**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

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NOV 10 2017

Peter D. Lopez
Regional Administrator
U.S. Environmental Protection Agency, Region 2
290 Broadway, 26th Floor
New York, NY 10007-1866

Dear Administrator Lopez:

DEC is submitting two documents for approval into the New York State Implementation Plan (SIP) for the 2008 ozone National Ambient Air Quality Standards (NAAQS). The New York-Northern New Jersey-Long Island, NY-NJ-CT area (hereafter the New York metropolitan area, or NYMA) was reclassified to moderate nonattainment for the 2008 NAAQS on May 4, 2016; DEC was therefore statutorily required to submit an attainment demonstration and a Reasonably Available Control Technology (RACT) demonstration to EPA as SIP revisions.

First, the enclosed attainment demonstration, being submitted pursuant to Clean Air Act (CAA) section 182(b), establishes that the NYMA is unable to reach attainment of the 2008 NAAQS by the statutory deadline of July 20, 2018. DEC is requesting that EPA issue an expeditious reclassification to serious nonattainment so New York, New Jersey, and Connecticut have adequate time to develop complete SIPs that forecast attainment in the NYMA by the serious area deadline of July 20, 2021.

This attainment demonstration includes complete 2011 baseline and 2017 projection inventories, and determines that the area is meeting the three-percent-per-year reasonable further progress requirements. DEC also certifies that certain previously-approved CAA requirements for ozone nonattainment areas remain adequate, and that no revisions to the state plan are necessary for these previously-approved requirements. Specifically, DEC certifies that the emission inventory, emission statement, vehicle inspection and maintenance, nonattainment new source review, and RACT requirements are up-to-date and valid for the 2008 ozone NAAQS.

Second, DEC is submitting a RACT demonstration pursuant to CAA section 172(c)(1) that confirms the New York portion of the NYMA is meeting the requirements for RACT in a moderate nonattainment area. Subject sources within the nonattainment area are controlled by standards that, at a minimum, meet RACT.

The proposed SIP revisions underwent a public review period. A Notice of Public Hearing was published in DEC's Environmental Notice Bulletin on July 19, 2017. A public hearing was held in Long Island City on August 21, 2017, and DEC accepted written comments through August 28, 2017. Comments were received from EPA

Region 2 and the Connecticut Department of Energy & Environmental Protection. Note that no changes were made to either document as a result of comments received.

The following documents are enclosed:

1. Attainment demonstration for the moderate NYMA nonattainment area;
2. RACT demonstration for the moderate NYMA nonattainment area;
3. Notice of Public Hearing as published in the July 19, 2017 ENB;
4. Hearing Report for the public hearing held in Long Island City on August 21, 2017;
5. Official transcript of the August 21, 2017 public hearing; and,
6. Assessment of Public Comments

Please contact Mr. Robert Bielawa or Mr. Scott Wajda-Griffin at 518-402-8396 if you have any questions.

Sincerely,

J. Jared Snyder
Deputy Commissioner
Office of Air Resources, Climate Change and Energy

Enclosures

c: R. Ruvo, EPA
R. Bielawa
S. Wajda-Griffin


Department of Environmental Conservation

# NEW YORK STATE IMPLEMENTATION PLAN FOR THE 2008 OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS

# NEW YORK-N. NEW JERSEY-LONG ISLAND, NY-NJ-CT NONATTAINMENT AREA

Final Proposed Revision

November 2017

**DIVISION OF AIR RESOURCES**
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# EXECUTIVE SUMMARY

In 2008, the U.S. Environmental Protection Agency (EPA) revised the primary and secondary National Ambient Air Quality Standards (NAAQS) for ozone to levels of 0.075 parts per million. EPA designated the New York-Northern New Jersey-Long Island, NY-NJ-CT metropolitan area (New York metropolitan area, or NYMA) as a nonattainment area for the 2008 ozone NAAQS effective July 20, 2012.

The NYMA failed to attain the NAAQS by the marginal attainment date of July 20, 2015, and was reclassified to moderate nonattainment effective June 3, 2016. With a moderate classification, New York is required to submit a State Implementation Plan (SIP) revision that demonstrates how the NYMA would attain the 2008 NAAQS by July 20, 2018 (based on monitored air quality data from 2015-2017). Current ozone design values and projection modeling for 2018 lead New York to the conclusion that attainment of the 2008 ozone NAAQS will not occur by the July 20, 2018 moderate area deadline.

DEC calls upon EPA to issue a timely reclassification to serious nonattainment for the tri-state NYMA, and to place the affected states on a schedule that would lead to attainment by the serious area deadline of July 20, 2021 (based on 2018-2020 monitored data). DEC is in the initial stages of preparing New York's serious area SIP, which will rely on new and updated control measures to demonstrate attainment of the 2008 NAAQS. DEC further calls on EPA to fulfill its obligation under Clean Air Act (CAA) sections 110(a)(1) and 110(a)(2)(D)(i) to address the interstate transport of air pollutants significantly contributing to nonattainment and interfering with maintenance of the 2008 ozone NAAQS.

New York currently has some of the most stringent control programs for nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the country. These control programs include the following:

- Reasonably Available Control Technology (RACT) standards on all major NOx and VOC stationary sources including electric generating units (EGUs) and non-EGUs;
- California's motor vehicle emission standards – most recently the Low Emission Vehicle III standards – which more stringently regulate the amount of NOx emitted from motor vehicles than federal emission standards;
- Statewide vehicle inspection and maintenance requirements that include testing of older, high-emitting vehicles to significantly reduce on-road mobile emissions;
- Measures to reduce VOC emissions from a variety of large source categories that have been recommended by the Ozone Transport Commission including consumer products, architectural and industrial maintenance coatings, portable fuel containers, adhesives and sealants, asphalt paving, and solvent metal cleaning processes; and
- Lowest Achievable Emission Rate standards on all new sources in the NYMA with the potential to emit 25 tons per year or more of NOx or VOCs, and on all

existing minor sources that would undergo modifications with emissions above these thresholds.

Without timely supplemental action by EPA to fully address interstate ozone transport from upwind states, however, the NYMA will continue to exceed the 2008 NAAQS and the citizens and environment of New York will be environmentally and economically burdened. DEC calls upon EPA to issue a timely update to the Cross-State Air Pollution Rule that fully remedies states' "good neighbor" obligations, to adopt or update additional control programs at the federal level (e.g., rules targeting emissions from architectural and industrial maintenance coatings, consumer products, and heavy-duty diesel engines), and to ensure RACT is properly enforced in applicable upwind areas.

This SIP revision also includes the 2011 baseline emissions inventory, which is officially being submitted to EPA for approval into the New York SIP pursuant to CAA sections 169A(b), 172(c)(3), and 182(a)(1). This baseline emissions inventory is summarized in Section 4, with additional details appended or available upon request. Also included in Section 4 is a projection inventory for 2017. Photochemical modeling results based on the 2017 projection inventory are included in Section 5.

Section 6 documents how the State of New York meets the three percent per annum reasonable further progress mandate for moderate nonattainment areas. In fact, this SIP details how New York goes well beyond the required 18 percent reduction from the 2011 base year. This requirement is being met through a combination of NOx and VOC reductions, with excess reductions of NOx totaling an additional 16.4 percent in 2017.

This SIP revision also addresses the continued nonattainment of the 1997 ozone NAAQS in the NYMA. On May 4, 2016, EPA rescinded a previous clean data determination for the NYMA and finalized a SIP call for the 1997 NAAQS. EPA noted in its rule that "it is appropriate for the three states involved to be able to meet their obligations under the SIP Call for the 1997 ozone NAAQS with their moderate area SIP submittal for the 2008 ozone standard." This SIP submission fulfills the requirement for the 1997 ozone NAAQS. Projection modeling included with this SIP revision predicts the NYMA will be attaining the 1997 NAAQS in 2017, which agrees with preliminary 2017 monitored data.

DEC is also certifying that its existing ozone program fulfills all SIP requirements for the 2008 ozone NAAQS. The following previously-approved SIP elements remain adequate, and no revisions to the state plan are necessary.

- Emission Inventory: Pursuant to CAA section 182(a)(3)(A), the emission inventory requirement is addressed through the submission of the 2011 baseline emission inventory;
- Emission Statements: Pursuant to CAA section 182(a)(3)(b), the emission statement requirement is fully addressed through 6 NYCRR Subpart 202-2;
- RACT: Pursuant to CAA section 182(b)(2), NOx and VOC RACT requirements are fully addressed as discussed in Section 7;

- Vehicle Inspection and Maintenance: Pursuant to CAA section 182(b)(4), the vehicle inspection and maintenance requirement is fully addressed through 6 NYCRR Part 217;
- Nonattainment New Source Review: Pursuant to CAA section 182(b)(5), the nonattainment New Source Review requirement is fulfilled by 6 NYCRR Part 231.

# Contents

## List of Tables

## LIST OF FIGURES

## LIST OF APPENDICES

## List of Commonly Used Acronyms and Abbreviations

| | |
|---|---|
| ACT | Alternative Control Techniques |
| AFS | Air Facility System |
| AIM | Architectural and Industrial Maintenance |
| ASC | Area Source Code |
| ATADS | Air Traffic Activity Data System |
| BACT | Best Available Control Technology |
| BART | Best Available Retrofit Technology |
| BEIS | Biogenic Emissions Inventory System |
| CAA | Clean Air Act |
| CARB | California Air Resources Board |
| CES | Clean Energy Standard |
| CFR | Code of Federal Regulations |
| CMV | Commercial Marine Vessels |
| CSAPR | Cross-State Air Pollution Rule |
| CTG | Control Techniques Guidelines |
| DEC | New York State Department of Environmental Conservation |
| DV | Design Value |
| ECL | Environmental Conservation Law |
| EDMS | Emissions and Dispersion Modeling System |
| EGU | Electric Generating Unit |
| EIIP | Emissions Inventory Improvement Program |
| EPA | United States Environmental Protection Agency |
| ERC | Emission Reduction Credit |
| ERG | Eastern Research Group |
| ERTAC | Eastern Regional Technical Advisory Committee |
| FAA | Federal Aviation Administration |
| FR | Federal Register |
| GA | General Aviation |
| GSE | Ground Support Equipment |
| GVWR | Gross Vehicle Weight Rating |
| HAP | Hazardous Air Pollutant |
| I/M | Inspection and Maintenance |
| ISA | Integrated Science Assessment |
| LAER | Lowest Achievable Emission Rate |
| LEV | Low Emission Vehicle |
| LTO | Landing and Take-Off |
| MACT | Maximum Achievable Control Technology |
| MANE-VU | Mid-Atlantic and Northeast Visibility Union |
| MARAMA | Mid-Atlantic Regional Air Management Association |
| MOVES | Motor Vehicle Emissions Simulator |
| MPO | Metropolitan Planning Organization |
| MVEB | Motor Vehicle Emission Budget |
| NAAQS | National Ambient Air Quality Standard |

| | |
|---|---|
| NAMS | National Air Monitoring Station |
| NEI | National Emissions Inventory |
| NESCAUM | Northeast States for Coordinated Air Use Management |
| NO | Nitric Oxide |
| $NO_2$ | Nitrogen Dioxide |
| NOx | Oxides of Nitrogen |
| NSR | New Source Review |
| NYCRR | New York Codes, Rules, and Regulations |
| NYMA | New York Metropolitan Area |
| NYVIP | New York Vehicle Inspection Program |
| OBD | Onboard Diagnostic |
| OSD | Ozone Season Day |
| OTC | Ozone Transport Commission |
| OTR | Ozone Transport Region |
| PM | Particulate Matter |
| $PM_{2.5}$ | Particulate Matter (Fine) |
| $PM_{10}$ | Particulate Matter (Coarse) |
| ppm | Parts per Million |
| PSD | Prevention of Significant Deterioration |
| QA | Quality Assurance |
| RACM | Reasonably Available Control Measures |
| RACT | Reasonably Available Control Technology |
| RE | Rule Effectiveness |
| REV | Reforming the Energy Vision |
| RFP | Reasonable Further Progress |
| RVP | Reid Vapor Pressure |
| SCC | Source Classification Code |
| SIP | State Implementation Plan |
| SLAMS | State and Local Air Monitoring Station |
| $SO_2$ | Sulfur Dioxide |
| TAF | Terminal Area Forecast |
| TIP | Transportation Implementation Plan |
| VMT | Vehicle Miles Traveled |
| VOC | Volatile Organic Compound |

# SECTION 1: BACKGROUND AND OVERVIEW OF FEDERAL REQUIREMENTS

## A. Introduction

Due to the severity of the health and welfare effects associated with ground-level ozone, the Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) designed to protect public health and the environment. The CAA allows EPA to establish two types of NAAQS for six criteria air pollutants: Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The EPA Administrator is tasked with considering the available scientific evidence and associated quantitative analyses in setting a primary standard that is requisite (i.e. neither more nor less stringent than necessary) to protect public health with an adequate margin of safety. The Administrator also considers the full body of evidence on welfare effects and related analyses (including the evidence of effects associated with cumulative seasonal exposures of the magnitudes allowed by the current standard) in determining a secondary standard that provides the requisite protection of public welfare from known or anticipated adverse effects.

## B. Ozone Formation

Ozone is produced through complex chemical reactions in which its precursors – oxides of nitrogen (NOx) and volatile organic compounds (VOCs) – react in the presence of sunlight and high temperatures. Ozone that is found high in the earth's upper atmosphere (stratosphere) is beneficial because it inhibits the penetration of the sun's harmful ultraviolet rays to the ground. Ozone, however, can also form near the earth's surface (troposphere). This ozone, commonly referred to as ground-level ozone, is breathed in by or comes into contact with people, animals, crops and other vegetation, and can cause a variety of serious health effects and damage to the environment. Stratospheric ozone can occasionally mix down and contribute to ozone levels in the troposphere.

Complicating the formation of ground-level ozone is the fact that the chemical reactions that create ozone can take place while the pollutants are being blown through the air (or "transported") by the wind. This means that elevated levels of ozone can occur many miles away from the source of their original precursor emissions. Therefore, unlike more traditional pollutants (e.g., sulfur dioxide ($SO_2$) and lead, which are emitted directly and can be controlled at their source), reducing ozone concentrations poses additional challenges.

## 1. Ozone Precursor: Oxides of Nitrogen

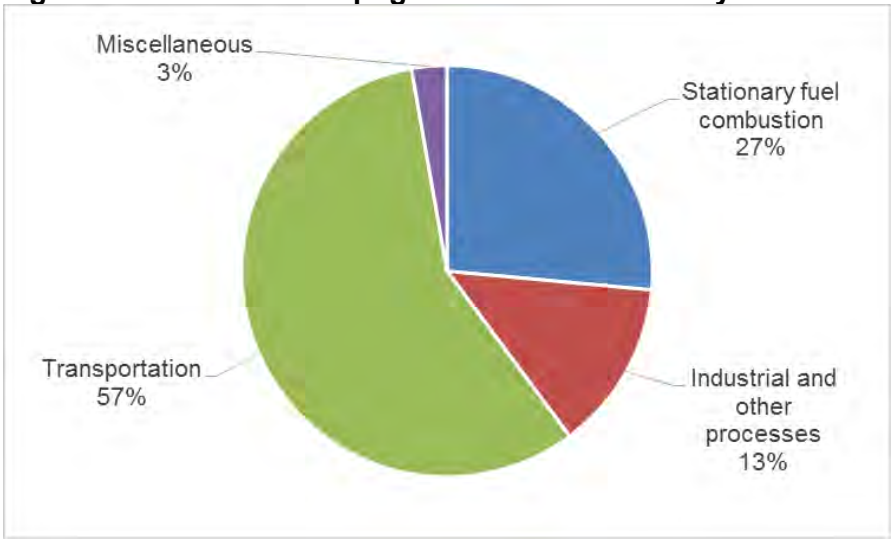
NOx is a group of gases including nitric oxide (NO) and nitrogen dioxide ($NO_2$). $NO_2$ is a reddish-brown, highly reactive gas that is formed in the air through the oxidation of NO. When $NO_2$ reacts with other chemicals in the atmosphere, it contributes to the formation of ozone and may also form particulate matter (PM), haze, and acid rain. Sources of NO and $NO_2$ include motor vehicle exhaust (including both gasoline- and diesel-fueled vehicles), the burning of coal, oil, and natural gas, and industrial processes such as welding and electroplating.

Although most NOx is emitted as NO, it is readily converted to $NO_2$ in the atmosphere. Since a considerable portion of the NOx in the air is attributed to motor vehicles, concentrations tend to peak during the morning and afternoon rush hours.

A challenging aspect of controlling ozone pollution in New York City is the nonlinear response of ozone to precursor concentrations. Local ozone concentrations may actually be suppressed by excess NOx emissions in a process referred to as NOx titration. Controlling excess NOx emissions can reduce this suppressive effect and increase ozone concentrations locally until such time that NOx becomes the limiting precursor.

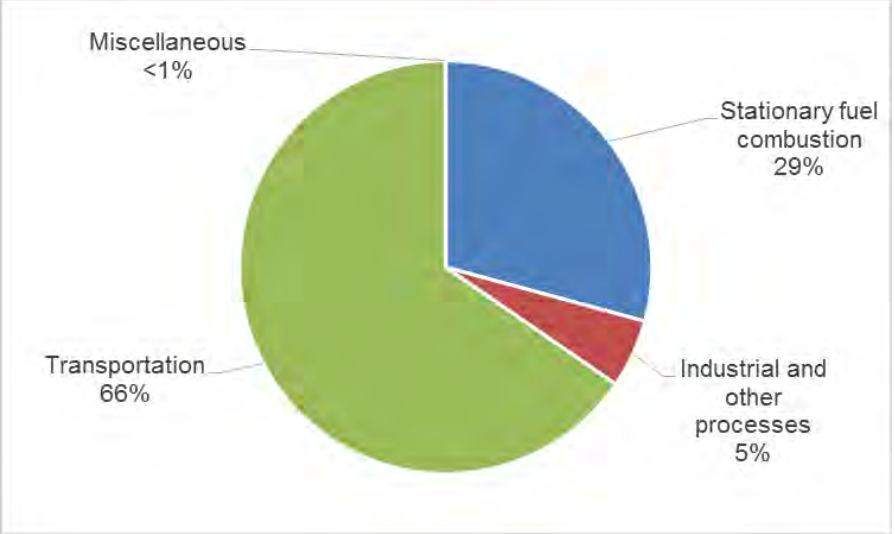
Figure 1 shows the national breakdown of NOx emissions by category. In this chart, fuel combustion refers to stationary sources (i.e., from electric utility, industrial, and other sources). Transportation is considered a mainly localized contributor of NOx, while fossil fuel combustion and industrial sources have transport impacts, making them more of a regional issue. Figure 2 provides these data for New York State.[1]

**Figure 1. National Anthropogenic NOx Emissions by Source Category for 2016**



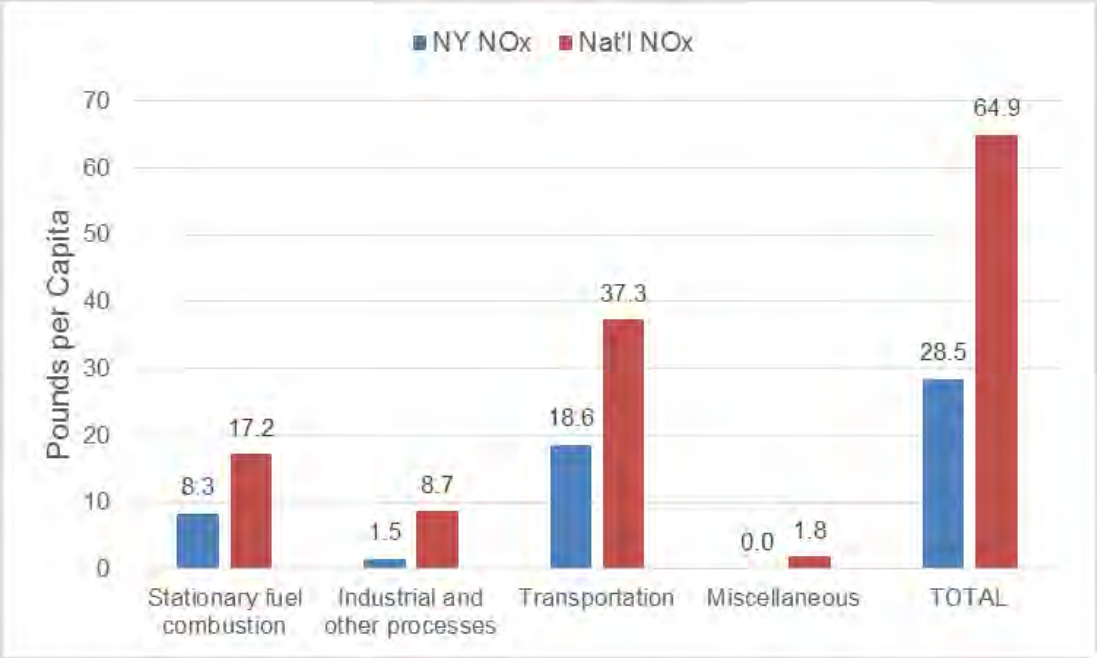

[1] U.S. EPA; Air Pollutant Emissions Trends Data. https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data. Accessed February 8 2017.

**Figure 2. New York State Anthropogenic NOx Emissions by Source Category for 2016**




The following figure displays 2016 per-capita NOx emissions at the New York State and national levels for the same categories as in Figures 1 and 2.[2] For each category, emissions in New York State are well below the national emission rate.

**Figure 3. New York State and National NOx Emissions per Capita for 2016**




[2] Ibid.; Population data via U.S. Census Bureau. https://www.census.gov/data/tables/2016/demo/popest/nation-total.html. Accessed March 9 2017.

## 2. Ozone Precursor: Volatile Organic Compounds

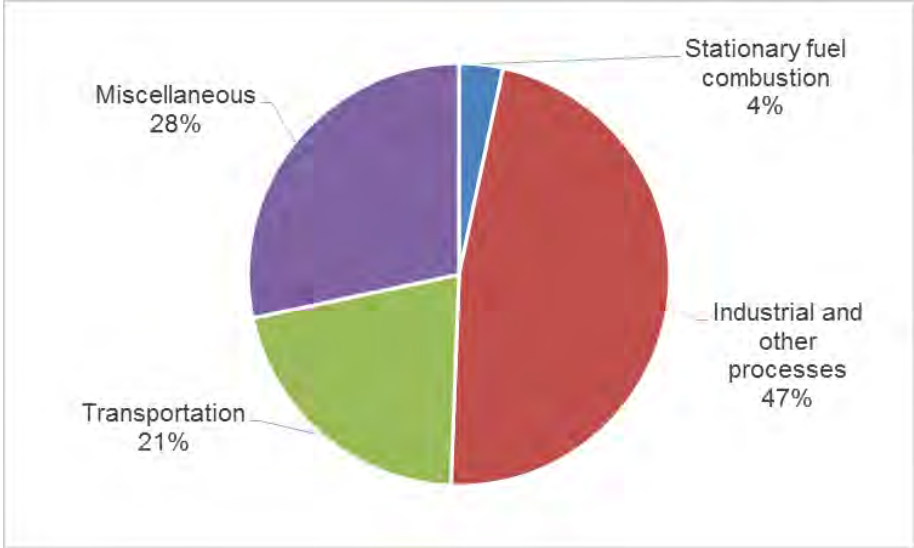
VOCs are chemicals that evaporate (or volatilize) when they are exposed to air. They are referred to as organic because they contain carbon. Some VOC compounds are highly reactive with a short atmospheric lifespan, while others can have a very long lifespan. The short-lived compounds contribute substantially to atmospheric photochemical reactions and thus the formation of ozone.

VOCs are used in the manufacture of, or are present in, many products used daily in both homes and businesses. Some products, like gasoline, actually are VOCs. VOCs are used as fuels (gasoline and heating oil) and are components of many common household items like polishes, cosmetics, perfumes, and cleansers. They are also used in industry as degreasers and solvents, and in dry cleaning. VOCs are present in many fabrics and furnishings, construction materials, adhesives, and paints. Examples of more well-known VOC species include carbon tetrachloride, benzene, and toluene. Because of their widespread historical use and past lack of stringent disposal requirements, they remain in our air, soil, and water in varying concentrations.

Anthropogenic VOCs are primarily emitted into the air by motor vehicle exhaust, industrial processes, and the evaporation of solvents, oil-based paints, and gasoline from gas pumps. Biogenic VOCs, such as isoprene, are commonly emitted by vegetation.

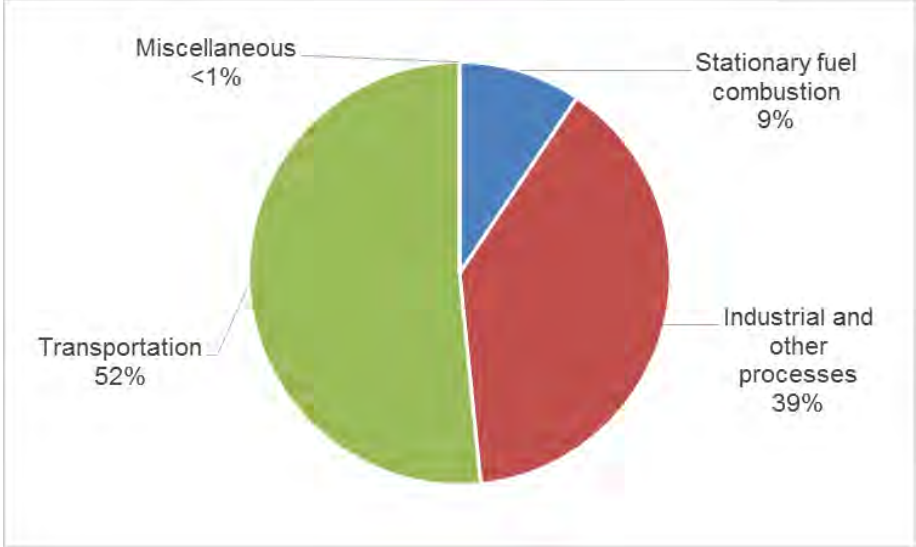
Figure 4 shows the national breakdown of anthropogenic VOC emissions by category. As with the $NO_x$ chart, fuel combustion refers to stationary sources (i.e., from electric utility, industrial, and other sources). Figure 5 provides these data for New York State.[3]

**Figure 4. National Anthropogenic VOC Emissions by Source Category for 2016**



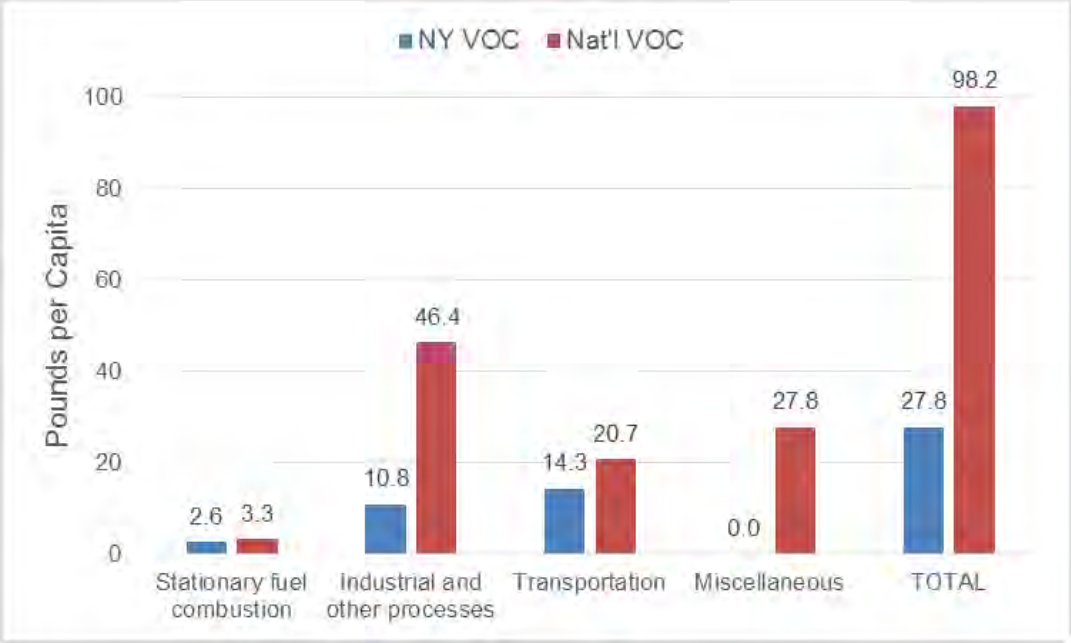

[3] U.S. EPA; Air Pollutant Emissions Trends Data; https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data. Accessed February 8, 2017.

**Figure 5. New York State Anthropogenic VOC Emissions by Source Category for 2016**




The following figure displays 2016 per-capita VOC emissions at the New York State and national levels for the same categories as in Figures 4 and 5.[4] For each category, emissions in New York State are well below the national emission rate.

**Figure 6. New York State and National VOC Emissions per Capita for 2016**




[4] Ibid.; Population data via U.S. Census Bureau. https://www.census.gov/data/tables/2016/demo/popest/nation-total.html. Accessed March 9 2017.

## C. Health and Welfare Effects

EPA's most recent Integrated Science Assessment (ISA) for ozone determined that a ''causal'' relationship exists between short-term exposure to ozone in ambient air and effects on the respiratory system and that a ''likely to be causal'' relationship exists between long-term exposure to ozone in ambient air and respiratory effects.[5] The ISA also determined that the relationships between short-term exposures to ozone in ambient air and both total mortality and cardiovascular effects are likely to be causal, based on expanded evidence in the current review.[6] Additionally, the latest review strengthened the body of evidence indicating the occurrence of respiratory effects due to long-term ozone exposure,[7] and recent studies have strengthened the body of evidence that supports the association between short-term ozone concentrations and mortality in adults.[8]

Ground-level ozone can irritate lung airways and cause skin inflammation much like sunburn. Other symptoms from exposure include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. Even at very low levels, exposure to ground-level ozone can result in decreased lung function, primarily in children active outdoors, as well as increased hospital admissions and emergency room visits for respiratory illnesses among children and adults with pre-existing respiratory diseases (e.g. asthma). People with respiratory problems are most vulnerable to the health effects associated with ozone exposure, but even healthy people that are active outdoors can be affected when ozone levels are high.

In addition to its health effects, ozone interferes with the ability of plants to produce and store nutrients, which makes them more susceptible to disease, insects, harsh weather, and other pollutants. This impacts annual crop production throughout the United States, resulting in significant losses and injury to native vegetation and ecosystems. In addition, ozone damages the leaves of trees and other plants, ruining the appearance of cities, national parks, and recreation areas. Ozone can also damage certain man-made materials, such as textile fibers, dyes, rubber products, and paints.

## D. Clean Air Act Amendments of 1990

During the fall of 1990, and after years of debate, the U.S. Congress approved changes to the federal CAA – the first since 1977. Congress added provisions that addressed acid rain, hazardous air pollutants, and stratospheric ozone concerns, and also significantly changed the way in which states were to address remaining attainment problems for criteria pollutants, including ground-level ozone. As opposed to the past when areas were merely designated as attainment, nonattainment, or unclassifiable, the

[5] U.S. EPA; "Final Report: Integrated Science Assessment of Ozone and Related Photochemical Oxidants." 2013. EPA/600/R-10/076F. P. 1-6 to 1-7.
[6] Ibid. P. 1-7 to 1-8.
[7] Ibid. Chapter 7.
[8] "National Ambient Air Quality Standards for Ozone." Final Rule. Published October 26, 2015. 80 FR 65309.

1990 Amendments required areas to also be classified according to severity. Additional requirements were placed on areas with more severe classifications, and additional time was provided to demonstrate attainment with the NAAQS.

## E. History of the 8-Hour Ozone NAAQS

In an effort to develop a standard more protective of public health than the existing 1-hour standards, EPA promulgated ozone standards of 0.08 ppm measured over an 8-hour period (known as the 8-hour standard or 1997 NAAQS) on July 18, 1997.[9] After a long period of litigation, EPA finalized designations for the 1997 NAAQS on April 30, 2004.[10] A number of areas within New York State were designated nonattainment for the 1997 NAAQS at the time, including the New York-Northern New Jersey-Long Island, NY-NJ-CT area (hereafter "New York metropolitan area" or NYMA). All of the nonattainment areas located in upstate New York now monitor attainment of the 1997 NAAQS; the NYMA, however, has wavered in and out of attainment since its designation. The 1997 NAAQS was revoked by EPA effective April 6, 2015.[11]

The next iteration of the NAAQS – and the focus of this SIP revision – was published on March 27, 2008.[12] The 2008 standards modified only the level of the existing standards, lowering both the primary and secondary standards from 0.08 ppm to 0.075 ppm in response to the latest health and welfare studies. EPA's designations and classifications were delayed due to a reconsideration of the 2008 NAAQS that was proposed on January 19, 2010, but ultimately abandoned.[13] Designations for the 2008 standards became effective on July 20, 2012.[14]

On October 1, 2015, EPA announced a new, more stringent ozone NAAQS in light of evidence that the 2008 standards were not sufficiently protective of public health and welfare.[15] The levels of the primary and secondary standards were both lowered to 0.070 ppm.

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[9] "National Ambient Air Quality Standards." Final Rule. Published July 18, 1997; effective September 16, 1997. 62 FR 38856-38896.

[10] "Air Quality Designations and Classifications for the 8-Hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas with Deferred Effective Dates." Final Rule. Published April 30, 2004; effective June 15, 2004. 69 FR 23858-23951

[11] "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements." Final Rule. Published March 6, 2015; effective April 6, 2015. 80 FR 12264-12319.

[12] "National Ambient Air Quality Standards for Ozone." Final Rule. Published March 27, 2008; effective May 27, 2008.

[13] "National Ambient Air Quality Standards for Ozone." Proposed Rule. Published January 19, 2010. 75 FR 2938-3052.

[14] "Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards." Final Rule. Published May 21, 2012; effective July 20, 2012. 77 FR 30088-30160.

[15] "National Ambient Air Quality Standards for Ozone." Final Rule. Published October 26, 2015; effective December 28, 2015. 80 FR 65292-65468.

## F. Designation and Requirements of the 2008 Ozone NAAQS

The CAA requires states to ensure that all areas within their jurisdiction meet and maintain air quality levels that comply with the NAAQS prescribed by the federal government.

Effective July 20, 2012, EPA designated two areas as nonattainment for the 2008 NAAQS: the Jamestown, NY area, comprised of Chautauqua County; and the New York-N. New Jersey-Long Island, NY-NJ-CT area, comprised of the New York State counties of Bronx, Kings, Nassau, New York, Queens, Richmond, Rockland, Suffolk, and Westchester, as well as 12 counties from New Jersey and three from Connecticut. Both areas were classified as marginal nonattainment, with an attainment date of July 20, 2015.[16]

EPA published its final actions for marginal nonattainment areas on May 4, 2016.[17] In this final reclassification rule, EPA determined that the Jamestown, NY area had demonstrated attainment with the 2008 ozone NAAQS based on monitored air quality data from 2012-2014, whereas the NYMA continued to exceed the NAAQS. EPA also reclassified the NYMA to moderate nonattainment with an attainment date of July 20, 2018.

## G. Additional Requirements for the 1997 Ozone NAAQS

EPA's reclassification rule also rescinded a clean data determination for the NYMA for the 1997 ozone NAAQS because monitored design values (DVs) again exceeded that standard. EPA also finalized a SIP call and noted that "it is appropriate for the three states involved to be able to meet their obligations under the SIP Call for the 1997 ozone NAAQS with their moderate area SIP submittal for the 2008 ozone standard." This SIP submission therefore fulfills the requirement for the 1997 ozone NAAQS as well. Projection modeling associated with this SIP, summarized in Section 5, demonstrates that the NYMA will be attaining the 1997 NAAQS in 2017.

[16] "Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards." Final Rule. Published May 21, 2012; effective July 20, 2012. 77 FR 30088-30160.

[17] "Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Several Areas for the 2008 Ozone National Ambient Air Quality Standards"; Final Rule. Published May 4, 2016. Effective June 3, 2016. 81 FR 26697-26722.

# SECTION 2: PREVIOUS REGULATORY COMMITMENTS

## A. Introduction

This section summarizes previous regulatory commitments in New York State that control emissions of NOx and VOCs from the mobile, stationary, and area source sectors. Many control measures were adopted or revised since 2008 as part of efforts to attain the 1997 NAAQS in the NYMA. Part D of Title I of the CAA requires that these measures be implemented and meet reasonable further progress goals as the area strives to reach attainment. Due to anti-backsliding requirements, these past commitments continue indefinitely unless replaced by an equivalent or stricter emission reduction strategy.

DEC also works closely with the Ozone Transport Commission (OTC) to develop stationary and area source control measures that states can use to help reduce ozone precursor emissions throughout the ozone transport region. DEC also develops its own regulations that target source categories that have meaningful potential emission reductions of NOx and VOCs, and implements regulations that mirror federal programs (e.g., EPA's interstate trading rules) as well.

A number of these regulations set Reasonably Available Control Technology (RACT) standards for NOx and VOCs, where RACT is defined 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."[18] RACT standards take the form of either presumptive emission limits (based on available control technologies and cost) or facility-specific emission limits.

## B. Implemented Control Measures

### Part 205: Architectural and Industrial Maintenance (AIM) Coatings

VOC content limits for AIM coatings contained in Part 205 reduce VOC emissions from the area source sector. It is periodically updated with new and/or more stringent VOC limits informed by OTC model rules. Part 205 also contains labeling and reporting requirements, compliance provisions, and test methods.

### Part 210: Emissions and Labeling Requirements for Personal Watercraft Engines

New York adopted California's emissions standards for personal watercraft in 2003, which reduce emissions of hydrocarbons, NOx, and PM beyond the levels achieved by federal standards by imposing lower emission certification levels beginning with model year 2006 and becoming increasingly stringent thereafter. In addition, the personal watercraft engine program includes test procedures for new and in-use engines, which guarantees compliance with the standards, establishes an environmental label program,

[18] "State Implementation Plans; Nitrogen Oxides Supplement to the General Preamble; Clean Air Act Amendments of 1990 Implementation of Title I." Proposed Rule. Published November 25, 1992. 57 FR 55620.

and extends emission warranty requirements. Emissions from manufacturers' entire product lines must be certified as meeting the corporate average requirement.

**Subpart 212-3: Reasonably Available Control Technology for Major Facilities**

This regulation requires a facility-specific RACT analysis for each emission point that emits NOx at major NOx facilities or VOCs at major VOC facilities. Its requirements are mostly generic, with specific requirements only for coating operations not subject to Part 228.

**Subpart 212-4: Control of Nitrogen Oxides for Hot Mix Asphalt Production Plants**

This new subpart was promulgated on September 30, 2010 to control NOx from asphalt production plants. Currently, all asphalt production plants in New York State are minor facilities. The dryer operation is the main source of NOx emissions at these facilities. This regulation requires best management practices and the installation of low NOx burners where economically feasible to reduce emissions.

**Subpart 217-6: Motor Vehicle Enhanced Inspection and Maintenance Program Beginning January 1, 2011**

New York State has implemented an approved statewide, enhanced motor vehicle inspection and maintenance (I/M) program under Title 6 of the New York Codes, Rules, and Regulations (NYCRR) Part 217-6 and 15 NYCRR Part 79 to limit ozone precursor emissions from motor vehicles. The current New York Vehicle Inspection Program (NYVIP2) requires an appropriate emissions inspection (e.g., onboard diagnostic (OBDII) or low enhanced inspection) for most vehicles annually and with change of vehicle ownership. The emissions inspection is completed along with a safety inspection. The appropriate emissions inspection is determined by vehicle model year, gross vehicle weight rating (GVWR), fuel type, and registration class. The latest NYVIP2 annual I/M report (2015) can be found at the following webpage as of May 1, 2017: http://www.dec.ny.gov/chemical/85985.html

**Part 218: Emission Standards for Motor Vehicles and Motor Vehicle Engines**

Section 177 of the CAA permits states to adopt new motor vehicle emissions standards that are identical to California's. DEC has exercised this option by incorporating the latest California emissions standards for light-duty vehicles through Part 218. In this regulation, New York State requires that new on-road motor vehicles sold in New York meet the California emissions standards.

The low-emission vehicle (LEV) regulations provide flexibility to auto manufacturers by allowing them to certify their vehicle models to one of several different emissions standards. These consist of several different tiers of increasingly stringent LEV emission standards to which a manufacturer may certify a vehicle, including LEV, ultra-low-emission vehicle (ULEV), super-ultra-low-emission vehicle (SULEV), and zero-emission vehicle (ZEV). The different standards are intended to provide flexibility to manufacturers in meeting program requirements. However, manufacturers must demonstrate that the overall fleet for each model year meets the specified non-methane

organic gas standard for that year. These requirements are progressively more stringent with each model year.

### Part 220: Portland Cement Plants and Glass Plants

Revisions were made to Part 220 effective July 11, 2010. In updating the regulation, the existing requirements for Portland cement plants were moved to Subpart 220-1 and new requirements for glass manufacturing plants were placed in Subpart 220-2. The update also required sources from each sector to perform a facility-specific RACT analysis. (Due to the variation in processes and NOx control technologies for each source type, DEC opted against presumptive NOx limits.) Analyses must be updated upon subsequent renewal of Title V permits pursuant to DEC's guidance document DAR-20. Two cement plants and four glass manufacturing plants in New York State are subject to these regulations, though none are located within the NYMA.

### Subpart 225-3: Fuel Consumption and Use - Gasoline

New York State adopted Subpart 225-3 to limit the volatility, or Reid Vapor Pressure (RVP), of motor fuel statewide as a strategy for controlling VOC emissions from motor vehicles. Specifically, this regulation established a maximum RVP of 9.0 pounds per square inch for all gasoline sold or supplied to retailers and wholesale purchaser-consumers anywhere in New York State from May 1 through September 15 of each year. Subpart 225-3 requires DEC to grant case-by-case exceptions for gasoline-alcohol blends to exceed 9.0 pounds per square inch RVP.

### Part 226: Solvent Metal Cleaning Processes

Part 226 sets guidelines for the cleaning of metal surfaces by VOC-containing substances. This regulation limits the vapor pressure of solvents and contains specifications for control equipment and proper operating practices for a variety of degreasing operations, in addition to general requirements for storage and record-keeping.

### Subpart 227-2: Reasonably Available Control Technology (RACT) for Major Sources of Oxides of Nitrogen (NOx)

Subpart 227-2 controls NOx emissions from a variety of emission sources at major facilities, including utility/industrial/commercial/institutional boilers, combustion turbines, and stationary internal combustion engines. More stringent emission limits went into effect July 1, 2014.

Presumptive NOx RACT emission rates are set for most unit types based on the size of the unit and fuel type. Units that cannot meet the presumptive NOx limits, in addition to certain other types of units (e.g., all combined cycle (including cogeneration) combustion turbines), must submit a case-by-case RACT analysis to DEC to determine a facility-specific emission limit.

The regulation also allows for alternate compliance options such as fuel switching and system-wide averaging. Testing, monitoring, and reporting requirements are also included.

**Subpart 228-1: Surface Coating Processes**

Part 228 limits the VOC content for each gallon of coating and sets minimum efficiency standards for VOC control equipment. It also contains requirements for application techniques, opacity limits, and housekeeping.

**Subpart 228-2: Commercial and Industrial Adhesives, Sealants and Primers**

DEC updated this regulation on June 5, 2013 utilizing the 2006 OTC model rule for adhesives, sealants, adhesive primers and sealant primers which was based, in turn, on California Air Resources Board (CARB) standards. This regulation places VOC content limits on these products, requires specific labeling standards, and provides an option for add-on control systems to meet the required content limits. Also included are requirements for surface preparation and cleanup solvents. Emission reductions from this regulation are primarily observed from the area source sector.

**Part 229: Petroleum and Volatile Organic Liquid Storage and Transfer**

This regulation limits VOC emissions from applicable gasoline bulk plants, gasoline loading terminals, marine loading vessels, petroleum liquid storage tanks, or organic liquid storage tanks.

**Part 230: Gasoline Dispensing Sites and Transport Vehicles**

This regulation contains requirements for Stage I and Stage II gasoline dispensing sites. Stage I systems are required statewide, while Stage II systems are mandated only in the NYMA and the lower Orange County towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick, and Woodbury. Part 230 affects gasoline-dispensing sites whose annual throughput exceeds 120,000 gallons, although this minimum throughput level is waived for the NYMA.

A Stage I vapor collection system captures gasoline vapors which are displaced from underground gasoline storage tanks when those tanks are filled. These vapors are forced into a vapor-tight gasoline transport vehicle or vapor control system through direct displacement by the gasoline being loaded. A Stage II vapor collection system captures at least 90 percent, by weight, of the gasoline vapors that are displaced or drawn from a vehicle fuel tank during refueling; these vapors are then captured and either retained in the storage tanks or destroyed in an emission control device. DEC, however, has ceased enforcement of the Stage II requirements in favor of the onboard refueling and vapor recovery systems that come equipped in newer model year vehicles, as they have demonstrated a greater degree of VOC emissions control.

**Part 231: New Source Review for New and Modified Facilities**

Part 231 has regulated the New Source Review (NSR) program for nonattainment areas since 1979. Part 231 was revised in 2009 to include the regulation of emission increases of attainment pollutants under Prevention of Significant Deterioration (PSD).

The regulation was written and amended to conform to federal guidelines and requirements on new sources and modifications at major facilities in nonattainment and attainment areas which would cause emission increases exceeding de minimis levels set forth in the regulation. The base requirements for applicable sources in nonattainment areas are that Lowest Achievable Emission Rate (LAER) control technology be applied and that emission offsets be provided. The base requirements for applicable sources in attainment areas are that Best Available Control Technology (BACT) be applied and the facility conducts modeling and ambient air monitoring of the applicable pollutants with respect to ambient air quality standards.

**Part 233: Pharmaceutical and Cosmetic Manufacturing Processes**

This regulation limits VOC emissions from synthesized pharmaceutical or cosmetic manufacturing processes. Compliance requires the installation of control devices, along with monitoring, recordkeeping, and leak repair.

**Part 234: Graphic Arts**

This regulation sets control requirements and/or limits VOC contents to reduce emissions from packaging rotogravure, publication rotogravure, flexographic, offset lithographic, and screen printing processes. It was updated on July 8, 2010 to address recent Control Techniques Guidelines (CTGs) for flexible package printing and offset lithographic and letterpress printing.

**Part 235: Consumer Products**

The consumer products rule regulates the VOC content of consumer and commercial products that are sold to retail customers for personal, household, or automotive use, along with the products marketed by wholesale distributors for use in commercial or institutional settings such as schools and hospitals. The regulation also includes labeling, reporting and compliance requirements that apply to manufacturers of these products. The most recent update to this regulation was effective on October 15, 2009, and was based on a 2006 OTC model rule which, in turn, was informed by amendments put forth by CARB in 2005.

**Part 239: Portable Fuel Container Spillage Control**

DEC updated this regulation in 2009 to better control VOC emissions resulting from evaporation through the diurnal cycle and spillage from portable fuel containers. The update eliminated the automatic shutoff feature, fill height, and flow rate standards from the previous rule to simplify fueling and lessen spillage. The revisions also required certification and compliance of portable fuel containers prior to their sale and expanded the definition of a non-compliant container, effectively regulating diesel and kerosene containers in the same manner as portable fuel containers.

**Part 241: Asphalt Pavement and Asphalt-Based Surface Coating**

DEC adopted the new Part 241 on January 1, 2011 to regulate the use of cutback and emulsified asphalts in paving operations. The regulation limits the amount of petroleum distillate allowed in emulsified asphalt, while prohibiting the use of cutback asphalt in most circumstances. It also places VOC content limits on asphalt-based surface coatings.

**Part 243: Transport Rule NOx Ozone Season Trading Program**

Part 243 codifies the "good neighbor" requirements of CAA section 100(a)(2)(D)(i) at the state level. Part 243 was initially effective on October 19, 2007 to manage the NOx ozone season trading program for the Clean Air Interstate Rule. EPA later updated its NOx trading program through the July 6, 2011 Cross-State Air Pollution Rule (CSAPR),[19] and Part 243 was revised to reflect this update.

The ozone season trading program was again updated in October 2016, resulting in adjusted NOx emission budgets to address the 2008 ozone NAAQS which are currently being worked into Part 243.[20] New York State is currently operating under the Federal Implementation Plan for CSAPR and DEC is considering its future implementation options.

CSAPR targets NOx emissions from fossil fuel-fired electric generating unit (EGU) sources serving, at any time on or after January 1, 2005, a generator with nameplate capacity of more than 25 megawatts producing electricity for sale. CSAPR allows these sources to trade emissions allowances with other sources within or across states, while firmly constraining any emissions shifting that may occur by requiring a strict emission ceiling in each state (i.e. the budget plus variability limit). It also includes assurance provisions that ensure each state will make the necessary emission reductions by requiring additional allowance surrenders in the instance that emissions in the state exceed the state's assurance level.

**Part 249: Best Available Retrofit Technology (BART)**

DEC's BART regulation was promulgated in response to the federal rule for regional haze which is aimed at reducing the impacts of visibility-impairing pollutants on Class I areas. The BART program targets emissions of NOx (as well as $SO_2$ and coarse particulate matter ($PM_{10}$)) from certain categories of stationary sources which began operation between 1962 and 1977. DEC identified 19 subject facilities in New York State, which are complying through a variety of options including unit shutdown, emission caps, add-on control technology, and process modifications.

[19] "Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals." Final Rule. Published August 8, 2011; effective October 7, 2011. 76 FR 48208-48483.
[20] "Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS." Final Rule. Published October 26, 2016; effective December 27, 2016. 81 FR 74504-74650.

## MACT

Under section 112 of the 1990 CAA Amendments, hazardous air pollutants (HAPs) are required to be controlled by what is determined to be the Maximum Achievable Control Technology (MACT). Since many organic HAPs are also VOCs, the use of MACT results in the reduction of VOC as well as NOx emissions. DEC has been adopting MACT control requirements as they have been developed by EPA and has therefore been realizing the reductions resulting from the MACT program. These federal regulations are incorporated by reference in 6 NYCRR 200.10 (Tables 3 and 4).

## Federal Reformulated Gasoline – Phase I and II

CAA section 211(k) requires that reformulated gasoline be sold in certain ozone nonattainment areas. The current federal Phase II reformulated gasoline standards, effective January 1, 2000, require 25 to 29 percent VOC emission reductions. Retail distribution of reformulated gasoline is required in the NYMA and Orange County. Dutchess County has also opted into the reformulated gasoline program.

## Federal Highway Diesel Fuel (with State Backstop) and Heavy Duty Highway Diesel Emissions Standards

New York State's motor vehicle diesel fuel program is identical to the EPA motor vehicle diesel fuel regulations, which regulate the heavy-duty vehicle and its fuel as a single system. EPA published its final rule for heavy-duty diesel engines that would reduce NOx emissions by 95 percent from then-current levels (in addition to reducing PM by 90 percent) on January 18, 2001.[21]

These standards, which apply to heavy-duty highway engines and vehicles greater than 8,500 pounds GVWR, are based on the use of high-efficiency catalytic exhaust emission control devices or comparably effective advanced technologies. DEC adopted CARB heavy-duty diesel standards for MY 2005-2007 (to prevent backsliding that may have occurred under the federal standards), and reverted to the federal standards for 2008 and beyond.

The rule's emission limits were phased in between 2007 and 2010. It established standards for NOx and non-methane hydrocarbons of 0.20 grams per brake horsepower-hour (g/bhp-hr) and 0.14 g/bhp-hr, respectively. EPA projects a 2.6 million ton reduction of NOx emissions in 2030 when the current heavy-duty vehicle fleet is completely replaced with newer heavy-duty vehicles that comply with these emission standards. The sulfur content of diesel fuel was reduced by 97 percent to 15 ppm in order to allow for the necessary control devices to achieve such a reduction.

[21] "Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements." Final Rule. Published January 18, 2001; effective March 19, 2001. 66 FR 5002-5193.

**Federal Non-Highway Diesel Fuel and Emissions Standards**

EPA published a rule to regulate emissions of NOx and PM from nonroad diesel vehicles on June 29, 2004.[22] Overall, the rule is projected to result in a 90 percent reduction in NOx emissions, equivalent to 738,000 tons annually by 2030.

The non-road standards apply to diesel engines that are used in construction, agricultural, industrial, and airport applications. Standards varied by engine size with implementation dates beginning in 2008. The rule was fully phased-in as of 2015. This rule also took advantage of the new low-sulfur fuel requirements in order to achieve the necessary NOx and PM reductions.

EPA also issued a separate rulemaking that targeted NOx and PM emissions from locomotive and marine diesel engines.[23] This rule is projected to result in an 80 percent reduction in NOx emissions over engines meeting the current standards, equivalent to approximately 800,000 tons annually by 2030.

The rule applies to all types of locomotives, including line-haul, switch, and passenger, and all types of marine diesel engines below 30 liters per cylinder displacement, including commercial and recreational, propulsion, and auxiliary. The near-term (Tier 3) emission standards for newly-built engines began its phase-in starting in 2009. The near-term program also includes new emission limits for existing locomotives and marine diesel engines that apply when they are remanufactured.

The long-term (Tier 4) emissions standards for newly-built locomotives and marine diesel engines are based on the application of high-efficiency catalytic after-treatment technology. These standards began to take effect in 2014 for marine diesel engines and in 2015 for locomotives.

[22] "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel." Final Rule. Published June 29, 2004; effective August 30, 2004. 69 FR 38958-39273.

[23] "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder; Republication." Final Rule. Published June 30, 2008; effective July 7, 2008. 73 FR 37096-37350.

# SECTION 3: AIR QUALITY NETWORK AND DATA

## A. Introduction

DEC continuously assesses ozone air pollution levels throughout the state and subsequently submits the monitored data to EPA through its Air Quality System. The NYMA contains many of New York's ozone monitors due to its high population density and the prevalence of ozone in the area. Design values calculated from data collected by these air quality monitors are compared to the NAAQS to determine compliance.

## B. State Monitoring Network

DEC maintains a monitoring network that fulfills EPA requirements and is sufficient to accurately gauge air quality in the NYMA and other regions of New York State. As required by Title 40 of the Code of Federal Regulations (CFR), Part 58.10(d), *"the State...agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this Part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network."*

The most recent version of the "New York State Ambient Air Monitoring Program Network Assessment" was completed and submitted to EPA in June, 2015 in order to meet this requirement.[24] As a part of this plan, all monitoring networks operated by DEC's Bureau of Air Quality Surveillance in the Division of Air Resources were evaluated to ensure they met the monitoring objectives as defined by the regulations. Considerations were given to population and geographical coverage, air quality trends, attainment classification, emissions inventory, parameters monitored, special purpose monitors, health-related and scientific research, external data users, new and proposed regulations, quality assurance (QA), technology, personnel, and training.

Additionally, starting in July, 2007, each state (or where applicable, local) agency is required to *"adopt and submit to the Regional Administrator an annual monitoring network plan which shall provide for the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations including FRM, FEM, and ARM monitors that are part of SLAMS, NCore stations, CSN stations, state speciation stations, SPM stations, and/or, in serious, severe and extreme ozone nonattainment areas, PAMS stations, and SPM monitoring stations."*[25] DEC prepares an Annual Monitoring Network Plan as part of the fulfillment of these requirements. EPA approved the majority of the latest version of this plan on July 28, 2016.[26]

[24] Available here: http://www.dec.ny.gov/chemical/65574.html
[25] 40 CFR 58.10, "Annual monitoring network plan and periodic network assessment", section (a)(1).
[26] Available here: http://www.dec.ny.gov/chemical/33276.html

In addition to the QA and quality control procedures implicit in the daily operation of each network component, independent and regularly scheduled audits are performed by personnel from the Ambient Monitoring Section of the Bureau of Quality Assurance. They also carry out the Performance Evaluation Program for the Federal Reference Method fine particulate matter ($PM_{2.5}$) network, and "Through the Probe" audits for all gaseous pollutants. All QA requirements specified in the monitoring rules of 40 CFR Parts 53 and 58 are adhered to.

Once the QA process is complete and ambient air monitoring data have been assured as accurate, precise, and complete, these data are submitted by DEC to EPA's Air Quality System.

## C. NYMA Ozone Air Quality Network

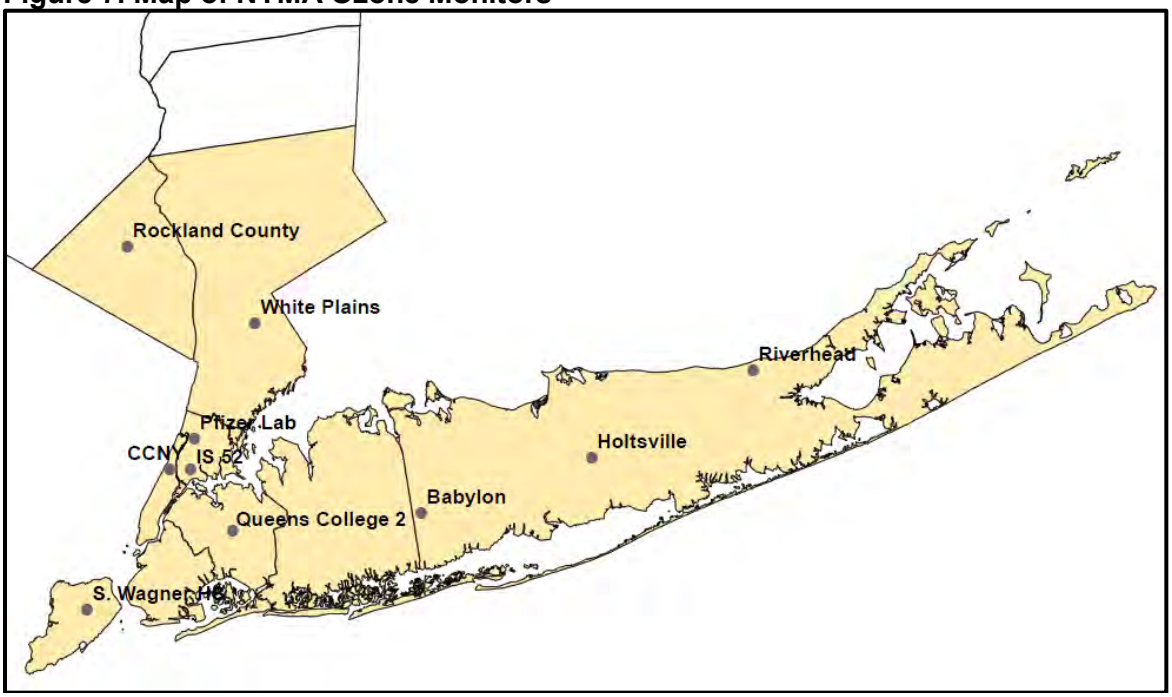
The State and Local Air Monitoring Stations (SLAMS) together with the National Air Monitoring Stations (NAMS) constitute New York's Ambient Air Monitoring System which provides the data used to demonstrate attainment. The principal objective of the ozone monitoring network is to determine the exposure of the state's population to ambient ozone.

Ambient ozone concentration data for the NYMA are provided by the monitors listed in Table 1 and shown in Figure 7. DEC presently operates 28 TEI Model 49C ozone monitors statewide, 10 of which are located within the NYMA, that use the ultraviolet photometric method for detection. All NYMA ozone monitors operate continuously.

**Table 1. Ozone Monitors Located in NYMA**

| AIRS ID | DEC ID | Site Name | County | Location |
|---|---|---|---|---|
| 36-103-0002 | 5150-02 | Babylon | Suffolk | 72 Gazza Blvd - Water Authority |
| 36-103-0009 | 5151-10 | Holtsville | Suffolk | 57 Division St - Sagamore JHS |
| 36-103-0004 | 5155-01 | Riverhead | Suffolk | 39 Sound Ave |
| 36-061-0135 | 7093-25 | CCNY | New York | 160 Convent Ave |
| 36-005-0133 | 7094-10 | Pfizer Lab | Bronx | 200th St & Southern Blvd |
| 36-005-0110 | 7094-07 | IS 52 | Bronx | 681 Kelly St, E 156th St |
| 36-081-0124 | 7096-15 | Queens College | Queens | NYSDEC Monitoring Bldg |
| 36-085-0067 | 7097-01 | Susan Wagner | Richmond | 1200 Manor Rd |
| 36-119-2004 | 5902-04 | White Plains | Westchester | Water Dist. Pumping Station |
| 36-087-0005 | 4353-02 | Rockland County | Rockland | Conklin Orchard |

**Figure 7. Map of NYMA Ozone Monitors**




## D. 2016 Design Values

The ozone DV is calculated as the three-year average of the annual fourth-highest daily maximum 8-hour concentration. This DV is then compared to the level of the standard to determine compliance. Table 2 provides the most recent DV data, including the fourth-highest 8-hour ozone concentrations for 2014, 2015, and 2016, and the resulting 2016 DV. Concentrations are provided for the Connecticut and New Jersey portions of the NYMA as well.

All 2016 DVs in the New York and New Jersey portions of the NYMA comply with the 2008 ozone NAAQS, except for the Susan Wagner monitor in New York which exceeds the NAAQS by 0.001 ppm. The Connecticut portion of the NYMA, meanwhile, contains multiple monitors recording exceedances. The “DV monitor,” which is the highest-concentration monitor that determines compliance for the entire tri-state area, is at Westport in Fairfield County, Connecticut. It recorded a 2016 DV of 0.085 ppm.

**Table 2. NYMA 2016 DVs for the 2008 Ozone NAAQS (ppm)**

| AIRS ID | Station | County | DEC Region/ State | 2014 4th Max | 2015 4th Max | 2016 4th Max | 2016 DV |
|---|---|---|---|---|---|---|---|
| 36-103-0002 | Babylon | Suffolk | 1 | 0.066 | 0.078 | 0.073 | **0.072** |
| 36-103-0009 | Holtsville | Suffolk | 1 | 0.062 | 0.063 | 0.073 | **0.066** |
| 36-103-0004 | Riverhead | Suffolk | 1 | 0.064 | 0.076 | 0.078 | **0.072** |
| 36-061-0135 | CCNY | New York | 2 | 0.065 | 0.071 | 0.071 | **0.069** |
| 36-005-0133 | Pfizer Lab | Bronx | 2 | 0.070 | 0.072 | 0.070 | **0.070** |
| 36-005-0110 | IS52 | Bronx | 2 | 0.071 | 0.063 | 0.069 | **0.067** |
| 36-081-0124 | Queens College 2 | Queens | 2 | 0.063 | 0.073 | 0.071 | **0.069** |
| 36-085-0067 | Susan Wagner | Richmond | 2 | 0.072 | 0.079 | 0.077 | **0.076** |
| 36-119-2004 | White Plains | Westchester | 3 | 0.074 | 0.073 | 0.075 | **0.074** |
| 36-087-0005 | Rockland County | Rockland | 3 | 0.068 | 0.077 | 0.073 | **0.072** |
| 09-001-0017 | Greenwich | Fairfield | CT | 0.078 | 0.084 | 0.085 | **0.082** |
| 09-001-1123 | Danbury | Fairfield | CT | 0.074 | 0.079 | 0.081 | **0.078** |
| 09-001-3007 | Stratford | Fairfield | CT | 0.074 | 0.086 | 0.083 | **0.081** |
| 09-001-9003 | Westport | Fairfield | CT | 0.081 | 0.087 | 0.087 | **0.085** |
| 09-007-0007 | Middletown | Middlesex | CT | 0.080 | 0.078 | 0.080 | **0.079** |
| 09-009-0027 | New Haven | New Haven | CT | 0.072 | 0.081 | 0.075 | **0.076** |
| 09-009-9002 | Madison Beach | New Haven | CT | 0.069 | 0.081 | 0.080 | **0.076** |
| 34-003-0006 | Leonia | Bergen | NJ | 0.073 | 0.076 | 0.075 | **0.074** |
| 34-013-0003 | Newark | Essex | NJ | 0.070 | 0.072 | 0.070 | **0.070** |
| 34-017-0006 | Bayonne | Hudson | NJ | 0.072 | 0.077 | 0.069 | **0.072** |
| 34-019-0001 | Flemington | Hunterdon | NJ | 0.065 | 0.073 | 0.078 | **0.072** |
| 34-023-0011 | Rutgers Univ. | Middlesex | NJ | 0.071 | 0.077 | 0.076 | **0.074** |
| 34-025-0005 | Monmouth Univ. | Monmouth | NJ | 0.064 | 0.077 | 0.070 | **0.070** |
| 34-027-3001 | Chester | Morris | NJ | 0.068 | 0.070 | 0.069 | **0.069** |
| 34-031-5001 | Ramapo | Passaic | NJ | 0.065 | 0.071 | 0.072 | **0.069** |
| 34-041-0007 | Columbia WMA | Warren | NJ | 0.060 | 0.066 | 0.066 | **0.064** |

Ozone concentrations in the NYMA have been exhibiting a declining trend for many years. Displayed in Figure 8 are the historic DVs from the New York portion of the NYMA, represented as the average of DVs through 2016 from all monitors operating in a given year.

**Figure 8. Historic NYMA DV Trend – New York Monitors Only (ppm)**

# SECTION 4: EMISSION INVENTORIES

## A. Introduction and Submission of 2011 Base Year Inventory

DEC has developed a full 2011 base-year inventory for New York State that is being submitted to EPA to be approved into the SIP. Included as Appendix A is a by-county summary of 2011 emissions of $PM_{2.5}$ and $PM_{10}$, VOCs, NOx, $SO_2$, ammonia, and carbon monoxide. More detailed inventory documents are referenced throughout this section.

The 2011 base year inventory was utilized in this ozone SIP for projecting a future-year (2017) inventory. This section begins with a review of the 2011 base-year inventory of annual emissions, followed by the baseline inventory in the form of ozone season day (OSD) emissions – which are a more appropriate measure for the purposes of this ozone implementation plan. The 2017 projection year OSD inventories are then provided. OSD emissions are adjusted for the various types of emission source sectors based on their activity level during the summer ozone season.

The source sectors enumerated in this chapter are divided into the following source categories: non-EGU point, EGU point, nonpoint (or area), nonroad mobile, on-road mobile, and biogenic. Explanations of the methodologies used to produce the base and projection inventories for each of these source categories are provided throughout this section.

## B. Summary of 2011 Base Year Annual Emissions

The fundamental unit for the inventory of each source sector and contaminant is an annual tons-per-year emissions level reported on a "by-county" basis. The 2011 by-county and total statewide inventories for CO, $NO_x$, and VOCs are detailed in Appendix B for EGU point, non-EGU point, and nonpoint sources; Appendix C contains the by-county and total statewide 2011 inventories for mobile sources. Facility-specific 2011 point source emissions are also provided in Appendix D. Point source emissions for both EGUs and non-EGUs are presented with and without rule effectiveness (RE) factored in.

The statewide totals for the 2011 base year are summarized in Table 3, with the percent share of each sector following as Table 4. Table 5 summarizes the 2011 base year annual emissions for the nine-county NYMA, with the percent share of each sector following as Table 6.

**Table 3. Statewide Summary of 2011 Annual Emissions (Tons)**

| 2011 New York State Annual | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| CO | 41,352 | 41,469 | 10,925 | 15,177 | 217,200 | 765,931 | 890,013 | 73,592 | 1,999,013 |
| NOx | 26,606 | 28,341 | 24,442 | 25,521 | 65,602 | 104,725 | 173,269 | 8,516 | 403,160 |
| VOC | 7,777 | 21,474 | 861 | 903 | 221,174 | 105,266 | 86,980 | 391,579 | 813,637 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 4. Statewide Summary of 2011 Annual Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| Point Non-EGU | 2.07% | 6.60% | 0.96% |
| Point EGU | 0.55% | 6.06% | 0.11% |
| Nonpoint | 10.87% | 16.27% | 27.18% |
| Nonroad | 38.32% | 25.98% | 12.94% |
| On-Road | 44.52% | 42.98% | 10.69% |
| Biogenic | 3.68% | 2.11% | 48.13% |
| All Sectors | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 5. NYMA Summary of 2011 Annual Emissions (Tons)**

| 2011 New York Metropolitan Area (NYMA) Annual | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| CO | 2,947 | 2,967 | 6,066 | 6,707 | 33,666 | 389,377 | 385,300 | 3,740 | 821,096 |
| $NO_x$ | 6,165 | 6,730 | 11,074 | 11,672 | 37,250 | 55,968 | 72,842 | 300 | 183,599 |
| VOC | 1,784 | 4,161 | 565 | 566 | 105,344 | 34,665 | 37,979 | 27,156 | 207,493 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 6. NYMA Summary of 2011 Annual Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| Point Non-EGU | 0.36% | 3.36% | 0.86% |
| Point EGU | 0.74% | 6.03% | 0.27% |
| Nonpoint | 4.10% | 20.29% | 50.77% |
| Nonroad | 47.42% | 30.48% | 16.71% |
| On-Road | 46.93% | 39.67% | 18.30% |
| Biogenic | 0.46% | 0.16% | 13.09% |
| All Sectors | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness not included in the total for all sectors

## C. Methodology for 2011 Base Year Emissions

### 1. Point Inventory Methodology

New York State has an integrated emissions, permitting, compliance, and fee billing computer system known as the Air Facility System (AFS). The Emissions Inventory module of AFS is a database that contains detailed facility and emissions information for all of the major (Title V) sources within New York State. This database is used to generate annual emission statement forms which are sent out to major facilities each year. Emission statements survey the type and amount of fuel consumed (combustion sources), throughput rates (non-combustion processes), average hours of operation, percent operation by season, control descriptions/efficiencies, and estimates of actual emissions for each regulated contaminant. The 2011 emissions from point sources were obtained directly from Title V sources via the required emission statement surveys. These data from the major sources were further subdivided into EGU and non-EGU point source sectors.

The inventory summary work described in this chapter was prepared by the Mid-Atlantic Regional Air Management Association (MARAMA) as a coordinated effort among the states to develop a consistent inventory throughout the region with the most efficient process. MARAMA is a voluntary, non-profit association of 10 state and local air pollution control agencies that is cooperating with the Northeast States for Coordinated Air Use Management (NESCAUM) and the Ozone Transport Commission (OTC) to provide staff support to the Mid-Atlantic and Northeast Visibility Union (MANE-VU). Emissions data from point sources were submitted to MARAMA for additional QA and for their use in preparing the projection inventories. MARAMA's methodology and results can be found in the document "Technical Support Document, Emission Inventory Development for 2011 and 2017 for the Northeastern U.S., Beta Version" dated June 10, 2016, provided as Appendix E.

### 2. Nonpoint Inventory Methodology

Nonpoint sources (referred to as "area sources" in previous inventories) are defined and calculated in accordance with the descriptions and methodologies in the EPA Emissions Inventory Improvement Program (EIIP) Volume III - Area Source series, and the Air Toxic Emission Protocol for the Great Lakes States. Nonpoint sources collectively represent individual stationary sources that have not been inventoried as specific point sources because they are too small, numerous, or difficult to inventory using the methods for the other classes of sources. Nonpoint sources represent a collection of emission points for a specific geographic area, most commonly at the county level; any geographic area, however, can be used to present nonpoint sources. Facilities and emission points are grouped together with other like sources into nonpoint source categories. These categories are combined in such a way that emissions can be estimated for an entire category using one methodology. This methodology normally requires a step to exclude the emissions from sources that have already been

accounted for as point sources. The nonpoint source categories must be defined in such a way as to avoid overlap or duplication with point, mobile, or biogenic emissions sources.

New York has applied the methodologies as identified in EIIP and/or the Air Toxic Emission Protocol for the Great Lakes States, including appropriate 2011 actual activity data, to develop the 2011 periodic nonpoint source inventory. The nonpoint sources are broken down according to Area Source Codes (ASC). Details of area source methodologies are provided in the Word document and Excel spreadsheet labeled as Appendix F-1 and F-2, respectively.

All nonpoint source data were submitted to MARAMA for additional QA and for preparing the projection inventories. The MARAMA methodology and results can be found in Appendix E.

Emissions from structure fires (ASC: 2810030000) and from landfills (ASC: 2620030000) were last estimated in 2008. The 2008 data were carried over into this inventory.

## 3. Nonroad Inventory Methodology

In New York's inventory, nonroad mobile source emissions are separated into four main categories: nonroad equipment, commercial marine vessels (CMV), locomotives, and airports. Emissions for these sectors were estimated using four separate methodologies.

### *a. Nonroad Equipment*

The nonroad equipment category is further broken down into several sub-categories of equipment and vehicles including agricultural, commercial, construction and mining, industrial, lawn and garden, logging, pleasure craft, and recreational.

Nonroad equipment is separated into 2-stroke gasoline, 4-stroke gasoline, liquefied petroleum gas, compressed natural gas, and diesel-fueled engine types. Emissions from these sources were estimated using the Motor Vehicle Emissions Simulator (MOVES2014a) model for 2011. The MOVES2014a nonroad model was used to calculate the inventory for all 62 counties for all 12 months of the year. County-specific temperature and fuels blend data for each month of the year were inputted into the model to account for differences across the state.

For fuels, New York is separated into two areas to account for the federally mandated reformulated gas program in place in NYMA. Fuels blend data for 2011 were acquired from the New York State Department of Agriculture and Markets. These data are based on thousands of samples collected across the state from fueling stations and retention areas, which are analyzed for many profiles including oxygen content, RVP, and sulfur

content. This analysis provides average monthly fuels profiles on a county-by-county basis for use in the model. Temperature data were acquired from the National Oceanic and Atmospheric Administration for 33 airport locations across New York State as well as surrounding locations to create county-by-county MOVES2014a inputs.

With these data compiled, the nonroad configuration file for the MOVES2014a nonroad run was created and MOVES2014a was run. When the run was completed, post-processing scripts were used to process and aggregate the MOVES2014a nonroad outputs into annual emissions by Source Classification Code (SCC) and by county, and OSD emissions by SCC and by county. Annual emissions values were created by aggregating the data for each of the 12 months, while OSD emissions were based on average daily emissions for the months of June, July, and August.

### *b. Commercial Marine Vessels*

The CMV sector includes boats and ships used either directly or indirectly in the conduct of commerce or military activity. The majority of vessels in this category are powered by diesel engines that are fueled with either distillate or residual fuel oil blends. The CMV inventory includes: Category 1 (C1), Category 2 (C2), and Category 3 (C3) vessels.

C1 and C2 vessels tend to be smaller ships that operate closer to shore, and along inland and inter-coastal waterways. C1 and C2 marine vessels typically have engines between 700 and 11,000 hp, often using distillate fuels, which provide propulsion power on many kinds of vessels including tugboats, pushboats, supply vessels, fishing vessels, and other commercial vessels in and around ports. C3 marine vessels include ships with engine displacement above 30 liters per cylinder and typically use residual oil.

The CMV source category does not include recreational marine vessels, which are generally less than 100 feet in length (the majority of which are less than 30 feet) and are powered by either inboard or outboard engines. The emissions from recreational marine vessels are accounted for as part of the “other” category of the nonroad inventory developed using MOVES2014a.

CMV emissions for New York State for 2011 are based on the 2011 National Emissions Inventory (NEI) developed by EPA. Each source classification code for commercial marine vessels requires an appropriate emissions type (M=maneuvering, H=hotelling, C=cruise, Z=reduced speed zone) because emission factors vary by emission type. The allowed combinations are shown in Table 7. The default values are those assumed when the actual emission type may be unknown; for example, emissions that occur in shipping lanes are assumed to be ‘cruising’ and cannot be ‘hotelling,’ which only occurs at ports.

**Table 7. Commercial Marine SCCs and Emission Types in EPA Estimates**

| SCC | SCC Description | Allowed | Default |
|---|---|---|---|
| 2280002100 | Marine Vessels, Commercial Diesel Port | M | M |
| 2280002200 | Marine Vessels, Commercial Diesel Underway | C | C |
| 2280003100 | Marine Vessels, Commercial Residual Port | H | H |
| 2280003100 | Marine Vessels, Commercial Residual Port | M | H |
| 2280003200 | Marine Vessels, Commercial Residual Underway | C | C |
| 2280003200 | Marine Vessels, Commercial Residual Underway | Z | C |

Geographically, the inventories include port and interport emissions that occur within the area that extends 200 nautical miles from the official U.S. shoreline, which is roughly equivalent to the border of the U.S. Exclusive Economic Zone. EPA allocates only some of these emissions to counties based on official state boundaries that typically extend 3 miles offshore.

For C1 and C2 marine diesel engines, the emission estimates were consistent with the 2011 Locomotive and Marine federal rulemaking.[27] For C3 engines, EPA developed the 2011 emission estimates by applying regional adjustment factors to account for growth to the previously developed emission estimates from the 2002 base year. In addition, EPA developed and applied NOx adjustment factors to account for implementation of the NOx Tier 1 standards.[28]

Resources for 2011 base year methodology for CMVs (available upon request):

1. 2011 National Emissions Inventory, version 2 Technical Support Document, August 2015
2. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
3. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
4. Technical Support Document Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. Beta Version, June 10, 2016

### *c. Locomotives and Rail Yards*

The locomotive sector includes railroad locomotives powered by diesel-electric engines. A diesel-electric locomotive uses 2-stroke or 4-stroke diesel engines and an alternator or generator to produce the electricity required to power its traction motors. The locomotive source category is further divided into Class I line haul, Class II/III line haul, Passenger, Commuter, and Yard:

[27] "Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles." Final Rule. Published September 15, 2011; effective November 14, 2011. 76 FR 57106-57513.

[28] "Control of Emissions from New Marine Compression-Ignition Engines at or Above 30 Liters per Cylinder." Final Rule. Published February 28, 2003; effective April 29, 2003. 68 FR 9746-9789.

- Class I line haul locomotives carry freight long distances and are operated by national railroad companies with large carrier operating revenues. There were seven Class I freight operators in 2008.
- Class II/III line haul locomotives are operated by companies with smaller revenues. Class II railroads operate on a regional basis, while Class III railroads are typically local short-line railroads serving a small number of towns and industries.
- Passenger railroads are operated by AMTRAK and provide intercity passenger train service in the U.S.
- Commuter railroads operate locomotives that provide a passenger rail transport service that primarily operates between a city center and the middle- to outer-suburbs.
- Rail yards include switcher locomotives engaged in splitting and joining rail cars.

Table 8 provides the SCCs for these locomotive sub-categories.

**Table 8. Locomotive SCCs**

| SCC | Description |
|---|---|
| 2285002006 | Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class I Operations |
| 2285002007 | Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Class II / III Operations |
| 2285002008 | Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Passenger Trains (Amtrak) |
| 2285002009 | Mobile Sources Railroad Equipment Diesel Line Haul Locomotives: Commuter Lines |
| 2285002010 | Railroad Equipment Diesel Yard Locomotives |
| 28500201 | Internal Combustion Engines Railroad Equipment Diesel Yard |

Annual Rail emissions for New York State for 2011 are based on the 2011 NEI developed by EPA. EPA developed 2011 national rail estimates by applying growth factors to the 2008 NEI values based on railroad freight traffic data from 2008 and 2011 submitted by all Class I rail lines to the Surface Transportation Board and employment statistics from the American Short Lines and Regional Railroad Association for Class II and III.

Resources for 2011 base year methodology for locomotives and rail yards (available upon request):

1. 2011 National Emissions Inventory, version 2 Technical Support Document, August 2015
2. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
3. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
4. Technical Support Document Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. Beta Version, June 10, 2016

### *d. Airports*

Airport emissions for New York State for the year 2011 are based on the 2011 NEI version 2 (NEI 2011v2). The NEI focuses on airports as point sources. The emission sources contained within the airport sector include commercial aviation, air taxi, general aviation (GA), military aircraft, ground support equipment (GSE), and auxiliary power units. These categories are broken down further into the multiple SCC listed in Table 9.

**Table 9. Airport SCCs and Emission Types**

| SCC | SCC Description |
|---|---|
| 2265008005 | GSE, Gas Fueled |
| 2267008005 | GSE, LPG Fueled |
| 2268008005 | GSE, CNG Fueled |
| 2270008005 | GSE, Diesel Fueled |
| 2275001000 | Military |
| 2275020000 | Commercial Aviation |
| 2275050011 | General Aviation, Piston Driven |
| 2275050012 | General Aviation, Turbine Driven |
| 2275060011 | Air Taxi, Piston Driven |
| 2275060012 | Air Taxi, Turbine Driven |
| 2275070000 | Auxiliary Power Unit |

EPA contracted with Eastern Research Group (ERG) to compile 2011 landing and take-off data (LTO). ERG obtained LTO data from the Air Traffic Activity Data System (ATADS), T-100 aircraft data, the Terminal Area Forecast (TAF) system, and the Federal Aviation Administration (FAA) 5010 Airport Master Record data. The LTO data from airports with control towers is publically available in the ATADS and TAF databases. The operations data for the airports in the TAF database that do not have control towers are estimates.

Once the LTO data were obtained, the aircraft-specific data were run in the FAA Emissions and Dispersion Modeling System (EDMS) to get annual emissions for all airports.

The airport characteristics identified by FAA and used to estimate GA operations at small airports include the number of aircraft based at a facility (based aircraft), population in the vicinity of the airport, airport regional prominence, per capita income, region, and the presence of certificated flight schools.

Since airports that are not in the TAF database submit data voluntarily to FAA for the 5010 data report, many only have operations data for years prior to 2011. Nationally, piston-engine operations have decreased in recent years. EPA therefore did not just use GA operations data from years prior to 2011; instead, EPA multiplied the older GA piston-engine data by factors that were derived by dividing the 2011 national amount of

aviation gas (avgas) produced by the national amount of avgas produced in the year the operations data represents.

Lead emissions associated with aircraft result from the use of 100 octane low-lead avgas. Tetraethyl lead is added to avgas to increase fuel octane, prevent engine knock, and prevent valve seat recession and subsequent loss of compression for engines without hardened valves. Lead is not added to jet fuel that is used in commercial aircraft, most military aircraft, or other turbine-engine powered aircraft. This is why there are no lead emissions for non-piston engine SCCs.

Resources for 2011 base year methodology for airports (available upon request):

1. Technical Support Document Emission Inventory Development For 2011 and 2017 for the Northeastern U.S. Beta Version, MARAMA, June 10, 2016
2. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
3. 2011 National Emissions Inventory, version 2 Technical Support Document, August 2015
4. ERG Memorandum, Development of 2011 Aircraft Component For National Emissions Inventory, June 17, 2013
5. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
6. Terminal Area Forecast Summary
7. Documentation for Aircraft Component of the National Emissions Inventory Methodology, Eastern Research Group, April 23, 2010

## 4. On-Road Inventory Methodology

New York State developed base year on-road mobile source emission inventories utilizing EPA's Motor Vehicle Emissions Simulator (MOVES) model, MOVES2014. The emission inventories are modeled in accordance with EPA's guidance, "*MOVES2014 and MOVES2014A Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (EPA-420-B-15-093, November 2015*).

The on-road component of the 2011 base year inventory includes an estimate of emissions from all motorized vehicles operated on public roadways (excluding emissions from refueling, which are captured separately). The development of the on-road inventory requires a substantial amount of processing of local-level data to replace default data, where available, to develop New York's county-level emission estimates. The local-level data are provided by several agencies and are derived mainly from actual vehicle registration data, estimated actual and forecasted vehicle miles traveled (VMT), driving patterns, regional fuel characteristics, emission control programs, and

meteorological data. The data are processed and formatted as 17 different MOVES2014 input files per county for import into MOVES2014. All inputs rely on the latest information available and the application of MOVES2014 defaults when local data are unavailable. Additional detailed descriptions of DEC's methodologies for developing MOVES-specific inputs, along with 2011 annual and OSD MOVES2014 emission estimates, can be found in Appendix G – *New York Motor Vehicle Emission Inventory – MOVES Technical Support Documentation*.

### *a. Refueling Emissions*

DEC calculated 2011 base year refueling emissions using MOVES2014 following the same methodologies described above for the on-road portion of the inventory. 2011 annual and OSD MOVES2014 refueling emission estimates can be found in Appendix G. While detailed breakouts of refueling emissions have been provided in the appendices, these emissions are added to and included with on-road emissions summaries in this document.

### *b. Re-entrained Road Dust - 2011 Base Year Only*

DEC has included road dust estimates as part of this SIP submission. This inventory was developed as part of our SIP modeling inventory and the methodology is contained in Appendix H - *Road Dust Estimation for Paved and Unpaved Roads*. For the relatively rural counties (i.e., all of upstate, Nassau, Rockland, Suffolk, and Westchester), speciated monitoring indicates that road dust emissions represent approximately 3.3 percent of the total mass. DEC has adjusted the calculated road dust emissions estimates for these counties so that they represent 3.3 percent of the total mass from the monitoring results. DEC also adjusted Bronx, Kings, New York, Queens, and Richmond Counties to 5.0 percent to more closely represent speciated monitoring at an urban monitor.

DEC believes that the values estimated using EPA's preferred methodology are inaccurate for inclusion in the SIP.[29] For the purposes of this submission, DEC has included an adjusted road dust inventory based on speciated monitoring.

The speciated monitoring data show that the portion known as the "crustal fraction" can be subtotaled yielding three to five percent of the $PM_{2.5}$ total mass on filters collected in the NYMA nonattainment area. This crustal fraction is a measure of particulate from any geological origin, not just from road dust (e.g., sand and gravel operations and their transportation, residential, commercial or roadway construction and demolition including trackout, other forms of trackout, waste transfer processes, fugitive dusts from roadway accidents and spillage, etc.).

[29] This methodology is outlined in AP-42, Chapter 13, §13.2.1 for paved roads and §13.2.2 for unpaved roads.

Original emissions (as contrasted to the re-entrained portions) are considered by DEC to minimally include brake wear, tire wear, and pavement wear. A case can be made that only pavement wear is road dust, but such estimates are indeterminate as well. Furthermore, for accounting purposes in this plan, tire wear (TW) and brake wear (BW) estimates are included as part of the on-road sector for $PM_{2.5}$. They are included in the $PM_{2.5}$ estimates made for the on-road mobile sources, together with exhaust gas PM (GASPM), organic carbon, (O_CARBON) and elemental carbon (E_CARBON) estimates.

2011 annual re-entrained emission estimates can be found in Appendix H.

### 5. Biogenic Inventory Methodology

Biogenic emissions were calculated using Biogenic Emissions Inventory System (BEIS) version 3.6.1. Daily values were totaled for each county to yield annual numbers.

## D. Summary of 2011 Base Year Ozone Season Day Emissions

For this portion of the inventory, the fundamental unit for each source sector is tons of emissions per OSD. Similar to the annual inventory, the OSD inventory is reported on a "by-county" basis for the various source sectors. The by-county and total statewide 2011 OSD inventories for CO, $NO_x$, and VOCs are detailed in Appendices B and C for stationary and mobile sources, respectively. Point source emissions for both EGUs and non-EGUs are presented with and without RE factored in.

The statewide 2011 OSD values are summarized in Table 10, with the percent share of each sector following as Table 11. Table 12 summarizes the 2011 OSD values for the NYMA, with the percent share of each sector following as Table 13.

**Table 10. Statewide Summary of 2011 OSD Emissions (Tons per Day)**

| 2011 New York State Ozone Season Day | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| CO | 132.33 | 133.26 | 118.37 | 142.72 | 287.18 | 2,141.20 | 2,262.68 | 453.28 | 5,395.04 |
| $NO_x$ | 130.34 | 139.42 | 553.84 | 572.49 | 95.22 | 290.35 | 488.76 | 38.96 | 1,597.47 |
| VOC | 29.80 | 72.61 | 7.76 | 8.07 | 593.46 | 294.31 | 234.80 | 2,658.65 | 3,818.78 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 11. Statewide Summary of 2011 OSD Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| **Point Non-EGU** | 2.45% | 8.16% | 0.78% |
| **Point EGU** | 2.19% | 34.67% | 0.20% |
| **Nonpoint** | 5.32% | 5.96% | 15.54% |
| **Nonroad** | 39.69% | 18.18% | 7.71% |
| **On-Road** | 41.94% | 30.60% | 6.15% |
| **Biogenic** | 8.40% | 2.44% | 69.62% |
| **All Sectors** | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness is not included in the total for all sectors

**Table 12. NYMA Summary of 2011 OSD Emissions (Tons per Day)**

| 2011 New York Metropolitan Area (NYMA) Ozone Season Day | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| **CO** | 14.20 | 14.30 | 74.37 | 85.99 | 46.18 | 1,088.43 | 1,018.81 | 22.11 | 2,264.10 |
| **$NO_x$** | 42.43 | 45.68 | 302.45 | 311.30 | 52.49 | 155.07 | 205.86 | 1.35 | 759.65 |
| **VOC** | 5.63 | 7.93 | 5.63 | 5.66 | 301.11 | 96.88 | 104.46 | 191.15 | 704.86 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 13. NYMA Summary of 2011 OSD Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| **Point Non-EGU** | 0.63% | 5.59% | 0.80% |
| **Point EGU** | 3.28% | 39.81% | 0.80% |
| **Nonpoint** | 2.04% | 6.91% | 42.72% |
| **Nonroad** | 48.07% | 20.41% | 13.74% |
| **On-Road** | 45.00% | 27.10% | 14.82% |
| **Biogenic** | 0.98% | 0.18% | 27.12% |
| **All Sectors** | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness not included in the total for all sectors

## E. Methodology for Computing Ozone Season Day Values from Annual Estimates

OSD emission inventories for most categories are derived from annual inventories and are estimated by adjustments to reflect the relative difference of emission patterns during the ozone season when compared to cooler months. Depending upon source sector activity levels, some source categories are more or less likely to have emissions during an OSD; for example, an OSD is less likely to have emissions related to space heating and more likely to have emissions related to air conditioning or painting. Many categories have relatively constant emissions throughout the year (e.g., consumer

products such as deodorant or house cleaning products). OSD estimates attempt to characterize those seasonal differences to more accurately reflect emissions during the summer season.

Nonpoint sector OSD emissions were calculated using the following formula:

$$\text{OSD Emissions} = \frac{\text{Annual Emissions} * \text{Ozone Season Factor}}{52 * \text{Activity Days per Week}}$$

The ozone season factor and the number of days per week differed for each nonpoint category; for example, the annual emissions for consumer products are simply divided by the product of 7 days per week times 52 weeks per year because consumer products are generally used uniformly throughout the year. For dry cleaning, the emissions are assumed to be consistent throughout the year, but emissions are assumed to occur five days per week, so annual emissions for this category are divided by 260 (5*52) to estimate OSD emissions. For AIM coatings, activity is higher during the summer, so an adjustment factor (or ozone season factor) of 1.3 is applied during the summer based on EPA guidance.[30] Appendix I presents OSD factors and data for activity days per week for each nonpoint SCC.

Point source sector OSD emissions are calculated from the operational information provided on the emission statement forms. This information includes the process throughput and a breakdown of operation by season, including the number of days the process was in operation during that season. OSD emissions were calculated for each process at point sources by multiplying the annual emissions by the seasonal operating percentage, then dividing by the number of days that process was in operation during the 2011 ozone season.

For most nonroad categories (i.e., CMV, rail, airports) there is no documentation that supports using any seasonal adjustment factors to develop daily emissions. Therefore, ozone season day emissions were calculated for these categories by dividing the annual emissions by 365.

The two categories that are derived utilizing seasonal factors and model runs specific to the development of OSD emissions are onroad and nonroad equipment. OSD emissions are generated from the MOVES model using data specific to June, July, and August.

For biogenic sources, ozone day emissions were estimated by taking the mean daily biogenic emissions during the months of June, July and August for each county.

[30] STAPPA-ALAPCO-EPA Emission Inventory Improvement Program; Volume III: Chapter 3 – Architectural Surface Coating, page 3-4. November 1995.

## F. Summary of 2017 Projection Year Ozone Season Day Emissions

For the NYMA and its moderate classification, the future year of interest is 2017. The by-county and total statewide 2017 OSD inventories for CO, $NO_x$, and VOCs are detailed in Appendix B for EGU point, non-EGU point, and nonpoint sources; Appendix J contains the by-county and total statewide 2017 inventories for mobile sources. Facility-specific projected 2017 point source emissions are also provided in Appendix D. Point source emissions for both EGUs and non-EGUs are presented with and without RE factored in.

The statewide OSD estimates for the 2017 projection year inventory are summarized in Table 14, with the percent share of each sector following as Table 15. Table 16 summarizes the 2017 projection year OSD inventory estimates for the NYMA, with the percent share of each sector following as Table 17.

**Table 14. Statewide Summary of 2017 OSD Emissions (Tons per Day)**

| 2017 New York State Ozone Season Day | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| CO | 132.83 | 133.81 | 142.49 | 166.01 | 277.15 | 3,133.13 | 1,690.20 | 453.28 | 5,829.08 |
| $NO_x$ | 129.56 | 136.18 | 409.24 | 431.83 | 81.27 | 299.72 | 280.79 | 38.96 | 1,239.54 |
| VOC | 30.43 | 73.15 | 11.24 | 11.59 | 570.15 | 292.63 | 147.70 | 2,658.65 | 3,710.80 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 15. Statewide Summary of 2017 OSD Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| Point Non-EGU | 2.28% | 10.45% | 0.82% |
| Point EGU | 2.44% | 33.02% | 0.30% |
| Nonpoint | 4.75% | 6.56% | 15.36% |
| Nonroad | 53.75% | 24.18% | 7.89% |
| On-Road | 29.00% | 22.65% | 3.98% |
| Biogenic | 7.78% | 3.14% | 71.65% |
| All Sectors | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness is not included in the total for all sectors

**Table 16. NYMA Summary of 2017 OSD Emissions (Tons per Day)**

| 2017 New York Metropolitan Area (NYMA) Ozone Season Day | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Point Non-EGU | Point Non-EGU with RE | Point EGU | Point EGU with RE | Nonpoint | Nonroad | On-Road | Biogenic | Total for all sectors* |
| CO | 14.30 | 14.41 | 63.43 | 71.94 | 42.26 | 1,652.22 | 799.44 | 22.11 | 2,593.76 |
| $NO_x$ | 42.82 | 44.66 | 167.23 | 172.46 | 44.82 | 148.73 | 117.21 | 1.35 | 522.16 |
| VOC | 5.79 | 8.09 | 4.40 | 4.43 | 289.27 | 109.65 | 67.95 | 191.15 | 668.21 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 17. NYMA Summary of 2017 OSD Emissions Contributions by Sector**

| Percent of All Sectors* | | | |
|---|---|---|---|
| | CO | $NO_x$ | VOC |
| **Point Non-EGU** | 0.55% | 8.20% | 0.87% |
| **Point EGU** | 2.45% | 32.03% | 0.66% |
| **Nonpoint** | 1.63% | 8.58% | 43.29% |
| **Nonroad** | 63.70% | 28.48% | 16.41% |
| **On-Road** | 30.82% | 22.45% | 10.17% |
| **Biogenic** | 0.85% | 0.26% | 28.61% |
| **All Sectors** | 100.00% | 100.00% | 100.00% |

*Point source emissions with rule effectiveness not included in the total for all sectors

## G. Methodology for 2017 Projection Year Emissions

### 1. Point and Nonpoint Inventory Methodology

The 2011 non-EGU point and nonpoint source emissions inventories were projected using the growth factors developed by MARAMA in consultation with DEC. The emissions used for projections were developed for 2017. The MARAMA methodology and results can be found in Appendix E.

For EGU point sources, MARAMA used the projection tool developed by state, local and tribal air management agencies with guidance from the Eastern Regional Technical Advisory Committee (ERTAC). The ERTAC projection tool uses 2011 emissions data from EPA's Clean Air Markets Division and growth factors developed from the U.S. Department of Energy's Energy Information Administration (EIA) data and other sources to create a 2017 emissions inventory for EGUs.

As stated in Section 4.C.2, structure fire and landfill emissions were last estimated in 2008. It was assumed that the 2008 estimates carried over to 2017.

Sample calculations for point and nonpoint sources using the growth and control factors are provided in Appendices F-1 and F-2.

### 2. Nonroad Inventory Methodology

#### *a. Nonroad Equipment*

When completing future year projections, the MOVES model incorporates emissions effects that result from both anticipated changes in equipment activity as well as deterioration of equipment. The model also accounts for expected turnover of old equipment. Emissions from these sources were estimated using MOVES2014a model for 2017. The MOVES2014a Nonroad model was used to calculate the inventory for all

62 counties for all 12 months of the year. County-specific temperature and fuels blend data for each month of the year were inputted into the model to account for differences across the state.

For fuels, New York is separated into two areas to account for the federally mandated Reformulated Gas program in place in NYMA. Fuels blend data for 2017 are based on recommendations from the Bureau of Mobile Sources' Fuels Impact and Program Support Section taking into account all regulatory requirements for fuels in New York for 2017. Temperature data were acquired from the National Oceanic and Atmospheric Administration from 33 airport locations across New York State as well as surrounding locations to create county-by-county MOVES2014a inputs.

With these data compiled, the nonroad configuration file for the MOVES2014a non-road run was created and the MOVES2014a was run. Post-processing scripts were then used to process and aggregate the MOVES2014a nonroad outputs into annual emissions by SCC and by county, and OSD emissions by SCC and by county. Annual emissions values were created by aggregating the data for each of the 12 months, while OSD emissions were based on average daily emissions for the months of June, July and August.

### *b. C1 and C2 Commercial Marine Vessels and Locomotives and Rail Yard Projections*

To project emissions for C1/C2 vessels, locomotives, and rail yards to 2017, New York relied upon emission projections developed by MARAMA using EPA data and methodologies. These methodologies supported the development of a projection factor (combined growth and control factor) for C1/C2 vessels and for locomotives.

EPA national projection factors by SCC and pollutant between 2011 and future years reflect the Tier 4 emissions standards and fuel requirements,[31] as well as the locomotive and marine rule which phased in starting in 2009.[32]

According to EPA, future-year C1/C2 vessel and rail emission projections account for increased fuel consumption based on EIA fuel consumption projections, and emissions reductions resulting from emissions standards from the aforementioned locomotive and marine rule. These standards lowered diesel sulfur content and tightened emission standards for existing and new locomotives and commercial marine vessels that resulted in lower future-year PM, $SO_2$, and NOx emissions. MARAMA created projection factors for all future years through 2040 for each type of engine and each pollutant.

[31] "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel." Final Rule. Published June 29, 2004; effective August 30, 2004. 69 FR 38958-39273.

[32] "Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder." Final Rule. Published May 6, 2008; republished June 30, 2008; effective July 7, 2008. 73 FR 25098-25352.

MARAMA provided the "C1C2RAIL 2016_04_29.xlsx" spreadsheet that was used to obtain growth factors for C1/C2 vessels and locomotives. The spreadsheet, available as Appendix K, contains four tabs labeled General Methodology, Growth Raw Data, NEI to Growth Factor XWALK, and EMF Projection Packet. The growth factors for the year 2017 were obtained by entering 2011 as a base year and 2017 as a future year into "The Growth Raw Data" tab.

The growth factors from emissions data from this spreadsheet were applied to New York's 2011 base year data to obtain the 2017 emissions for C1/C2 vessels and locomotives. 2017 OSD emissions data were obtained by dividing the annual emissions data by 365 days per year.

Resources for 2017 projection year methodology for C1/C2 CMVs, locomotives, and rail yards (available upon request):

1. 2011 National Emissions Inventory, version 2 Technical Support Document, August 2015
2. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
3. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
4. Technical Support Document Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. Beta Version, June 10, 2016

**c. C3 Commercial Marine Vessels**

To project emissions for C3 CMV to 2017, pollutant- and geographic-specific projection factors were applied that reflect assumed growth and final Emissions Control Area-International Marine Organization (ECA-IMO) controls. Projection factors for creating the New York's 2017 C3 CMV inventory from 2011 are provided in Table 18.

**Table 18. CMV Projection Factors**

| Region | EEZ (Offshore) FIPS | Year | 2017 and 2025 Adjustments Relative to 2011 | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CO | $NO_X$ | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | VOC |
| North Pacific (NP) | 85001 | 2017 | 1.205 | 0.989 | 0.168 | 0.167 | 0.047 | 1.215 |
| | | 2025 | 1.575 | 0.798 | 0.217 | 0.216 | 0.061 | 1.575 |
| South Pacific (SP) | 85002 | 2017 | 1.350 | 1.084 | 0.187 | 0.185 | 0.053 | 1.351 |
| | | 2025 | 2.027 | 0.909 | 0.285 | 0.283 | 0.081 | 2.028 |
| East Coast (EC) | 85004 | 2017 | 1.302 | 1.039 | 0.177 | 0.176 | 0.047 | 1.302 |
| | | 2025 | 1.852 | 0.838 | 0.252 | 0.250 | 0.066 | 1.852 |
| Gulf Coast (GC) | 85003 | 2017 | 1.187 | 0.947 | 0.162 | 0.161 | 0.042 | 1.187 |
| | | 2025 | 1.492 | 0.679 | 0.204 | 0.202 | 0.053 | 1.492 |
| Great Lakes (GL) | n/a | 2017 | 1.106 | 0.972 | 0.146 | 0.145 | 0.039 | 1.106 |
| | | 2025 | 1.266 | 0.940 | 0.168 | 0.166 | 0.045 | 1.266 |
| Outside ECA | 98001 | 2017 | 1.298 | 1.182 | 1.298 | 1.298 | 1.298 | 1.298 |
| | | 2025 | 1.858 | 1.463 | 0.409 | 0.405 | 0.337 | 1.858 |

MARAMA provided the "C3Marine 2016_02_20.xlsx" spreadsheet which was used to obtain projection factors for C3 marine vessels. The spreadsheet, available as Appendix L, contains four tabs labeled General Methodology, Growth Raw Data, NEI to Growth Factor XWALK, and EMF Projection Packet. The growth factors for the year 2017 were obtained by entering 2011 as a base year and 2017 as a future year into the "Growth Raw Data" tab.

The growth factors from emissions data from this spreadsheet were applied to the 2011 base year to obtain the 2017 emissions for C3 CMV. 2017 OSD emissions data were obtained by dividing the annual emissions data by 365 days per year.

Resources for 2017 projection year methodology for C3 CMVs (available upon request):

1. 2011 National Emissions Inventory, version 2 Technical Support Document, August 2015
2. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
3. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
4. Technical Support Document Emission Inventory Development for 2011 and 2017 for the Northeastern U.S. Beta Version, June 10, 2016

### d. Airports

To project airport emissions for 2017, New York obtained 2011 airport emissions data from EPA's Emissions Inventory System (EIS). New York updated its inventory of airports to remove facilities that are no longer operational, to add new facilities, and to correct inaccuracies such as facility names and locations. For newly added facilities, no

emissions data were available for 2011. To obtain estimated emissions for these facilities, a comparison was done of pre-existing facilities within the same county with similar operational data. The operational data was obtained from the FAA 5010 Airport Master Record data.[33]

To project the NEI 2011v2 data to 2017, New York relied upon growth factors developed by MARAMA. Future year airport emissions projections were obtained by applying airport- and SCC-specific growth factors to the 2011 emissions data. These growth factors were developed from itinerant (ITN) operations at airports. ITN operations are aircraft LTOs where an aircraft takes off from one airport and lands at another airport, or the aircraft lands at one airport after taking off from another airport. The ITN data were obtained from the FAA's TAF system. EPA applied a cap of 2.0 (100 percent increase) on projection factors for state-level defaults and 5.0 for airport-specific entries.

MARAMA provided the spreadsheet, included as Appendix M, that was used to obtain New York-specific growth factors by entering 2017 as the "future year" in the "Growth Raw Data" tab. These growth factors were then applied to the annual emissions data for the NEI 2011v2 to obtain 2017 projected emissions data. 2017 OSD emissions data were obtained by dividing the annual emissions data by 365 days per year.

Resources for 2017 projection year methodology for airports (available upon request):

1. Technical Support Document Emission Inventory Development For 2011 and 2017 for the Northeastern U.S. Beta Version, MARAMA, June 10, 2016
2. Technical Support Document Emission Inventory Development For 2011, 2018 And 2028 For The Northeastern U.S. Alpha2 Version, MARAMA, November 23, 2015
3. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform, U.S. EPA, August 2015
4. 2011 National Emissions Inventory, version 2, Technical Support Document U.S. EPA, August 2015

### 3. On-Road Inventory Methodology

New York State developed projection year on-road mobile source emission inventories utilizing EPA's MOVES model, MOVES2014. The emission inventories are modeled in accordance with EPA's "*MOVES2014 and MOVES2014A Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity (EPA-420-B-15-093, November 2015*).

The on-road component of the 2017 projection year inventory includes an estimate of emissions from all motorized vehicles operated on public roadways (excluding emissions from refueling which are captured separately). Projection inputs are

[33] Accessed at: http://www.gcr1.com/5010web/

prepared from VMT growth based on linear regression of Highway Performance Monitoring System (HPMS) historical data for forecasting VMT prepared by the New York State Department of Transportation, which is specific to county and road type. The same growth rate is applied to the base year vehicle population by source type and road type associations. Vehicle age distributions are grown using the EPA's "Age Distribution Projection Tool for MOVES2014," version 11/21/2014. Fuel information is provided for future years based on properties expected to be in place per fuel supply region (upstate/downstate) and expected seasonal changes, as well as regulatory requirements. All other inputs remain the same as those used to develop the 2011 base year except for an adjustment required to account for the extra leap year day which impacts growth estimates.

2017 annual and OSD MOVES2014 emission estimates can be found in Appendix G.

***a. Refueling emissions***

DEC calculated 2017 future year refueling emissions using MOVES2014 following the same methodologies described above for the on-road portion of the inventory. 2017 annual and OSD MOVES2014 refueling emission estimates can be found in Appendix G. While detailed breakouts of refueling emissions have been provided in the appendices, these emissions are added to and included with on-road emissions summaries in this document.

**4. Biogenic Inventory Methodology**

Biogenic emissions levels were maintained at the 2011 levels for year 2017.

## H. Summary of Emissions Changes between Base Year and Projection Year

Tables 19 and 20 summarize the difference in emissions between the 2011 base year and 2017 projection year. Negative numbers denote decreases in emissions over this time period. Table 19 represents the change in OSD emissions over the entirety of New York State, while Table 20 represents the change in OSD emissions within the NYMA.

**Table 19. 2011 to 2017 Emissions Difference in New York State (OSD Tons)**

| 2017 - 2011 NYS OSD | CO | NOx | VOC |
|---|---|---|---|
| **Non-EGU Point** | 0.50 | -0.78 | 0.63 |
| **Non-EGU Point w/ RE** | 0.55 | -3.24 | 0.54 |
| **EGU Point** | 24.12 | -144.60 | 3.48 |
| **EGU Point w/RE** | 23.29 | -140.66 | 3.52 |
| **Nonpoint** | -10.03 | -13.95 | -23.31 |
| **Nonroad** | 991.93 | 9.37 | -1.68 |
| **On-Road** | -572.48 | -207.97 | -87.10 |
| **Biogenic** | 0.00 | 0.00 | 0.00 |
| **All Sectors*** | 434.04 | -357.93 | -107.98 |

*Point source emissions with rule effectiveness not included in the total for all sectors

**Table 20. 2011 to 2017 Emissions Difference in NYMA (OSD Tons)**

| 2017 - 2011 NYMA OSD | CO | NOx | VOC |
|---|---|---|---|
| **Non-EGU Point** | 0.10 | 0.39 | 0.16 |
| **Non-EGU Point w/RE** | 0.11 | -1.02 | 0.16 |
| **EGU Point** | -10.94 | -135.22 | -1.23 |
| **EGU Point w/RE** | -14.05 | -138.84 | -1.23 |
| **Nonpoint** | -3.92 | -7.67 | -11.84 |
| **Nonroad** | 563.79 | -6.34 | 12.77 |
| **On-Road** | -219.37 | -88.65 | -36.51 |
| **Biogenic** | 0.00 | 0.00 | 0.00 |
| **All Sectors*** | 329.66 | -237.49 | -36.65 |

*Point source emissions with rule effectiveness not included in the total for all sectors

## I. Conformity Requirements

The CAA prohibits federally-funded projects from interfering with the ability of a state to come into compliance with a NAAQS through its SIP. SIPs establish baseline emissions and also project emission changes through the period of future years covered by the SIP. The projected emission levels throughout this period are considered to be a part of the state's budget for emissions of the pollutant(s) covered by the SIP.

Under conformity requirements, emissions from federally-funded or approved projects are not allowed to cause these emission budgets to be exceeded. The motor vehicle emissions budgets (MVEBs) are presented in subsection 2 below.

## 1. Transportation Conformity

Under the CAA, federally funded transportation projects must not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of a NAAQS. In other words, these projects, and any emissions changes resulting from them, must "conform" to implementation plans developed by states for the criteria pollutants. Conformity generally applies to projects funded or approved by the Federal Highway Administration or the Federal Transit Administration in areas that do not meet, or previously have not met, a NAAQS for a criteria pollutant (i.e., nonattainment or maintenance areas). A one-year grace period is allowed for newly-designated nonattainment or maintenance areas.

Conformity does not apply in attainment or unclassifiable areas. Conformity determinations are also not required for certain exempt projects, such as safety projects (e.g., lighting, guardrails), vehicle rehabilitation, shelters, and maintenance building construction, and other projects such as sign removal, noise reduction, and planning.

Generally, the metropolitan planning organizations (MPOs) involved in transportation planning for each area are responsible for determining if projects and their overall transportation implementation plan (TIP) conform to the state's SIP. The MPOs develop the necessary conformity determinations allowing for public input and hearings in the process demonstrating that their transportation projects meet conformity requirements. State transportation departments and air agencies, and the Federal Highway Administration, Federal Department of Transportation, and EPA are all involved in reviewing conformity determinations and TIPs developed by the MPOs.

State air quality plans contain emission reductions for each pollutant or precursor for each source sector (i.e., on-road motor vehicles, nonroad equipment and vehicles, and stationary and area sources). The level of emissions for on-road motor vehicles, such as cars, trucks, and buses, is referred to as the "motor vehicle emissions budget." Budgets are developed as part of the air quality planning process by state air quality or environmental agencies, and approved by EPA. For transportation conformity, projected emission changes resulting from construction projects involving highway and transit use must not cause this budget to be exceeded. Both long- and short-term emissions must be considered, including the direct emissions of NOx and VOCs.

To maintain conformity, emissions from new projects can be mitigated or offset. This can be done through planning strategies or Transportation Control Measures, which are specific projects or programs designed to reduce emissions from transportation sources by reducing vehicle use, changing traffic flow, or congestion conditions. Examples include programs for improving public transit, developing high occupancy vehicle facilities, and ordinances to promote non-motorized vehicle travel.

## 2. Motor Vehicle Emission Budgets

For the purposes of transportation conformity, the emission budget is essentially a cap on the total emissions allocated to on-road vehicles. The projected regional emissions calculated based on a transportation plan, transportation improvement program, or project may not exceed the MVEB or cap contained in the appropriate SIP. Emissions in years for which no motor vehicle emissions budgets are specifically established must be less than or equal to the motor vehicle emissions budget established for the most recent prior year.

For transportation conformity, the two primary ozone precursors (NOx and VOCs) must be considered in the conformity process in ozone nonattainment areas. The proposed transportation conformity emission budgets are provided in Table 21 below. These proposed budgets are based on the latest planning assumptions, MOVES modeling, and the development of the 2011 base-year inventory and projection inventories for 2017. Note that the 2017 MVEB is a projection from the 2011 base year inventory, and that the 2017 VOC MVEB excludes emissions from refueling.

**Table 21. Motor Vehicle Emission Budgets**

| Year | VOC (tpd) | NOx (tpd) |
|---|---|---|
| 2017 | 65.69 | 117.21 |

## 3. General Conformity

CAA Section 176(c) prohibits federal agencies from conducting activities in nonattainment or maintenance areas that do not conform to a state's SIP. General conformity requirements are in place to ensure federal activities not related to transportation or highway projects do not interfere with the SIP budgets, do not cause or contribute to new violations, and ensure the timely attainment and maintenance of the NAAQS as the schedule exists in the SIP. Examples of types of activities that could affect general conformity requirements are harbor dredging or beach rehabilitation by the Army Corps of Engineers, where heavy diesel equipment is used both on land and on off-shore vessels thus increasing emissions of NOx.

General conformity differs from transportation conformity in that it applies to projects that were not considered in the TIP, as the TIP applies to highways and mass transit. All federal actions not covered under transportation conformity are covered under general conformity requirements unless the actions do not exceed de minimis levels. General conformity requirements can be met by:

- showing emission increases are already covered in the SIP;
- the state agreeing to modify the SIP to include the emissions;
- finding offsets for the increased emissions; or
- mitigating the increased emissions.

Conformity restrictions may also be avoided through construction strategies or planning, such as conducting construction operations outside of the ozone season when specific NOx emission restrictions do not apply.

## SECTION 5: AIR QUALITY MODELING

Photochemical modeling for the 2017 projection year was developed by OTC/MANE-VU states working collaboratively utilizing the SMOKE/CMAQ modeling system. This collaborative effort allows the modeling results to be used by all regional states in their ozone SIPs and future regional haze efforts.

Future DVs were determined by calculating a Relative Response Factor for each monitor and multiplying it by the current DV (actually the average of the three DVs that "straddle" the baseline inventory year, i.e., the average of the 2010, 2011, and 2012 DVs).

Included as Appendix N is the "Technical Support Document for the 2011 Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union Modeling Platform." It provides a thoroughly detailed description of the methodology used to accurately model the region's current and future air quality.

The modeled 2017 DVs for the tri-state NYMA are provided in Table 22. These results indicate that the NYMA is expected to be in nonattainment of the 2008 ozone NAAQS through at least 2017. The DV monitor is located at Westport (CT) with a value of 0.083 ppm, and the New York portion of the NYMA is projected to contain two exceeding monitors at Babylon and Susan Wagner. Preliminary monitoring data that cover the recently-concluded 2017 ozone season support the results of the projection modeling – specifically, that the NYMA would remain in nonattainment with the 2008 NAAQS.

These results support DEC's request for a reclassification of the NYMA to serious nonattainment for the 2008 ozone NAAQS. DEC is in the initial planning stages of a demonstration to show projected attainment of the 2008 NAAQS in 2020, pursuant to the July 20, 2021 attainment deadline for serious nonattainment areas.

This SIP submission is also intended to address compliance with the 1997 ozone NAAQS. The 0.083 ppm DV projected for the DV monitor at Westport (CT) in 2017 demonstrates that the NYMA is again expected to comply with the 1997 NAAQS.

**Table 22. Projected 2017 Ozone DVs in the NYMA (ppm)**

| AIRS ID | DEC Reg./ State | Site | County | 2011 DV | 2017 Future DV |
|---|---|---|---|---|---|
| 36-103-0002 | 1 | Babylon | Suffolk | 0.083 | 0.077 |
| 36-103-0009 | 1 | Holtsville | Suffolk | 0.078 | 0.073 |
| 36-103-0004 | 1 | Riverhead | Suffolk | 0.078 | 0.071 |
| 36-061-0135 | 2 | CCNY | New York | 0.073 | 0.070 |
| 36-005-0133 | 2 | Pfizer Lab Site | Bronx | 0.074 | 0.071 |
| 36-081-0124 | 2 | Queens College 2 | Queens | 0.078 | 0.074 |
| 36-085-0067 | 2 | Susan Wagner HS | Richmond | 0.081 | 0.078 |
| 36-119-2004 | 3 | White Plains | Westchester | 0.075 | 0.073 |
| 36-087-0005 | 3 | Rockland County | Rockland | 0.075 | 0.067 |
| 09-001-0017 | CT | Greenwich | Fairfield | 0.080 | 0.077 |
| 09-001-1123 | CT | Danbury | Fairfield | 0.081 | 0.074 |
| 09-001-3007 | CT | Stratford | Fairfield | 0.084 | 0.077 |
| 09-001-9003 | CT | Westport | Fairfield | 0.083 | 0.083 |
| 09-007-0007 | CT | Middletown | Middlesex | 0.079 | 0.070 |
| 09-009-0027 | CT | New Haven | New Haven | 0.074 | 0.067 |
| 09-009-9002 | CT | Madison | New Haven | 0.085 | 0.077 |
| 34-003-0006 | NJ | Leonia | Bergen | 0.077 | 0.068 |
| 34-013-0003 | NJ | Newark - Firehouse | Essex | 0.078 | 0.069 |
| 34-017-0006 | NJ | Bayonne | Hudson | 0.077 | 0.069 |
| 34-019-0001 | NJ | Flemington | Hunterdon | 0.078 | 0.068 |
| 34-023-0011 | NJ | Rutgers University | Middlesex | 0.081 | 0.071 |
| 34-025-0005 | NJ | Monmouth University | Monmouth | 0.080 | 0.071 |
| 34-027-3001 | NJ | Chester | Morris | 0.076 | 0.067 |
| 34-031-5001 | NJ | Ramapo | Passaic | 0.073 | 0.065 |
| 34-041-0007 | NJ | Columbia WMA | Warren | 0.066 | 0.057 |

# SECTION 6: REASONABLE FURTHER PROGRESS

## A. Introduction

The CAA requires ozone nonattainment areas classified as moderate or higher to submit plans demonstrating gradual progress toward attainment of the NAAQS. Reasonable Further Progress (RFP) is defined by section 171(1) of the CAA to mean ''such annual incremental reductions in emissions of the relevant air pollutant as are required by [part D of title I] or may reasonably be required by the Administrator for the purpose of ensuring attainment of the applicable [NAAQS] by the applicable date.''

The RFP requirements for the 2008 ozone NAAQS are codified in 40 CFR 51.1110 and discussed in EPA's 2008 ozone implementation rule.[34] Because the NYMA had previously fulfilled the 15 percent RFP plan for VOC for the 1997 NAAQS, EPA requires it "to achieve an average 3 percent annual reduction in VOC and/or NOx emissions for the first 6 years following the baseline year" for the 2008 NAAQS and, furthermore, "RFP requirements may be satisfied with reductions in either NOx or VOC emissions."[35] Note that this 18 percent requirement must be met by the end of the 6-year period regardless of whether the area attains the NAAQS. The emission reduction calculations contained in this section utilize the inventory data with RE factored in.

EPA no longer requires the calculation of non-creditable emissions reductions because of the minimal effect of their exclusion. This includes measures related to motor vehicle exhaust or evaporative emissions promulgated by January 1, 1990; regulations concerning Reid vapor pressure promulgated by November 15, 1990; measures to correct previous RACT requirements; and measures required to correct previous I/M programs.

Although DEC's modeling demonstration illustrates that the NYMA will not meet the moderate area attainment deadline of July 20, 2018, the calculations indicate that the 18 percent RFP requirement will be achieved through a combination of NOx and VOC emission reductions through 2017. The following subsections provide details of these calculations.

## B. 2017 VOC Reductions

The following steps were used to calculate the VOC reductions that have occurred between the 2011 base year and 2017 projection year. An 18 percent VOC reduction is the goal, though NOx reductions may be used to fulfill the RFP requirements in the event of a shortfall.

[34] "Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements." Final Rule. Published March 6, 2015; effective April 6, 2015. 80 FR 12264-12319.
[35] Ibid. p.12276

*Step 1*: Compile the base year inventory for VOC emissions in the NYMA, including biogenic emissions. Section 4 contains the 2011 base year inventory, summarized here on an OSD basis with RE factored in.

**Table 23. 2011 NYMA Base Year VOC Inventory for RFP**

| Sector | VOC (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 7.93 |
| **Point (EGU) w/ RE** | 5.66 |
| **Nonpoint** | 301.11 |
| **Nonroad** | 96.88 |
| **On-Road** | 104.46 |
| **Biogenic** | 191.15 |
| **All Sectors** | 707.19 |

*Step 2*: Remove the biogenic emissions from the base year inventory to develop the base year anthropogenic inventory.

**Table 24. 2011 NYMA Base Year Anthropogenic VOC Inventory for RFP**

| Sector | VOC (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 7.93 |
| **Point (EGU) w/ RE** | 5.66 |
| **Nonpoint** | 301.11 |
| **Nonroad** | 96.88 |
| **On-Road** | 104.46 |
| **Anthropogenic Sectors** | 516.04 |

*Step 3:* Multiply the base year anthropogenic inventory from Step 2 by 0.82 to identify the required 2017 VOC emissions to fulfill the 18 percent RFP requirement.

516.04 tpd VOC * 0.82 = 423.15 tpd VOC

*Step 4*: Determine the 2017 projection year anthropogenic inventory for the NYMA. Section 4 contains the 2017 projection year inventory, summarized here on an OSD basis. Emission Reduction Credits (ERCs) are also being added to the projection inventory. ERCs are credits that are generated when a facility shuts down or voluntarily reduces its permitted emissions by accepting a federally-enforceable emission limit or operating condition. The ERCs can be used to offset emission increases from facilities constructing or modifying air emission sources subject to New Source Review. Since they can be used at any time in the future, they must be accounted for in the VOC projection inventory.

**Table 25. 2017 NYMA Projection Year Anthropogenic VOC Inventory for RFP**

| Sector | VOC (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 8.09 |
| **Point (EGU) w/ RE** | 4.43 |
| **VOC ERCs** | 2.09 |
| **Nonpoint** | 289.27 |
| **Nonroad** | 109.65 |
| **On-Road** | 67.95 |
| **Anthropogenic Sectors** | 481.48 |

*Step 5*: Compare the 2017 projection year anthropogenic VOC inventory for the NYMA (determined in step 4) to the required 2017 VOC emissions (determined in step 3). Comparison of the figures in Steps 3 and 4 shows that there is a shortfall of 58.33 tpd (481.48 tpd – 423.15 tpd) to demonstrate RFP through 2017. NOx reductions must therefore be relied upon to meet the requirement.

In order to meet the contingency requirement discussed later in Section 6.E, however, 0.3 percent of reductions must come from VOC measures (516.04 tpd * 0.003, or 1.55 tpd), so 1.55 tpd are being held back in this calculation to use for the contingency requirement. The VOC shortfall to demonstrate RFP is therefore 59.88 tpd (58.33 tpd + 1.55 tpd) or 11.60 percent (59.88 tpd / 516.04 tpd).

## C. 2017 NOx Reductions

*Step 1*: Compile the base year inventory for NOx emissions in the NYMA, including biogenic emissions, on an OSD basis with RE factored in.

**Table 26. 2011 NYMA Base Year NOx Inventory for RFP**

| Sector | NOx (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 45.68 |
| **Point (EGU) w/ RE** | 311.30 |
| **Nonpoint** | 52.49 |
| **Nonroad** | 155.07 |
| **On-Road** | 205.86 |
| **Biogenic** | 1.35 |
| **All Sectors** | 771.75 |

*Step 2*: Remove the biogenic emissions from the base year inventory to develop the base year anthropogenic inventory.

**Table 27. 2011 NYMA Base Year Anthropogenic NOx Inventory for RFP**

| Sector | NOx (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 45.68 |
| **Point (EGU) w/ RE** | 311.30 |
| **Nonpoint** | 52.49 |
| **Nonroad** | 155.07 |
| **On-Road** | 205.86 |
| **Anthropogenic Sectors** | 770.40 |

*Step 3*: Multiply the base year anthropogenic inventory from Step 2 by 0.884 (1 – 11.60 percent VOC shortfall) to identify the required 2017 NOx emissions to fulfill the remainder of the RFP requirement.

770.40 tpd VOC * 0.884 = 681.03 tpd NOx

*Step 4*: Determine the 2017 projection year anthropogenic inventory for the NYMA. Section 4 contains the 2017 projection year inventory, summarized here on an OSD basis. ERCs are being added to the NOx projection inventory to account for credits that may be used in the future.

**Table 28. 2017 NYMA Projection Year Anthropogenic NOx Inventory for RFP**

| Sector | NOx (tpd) |
|---|---|
| **Point (non-EGU) w/ RE** | 44.66 |
| **Point (EGU) w/ RE** | 172.46 |
| **NOx ERCs** | 26.70 |
| **Nonpoint** | 44.82 |
| **Nonroad** | 148.73 |
| **On-Road** | 117.21 |
| **Anthropogenic Sectors** | 554.58 |

*Step 5*: Compare the 2017 projection year anthropogenic NOx inventory for the NYMA (determined in step 4) to the required 2017 NOx emissions (determined in step 3). Projected NOx emissions for 2017 easily fulfill the remainder of the 18 percent RFP mandate. Surplus NOx emissions total 126.45 tpd (681.03 tpd – 554.58 tpd), which is equivalent to a 16.41 percent surplus (126.45 tpd / 770.40 tpd).

RFP is therefore successfully demonstrated for the NYMA pursuant to CAA section 182(b)(1) and 40 CFR 51.1110.

## D. Simplified RFP Calculation

The following calculations replicate those made above in an alternate, percentage-based format which expresses the fulfillment of the RFP goal more simply.

VOC:
516.04 tpd base inventory – 481.48 tpd projection inventory = 34.56 tpd reduction
34.56 tpd reduction / 516.04 tpd base inventory = 6.70% VOC reduction
Withhold 0.3% for contingency = **6.40%** VOC reduction

Remainder of RFP mandate to be fulfilled by NOx: 18% - 6.40% = **11.60%**

NOx:
770.40 tpd base inventory – 554.58 tpd projection inventory = 215.82 tpd reduction
215.82 tpd reduction / 770.40 tpd base inventory = **28.01%** NOx reduction

28.01% NOx reduction – 11.60% NOx target reduction = **16.41%** NOx reduction surplus

## E. Contingency Measures

Contingency measures are additional controls that must be implemented pursuant to CAA section 172(c)(9) in the event a nonattainment area fails to meet an RFP milestone or attain the NAAQS by the applicable deadline. Such measures are to take effect in any such case without further action by the state or the Administrator.

Although the NYMA has fulfilled its RFP requirements for a moderate nonattainment area, it is not projected to attain by the July 20, 2018 deadline. Contingency measures are therefore required. DEC's rulemaking process, however, does not allow for regulations that are automatically "triggered" into effectiveness in the event a future DV exceeds the 2008 NAAQS.

EPA's implementation rule for the 2008 ozone NAAQS notes that the "contingency measures should represent one year's worth of progress, amounting to reductions of 3 percent of the baseline emissions inventory" in the year following that in which the failure has been identified.[36] Of this 3 percent, a minimum of 0.3 percent must come from VOC reductions.[37]

Although New York can't implement automatically-triggered contingency measures, existing regulations demonstrate excess emission reductions over the six-year RFP period. The calculations in the preceding subsections provided for 0.3 percent excess VOC reductions and 16.41 percent excess NOx reductions, obviously enough to satisfy the 3 percent contingency measure emission reduction requirement.

DEC is also planning to adopt a number of additional NOx and VOC regulations in the near-term as described in Section 8. DEC continues to analyze all options for reducing the transport of ozone and ozone precursors into the NYMA from upwind states.

[36] Ibid. p.12285
[37] "Guidance on the Post-1996 Rate-of-Progress Plan and the Attainment Demonstration." EPA Office of Air Quality Planning and Standards, Ozone/Carbon Monoxide Programs Branch. P. D-15. February 18, 1994.

# SECTION 7: REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT)

RACT is defined as the lowest emissions limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. CAA Section 183 requires EPA to issue (and periodically update as needed) guidance that would help states meet RACT requirements. This includes the development of Control Techniques Guidelines (CTG) and Alternative Control Techniques (ACT) documents for controlling NOx and VOCs from stationary sources. CTGs presumptively define a level of control as RACT; ACT documents do not formally define RACT, but describe available measures that are technologically and economically feasible which states can adopt to satisfy RACT.

CAA Sections 182(b)(2) and 182(f) require ozone nonattainment areas classified as moderate and above to adopt RACT for sources that are subject to CTGs, and for non-CTG major sources of VOCs and NOx, respectively. CAA Section 184 further requires states such as New York that reside in the Ozone Transport Region (OTR) to implement RACT with respect to all sources covered by CTGs. States must demonstrate via a SIP submission that the state's RACT requirements for NOx and VOCs are current and appropriate to meet the requirements of the 8-hour ozone NAAQS.

EPA initially issued three sets of CTG documents establishing a "presumptive norm" for RACT for several VOC source categories. The three sets of CTGs were:

- Group I – issued before January 1978 (15 CTGs);
- Group II – issued in 1978 (nine CTGs); and
- Group III – issued in the early 1980's (five CTGs).

Another 18 CTGs were later issued between December 1992 and September 2008, and one additional CTG on October 20, 2016. VOC ACT documents were issued between 1983 and 1994, while NOx ACT documents were issued between 1992 and 1995, along with September 2000 updates to the stationary internal combustion engine and cement kiln ACTs.

DEC submitted a RACT SIP for the 1997 ozone NAAQS on September 1, 2006, which concluded that the RACT rules in place at the time met the criteria for RACT for the 1997 standard. EPA conditionally approved this SIP revision on July 23, 2010.[38]

DEC performed an updated evaluation of its existing RACT regulations in a December 22, 2014 submission and determined that these measures constituted RACT statewide for the 2008 8-hour ozone NAAQS. New York's adopted RACT regulations are consistent with the CTG and ACT documents that have been released by EPA to date. A number of New York's RACT regulations have been updated within the last few years, relying on guidance documents and best emissions control technology data to establish

[38] "Approval and Promulgation of Implementation Plans; New York Reasonably Available Control Technology and Reasonably Available Control Measures." Final Rule. Published July 23, 2010; effective August 23, 2010. 75 FR 43066-43069.

control requirements. RACT determinations made on a source-specific basis are consistent with the latest emission control technology and follow the cost thresholds – established in 1994 and continuously adjusted to account for inflation – to determine what constitutes technically and economically feasible controls.

DEC will work to adopt and implement the recently-finalized oil and natural gas CTG in a timely manner. Part of this effort will be in ensuring the statewide inventory for the subject equipment is up-to-date and accurate. Initial review of DEC's inventory indicates there are 66 compressors statewide, with five of those being located in the NYMA. These existing compressors are subject to the CTG, which would address the pervasive equipment leaks.

DEC has also committed to revising Part 226, "Solvent Metal Cleaning Processes," to include the requirements of the industrial cleaning solvents CTG issued by EPA in September, 2006.

# SECTION 8: REASONABLY AVAILABLE CONTROL MEASURES (RACM)

## A. Introduction

CAA Section 172(c)(1) discusses RACM as a SIP requirement for nonattainment areas, stating: "Such plan provisions shall provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the [primary NAAQS]." The RACM requirement applies to all nonattainment areas that are required to submit an attainment demonstration. DEC submitted a statewide RACT SIP revision for the 2008 ozone NAAQS to EPA on December 22, 2014, and will submit a RACT SIP revision for the NYMA moderate nonattainment area.

EPA issued several guidance documents to assist states in implementing the RACM provisions of the CAA. The guidance interprets section 172(c)(1) to require a demonstration that the state has adopted all reasonable measures to meet RFP requirements and to demonstrate attainment as expeditiously as practicable and thus, that no additional measures that are reasonably available will advance the attainment date or contribute to RFP for the area. The most recent guidance was a memorandum titled "Guidance on Incorporating Bundled Measures in a State Implementation Plan," from Stephen D. Page, Director of the Office of Air Quality Standards and Planning, on August 15, 2005.

DEC confirms that RACM has been met in the NYMA and that no additional measures could be adopted that would advance the attainment date. DEC was unable to implement NOx and VOC control measures for the 2018 moderate area attainment deadline because the NYMA had initially been classified as marginal nonattainment (which assumes no additional control measures are necessary) and was reclassified to moderate nonattainment effective June 3, 2016. Development has begun on many NOx and VOC regulations to address the 2008 ozone NAAQS.

## B. RACM for the 2008 Ozone NAAQS

Due to the timing associated with the reclassification for the NYMA under the 2008 ozone NAAQS, New York was unable to implement regulations that became effective by EPA's prescribed SIP submission date of January 1, 2017 or by the final ozone season of the moderate area classification, i.e. 2017. Under the initial marginal classification effective July 20, 2012, the NYMA was not expected to promulgate any new regulations since the marginal level presumes the NAAQS will be met through ongoing emissions reductions from existing measures. With the marginal classification in place, the state lacked the leverage to implement new control programs. DEC had voluntarily requested a reclassification on two prior occasions (June 20, 2012 and March 13, 2015) based on the evidence that the area would not be able to comply with

the marginal attainment date of July 20, 2015 without additional control programs; neither request was granted by EPA.[39]

Although EPA was required by section 181(b)(2)(B) to act on the reclassification within six months of the missed attainment date (i.e., January 20, 2016), the area was not reclassified to moderate nonattainment until May 4, 2016 (effective June 3, 2016). The due date provided for the moderate area attainment SIP was January 1, 2017; this schedule offered no opportunity to develop, promulgate, and implement regulations prior to the SIP due date. Because of the delay in reclassifying the NYMA, New York is now behind in its efforts to promulgate meaningful regulations to curb emissions of NOx and VOCs.

New York is proceeding with a number of regulations that will yield reductions of NOx and VOC emissions in an effort to attain the 2008 ozone NAAQS as expeditiously as possible. Although the NYMA is not expected to meet the attainment date for a moderate nonattainment area, these regulations will provide emission reductions in the 2018-2020 period that will be used to determine compliance for a serious nonattainment area, for which attainment is required by July 20, 2021. DEC will be performing additional modeling analyses to determine whether these control measures, in sum, represent RACM for the 2008 NAAQS, or if additional NOx and VOC measures will be necessary.

## C. Regulatory Planning

New York has a history of working with the OTC to develop model rules for a wide variety of NOx and VOC source categories. DEC plans to use the OTC's VOC model rules for AIM coatings, consumer products, and auto body refinishing as a basis for revising its existing regulations for those source categories. OTC has determined that updated limits to these source categories are warranted as they will garner additional emissions reductions at reasonable costs. DEC expects to adopt these model rules with tentative implementation dates in early 2018.

DEC has initiated a regulation that will limit NOx emissions from "peaking" turbines that are primarily operated during periods of peak electricity demand. Consistent with the Clean Energy Standard (CES) and Reforming the Energy Vision (REV) initiatives (discussed later), the adopted rule will encourage electricity generation from clean technologies and reduce peak demand without negatively affecting reliability. DEC will work with the Department of Public Service and the New York Independent System Operator to evaluate and address any reliability issues associated with any potential compliance options.

DEC also adopted an update to its LEV program under Part 218, "Emission Standards for Motor Vehicles and Motor Vehicle Engines," on September 15, 2016 (effective

[39] June 20, 2012 letter from DEC Commissioner Martens to EPA Administrator Jackson; March 13, 2015 letter from DEC Commissioner Martens to EPA Administrator McCarthy

October 19, 2016). This update incorporates California's latest LEV standards (LEV III) and ZEV standards into New York's program. The LEV III amendment will take effect for 2017 through 2025 model year passenger cars, light-duty trucks, and medium-duty passenger vehicles. The ZEV revisions apply to 2018 through 2025 model year passenger cars, light-duty trucks, and medium-duty vehicles.

The LEV III amendments allow vehicle manufacturers the voluntary option of demonstrating compliance with EPA Tier 3 emission standards rather than LEV III standards for model years 2017 through 2025. EPA's rule coupled the more stringent vehicle emissions standards with a reduction in gasoline sulfur content, which will allow for more effective emission control systems.[40] EPA estimates national annual reductions from its vehicle and sulfur standards of over 328,000 tons of NOx and 167,000 tons of VOC by 2030; additional reductions should occur past 2030 as further fleet turnover takes place.[41]

## D. Addressing Transported Ozone Pollution

The NYMA has for years been subject to significant levels of ozone pollution that have been transported to the area from upwind states. The total impact from significantly contributing upwind states (excluding New Jersey and New York) on the DV monitor in Fairfield County (CT), for example, is projected to be nearly 0.018 ppm in 2017 – or 24 percent of the 2008 standard.[42] The NYMA will continue to struggle with attaining the 2008 ozone NAAQS until transported ozone pollution is fully addressed by EPA. New York has repeatedly requested a complete and timely remedy to ozone contributions from upwind states, and the OTC recently signed a formal Memorandum of Understanding requesting the same.[43]

EPA has issued a series of pollutant trading rules to assist states in meeting the "good neighbor" provision of section 110(a)(2)(D)(i) by addressing states' contributions to nonattainment and maintenance issues in downwind states: the NOx SIP Call, the Clean Air Interstate Rule, and most recently CSAPR.

EPA revised CSAPR's ozone season NOx budgets to address the 2008 ozone NAAQS in a final rule released on September 7, 2016.[44] EPA admitted, however, that this CSAPR update only "partially addresses the EPA's obligation under the [CAA] to promulgate Federal Implementation Plans to address interstate emission transport for

[40] "Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards." Final Rule. Published April 28, 2014; effective June 27, 2014. 79 FR 23414-23886.
[41] Ibid. p. 23443.
[42] EPA's 2017 ozone contribution modeling data associated with the "Notice of Availability of the Environmental Protection Agency's Updated Ozone Transport Modeling Data for the 2008 Ozone National Ambient Air Quality Standard (NAAQS)," published August 4, 2015 at 80 FR 46271.
[43] "Resolution of the Ozone Transport Commission Requesting that the United States Environmental Protection Agency Address the Good Neighbor Provision for the 2008 and 2015 Ozone National Ambient Air Quality Standards," adopted June 3, 2016
[44] "Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS." Final Rule. Published October 26, 2016; effective December 27, 2016. 81 FR 74504-74650

the 2008 ozone NAAQS."[45] Specifically, EPA's projection modeling for 2017 found that the Westport and Madison Beach monitors in Connecticut are expected to still be monitoring nonattainment, while the Susan Wagner and Babylon monitors in New York and the Greenwich and Stratford monitors in Connecticut are expected to be in maintenance status. Monitors in other areas of the country face similar issues. DEC calls on EPA to finalize a subsequent update to CSAPR in a timely manner that fully eliminates all states' significant contributions to downwind nonattainment and maintenance areas.

A group of nine northeastern states, including New York, exercised an option pursuant to CAA section 176A to petition EPA to expand the current OTR to include additional states that contribute to regional ozone nonattainment. This action would require the additional states to implement certain control programs already required in current OTR states under the CAA. The December 9, 2013 petition named nine states considered the most significant contributors to ozone violations in the OTR. EPA proposed to deny the section 176A petition on January 19, 2017; rather than refute the petitioning states' claims, EPA's proposed denial was based on the notion that there are more appropriate mechanisms for addressing transport, specifically CAA Sections 110(a)(2)(D) and 126(b).[46]

DEC also recommends that EPA implement new NOx and VOC control measures at the federal level. Through the OTC, New York and other northeastern states have implemented and periodically update regulations targeting area source sectors – e.g., architectural and industrial maintenance coatings and consumer products. These are very cost-effective measures that yield significant precursor reductions, and the consistency of a unified set of standards would benefit manufacturers.

EPA should also take action on the mobile source sector, which states have a limited ability to regulate. On June 3, 2016, the South Coast (California) Air Quality Management District petitioned EPA to adopt ultra-low NOx exhaust emission standards for on-road heavy-duty trucks and engines. DEC's Commissioner Seggos wrote Administrator McCarthy on July 25, 2016 to officially join this petition. The petition requests a revision of the NOx emission standards from 0.2 g/bhp-hr to 0.02 g/bhp-hr, a reduction of 90 percent. This action to further tighten the NOx standards would serve to greatly reduce both local and upwind emissions. In a December 20, 2016 response, EPA stated it "acknowledges a need for additional NOx reductions from this category of vehicles and engines…and believes that opportunity exists to develop, in close coordination with CARB and other stakeholders, a new, harmonized and comprehensive national NOx reduction strategy for heavy-duty on-highway engines." EPA noted it was premature to commit to any particular level of a future NOx standard, but that it will begin the work necessary to issue a notice of proposed rulemaking with

[45] Ibid., p.74504
[46] "Response to December 9, 2013, Clean Air Act Section 176A Petition from Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania, Rhode Island and Vermont." Notice of Proposed Action on Petition. Published January 19, 2017. 82 FR 6509-6522.

the intention of proposing standards that could begin with model year 2024, consistent with the lead-time requirements of the Clean Air Act.[47]

Lastly, it is crucial for the NYMA that RACT be enforced in upwind states. States must ensure that RACT is implemented under CAA section 172(c)(1). Meanwhile, there are many instances of upwind sources that have installed advanced NOx controls yet failed to operate them consistently. Analysis by Maryland's Department of the Environment has revealed that dozens of EGUs, particularly coal-fired units, located in upwind states are not consistently operating already-installed control equipment during the ozone season. A November 16, 2016 petition filed by Maryland pursuant to CAA section 126 targeted 36 EGUs, which are located in five states linked to downwind nonattainment and maintenance areas (including the NYMA), whose recent NOx emission rates differ significantly from their historically low rates – evidence that advanced NOx controls are not operating reliably. Other CAA section 126 petitions have been filed against individual EGU sources by regional states whose air quality is impacted by their emissions. EPA's approval of these petitions and the general enforcement of RACT would benefit not only the petitioning states' air quality but that of the NYMA as well.

[47] "Memorandum in Response to Petition for Rulemaking to Adopt Ultra-Low NOx Standards for On-Highway Heavy-Duty Trucks and Engines." December 20, 2016. Retrieved on January 4, 2017 from https://www.epa.gov/regulations-emissions-vehicles-and-engines/petitions-revised-nox-standards-highway-heavy-duty

## SECTION 9: PERMIT PROGRAM

An air pollution permitting program for stationary sources helps assure the emission reductions called for in a SIP are achieved. New York's air permitting program identifies and controls sources of air pollution, ranging in size from large industrial facilities and power plants to small commercial operations, such as dry cleaners.

Before 1970, few emission limitations were placed on the pollutants that could be discharged to the air. When the first federal air quality standards were issued, New York's air was more polluted than the standards allowed in several areas. Today, however, air quality in most areas of New York meets standards that are much more rigorous than those of 1970. As new information on the health and environmental effects of air pollution has become available, new state and federal standards have been established and emission limits have been tightened to protect public health and the environment. By requiring the use of effective pollution control technology and enforcing compliance with these requirements through permitting, DEC's air permitting program has been a vital means of reducing air emissions to meet ever more stringent air quality standards.

Title V of the CAA requires states to implement a permitting program for major stationary sources. Section 19-0311 of Article 19 of the Environmental Conservation Law (ECL) directs DEC to establish a permitting program to implement Title V of the CAA. In addition, DEC has implemented a permitting program for minor sources of air pollution. DEC's permitting regulations are set forth at 6 NYCRR Part 201, "Permits and Registrations." The two most common types of permits for air contamination sources are described in Part 201 and include State Facility permits (Subpart 201-5) and Title V permits (Subpart 201-6).

State Facility permits are issued to facilities whose emissions are below the major source threshold (as defined in Part 201), but meet the criteria for permitting under Subpart 201-5. These are stationary source facilities that generally meet one or more of the following characteristics:

- Require and have accepted an emission cap pursuant to Subpart 201-7 to limit their potential to emit regulated air contaminants to avoid the requirement to obtain a Title V permit or other applicable requirement;
- Have been granted a variance pursuant to an air regulation implemented by DEC;
- Have annual actual emissions of one or more persistent, bioaccumulative, and toxic compounds equal to or greater than the thresholds listed in table 1 of Subpart 201-9, except where the facility is a stationary or portable combustion installation;
- Have annual actual emissions of any regulated air contaminant in excess of the thresholds in Subpart 201-4.

Title V facilities are required for major facilities under the CAA and the ECL and the implementing regulations at 40 CFR Part 70 and 6 NYCRR Subpart 201-6, respectively. These include stationary source facilities which meet any of the following characteristics:

- Have a potential to emit that is major as defined in Part 201;
- Are subject to a New Source Performance Standard and/or National Emission Standards for Hazardous Air Pollutants and are specifically required to obtain a Title V permit;
- Are subject to federal acid rain program requirements;
- Are a facility in a category designated by the EPA Administrator.

Title V permits have greatly assisted DEC's efforts to ensure that major sources are operating in compliance with applicable air pollution control laws and regulations. Notably, the Title V permit contains all applicable requirements for a major stationary source, the approved test methods by which a source will determine whether it is in compliance with those requirements, and conditions requiring prompt reporting of all violations and emission limit exceedances. The Title V permit also includes conditions for recordkeeping, monitoring, and reporting, including the requirement for facilities to prepare semi-annual reports of their monitoring activities, annual reports of their emissions, and an annual certification that they have operated in compliance with all applicable requirements. All of this information is accessible to the public. Thus, the Title V permit provides both DEC and members of the public with a clear picture of what a facility does, what requirements are applicable to a facility, what measures the facility must implement to control its emissions of air pollutants, and how the facility will determine whether it is operating in compliance with those applicable requirements. Most of the terms of the Title V permit are also federally enforceable meaning citizens can bring suit to address violations of the permit.

To obtain a permit, a facility owner or operator must apply to DEC using a form designated for this purpose. Applicants must supply information on the facility's emissions, the processes operating at the facility, the raw materials being used, the height and location of stacks or vents, the requirements that apply to the facility, and the controls being applied. DEC develops air pollution permits based on the information in the applications and DEC's own assessment of the applicable regulations.

The information generated by the permit process is also used by DEC in its air quality planning to ensure the effective implementation of control measures needed to curb air pollution. Air permits play a direct role in the implementation of emission reduction requirements at stationary sources. For example, RACT requirements intended to reduce VOC and NOx emissions, as well as NOx budgets and other requirements applicable to large sources, are set forth in regulations that serve as the source of conditions in permits issued by DEC. Permit terms and conditions in turn ensure that the facility is complying with applicable regulatory requirements. The result is that DEC can document that it is achieving the emission reduction targets contained in the SIP which are necessary to improve air quality in New York State.

All other non-major facilities that meet the criteria of Subpart 201-4 can obtain a minor facility registration rather than a permit. Registration facilities must have actual emissions of all regulated air contaminants less than one-half of the major source threshold. Registration facilities are still required to meet all applicable requirements in accordance with federal and DEC regulations. DEC, in addition, can enforce these regulatory obligations through its authority under the ECL and CAA.

## SECTION 10: CLEAN AIR ACT SECTION 110 MEASURES

Sections 110(a)(1) and 110(a)(2) of the CAA direct each state to develop and submit to EPA a plan that provides for the implementation, maintenance, and enforcement of the NAAQS. Such plans, commonly referred to as "infrastructure SIPs," are required within three years of any NAAQS revision. Section 110(a)(1) contains the general requirements for submitting a SIP to address a new or revised NAAQS, while section 110(a)(2) specifies the substantive elements to be contained in the plan, which relate to the general information and authorities that constitute the basic structural requirements for an air agency's overall air quality management program to be effective.

EPA's most recent guidance pertaining to the 2008 ozone NAAQS was released on September 13, 2013.[48] Additional information specifically addressing the interstate transport "good neighbor" provision of section 110(a)(2)(D)(i)(I) was provided in an EPA memorandum on January 22, 2015.[49] Pursuant to these guidance documents, SIPs must address the following elements of CAA section 110(a)(2):

| | |
|---|---|
| 110(a)(2)(A) | Emission Limits and Other Control Measures |
| 110(a)(2)(B) | Ambient Air Quality and Monitoring/Data System |
| 110(a)(2)(C) | Programs for Enforcement of Control Measures and for Construction or Modification of Stationary Sources |
| 110(a)(2)(D) | Interstate Pollution Transport; Interstate Pollution Abatement and International Air Pollution |
| 110(a)(2)(E) | Adequate Resources and Authority, Conflict of Interest, and Oversight of Local Governments and Regional Agencies |
| 110(a)(2)(F) | Stationary Source Monitoring and Reporting |
| 110(a)(2)(G) | Emergency Episodes |
| 110(a)(2)(H) | SIP Revisions |
| 110(a)(2)(I) | Plan Revisions for Nonattainment Areas |
| 110(a)(2)(J) | Consultation with Government Officials, Public Notification, PSD and Visibility Protection |
| 110(a)(2)(K) | Air Quality Modeling and Submission of Modeling Data |
| 110(a)(2)(L) | Permitting Fees |
| 110(a)(2)(M) | Consultation and Participation by Affected Local Entities |

[48] "Guidance on Infrastructure State Implementation Plan (SIP) Elements under Clean Air Act Sections 110(a)(1) and 110(a)(2)." EPA Office of Air Quality Planning and Standards. September 13, 2013.

[49] "Information on the Interstate Transport "Good Neighbor" Provision for the 2008 Ozone National Ambient Air Quality Standards (NAAQS) under Clean Air Act (CAA) Section 110(a)(2)(D)(i)(I)." Memorandum from Stephen D. Page, Director, EPA Office of Air Quality Planning and Standards, to Regional Air Division Directors. January 22, 2015

DEC submitted its infrastructure SIP for the 2008 ozone NAAQS on April 4, 2013. For nearly four years EPA has failed to take action, aside from two actions that included partial approvals and disapprovals:

- On August 26, 2016, EPA disapproved section 110(a)(2)(D)(i)(I) prongs 1 and 2 (interstate contribution), and approved section 110(a)(2)(D)(i)(II) prong 4 (visibility); [50]
- On December 27, 2016, EPA approved sections 110(a)(2)(C), 110(a)(2)(D)(i)(II) prong 3 (PSD), and 110(a)(2)(J).[51]

DEC maintains that EPA did not provide an adequate review of New York's transport SIP in its disapproval of the transport elements (prongs 1 and 2) as outlined in DEC's July 18, 2016 comment letter, which is included as Appendix O. Rather than reviewing New York's control program relative to what it might determine to be an approvable remedy, EPA based its disapproval on the emission reduction estimates used in DEC's transport demonstration as well as the fact that DEC did not quantify its transport contributions. EPA had not, however, provided states with a clear indication of what was required for their respective transport SIPs at the time they were due, as cross-state contributions had not been quantified for the future attainment year.

EPA proposed to disapprove New York's plan that is based, in part, on a NOx regulation that covers EGUs as well as non-EGU source categories at a $5,000/ton control cost threshold, and replace it with its own NOx program that covers only EGUs at a $1,400/ton control cost threshold. EPA failed to explain how its proposed transport rule addresses transport more effectively than New York's established regulations. Furthermore, EPA's ongoing failure to implement a full remedy to the good neighbor provision leaves states unsure of how to satisfy their transport obligations for the 2008 NAAQS.

Accordingly, EPA should expeditiously propose a subsequent update to CSAPR that would provide a full remedy for the 2008 ozone NAAQS' good neighbor requirements. That update should introduce requirements for large non-EGU sources and utilize a control cost threshold that is more equitable to states that have already forged ahead with stringent regulatory programs, such as New York.

[50] "Partial Approval and Partial Disapproval of Air Quality Implementation Plans; New York; Interstate Transport Infrastructure SIP Requirements for the 2008 Ozone NAAQS." Final Rule. Published August 26, 2016; effective September 26, 2016. 81 FR 58849-58855.

[51] "Approval and Promulgation of Implementation Plans; New York Prevention of Significant Deterioration of Air Quality and Nonattainment New Source Review; Infrastructure State Implementation Plan Requirements." Final Rule. Published December 27, 2016; effective January 26, 2017. 81 FR 95047-95050.

## SECTION 11: NEW SOURCE REVIEW (NSR)

New major stationary sources of air pollution (as defined by the CAA) and major stationary sources which undertake major modifications are required to obtain a permit before commencing construction. The review process through which permits are issued is known as new source review (NSR). NSR is required for major sources whether the source or modification is located in an area classified as attainment, nonattainment, or unclassifiable.

For nonattainment areas, the permits are called nonattainment NSR (NNSR) permits. Permits for sources in attainment areas are referred to as Prevention of Significant Deterioration (PSD) permits. NSR encompasses both the NNSR and PSD permit programs.

The NSR program is in place to protect the air quality in the areas where sources are being constructed or modified, as well as areas that might be affected by transport. These programs are integral to the success of the various SIP efforts, ensuring that new major sources and modifications to existing sources do not interfere with attainment and maintenance of the NAAQS or exacerbate air quality problems in existing nonattainment areas.

The NSR permitting program in New York is implemented through the provisions of 6 NYCRR Part 231, “New Source Review for New and Modified Facilities.” This rule underwent a major revision in 2009 to conform to recent federal guidelines. With this revision, New York took back the administration of the PSD program for attainment pollutants (i.e., all pollutants subject to a NAAQS, regulated under a New Source Performance Standard, or regulated under the CAA except HAPs in section 112), which had been under EPA’s purview since 2004. The revised rule also incorporates provisions to ensure enforceability of the rule and effective monitoring, recordkeeping, and reporting.