	60.5	61.4	60.1	61	60.1	61
220870004	Louisiana	St. Bernard	Meraux		29.93961	-89.9239	65.3	66	59	58	59	59.7	59.4	60.1	59.3	59.9	59.6	60.2
220930002	Louisiana	St. James	Convent		29.99497	-90.8174	63.3	65	59	59	58.5	60	58.5	60	57.9	59.4	57.9	59.4
220950002	Louisiana	St. John the Baptist	Garyville		30.05752	-90.6193	65	66	60	60	60	60.9	60	60.9	59.7	60.7	59.7	60.7
220990001	Louisiana	St. Martin	St. Martinville		30.08887	-91.8696	65	65	61	62	59.3	59.3	59.3	59.3				
221030002	Louisiana	St. Tammany	Madisonville		30.42938	-90.1997	66	68	59	60	58.4	60.1	58.7	60.4	58.9	60.7		
221210001	Louisiana	West Baton Rouge	Port Allen		30.50064	-91.2136	67	68	65	66	60.6	61.5	60.6	61.5	59.5	60.4	59.5	60.4
260050003	Michigan	Allegan	Holland		42.76779	-86.1486	73.7	75	75	75	67.7	68.9	67.2	68.4	68.7	69.9	67	68.1
260190003	Michigan	Benzie			44.61694	-86.1094	68.3	69	64	68	62.2	62.8	61.9	62.6	61.9	62.5		
260210014	Michigan	Berrien	Coloma		42.19779	-86.3097	73.3	74	71	73	68.1	68.7	66.6	67.2	67.8	68.4	65.8	66.5

260270003	Michigan	Cass	Cassopolis	41.89557	-86.0016	72	74	68	70	64	65.8	64	65.8	63.3	65.1	63.3	65.1
260330901	Michigan	Chippewa	NORTH OF EASTERDAY AVENUE	46.49363	-84.3642	58	59	NA	NA								
260370001	Michigan	Clinton	ROSE LAKE: STOLL RD.(8562 E.)	42.79834	-84.3938	67	67	NA	NA	59.1	59.1	59.1	57.6	57.6	57.6	57.6	57.6
260490021	Michigan	Genesee		43.04722	-83.6702	67.7	68	64	67	60	60.2	60					
260492001	Michigan	Genesee	Otisville	43.16834	-83.4615	68	69	65	67								
260630007	Michigan	Huron	RURAL THUMB AREA OZONE SITE	43.83639	-82.6429	67.7	68	68	70					62.7	63		
260650012	Michigan	Ingham		42.73862	-84.5346	67	67	NA	NA	59	59	59	57.6	57.6	57.6	57.6	57.6
260770008	Michigan	Kalamazoo	KALAMAZOO FAIRGROUNDS	42.27807	-85.5419	69.7	71	65	68	62	63.1	62		60	61.1	60	61.1
260810020	Michigan	Kent	GR-Monroe	42.98417	-85.6713	69	70	70	72	62.3	63.2	62.3					
			APPROXIMATELY 1/4 MILE SOUTH OF 14 MILE RD														
260810022	Michigan	Kent		43.17667	-85.4166	67.3	68	65	67	60.2	60.8	60.2					
			6792 RAISIN CENTER HWY: LENA WEE CO.RD.COMM.OWNER:														
260910007	Michigan	Lenawee	TECUMSEH	41.99557	-83.9466	67	68	64	66								
260990009	Michigan	Macomb	New Haven	42.73139	-82.7935	71.7	72	68	69	63.7	64	63.5	63.8	62.6	62.9	62	62.3
260991003	Michigan	Macomb		42.51334	-83.006	67.3	69	66	68	59.5	61	59.5	61	58.3	59.7	58.3	59.7
261010922	Michigan	Manistee		44.307	-86.2426	67	68	NA	NA	60.5	61.4	60.5	61.4	60.1	61	60.4	61.3
261050007	Michigan	Mason	LOCATED 550 FT NORTH OF US10	43.95333	-86.2944	68.7	70	64	67	62.5	63.7	62.5	63.7	61.7	62.9	61.7	62.9
261130001	Michigan	Missaukee	LOCATED ABOUT 1/4 MILE WEST OF SITE	44.31056	-84.8919	66.7	67	63	65								
261210039	Michigan	Muskegon		43.27806	-86.3111	75	76	74	79	69.1	70	68.4	69.3	68	68.9	67.7	68.6
261250001	Michigan	Oakland	Oak Park	42.46306	-83.1832	70.7	73	69	69	63.8	65.8	63.8	65.8	61.6	63.6	61.6	63.6
261390005	Michigan	Ottawa	Jenison	42.89445	-85.8527	69.3	70	69	71	62.8	63.5	62.8	63.5	62.3	62.9	62.3	62.9
261470005	Michigan	St. Clair	Port Huron	42.95334	-82.4562	72	73	70	69	65.8	66.7	65.4	66.3	65.8	66.8	64.8	65.7
261530001	Michigan	Schoolcraft	Seney	46.28888	-85.9502	67	70	64	66								
261579991	Michigan	Tuscola	Unionville	43.6138	-83.3591	65.7	66	64	66								

261610008	Michigan	Washtenaw	TOWNER ST: SOUTH; 2 LANE RESIDENIAL - HOSPITAL	42.24057	-83.5996	67.7	69	66	68	61.8	62.9	61.8	62.9	60.1	61.3	60.1	61.3
261619991	Michigan	Washtenaw	Ann Arbor	42.41664	-83.9022	69.3	71	62	65	62.5	64	62.5	64	60.7	62.2	60.7	62.2
261630001	Michigan	Wayne	Allen Park	42.22862	-83.2082	66.3	68	67	70	59.6	61.1	59.6	61.1	59	60.6	59	60.6
261630019	Michigan	Wayne	East 7 Mile	42.43084	-83.0001	73	74	70	71	64.9	65.7	64.9	65.7	63.6	64.5	63.6	64.5
261659991	Michigan	Wexford	Hoxeyville	44.18089	-85.739	66.7	67	64	68								
270031001	Minnesota	Anoka	Cedar Creek	45.40184	-93.2031	60	61	NA	59								
270031002	Minnesota	Anoka	Anoka County Airport	45.13768	-93.2076	62.7	63	64	63	58.8	59.1	58.8	59.1	58.8	59.1	58.8	59.1
270052013	Minnesota	Becker	FWS Wetland Management District	46.85181	-95.8463	58.7	59	NA	60								
270177417	Minnesota	Carlton	Fond du Lac Band	46.71369	-92.5117	59	59	NA	55								
270353204	Minnesota	Crow Wing	Brainerd Lakes Regional Airport	46.39674	-94.1303	59	59	NA	57								
270495302	Minnesota	Goodhue	Stanton Air Field	44.47375	-93.0126	60.7	61	NA	60								
270530962	Minnesota	Hennepin	Near Road I-35/I-94	44.96524	-93.2548	55.7	56	53	53	52.6	52.9	52.6	52.9	51.3	51.6	51.3	51.6
270750005	Minnesota	Lake	Boundary Waters	47.94862	-91.4956	55.7	56	NA	55								
270834210	Minnesota	Lyon	Southwest Minnesota Regional Airport	44.4438	-95.8179	59.3	60	62	62								
270953051	Minnesota	Mille Lacs	Mille Lacs Band	46.2053	-93.7595	60	60	59	57					52	52		
271095008	Minnesota	Olmsted	Ben Franklin School	43.99691	-92.4504	60.7	61	62	63								
271370034	Minnesota	Saint Louis	Voyageurs NP - Sullivan Bay	48.41252	-92.8292	54.7	55	56	55								
271377550	Minnesota	Saint Louis	U of M - Duluth	46.81826	-92.0894	53	53	NA	NA								
271390505	Minnesota	Scott	B.F. Pearson School	44.79144	-93.5125	61.3	63	61	60					56.4	57.9	56.4	57.9
271453052	Minnesota	Stearns	Talahi School	45.54984	-94.1335	60	61	62	60								
271636016	Minnesota	Washington	St. Croix Watershed Research Station	45.168	-92.7651	60	61	NA	62								
271713201	Minnesota	Wright	St. Michael Elementary School	45.20916	-93.6692	61.3	63	63	63								
280110001	Mississippi	Bolivar	Cleveland	33.74606	-90.723	62	62	NA	NA								
280330002	Mississippi	DeSoto	Hernando	34.82166	-89.9878	63.7	65	64	67	56.4	57.6	56.4	57.6	55.7	56.8	55.7	56.8
280450003	Mississippi	Hancock	Waveland	30.30083	-89.3959	61.7	63	58	58	53.6	54.8	53.2	54.3	53.5	54.7	52.6	53.8
280470008	Mississippi	Harrison	Gulfport Youth Court	30.39037	-89.0498	65.3	67	58	60	56.8	58.3	57.1	58.6	55	56.4	54.8	56.2

280490020	Mississippi	Hinds	Jackson NCORE		32.32911	-90.1827	60.3	61	55	56	50	50.6	50	50.6				
280490021	Mississippi	Hinds	Hinds CC		32.34672	-90.2257	62	63	57	55	51.4	52.2	51.4	52.2				
280590006	Mississippi	Jackson	Pascagoula		30.37829	-88.5339	64.7	67	59	61	56.6	58.7	55.9	57.9	56.7	58.8	55.8	57.8
280750003	Mississippi	Lauderdale	Meridian		32.36457	-88.7315	57	58	54	54								
			TUPELO AIRPORT NEAR OLD NWS OFFICE															
280810005	Mississippi	Lee			34.26492	-88.7662	58.3	59	57	59								
281619991	Mississippi	Yalobusha	Coffeerville		34.00275	-89.7992	55.7	57	55	57								
290030001	Missouri	Andrew	Savannah		39.9544	-94.849	62.7	63	60	61								
290190011	Missouri	Boone	Finger Lakes		39.07807	-92.3163	63.3	64	57	57								
290270002	Missouri	Callaway	New Bloomfield		38.70608	-92.0931	62.7	64	59	59								
290370003	Missouri	Cass	Richard Gebaur-South		38.75961	-94.5798	63	63	61	61								
290390001	Missouri	Cedar	El Dorado Springs		37.69	-94.035	60.7	61	57	60								
290470003	Missouri	Clay	Watkins Mill State Park		39.40745	-94.2654	66.7	69	64	65	59.7	61.7	59.7	61.7	59.5	61.5	59.5	61.5
290470005	Missouri	Clay	Liberty		39.30317	-94.377	66	69	64	66	60.8	63.6	60.8	63.6	59.9	62.6	59.9	62.6
290470006	Missouri	Clay	Rocky Creek		39.33191	-94.5809	68.7	70	66	68	62.9	64.1	62.9	64.1	61.8	62.9	61.8	62.9
290490001	Missouri	Clinton	Trimble		39.53063	-94.5559	67.3	68	62	63	60.5	61.2	60.5	61.2	59.2	59.8	59.2	59.8
290770036	Missouri	Greene	Hillcrest High School		37.25614	-93.2999	60	61	59	61								
290770042	Missouri	Greene	Fellows Lake		37.31919	-93.2044	60.3	61	57	59								
290970004	Missouri	Jasper	Alba		37.2385	-94.4247	60.7	61	60	63	53.2	53.5	53.2	53.5				
290990019	Missouri	Jefferson	Arnold West		38.44857	-90.3987	69	70	68	68	61.1	62	61.1	62	60	60.9	60	60.9
291130003	Missouri	Lincoln	Foley		39.04512	-90.8663	65	65	NA	NA	58.1	58.1	58.1	58.1	56.9	56.9	56.9	56.9
291370001	Missouri	Monroe	MTSP		39.47498	-91.789	59.3	60	55	54								
291570001	Missouri	Perry			37.70264	-89.6986	67	67	62	64	59.3	59.3	59.3	59.3				
291831002	Missouri	Saint Charles	West Alton		38.87255	-90.2265	72.7	74	NA	69	66.1	67.3	66.1	67.3	65	66.2	65	66.2
291831004	Missouri	Saint Charles	Orchard Farm		38.8994	-90.4492	71	72	66	65	63.7	64.6	63.7	64.6	62	62.8	62	62.8
291860005	Missouri	Sainte Genevieve	Bonne Terre		37.90084	-90.4239	65.3	66	62	63	59.4	60	59.4	60	59.8	60.4	59.8	60.4
291890005	Missouri	Saint Louis	Pacific		38.49015	-90.7051	65	66	64	63	57.5	58.4	57.5	58.4	56.7	57.5	56.7	57.5
291890014	Missouri	Saint Louis	Maryland Heights		38.71085	-90.4761	70	71	69	68	62.6	63.5	62.6	63.5	61.4	62.3	61.4	62.3
292130004	Missouri	Taney	Branson		36.70773	-93.222	57	57	NA	NA	49.8	49.8	49.8	49.8				

295100085	Missouri	St. Louis City	Blair Street	38.65643	-90.1983	67.3	71	65	67	61.4	64.8	61.4	64.8	59.3	62.5	59.3	62.5
300710010	Montana	Phillips	Malta	48.31751	-107.862	55.3	56	57	55								
300750001	Montana	Powder River	BROADUS	45.4403	-105.37	58.5	60	NA	62								
300830001	Montana	Richland	Sidney Oil Field	47.80339	-104.486	55	55	NA	NA								
300870001	Montana	Rosebud	Birney - Tongue river 4102 Woolworth Ave. on Healthcenter Warehouse	45.36615	-106.49	57	58	NA	NA								
310550019	Nebraska	Douglas		41.24749	-95.9731	62.7	64	61	61								
310550028	Nebraska	Douglas		41.20796	-95.9459	60	62	NA	NA								
310550053	Nebraska	Douglas	Whitmore	41.32251	-95.9386	63.5	64	60	58								
311079991	Nebraska	Knox	Santee Sioux	42.82915	-97.8541	64	65	65	67								
311090016	Nebraska	Lancaster		40.98472	-96.6775	60	60	56	56								
350010023	New Mexico	Bernalillo	DEL NORTE HIGH SCHOOL	35.1343	-106.585	67.3	70	68	69	63.2	65.7	63.2	65.7	62.1	64.6	62.1	64.6
350010029	New Mexico	Bernalillo	SOUTH VALLEY	35.01708	-106.657	65.3	66	66	67	61.1	61.8	61.1	61.8	60.2	60.8	60.2	60.8
350011012	New Mexico	Bernalillo	Foothills	35.1852	-106.508	66.7	69	72	73	63.5	65.7	63.5	65.7	62.5	64.6	62.5	64.6
350130008	New Mexico	Dona Ana	60 La Union	31.93066	-106.631	67.3	68	72	76					63.8	64.5	63.8	64.5
350130020	New Mexico	Dona Ana	62K Chaparral	32.04121	-106.41	68.3	71	70	71	65.4	67.9	65.4	67.9	64	66.5	64	66.5
350130021	New Mexico	Dona Ana	62M Desert View	31.79622	-106.584	72.7	74	80	81					69.3	70.5	69.3	70.5
350130022	New Mexico	Dona Ana	62N Santa Teresa	31.78789	-106.683	71.3	74	75	75								
350130023	New Mexico	Dona Ana	62Q Solano	32.31759	-106.768	66	67	70	66								
			52R ON BLM LAND BORDERING RESIDENTIAL AREA OUTSIDE CARLSBAD CITY LIM														
350151005	New Mexico	Eddy		32.38012	-104.263	69.7	74	77	77								
350153001	New Mexico	Eddy	Carlsbad Caverns NP - Maintenance Area	32.1783	-104.441	71	71	NA	NA								
350250008	New Mexico	Lea	52S Hobbs Jefferson	32.72666	-103.123	67.7	70	66	66								
350390026	New Mexico	Rio Arriba	3CRD Coyote Ranger District	36.18774	-106.698	65.3	67	64	64	61.9	63.5	61.9	63.5	61.8	63.4	61.8	63.4
350431001	New Mexico	Sandoval		35.29948	-106.549	65.7	68	68	70	62.3	64.5	62.3	64.5	61.4	63.6	61.4	63.6

350490021	New Mexico	Santa Fe		35.61975	-106.08	64	66	66	67	60.8	62.7	60.8	62.7	60.6	62.5	60.6	62.5
350610008	New Mexico	Valencia		34.8147	-106.74	65.3	67	66	66	61.5	63.1	61.5	63.1	60.8	62.4	60.8	62.4
370030005	North Carolina	Alexander	Taylorsville Liledoun	35.9138	-81.191	64.3	65	58	58	54.1	54.7	54.1	54.7				
370110002	North Carolina	Avery	Linville Falls	35.97235	-81.9331	61.7	62	57	57	53.5	53.8	53.5	53.8				
370119991	North Carolina	Avery	Cranberry	36.1058	-82.0454	64	64	59	59	56.3	56.3	56.3	56.3				
370210030	North Carolina	Buncombe	Bent Creek	35.5001	-82.5999	62	63	58	58	53.2	54.1	53.2	54.1				
370270003	North Carolina	Caldwell	Lenoir (city)	35.9359	-81.5306	64	64	57	57	53.8	53.8	53.8	53.8				
370330001	North Carolina	Caswell	Cherry Grove	36.30703	-79.4674	62	63	56	57	51.9	52.8	51.9	52.8				
370510008	North Carolina	Cumberland	Wade	35.15869	-78.728	62	63	59	NA	53.8	54.6	53.8	54.6				
370510010	North Carolina	Cumberland	Honeycutt School	35.0023	-78.9917	63.3	64	60	63	54.7	55.4	54.7	55.4				
370630015	North Carolina	Durham	Durham Armory	36.03296	-78.904	61.7	62	58	58	51.1	51.3	51.1	51.3	50.4	50.7	50.4	50.7
370650099	North Carolina	Edgecombe	Leggett	35.98828	-77.5843	62	62	59	59	52.2	52.2	52.2	52.2				
370670022	North Carolina	Forsyth	Hattie Avenue	36.11069	-80.2264	66.7	67	64	63	56	56.2	56	56.2	54.9	55.1	54.9	55.1
370670030	North Carolina	Forsyth	Clemmons Middle	36.026	-80.342	67.3	68	59	59	56.2	56.7	56.2	56.7	55	55.6	55	55.6
370671008	North Carolina	Forsyth	Union Cross	36.05097	-80.1437	66.3	67	60	59	55.6	56.2	55.6	56.2	54.4	54.9	54.4	54.9
370750001	North Carolina	Graham	Joanna Bald	35.25793	-83.7956	63.5	64	62	62	54.6	55	54.6	55				
370770001	North Carolina	Granville	Butner	36.14111	-78.7681	64.3	65	57	57	54.2	54.8	54.2	54.8				
370810013	North Carolina	Guilford	Mendenhall School	36.10901	-79.8023	65.3	66	62	62	54.4	55	54.4	55	53.5	54	53.5	54
370870008	North Carolina	Haywood	Waynesville School	35.50716	-82.9634	61.3	62	58	59	53.3	53.9	53.3	53.9				
370870035	North Carolina	Haywood	Frying Pan Mountain	35.37917	-82.7925	64.3	66	61	61	55.7	57.1	55.7	57.1				
370870036	North Carolina	Haywood	Purchase Knob	35.58714	-83.0742	64.3	65	61	62	56	56.6	56	56.6				

371010002	North Carolina	Johnston	West Johnston Co.		35.59095	-78.4622	63.7	65	60	60	53.8	54.9	53.8	54.9	51.6	52.6	51.6	52.6
371050002	North Carolina	Lee	Blackstone		35.4325	-79.2887	61.5	62	NA	NA	52.2	52.6	52.2	52.6				
371070004	North Carolina	Lenoir	Lenoir Co. Comm. Coll.		35.23146	-77.5688	62.7	63	60	61								
371090004	North Carolina	Lincoln	Crouse		35.43856	-81.2768	66.3	67	61	61	55.7	56.2	55.7	56.2	55.2	55.8	55.2	55.8
371139991	North Carolina	Macon	Coweeta		35.0608	-83.4306	61.3	62	55	55	52.1	52.7	52.1	52.7				
371170001	North Carolina	Martin	Jamesville School		35.81066	-76.9062	60	60	56	54								
371190041	North Carolina	Mecklenburg	Garinger High School		35.2401	-80.7857	68.7	69	66	64	58	58.3	58	58.3	57	57.3	57	57.3
371190046	North Carolina	Mecklenburg	University Meadows		35.31416	-80.7135	70	70	66	64	58.3	58.3	58.3	58.3	57.4	57.4	57.4	57.4
371239991	North Carolina	Montgomery	Candor		35.2632	-79.8365	61	61	57	58	51.3	51.3	51.3	51.3				
371290002	North Carolina	New Hanover	Castle Hayne		34.36417	-77.8386	59	60	58	58					48.3	49.1		
371450003	North Carolina	Person	Bushy Fork		36.30697	-79.092	62	63	59	57	52.9	53.8	52.9	53.8				
371470006	North Carolina	Pitt	Pitt Agri. Center		35.64128	-77.3601	62.7	64	59	59								
371570099	North Carolina	Rockingham	Bethany sch.		36.30889	-79.8592	65.3	66	60	60	55.1	55.7	55.1	55.7	54.2	54.8	54.2	54.8
371590021	North Carolina	Rowan	Rockwell		35.55187	-80.395	63.7	65	62	61	52.7	53.8	52.7	53.8	52.5	53.6	52.5	53.6
371730002	North Carolina	Swain	Bryson City		35.43477	-83.4421	60	60	56	57	51.9	51.9	51.9	51.9				
371730007	North Carolina	Swain			35.49871	-83.3102	59	61	58	NA	50.9	52.6	50.9	52.6				
371790003	North Carolina	Union	Monroe School		34.97404	-80.5406	67.7	68	62	61	59	59.2	59	59.2	57.8	58.1	57.8	58.1
371830014	North Carolina	Wake	Millbrook School		35.85611	-78.5742	65.7	66	60	60	55.3	55.6	55.3	55.6	53.6	53.8	53.6	53.8
371990004	North Carolina	Yancey	Mt. Mitchell		35.76541	-82.2649	65	65	62	62	56.2	56.2	56.2	56.2				
380070002	North Dakota	Billings	PAINTED CANYON		46.8943	-103.379	59	60	60	58								

380130004	North Dakota	Burke	LOSTWOOD NWR	48.64193	-102.402	58.3	59	56	56										
380171004	North Dakota	Cass	FARGO NW	46.93375	-96.8554	58	59	60	58										
380250003	North Dakota	Dunn	DUNN CENTER	47.3132	-102.527	58	58	NA	NA										
380530002	North Dakota	McKenzie	TRNP-NU	47.5812	-103.3	57.7	58	58	56										
380570004	North Dakota	Mercer	BEULAH NORTH	47.29861	-101.767	57	58	58	57										
380650002	North Dakota	Oliver	HANNOVER	47.18583	-101.428	59.3	60	60	58										
381050003	North Dakota	Williams	Williston	48.15278	-103.64	57	58	NA	NA										
390030009	Ohio	Allen	Lima	40.77094	-84.0539	67.7	70	64	65	59.9	61.9	59.9	61.9	58	60	58	60		
390071001	Ohio	Ashtabula	Conneaut	41.9597	-80.5728	70	70	65	67	62.4	62.4	61.4	61.4	61.8	61.8	59.7	59.7		
390170004	Ohio	Butler	HAMILTON	39.38338	-84.5444	72	72	NA	NA	62.7	62.7	62.7	62.7	60.3	60.3	60.3	60.3		
390170018	Ohio	Butler	Middletown Airport	39.52944	-84.3935	71.3	73	67	67	62	63.5	62	63.5	59.8	61.2	59.8	61.2		
390179991	Ohio	Butler	Oxford	39.5327	-84.7286	69.3	70	64	64	60.2	60.8	60.2	60.8	58.5	59.1	58.5	59.1		
390230001	Ohio	Clark	Springfield Well Fd	40.00103	-83.8046	69.3	70	63	64	60.6	61.2	60.6	61.2	58.2	58.8	58.2	58.8		
390230003	Ohio	Clark	Mud Run	39.85567	-83.9977	68.3	69	65	65	60.2	60.8	60.2	60.8	57.7	58.2	57.7	58.2		
390250022	Ohio	Clermont	Batavia	39.0828	-84.1441	70	70	66	64	59.4	59.4	59.4	59.4	57.2	57.2	57.2	57.2		
390271002	Ohio	Clinton	Wilmington	39.43004	-83.7885	69.7	70	63	63	59.4	59.6	59.4	59.6	58	58.2	58	58.2		
390350034	Ohio	Cuyahoga	District 6	41.55523	-81.5753	69	70	70	72	61	61.8	61.3	62.2	65.7	66.6	61	61.9		
390350060	Ohio	Cuyahoga	GT Craig NCore	41.49212	-81.6784	62.7	64	63	62	54.8	55.9	54.5	55.6	61.3	62.5	53.9	55		
390350064	Ohio	Cuyahoga	Berea BOE	41.36186	-81.8646	65.3	66	66	66	58.5	59.1	58.3	59	63.6	64.2	56.2	56.8		
390355002	Ohio	Cuyahoga	Mayfield	41.53707	-81.4588	69.3	71	68	67	61.1	62.6	60.2	61.6	62.1	63.6	59.3	60.7		
390410002	Ohio	Delaware	Delaware	40.35669	-83.064	65.3	67	62	61	56.2	57.6	56.2	57.6	54.2	55.6	54.2	55.6		
390479991	Ohio	Fayette	Deer Creek	39.6359	-83.2605	66.7	68	61	58	58.2	59.4	58.2	59.4	55.9	57	55.9	57		
390490029	Ohio	Franklin	New Albany	40.08451	-82.8156	70.3	71	66	66	62	62.6	62	62.6	58.6	59.2	58.6	59.2		
390490037	Ohio	Franklin	FRANKLIN_PK	39.96523	-82.9555	65.5	66	NA	NA	58.1	58.5	58.1	58.5	54.9	55.3	54.9	55.3		
390490081	Ohio	Franklin	Maple Canyon	40.0877	-82.9598	66.3	67	62	62	58.8	59.4	58.8	59.4	55.4	56	55.4	56		
390550004	Ohio	Geauga	Notre Dame	41.51505	-81.2499	71.3	72	66	65	61.5	62.1	61.5	62.1	59.9	60.5	59.9	60.5		

390570006	Ohio	Greene	Xenia		39.66575	-83.9427	67.3	68	62	63	58.3	58.9	58.3	58.9	56.2	56.8	56.2	56.8
390610006	Ohio	Hamilton	Sycamore		39.2787	-84.3663	73.3	75	70	69	63.8	65.3	63.8	65.3	61.3	62.7	61.3	62.7
390610010	Ohio	Hamilton	Colerain		39.21487	-84.6909	71.3	72	67	67	61.8	62.4	61.8	62.4	59.5	60.1	59.5	60.1
390610040	Ohio	Hamilton	Taft NCore		39.12886	-84.504	71.3	72	69	68	62.1	62.7	62.1	62.7	59.6	60.2	59.6	60.2
390810017	Ohio	Jefferson	Stuebenville		40.36644	-80.6156	63	65	60	62	55.2	56.9	55.2	56.9	54.3	56	54.3	56
390830002	Ohio	Knox	CENTERBURG		40.31003	-82.6917	66.5	67	NA	NA	56.4	56.8	56.4	56.8	54.8	55.2	54.8	55.2
390850003	Ohio	Lake	Eastlake		41.67301	-81.4225	73.7	74	72	74	64.6	64.8	64.9	65.2	66.1	66.4	65.7	66
390850007	Ohio	Lake	Painesville		41.72681	-81.2422	69	70	66	64	61.3	62.2	61.2	62	62.5	63.4	63	64
390870011	Ohio	Lawrence	Wilgus		38.62901	-82.4589	63.7	64	56	57	55.7	56	55.7	56	55.1	55.4	55.1	55.4
390870012	Ohio	Lawrence	ODOT Ironton		38.50808	-82.6592	66	67	58	58	58.1	59	58.1	59	56.9	57.8	56.9	57.8
390890005	Ohio	Licking	Heath		40.02604	-82.433	65.7	67	59	60	56.1	57.3	56.1	57.3	54.2	55.3	54.2	55.3
390930018	Ohio	Lorain	Sheffield		41.42088	-82.0957	65.7	67	58	60	58.2	59.4	58.1	59.2	59.1	60.3	56.5	57.6
390950024	Ohio	Lucas	Erie		41.64407	-83.5462	67.5	69	64	67	60.4	61.7	61.1	62.4	58.6	59.9	58.9	60.2
390950027	Ohio	Lucas	Waterville		41.4942	-83.7189	64.7	66	63	64	58.5	59.6	58.5	59.6	57.2	58.3	57.2	58.3
390970007	Ohio	Madison	London		39.78819	-83.4761	67.3	68	61	61	58.4	59	58.4	59	57.1	57.7	57.1	57.7
390990013	Ohio	Mahoning	Oakhill		41.09619	-80.6589	59.7	63	64	NA	51.4	54.2	51.4	54.2	50.2	53	50.2	53
391030004	Ohio	Medina	Chippewa		41.0604	-81.9239	64.3	65	61	65	56.1	56.7	56.1	56.7	55.1	55.7	55.1	55.7
391090005	Ohio	Miami	Miami East HS		40.08502	-84.1138	67.7	68	61	63	58.5	58.8	58.5	58.8	57	57.3	57	57.3
391130037	Ohio	Montgome ry	Eastwood		39.78564	-84.1344	70.3	71	67	68	61.2	61.8	61.2	61.8	59.3	59.9	59.3	59.9
391219991	Ohio	Noble	Quaker City		39.9428	-81.3373	64.7	66	61	61	56.6	57.7	56.6	57.7				
391331001	Ohio	Portage	Lake Rockwell		41.18247	-81.3305	62	63	62	67	54.1	55	54.1	55	52.3	53.2	52.3	53.2
391351001	Ohio	Preble	Preble NCore		39.83562	-84.7205	67	67	63	64	58.2	58.2	58.2	58.2	57	57	57	57
391510016	Ohio	Stark	Malone Univ		40.82812	-81.3785	68.3	69	65	65	59.1	59.8	59.1	59.8	58.5	59.1	58.5	59.1
391510022	Ohio	Stark	Brewster		40.71278	-81.5983	65	66	61	62	56.1	56.9	56.1	56.9				
391514005	Ohio	Stark	Alliance		40.93133	-81.1235	68.3	70	64	65	59.4	60.8	59.4	60.8	58.6	60.1	58.6	60.1
391530020	Ohio	Summit	Patterson Park		41.10649	-81.5035	63.3	65	64	NA	55	56.4	55	56.4	54	55.5	54	55.5
391550011	Ohio	Trumbull	TCSE		41.24045	-80.6627	68.3	69	65	65	58.7	59.3	58.7	59.3	57.6	58.2	57.6	58.2
391550013	Ohio	Trumbull	Kinsman Maintenance		41.4546	-80.5896	66	66	64	65	57.3	57.3	57.3	57.3	56	56	56	56
391650007	Ohio	Warren	Lebanon		39.42689	-84.2008	71.7	72	70	69	62.5	62.7	62.5	62.7	60.4	60.6	60.4	60.6

391670004	Ohio	Washington	Marietta WTP	39.43212	-81.4604	64.3	65	60	60	55.9	56.5	55.9	56.5	55.3	55.9	55.3	55.9
391730003	Ohio	Wood	Bowling Green	41.37769	-83.6111	64.3	66	62	63	56.9	58.4	56.9	58.4	56.1	57.6	56.1	57.6
400019009	Oklahoma	Adair	STILWELL	35.75074	-94.6697	59.7	61	NA	61	52	53.1	52	53.1				
400170101	Oklahoma	Canadian	OKC WEST-(YUKON)	35.47922	-97.7515	66.3	69	65	67					56	58.3	56	58.3
400219002	Oklahoma	Cherokee	TAHLEQUAH SHELTER	35.85408	-94.986	59.5	60	NA	NA	53.3	53.8	53.3	53.8				
400270049	Oklahoma	Cleveland	MOORE WATER TOWER	35.32011	-97.4841	66.7	68	64	66								
400310651	Oklahoma	Comanche	LAWTON NORTH	34.63298	-98.4288	65	66	65	66								
400370144	Oklahoma	Creek	MANNFORD	36.10548	-96.3612	64	65	63	65	56.6	57.5	56.6	57.5	56	56.9	56	56.9
400430860	Oklahoma	Dewey	SEILING MUNICIPAL AIRPORT	36.15841	-98.932	66	68	61	64								
400719010	Oklahoma	Kay	NEWKIRK IMPROVE	36.95622	-97.0314	62	63	NA	NA								
400871073	Oklahoma	McClain	GOLDSBY	35.15965	-97.4738	66.3	67	NA	NA								
400979014	Oklahoma	Mayes	CHEROKEE HEIGHTS	36.22841	-95.2499	62	62	59	61	54.9	54.9	54.9	54.9	53.3	53.3	53.3	53.3
401090033	Oklahoma	Oklahoma	OKC CENTRAL-OSDH	35.47704	-97.4943	67.3	68	NA	NA	60.4	61.1	60.4	61.1	57.9	58.5	57.9	58.5
401090096	Oklahoma	Oklahoma	CHOCTAW	35.4778	-97.303	66.3	67	65	67	59.9	60.6	59.9	60.6				
401091037	Oklahoma	Oklahoma	OKC NORTH	35.61413	-97.4751	69	70	68	70	61.2	62.1	61.2	62.1	59.5	60.4	59.5	60.4
401159004	Oklahoma	Ottawa	QUAPAW SHELTER	36.92222	-94.8389	55.7	57	NA	NA	49.1	50.2	49.1	50.2				
401210415	Oklahoma	Pittsburg	McALESTER MUNICIPAL AIRPORT	34.88561	-95.7844	61	63	62	62								
401359021	Oklahoma	Sequoyah		35.40814	-94.5244	59.3	60	57	58	51.9	52.5	51.9	52.5				
401430174	Oklahoma	Tulsa	TULSA SOUTH	35.95371	-96.005	65	65	62	64	59.3	59.3	59.3	59.3	58.2	58.2	58.2	58.2
401430178	Oklahoma	Tulsa	TULSA EAST	36.1338	-95.7645	64	65	64	66	58.6	59.5	58.6	59.5	57.2	58.1	57.2	58.1
401431127	Oklahoma	Tulsa	NORTH TULSA - FIRE STATION#24	36.2049	-95.9765	65	65	61	65	58.5	58.5	58.5	58.5	58.1	58.1	58.1	58.1
450010001	South Carolina	Abbeville	DUE WEST	34.32532	-82.3864	58	58	NA	NA	49.5	49.5	49.5	49.5				
450030003	South Carolina	Aiken	JACKSON MIDDLE SCHOOL	33.34223	-81.7887	60.3	62	60	58	51.5	53	51.5	53				
450070005	South Carolina	Anderson	Big Creek	34.62324	-82.5321	58.7	60	NA	NA	49.8	50.9	49.8	50.9	48.9	50	48.9	50
450150002	South Carolina	Berkeley	BUSHY PARK PUMP STATION	32.98725	-79.9367	57.3	58	NA	NA	49.4	50	49.4	50				

450190046	South Carolina	Charleston	CAPE ROMAIN	32.94102	-79.6572	59	61	NA	57	51.3	53.1	51.2	52.9				
450250001	South Carolina	Chesterfield	CHESTERFIELD	34.61537	-80.1988	60	60	60	59	51.8	51.8	51.8	51.8				
450290002	South Carolina	Colleton	ASHTON	33.00787	-80.965	56.3	57	NA	NA								
450310003	South Carolina	Darlington	Pee Dee Experimental Station	34.2857	-79.7449	61	62	58	57	51.3	52.1	51.3	52.1				
450370001	South Carolina	Edgefield	TRENTON	33.73996	-81.8536	59.7	61	60	58	50.3	51.4	50.3	51.4				
450450016	South Carolina	Greenville	Hillcrest Middle School	34.75185	-82.2567	63.3	65	64	64	53.8	55.3	53.8	55.3	52.8	54.2	52.8	54.2
450730001	South Carolina	Oconee	LONG CREEK	34.80526	-83.2377	63	63	NA	NA	53	53	53	53				
450770002	South Carolina	Pickens	CLEMSON CMS	34.65361	-82.8387	62.7	63	NA	NA	53.3	53.6	53.3	53.6	52.7	53	52.7	53
450770003	South Carolina	Pickens	Wolf Creek	34.85154	-82.7446	61	62	NA	NA	51.5	52.3	51.5	52.3	51.3	52.1	51.3	52.1
450790007	South Carolina	Richland	PARKLANE	34.09396	-80.9623	60	61	60	58	50.3	51.2	50.3	51.2	48.8	49.6	48.8	49.6
450790021	South Carolina	Richland	CONGAREE BLUFF	33.81468	-80.7811	55	55	55	55	47.2	47.2	47.2	47.2				
450791001	South Carolina	Richland	SANDHILL EXPERIMENTAL STATION	34.13126	-80.8683	64.3	65	62	61	54	54.5	54	54.5	52.3	52.9	52.3	52.9
450830009	South Carolina	Spartanburg	NORTH SPARTANBURG FIRE STATION #2	34.98871	-82.0758	66	67	65	63	55.2	56.1	55.2	56.1	54.9	55.7	54.9	55.7
450910008	South Carolina	York	YORK (LANDFILL)	34.977	-81.207	61.3	63	62	59	51.6	53	51.6	53	51.1	52.5	51.1	52.5
450918801	South Carolina	York		34.9127	-80.8745	64	64	62	NA	55.2	55.2	55.2	55.2	53.9	53.9	53.9	53.9
460110003	South Dakota	Brookings	Research Farm	44.3486	-96.8073	62	63	68	66								
460330132	South Dakota	Custer	Wind Cave NP - Visitor Center	43.55764	-103.484	60.3	62	61	63								
460710001	South Dakota	Jackson	SOUTH OF BADLANDS NP HEADQUARTERS	43.74561	-101.941	60.7	63	57	60								
460930001	South Dakota	Meade	BLACK HAWK ELEMENTARY SCHOOL GROUNDS	44.15564	-103.316	53.3	57	63	64								

460990008	South Dakota	Minnehaha	SD School for the Deaf	43.54792	-96.7008	65	67	NA	NA										
461270001	South Dakota	Union	Union County #1 Jensen	42.75152	-96.7072	62.3	64	64	NA										
470010101	Tennessee	Anderson	Freel's Bend O3 and SO2 monitoring	35.96497	-84.2232	63.7	64	60	58	53.8	54	53.8	54	51.7	52	51.7	52	51.7	52
470090101	Tennessee	Blount	Great Smoky Mountains NP - Look Rock	35.63348	-83.9416	67	67	62	63	57	57	57	57	56.9	56.9	56.9	56.9	56.9	56.9
470090102	Tennessee	Blount	Great Smoky Mountains NP - Cade's Cove	35.60306	-83.7836	61	62	56	58	51.9	52.7	51.9	52.7						
470259991	Tennessee	Claiborne	Speedwell	36.46983	-83.8265	62.7	63	57	56	53.7	54	53.7	54						
470370011	Tennessee	Davidson	East Health	36.20506	-86.7447	66	66	63	64	56.3	56.3	56.3	56.3	55.2	55.2	55.2	55.2	55.2	55.2
470370026	Tennessee	Davidson	Percy Priest Dam	36.1508	-86.6233	66	67	62	63	56.1	56.9	56.1	56.9	55.2	56.1	55.2	56.1	55.2	56.1
470419991	Tennessee	DeKalb	Edgar Evans	36.0388	-85.7331	61.3	62	57	57	52.4	53	52.4	53						
470651011	Tennessee	Hamilton	Soddy-Daisy High School	35.23348	-85.1816	64.7	65	60	61	54.7	54.9	54.7	54.9	53.9	54.1	53.9	54.1	53.9	54.1
470654003	Tennessee	Hamilton	Eastside Utility	35.10264	-85.1622	67	68	61	63	56	56.8	56	56.8	55	55.8	55	55.8	55	55.8
470890002	Tennessee	Jefferson	New Market ozone monitor	36.10563	-83.6021	67	68	63	61	56.9	57.7	56.9	57.7	56	56.8	56	56.8	56	56.8
470930021	Tennessee	Knox	East Knox Elementary School	36.08551	-83.7648	64.3	65	59	58	54.7	55.3	54.7	55.3	53.8	54.4	53.8	54.4	53.8	54.4
470931020	Tennessee	Knox	Spring Hill Elementary School	36.01919	-83.8738	66.7	67	57	57	56.3	56.6	56.3	56.6	55.7	56	55.7	56	55.7	56
471050109	Tennessee	Loudon	Loudon Middle School ozone monitor	35.7211	-84.343	68	69	62	60	57.2	58.1	57.2	58.1	56.1	56.9	56.1	56.9	56.1	56.9
471550101	Tennessee	Sevier	Great Smoky Mountains NP - Cove Mountain	35.69676	-83.6096	67.3	68	60	61	57.4	58	57.4	58						
471570021	Tennessee	Shelby	Frayser Ozone Monitor	35.2175	-90.0197	66.7	67	65	65	59.7	59.9	59.7	59.9	59.1	59.3	59.1	59.3	59.1	59.3
471570075	Tennessee	Shelby	Memphis NCORE site	35.1517	-89.8502	67.3	69	66	69	60.3	61.9	60.3	61.9	59.9	61.4	59.9	61.4	59.9	61.4
471571004	Tennessee	Shelby	Edmund Orgill Park Ozone	35.37815	-89.8345	65.7	66	61	64	57.9	58.2	57.9	58.2	57.2	57.4	57.2	57.4	57.2	57.4
471632002	Tennessee	Sullivan	Blountville Ozone Monitor	36.54137	-82.4246	66	66	61	60	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2
471632003	Tennessee	Sullivan	Kingsport ozone monitor	36.58211	-82.4857	64.7	65	60	59	58.6	58.9	58.6	58.9	59.1	59.4	59.1	59.4	59.1	59.4
471650007	Tennessee	Sumner	Hendersonville Ozone Site at Old Hickory Dam	36.29756	-86.6531	66.3	67	65	64	56	56.6	56	56.6	54.4	54.9	54.4	54.9	54.4	54.9

471870106	Tennessee	Williamson	FAIRVIEW MIDDLE SCHOOL ozone monitor	35.94977	-87.1382	60.3	61	58	61	50.8	51.3	50.8	51.3	50.8	51.3	50.6	50.1	50.6
471890103	Tennessee	Wilson	Cedars of Lebanon Ozone Monitor	36.0609	-86.2863	63.5	64	59	60	53.3	53.7	53.3	53.7	52.9	52.5	52.9	52.5	52.9
480271045	Texas	Bell	Temple Georgia	31.12242	-97.4311	68	69	64	66									
480271047	Texas	Bell	Killeen Skylark Field	31.088	-97.6797	67.3	68	66	67									
480290032	Texas	Bexar	San Antonio Northwest	29.51509	-98.6202	73	74	71	71	67.2	68.1	67.2	68.1	66.3	66.3	67.2	66.3	67.2
480290052	Texas	Bexar	Camp Bullis	29.63206	-98.5649	72.3	73	73	75	67.9	68.5	67.9	68.5	66.1	66.1	66.7	66.1	66.7
480290059	Texas	Bexar	Calaveras Lake	29.27538	-98.3117	65	66	65	67	60.7	61.7	60.7	61.7					
480391004	Texas	Brazoria	Manvel Croix Park	29.52044	-95.3925	74.7	77	75	73	70.7	72.9	70.7	72.9	67.9	67.9	70	67.9	70
480391016	Texas	Brazoria	Lake Jackson	29.04376	-95.4729	65	66	65	68	59.2	60.1	59.2	60.1					
480430101	Texas	Brewster	Big Bend NP - K-Bar Ranch Road	29.30265	-103.178	62.3	63	61	61									
480610006	Texas	Cameron	Brownsville	25.89252	-97.4938	56.5	57	NA	NA									
480611023	Texas	Cameron	Harlingen Teege	26.20034	-97.7127	57	57	56	55									
480850005	Texas	Collin	Frisco	33.1324	-96.7864	74.3	75	75	74	65.7	66.3	65.7	66.3	64.4	64.4	65	64.4	65
481130069	Texas	Dallas	Dallas Hinton	32.82006	-96.8601	73	74	67	67	64.8	65.7	64.8	65.7	63.6	63.6	64.5	63.6	64.5
481130075	Texas	Dallas	Dallas North #2	32.91921	-96.8085	73.7	75	71	71	65.7	66.8	65.7	66.8	64.1	64.1	65.3	64.1	65.3
481130087	Texas	Dallas	Dallas Redbird Airport Executive	32.67645	-96.8721	64.7	66	68	71	57.4	58.6	57.4	58.6	57.2	57.2	58.4	57.2	58.4
481210034	Texas	Denton	Denton Airport South	33.21907	-97.1963	78	80	74	76	70.1	71.9	70.1	71.9	69.1	69.1	70.9	69.1	70.9
481211032	Texas	Denton	Pilot Point	33.41065	-96.9446	74	76	76	77	66.6	68.4	66.6	68.4	65.1	65.1	66.8	65.1	66.8
481390016	Texas	Ellis	Midlothian OFW	32.48208	-97.0269	64.3	65	62	62	57	57.6	57	57.6	56.1	56.1	56.7	56.1	56.7
481391044	Texas	Ellis	Italy	32.17542	-96.8702	63.7	65	61	63									
481410029	Texas	El Paso	Ivanhoe	31.78577	-106.324	63.7	66	67	65	62.1	64.3	62.1	64.3	61.6	61.6	63.8	61.6	63.8
481410037	Texas	El Paso	El Paso UTEP	31.76829	-106.501	71.3	73	75	NA	69.3	70.9	69.3	70.9	68.6	68.6	70.2	68.6	70.2
481410044	Texas	El Paso	El Paso Chamizal	31.76569	-106.455	69	71	71	69	67	69	67	69	66.3	66.3	68.3	66.3	68.3
481410055	Texas	El Paso	Ascarate Park SE	31.74678	-106.403	66	69	NA	64	64.1	67	64.1	67	63.5	63.5	66.3	63.5	66.3
481410057	Texas	El Paso	Socorro Hueco	31.6675	-106.288	65.3	66	70	73					62.8	62.8	63.5	62.8	63.5
481410058	Texas	El Paso	Skyline Park	31.89391	-106.426	70	72	70	70	67.6	69.6	67.6	69.6	66.9	66.9	68.9	66.9	68.9
481671034	Texas	Galveston	Galveston 99th Street	29.25447	-94.8613	75.7	77	72	70	71	72.2	71.2	72.4	70.6	71.8	70.3	71.5	71.5
481830001	Texas	Gregg	Longview	32.37868	-94.7118	65.3	66	62	61	58.8	59.5	58.8	59.5	59.4	59.4	60	59.4	60

482010024	Texas	Harris	Houston Aldine	29.90104	-95.3261	79.3	81	74	69	75.6	77.2	75.6	77.2	73.1	74.6	73.1	74.6
482010026	Texas	Harris	Channelview	29.80271	-95.1255	68.3	69	65	64	64.3	65	64.3	65	63.8	64.4	64.4	65
482010029	Texas	Harris	Northwest Harris County	30.03952	-95.674	71.3	73	71	70	65.3	66.9	65.3	66.9	63	64.5	63	64.5
482010046	Texas	Harris	Houston North Wayside	29.82809	-95.2841	67	69	64	62	63.9	65.8	63.9	65.8	61.7	63.6	61.7	63.6
482010047	Texas	Harris	Lang	29.83417	-95.4892	73.7	76	71	70	69.7	71.8	69.7	71.8	66.7	68.8	66.7	68.8
482010051	Texas	Harris	Houston Croquet	29.62389	-95.4742	70	71	74	73	65.5	66.4	65.5	66.4	62.9	63.8	62.9	63.8
482010055	Texas	Harris	Houston Bayland Park	29.69573	-95.4992	76	77	77	78	71.1	72.1	71.1	72.1	68.3	69.2	68.3	69.2
482010062	Texas	Harris	Houston Monroe	29.62556	-95.2672	63	65	67	63	60.9	62.8	60.9	62.8	58.7	60.5	58.7	60.5
482010066	Texas	Harris	Houston Westhollow	29.72333	-95.6358	75	76	70	70	69.3	70.3	69.3	70.3	66.5	67.3	66.5	67.3
482010416	Texas	Harris	Park Place	29.68639	-95.2947	72.3	74	73	73	69	70.6	69	70.6	66.4	68	66.4	68
482011015	Texas	Harris	Lynchburg Ferry	29.75889	-95.0794	65	65	64	63	61.2	61.2	61.2	61.2	60.7	60.7	61.2	61.2
482011017	Texas	Harris	Baytown Garth	29.82332	-94.9838	71	73	68	69	67.1	69	67.1	69				
482011034	Texas	Harris	Houston East	29.768	-95.2206	73.7	75	71	72	70.3	71.5	70.3	71.5	68.9	70.1	68.9	70.1
482011035	Texas	Harris	Clinton	29.73373	-95.2576	71.3	75	71	72	68	71.5	68	71.5	66.7	70.1	66.7	70.1
482011039	Texas	Harris	Houston Deer Park #2	29.67003	-95.1285	68.7	71	74	71	65.1	67.3	65.1	67.3	64.3	66.4	64.9	67.1
482011050	Texas	Harris	Seabrook Friendship Park	29.58305	-95.0155	70.7	71	62	61	66.3	66.6	66.5	66.8	65.9	66.1	66.2	66.5
482030002	Texas	Harrison	Karnack	32.66899	-94.1675	61.3	62	59	61	55.1	55.7	55.1	55.7				
482150043	Texas	Hidalgo	Mission	26.22621	-98.2911	55	55	56	60								
482210001	Texas	Hood	Granbury	32.4423	-97.8035	67.3	69	64	69								
482311006	Texas	Hunt	Greenville	33.15309	-96.1156	62.3	65	62	63	55.1	57.5	55.1	57.5				
482450009	Texas	Jefferson	Beaumont Downtown	30.03642	-94.0711	64.7	65	65	63	60.3	60.6	60.3	60.6				
482450011	Texas	Jefferson	Port Arthur West	29.89752	-93.9911	66.7	67	62	60	62.7	63	62.2	62.5	65	65.3		
482450022	Texas	Jefferson	Hamshire	29.86396	-94.3178	67	68	63	62	61.9	62.9	61.9	62.9				
482450101	Texas	Jefferson	SETRPC 40 Sabine Pass	29.72793	-93.8941	65.7	67	NA	61	60.9	62.1			61.5	62.8		
482450102	Texas	Jefferson	SETRPC 43 Jefferson Co Airport	29.9425	-94.0006	63	65	66	63	59.7	61.6	59.4	61.3	61.1	63	59.5	61.4
482451035	Texas	Jefferson	Nederland High School	29.97893	-94.0109	66.7	68	61	62	63.2	64.5	62.9	64.1	64.7	65.9	63	64.3
482510003	Texas	Johnson	Cleburne Airport	32.3536	-97.4367	73.7	76	71	74								
482570005	Texas	Kaufman	Kaufman	32.56497	-96.3177	61	61	64	66								

483091037	Texas	McLennan	Waco Mazanec	31.65307	-97.0707	63	63	64	64	64									
483390078	Texas	Montgomery	Conroe Relocated	30.3503	-95.4251	73.7	75	73	72		67.5	68.7	67.5	68.7	67.5	68.7	67.5	68.7	
483491051	Texas	Navarro	Corisicana Airport	32.03193	-96.3991	62.7	64	63	65										
483550025	Texas	Nueces	Corpus Christi West	27.76534	-97.4343	62.3	64	62	62										
483550026	Texas	Nueces	Corpus Christi Tuloso	27.83241	-97.5554	61.3	63	62	61										
483611001	Texas	Orange	West Orange	30.08526	-93.7613	61.7	64	62	61		57.8	60	57.9	60.1	60.5	62.8			
483670081	Texas	Parker	Parker County	32.86877	-97.9059	70.7	73	67	69										
483739991	Texas	Polk	Alabama-Coushatta	30.7017	-94.6742	60.3	61	57	57										
483819991	Texas	Randall	Palo Duro	34.8803	-101.665	65.7	68	66	67										
483970001	Texas	Rockwall	Rockwall Heath	32.93652	-96.4592	66	66	63	63		59.4	59.4	59.4	59.4					
484230007	Texas	Smith	Tyler Airport Relocated	32.34401	-95.4158	64.7	65	64	65		57.7	58	57.7	58					
484390075	Texas	Tarrant	Eagle Mountain Lake	32.98789	-97.4772	71	72	75	76		63.7	64.6	63.7	64.6	63.1	64	63.1	64	
484391002	Texas	Tarrant	Fort Worth Northwest	32.80582	-97.3566	72.3	74	72	77		64.5	66	64.5	66	63.7	65.2	63.7	65.2	
484392003	Texas	Tarrant	Keller	32.92247	-97.2821	73.3	74	72	72		66.2	66.8	66.2	66.8	65.3	66	65.3	66	
484393009	Texas	Tarrant	Grapevine Fairway	32.98426	-97.0637	75.3	76	74	76		67.6	68.3	67.6	68.3	67.2	67.9	67.2	67.9	
484393011	Texas	Tarrant	Arlington Municipal Airport	32.65636	-97.0886	67	69	NA	72		59.5	61.3	59.5	61.3	59.3	61	59.3	61	
484530014	Texas	Travis	Austin Northwest	30.35444	-97.7603	67.7	69	NA	NA		61.4	62.6	61.4	62.6	61.1	62.3	61.1	62.3	
484530020	Texas	Travis	Austin Audubon Society	30.48317	-97.8723	66.3	67	63	64		60.3	61	60.3	61	59.8	60.4	59.8	60.4	
484690003	Texas	Victoria	Victoria	28.83617	-97.0055	65	65	61	60										
484790016	Texas	Webb	Laredo Vidaurri	27.51746	-99.5152	54	54	NA	NA										
540030003	West Virginia	Berkeley	MARTINSBURG BALL FIELD	39.44811	-77.9638	62	63	57	56		54.1	55	54.1	55					
540110006	West Virginia	Cabell	HENDERSON CENTER/MARSHALL UNIVERSITY - MOVED FROM WATER CO. 5/98	38.42413	-82.4259	64	64	NA	NA		56.6	56.6	56.6	56.6	55.6	55.6	55.6	55.6	
540219991	West Virginia	Gilmer	Cedar Creek	38.8795	-80.8477	58	59	54	53		53.3	54.2	53.3	54.2	52	52.8	52	52.8	
540250003	West Virginia	Greenbrier	SAM BLACK CHURCH - DOH GARAGE - GREENBRIER COUNTY	37.90853	-80.6326	59.7	60	56	54		53.6	53.9	53.6	53.9					

540290009	West Virginia	Hancock		40.42737	-80.5923	65.5	66	NA	64	56.7	57.1	56.7	57.1	55.5	56	55.5	56
540390020	West Virginia	Kanawha		38.34626	-81.6212	67	67	NA	61	59.3	59.3	59.3	59.3	59.3	59.3	59.3	59.3
540610003	West Virginia	Monongalia		39.64937	-79.9209	62.3	64	61	60	56.3	57.8	56.3	57.8	56.2	57.7	56.2	57.7
540690010	West Virginia	Ohio		40.11488	-80.701	67	68	61	60	59.1	59.9	59.1	59.9	58.8	59.7	58.8	59.7
540939991	West Virginia	Tucker	Parsons	39.0905	-79.6617	61.7	62	56	58	55.4	55.7	55.4	55.7				
541071002	West Virginia	Wood	Neale Elementary School	39.32353	-81.5524	65	68	NA	59	56.6	59.2	56.6	59.2	56.4	59	56.4	59
550030010	Wisconsin	Ashland	BAD RIVER TRIBAL SCHOOL - ODANAH	46.60225	-90.6561	58.3	59	58	57								
550090026	Wisconsin	Brown	GREEN BAY - UW	44.53098	-87.908	65.3	66	62	64								
550210015	Wisconsin	Columbia	COLUMBUS	43.3156	-89.1089	66	67	64	66								
550250041	Wisconsin	Dane	MADISON EAST	43.10084	-89.3573	65	65	64	65								
550270001	Wisconsin	Dodge	HORICON WILDLIFE AREA	43.46611	-88.6211	66.3	68	65	66								
550290004	Wisconsin	Door	NEWPORT PARK	45.2384	-86.994	72.7	73	70	73	65.7	65.9	65.8	66	65.4	65.7	65.2	65.4
550350014	Wisconsin	Eau Claire	EAU CLAIRE - DOT SIGN SHOP	44.7614	-91.143	62	64	62	62								
550390006	Wisconsin	Fond du Lac	FOND DU LAC	43.6874	-88.422	64.7	66	62	64								
550410007	Wisconsin	Forest	POTAWATOMI	45.565	-88.8086	62.7	63	59	59								
550550009	Wisconsin	Jefferson	JEFFERSON - LAATSCH	43.0034	-88.8283	68	69	66	66								
550590019	Wisconsin	Kenosha	CHIIWAUKEE PRAIRIE STATELINE	42.50472	-87.8093	78	79	74	75	72.5	73.4	72.5	73.5	73.5	74.4	75.4	76.3
550590025	Wisconsin	Kenosha	KENOSHA - WATER TOWER	42.5958	-87.8858	73.7	77	72	73	68.9	72	67.8	70.8	70.2	73.4	66.1	69.1
550610002	Wisconsin	Kewaunee	KEWAUNEE	44.44312	-87.5052	69.3	70	64	67	63.4	64.1	62.9	63.6	62.8	63.4	62.6	63.3
550630012	Wisconsin	La Crosse	LACROSSE - DOT BUILDING	43.7775	-91.2269	62	62	60	59								
550710007	Wisconsin	Manitowoc	MANITOWOC - WDLND DUNES	44.13862	-87.6161	73	74	68	73	66.8	67.7	66.1	67	66.5	67.4	66.2	67.2
550730012	Wisconsin	Marathon	LAKE DUBAY	44.70735	-89.7718	64	65	58	57								

550790010	Wisconsin	Milwaukee	MILWAUKEE - SIXTEENTH ST. HEALTH CENTER	43.01667	-87.9333	65.3	67	61	NA	60.4	62	60.3	61.9	62.2	63.8	59.2	60.8
550790026	Wisconsin	Milwaukee	MILWAUKEE - SER DNR HDQRS	43.06098	-87.9135	68	69	NA	NA	62.9	63.8	63.4	64.3	64	64.9	65.9	66.9
550790085	Wisconsin	Milwaukee	BAYSIDE	43.1818	-87.901	71.7	73	70	73	66.6	67.8	67.2	68.4	66.9	68.1	69.8	71.1
550870009	Wisconsin	Outagamie	APPLETON - AAL	44.30738	-88.3952	65.7	67	62	64								
550890008	Wisconsin	Ozaukee	GRAFTON	43.343	-87.92	71.3	72	71	72	66.2	66.8	65.7	66.3	68	68.7	64.5	65.1
550890009	Wisconsin	Ozaukee	HARRINGTON BEACH PARK	43.4981	-87.81	73.3	74	70	71	68.4	69.1	67.7	68.4	68.2	68.9	67.2	67.9
551010020	Wisconsin	Racine	RACINE - PAYNE AND DOLAN	42.77368	-87.7963	76	78	73	75	70.5	72.3	71.1	73	71.1	73	73	74.9
551050030	Wisconsin	Rock	BELOIT - CONVERSE	42.51831	-89.0635	67.7	69	65	67								
551110007	Wisconsin	Sauk	DEVILS LAKE PARK	43.4351	-89.6797	63.7	64	63	63								
551170006	Wisconsin	Sheboygan	SHEBOYGAN - KOHLER ANDRAE	43.66742	-87.7162	80	81	72	75	74	74.9	73.5	74.4	73.8	74.7	72.3	73.2
551170009	Wisconsin	Sheboygan	SHEBOYGAN - HAVEN	43.8156	-87.7922	70	71	65	69	64.2	65.1	63.8	64.7	64.4	65.3	63.2	64.1
551199991	Wisconsin	Taylor	Perkinstown	45.2066	-90.5969	61	62	59	58								
551250001	Wisconsin	Vilas	TROUT LAKE	46.0519	-89.654	61.3	62	58	58								
551270005	Wisconsin	Walworth	LAKE GENEVA	42.58001	-88.499	69	70	NA	NA								
551330027	Wisconsin	Waukesha	WAUKESHA - CLEVELAND AVE	43.02008	-88.2151	65.7	66	65	68	60.4	60.7	60.4	60.7	59.9	60.2	59.9	60.2
560019991	Wyoming	Albany	Centennial	41.3642	-106.24	64.7	66	67	68								
560050123	Wyoming	Campbell	Thunder Basin	44.6522	-105.29	59.7	61	64	66								
560050456	Wyoming	Campbell	Campbell County	44.14696	-105.53	61.5	63	NA	NA								
560070100	Wyoming	Carbon	Atlantic Rim Sun Dog	41.38694	-107.617	60.7	62	NA	NA								
560090008	Wyoming	Converse	Tallgrass Energy Partners - Gaseous	42.79637	-105.362	59	59	NA	NA								
560090010	Wyoming	Converse	Converse County Long-Term	43.10128	-105.499	62	63	66	66								
560130232	Wyoming	Fremont	Spring Creek	43.08167	-107.549	61.7	62	64	NA								
560210100	Wyoming	Laramie	Cheyenne NCore	41.18223	-104.778	63.3	64	64	65								
560250100	Wyoming	Natrona	Casper Gaseous	42.82231	-106.365	61.3	63	65	65								
560252601	Wyoming	Natrona		42.8608	-106.236	58	59	64	NA								

Appendix M

DRAFT – 3/17/23 – PUBLIC REVIEW VERSION

**DRAFT: Guidance on the Preparation of State Implementation Plan Provisions that
Address the Nonattainment Area Contingency Measure Requirements for Ozone and
Particulate Matter**

**U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Policy Division**

March 16, 2023

**DRAFT: Guidance on the Preparation of State Implementation Plan Provisions that
Address the Nonattainment Area Contingency Measure Requirements for Ozone and
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1. Introduction

The purpose of this guidance document¹ is to assist air agencies² that are required to prepare nonattainment plan submissions under Part D of Title I of the Clean Air Act (CAA). Specifically, in this document the Environmental Protection Agency (EPA or Agency) provides guidance to air agencies for the preparation of ozone and particulate matter (PM) plans,³ and focuses on the requirement for those plans to include contingency measures (CMs). CMs are control requirements that would take effect if an area fails to attain a National Ambient Air Quality Standard (NAAQS) by an applicable attainment date, or fails to make reasonable further progress (RFP) toward attainment. These CM requirements are specified in CAA section 172(c)(9) for nonattainment areas generally, and in section 182(c)(9) for Serious or higher ozone nonattainment areas. This document addresses application of the CM requirements for the ozone and PM NAAQS. It does not address contingency provisions required for maintenance plans in section 175A(d), nor does it address specific contingency provisions for anticipated control measures in Extreme ozone nonattainment areas under section 182(e). It also does not address CM requirements for pollutants other than PM and ozone, where existing CM guidance remains in effect.

EPA is issuing this guidance document because recent court decisions – discussed later in this document – have invalidated key aspects of EPA’s historical approach to implementing the CM requirement. These court decisions had the effect of prohibiting an approach that many air agencies have historically used to meet the CM requirement, i.e., the reliance on implemented control measures as CMs (particularly the commonly used approach of relying on surplus reductions from mobile source fleet turnover from already-implemented federal or state control measures). EPA has received feedback from some air agencies that this constraint, together with the evolution toward more stringent control programs in the 30 years since EPA first articulated its CM guidance (explained in Section 2 of this guidance), has increased the difficulty that they face in identifying measures sufficient to meet the CM requirement. Some air agencies, particularly those with longstanding nonattainment problems that have implemented progressively more stringent control measures over time to meet more stringent NAAQS, have stated that the scarcity of remaining unimplemented control measures poses a significant

¹ This document is intended only to provide clarity to the public regarding existing requirements under the CAA or EPA regulations. This document is not a rule or regulation, and the guidance it contains may not apply to a particular situation based upon the individual facts and circumstances. This guidance does not change or substitute for any law, regulation, or other legally binding requirement and is not legally enforceable. The use of non-mandatory language such as “guidance,” “recommend,” “may,” “should,” and “can” is intended to describe EPA’s policies and recommendations. The use of mandatory terminology such as “must” and “required” is intended to describe controlling legal requirements under the terms of the CAA and of EPA regulations. Such language and anything else in this document is not intended to and does not establish legally binding requirements in and of itself. None of the recommendations in this guidance are binding or enforceable against any person, and neither any part of the guidance nor the guidance as a whole constitutes final agency action that affects the rights and obligations of any person or represents the consummation of agency decision making. Only final EPA actions taken to approve or disapprove state implementation plan (SIP) submissions that implement any of the recommendations in this guidance would be final actions for purposes of CAA section 307(b).

² References to air agencies include state, local, and tribal air agencies.

³ As used in this document, PM refers to both PM₁₀ and PM_{2.5}. The guidance is intended to address planning requirements for NAAQS for both pollutants.

challenge to meeting CM requirements. EPA intends this guidance to address that increased challenge by clarifying and explaining approaches available to air agencies to meet the CM requirement, while still meeting the CAA as interpreted by the courts.

This guidance focuses on three key aspects of EPA’s CM guidance. First, the guidance addresses the method that air agencies should use to calculate EPA-recommended amount of emissions reductions that CMs should provide. Longstanding EPA guidance, discussed in Section 2 of this document guidance, has recommended that CMs provide reductions approximately equal to or greater than the amount needed to meet the requirement for RFP in the relevant area for 1 year. In this guidance EPA continues to recommend an annual progress-based approach for calculating the recommended amount of reductions for CMs but changes the metric to be more closely tied to the air quality improvement needs of the area when the CMs are triggered. (The term “triggered” for CMs refers to the effective date of EPA’s final determination that a nonattainment area has failed to attain a NAAQS by the applicable attainment date or has failed to meet RFP.⁴ The CAA establishes time frames for EPA to make such determinations.)

Second, the guidance addresses the situation where an air agency cannot identify feasible CMs in sufficient quantity to produce the recommended amount of reductions using the updated metric. Previous EPA policy has indicated that states could provide a “reasoned justification” to have CMs that result in less than the recommended one year’s worth (OYW) of RFP. This guidance provides air agencies with specific recommendations about how to develop such reasoned justifications to support state implementation plan (SIP) submissions for which the submitting agency is asserting that it cannot provide for the recommended amount of CM reductions due to a lack of feasible measures.

Finally, this guidance addresses the time period within which reductions from CMs should occur. EPA previously recommended that CMs take effect within 60 days of being triggered, and that the resulting reductions generally occur within 1 year of the CMs being triggered. In instances where there are insufficient CMs available to achieve the recommended amount of emissions reductions within 1 year, EPA provides recommendations for how air agencies could include CMs that provide reductions within up to 2 years of being triggered. This guidance does not alter the 60-day recommendation for the measures to take effect.

While this guidance document focuses on these three aspects of CM guidance that EPA is updating, it also provides additional information to summarize EPA’s existing guidance for CMs more broadly, including aspects that EPA is not updating, to ensure clarity and national consistency.

2. Background

This section provides background and context on the relevant statutory provisions, previous EPA guidance, and court decisions involving the CM requirement.

⁴ For ozone nonattainment areas classified Serious or above, CAA section 182(c)(9) further specifies that CMs are triggered by an area’s failure to meet the applicable RFP milestone. For PM_{2.5}, the triggers for CM are further specified by regulation at 40 CFR 1014(a)(1)-(4). The term “triggered” as used here would also include any final EPA determination regarding these requirements.

2.1. Nonattainment Area CM Provisions in the CAA

The CAA’s nonattainment area CM requirements appear in two specific provisions: sections 172(c)(9) and 182(c)(9). Congress added these CM requirements to the CAA as part of the Amendments of 1990. Any evaluation of these provisions must rely on the statutory language as well as the larger statutory context and structure of the Act with respect to nonattainment plan requirements.

Section 172(c)(9) is included in the Part D Subpart 1 general nonattainment plan SIP requirements applicable to all NAAQS. It provides that states must include specific measures as CMs as a required element of their nonattainment plan SIP submissions. It applies to nonattainment plans regardless of the classification of the nonattainment area, with one notable exception, i.e., states are not required to meet certain nonattainment plan requirements, including the CM requirement, for ozone nonattainment areas classified as “Marginal.”⁵ Section 172(c)(9) provides as follows:

(9) Contingency measures

Such plan shall provide for the implementation of specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national ambient air quality standard by the attainment date applicable under this part [D]. Such measures shall be included in the plan revision as contingency measures to take effect in any such case without further action by the State or the Administrator.

Section 182(c)(9) is included in the Part D Subpart 2 ozone NAAQS nonattainment plan SIP requirements and applies specifically to states with ozone nonattainment areas classified as “Serious” or above. It provides that states must include specific measures as CMs as a required element of their nonattainment plan SIP submissions. In particular, section 182(c)(9) adds the requirement that the CMs must be in place to be triggered in the event that the state fails to meet a reasonable further progress “milestone” related to sections 182(c)(2)(B) and 182(g).⁶ Section 182(c)(9) provides as follows:

(9) Contingency measures

In addition to the contingency provisions required under [section 172(c)(9)] of this title, the plan revision shall provide for the implementation of specific measures to be undertaken if the area fails to meet any applicable milestone. Such measures shall be included in the plan revision as contingency measures to take effect without further action by the State or the Administrator upon a failure by the State to meet the applicable milestone.

⁵ See text at the end of CAA Section 182(a)(4), which states “[s]ection 7502(c)(9) [172(c)(9)] of this title (relating to contingency measures) shall not apply to Marginal Areas.”

⁶ EPA has explained that “[s]ection 182(c)(9) requires that certain state submissions must provide for the implementation of contingency measures in the event of a failure to meet a milestone; it does not require the state to submit separate and distinct contingency measures allocated exclusively for a failure to meet a milestone.” 86 FR 27524 at 27527 (May 21, 2021).

The CAA includes no specific definition of the term “contingency measures” in section 302 or elsewhere, and thus section 172(c)(9) and section 182(c)(9) provide the statutory parameters that both states and EPA must meet with respect to these requirements.

2.2. Existing EPA Guidance and Regulations Interpreting the CM Provisions

The statutory requirements of sections 172(c)(9) and 182(c)(9) may appear straightforward, but ambiguities and gaps in the statutory language leave some important questions unanswered. Thus, EPA has previously addressed the CM requirements in a series of guidance documents and implementation rules. To understand EPA’s interpretation of these statutory requirements, and the evolution of EPA guidance for CMs, it is helpful to review key aspects of these documents.

2.2.1. 1992 General Preamble

In 1992, EPA published the “General Preamble for Implementation of Title I of the Clean Air Act Amendments of 1990” (General Preamble), which served as a preliminary roadmap outlining how the Agency intended to interpret various provisions of the CAA, as amended in 1990.⁷ In the General Preamble, EPA provided its first guidance concerning key aspects of the new statutory CM requirements, including: (i) the recommendation that CMs should provide OYW of RFP; (ii) the conditions under which less or more than OYW of RFP may be appropriate; (iii) the timing of emissions reductions from CMs; (iv) how early implementation of an otherwise required measure could be a valid CM; and (v) what constitutes taking effect “without any further action” in the CM context. EPA provided somewhat different guidance for CMs for each of the criteria pollutants, based on differences in other relevant statutory provisions and the nature of the pollutants, but the portions of the General Preamble most relevant in this guidance document are those for ozone and PM₁₀.⁸

Ozone

EPA previously provided guidance to address the CM requirements for the ozone NAAQS, taking into consideration other related provisions of Part D, Subpart 2 (of CAA Title I) that gave context for interpreting these requirements. We highlight some key aspects of the historical guidance that are relevant for this new guidance document.

Amount of Emissions Reductions

From the outset, EPA recognized that neither section 172(c)(9), nor section 182(c)(9) “specify how many measures are needed or the magnitude of emissions reductions that must be provided by these measures.”⁹ Knowing the amount of emissions reductions that CMs should provide is a

⁷ 57 FR 13498 at 13511/Column 1 (April 16, 1992). The General Preamble served as an advance notice of how EPA generally intended, in subsequent rulemakings, to take action on SIP submissions and to interpret various title I provisions. EPA has subsequently applied this guidance in the context of many individual EPA SIP actions.

⁸ EPA notes that guidance in the General Preamble and subsequent Addendum (59 FR 41998 (August 16, 1994)) remained applicable for the PM₁₀ NAAQS, whereas EPA provided additional guidance and regulatory requirements for purposes of the PM_{2.5} NAAQS in the PM_{2.5} Implementation Rule (81 FR 58010 (August 24, 2016)) discussed below. States must meet the statutory CM requirements in nonattainment area plans for any of the NAAQS for which they have a designated nonattainment area.

⁹ 57 FR 13498 at 13511/1.

crucial issue for implementing the CM requirements. Because the express statutory language of these provisions does not provide an answer to this important question, EPA sought to resolve this statutory ambiguity. To do so, EPA considered the purpose of CMs in the context of ozone nonattainment plan requirements.

First, EPA noted that both statutory provisions require that CMs go into effect in the event that the state fails to meet RFP or fails to attain the NAAQS in the area.¹⁰ Second, EPA noted that under section 182(b)(1)(A), states were separately required to make a SIP submission to meet RFP. For Moderate area RFP, the statute requires a 15 percent reduction from the base year emissions inventory (EI) over 6 years. For Serious and above area RFP, the statute requires a 3 percent per year reduction averaged over 3-year periods. The RFP calculation is for VOC, but in states that meet the equivalence provisions in CAA section 182(c)(2)(C), air agencies may substitute nitrogen oxides (NO_x) reductions for a shortfall in VOC reductions for the period after the initial 6-year period. With respect to CMs, EPA stated: “If the strategy for an area relies on NO_x substitution in lieu of or in addition to VOC reductions, the State should also submit NO_x contingency measures as necessary to meet the 3 percent requirement.”¹¹

Third, EPA considered whether it would be appropriate to require that CMs triggered by a failure to meet RFP should result in emissions reductions that could make up for an “entire shortfall” of the full 15 percent (thereby requiring a state to “adopt double the measures” to meet RFP), or some lesser amount. Fourth, EPA observed that in the event of a failure to meet RFP or a failure to attain, the state would need to develop and submit a new SIP submission to address the deficiency as necessary within 1 year.

Even in 1992, states were having difficulty identifying and adopting measures to meet RFP. Therefore, EPA reasoned that it would be more appropriate to interpret the statute to require that upon triggering, the CMs (whether one or more than one cumulatively) should provide emissions reductions equivalent to OYW of RFP, rather than some larger amount. EPA reasoned that this RFP-based approach would assure that the CMs would provide additional emissions reductions while the state took action to address the deficiency that triggered the CMs. The Agency concluded:

Therefore, EPA will interpret the Act to require States with moderate and above ozone nonattainment areas to include sufficient contingency measures . . . so that, upon implementation of such measures, additional emissions reductions of up to 3 percent of the emissions in the adjusted base year inventory (or such lesser percentage that will cure the identified failure) would be achieved in the year following the year in which the failure has been identified.¹²

This was the genesis of EPA’s guidance that CMs should achieve emissions reductions equivalent to “one year’s worth” of RFP in the area in question, and the assumption that states and EPA should calculate this amount of emissions reductions based on the initial base year EI

¹⁰ Id. at 13511/1

¹¹ Id. at 13520/3.

¹² Id. at 13511/2.

for the nonattainment area, rather than some other form of calculation. At the time, EPA logically thought it appropriate to recommend that CMs achieve a specific amount of emissions reductions related to the then current expectations for RFP.

EPA’s guidance in the General Preamble concerning the amount of emissions reductions that CMs should achieve was not compelled by specific statutory language. Instead, it reflected the Agency’s judgment at the time concerning an appropriate approach. EPA formulated this guidance 30 years ago, at a time before promulgation of multiple iterations of increasingly protective ozone NAAQS, and before development of multiple rounds of nonattainment plans to meet those NAAQS, have made it increasingly more difficult for states to identify and adopt additional control measures that are valid CMs. This guidance document revises the General Preamble’s OYW of RFP approach to calculating emissions reductions needed for CMs. The new approach is described in Section 3.

Conditions Under Which Less or More Reductions are Appropriate

In the General Preamble, EPA considered the possibility that its recommendation that CMs should achieve OYW of RFP based on the initial base year EI might result in CMs that provided too much or too little emissions reductions, compared to the actual shortfall that might trigger the CMs in the future. Thus, when recommending that the CMs provide emissions reductions equivalent to OYW of RFP, EPA stated that the CMs should result in “additional emissions reductions of up to 3 percent of the emissions in the adjusted base year inventory (*or such lesser percentage that will cure the identified failure*).”¹³ By this, EPA was suggesting that if the future RFP or attainment shortfall that triggers the CMs could be cured by less than the full amount of reductions that would result from implementing all the CMs that add up to OYW of RFP, then it may not be necessary to trigger all of the CMs. EPA also acknowledged that “there is the possibility that in some cases 3 percent may not be adequate.” For those situations, EPA recommended two alternative approaches, one being a combination of the CMs and an enforceable commitment from the state to create a tracking program, and another being for the state to submit additional CMs to be held “as a reserve” in the event of a larger shortfall.

These complexities that EPA identified serve to illustrate that the OYW of RFP approach was understood by the Agency to be merely a rough estimate of the appropriate amount of emissions reductions, based on certain assumptions at that point in time. It illustrates that EPA was aware that its approach might turn out to be incorrect in either direction, and that CMs based on this approach would not necessarily reflect the amount of emissions reductions needed at the time of an actual triggering event to make up a shortfall.

EPA notes that its guidance in the General Preamble concerning the conditions under which less or more emissions reductions from CMs might be appropriate, and how to address that possibility, was premised upon the theory that the amount of reductions should be based on the separate RFP requirement in the first instance. As explained above, this recommendation resulted from EPA’s then expectations concerning the amount of emissions reductions that would be appropriate. EPA had these expectations before the Agency promulgated several more stringent

¹³ Id. at 13511/2 (emphasis added).

iterations of the ozone NAAQS and air agencies developed new nonattainment plans to address those NAAQS, which have reduced the pool of available control measures that could be valid CMs.

In this guidance document, EPA is revising its approach to estimating the amount of emissions reductions that CMs should achieve (from OYW of RFP to OYW of progress), and thus EPA's revised guidance does not follow the approach described above related to the conditions under which less or more reductions are appropriate. EPA's new approach is intended to more closely relate the amount of emissions reductions provided by CMs to the potential need for additional emissions reductions in the event CMs are triggered.

Timing of Emissions Reductions

Another important point that EPA addressed in the General Preamble was the timing of emissions reductions from CMs. As with the amount of emissions reductions that CMs should achieve, neither CAA section 172(c)(9) nor section 182(c)(9) expressly provide the time frame within which the CM emissions reductions should occur. In light of this statutory ambiguity, EPA considered the context and purpose of CMs to interpret the provisions and provide guidance to states on this important question of timing.

EPA directly addressed the question of how soon after a triggering event CMs should “take effect.” To evaluate this question, EPA considered the fact that the statutory provisions imply the need for prompt emissions reductions in the event CMs are triggered and considered the intended purpose for CMs. Thus, in discussing the express statutory requirement that CMs “take effect” with no further action by the state or EPA, the Agency stated its view that: “EPA will expect all actions needed to effect full implementation of the measures to occur within 60 days after EPA notifies the State of its failure.”¹⁴ This reflects EPA's view that CMs should generally begin to achieve emissions reductions soon after the triggering event to be consistent with the purpose of CMs. The intended purpose of CMs is to provide emissions reductions and to continue to make progress towards RFP and/or attainment and to bridge the gap after a triggering event, while the state is “conducting additional control measure development and implementation as necessary to correct the shortfall in emissions reductions or to adopt newly required measures resulting from bump-up to a higher classification.”¹⁵ Accordingly, EPA recommended that CMs should be measures that will begin to result in additional emissions reductions quickly. EPA is not altering its guidance with respect to this 60-day expectation.

On the equally important question of what the outer date for CMs to achieve the intended emissions reductions should be, EPA guidance did not definitively state when the emissions reductions should occur. By implication, however, EPA was recommending that CMs achieve the necessary emissions reductions during the year following a triggering event, because EPA assumed that would be the period of time during which the state would be developing the subsequent SIP submission to cure the deficiency. This is illustrated by the General Preamble statement that a submission should include sufficient contingency measures so that, “upon

¹⁴ Id. at 13512/1.

¹⁵ Id. at 13511/2.

implementation of such measures, additional emissions reductions...*would be achieved in the year following the year in which the failure has been identified.*”¹⁶

This was the origin of EPA’s guidance to states that CMs should, among other requirements, be measures that will begin to achieve emissions reductions soon after the triggering event, and that the reductions from the CM (the full OYW of RFP) should occur within 1 year following the triggering event.¹⁷ As with other aspects of EPA’s guidance, however, these recommendations concerning the timing of emissions reductions from CMs were colored by the Agency’s then current understanding. In retrospect, interpreting the CAA to restrict CMs to measures that can achieve needed emissions reductions only in this 1-year time frame may serve to disqualify control measures that could otherwise be valid CMs that would serve the intended purpose of providing emissions reductions and bridging the gap after a state’s failure to meet RFP or to attain. As explained below in Section 5, EPA is revising this aspect of its prior guidance and now interpreting the CAA to allow for CMs that result in emissions reductions that occur up to 2 years from the triggering event under appropriate circumstances.

Early Implementation

In the General Preamble, EPA recognized that one form of valid CM could be the accelerated implementation of a control measure that the state must include in its SIP to meet another requirement, such as reasonably available control measures or reasonably available control technology (RACM/RACT), or RFP in the nonattainment plan. As an example, EPA suggested that “a State could include as a contingency measure the requirements that measures which would take place in later years if the area met its RFP target or attainment deadline, would take effect earlier if the area did not meet its RFP or attainment deadline.”¹⁸

It is important to note that, for this example, EPA clearly contemplated that although the control measure at issue might be in the SIP to meet another requirement, the triggering of the CM would result in the air agency *accelerating the actual implementation* of such measure so that the emissions reductions would happen *earlier* than otherwise required (i.e., the acceleration is a direct result of the triggering of the CM). Such a CM would meet the statutory language of CAA sections 172(c)(9) and 182(c)(9), which requires CMs to be both conditional and prospective. To clarify, this initial concept in the General Preamble is distinct and separate from EPA’s later interpretation of CAA sections 172(c)(9) and 182(c)(9), discussed in Section 2.2.2, to allow states to use the reductions from measures designated as CMs but implemented early (i.e., before triggering), or the surplus emissions reductions from already implemented measures required for other nonattainment plan purposes, to meet the CM requirements. EPA no longer interprets the CAA to allow approval of this latter form of CM, as courts have held this to be an incorrect

¹⁶ Id. at 13511/2 (emphasis added).

¹⁷ EPA notes that, where air quality is influenced by seasonal variability, this 1-year period should be sufficient to encompass at least one relevant season (e.g., at least one summer). However, EPA acknowledges that it is possible a triggering event could occur at a less convenient time of year. For example, a triggering event could occur in the middle of the relevant season, which could make it difficult for certain CMs to achieve their anticipated reductions within the timeframe needed. Air agencies should take this possibility into account when developing CMs, but EPA recognizes it is impractical to assess all possible timing scenarios.

¹⁸ 57 FR 13498 at 13511/2-3.

reading of the plain language of the statute. However, EPA notes that a CM that requires accelerated implementation of an otherwise already required control measure as a result of a triggering event could still be a valid CM, if appropriately structured. This form of CM may be of limited utility in a situation in which a state has few or no available control measures, and the existing measures in the SIP to meet other requirements are incapable of more accelerated implementation, but EPA generally considers it a potentially available approach.

Without Further State or EPA Action

In the General Preamble, EPA acknowledged that although the statutory language of section 172(c)(9) and section 182(c)(9) provides that CMs must take effect “without further action by the State or the Administrator,” the Agency interprets this language to allow certain “minimal” actions by the state to implement the measures. For example, EPA noted that actions such as notification of affected sources subject to the triggered CM might be appropriate, whereas additional rulemaking or legislative action by the state to implement the CM would not be. This remains an element of EPA’s guidance for CMs and is not affected by this guidance document.

Particulate Matter

EPA also provided guidance to address the CM requirements for the PM₁₀ NAAQS in the General Preamble that was very similar to that for the ozone NAAQS. Core tenets of the guidance pertained to: (i) the amount of emissions reductions CMs should achieve; (ii) the fact that CMs are in addition to and beyond what is required for other nonattainment plan purposes; (iii) when states should begin to implement CMs; (iv) the timing of when CMs should be “implemented;” and (iv) when CMs should be “fully adopted and take effect.”¹⁹

Amount of Emissions Reductions

As with ozone, EPA recommended that states should have CMs that would achieve OYW of RFP for the area. Unlike ozone, however, Part D, Subpart 4 (of CAA Title I) does not include a statutory requirement for a particular percentage of emissions reductions for purposes of RFP. Instead, EPA guidance recommended that RFP for PM₁₀ nonattainment areas should represent generally linear progress toward attainment (i.e., the difference between the attainment projected inventory and the base year EI, divided by the number of years between the base year and the attainment year).²⁰ Following this approach to RFP, EPA recommended that the CMs should achieve a proportional amount of emissions reductions based on the number of years from the base year to the applicable attainment date:

the contingency emissions reductions should be approximately equal to the emissions reductions necessary to demonstrate RFP for one year. For instance, reductions equal to 25 percent of the total strategy would be appropriate for a moderate nonattainment area since the control strategy must generally be implemented in a 3- to 4- year period

¹⁹ Id. at 13543-13544.

²⁰ 59 FR 41998, 42015 (August 16, 1994).

between SIP development and the attainment date, and since RFP generally requires annual incremental reductions to attain the standards.²¹

Thus, at the time of the General Preamble, EPA was likewise interpreting section 172(c)(9) for purposes of the PM₁₀ NAAQS based on its then understanding of the facts and the most appropriate way to address this requirement. Now, as explained in more detail in Section 3, after the addition of PM_{2.5} as a different indicator and NAAQS criteria pollutant, several increasingly more stringent iterations of the PM_{2.5} NAAQS, and in some cases multiple rounds of state development of nonattainment plans for the PM₁₀ and PM_{2.5} NAAQS, this OYW of RFP approach to the CM requirement is no longer as appropriate. This guidance document revises the General Preamble's OYW of RFP approach to calculating emissions reductions for CMs for both ozone and PM.

Timing of CMs

As noted above, neither section 172(c)(9) nor 182(c)(9) expressly provide when the resulting emissions reductions from CMs should occur. In light of this statutory ambiguity, EPA considered the context and purpose of CMs to interpret the provisions and provide guidance to states on this important question of timing.

In the case of PM, as with ozone, EPA guidance was unclear. In one place, EPA stated that “[c]ontingency measures must be implemented immediately after EPA determines the area has failed to make RFP or to attain the standards.”²² At the end of the very same paragraph, EPA stated that “[c]ontingency measures must be fully adopted and take effect within 1 year without further legislative action once EPA makes such determinations.” There is no explanation to elaborate on EPA's use of these different terms (i.e., implemented, fully adopted, and take effect). EPA is now concerned that there has been confusion about the meaning of the term “take effect” and whether that pertains only to the effective date of a state's CMs, or to the date when the state is beginning to “implement” the CMs, and about the related questions related to the timing of partial implementation or full implementation of the CMs. In reviewing its existing CM guidance, EPA has concluded that it is important to revisit the question of when emissions reductions from CMs should occur in light of the purpose of these provisions. Section 5 discusses EPA's revised approach.

2.2.2. 1993 Guidance Memoranda

In August 1993, EPA issued two guidance memoranda that further addressed the CM requirements. On August 13, 1993, EPA issued a guidance memorandum regarding the early implementation of CMs for ozone and carbon monoxide nonattainment areas.²³ In this initial 1993 guidance, EPA first explicitly addressed the issue of states electing to implement CMs earlier than otherwise required (i.e., before a triggering event). Specifically, EPA stated: “[i]t

²¹ 57 FR 13498 at 13543-44.

²² Id. at 13544/1

²³ EPA, Memorandum from G.T. Helms, Chief, Ozone/Carbon Monoxide Programs Branch, Office of Air Quality Planning and Standards, to Air Branch Chief[s], Regions I-X, “Early Implementation of Contingency Measures for Ozone and Carbon Monoxide (CO) Nonattainment Areas,” August 13, 1993.

seems illogical to penalize nonattainment areas that are taking extra steps to ensure attainment of the NAAQS by having them adopt additional contingency measures now. Therefore, in cases of early implementation of State contingency measures, we do not feel that it is necessary now to adopt additional contingency measures to backfill for the early activation of contingency measures.”²⁴ In subsequent rulemakings on individual SIP submissions, EPA expanded upon this concept of early implementation of CMs to allow states to have CMs that are control measures that are already implemented and that provide ongoing reductions each year that are in excess of RFP or attainment needs.²⁵ As noted below, EPA carried forward its then current interpretation of the CM requirement that allowed approval of already implemented measures as CMs in the ozone and PM_{2.5} NAAQS implementation rules, but courts have rejected this interpretation and it no longer informs EPA’s interpretation of the CM requirements.

On August 23, 1993, EPA issued another guidance memorandum concerning, among other issues, the CM requirement.²⁶ In this second 1993 guidance, EPA addressed the content of the CMs and indicated that for states with ozone nonattainment areas classified Moderate and higher that had completed the initial 15 percent VOC reductions for RFP, CMs could be a mixture of VOC and NO_x reductions on a percentage basis.²⁷ EPA indicated that of the OYW of RFP reductions required, at least 10 percent should be VOC emissions reductions, allowing up to 90 percent of the CM emissions reductions to be NO_x emissions reductions. While EPA’s guidance from August 23, 1993, explicitly allowed for NO_x reductions in the context of CMs, it did not alter EPA’s approach to the overall amount of reductions required. As explained in Section 3, EPA is now recommending a different approach to calculating the amount of VOC and/or NO_x reductions recommended for purposes of CMs.

2.2.3. 1994 Addendum to the General Preamble

In 1994, EPA published the “Addendum to the General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990” (Addendum).²⁸ The Addendum provided additional guidance to states with PM₁₀ nonattainment areas designated Serious under the Part D Subpart 4 requirements. EPA reiterated its guidance for section 172(c)(9), emphasizing key points including: (i) states must meet the CM requirement with measures that are not required to meet other attainment plan obligations; (ii) the CMs should be already adopted measures that would

²⁴ Id., at 2.

²⁵ For example, see 61 FR 36004, at 36009-36010 (July 9, 1996) and 62 FR 10690, at 10695 (March 10, 1997). Also see 62 FR 15844 (April 3, 1997); 62 FR 66279 (December 18, 1997); 66 FR 30811 (June 8, 2001); 66 FR 586 and 66 FR 634 (January 3, 2001); and 70 FR 71612, at 71651 (November 29, 2005).

²⁶ EPA, Memorandum from Michael H. Shapiro, Acting Assistant Administrator for Air and Radiation, to Regional Air Directors, “Guidance on Issues Related to 15 Percent Rate-of-Progress Plans,” August 23, 1993.

²⁷ In this context, “on a percentage basis” refers to substitution on the basis of the percentage of NO_x emissions reductions relative to the NO_x RFP baseline inventory. For example, in an area where the RFP baseline is 200 tons per day of VOC and 100 tons per day of NO_x, an RFP shortfall of 1 percent in VOC emissions reductions (i.e., 2 tpd) can be remedied by NO_x emissions reductions of 1 percent of the NO_x inventory (i.e., 1 tpd).

²⁸ 59 FR 41998.

go into effect with minimal further action upon a triggering event; and (iii) the CMs should result in emissions reductions that are equivalent to OYW of RFP in the area.²⁹

In the Addendum, the most notable clarification to prior EPA guidance for PM₁₀ was with respect to what additional state or EPA action is permissible after a triggering event, and within what time frame. Comparable to its prior guidance for ozone, EPA stated that it “generally expects” that any such actions to implement CMs should occur within 60 days of the triggering event, and further recommended that the state “should ensure that the measures are fully implemented as expeditiously as practicable after they take effect.”³⁰ Again, this statement indicated a distinction between the “effective date” and the “implementation” of the CMs, without fully evaluating or explaining what that might mean in terms of when the emissions reductions from CMs should occur.

2.2.4. Implementation Rule for 2008 Ozone NAAQS

For implementation of the 2008 Ozone NAAQS, EPA issued a rule in 2015 that included additional regulatory requirements and additional guidance for ozone nonattainment plan requirements.³¹ With respect to the CM requirement, EPA relied on its prior guidance in the General Preamble and provided additional guidance on several points.

In accordance with longstanding guidance, EPA reiterated that to meet statutory requirements CMs must: (i) provide for the implementation of specific measures if the area at issue fails to attain or to meet any milestone; (ii) must take effect without further action by the state or EPA upon a triggering event; and (iii) should represent OYW of RFP “amounting to reductions of 3 percent of the baseline emissions inventory for the nonattainment area.”³² EPA also repeated its guidance that states could rely on emissions reductions from already implemented measures to be CMs, and in particular its “policy that allows promulgated federal measures to be used as contingency measures as long as they provide emissions reductions in the relevant years in excess of those needed for attainment or RFP.”³³

The one significant modification to EPA’s prior CM guidance concerned whether the CMs must result in some VOC emissions reductions or may instead result only in NO_x emissions reductions. As noted above, EPA’s prior 1993 guidance had been that some portion of the emissions reductions from the CMs must consist of VOC emissions reductions. However, in 2015 EPA stated that:

As explained in the proposal, this previous limitation is no longer necessary in all cases. In particular, Moderate and above areas that have completed the initial 15 percent VOC reduction required by CAA section 182(b)(1)(A)(i) can meet the contingency measures requirement based entirely on NO_x controls if that is what the state’s analyses have

²⁹ Id. at 42014-15.

³⁰ Id. at 42015/1.

³¹ “Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements,” 80 FR 12264 (March 6, 2015).

³² Id. at 12285.

³³ Id.; citing *LEAN v. EPA*, 382 F.3d 575 (5th Cir. 2004).

demonstrated would be more effective in bringing the area into attainment. There would be no minimum VOC requirement.³⁴

As explained in Section 3, EPA now recommends a different approach to calculating the amount of VOC and/or NO_x reductions recommended for purposes of CMs.

Petitioners challenged EPA's implementation rule for the 2008 Ozone NAAQS on other issues, but no party challenged EPA's interpretation of section 172(c)(9) and section 182(c)(9).³⁵ Accordingly, EPA guidance has remained the same with respect to other aspects of its interpretation of the CM requirements.

2.2.5. Implementation Rule for PM_{2.5} NAAQS

In 2016, EPA promulgated an implementation rule intended to address nonattainment plan SIP requirements for the 1997 PM_{2.5} NAAQS and all other iterations of the PM_{2.5} NAAQS going forward.³⁶ With respect to CM requirements, EPA provided both regulatory requirements in 40 CFR 51.1014 and guidance recommendations in the final rule preamble. This rulemaking highlighted several important distinctions to make with respect to CM for PM_{2.5}.

First, states with PM_{2.5} nonattainment areas must have CMs that can be triggered by four different events: (i) a failure to meet an RFP requirement; (ii) a failure to meet any quantitative milestone requirement; (iii) a failure to submit a quantitative milestone report; or (iv) a failure to attain by the applicable attainment date.³⁷

Second, EPA codified certain CM requirements in regulatory text. For example, EPA has long interpreted section 172(c)(9) to require that CMs be measures that the state is not otherwise required to adopt and implement to meet other nonattainment plan requirements such as RACM/RACT, and that the state does not otherwise rely upon to meet RFP or attainment requirements. This and other core CM requirements are set forth by regulation for the PM_{2.5} NAAQS.³⁸ EPA provided additional guidance on these requirements in the preamble to the final rule.³⁹

Third, unlike Subpart 2 for ozone, Subpart 4 applicable to the PM_{2.5} NAAQS does not include a statutory provision that defines what amount of emissions reductions constitute RFP, comparable to sections 182(b)(1)(A) and (c)(2)(B). Instead, the RFP requirement for PM_{2.5} is governed by section 172(c)(2), as defined in section 171(1). The latter section provides that RFP means annual incremental reductions in emissions as required or may reasonably be required by EPA

³⁴ Id. at 12285/2.

³⁵ See *South Coast Air Quality Management District v. EPA, et al.*, 882 F.3d 1138 (D.C. Cir. 2018). Although the court rejected EPA's approach to implementation of the 2008 Ozone NAAQS with respect to other issues, no petitioners challenged EPA's guidance with respect to CM requirements.

³⁶ See "Fine Particulate Matter National Ambient Air Quality Standards: Nonattainment Area State Implementation Plan Requirements," 81 FR 58010 (August 24, 2016).

³⁷ 40 CFR 51.1014(a).

³⁸ 40 CFR 51.1014(b).

³⁹ 81 FR 58010 at 58066-068 (Moderate area plans); at 58092-93 (Serious area plans); and at 58105-106 (CAA section 189(d) plans).

for purposes of reaching attainment by the attainment date. Thus, rather than a set percentage reduction of emissions measured from the initial EI for the area (base year), EPA has interpreted RFP for PM_{2.5} to mean annual generally linear reductions in emissions from the base year to the attainment year. Air agencies must perform this calculation for both the NAAQS pollutant and for each relevant plan precursor. Rates of reduction may differ for each pollutant or relevant plan precursor, and a state can use the relative air quality impacts of different precursors identified in the attainment modeling to demonstrate that the emissions reductions provide adequate progress toward attainment to meet the RFP requirement.⁴⁰

Finally, EPA explained in the PM_{2.5} Implementation Rule the amount of emissions reductions that CMs should achieve. EPA repeated its longstanding guidance that PM CMs should provide OYW of RFP, calculated as the annual average reductions from the base year EI to the attainment year EI for the area. However, EPA also acknowledged that there could be situations in which states would be unable to develop CMs that would achieve this amount of emissions reductions. In such cases, EPA stated that:

States should explain the amount of anticipated emissions reductions to be accomplished by the contingency measures outlined in the plan. In the rare event that an area is unable to identify contingency measures to account for approximately 1 year's worth of emissions reductions, the state should provide a reasoned justification why the smaller amount of emissions reductions is appropriate.⁴¹

EPA did not provide any specific guidance to states concerning how to construct such a reasoned justification, but the Agency anticipated that there could be a factual and analytical basis to support approval of CMs that achieve less than the amount of reductions that EPA has historically recommended. EPA is providing additional guidance on this approach in this document in Section 4.

2.2.6. Implementation Rule for 2015 Ozone NAAQS

For implementation of the 2015 Ozone NAAQS, EPA issued a new implementation rule in 2018 that was primarily an update to the implementation rule for the 2008 Ozone NAAQS.⁴² With respect to the CM requirement, EPA relied on its prior guidance in the General Preamble and the prior ozone implementation rule.

In the preamble to the final rule EPA reiterated guidance on a number of key points, including: (i) that CMs must be fully adopted rules or measures that will take effect without further action upon a triggering event; (ii) that CMs should achieve OYW of RFP or approximately 3 percent of the baseline EI; (iii) that states may rely on NO_x emissions rather than VOC emissions, if they have already fulfilled the 15 percent VOC reduction requirement for RFP in section

⁴⁰81 FR 58010, 58055–58063, 58090–58091, 58103–58104. The PM_{2.5} implementation rule also lays out a stepwise option for RFP, but this approach is generally not relevant to the use of RFP in the calculation of the recommended amount of CM reductions based on the average annual rate.

⁴¹ Id. at 58067/3.

⁴² See “Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements,” 83 FR 62998 (December 6, 2018).

182(b)(1)(A)(i) and provide a demonstration that NO_x substitution would be effective to bringing the area to attainment; and (iv) that CMs may consist of already implemented measures, so long as they meet other CM requirements and the state had not relied upon them for RFP or for attainment in the nonattainment plan.⁴³

As discussed in Section 2.3.3 below, petitioners challenged EPA’s interpretation of CAA sections 172(c)(9) and 182(c)(9) to allow approval of already implemented measures as CMs and the D.C. Circuit agreed.⁴⁴ Although the court rejected EPA’s statutory interpretation and thus vacated the implementation rule with respect to EPA’s position on this specific issue, there were no challenges to any other aspect of EPA’s approach to CMs in the Implementation Rule for the 2015 Ozone NAAQS. Accordingly, EPA guidance has remained the same with respect to all other aspects of its interpretation of the CM requirements.

2.3. Relevant Court Decisions Addressing the CM Requirement

In addition to the statutory provisions, prior guidance, and existing implementation rules for purposes of the ozone and PM_{2.5} NAAQS, EPA must take into account a number of significant court decisions that interpret the nonattainment plan CM requirements. These decisions focused on specific aspects of EPA’s interpretations of the statutory CM requirements, and thus inform EPA’s current guidance.

2.3.1. *Louisiana Environmental Action Network (LEAN) v EPA*

LEAN v. EPA was a challenge to EPA’s approval of a portion of a nonattainment plan for the 1979 Ozone NAAQS for the Baton Rouge area of Louisiana.⁴⁵ EPA approved a new substitute CM that consisted of a control measure on a stationary source to reduce VOC emissions. The source had already installed and begun operating a flare to reduce VOC to meet this requirement in 1998; EPA’s approval of the CM was in 2002 and thus after the control measure was already implemented and achieving emissions reductions. In addition, the source at issue was located outside the boundaries of the designated nonattainment area.

Petitioners challenged EPA’s approval on several grounds, including: (i) that because the measure was already implemented, it could not be a CM consistent with the express language in section 172(c)(9) and section 182(c)(9) indicating that they are supposed to occur in the future after a triggering event; and (ii) that because the control measure applied to a source outside the nonattainment area, it could not be a CM.

With respect to the first issue, the court accepted EPA’s arguments that the statutory language was ambiguous, thereby allowing EPA to interpret the language to allow continuing emissions reductions from already implemented measures to be CMs.⁴⁶ As explained below, subsequent courts have disagreed that the statutory provisions are ambiguous and have ruled that CMs must be conditional and prospective based on the plain language of the provisions. Thus, EPA no

⁴³ Id. at 63026.

⁴⁴ *Sierra Club v. EPA*, 21 F.4th 815, at 827-828 (D.C. Cir. 2021).

⁴⁵ 382 F.3d 575 (5th Cir. 2004).

⁴⁶ 382 F.3d at 582-585.

longer interprets the CAA to allow approval of already implemented measures, or surplus emissions reductions from such measures, to be CMs.

With respect to the second issue, the court found that the state and EPA had failed to provide adequate technical support to demonstrate that the emissions reductions from a source outside the designated nonattainment area would in fact result in the necessary air quality improvements inside the nonattainment area.⁴⁷ However, the court’s opinion leaves open the possibility that states could rely on control measures on sources outside the designated nonattainment area as CMs, so long as there is an adequate technical showing that the resulting emissions reductions from the CMs have the required impact within the nonattainment area.⁴⁸ Unlike other nonattainment plan requirements, section 172(c)(9) and section 182(c)(9) do not explicitly require that the control measures apply to sources inside the designated nonattainment area. The *LEAN* decision highlights that the technical support for such an approach to CMs must be adequate.

2.3.2. *Bahr v. EPA*

Bahr v. EPA was a challenge to EPA’s approval of a nonattainment plan for the PM₁₀ NAAQS for the Phoenix Planning Area of Arizona.⁴⁹ EPA approved the state’s SIP submission as meeting all applicable nonattainment plan requirements pursuant to section 189(d), including the CM requirements of section 172(c)(9).

The CMs at issue consisted of measures designed to reduce windblown dust, such as paving and stabilizing roads, lowering speed limits, and purchasing and using street sweepers to help reduce ambient PM₁₀. There was no dispute that the state had already implemented these measures prior to EPA’s approval of the measures as CMs, and that the measures were then in place and thus continuing to reduce windblown dust. The court rejected EPA’s approval of the CMs, reasoning that the statutory language of section 172(c)(9) clearly indicates that they must be measures that are to take effect in the future, only after being triggered by a finding of failure to meet RFP or failure to attain.

The 9th Circuit found that the CAA language overrides EPA’s argument that allowing approval of already implemented measures as CMs would encourage states to implement control measures sooner, consistent with the overall policy objectives of the CAA to reduce pollution and protect public health. The court stated: “Even if we agreed that the EPA’s policy considerations are compelling, such considerations cannot override the plain language of the statute.” Although there was a dissenting opinion in this case, agreeing with the decision in the 2004 *LEAN* case, the majority expressly disagreed with that prior 5th Circuit decision. After the court decisions in *Bahr* and *LEAN*, EPA was left with seemingly contradictory opinions in the 9th and 5th Circuits.

⁴⁷ 382 F.3d at 584-587.

⁴⁸ EPA has provided guidance with respect to CM on sources outside the nonattainment area in the PM_{2.5} Implementation Rule. 81 FR 58067 (CM for Moderate nonattainment areas); 81 FR 58105 (CM for Serious nonattainment areas).

⁴⁹ 836 F.3d 1218 (9th Cir. 2016).

EPA now draws from this case that the statute prohibits approval as CMs any measures that the state has already implemented, and that will already be in place and achieving emissions reductions, regardless of whether there is ever a future triggering event for CMs such as a finding of failure to meet RFP or finding of failure to attain. States must have CMs that are structured and worded so that they are both conditional and prospective, to take effect only in the event of a future triggering event.

2.3.3. *Sierra Club v. EPA*

Sierra Club v. EPA was a challenge to EPA’s final implementation rule for the 2015 Ozone NAAQS.⁵⁰ EPA issued the rule to provide additional regulatory requirements and guidance to all states concerning nonattainment plan SIP requirements for the 2015 ozone NAAQS, including CMs. Among other aspects of the final rule challenged in this case, EPA interpreted section 172(c)(9) and section 182(c)(9) to allow approval of emissions reductions from already implemented measures as CMs. In the challenged rule, EPA also reiterated its interpretation of the CM requirements expressed in the implementation rule for the 2008 Ozone NAAQS, in which EPA explicitly identified surplus emissions reductions that would occur in the future as a result of mobile source fleet turnover as one acceptable form of already implemented CM.⁵¹

The D.C. Circuit rejected this interpretation. The court held that the specific statutory wording of sections 172(c)(9) and 182(c)(9) are unambiguously “conditional and prospective.” The court evaluated the express statutory language in light of dictionary definitions and reasoned that “contingent” means “dependent on or conditioned by something else.” Similarly, the court reasoned that already implemented measures are not measures “to take effect” only if and when the contingency occurs.

Significantly, the *Sierra Club* decision explicitly rejected EPA’s argument that these statutory provisions are ambiguous because the 5th Circuit found them to be so in the *LEAN* decision, as did the dissent in *Bahr*. Although the court acknowledged the different outcome in the *LEAN* decision, it rejected the conclusion that the statutory language is ambiguous with respect to the conditional and prospective requirements for CMs.

EPA draws from this decision, which the court rendered on a rule of nationwide applicability, that it cannot approve as CMs any measures that are already implemented, and that will already be in place and achieving emissions reductions, regardless of whether there is ever a triggering event in the future such as a finding of failure to meet RFP or finding of failure to attain. Again, states must have CMs that are structured and worded so that they are both conditional and prospective, to take effect only in the event of a future triggering event.

2.3.4. *Association of Irrigated Residents (AIR) v. EPA*

AIR v. EPA was a challenge to EPA’s approval of a nonattainment plan SIP submission for the 2008 Ozone NAAQS for the San Joaquin Valley area of California.⁵² EPA approved the SIP

⁵⁰ 21 F.4th 815 (D.C. Cir. 2021).

⁵¹ 80 FR 12264 at 12285.

⁵² 10 F.4th 937 (9th Cir. 2021).

submission as meeting the CM requirement with a single measure projected to achieve a relatively small amount of emissions reductions, well below the amount that would constitute OYW of RFP in the area. EPA’s approval action very explicitly acknowledged this fact. EPA explained its view that other surplus emissions reductions in the area, including those that would result from mobile source fleet turnover, that were not relied upon in the nonattainment plan for any purpose, would provide substantial additional emissions reductions following a failure to meet a milestone or attain the standard by the applicable attainment date, thereby justifying the small amount from the CM.

The 9th Circuit rejected this interpretation. Although the court noted that the CAA does not specify the amount of emissions reductions that CMs must achieve, and that EPA’s prior statements concerning this point are nonbinding guidance, the court evaluated EPA’s action under an arbitrary and capricious standard of review and concluded that EPA had not provided a sufficiently reasoned explanation for departure from its guidance that CMs should achieve emissions reductions equivalent to OYW of RFP in the area. Notwithstanding EPA’s acknowledgement of the issue, and EPA’s explanation for its application of its guidance to the facts at issue, the court reasoned that the Agency was allowing surplus emissions from other already implemented measures to make up for a lack of CMs that would achieve the recommended OYW of RFP. In particular, the court stated that EPA “has severed the relationship between the requirement of contingency measures and the benchmark of reasonable further progress, without an adequate explanation of why the new – and far more modest – contingency measure is reasonable.”⁵³

EPA draws from the *AIR* decision that it cannot approve as meeting the CM requirement proposed CMs with reductions that comprise substantially less than OYW of RFP if our approval is dependent upon surplus emissions reductions from other already implemented measures to justify the smaller amount. States cannot rely on surplus emissions from other already implemented measures even indirectly as a means to reduce the amount of emissions reductions otherwise recommended for CMs. However, the court acknowledged that EPA’s prior statements concerning the amount of emissions reductions that CM should achieve to meet the statutory requirements are guidance, and that EPA can revise its guidance if it provides a sufficient reasoned justification for a change. EPA is heeding the court’s decision and in this guidance is reconsidering this key aspect of its prior guidance.

2.4. Summary of EPA’s Existing Approach to CMs

In light of the statute, rules, guidance, and court decisions just described, the following summary distills key aspects of existing CM policy, prior to the issuance of this guidance. As noted throughout this guidance document, EPA is now changing and/or clarifying some of the aspects summarized here, while leaving others unchanged. Specifically, changes described in the remainder of this document relate to items 3 and 5 of the summary:

1. CMs must be conditional and prospective, not already implemented, per the statute and relevant court decisions. For this same reason, EPA cannot approve “excess” or “surplus”

⁵³ *AIR*, 10 F.4th at 946.

emissions reductions from already required and implemented control measures as meeting the CM requirement. Thus, for example, additional emissions reductions that will occur each year as a result of mobile source fleet turnover, whether from federal or state requirements, cannot constitute CMs, because they are the result of regulatory requirements that are already implemented and the emissions reductions will occur regardless of whether there is, or is not, any future CM triggering event.

2. CMs cannot be control measures that states are required to adopt and implement to meet other legal requirements. They cannot be control measures that the state is required to impose to meet other CAA requirements including, but not limited to, nonattainment plan requirements, such as RACM/RACT, or best available control measures or best available control technology (BACM/BACT), or most stringent measures (MSM), and cannot be measures the state otherwise relies upon to meet RFP or for attainment in the modeled attainment demonstration. States are separately required to meet those other requirements and, by definition, CMs are required to be measures that will provide emissions reductions over and above what the state is required to impose to meet all other separate obligations under the CAA.
3. CMs should achieve emissions reductions equal to or greater than OYW of RFP for the nonattainment area and the NAAQS at issue, as projected in the nonattainment plan. States may meet this OYW requirement to satisfy the CM requirement through one or more control measures; individual measures do not need to provide this amount of reductions in isolation but can be combined with other measures in order to achieve OYW of RFP and thus be deemed a valid CM. CMs (one or more measures) that achieve less than OYW may be sufficient, with a reasoned justification for the lower amount.
4. CMs should take effect within 60 days, and with no further significant action by the state or EPA, following an EPA notification to the state of a failure to meet RFP or a failure to attain.
5. The emissions reductions from the CMs should generally occur in the year following the determination of failure to meet RFP or failure to attain, i.e., during the period that the state and EPA should be addressing the deficiency that triggered the CMs through a new SIP submission, as appropriate.
6. CMs may be measures that apply to sources outside the designated NAA (unlike other nonattainment plan requirements such as RACM/RACT), so long as there is an adequate technical demonstration showing that the emissions reductions from the CMs would provide the necessary air quality benefit within the NAA.
7. It is permissible, but not necessary, for a state to specify that certain CMs are for RFP failure only or for failure to attain only. If specified in this way, however, the state must ensure that adequate CMs are in place for each triggering event; this could result in the need for additional measures if a state elects to differentiate between CMs in this way.

EPA intends the remainder of this document to revise and supplement its existing CM guidance reflected in this summary. In particular, EPA is revising its prior guidance with respect to how to calculate the amount of emissions reductions that CMs should achieve (Section 3), and its guidance concerning the period of time during which emissions reductions from CMs should occur (Section 5). In addition, EPA is expanding its prior guidance concerning what would constitute a reasoned justification for air agencies to provide to establish that they cannot identify and adopt sufficient CMs to achieve the recommended amount of reductions (Section 4).

3. Showing that the CMs Achieve Sufficient Reductions

As explained in Section 2, EPA previously recommended that CMs provide reductions that provide for OYW of RFP. Under the historical OYW of RFP approach, air agencies documented the amount of reductions expected from the identified CMs and compared them to the amount of emissions that would constitute RFP in 1 year. EPA now believes that it is appropriate to update its prior guidance in light of changed factual circumstances and a current understanding of what remaining controls may be available for states to adopt as CMs. EPA now considers it more appropriate for CMs to achieve approximately “OYW of progress,” which is a different metric than OYW of RFP.

Section 2 briefly describes how OYW of RFP is calculated (i.e., by summarizing how underlying RFP, which is a separate requirement, is calculated), noting differences between the CAA’s ozone and PM provisions. To summarize, for ozone, annual RFP is essentially defined as 3 percent of the base year EI anthropogenic emissions. For PM, annual RFP is the average annual reductions between the anthropogenic emissions from the base year EI and the projected attainment year EI (i.e., the projected attainment inventory for the nonattainment area, referred to in this document as the attainment projected inventory).⁵⁴ In contrast, OYW of progress is calculated the same way for ozone and PM: by determining the average annual reductions between the base year EI and the projected attainment year EI, determining what percentage of the base year EI this amount represents, then applying that percentage to the projected attainment year EI to determine the amount of reductions needed to ensure ongoing progress if CMs are triggered.⁵⁵ This CM guidance should not be read as defining or changing existing underlying RFP interpretations or regulatory requirements for RFP in any way.

In reviewing its guidance regarding the recommended amount of emissions reductions that CMs should achieve, EPA observed that basing the amount of emissions reductions on the annual amount of reductions needed to meet the separate RFP requirement – OYW of RFP – may in some cases lead to an amount that is greater than what would be typically needed to make up for a shortfall in RFP or for attainment purposes. The situation arises because the separate RFP requirement is tied in part to the base year inventory, despite the fact that the actual emissions inventory in nonattainment areas typically declines over time as a result of the implementation of

⁵⁴ The term “attainment projected inventory” is described further in Section 3.8.1 (for ozone) and Section 3.8.2 (for particulate matter) of EPA’s “Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter NAAQS and Regional Haze Regulations”. See <https://www.epa.gov/air-emissions-inventories/air-emissions-inventory-guidance-implementation-ozone-and-particulate>.

⁵⁵ For the purposes of calculating OYW of progress, references to emissions, including “base year EI” and “projected attainment EI,” refer to the anthropogenic portion of the total emissions inventory.

control measures. Because the base year inventory for a given attainment plan is fixed until the attainment date,⁵⁶ an amount calculated based on a percentage of that inventory would also be fixed, despite the fact that as the emissions inventory declines in subsequent years, that amount actually represents an ever-growing percentage of any future year inventory. For example, the amount of VOC that represents 3 percent of the base year EI could represent 10 percent or more of the attainment projected inventory in some cases. Meanwhile, the timing of the implementation of CMs (i.e., the future year in which CMs will be triggered, if at all), is uncertain. CMs would be triggered no earlier than the first RFP milestone (and then only if a milestone failure occurred) and might not be triggered until the attainment date.⁵⁷ In either case, the emissions inventory will have declined from the baseline.

This declining inventory/increasing percentage effect associated with OYW of RFP is more pronounced in nonattainment areas with higher classifications, particularly for ozone areas, where the base year inventory can be 10 years or more removed from the attainment date. Over long time periods, the attainment projected inventory will likely be significantly smaller than the base year inventory. Consequently, 3 percent of the original base year EI at that time could represent a much larger percentage of the attainment projected inventory. After decades of implementing the CAA, EPA now believes that its OYW of RFP approach to calculating the amount of reductions for CMs was unnecessarily conservative for estimating the amount of emissions reductions needed for CM purposes because a given percentage of the base year inventory tends to represent a much more significant portion of the attainment projected inventory. Further, areas with higher classifications also generally have historically had more significant air quality problems that have required implementing a more comprehensive and stringent set of control measures; therefore, they tend to be the areas where the scarcity of measures presents the greatest challenge to developing CMs that provide sufficient reductions.

For these reasons, EPA believes it is reasonable to revise its guidance concerning the minimum amount of emissions reductions that CMs should achieve. It is more appropriate for CMs to achieve emissions reductions reflecting an amount equal to or greater than the annual emissions reductions between the base year and the attainment year, as applied to the attainment projected inventory, rather than to a set percentage of the base year EI (for ozone) or to the annual average reductions between the base year EI and the attainment projected EI (for PM). In making this change, EPA recognizes attainment of the NAAQS as the primary objective of the nonattainment plan requirements, and thus the appropriate metric should be attainment-focused. In the absence of a CAA-specified amount of emissions reductions required for CMs, EPA's new approach is reasonable given our understanding of the statutory purpose of CMs following a failure to attain or to meet an RFP milestone, which is to ensure uninterrupted progress toward attainment while the next steps unfold in response to the failure. Applying the percentage reduction equivalent to or greater than OYW of progress for CM purposes (rather than OYW of RFP) in the plan

⁵⁶ In the event of reclassification of a nonattainment area for PM₁₀ or PM_{2.5}, the state is required to update the base year EI as part of the new attainment plan SIP submission; for an ozone nonattainment area, the base year EI remains the same following reclassification.

⁵⁷ Note that for Moderate ozone nonattainment areas, the end of the RFP interval occurs at the 6-year mark and thus coincides with the attainment date. For areas classified Serious or above, there are separate RFP milestone-related triggers for CMs that could occur in advance of the attainment date.

submission to determine the recommended amount of CM reductions is a reasonable approach to ensuring such progress. EPA also recognizes an air agency may elect to adopt CMs that achieve more emission reductions than EPA’s recommendation. More details about performing this calculation and some examples are provided later.

In addition to focusing on the attainment projected inventory, there is, for ozone, an additional way in which the OYW of progress metric will differ from OYW of RFP: the recommended percentage of reductions represents appropriate progress toward attainment as opposed to a fixed amount. Under the CAA, the rate of emissions reductions to meet OYW of RFP for ozone is essentially specified to be a fixed amount of VOC (3 percent of the base inventory per year).⁵⁸ This fixed amount is not necessarily equivalent to the amount of emissions reductions of VOC and/or NO_x that the area will need (as reflected in the attainment projected inventory) to attain the ozone NAAQS by the applicable attainment date. To calculate EPA’s recommended amount of CM reductions using the OYW of progress approach, which does relate to the amount of reductions that the area will need (again, as reflected in the attainment projected inventory), air agencies would determine the percentage of the base year EI the annual rate of reductions (i.e., the reductions in anthropogenic emissions between the base year and the attainment year, divided by the number of years between the base year and the attainment year) represents, then apply *that* percentage to the attainment projected EI, rather than calculating the amount based on a fixed 3 percent of the base year EI. The annual rate of reductions (i.e., the percentage) could be more or less than 3 percent. (This is similar to how the percentage is already determined for PM_{2.5} precursors, because RFP for PM is not a fixed percentage). States should perform this calculation separately for both ozone precursors, VOC and NO_x.⁵⁹ This would ensure that the state develops CMs to achieve reductions related to the reductions of the precursors that are needed for the area to attain, regardless of whether the approach is being applied for PM or for ozone.⁶⁰

3.1. OYW of Progress Calculation Described

EPA recommends that air agencies use the following equation to calculate OYW of progress for the purpose of assessing the adequacy of the reductions provided by the submitted CMs:

$$\frac{(base\ year\ EI - attainment\ year\ EI)}{(attainment\ year - base\ year)} \div base\ year\ EI \times attainment\ year\ EI = OYW\ of\ Progress$$

⁵⁸ The CAA expresses RFP for ozone in terms of averages over certain time periods. For example, RFP for Serious ozone areas is expressed in CAA section 182(c)(2)(B) as an average of 3% per year over 3 consecutive years.

⁵⁹ Under our previous guidance the calculation is done for VOC, with the possibility of NO_x substitution. This is discussed in Section 2.2.1 of this document.

⁶⁰ For ozone, EPA notes that the new recommendation for separate NO_x and VOC amounts has the potential to result in more CM reductions being needed for one of the precursors than would have been needed under the prior OYW of RFP approach, which allowed NO_x substitution. EPA estimates this will be an uncommon occurrence, and it does not alter our conclusion that the new recommendation results in an amount of reductions that better aligns with the area’s air quality needs for reductions of that precursor, accounting for declining emissions. Air agencies that cannot adopt CMs sufficient to provide the recommended amount of reductions for a given precursor may wish to consider an infeasibility justification for that precursor.

The OYW of progress calculation is based on anthropogenic emissions. All uses of the term “emissions,” including “base year EI” and “projected attainment EI,” refer to anthropogenic emissions.

States should use this approach for ozone and PM nonattainment plans and should perform the calculation separately for each relevant pollutant and precursor. This calculation can be broken down into three steps.

Step 1: Calculate the average annual emissions reductions needed to attain. For each relevant precursor, determine the amount of emissions reductions between the base year and the projected attainment year and divide by the number of years between the base year and the attainment year. Note: for PM, this typically represents the RFP annual average reduction, but for ozone, this will likely be different from the 3 percent annual requirement for RFP.

Step 2: Calculate the annual percentage reduction needed to attain. Determine what percentage of the *base year inventory* is represented by the annual average emissions reduction needed to attain by dividing the annual average reductions by the base year inventory for the NAA.

Step 3: Calculate the amount of emissions reductions needed for OYW of progress. Multiply the total emissions from the *attainment projected inventory for the NAA* by the annual percentage reduction needed to attain. This represents the amount of emissions reductions CMs should provide to meet OYW of progress.

EPA notes that this calculation depends on an approvable attainment demonstration, which could either be a modeled attainment demonstration or, where the model does not show attainment, one that relies on weight of evidence to demonstrate attainment. For reasons explained in Section 2, EPA believes it is appropriate to base the OYW of progress amount on the attainment projected inventory for the NAA. However, if EPA is unable to approve the attainment demonstration for reasons related to the adequacy of the modeling or weight of evidence demonstration, then EPA would not be able to approve as adequate the amount of CMs the air agency provided.

To affirm that the CMs achieve OYW of progress, the SIP submission should provide documentation of the expected reductions from the CMs contained within the plan and should compare the expected emissions reductions to the OYW of progress amount calculated above. Air agencies should include all steps of these calculations in their SIP submissions. EPA expects that the CM requirement would be met if the expected reductions meet or exceed the OYW of progress amount for the relevant precursor(s) / pollutant(s), and the CMs meet all other applicable requirements and guidance. If submitted CMs fall short of this amount, Section 4 of this guidance addresses the potential for an infeasibility justification for a lesser amount. Air agencies should ensure that other CM requirements and guidance unrelated to the amount of reductions are met (e.g., the measures are prospective and conditional and will take effect without further actions by the state or EPA as §172(c)(9) requires). Finally, we note that this OYW of progress approach is only for the purpose of calculating the amount for CM purposes and does not relieve an area from meeting other applicable CAA requirements (e.g., RFP, the

milestone compliance demonstration requirements in CAA §182(g), or the quantitative milestone requirements of §189(c), which are separate and distinct from §172(c)(9) and §182(c)(9)).

OYW of progress is calculated for all relevant precursors to determine the amount of emissions reductions that CMs would need to provide to continue the annual percentage reduction, as applied to the attainment projected inventory. However, attainment demonstration modeling may provide a reasonable basis to identify ratios of the effectiveness of reductions of one precursor to reduce ambient concentrations relative to other precursors. If that is the case, then a state may use the ratio to substitute CM reductions of one precursor for a shortfall in CM reductions of another precursor. This applies to VOC and NO_x for ozone and to the PM_{2.5} plan precursors for PM_{2.5}. EPA recommends that an air agency intending to use such a substitution approach consult with its Regional Office concerning selection of a methodology for developing appropriate ratios.

3.2. Examples OYW of Progress Calculations

This section provides examples of the OYW of progress calculation. The first example is for a Severe ozone nonattainment area and the second is for a Serious PM_{2.5} nonattainment area. EPA is providing these examples for the purpose of illustrating the concepts only and they are not based on any particular nonattainment area.

3.2.1. Example for Severe Ozone Nonattainment Area

Consider the example of a state with a Severe ozone nonattainment area that has a 2017 base year EI of 200 tons per day (tpd) of VOC and 150 tpd of NO_x. The attainment demonstration shows that the area will attain the ozone NAAQS in 2032. The 2032 attainment projected inventory for the NAA (that are reflected in the modeled attainment demonstration) is 140 tpd of VOC and 50 tpd of NO_x. The annual average reduction in emissions during the 15-year plan period is 4.0 tpd for VOC and 6.7 tpd for NO_x, which represents 2.0 percent and 4.5 percent of the base year EI of VOC and NO_x, respectively, i.e., the annual percent reductions needed to attain.

Under the OYW of progress approach, the CMs should provide emissions reductions sufficient to maintain the annual percentage reductions needed to attain. This amount (OYW of progress) is calculated by applying the annual percent reductions needed to attain to the emissions totals from the projected attainment inventory for the NAA. That is, upon triggering, the CMs should provide emissions reductions sufficient to provide an annual emissions reduction rate of 2.0 percent for VOC and 4.5 percent for NO_x, based on the attainment projected inventory. In this example, the CMs should provide emissions reductions equivalent to 2.8 tpd of VOC and 2.2 tpd of NO_x. This amount represents OYW of progress for CM purposes (but is not equivalent to the amount of emissions reductions the state would need to achieve for RFP purposes).

$$\text{OYW of Progress for VOC: } \frac{(200 \text{ tpd} - 140 \text{ tpd})}{(2032 - 2017)} \div 200 \text{ tpd} \times 140 \text{ tpd} = 2.8 \text{ tpd}$$

$$\text{OYW of Progress for NO}_x: \frac{(150 \text{ tpd} - 50 \text{ tpd})}{(2032 - 2017)} \div 150 \text{ tpd} \times 50 \text{ tpd} = 2.3 \text{ tpd}$$

This example can be broken down into three steps as described in Section 3.1.

Step 1: Calculate the annual average reductions needed to attain for each relevant precursor.

VOC Step 1a	$200 \text{ tpd} - 140 \text{ tpd} = 60 \text{ tpd}$
VOC Step 1b	$60 \text{ tpd} \div 15 \text{ years} = 4 \text{ tpd}$
NO _x Step 1a	$150 \text{ tpd} - 50 \text{ tpd} = 100 \text{ tpd}$
NO _x Step 1b	$100 \text{ tpd} \div 15 \text{ years} = 6.7 \text{ tpd}$

Step 2: Calculate the annual percentage reduction needed to attain.

VOC	$4.0 \text{ tpd} \div 200 \text{ tpd} = 0.02 \text{ (or 2\%)}$
NO _x	$6.7 \text{ tpd} \div 150 \text{ tpd} = 0.045 \text{ (or 4.5\%)}$

Step 3: Calculate the amount of reductions needed for OYW of progress.

VOC	$140 \text{ tpd} \times 0.02 \text{ (or 2\%)} = 2.8 \text{ tpd}$
NO _x	$50 \text{ tpd} \times 0.045 \text{ (or 4.5\%)} = 2.3 \text{ tpd}$

Comparison of Historical and Revised Guidance:

Under EPA's prior guidance for CMs, the Agency recommended that CMs should achieve emissions reductions equivalent to OYW of RFP, which is essentially defined for ozone as 3 percent of the VOC emissions from the anthropogenic portion of the base year inventory for the NAA.⁶¹

VOC	$200 \text{ tpd} \times 0.03 \text{ (or 3\%)} = 6.0 \text{ tpd}$
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In this example, under EPA's prior guidance, CMs should provide for emissions reductions equivalent to **6.0 tpd of VOC** (or, under the NO_x substitution guidance, 4.5 tpd of NO_x or a

⁶¹ NO_x reductions could generally be credited to make up for a shortfall in VOC reductions on a percentage-of-inventory basis. In other words, if VOC CMs only achieve reductions equivalent to 2 percent of the VOC base year inventory, the addition of NO_x CMs that achieve 1 percent of the NO_x base year EI could be used to meet a OYW of RFP requirement of 3 percent.

combination of VOC and NO_x on a percentage basis). Under the revised guidance, CMs should provide for emissions reductions equivalent to **2.8 tpd of VOC** and **2.3 tpd of NO_x** (although, as noted earlier in this section, a shortfall of reductions from CMs for one of the precursors may be remedied by additional reductions from CMs for other precursors if the attainment demonstration provides the basis to develop a ratio of relative effectiveness).

3.2.2. Example for Moderate PM_{2.5} Nonattainment Area

Consider the example of a Moderate PM_{2.5} nonattainment area that has 2011 base year emissions of 100 tpd of direct PM_{2.5} and 200 tpd of NO_x and the air agency has adequately demonstrated the insignificance of precursor emissions of VOC, sulfur dioxide (SO₂), and ammonia. The modeled attainment demonstration shows that the area will attain the NAAQS by the end of 2021. The attainment projected inventory in the nonattainment plan is 75 tpd of direct PM_{2.5} emissions and 150 tpd of NO_x. The annual average reduction in emissions during the 10 years between the base year and the attainment year is 2.5 tpd of direct PM_{2.5} and 5.0 tpd for NO_x, which represents 2.5 percent of the base year emissions for both direct PM_{2.5} and NO_x. This represents OYW of RFP, which for purposes of the PM_{2.5} NAAQS is defined as generally linear annual emissions reductions, rather than a set percentage as for ozone. Under EPA's prior guidance for CMs, this OYW of RFP is the amount of emissions reductions that the CMs should achieve.

Under the revised OYW of progress approach, the CMs should provide emissions reductions sufficient to maintain the annual percentage reductions needed to attain. This amount (OYW of progress) is calculated by applying the annual percent reductions needed to attain to the attainment year inventory. That is, upon triggering, the CMs should provide emissions reductions sufficient to provide an annual emissions reduction rate of 2.5 percent for both direct PM_{2.5} and NO_x calculated as a percentage of the attainment projected inventory rather than the base year EI. In this example, the CMs should provide emissions reductions equivalent to 1.9 tpd of direct PM_{2.5} and 3.8 tpd of NO_x. This amount represents OYW of progress for CM purposes (but is not the RFP amount).

$$\text{OYW of Progress for Direct PM}_{2.5}: \frac{(100 \text{ tpd} - 75 \text{ tpd})}{(2021 - 2011)} \div 100 \text{ tpd} \times 75 \text{ tpd} = 1.9 \text{ tpd}$$

$$\text{OYW of Progress for NO}_x: \frac{(200 \text{ tpd} - 150 \text{ tpd})}{(2021 - 2012)} \div 200 \text{ tpd} \times 150 \text{ tpd} = 3.8 \text{ tpd}$$

Like the example above for a Severe ozone nonattainment area, this example can be broken down into three steps as described in Section 3.1.

Step 1: Calculate the annual average reductions needed to attain for each relevant precursor. (In this example, we assume the state has adequately demonstrated that it does not need to regulate the PM_{2.5} precursors VOC, SO₂ and ammonia.)

Direct PM _{2.5} Step 1a	$100 \text{ tpd} - 75 \text{ tpd} = 25 \text{ tpd}$
Direct PM _{2.5} Step 1b	$25 \text{ tpd} \div 10 = 2.5 \text{ tpd}$
NO _x Step 1a	$200 \text{ tpd} - 150 \text{ tpd} = 50 \text{ tpd}$
NO _x Step 1b	$50 \text{ tpd} \div 10 = 5.0 \text{ tpd}$

Step 2: Calculate the annual percentage reduction needed to attain.

Direct PM _{2.5}	$2.5 \text{ tpd} \div 100 \text{ tpd} = 0.025 \text{ (or 2.5\%)}$
NO _x	$5.0 \text{ tpd} \div 200 \text{ tpd} = 0.025 \text{ (or 2.5\%)}$

Step 3: Calculate the amount of reductions needed for OYW of progress.

Direct PM _{2.5}	$75 \text{ tpd} \times 0.025 \text{ (or 2.5\%)} = 1.9 \text{ tpd}$
NO _x	$150 \text{ tpd} \times 0.025 \text{ (or 2.5\%)} = 3.8 \text{ tpd}$

Comparison of Historical and Revised Guidance:

Under EPA’s prior guidance, EPA recommended that CMs should provide for emissions reductions equivalent to OYW of RFP for direct PM_{2.5} and each PM_{2.5} plan precursor. The amount of OYW of RFP is determined by the same method as described above for step 1. That is, calculate the annual average reductions needed to attain for each relevant precursor by subtracting the attainment projected inventory from the base year EI and dividing that value by the number of years between the base year and the attainment year.

Direct PM _{2.5} Step 1a	$100 \text{ tpd} - 75 \text{ tpd} = 25 \text{ tpd}$
Direct PM _{2.5} Step 1b	$25 \text{ tpd} \div 10 = 2.5 \text{ tpd}$
NO _x Step 1a	$200 \text{ tpd} - 150 \text{ tpd} = 50 \text{ tpd}$
NO _x Step 1b	$50 \text{ tpd} \div 10 = 5.0 \text{ tpd}$

In this example, under EPA’s prior guidance, CMs should provide for emissions reductions equivalent to **2.5 tpd of direct PM_{2.5}** and **5.0 tpd of NO_x**. Under the revised guidance, CMs should provide for emissions reductions equivalent to **1.9 tpd of direct PM_{2.5}** and **3.8 tpd of NO_x**.

4. Reasoned Justification for Less Than OYW of Progress

Notwithstanding the updated OYW of progress calculation in Section 3, EPA recognizes that some air agencies may still be concerned that they cannot meet the recommended amount of reductions from CMs. As noted in Section 2, EPA guidance currently interprets the CAA to allow an air agency that is unable to provide sufficient emissions reductions from CMs to provide a reasoned justification for a lesser amount. EPA has not to date provided further guidance on how to develop such a justification, but some air agencies have requested clarification, claiming that they are unable to provide sufficient reductions because there are not remaining sufficient feasible measures to meet the requirements for CMs. This guidance is intended to provide such additional clarification in response to these requests.

If, after adequately evaluating additional control measures, the air agency is unable to identify and adopt feasible CMs that would reduce emissions by an amount sufficient to meet the OYW of progress recommendation, then it may be appropriate for the air agency to submit CMs that result in less than that amount, using the reasoned justification approach described in this section. While EPA notes that CAA section 172(c)(9) and section 182(c)(9) do not explicitly provide for consideration of whether specific measures are feasible, the Agency believes that it is reasonable to infer that the statute does not require control measures regardless of any technological or cost constraints whatsoever. It is more reasonable to interpret the CM requirement not to require air agencies to adopt and impose infeasible measures. The statutory provisions applicable to other nonattainment area plan control measure requirements, including RACM/RACT (for ozone and PM), BACM/BACT (for PM), and most stringent measures (for PM) allow air agencies to exclude certain measures that are deemed unreasonable or infeasible (depending on the requirement). For example, the most stringent measures provision in CAA section 188(e) requires plans to include “the most stringent measures that are included in the implementation plan of any state or are achieved in practice in any state, *and can feasibly be implemented in the area* [emphasis added].” EPA considers it reasonable to conclude that Congress similarly did not expect air agencies to satisfy the CM requirement with infeasible measures. Thus, EPA anticipates that a demonstrated lack of feasible measures would be a reasoned justification for adopting CMs that only achieve a lesser amount of emission reductions. To justify a lesser amount of emissions reductions based on infeasibility, an air agency would need to provide EPA with an adequate explanation and documentation that there are not additional feasible CMs that could achieve the recommended full OYW of progress amount.

EPA notes that a key factor affecting the availability of feasible measures to be CMs in a given nonattainment area is the degree to which the air agency has (1) already implemented all feasible measures, or (2) already included all feasible measures in the state’s SIP to meet other control strategy requirements for implementation no later than the attainment date. In some areas, particularly those with longstanding nonattainment problems where the air agencies have already adopted increasingly stringent measures in attainment plans over the years since EPA issued the General Preamble, the available supply of feasible measures to hold in reserve as CMs may be greatly diminished. These air agencies may be justified in adopting and submitting CMs that would result in less than OYW of progress, if they have identified and evaluated all potentially applicable measures, have adopted the feasible measures necessary to expeditiously attain the

relevant NAAQS, have determined that the remaining feasible measures are insufficient to achieve OYW of progress, and have adequately demonstrated these points in their submission to EPA.

EPA recommends that if an air agency is seeking to satisfy the statutory CM requirement with less than OYW of progress based on lack of feasible measures, then that air agency should demonstrate that they have in fact considered all existing and potential control measures relevant to the appropriate source categories and pollutants in the nonattainment area, and have reached reasonable conclusions regarding whether a measure is infeasible.⁶² In this guidance, we use the term “infeasibility justification” to refer to this kind of demonstration. The demonstration will entail air agencies documenting their efforts to identify existing and potential measures and explaining their reasoning for concluding that identified measures are infeasible. Where the nonattainment plan associated with the CM submission contains a robust control strategy analysis, that analysis can serve as a foundation for much of this effort. However, EPA recommends additional documentation specific to the infeasibility justification for CMs as described in this section to ensure that the justification is adequate.

This section provides a suggested step-by-step methodology for air agencies to use to develop an infeasibility justification for CMs based on the following general principles:

- It should be based on a case-specific factual analysis that begins with a thorough examination, as described in this section, of relevant emissions sources in the area and the range of existing and potential control measures for such sources. If existing or potential control measures are excluded from this analysis, the resulting infeasibility claim would likely be deficient with respect to the excluded measures.
- The evaluation of existing and potential control measures should encompass a broad range of sources and measures that could reduce relevant emissions. If the control strategy analysis was previously limited in scope (for example, a RACT analysis that only evaluated major sources and CTG-covered sources within an ozone nonattainment area), the air agency should evaluate additional sources because the CM requirement is not limited in this way.
- Once measures are identified, the case-specific factual analysis should explain and document the reasoning behind each claim that an identified measure is infeasible in the area. As explained later in this section, “infeasible” means either technologically or economically infeasible.
- The focus of the infeasibility justification should be on existing and potential control measures that the air agency intends to reject as infeasible as CM; for this type of justification, it may be useful to refer to measures that have already been adopted and described in the air agency’s current or previous control strategy submissions, but the

⁶² In this document, “existing control measures” refers to controls that are not yet on-the-books or on-the-way, but which could prospectively be applied to sources in the nonattainment area because they are presently being implemented for sources outside the relevant nonattainment area or are presently being implemented for different sources in the nonattainment area. “Potential control measures” refers to identifiable measures that may be feasible for sources in the nonattainment area but have not been previously implemented elsewhere.

information needed to support the infeasibility justification relates primarily to identifying the rejected measures and the reasons why they are infeasible.

We note that, where appropriate, air agencies evaluate control measures for reasons other than the CM requirement and may separately establish that specific control measures are not technologically or economically feasible in their non-CM control strategy analyses (e.g., that a measure is not RACM/RACT, BACM/BACT, or MSM, and is not feasible for meeting RFP or for attaining by the applicable attainment date) under existing guidance.⁶³ EPA expects that justifications to establish that control measures evaluated as CMs are infeasible could be similar to these analyses but should not simply repeat the control strategy's infeasibility showing. By statute, CMs are a separate nonattainment plan requirement that is in addition to other control measure requirements, so disqualification of a specific control measure for purposes of other requirements does not per se disqualify the measure as a CM. As described in more detail below, a claim that a measure is infeasible for control strategy purposes does not necessarily mean that it is also infeasible as a CM, and in some cases additional explanation should be provided as to why an available measure will not be feasible as a CM at a given source.

It is important to note the possibility, that there may be *feasible* controls that the air agency previously considered in the control strategy analysis, but determined to be unnecessary for attainment, insufficient to advance attainment, or otherwise not required by the CAA. Where these measures are otherwise suitable for adoption as CMs (i.e., they can be implemented within 60 days of triggering, reductions can occur within 2 years of triggering, etc.) EPA recommends that, before undertaking an infeasibility justification as explained in Section 4.1, the air agency first ensures that such measures are already included as CMs in the nonattainment plan submission. If such measures are sufficient to reach OYW of progress, then the infeasibility justification is not necessary. If such measures and all other feasible measures still do not reach OYW of progress, then the shortfall may be addressed by an infeasibility justification.

Even where an air agency submits an infeasibility justification, it should also adopt and submit all feasible CMs (possibly including, pursuant to the previous paragraph, measures it previously excluded from the control strategy), documenting the reductions that would be achieved from the implementation of these CMs, if triggered. A plan that incorporates all feasible reductions but falls short of providing the recommended amount of CM reductions may still satisfy the CM requirement. EPA anticipates that, except in extremely rare instances, a state will be able to identify at least some feasible measures to serve as CMs, even if they achieve substantially less than OYW of progress. In light of the expected variation in the availability of feasible measures and resulting emissions reductions across different nonattainment areas, we are not recommending a minimum amount of CM emissions reductions that would be approvable as part of an infeasibility justification. With sufficient justification, CMs representing a small amount of reductions may be reasonable. However, EPA emphasizes that lower amounts of CM emissions reductions will warrant more robust infeasibility showings. In light of the very strong likelihood

⁶³ See, e.g., 1992 General Preamble at 57 FR 13540-41, which states in reference to RACM/RACT that a submission should contain “a reasoned justification for partial or full rejection of any available control measures, including those considered or presented during the State's public hearing process, that explains, with appropriate documentation, why each rejected control measure is infeasible or otherwise unreasonable.”

of any area having at least some available reductions, however small the amount, we do not recommend submission of a plan that provides no CMs (i.e., zero reductions) for a given precursor.⁶⁴

4.1. Recommended procedure for developing a demonstration that the area lacks sufficient feasible measures to achieve 1-years' worth of reductions ("infeasibility justification").

EPA recommends the following four-step approach for air agencies to identify CMs and to develop an infeasibility justification where warranted:

Step 1: Identify existing and potential control measures, i.e., measures not already included in the plan, that could be applied to sources in the nonattainment area.

Step 2: Review each of the measures identified in Step 1 to determine whether it is feasible as CM. If feasible, include the measure in the CM submission. (Check to see if OYW of progress is met, and if so, the infeasibility justification is no longer needed).

Step 3: For the remaining measures (i.e., the infeasible measures from Step 2), document the reason why the air agency reached the conclusion that each measure is infeasible, including whether the conclusion is based on technological or economic infeasibility.

Step 4: Prepare the infeasibility justification to include with the SIP submission by identifying each measure determined to be infeasible in Step 3, explaining the reason for each such determination, and providing supporting information and analysis that supports each conclusion.

Each of these steps is explained in more detail below.

Step 1: Identify existing and potential control measures not already included in the plan that could be applied to sources in the nonattainment area.

In this step, the air agency should conduct a careful analysis to identify the sources present in the nonattainment area, the "on-the-books" control measures (i.e., the control measures that already apply to those sources) and the "on-the-way" control measures (i.e., the control measures in the nonattainment plan that will be implemented during the upcoming planning period), and any remaining unregulated source categories. In addition, it should identify existing measures (including strengthening and expanding on-the-books and on-the-way measures) and potential measures that could serve as CMs. This analysis should include the following elements:

- An emissions inventory that provides a comprehensive, detailed list of source categories emitting relevant pollutants, including identification of subcategories based on different fuels or materials (e.g., feedstock or production materials) as applicable. For ozone areas that are newly designated for a NAAQS and for PM areas, the base year inventory for the nonattainment area can be used for this purpose. Ozone areas that have been reclassified

⁶⁴ EPA notes that in the *AIR* decision, the court rejected a measure that would have achieved 10 percent of the recommended amount. However, EPA's action there was not based on an infeasibility justification as described in this guidance. EPA believes that with the appropriate infeasibility justification, a lesser amount could be supported.

to a higher classification should use the most recent periodic inventory for the nonattainment area.

- The emissions inventory should separate broader source categories into more specific categories that correspond with different control measures that apply and should separately list subcategories that are currently unregulated. For example, reciprocating engines can be categorized according to size or the type of fuel used to allow contingency measures to be specified for certain subcategories. Farming operations can be broken down into tilling dust, harvesting dust, and animal husbandry. Animal husbandry can be categorized by the type of livestock, for example, dairy cattle, range cattle, feedlot cattle, poultry, etc. This level of detail is necessary for the next step of the analysis.
- Identification of the on-the-books and on-the-way controls that apply to the source categories or subcategories present in the nonattainment area.
 - In order to facilitate a comparison of the on-the books and on-the-way control measures with other existing and potential control measures and the identification of unregulated sources and subcategories in the nonattainment area, air agencies should list each source category included in the inventory as described above, the amount of relevant emissions generated by that source category, and the corresponding rules that apply (or are scheduled to apply) to the individual source categories and subcategories, and note any exemptions that apply.
- Identification of existing and potential control measures, including opportunities to strengthen on-the-books and on-the-way rules.⁶⁵ A robust attainment plan control strategy analysis⁶⁶ can serve as a good starting point for conducting this analysis.⁶⁷
 - The CM analysis should include the full range of sources appropriate for emissions controls in a nonattainment plan, i.e., stationary point sources, anthropogenic area sources (also referred to as nonpoint sources), and mobile sources.
 - For stationary source measures, air agencies can use resources such as EPA’s Menu of Control Measures,⁶⁸ recent control strategy analyses (e.g., RACM/BACM and RACT/BACT analyses), and control measures in other nonattainment areas (particularly those with higher classifications or more mature programs), the RACT/BACT/LAER Clearinghouse

⁶⁵ Changes to on-the-books and on-the-way control measures could include strengthening emissions limits, lowering applicability thresholds, and removing exemptions.

⁶⁶ The PM_{2.5} Implementation Rule provides a detailed description of the elements of a control strategy analysis, including guidance regarding the determination of technological and economic feasibility. 81 FR 58010, 58033-58043 (August 24, 2016).

⁶⁷ Serious PM areas are required to adopt BACM/BACT, and under some circumstances, MSM. Such measures may also be useful models for contingency measures in other areas.

⁶⁸ <https://www.epa.gov/air-quality-implementation-plans/menu-control-measures-naaqs-implementation>.

(RBLC)⁶⁹, and other resources available to the air agency to identify potential new stationary source control measures.

- For mobile source measures, there are currently two EPA webpages that provide information on mobile source program design and implementation as well as guidance on the crediting of such programs in a state implementation plan: (1) the Guidance on Control Strategies for State and Local Agencies webpage⁷⁰ and (2) the Policy and Technical Guidance webpage.⁷¹
- Some air agencies or multi-jurisdictional air organizations provide additional sources of information that can also assist in identifying additional control measures.⁷² EPA recommends consulting with the appropriate Regional office regarding sources of measures beyond those EPA has identified above.
- A control measure that the state does not have the legal authority to impose because of federal preemption would not need to be evaluated in detail as part of the infeasibility justification, but the infeasibility justification should include a description of any such measures the air agency considered and excluded due to preemption, specifically identifying the preemption.⁷³

In developing the Step 1 list of measures, air agencies may determine that some identified measures may have only a trivial impact on emissions. It would be appropriate for states to exclude trivial measures from the Step 1 list under such circumstances. In keeping with the recommendation earlier in this section regarding the preference for states to adopt at least one CM or a combination of CMs even if they only achieve a relatively small amount of emission reductions, along with an infeasibility justification, EPA recommends that if a state seeks to exclude measures in this way, the emission reductions from such measures should be unquestionably negligible, even when considered alongside other similarly trivial measures (e.g., no more than 1 percent of OYW in total).

⁶⁹ <https://cfpub.epa.gov/rblc/>.

⁷⁰ <https://www.epa.gov/state-and-local-transportation/guidance-control-strategies-state-and-local-agencies>. This webpage contains EPA guidance to help state and local air quality agencies quantify and implement state implementation plan control strategies that reduce mobile source emissions. Examples include commuter programs, diesel retrofit and replacement, land use, locomotive idle reduction, transportation control measures (TCMs), and transportation pricing programs.

⁷¹ <https://www.epa.gov/state-and-local-transportation/policy-and-technical-guidance>. This webpage provides links to general information on mobile source Clean Air Act requirements and guidance on control strategies.

⁷² Two examples are (1) the Ozone Transport Commissions (OTC) 2017 “White Paper on Control Technologies and OTC State Regulations for NO_x Emissions from Eight Source Categories” and (2) the CARB Technology Clearinghouse <https://ww2.arb.ca.gov/our-work/programs/technology-clearinghouse/technology-clearinghouse-tools>.

⁷³ EPA notes that a state is obligated to meet the CM requirement of the CAA and thus division of authority between the state and local air districts, or between different state agencies within a given state, does not provide a basis to claim lack of authority.

The result of Step 1 would be a detailed list of source categories and subcategories, the associated relevant emissions for each category/subcategory, the “on-the-books” and on-the-way” that apply, and all existing or potential control measures that, prior to any feasibility screen, are applicable to sources in the nonattainment area, that could achieve additional emissions reductions, and that are not already adopted or implemented. The list should be accompanied by a description of how the air agency conducted the search for contingency measures. The list of measures identified in Step 1 will identify the scope of potential CMs and will later be used to define the remaining measures for which the air agency intends to make a technological/economic infeasibility justification in Step 3. It will also allow EPA and the public to comment on the full list of existing or potential measures that the air agency considered, in order to provide an opportunity to identify any potential measures that the air agency did not include in the analysis.

Step 2: Review each of the measures identified in Step 1 to determine whether it is feasible as CM. If feasible, include the measure in the CM submission.

In this step, the air agency will apply a feasibility screen to determine whether any of the identified measures are feasible as CMs. The measures not found to be feasible in this step will comprise the list of infeasible measures for which the air agency needs to provide infeasibility justification in Step 3. But first, EPA anticipates that the Step 1 search for existing and potential measures could identify measures that are feasible as CMs. Any measures identified during the Step 1 analysis that are feasible should be adopted as CMs, and an updated comparison with the OYW of progress metric should be conducted. If they are sufficient to reach OYW of progress, then the infeasibility demonstration is no longer needed.

A particular set of measures that an air agency could determine to be feasible in Step 2 and that would not already be included in the control strategy would be the measures that an air agency determined that it is not required to impose to meet RACM requirements because they would not advance the attainment date by 1 year. Assuming these measures meet the other conditions for being a valid CM, they should be adopted as CM in Step 2 unless they are infeasible, or until the OYW of progress recommendation is met. If rejecting those same measures as infeasible as CMs, the air agency should specifically address the feasibility of those measures because the fact that the control measures would not advance the attainment date by 1 year is not a sufficient reason for rejecting those control measures as CMs.

EPA has previously issued guidance addressing feasibility for various control measure requirements in nonattainment plans (e.g., RACM/RACT, BACM/BACT, or MSM).⁷⁴ This guidance has described the analytical factors that states should use to evaluate feasibility of CMs, identifying two kinds of feasibility: technological and economic. Each of these is briefly reviewed in this section. The discussion focuses on the considerations for evaluating feasibility of measures for CM purposes, which build upon these previously discussed feasibility

⁷⁴ See, e.g., the Appendices to the 1992 General Preamble, 57 FR 18070 at 18073-4 (April 28, 1992), the 1992 NO_x Supplement to the General Preamble, 57 FR 55620 at 55624-5 (November 25, 1992), the 1994 PM₁₀ General Preamble Addendum, 59 FR 41988 at 42013, and the 2016 PM_{2.5} NAAQS SIP Requirements Rule at 81 FR 58010 at 58084-85.

considerations for other control measure requirements (and therefore this discussion should not be read as addressing feasibility analysis for requirements other than CMs).

Step 2a. Technological Feasibility

EPA has identified several factors that affect technological feasibility of a measure, including the source's process and operating procedures, raw materials, physical plant layout, and other environmental impacts such as water pollution, waste disposal, and energy requirements that would negate the environmental benefit of the control. If, upon consideration of these and other relevant factors, the air agency determines that a measure would render the source completely inoperable, make the source clearly unsafe to operate, or create significant negative non-air quality related environmental impacts, such a showing could support a justification that the measure is technologically infeasible.

An additional consideration in technological feasibility is the time frame for achieving reductions. For CMs, as explained in section 5 of this guidance, reductions should be achieved in no more than 2 years from the triggering event. Where an otherwise feasible measure requires longer than 2 years to achieve reductions, this could be a justification for technological infeasibility with appropriate documentation of the time frames involved.

EPA acknowledges that if an air agency determines that a control measure is not technologically feasible in the nonattainment plan control strategy analysis it may also not be technologically feasible as a CM. However, in light of the separate CAA requirement for CM, EPA recommends that any control measures a state rejected because of technological infeasibility in a control strategy analysis should still be evaluated to determine whether they may be feasible as CM. For example, there may be timing considerations (e.g., the need to implement RACT by a specified date) that could render an identified measure infeasible in a RACT analysis, but when considering the time that the CM would likely be implemented, up to and including the 2 years following the CM trigger date (i.e., the maximum date based on failure to attain), the measure may become feasible. Moreover, if a measure was included in the plan's control strategy but its scope/coverage was limited due to technological feasibility considerations, the state should consider it in Step 2 of the CM analysis by evaluating whether additional time would improve the feasibility of expanding its scope/coverage as a potential CM.

Where a measure involves significant planning, such as an extensive stakeholder, planning and/or budgeting process, that measure could still be feasible as a CM. Air agencies would need to complete these planning processes prior to adopting and submitting such a measure in order to assure its timely approval in a SIP, and ensure that it can otherwise meet CM requirements and guidance for timing and implementation without further action. At the same time, EPA believes that it is reasonable for states to account for factors that might prevent a particular measure from taking effect within 60 days of triggering when determining its feasibility as a CM. For example, a measure may be infeasible if it requires a plan for program implementation with details (e.g., project plan, detailed budget, schedule, etc. to assure the timely and successful implementation of the measure) that cannot be specified to take effect within 60 days of triggering. Similarly, a potential measure may be infeasible if it requires program funding to be available upon triggering the CM, but the funding or irrevocable funding commitment cannot be secured prior to

the time the state submits, and EPA approves the CM. Securing program funding or irrevocable funding commitments in advance for a CM program which may never be triggered may be a challenge for states. Where a state claims that a measure is infeasible for these reasons, it should clearly identify the specific factors that prevent it from taking effect within 60 days.

Step 2b. Economic Feasibility

EPA often uses cost per ton reduced as an indicator of economic feasibility, but there is not a single one-size-fits-all cost per ton (cost/ton) amount that would provide a bright line that renders a control measure economically feasible (or infeasible) for CM purposes for all areas, industry sectors, pollutant/precursors, etc.⁷⁵ Instead, evaluating whether a given measure is economically feasible as a CM will include a robust evaluation of the cost of the control measure to be implemented within a given timeframe. Therefore, EPA recommends that air agencies provide cost/ton estimates for each of the measures the air agency is rejecting as a CM on this basis. EPA's Control Cost Manual provides guidance for developing accurate and consistent costs for air pollution control devices.⁷⁶ Providing cost/ton estimates for CMs that the air agency is adopting provides a useful basis for illustrating the relatively higher cost/ton of any measures rejected on this basis. Importantly, economic feasibility considerations include the control cost for a source relative to other similar sources that have implemented a specific control measure. EPA presumes that it is reasonable for similar sources to bear similar costs of achieving emissions reductions. Economic feasibility rests very little on the ability of a particular source to "afford" to reduce emissions to the level of similar sources.⁷⁷ Air agencies should also ensure that control measures are not rejected categorically as economically infeasible if they may otherwise be economically feasible for some individual sources with that category.

In determining what is economically feasible for CM purposes, the fact that a potential CM is more costly than those in the plan's control strategy is not automatically a basis for concluding it is economically infeasible. EPA expects air agencies may need to consider more costly measures than those in the control strategy because, by definition, triggering CMs means the area has failed to attain or meet RFP through implementing the set of measures within the plan. Consistent with the statutory purpose of CMs to provide additional emissions reductions in the event that the measures in the control strategy fail to meet RFP or to result in attainment, EPA believes that CMs are logically measures that may have greater economic consequence than what was provided in the control strategy. Accordingly, measures that the air agency rejected in the control strategy analysis due to economic considerations should still be evaluated by the air agency in Step 2 as potential CMs. If the air agency still rejects the measures as CM due to economic infeasibility, Step 3 will need to document the agency's reasoning.

⁷⁵ The cost per ton amount referred to here is for an annual or annualized cost; that is, the typical yearly cost associated with a control measure under consideration for CM purposes.

⁷⁶ <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>. Section 1, Chapter 2 of the Control Cost Manual provides guidance on the cost estimation methodology that is appropriate for use with air pollution control devices such as those under consideration as CMs.

⁷⁷ See, e.g., 57 FR 18070 at 18074, and 81 FR 58010 at 58085.

The CAA does not indicate whether the cost of controls is a factor to consider when identifying CMs. On one hand, this suggests that air agencies ought to be considering all possible CMs regardless of how much those controls cost to implement. However, as explained above, EPA considers it reasonable to interpret the CM requirements not to require air agencies to adopt and impose economically infeasible measures. As such, EPA believes it is reasonable to expect that there be some upper limit relevant to costs in the context of CM; that at some point costs could become so exorbitant that it would render the otherwise possible CM infeasible. However, this point is difficult to define because it depends on many fact-specific elements that can change over time. EPA believes a reasonable approach is to recommend that the economic feasibility of potential CMs be evaluated based on a cost/ton threshold that is higher than what was considered in a similar economic analysis for control strategies in the nonattainment area, including any thresholds associated with RACT determinations. A measure that was determined economically “unreasonable” for RACT purposes because of cost is not automatically economically infeasible for use as a CM.

As with technological feasibility, the economic feasibility analysis for potential CMs should consider the timeframe by which the measures will need to achieve reductions. As explained in Section 5, EPA recommends that for CMs, this should be no later than 2 years following the trigger for the CM. To the degree that a measure, once triggered, would cost more to implement within 2 years of triggering than it would to implement it over a longer time, this could be a relevant consideration to the measure’s economic feasibility as a CM, provided the costs of the “faster” implementation are appropriately documented. At the same time, the economic feasibility analysis should reasonably consider the potential that the trigger for CMs might not occur until the attainment date, and for all creditable emissions reductions to not be realized until 2 years later. Additional time to prepare for implementation of a measure might reasonably lower its cost compared to the cost of implementing it now. Accounting for these timing considerations need not be based on detailed economic forecasts, but should provide a sufficiently robust basis for an air agency’s conclusions regarding economic infeasibility of the measure specifically as a CM.

Step 3: For the remaining measures (i.e., the infeasible ones from Step 2), describe the reason why the air agency reached the conclusion that they were infeasible (including whether the conclusion is based on technological or economic infeasibility).

Following the generation of the list of measures potentially applicable as CMs (Step 1) and the identification and adoption of the subset of those that are feasible (Step 2), air agencies begin Step 3 with the list of remaining measures for which they intend to provide an infeasibility justification. In Step 3, for each remaining measure, the air agency should develop an explanation of why it rejected the existing or potential control measures during Step 2 review. In keeping with the discussion in Step 2, EPA recommends that the air agency first identify whether the justification for excluding a measure as a CM is based on a determination that the measure is technologically infeasible and/or that it is economically infeasible. The air agency should then provide the basis for each such determination, consistent with the feasibility considerations that it evaluated in Step 2.

For a technological infeasibility determination, the explanation should identify on a measure-by-measure basis, the specific factors that the air agency used in determining that the measure cannot be implemented for the relevant sources (or, as applicable, that its implementation cannot be broadened). If the technological infeasibility determination is tied to the timeframe for achieving reductions (for example, if the measure cannot possibly achieve any reductions within 2 years) the air agency should describe the implementation time frames that it considered. As noted in Step 2, in light of the separate CM requirement, the justification should address why the new or expanded measure is technologically infeasible for CM purposes.

For an economic infeasibility determination, the explanation should identify on a measure-by-measure basis, the cost factors and other related factors that the air agency used in determining that the measure is economically infeasible. EPA recommends that air agencies provide cost/ton estimates for each of the measures being rejected as CMs on this basis. The air agency should also provide an explanation of why this cost/ton is infeasible for the specific CM under consideration. For example, it could compare the cost/ton of the infeasible measure to the estimates for CMs that the state is adopting to illustrate the relatively higher cost/ton of the rejected measures. The explanation of the air agency's judgments regarding infeasibility of measures as CMs should address the CM-specific factors noted in discussion of economic feasibility in Step 2, i.e., the expectation that CMs may be judged on a higher cost threshold than for other control strategy analysis in the SIP, and the costs to implement CMs should consider the later trigger date and potential for additional time beyond the attainment date that may be available to implement CMs.

Step 4. Prepare the infeasibility justification to include with the SIP submission by identifying each measure determined to be infeasible in Step 3, explaining the reason for each such determination, and providing supporting information and analysis to support each conclusion.

A state's nonattainment plan SIP submission should provide documentation of Steps 1 through 3 to ensure an adequate record to support the reasoned justification for having CMs that provide emissions reductions that result in less than OYW of progress. Specifically, EPA recommends that the submission should provide thorough description of:

- (1) *the approach used by the air agency in Steps 1 and 2 to identify existing and potential control measures*, which will provide EPA an ability to assess whether existing and potential control measures have been identified, including any beyond the control strategy analysis, and, where feasible, have been included in the submission as CMs; and
- (2) *the analysis in Step 3 of feasibility for each of these measures and justification for the conclusion that certain measures are technologically and/or economically infeasible*, which will provide EPA with an ability to assess the basis for any infeasibility justification that the air agency makes for the measures identified in Step 1.

EPA recognizes that in cases where the air agency is asserting that numerous measures are infeasible, this documentation effort will require an investment of effort beyond that already invested to document the control strategy analysis. At the same time, we recognize that without adequate record support, EPA would lack a basis for its approval of a reasoned justification for

approval of CMs that result in emissions reductions less than OYW of progress, particularly if the amount is significantly less than OYW. To balance these factors, EPA recommends that for Step 1, the air agency should prioritize more robust documentation of its approach for identifying existing and potential measures for the sources and categories that comprise larger portions of the inventory. Similarly, for Steps 2 and 3, EPA recommends that the air agency should provide more robust documentation for the infeasibility analysis for the measures that, if feasible, would have provided a greater amount of reductions. While focusing effort in this way is reasonable, the air agency, in order to provide the strongest justification, should at least describe the basis for infeasibility for any category and measure identified in Step 1. To further affirm that it has addressed all non-trivial measures, an air agency could list the source categories for which it determined in Step 1 that the aggregate reductions from available CM would result in unquestionably negligible emissions reductions. As noted previously, the further a CM plan is from achieving OYW of progress, the more robust the record support for its infeasibility showing should be.

5. Guidance on Timing of Reductions from CMs

EPA is also updating its guidance on the recommended timing of emissions reductions that CMs should achieve. Section 172(c)(9) and 182(c)(9) both provide that CMs must “take effect” without further action by EPA or the state, but do not define the term “take effect” or specify timelines for implementing the measures or achieving reductions. As discussed in Section 2, in the 1992 General Preamble, EPA did address the question of how soon the CMs for ozone should take effect, and acknowledged that certain actions, such as notification of sources, modification of permits, etc., would probably be needed before a measure could be implemented effectively. There, EPA concluded that in general, actions needed to affect full implementation of the measures should occur within 60 days after EPA notifies the State of its failure. For purposes of PM, EPA stated in the General Preamble that states should implement CMs “immediately” after a triggering event, but subsequently in the PM_{2.5} Implementation Rule, EPA has indicated that states should implement the CMs “quickly” in recognition of the potential need for minimal administrative actions to begin implementation, and by regulation EPA has required that the CMs expressly specify the time frame during which the CMs will become effective after a triggering event.⁷⁸ We continue to believe that 60 days is a reasonable period for such administrative actions to occur before the CMs begin to provide emissions reductions. EPA is not altering its previous guidance with respect to this 60-day period.

Turning to the question of when the emissions reductions from the CMs should occur, as discussed in Section 2, EPA did not make explicit recommendations in the General Preamble. However, EPA implicitly was assuming that the emissions reductions should occur within the year following a triggering event. This was a function of EPA’s approach to guidance on the amount of emissions reductions that CMs should achieve, premised on OYW of RFP, and the purpose of CMs as providing emissions reductions that would bridge the gap during the period – which prior guidance generally assumed to be 1 year – that a state would be developing a new SIP submission to address the underlying deficiencies that resulted in the failure to meet RFP or

⁷⁸ 57 FR 13498 at 13544/1 (“immediately”); 81 FR 58.066 (“quickly”); 40 CFR 51.1014.

the failure to attain. Following this logic, it was reasonable to conclude that emissions reductions from CMs should generally occur within a year of the triggering event. EPA continues to believe that 1 year is generally the appropriate timeframe for CMs to achieve reductions because of the intended purpose of CMs to provide emissions reductions to bridge the gap between the failure and the subsequent corrective action.

Section 4 of this guidance discusses infeasibility justifications that could be used where an air agency is unable to identify and adopt sufficient CMs to provide OYW of progress due to a lack of feasible measures. However, it is also possible that an air agency lacking sufficient feasible CMs that it could implement to provide emissions reductions within 1 year could, upon accounting for reductions in the second year, come closer to reaching – or potentially fully reach – OYW of progress. EPA believes in this case that, rather than exclude measures that are feasible as CMs because they would not result in sufficient emissions reductions in the first year after triggering, it is preferable for air agencies to consider and include these as CMs in their SIP submissions. We think that CMs that result in new emissions reductions during the second year following triggering will still serve the important purpose of CMs to continue progress towards attainment, as the state develops and submits, and EPA acts on, a SIP submission to address the underlying deficiency.

EPA acknowledges that this approach would result in the OYW of progress reductions being spread out over the (up to) 2-year period following the triggering event. In light of the fact that the statute specifies neither the amount of emissions reductions that CMs should achieve, nor the timing for achieving the CM emissions reductions, EPA considers it is reasonable to provide for this option, especially where there are insufficient measures available to achieve sufficient emissions reductions over a 1-year period. If an air agency elects to adopt as CMs measures that will require more than one year from the triggering event to provide the full amount of necessary reductions, then it should provide an adequate explanation of why the reductions could not be achieved within the first year and how much additional time is needed (up to one additional year). Reductions should be achieved as soon as possible. This new approach remains consistent with EPA's original approach because the benefits of reductions in the second year would result in improvements to air quality during the time that the state and EPA are taking the next steps in response to the failure that triggered the CM, such as the state developing and EPA acting on a new SIP submission (e.g., the SIP submission that would be required upon reclassification, or in response to a PM milestone failure under 189(c)(3)). With the benefit of up to an additional year to achieve reductions, air agencies may also be able to avoid the need for an infeasibility justification by instead developing and adopting CMs that will provide the OYW of progress recommended amount of emissions reductions.

Where partial implementation of a measure is feasible in year 1 following triggering of a CM, but further implementation is feasible in year 2 (e.g., a phased-in control measure), the same reasoning applies. EPA believes that it could be appropriate for the reductions in both years to count toward the OYW of progress showing, but the state should adequately explain and document the basis for the inability to fully realize the reductions of the measure in year 1. On the other hand, where the phased measure extends to periods beyond year 2, EPA does not believe it would be appropriate to continue to credit new reductions beyond year 2 to the initial

OYW of progress showing, because by that time, the next steps should be well underway. For example, within 2 years of a CM triggering event, the state generally would have been required to develop and submit a SIP submission containing new control measures necessary to achieve attainment or address RFP. Where an air agency wishes to adopt into a SIP the phased implementation of a CM that continues to achieve additional reductions beyond the second year following triggering, EPA would likely be able to approve that portion of the measure as a SIP strengthening measure, but we would not consider new reductions beyond 2 years to count toward OYW of progress for the CM requirement.