



NEW YORK
STATE OF
OPPORTUNITY.

**Department of
Environmental
Conservation**

**2023 ANNUAL MONITORING NETWORK PLAN
New York State Ambient Air Monitoring Program**

**BUREAU OF AIR QUALITY SURVEILLANCE
DIVISION OF AIR RESOURCES
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

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1.0 Introduction

As part of the regulations finalized by the U.S. Environmental Protection Agency (EPA) on October 17th, 2006, monitoring agencies are 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, 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.” This document is prepared and submitted as part of the fulfillment of these requirements.

1.1 Background

New York State began a concerted effort to control air pollution back in 1957, when the State Legislature enacted one of the nation’s first comprehensive air pollution control laws. An Air Pollution Control Board was established to develop and direct a public information program for monitoring contaminant levels, and to conduct area studies and inventories outlining major problems. In December 1964, New York State developed air quality standards to protect its citizens against adverse health effects. These standards provided a long-range planning tool and established numerical air quality limits for the following contaminants: particulates, sulfur dioxide, carbon monoxide, oxidants, hydrogen sulfide, fluoride, beryllium and sulfuric acid mist.

In 1966, the Legislature responded to the increasing pollution levels by restructuring the administrative authority into the Department of Health, under which the Division of Air Resources was created. Major legislation was also introduced to provide increased efficacy of rules and regulations. That year also marked the severe New York City Thanksgiving holiday air pollution episode brought upon by a temperature inversion that lasted through the weekend.

When the first Earth Day was held in 1970, it had become apparent that pollution abatement strategies in place were inadequate, and air quality—along with water quality and solid waste—became cornerstones of the emerging U.S. environmental conscience. The 1970 Clean Air Act Extension, and the establishment of the U.S. EPA in that same year, were defining moments in the history of air quality in this country. That same year, the Department of Environmental Conservation (NYSDEC) was created. The Division of Air Resources was transferred to the new NYSDEC, and its administrative functions restructured and streamlined. Nine new regional offices were established to carry out responsibilities relating to pollution control of sources within their respective part of the State.

In 1977, the first set of Clean Air Act amendments was adopted because many states failed to meet mandated targets. One of the most effective of these was the New Source Review (NSR), which addresses older facilities that had been "grandfathered" by the original law. In 1990, additional amendments to the Clean Air Act included provisions for attainment and maintenance of national ambient air quality standards, mobile sources, air toxics, acid deposition control, permits, stratospheric ozone and global climate protection, enforcement; visibility improvement near National Parks, and other provisions relating to research, development, and air monitoring.

Through the years, ambient monitoring has always been an important and integral part of the overall effort to manage our environmental resources. The Bureau of Air Quality Surveillance (BAQS), which was originally established in the Division of Air Resources under the Department of Health in 1966, has been performing ambient air monitoring since.

BAQS currently operates the following monitors: 29 ozone, 10 SO₂, 10 NO_x (including 3 NO_y), 10 CO, 21 FRM PM_{2.5}, 16 TEOM PM_{2.5}, 5 FRM PM₁₀, 11 T640 optical PM instruments (PM_{2.5}, PM₁₀), 8 CSN, 2 speciated carbon, 6 black carbon (aethalometer), 2 wet deposition mercury, 4 particulate sulfate, 7 acid deposition, 1 low volume TSP-lead, 2 PM₁₀ metals, 12 toxics, 11 carbonyls, 2 PAMS, and 2 PAHs sites. Figure 1.1 and Figure 1.2 below show the geographic locations of monitoring sites in all nine regions of the State.

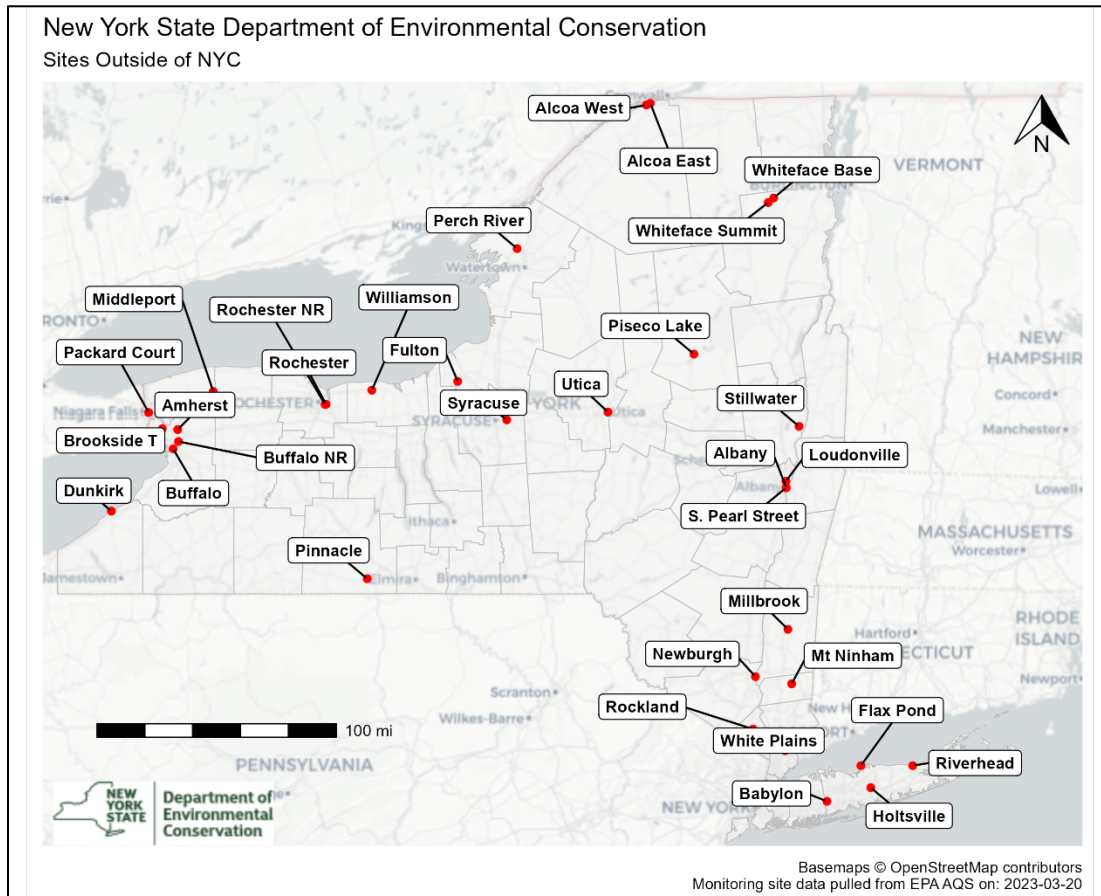


Figure 1-1 Map of Ambient Air Monitoring Sites in New York State, Excluding NYC

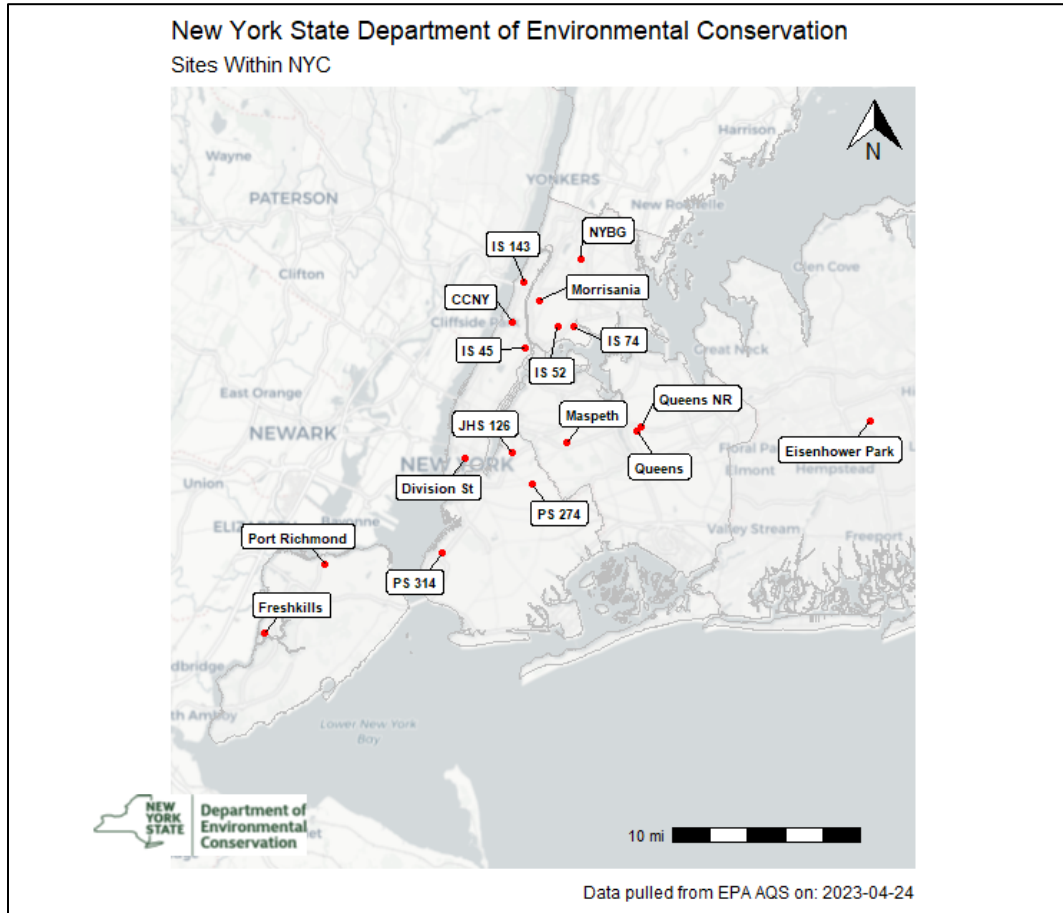


Figure 1-2 Map of Ambient Air Monitoring Sites in NYC

1.2 Climate Justice and Disadvantaged Communities

On July 18, 2019, the Climate Leadership and Community Protection Act (Climate Act) was signed into law. New York State's Climate Act is among the most ambitious climate laws in the nation and requires New York to reduce economy-wide greenhouse gas emissions 40 percent by 2030 and no less than 85 percent by 2050 from 1990 levels. The Climate Act requires New York State to invest or direct resources to ensure that disadvantaged communities receive at least 35 percent, of overall benefits of spending on clean energy and energy efficiency programs - one of several ways the Climate Act prioritizes climate justice. The Climate Act also requires State agencies and entities to prioritize greenhouse gas emissions co-pollutant reductions and ensure State decision-making does not disproportionately burden disadvantaged communities.

A map of disadvantaged communities is below Figure 1.3.

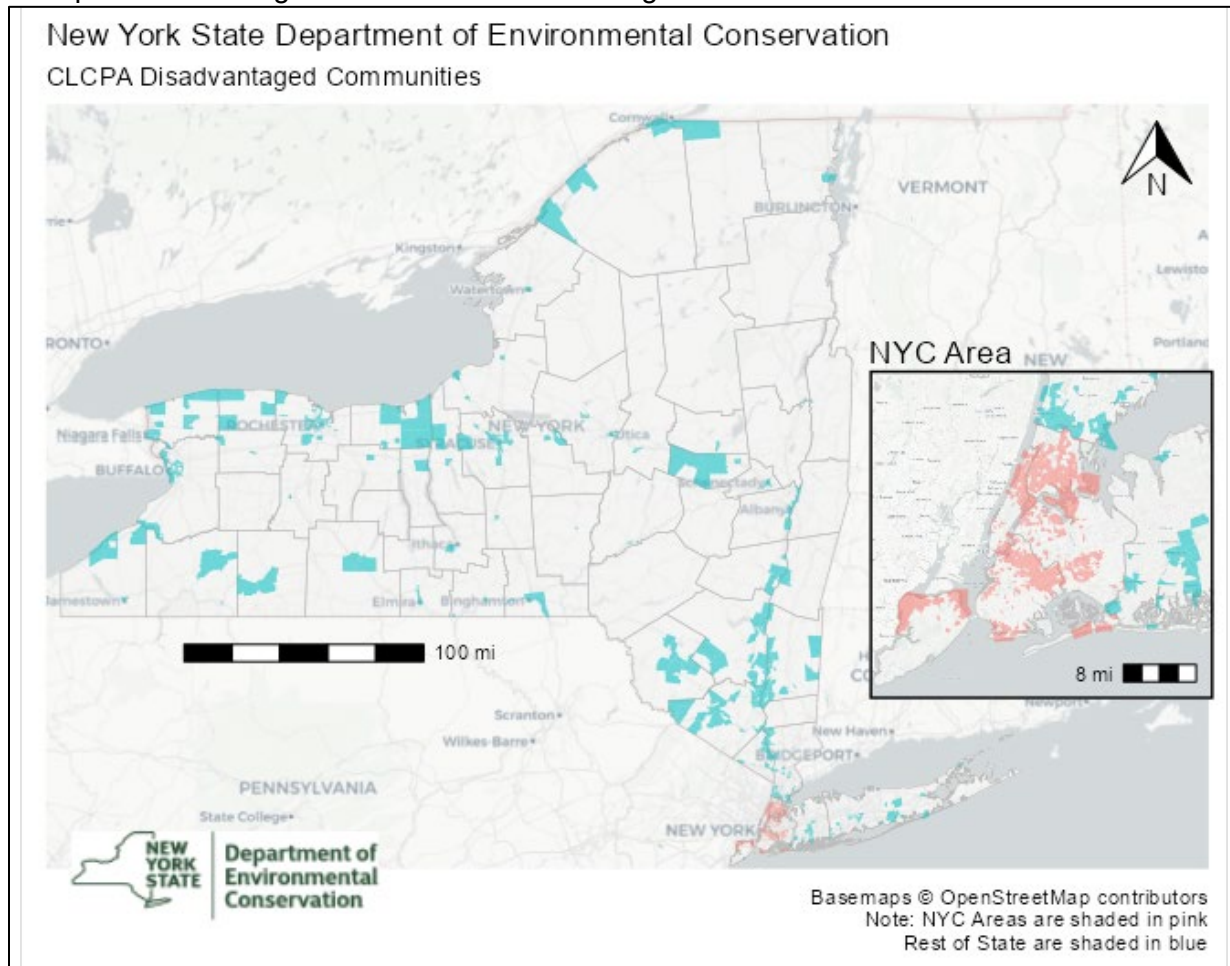


Figure 1-3 Map of CLCPA Disadvantaged Communities in New York State

More information about the NYS's efforts to address environmental issues and concerns that impact disadvantaged communities through grant opportunities, enforcement of environmental laws and regulations, consultation, guidance, and enhanced public participation, please see the Climate Leadership and Community Protection Act website [here](#).

1.3 Environmental Justice Areas

Environmental justice (EJ) is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

A map of potential EJ areas in the State is shown in . In our network, there are 26 air monitors, 15 of which downstate are in potential EJ areas.

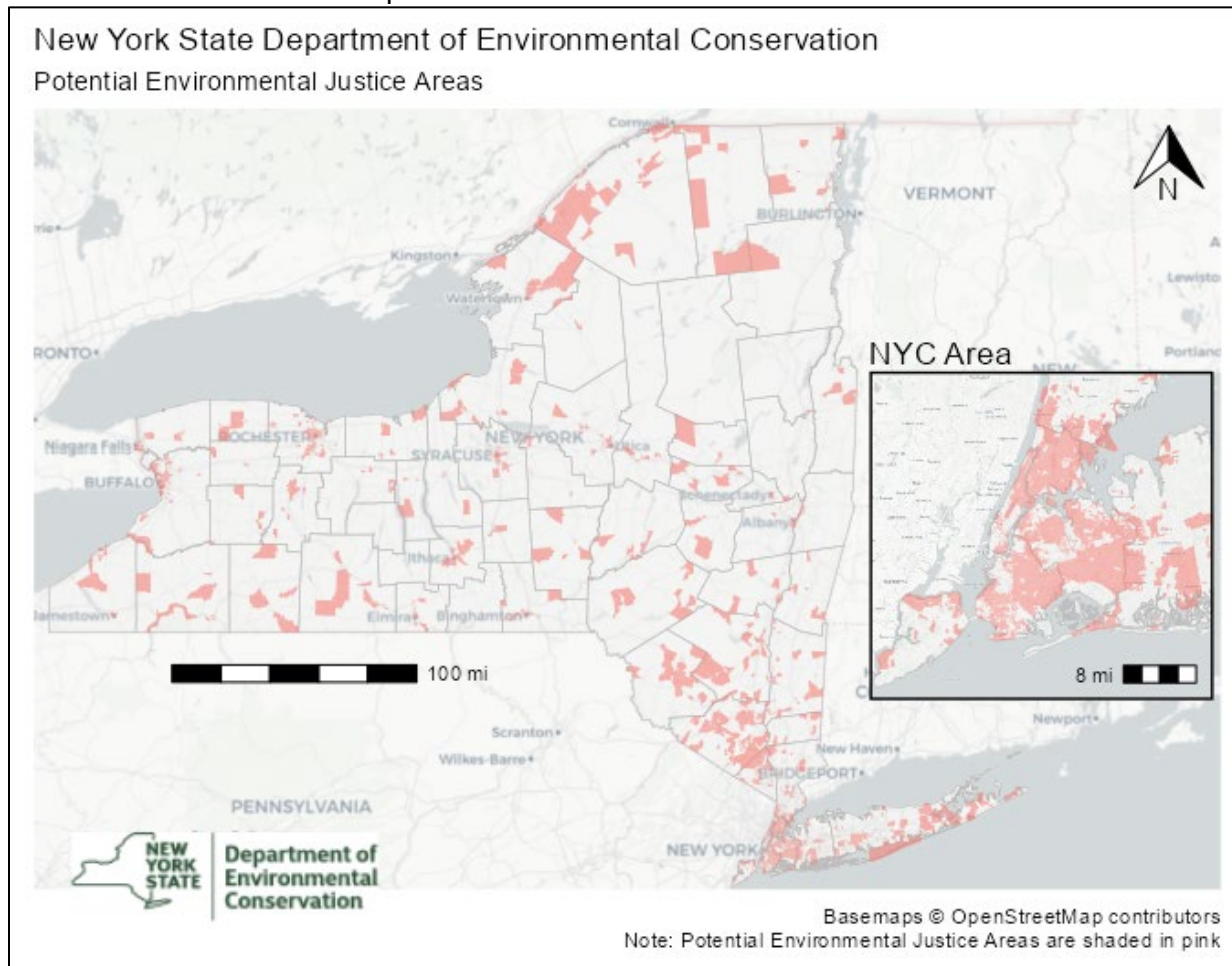


Figure 1-4 Map of Potential Environmental Justice Areas in New York State

More information about the NYSDEC's efforts to address environmental issues and concerns that affect low income and minority communities through grant opportunities, enforcement of environmental laws and regulations, consultation, guidance, and enhanced public participation, please see our website here: [Office of Environmental Justice](#)

2.0 Monitoring Related Research and Investigations

In addition to the routine monitoring work, bureau staff collaborate with researchers from other agencies and academic institutions on a multitude of air pollution related studies. These endeavors provide valuable data for the regulatory, scientific, and health research communities. Study findings are communicated through journal publications, as well as presentations at technical meetings and conferences. Listings of peer-reviewed scientific articles and oral/poster presentations resulting from recent BAQS monitoring activities are provided below from 2020 to current.

2.1 Publications

Yun, J., Y. Tian, W. Hao, E. Zalewsky, and K. Civerolo, Ozone Air Quality Modeling for Regulatory Purposes Using CMAQ and CAMx, Health and Air Quality Applied Science Team (HAQAST) meeting, Madison, WI, October 20-21, 2022.

Civerolo, K. L., O. V. Rattigan, H. D. Felton, and J. J. Schwab, Ambient total oxidized nitrogen monitoring in New York State, EM, September, 2022.

Tao, M., A. M. Fiore, X. Jin, L. D. Schiferl, R. Commane, L. M. Judd, S. Janz, J. T. Sullivan, P. J. Miller, A. Karambelas, S. Davis, M. Tzortziou, L. Valin, A. Whitehall, K. Civerolo, and Y. Tian, Investigating changes in ozone formation chemistry during summertime pollution events over the northeastern United States, Environ. Sci. Technol., 56, 15312-15327, 2022.

Oliver Rattigan, Amanda Teora, Dirk Felton and Kevin Civerolo, FRM Black Carbon Measurements in New York, ASRC-DEC joint meeting, Oct 17, 2022.

Rattigan, O.V., A.C. Carpenter, H.D. Felton, K.L. Civerolo. Optical carbon analysis on Teflon filters from the FRM network in New York. Atmospheric Pollution Research, 12, 101163, 2021 DOI: 10.1016/j.apr.2021.101163

Li AF, Zhang KM, Allen G, Zhang S, Yang B, Gu J, Hashad K, Sward J, Felton D, Rattigan O. Ambient sampling of real-world residential wood combustion plumes. J Air Waste Manag Assoc. 2022 Feb 24. doi: 10.1080/10962247.2022.2044410. PMID: 35200107.

Blanchard, C. L., S. L. Shaw, E. S. Edgerton, and J. J. Schwab, Ambient PM2.5 organic and elemental carbon in New York City: changing source contributions during a decade of large emission reductions, Journal of the Air & Waste Management Association, 71, 995-1012, 2021.

Hopke, P. K., and E. L. Hill, Health and charge benefits from decreasing PM2.5 concentrations in New York State: effects of changing compositions, Atmospheric Pollution Research, 12, 47-53, 2021.

Hung, W.-T., C.-H. Lu, S. Alessandrini, R. Kumar, and C.-A. Lin, The impacts of transported wildlife smoke aerosols on surface air quality in New York State: a multi-year study using machine learning, Atmospheric Environment, 259, 118513, 2021.

Lin, C.-A., C.-H. Lu, S.-P. Chen, W.-T. Hung, K. L. Civerolo, and O. V. Rattigan, Characterization of intra-continental smoke transport and impact on New York State air quality using aerosol reanalysis and multi-platform observations, Atmospheric Pollution Research, 12, 154-166, 2021.

Zhang, J., J. Mak, Z. Wei, C. Cao, M. Ninneman, J. Marto, and J. J. Schwab, "Long Island enhanced aerosol event during 2018 LISTOS: Association with heatwave and marine influences", *Environmental Pollution* 270 (2021) 116299, 2020 DOI: 10.1016/j.envpol.2020.116299

2.2 NYSDEC Collaborations

The Bureau of Air Quality Surveillance collaborates with many different research groups by providing access to NYSDEC air monitoring stations as well as data produced by BAQS. These collaborations vary in duration and scope, depending to the goals of the research partners. Below are some of the collaborations currently underway at various NYSDEC air monitoring stations.

New York City Community Air Survey (NYCCAS)

The New York City Department of Health and Mental Hygiene and CUNY - Queens College are conducting the New York City Community Air Survey (NYCCAS) to evaluate how air quality differs across New York City. This program studies how pollutants from traffic, buildings (boilers and furnaces), and other sources impact air quality in different neighborhoods. [Link](#)

Columbia University at Queens College

Researchers at Columbia University have been monitoring fine particulates at Queens College since 2017 as part of a research project using a MetOne Neighborhood Particulate Monitor. Data are collected from students on the campus and these data are merged with data collected at Queens College to assess the correlation. [Link](#)

NESCAUM Long Island Sound Tropospheric Ozone Study (LISTOS)

Beginning in 2018, a group of State, Federal and Academic researchers will begin to examine ozone precursor and ozone formation from the I-95 corridor through NYC, Long Island, Long Island Sound and on to Connecticut and Rhode Island. The work is being designed to complement the Photochemical Assessment Monitoring Stations (PAMS) network. [Link](#)

Long-Term Monitoring of Methane within New York State Phase I Findings and Plans for Phase II: Assessing Trends in Sources and Characterizing Hot Spots; Lee Murray, University of Rochester. [Link](#)

Mobile Laboratory Measurements of Methane, Ethane, New York State; James Schwab, SUNY Albany [Link](#)

Atmospheric Measurements in Support of Methane Source Characterization within New York State – Harlem; Roisin Commane, Columbia University. [Link](#)

Mid-scale RI-1 (M1:IP): Atmospheric Science and Chemistry mEasurement NeTwork (ASCENT) Nga Lee Ng Georgia Institute of Technology. ASCENT will provide the first high time-resolution, long-term measurements of the properties of atmospheric particulates, known as aerosols. [Link](#)

3.0 Criteria Contaminants

The U.S. EPA is required to set National Ambient Air Quality Standards (NAAQS) for wide-spread pollutants from numerous and diverse sources considered harmful to public health and the environment. The Clean Air Act established two types of national air quality standards. 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 visibility impairment, damage to animals, crops, vegetation, and buildings. The Clean Air Act requires periodic review of the science upon which the standards are based and the standards themselves. Listed below in Table 3.1 are the NAAQS for six principal pollutants, which are called "criteria" pollutants.

Table 3-1 National Ambient Air Quality Standards

Pollutant	Standard Type	Averaging Time	Level	Unit	Form
Carbon Monoxide (CO)	primary	8 hours	9	ppm	Not to be exceeded more than once per year
Carbon Monoxide (CO)	primary	1 hour	35	ppm	Not to be exceeded more than once per year
Lead (Pb)	primary and secondary	Rolling 3-month	0.15	µg/m ³	Not to be exceeded
Nitrogen Dioxide (NO ₂)	primary	1 hour	100	ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Nitrogen Dioxide (NO ₂)	primary and secondary	1 year	53	ppb	Annual Mean
Ozone (O ₃)	primary and secondary	8 hours	0.07	ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution PM _{2.5}	primary	1 year	12	µg/m ³	annual mean, averaged over 3 years
Particle Pollution PM _{2.5}	secondary	1 year	15	µg/m ³	annual mean, averaged over 3 years
Particle Pollution PM _{2.5}	primary and secondary	24 hours	35	µg/m ³	98th percentile, averaged over 3 years
Particle Pollution PM ₁₀	primary and secondary	24 hours	150	µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO ₂)	primary	1 hour	75	ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
Sulfur Dioxide (SO ₂)	secondary	3 hours	0.5	ppm	Not to be exceeded more than once per year

3.1 Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas produced as a primary pollutant during the combustion of fossil and biomass fuels. Vegetation also can emit CO directly into the atmosphere as a metabolic by-product. Sources such as motor vehicles, non-road combustion engines or vehicles, and biomass burning can cause high concentrations of CO. Motor vehicle exhaust contributes about 60 percent of all CO emissions nationwide. Indoor sources include unvented, malfunctioning, or misused combustion appliances, combustion engines in garages or basements, and tobacco combustion.

CO enters the bloodstream through the lungs and reduces oxygen delivery to the body's organs and tissues. The health threat from levels of CO sometimes found in the ambient air is most serious for those who suffer from cardiovascular disease such as angina pectoris. At much higher levels of exposure not commonly found in ambient air, CO can be poisonous, and even healthy individuals may be affected.

There are two primary NAAQS for ambient CO: a 1-hour average of 35 ppm and an 8-hour average of 9 ppm. These concentrations are not to be exceeded more than once per year. There currently are no secondary standards for CO.

The number of monitors and concentration trends chart over the years in New York State are depicted in Figure 3.1 Carbon Monoxide Monitors and Concentration Trends. It clearly demonstrates that the current ambient levels of CO are well below the NAAQS, despite the continual increase in automobiles and vehicle-miles traveled in the State. As of 2002, all counties in the State have achieved attainment designation. CO monitoring is required at NCore, Near Road, and PAMS sites.

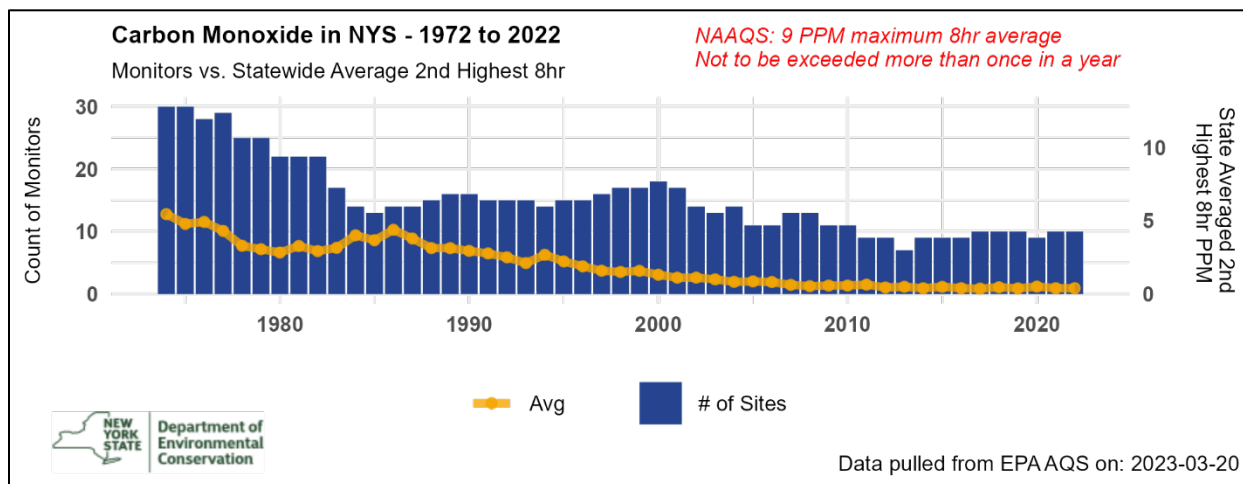


Figure 3-1 Carbon Monoxide Monitors and Concentration Trends

NYSDEC uses TEI Model 48C and Teledyne API 300 EU instruments that employ the NDIR gas filter correlation method for the continuous measurement of CO. Currently there are ten CO monitors in operation statewide, including the near-road sites in Buffalo and Rochester.

3.1.1 Near-Road CO Monitoring

The EPA updated the monitoring regulations for CO in August 2011, adding a requirement to perform CO monitoring at one location on a busy roadway in each city (CBSA) with a population over 1 million. The near-road CO monitors are expected to be collocated with the existing near-road monitors established for monitoring nitrogen dioxide (NO₂). The NYSDEC currently operates Near-Road CO at all near-road sites.

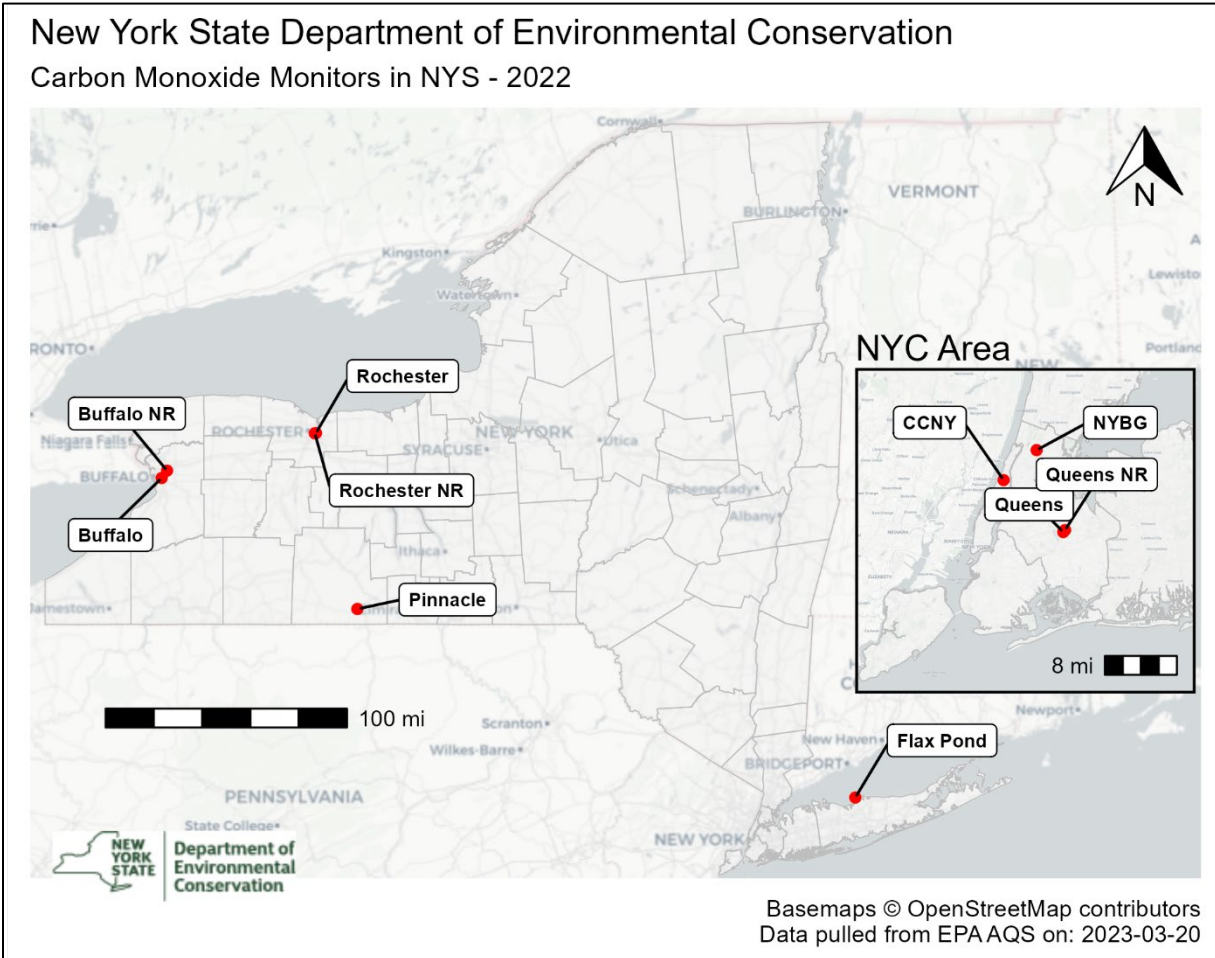


Figure 3-2 Map of Carbon Monoxide Monitors

3.2 Nitrogen Dioxide

Many chemical species of nitrogen oxides (NO_x) exist, but most concerning for human health is nitrogen dioxide (NO₂). Breathing air with a high concentration of NO₂ can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma. Long exposures to elevated concentrations of NO₂ may contribute to developing asthma and can increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly, are generally at greater risk for the health effects of NO₂. NO₂ along with other NO_x reacts with other chemicals in the air to form both particulate matter and ozone. Both of these are also harmful when inhaled due to effects on the respiratory system.

Natural sources include intrusion of stratospheric NO_x, bacterial and volcanic action, and lightning. The major source of anthropogenic NO_x emissions into the atmosphere is the combustion of fossil fuels in stationary sources (heating, power generation) and in motor vehicles (internal combustion engines). Other contributions of NO₂ to the atmosphere come from specific non-combustion industrial processes, such as the manufacture of nitric acid, the use of explosives and welding. Indoor sources include tobacco smoking and the use of gas-fired appliances and oil stoves.

The level for both the primary and secondary NAAQS for NO₂ is 53 ppb annual arithmetic average (mean), not to be exceeded. In January 2013, the EPA revised the NAAQS to include an hourly standard of 100 ppb. Figure 3.3 shows the number of monitoring sites and NO₂ concentration trends over the years.

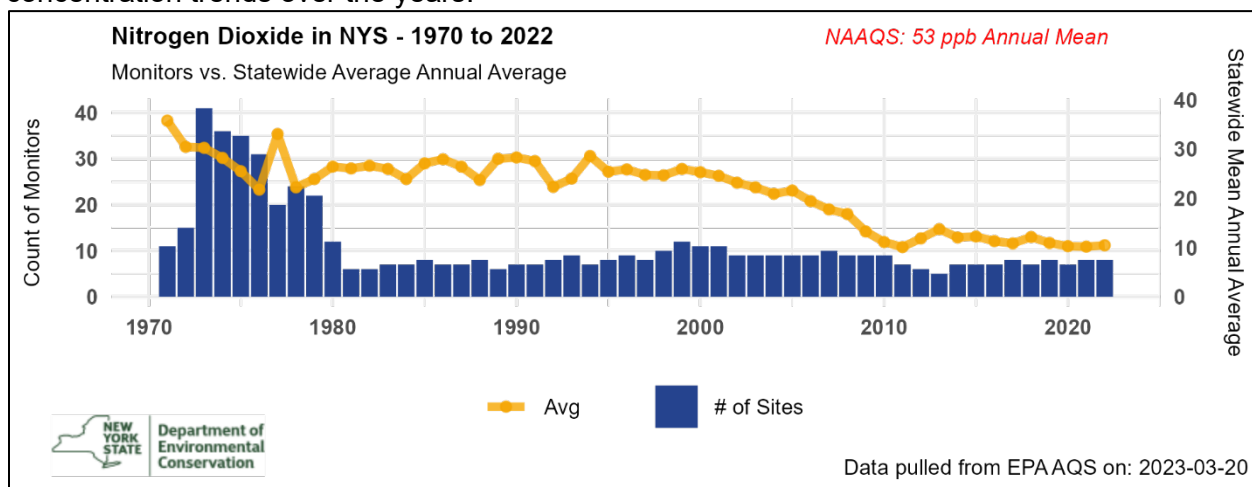


Figure 3-3 Nitrogen Dioxide Monitors and Concentration Trends

In New York, instruments are deployed for continuous NO₂ measurements using the gas phase chemiluminescence method. Currently there are four NO_x monitoring sites statewide, and NO/NO_y monitors in Rochester, Pinnacle, and Queens College (both NO₂ and NO_y) as shown in Figure 3.4. NO/NO_y measurements are included within the NCore multi-pollutant site requirements and the PAMS program. These NO/NO_y measurements will produce conservative estimates for NO₂ that can be used to ensure tracking continued compliance with the NO₂ NAAQS. NO/NO_y monitors are used at these sites because it is important to collect data on total reactive nitrogen species for understanding O₃ photochemistry. In 2012, we discontinued using the (NO/NO_y) values as NO₂ from these three sites for statewide annual average calculations.

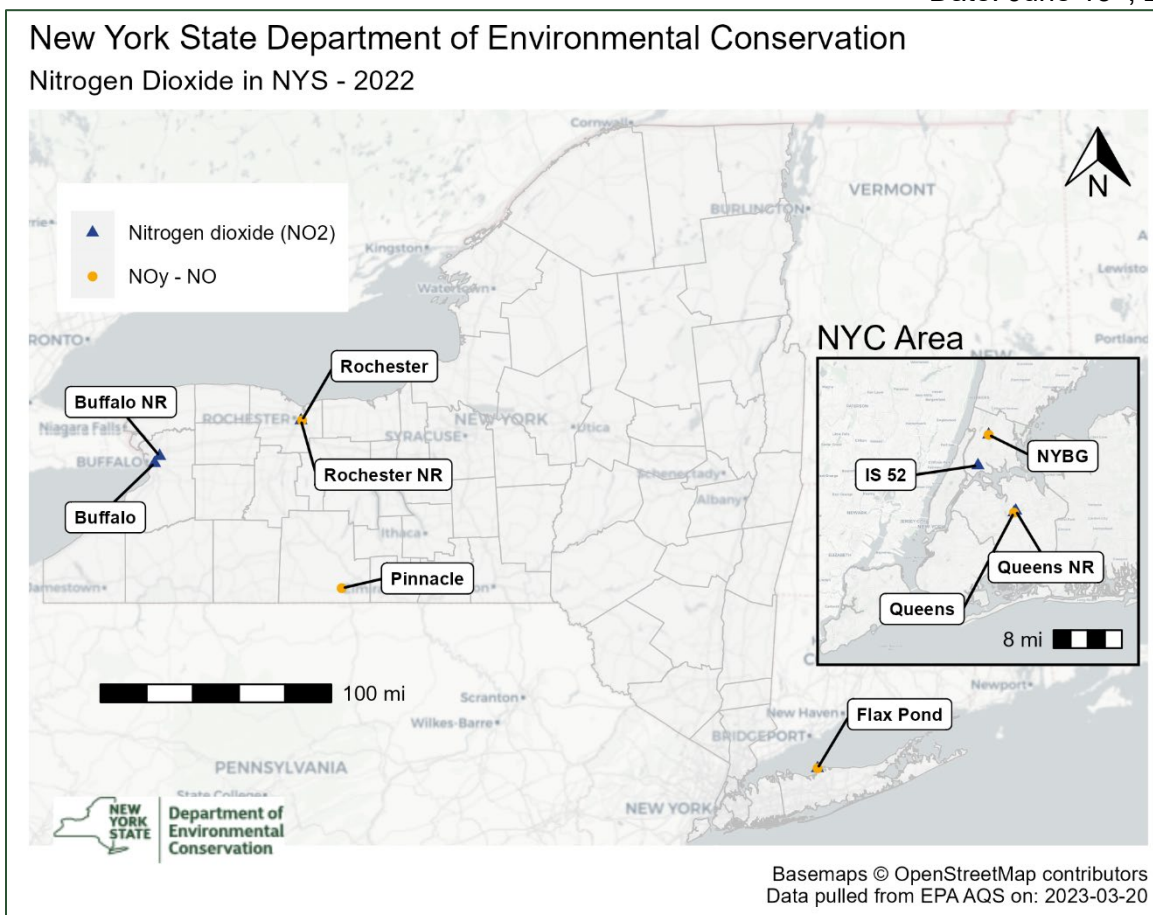


Figure 3-4 Map of Nitrogen Oxides Monitoring Sites

3.2.1 Near-Road NO₂ Monitoring

The primary aim of the near-road NO₂ network is to monitor where peak, ambient NO₂ concentrations are expected to occur as a result of on-road mobile source emissions. The sites will also represent the worst case for population exposure for each CBSA since the sites are at locations where NO₂ concentrations are expected to be high for one or more hours at a time.

Table 3-2 Characteristics for New York State Near-Road Sites

	Buffalo	Rochester	Queens
Target Road	I90 between Exit 51 and Exit 52	I490 Winton Road Acc	I495 between Main St. – Kissena Blvd
AADT (Rank)	131,020 (2)	110,990 (3)	166,340 (115)
Distance from probe to Target Road	20 meters	20 meters	28 meters
Probe Height	4 meters	4 meters	4 meters
Start Date	4/1/2014	12/18/2014	Est. 1/1/2016
Latitude	42° 55' 16" N	43° 8'42.08" N	40°44'21.49" N
Longitude	-78° 45' 58" W	-77°33'27.59" W	-73°49'3.76" W

Near-road NO₂ monitoring commenced at the Buffalo and Rochester sites on April 1, 2014, and December 18, 2014, respectively. The Queens Near-Road began operation on April 1st, 2017.

3.3 Lead

Exposure to lead (Pb) occurs through ingestion of lead in food, water, soil, or dust and through inhalation. It accumulates in the blood, bones, and soft tissues and can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to lead may cause neurological impairments such as seizures, and/or behavioral disorders. Additionally, even low levels of lead exposure may cause central nervous system damage in fetuses and children.

In November of 2008 EPA published the final rule for the revision of the NAAQS for lead to not exceed 0.15 $\mu\text{g}/\text{m}^3$ in total suspended particles averaged over rolling 3-months evaluated over a 3-year period. As part of the lead monitoring requirements, agencies are required to monitor ambient air near lead sources which are expected or to have a potential to exceed the NAAQS. At a minimum, monitoring agencies must monitor near lead sources that emit 1.0 ton per year (tpy) or more.

The new regulations replaced the requirements for population-oriented sampling with lead monitors at the urban NCore sites. In addition, an airport monitoring study was done to determine the need for monitoring of airports that emit less than 1.0 tpy of lead. A 12-month monitoring study at Brookhaven Airport concluded in October 2012. The Republic Airport monitoring began in October 2012 and completed a year later. Both sites exhibited lead concentrations significantly below the NAAQS, and EPA approved the discontinuation of monitoring.

Federal Reference Method (FRM) particulate lead samples are collected on glass fiber filters using a standard TSP high volume sampler which are subsequently analyzed by the laboratory using atomic absorption spectroscopy. Under the new rule, EPA is allowing lead- PM_{10} in lieu of lead-TSP where the maximum 3-month arithmetic mean lead concentration is expected to be less than 0.10 $\mu\text{g}/\text{m}^3$ (i.e., two thirds of the NAAQS) and where sources are not expected to emit ultra-coarse lead. The population oriented lead monitors at the NCore or NATTS sites are located away from known sources of lead and utilize lead- PM_{10} samplers.

There is one lead-TSP monitoring site in operation in Wallkill near a lead-acid battery recycling facility. The source-oriented monitoring site (AQS site ID # 36-071-3002) is in place as the facility had the potential to exceed the level of the NAAQS. Two urban CBSA monitors (low volume PM_{10}) are operating at the NATTS sites in the Bronx and Rochester

In October 2016, the facility in Wallkill installed new emission control technologies that have led to reduced emissions of lead into the environment. As a result, the NYSDEC closed a redundant lead-TSP site at Ballard Road at the end of 2017 because of low values. Additionally, the NYSDEC has transitioned the equipment from high volume TSP sampling to low volume TSP sampling.

The 2021 three-month rolling average values for the TSP and PM_{10} lead sites are listed in Table 3.3, and Table 3.4, respectively. The data show the lead levels are well below the standard of 0.15 $\mu\text{g}/\text{m}^3$.

Table 3-3 2022 3-Month Rolling Average Lead for TSP Lead ng/m3

Month	Wakefern food
January	0.0038
February	0.0043
March	0.0047
April	0.0040
May	0.0030
June	0.0034
July	0.0047
August	0.0053
September	0.0065
October	0.0062
November	0.0066
December	0.0052
Maximum	0.0066

Table 3-4 2022 3-Month Rolling Average PM₁₀ Lead for Urban Sites ng/m3

Month	IS52	Rochester
January	0.0021	0.0012
February	0.0024	0.0012
March	0.0026	0.0015
April	0.0022	0.0015
May	0.0019	0.0015
June	0.0018	0.0014
July	0.0020	0.0016
August	0.0021	0.0013
September	0.0021	0.0011
October	0.0036	0.0008
November	0.0035	0.0009
December	0.0034	0.0011
Maximum	0.0036	0.0016

3.4 Particulate Matter

3.4.1 PM₁₀

In 1987, EPA revised the 1971 standards in order to protect against adverse health effects of inhalable airborne particles that can be deposited in the lower (thoracic) regions of the human respiratory tract, with PM₁₀ as the indicator. EPA established primary and secondary PM₁₀ standards for two averaging times: 150 µg/m³ (24-hr average, with no more than one expected exceedance per year) and 50 µg/m³ (expected annual arithmetic mean, averaged over three years). After the most recent scientific review on PM, EPA issued the final rule in December 2006 revising the PM_{2.5} standards, at the same time revoking the PM₁₀ annual standard while retaining the 24-hr standard at 150 µg/m³.

Starting in 2004, the R&P Partisol 2025 samplers were used for manual PM₁₀ collection by removing the PM_{2.5} size selective inlet. The filters are submitted to a contract laboratory for mass analysis. Figure 4.7 shows the number of monitors and the composite annual arithmetic mean for PM₁₀.

On Figure 3.5, there is a break in the graph during 2005, due to a changeover in equipment causing there to be only one quarter of data for the entire year. The small increase observed in 2015 is due to elevated readings at the Buffalo, NY site. In March of 2015 the land use type changed at the Buffalo site following the sale of an adjacent land parcel, introducing a local source of PM₁₀. This caused the values to no longer be regionally representative. In the future the NYSDEC may relocate the PM₁₀ monitor to a nearby site that is not influenced by the local source.

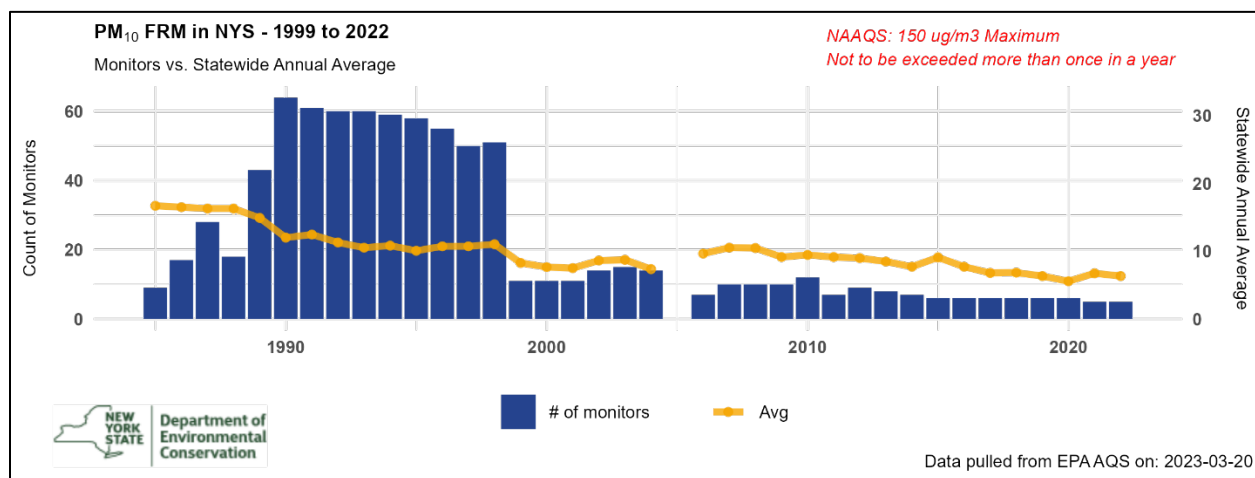


Figure 3-5 PM₁₀ Monitors and Concentration Trends

Currently, there are five such sites in operation on a one in six days schedule, as shown in Figure 3.6.

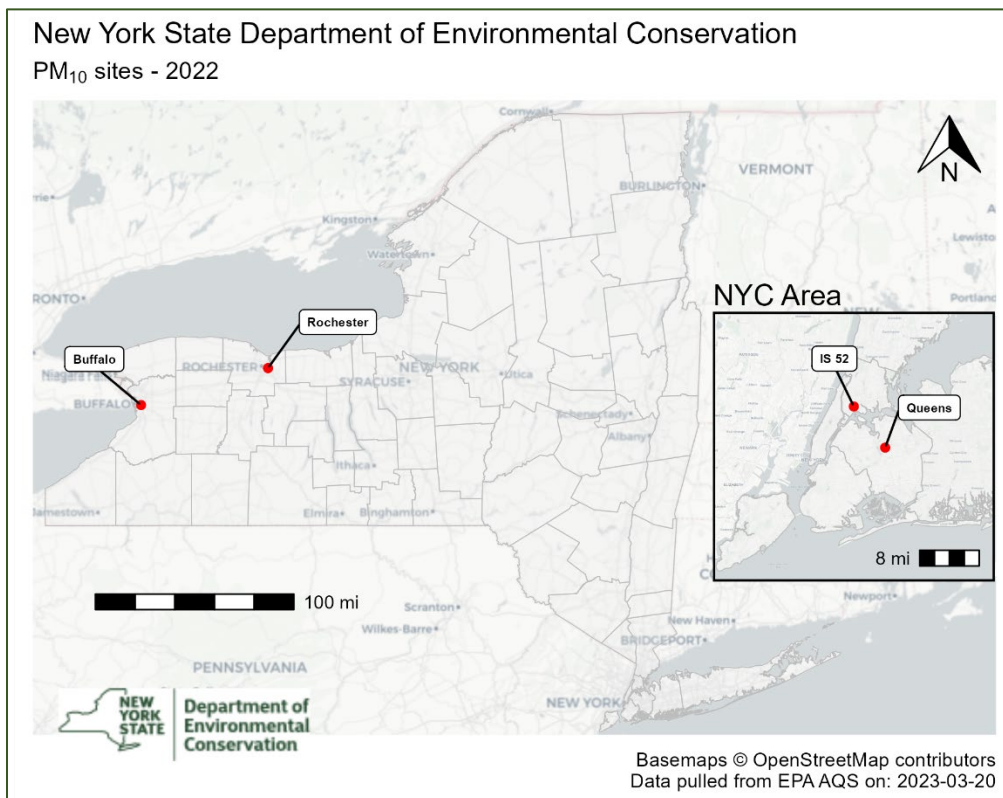


Figure 3-6 Map of PM₁₀ Monitoring Sites

Continuous PM₁₀ data are also obtained using API T640 instruments that simultaneously measure PM_{2.5}, PM_{coarse} (PM₁₀ - PM_{2.5}) and PM₁₀ mass concentrations at the IS 52, IS74, PS 314, PS 274, Queens College, Albany, East Syracuse, Rochester, Buffalo, Whiteface Base, and Pinnacle sites.

3.4.2 PM_{2.5}

In July 1997, the EPA Administrator promulgated significant revisions to the PM NAAQS, after taking into account scientific information and assessments. Two new PM_{2.5} standards were set: an annual standard of 15 µg/m³, based on the 3-year average of annual arithmetic mean PM_{2.5} concentrations from single or multiple community-oriented monitors; and a 24-hr standard of 65µg/m³, based on the 3-year average of the 98th percentile of 24-hr PM_{2.5} concentrations at each population-oriented monitor within an area. To continue to address coarse-fraction particles, the annual PM₁₀ standard was retained, and the form, but not the level, of the 24-hr PM₁₀ standard was revised to be based on the 99th percentile of 24-hr PM₁₀ concentrations at each monitor in an area. The secondary standards were revised by making them identical in all respects to the PM_{2.5} and PM₁₀ primary standards.

EPA lowered the NAAQS for PM in December of 2006 to provide increased protection of public health and welfare, respectively. EPA revised the level of the 24-hour PM_{2.5} standard from 65 to 35 micrograms per cubic meter (µg/m³) and retained the level of the annual PM_{2.5} standard at 15µg/m³. Regarding PM₁₀, the 24-hour standard was retained, but the annual PM₁₀ standard

was revoked. On Dec. 14, 2012, EPA further strengthened the nation's air quality standards for fine particle pollution to by revising the primary annual PM_{2.5} standard from 15 to 12 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and retaining the 24-hour fine particle standard of $35\mu\text{g}/\text{m}^3$. The new standards became effective on March 18, 2013.

The 2012 PM NAAQS added a network monitoring requirement for PM_{2.5}. A PM_{2.5} monitor must be installed in CBSAs with populations over 1 million near a busy road segment. The monitor deployments are staged with the monitors required in CBSAs over 2.5 million by January 1, 2015, and the rest by January 1, 2017. The data from these sites have been used to evaluate the impact of emissions from busy roadways in urban areas. The NYSDEC installed near-road PM_{2.5} monitors in Buffalo and Rochester in 2014 at the Queens site in 2017.

The NYSDEC PM_{2.5} monitoring network deploys a combination of filter based FRM samplers, continuous mass monitors, filter based speciation samplers and continuous speciation samplers. The data from the FRM samplers are used to determine if the State's air quality meets the NAAQS. The continuous mass sampler data are used for the reporting of near real-time air quality data for health-related warnings and forecasts. The speciation filter sampler data are used to determine the chemical constituents that make up PM_{2.5}. The continuous speciation data are used to examine the short-term fluctuations in the concentrations of individual species or components that make up PM_{2.5}.

3.4.3 PM_{2.5} FRM Monitoring Instrumentation

The filter based FRM samplers used in New York are the Model 2025 sequential samplers made by the Thermo Environmental Company (Franklin, MA). The sampler has been designated by EPA as a reference method instrument for PM_{2.5} particle collection. The designation is: RFPS-0498-118.

Figure 3-7 below shows the number of manual PM_{2.5} monitoring sites and the composite annual arithmetic means in New York State since the network was implemented in 1999.

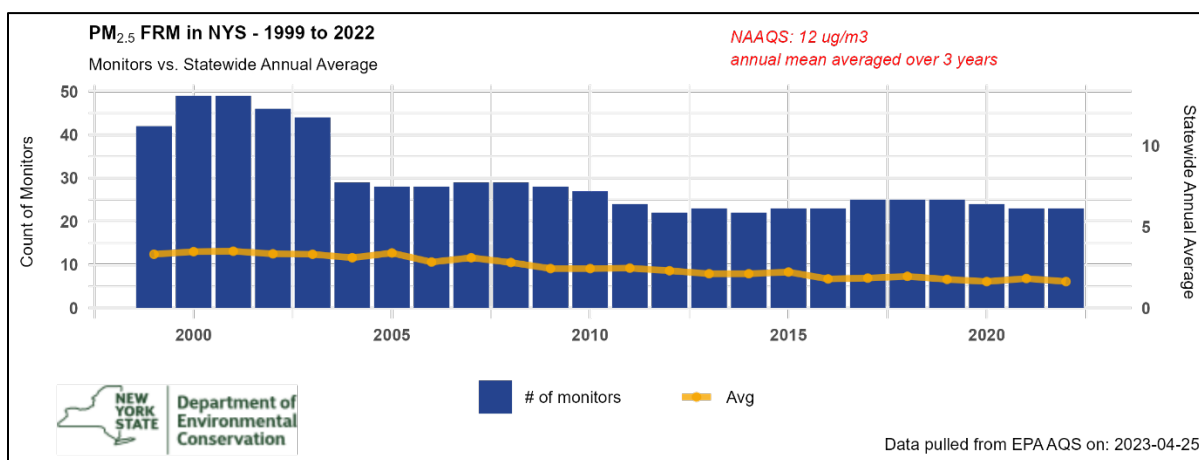


Figure 3-7 PM_{2.5} FRM Monitors and Concentration Trends

Currently, there are 21 FRM monitors in operation statewide, as shown in Figure 3-8.

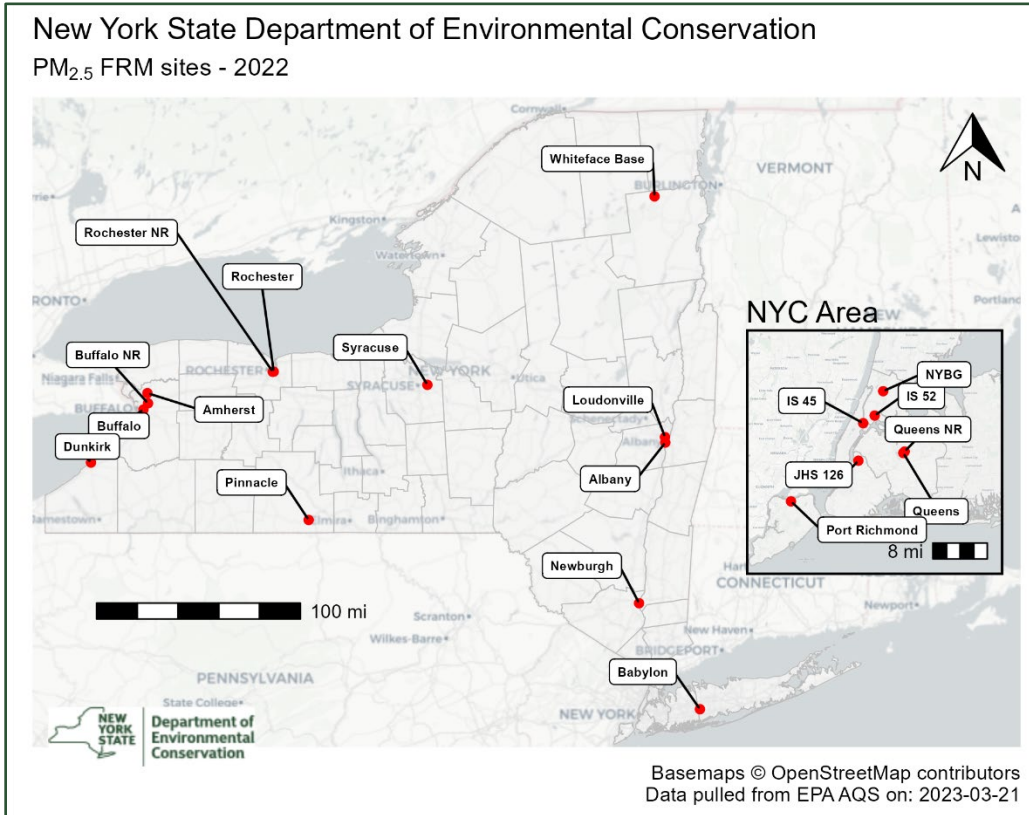


Figure 3-8 Map of Manual PM_{2.5} (FRM) Monitoring Network

3.4.4 Continuous PM Monitoring

Continuous mass monitoring is performed primarily with a network of TEOM 1405 instruments. In addition, there are nine Teledyne T640's to simultaneously measure PM_{2.5}, PM Coarse (PM₁₀ - PM_{2.5}) and PM₁₀ mass concentrations. TEOM 1405 instruments have received designation by EPA for PM₁₀ but not for PM_{2.5}. PM_{2.5} is more difficult to measure than PM₁₀ with automated samplers because PM_{2.5} contains a higher fraction of volatile components. The heated measurement sensor for the TEOM reduces the amount of volatile mass measured as compared to filter based FRMs. The NYSDEC utilizes non-linear data adjustments to make the TEOM data more comparable with the FRM data. This element of the PM_{2.5} monitoring network provides the data used for public reporting purposes including the NYSDEC website and for PM_{2.5} forecasting.

The TEOM data are compared to the filter based FRM annually, and the comparison allows the analysts to create non-linear correction factors that modify the TEOM data to more closely resemble FRM data. This is necessary because FRM data are not available for near real-time public reporting purposes. The NYSDEC now submits TEOM data from each site in its original unadjusted format as well as the adjusted data to match more closely with the FRM.

Figure 3-9 below shows the number of manual PM_{2.5} monitoring sites and the composite annual arithmetic means in New York State since the network was implemented in 1996.

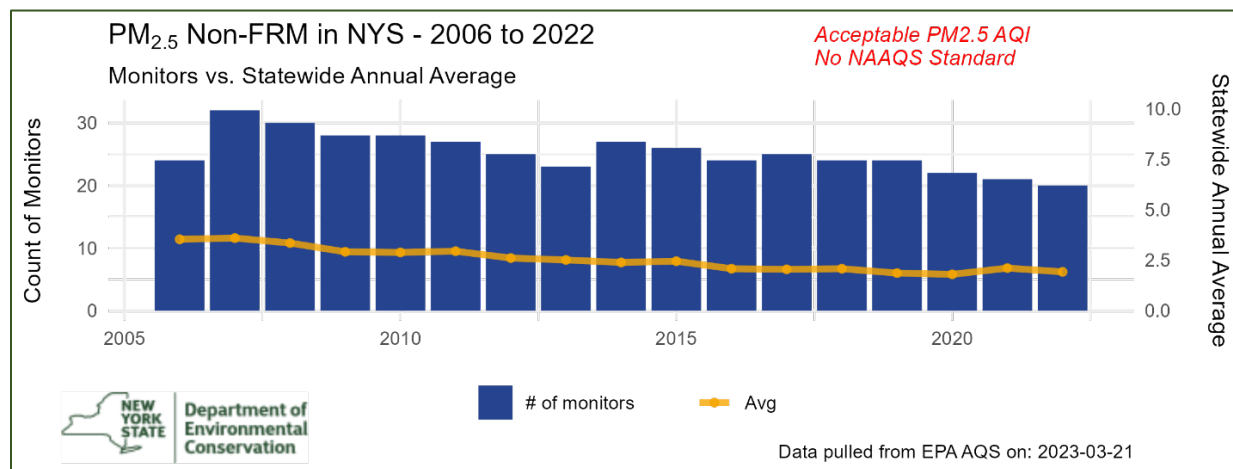


Figure 3-9 PM_{2.5} Monitors and Concentration Trends

There are 29 continuous PM_{2.5} monitoring sites as shown in Figure 3-10.

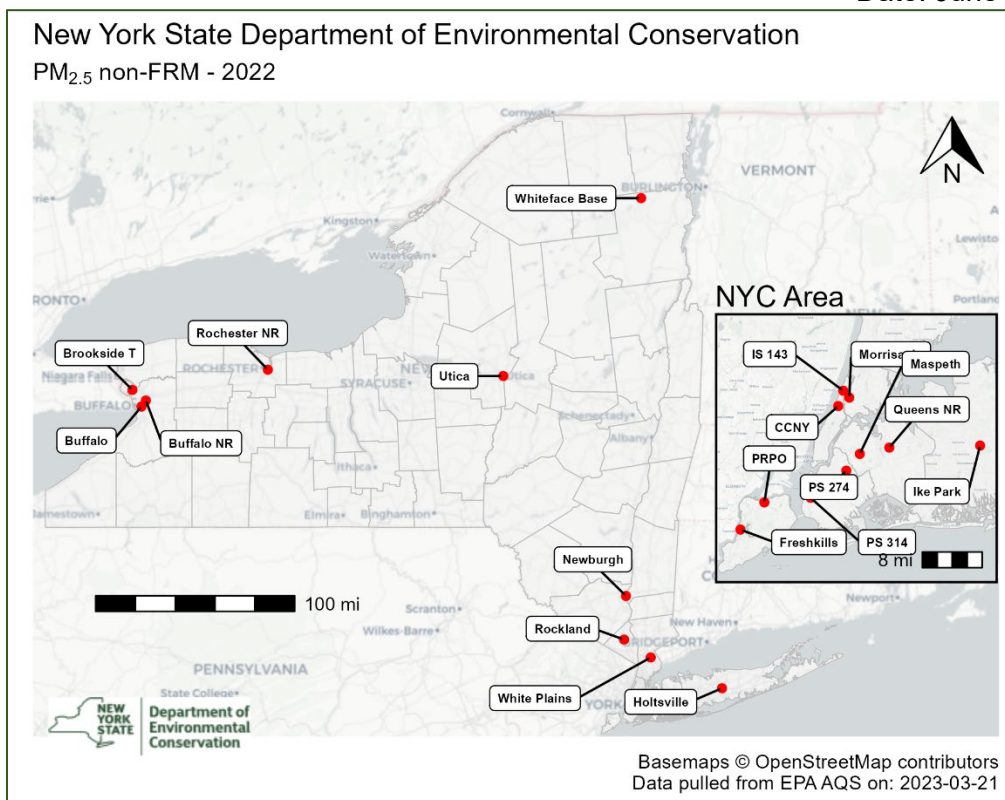


Figure 3-10 Map of Continuous PM_{2.5} Monitoring Network

The NYSDEC also operates some of the newest continuous mass monitors which have undergone Federal Equivalent Method (FEM) designation. These instruments collect more of the volatile PM mass that the filter based FRM may or may not retain depending on the environmental conditions during and after the period in which the filter sample was collected. NYSDEC has been evaluating the technological improvements that have led to the current PM_{2.5} continuous FEMs for more than 20 years. The performance of eleven TAPI T640s are being evaluated at urban and rural locations in the state. Currently, the T640s are deployed at nine sites (Albany, Whiteface, IS 52, Queens College, East Syracuse, Rochester, Buffalo, Brooklyn, and Pinnacle) to simultaneously measure PM_{2.5}, PM Coarse (PM₁₀ - PM_{2.5}) and PM₁₀ mass concentrations.

3.4.5 Speciation

In New York State, sites operating with the Speciation Trends Network (CSN) sampling protocol use MetOne SuperSass and URG 3000N instruments. The samplers collect 3 and 1 filter samples respectively every third day or sixth day for a period of 24 hours. Five operate on a 1-in-3 day schedule and three operate on a 1-in-6 day schedule. All these sites host collocated FRM and continuous mass monitoring instruments. The samples are then sent to an EPA contract laboratory for chemical analysis. There are over fifty species consisting of ions, metals and carbon species quantified by the analyses.

To address inconsistencies in carbon sampling and analysis procedures used in urban CSN/SLAMS and rural IMPROVE programs, EPA determined that the URG sampler would be

used at all CSN sites. The conversion was completed 2008 for all of the NY sites. Figure 3.11 shows the eight CSN sites currently in operation.

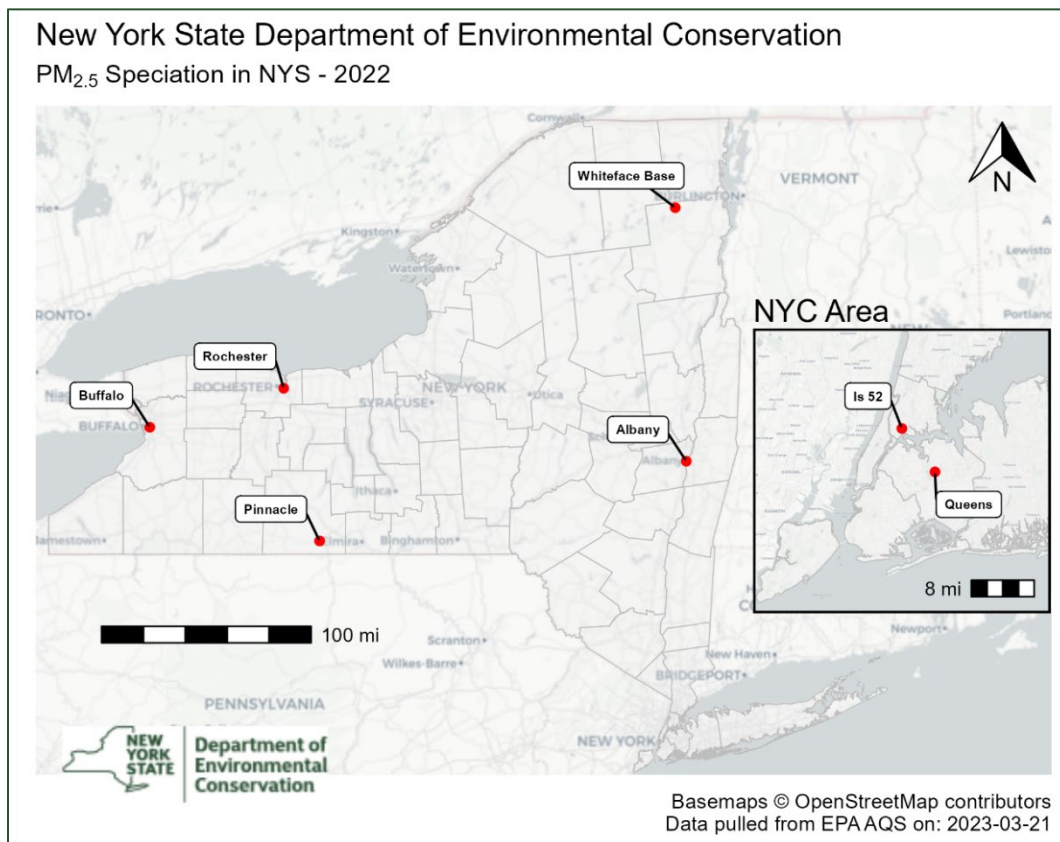


Figure 3-11 Map of Speciation Sampling Sites

3.4.6 Continuous Speciation

The NYSDEC recognizes the value of high resolution measurements (hourly or higher) of PM_{2.5} species. This data is useful for the examination of pollutant trends (and temporal patterns) and is critically important for areas facing non-attainment for the PM_{2.5} NAAQS. Identifying seasonality of species is necessary to develop control strategies. Long term monitoring is vital to this effort because in addition to changes in source emissions changes in meteorology also affect PM pollution.

The NYSDEC continuous speciation program is expanding and currently includes monitoring at urban and rural locations. Sulfate, organic carbon, elemental carbon and black carbon species data are collected at hourly or higher frequency. In this manner, both the regional and inter-urban variability of these species are being investigated. The NYSDEC uses instruments to examine the species of PM_{2.5} on a higher frequency than what is available from the filter-based speciation sampling network. This continuous speciation data is useful in the examination of source strengths and the relationship between pollutant concentrations and meteorology. The operation of continuous speciation equipment is also less expensive than long-term filter species measurements due to the high costs associated with filter lab analysis. Operation of continuous speciation in conjunction with 24-hr CSN sampling is beneficial in accounting for biases in measurements when a change to the CSN method occurs as happened for example in the case of the CSN carbon which was changed to the IMPROVE method in 2007.

NYSDEC has been using the continuous speciation data in New York City to examine temporal patterns such as diurnal and day of week patterns of aerosol species related to source strengths and meteorology. For example, elemental carbon, black carbon and primary pollutant NO_x in New York City track throughout the day with peak concentrations in the morning coincident with the early commute period. Mobile emissions in the early morning occur in a shallow boundary layer which concentrates pollutants near ground level. An elevation in boundary layer height during the day leads to a dispersion of pollutants and a less pronounced afternoon/evening peak. Concentrations of these species are also higher on weekdays compared to weekends indicating that local mobile emissions are a significant source of these species. During winter months organic carbon sometimes shows similar patterns to elemental carbon and NO_x reflecting that the primary organic component most likely from mobile emissions. Throughout the year however organic carbon does not track the primary pollutants but is more correlated with $\text{PM}_{2.5}$ mass (and sulfate during summer months) indicating that there is a significant regional or non-local contribution to organic carbon measured in New York City.

3.4.7 Ultrafine Particulate Monitoring

Ultrafine particles (UFPs) are aerosols with an aerodynamic diameter of $0.1\ \mu\text{m}$ (100 nm) or less. There is a growing concern in the public health community about the contribution of UFPs to human health. Despite their modest mass and size, they dominate in terms of the number of particles in the ambient air. A concern about UFPs is their potential ability to reach deeply into the lungs. Moreover, UFPs have a high surface area and potential to absorb a substantial amount of toxic organic compounds.

NYSDEC first began ultrafine particulate monitoring (UPM) at Queens College in June of 2009. The Queens College NCore site was selected for the UPM to complement a suite of parameters already being measured there. This instrument provides continuous measurements of size distribution and particle number concentrations of fine particles below one micron, in the range from 20 to 500 nanometers. Data on particle size distribution and concentration will provide valuable information for the understanding of $\text{PM}_{2.5}$ formation mechanisms, as well as source apportionment determination.

Monitoring for UFPs in New York has expanded since 2009. There are now monitors in New York City, at near-road locations in Buffalo, Rochester, and Queens, and one located in a rural area in the Southern Tier. Preliminary data suggest that the UFPs are regional in nature, though some size fractions are impacted by local mobile sources. These sites utilize an API Model 651 which counts particles larger than 7 nanometers. Data from these ultrafine monitors are being uploaded to the EPA AQS database for use by researchers.

3.5 Sulfur Dioxide

Sulfur dioxide (SO_2), a colorless, reactive gas, is produced during the burning of sulfur-containing fuels such as coal and oil, during metal smelting, and by other industrial processes. It belongs to a family of gases called sulfur oxides (SO_x). Major sources include power plants, industrial boilers, petroleum refineries, smelters, and iron and steel mills. Generally, the highest concentrations of SO_2 are found near large fuel combustion sources.

High concentrations of SO_2 can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated SO_2 levels while at moderate exertion may result in reduced lung function that may be

accompanied by symptoms such as wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer-term exposures to high concentrations of SO₂, in conjunction with high levels of PM, include respiratory illness, alterations in the lungs' defenses, and aggravation of existing cardiovascular disease.

Additionally, there are a variety of environmental concerns associated with high concentrations of SO₂. Because SO₂, along with NO_x, is a major precursor to acidic deposition (acid rain), it contributes to the acidification of soils, lakes, and streams and the associated adverse impacts on ecosystems. Sulfur dioxide exposure to vegetation can increase foliar injury, decrease plant growth and yield, and decrease the number and variety of plant species in a given community. Sulfur dioxide also is a major precursor to PM_{2.5} (aerosols), which is of significant concern to human health, as well as a main pollutant that impairs visibility. Finally, SO₂ can accelerate the corrosion of natural and man-made materials (e.g., concrete and limestone) that are used in buildings and monuments, as well as paper, iron-containing metals, zinc, and other protective coatings.

Figure 3.12 shows the number of SO₂ monitors and the composite annual means in New York State over the years.

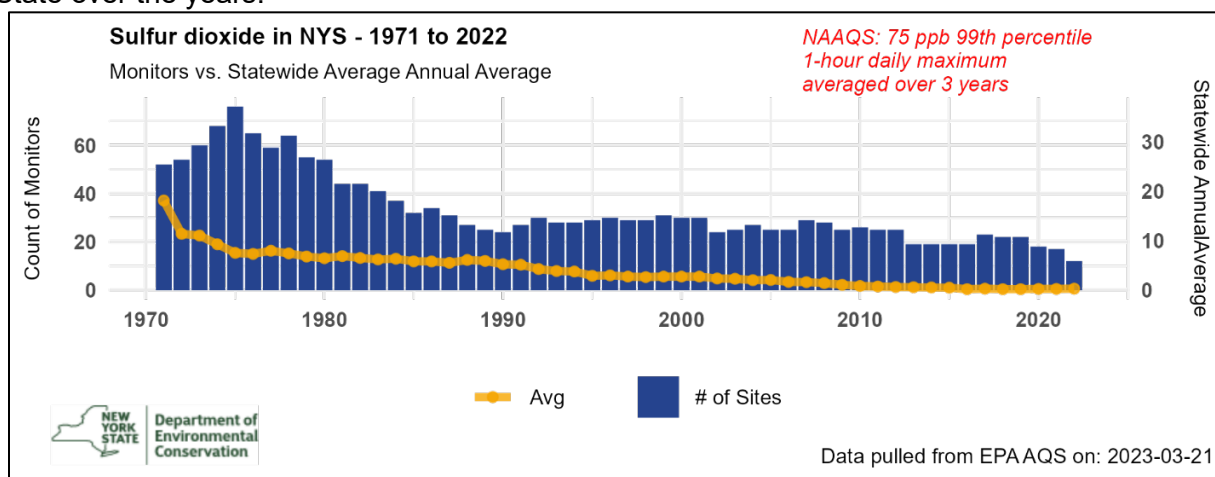


Figure 3-12 Sulfur Dioxide Monitors and Concentration Trends

Effective August 23, 2010, the EPA established requirements for an SO₂ monitoring network, and replaced the existing 24-hour and annual standards with a new short-term standard based on the 3-year average of the 99th percentile of the yearly distribution of 1-hour daily maximum SO₂ concentrations at 75 ppb. On September 21, 2015, the EPA finalized requirements for air agencies to monitor or model ambient SO₂ levels in areas with large sources of SO₂ emissions to help implement the 1-hour SO₂ National Air Ambient Quality Standard (NAAQS). This final rule which is known as the Data Requirements Rule (DRR) establishes that, at a minimum, air agencies must characterize air quality around sources that emit 2,000 tons per year (tpy) or more of SO₂. The DRR allows sources to accept enforceable emission limits to reduce their emissions to a level less than 2000 tpy or to determine through dispersion modeling that there are no ambient air concentrations of SO₂ above the NAAQS or to monitor air quality to ensure that there are no exceedances of the primary SO₂ NAAQS.

There are two sources in New York State that have elected to characterize air quality in areas near their facilities by monitoring in order to satisfy the DRR. The facilities established and operated SO₂ monitors at locations that are acceptable to the NYSDEC and EPA. The primary

objective of this monitoring is to determine the 1-hour concentration of SO₂ at the location or locations where the maximum impact from the source is expected to occur. The NYSDEC utilized dispersion modeling to determine how many monitors were necessary for each source as well as to determine the acceptable locations where these monitors could be established. The Cayuga East and Cayuga West sites were closed at the end of 2019, and thus do not appear on the map in Figure 3.14.

There are 18 SO₂ monitors in operation currently, as shown in Figure 3.13. TEI Model 43C and 43i TLE instruments using the pulsed fluorescence method are deployed in the network.

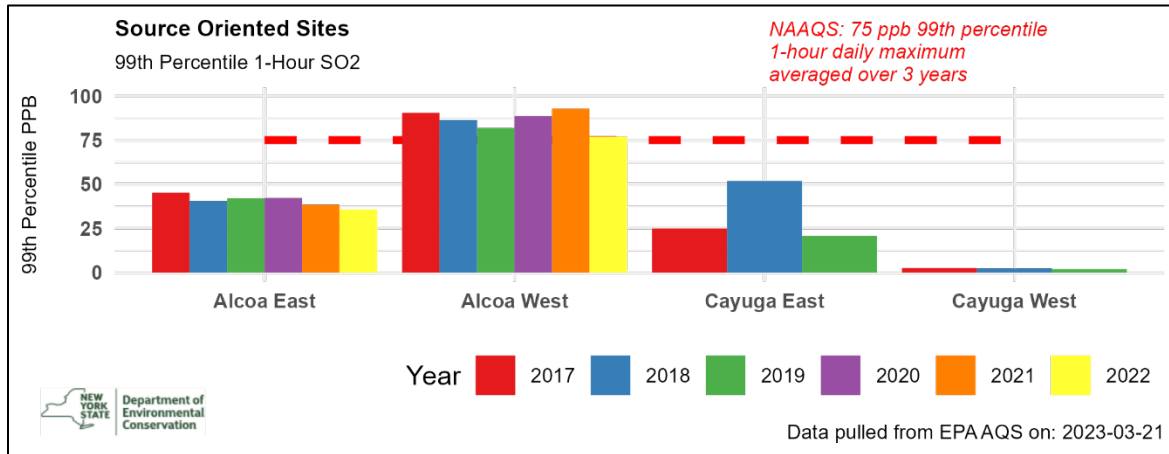


Figure 3-13 Source Oriented Sulfur Dioxide Monitors and Concentration Trends

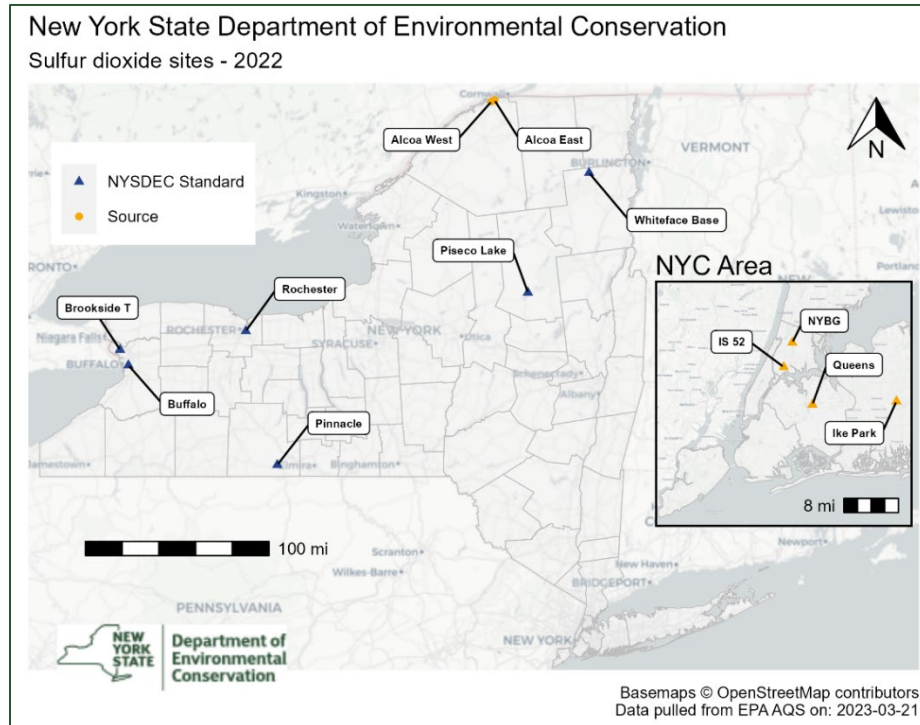


Figure 3-14 Map of Sulfur Dioxide Monitoring Sites

3.6 Ozone

Ozone (O₃), a molecule made up of three oxygen atoms, is a very reactive gas, and is toxic and irritating even at low concentrations. It occurs naturally in small amounts in the earth's upper atmosphere, and in the air of the lower atmosphere after a lightning storm. In the stratosphere, between 10km and 50km above the earth's surface, it forms the Ozone Layer. This is an important protective layer that filters out most of the harmful ultra-violet radiation from the sun. When O₃ is present at ground level and in the troposphere (10-18 km above earth's surface) it is considered a pollutant and a greenhouse gas. Ozone is a primary ingredient of smog. Short-term (1- to 3-hour) and prolonged (6- to 8-hour) exposures to ambient O₃ concentrations have been linked to a number of health effects.

Ground-level O₃ remains a pervasive pollution problem in the United States. Ozone is formed in the atmosphere by the reaction of volatile organic compounds (VOCs) and NO_x in the presence of heat and sunlight, which are most abundant in the summer. VOCs are emitted from a variety of sources, including motor vehicles, refineries, consumer products, and natural sources. Changing weather patterns contribute to yearly differences in O₃ concentrations. Ozone and the precursor pollutants that cause O₃ also can be transported into an area from sources located hundreds of miles upwind.

Exposures to O₃ result in lung inflammation, aggravate preexisting respiratory diseases such as asthma, and may make people more susceptible to respiratory infection. Children active outdoors during the summer when O₃ levels are at their highest are most at risk of experiencing such effects. Other at-risk groups include adults who are active outdoors and individuals with preexisting respiratory disorders.

EPA initially established primary and secondary NAAQS for photochemical oxidants on April 30, 1971. Both primary and secondary standards were set at an hourly average total photochemical oxidants, not to be exceeded more than one hour per year. Revisions to the NAAQS were made in 1979, and again in 1997. In July 1997 EPA revised the O₃ standards by replacing the existing primary 1-hr average standard with an 8-hr average set at a level of 0.08 ppm. The form of the primary standard was changed to the annual fourth-highest daily maximum 8-hr average concentration, averaged over three years. The 8-hr ozone standard (primary and secondary) was lowered to 0.075 ppm on May 27, 2008, at which time the 1-hr standard was revoked.

In October 2015, the EPA updated the NAAQS for ground-level O₃, based on extensive scientific evidence about ozone's effects. Under the October 2015 rule, the primary standard was lowered to 0.070 ppm, which took effect January 1st, 2016. In addition to lowering the 8-hr O₃ standard, the 2015 O₃ rule expanded the monitoring season of 32 states including New York. The New York O₃ monitoring season now runs from March 1 through the end of October. The number of O₃ monitors and concentration trends for the 8-hr standard in New York State for the past three decades is shown in Figure 3.15.

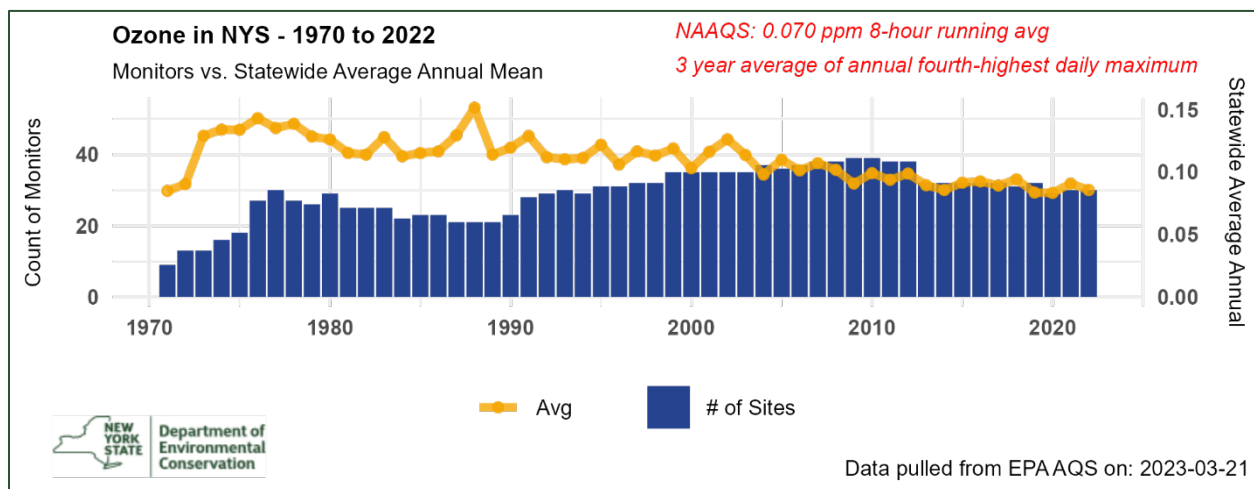


Figure 3-15 Ozone Monitors and 8-hr Concentration Trends

At present, the NYSDEC operates API T400 ozone monitors statewide, which use the UV photometric method for detection. The site locations are depicted in Figure 3.16 below.

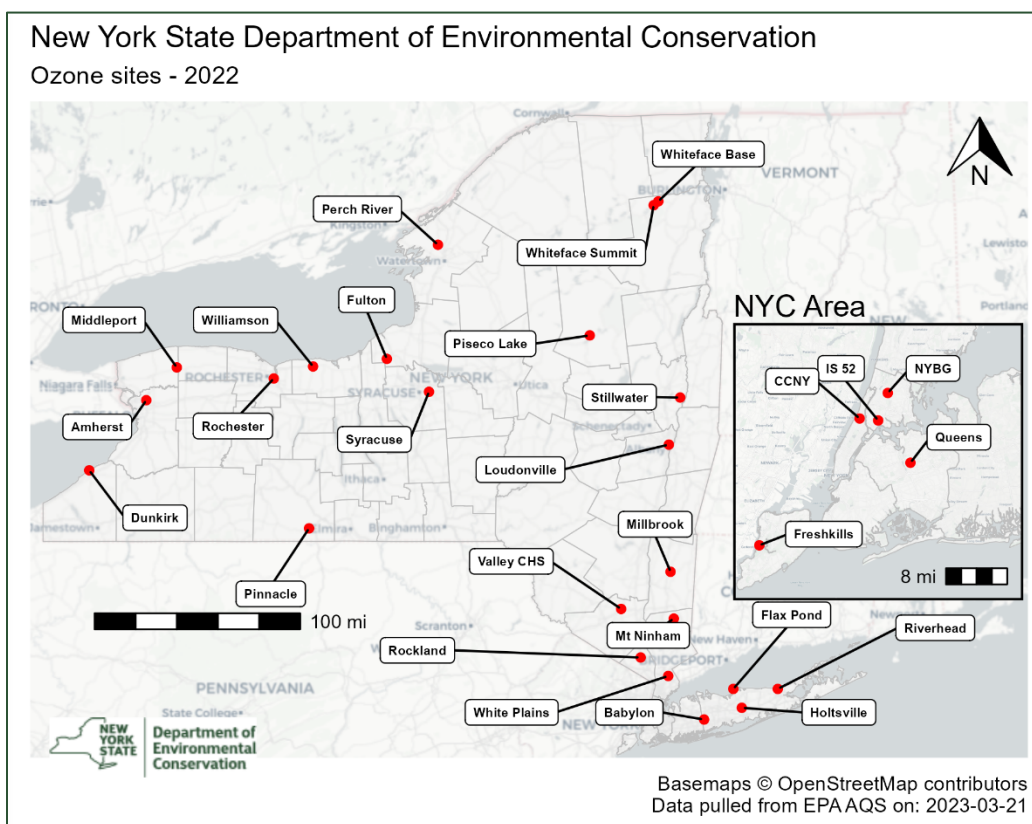


Figure 3-16 Map of Ozone Monitoring Sites

4.0 Air Toxics Program

In general, EPA uses ambient air toxics monitoring to support the efforts to reduce human exposure and health risks from air toxics. The monitoring data provided by the ambient air toxics monitoring program is intended to support four major objectives:

- Establish trends and evaluate the effectiveness of air toxics emissions reduction strategies.
- Characterize ambient concentrations (and deposition) in local areas. Air toxics originate from local sources and can concentrate in relatively small geographical areas, producing the greatest risks to human health.
- Provide data to support, evaluate, and improve air quality models. Air quality models are used to develop emission control strategies, perform exposure assessments, and assess program effectiveness.
- Provide data to support scientific studies to better understand the relationship between ambient air toxics concentrations, human exposure, and health effects from these exposures.

EPA's national air toxics monitoring program is comprised of four different monitoring efforts:

- National Air Toxics Trends Stations (NATTS)
- EPA funded local-scale projects to assess conditions at the local level
- Existing State and local program monitoring
- Persistent bio-accumulative toxics monitoring

The aim for the NATTS network is to supply long-term monitoring data for certain priority air toxics across representative areas of the country to show overall trends for these pollutants. Currently, there are 23 NATTS established in 22 cities. The two New York NATTS sites are in the Bronx and Rochester.

4.1 National Air Toxics Trends Stations (NATTS)

EPA's Urban Air Toxics Program identified 33 high-priority urban air toxics. From these 33 air toxics EPA developed a list of 19 "core" air toxics representing the pollutants for which EPA eventually develops trends information. However, because of limitations in available methodologies, EPA decided that at a minimum, in starting the network, each of the NATTS should monitor for at least 6 of these 19 pollutants. These six pollutants are considered national air toxics "drivers" (i.e., pollutants of concern in all areas of the country).

Table 4-1 NATTS Pollutants of Concern

Compound	Monitoring Type
1,3-butadiene	Required
acrolein	Required
arsenic	Required
formaldehyde	Required
benzene	Required
trichloroethylene	Desired
tetrachloroethylene	Desired

Compound	Monitoring Type
beryllium	Desired
nickel	Desired
cadmium	Desired
acetaldehyde	Desired
1,2-dichloropropene	Desired
carbon tetrachloride	Desired
lead	Desired
chloroform	Desired
manganese	Desired
methylene chloride	Desired
vinyl chloride	Desired

For the two NATTS sites, New York will perform analysis of 42 VOCs (Table 5.2), and 12 carbonyls (Table 5.6). More details on the sampling and analysis are provided in the NY Toxics Monitoring, and Photochemical Assessment Monitoring Stations sections, respectively. In addition, low volume PM₁₀ Teflon filters are collected for trace metals analysis using ICP-MS. The targeted metals include: arsenic, beryllium, cadmium, lead, manganese, nickel, antimony, cobalt, and selenium, with the last three being potential future Hazardous Air Pollutants (HAPs).

Polycyclic Aromatic Hydrocarbons (PAHs) sampling at the Rochester and IS 52 sites began in July 2008. The collection media consists of one 110 mm diameter glass microfiber filter and a tubular glass cartridge containing a combination of Polyurethane Foam (PUF) and XAD-2 resin. The exposed samples are shipped to an EPA contract laboratory (ERG) for analysis.

4.2 NY Toxics Monitoring Network

The NY ambient air toxics monitoring program was first established in 1985 as part of the Governor's Air Monitoring Modernization Capital Budget Program. New York State has been operating a toxics monitoring network, funded entirely by State monies since 1990. Currently, there are 12 sites statewide collecting 24-hr canister samples for VOC analysis in a 1-in-6 day interval. See section on NY Toxics Monitoring Network.

The goal is to monitor air quality related to toxics in the State's urban, industrial, residential, and rural areas. Implementation of this program started the development of a long-term toxics air quality database for New York State. The database will be used to define, attain, and preserve good air quality in New York State. The data defines actual air quality impacts of the VOCs. The data is used in the design and management of New York's air quality, including risk assessment, modeling, planning and trend analysis. Volatile organic compounds are collected in fused silica lined stainless steel canisters. The canister is filled by a flow calibrated sampling device that pumps ambient air into the canister over a 24-Hr period. Samples are collected at a one in six days' frequency and shipped back to the Rensselaer laboratory facility for analysis.

The analysis methodology is a modified version of EPA method TO-15. An aliquot of air sample is taken from the canister at a controlled flow and temperature onto an Entech Model 7100A preconcentrator. The preconcentration process involves a series of steps. The first trap consists of glass beads/Tenax held at -110°C which is then heated to room temperature to remove

water/moisture in the sample. The next trap in line consists of Tenax held at - 30 °C. The contaminants of interest are then desorbed at 150 °C and collected on the cryofocuser held at - 150 °C. The sample is then rapidly heated for injection into a GCMS. This method of analysis allows for positive identification by retention time and molecular mass.

Concentration trends charts for some ubiquitous VOCs are provided below. Annual averages are weighted by the number of samples on a given year.

Table 4-2 Target List of Volatile Organic Compounds

Chemical	Alternative Names and Notes	CAS Number	AQS ID
Acrolein	2-Propenal; Acrylic aldehyde; Acrylaldehyde	107-02-8	43505
Benzene	Benzol	71-43-2	45201
Benzyl chloride	Chloromethylbenzene; Chlorotoluene	100-44-7	45809
1,3-Butadiene	Butadiene	106-99-0	43218
Carbon tetrachloride	Tetrachloromethane	56-23-5	43804
Chlorobenzene	Monochlorobenzene; Benzene chloride	108-90-7	45801
Chloroform	Trichloromethane	67-66-3	43803
1,4-Dichlorobenzene(p)	p-Dichlorobenzene	106-46-7	45807
1,3-Dichloropropene	Includes cis and trans isomers	542-75-6	43841
Ethyl Chloride	Chloroethane	75-00-3	43812
Ethylbenzene	Ethylbenzol; Phenylethane	100-41-4	45203
Ethylene dibromide	1,2-Dibromoethane	106-93-4	43843
Ethylene dichloride	1,2-Dichloroethane	107-06-2	43815
Ethylidene dichloride	1,1-Dichloroethane	75-34-3	43813
Methyl bromide	Bromomethane	74-83-9	43819
Methyl chloride	Chloromethane	74-87-3	43801
Methyl chloroform	1,1,1-Trichloroethane	71-55-6	43814
Methyl tert-butyl ether	MTBE	1634-04-4	43372
Methylene chloride	Dichloromethane	75-09-2	43802
Propylene dichloride	1,2-Dichloropropane	78-87-5	43829
Styrene	Ethenylbenzene, Vinyl benzene	100-42-5	45220
1,1,2,2-Tetrachloroethane	Tetrachloroethane	79-34-5	43818
Tetrachloroethylene	Perchloroethylene; Perc	127-18-4	43817
Toluene	Methylbenzene	108-88-3	45202

Chemical	Alternative Names and Notes	CAS Number	AQS ID
1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzol	120-82-1	45810
1,1,2-Trichloroethane	Vinyl Trichloride	79-00-5	43820
Trichloroethylene	Trichloroethene; TCE	79-01-6	43824
Vinyl chloride	Chloroethylene	75-01-4	43860
Vinylidene chloride	1,1-Dichloroethylene; 1,1-Dichloroethene	75-35-4	43826
o-Xylene	1,2-Dimethyl benzene	95-47-6	45204
m,p-Xylenes	Dimethyl benzenes	1330-20-7	45102
1,2 Dichlorobenzene	<i>ortho</i> -Dichlorobenzene, <i>o</i> -Dichlorobenzene	95-50-1	45805
1,3 Dichlorobenzene	<i>m</i> -Dichlorobenzene; <i>meta</i> -Dichlorobenzene	541-73-1	45806
1,2,4-Trimethylbenzene	pseudocumene	95-63-6	43348
1,3,5-Trimethylbenzene	Mesitylene	108-67-8	45207
Hexachloro-1,3-Butadiene	Hexachlorobutadiene	87-68-3	43844
<i>Cis</i> -1,2-Dichloroethylene	1, 2-dichloroethylene	156-59-2	43218
Dichlorodifluoromethane	Freon-12	75-71-8	43823
Trichlorofluoromethane	Freon-11	75-69-4	43811
Trichlorotrifluoroethane	Freon 113, 1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	43821
Dichlorotetrafluoroethane	Freon 114	76-14-2	43852
Bromodichloromethane	Bromodichloromethane, Bromo(dichloro)methane, Dichlorobromomethane	75-27-4	43828

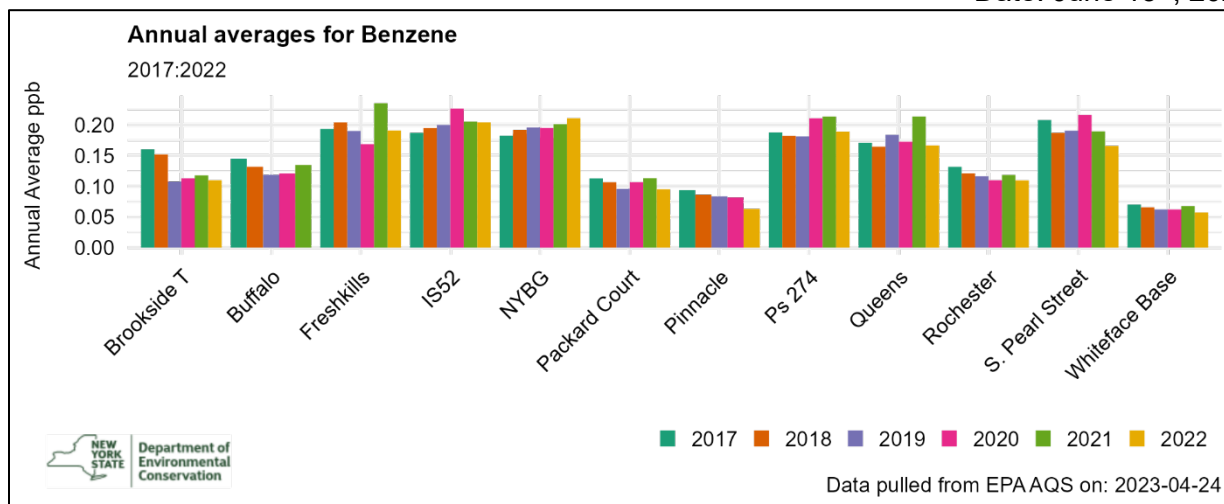


Figure 4-1 Annual Averages for Benzene

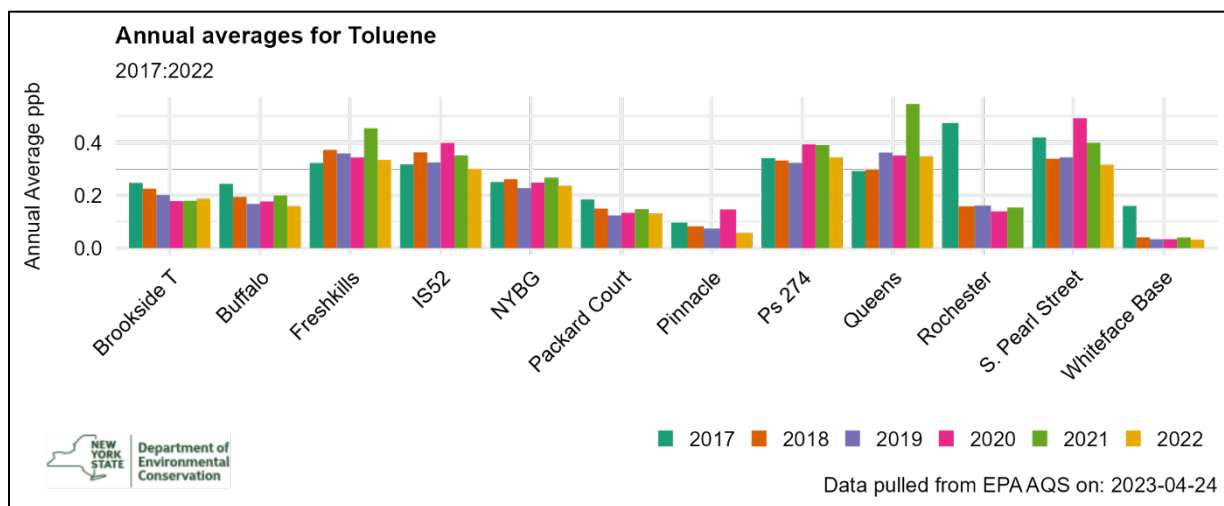


Figure 4-2 Annual Averages for Toluene

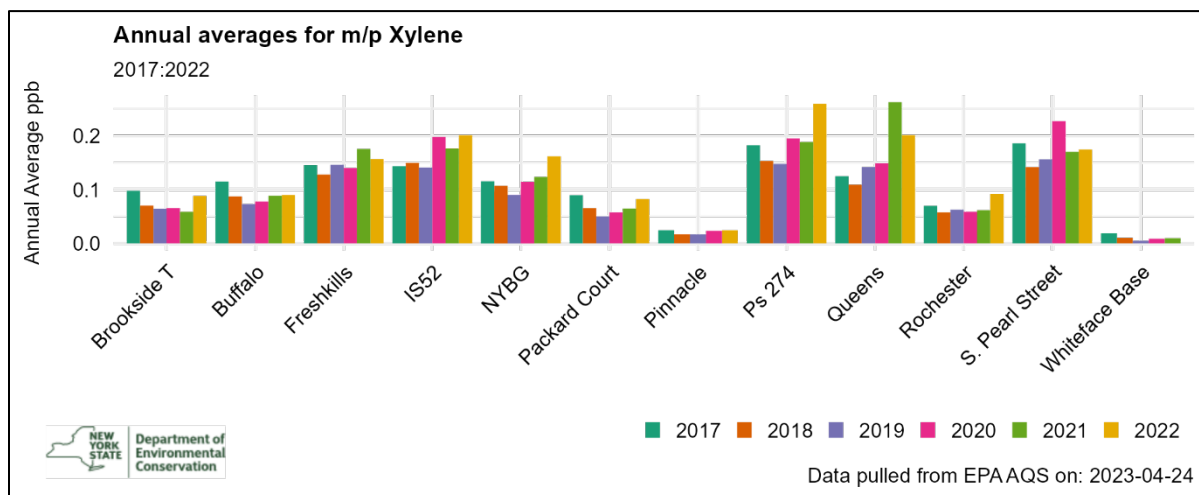


Figure 4-3 Annual Averages for m,p-Xylene

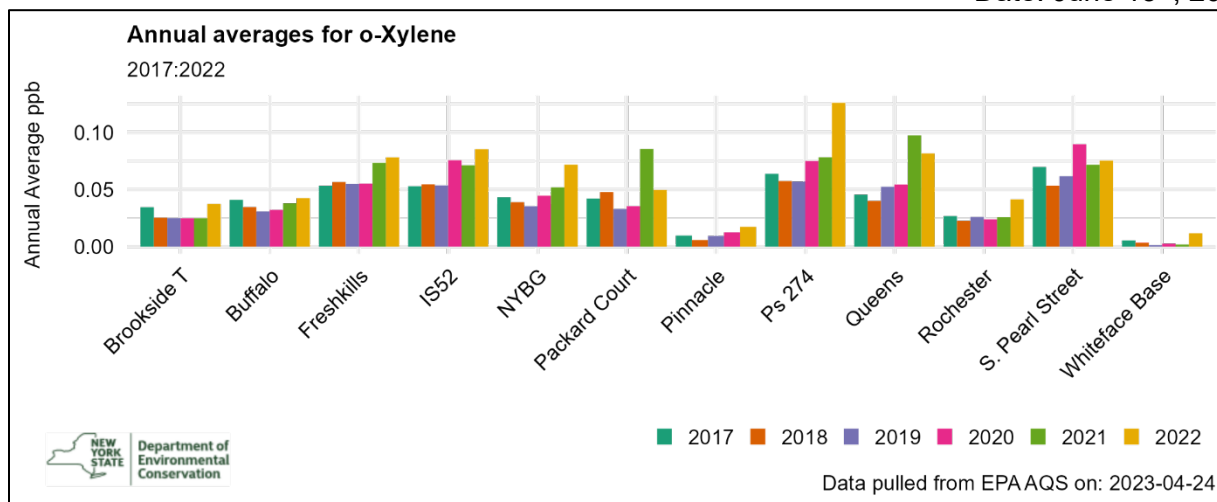


Figure 4-4 Annual Averages for o-Xylene

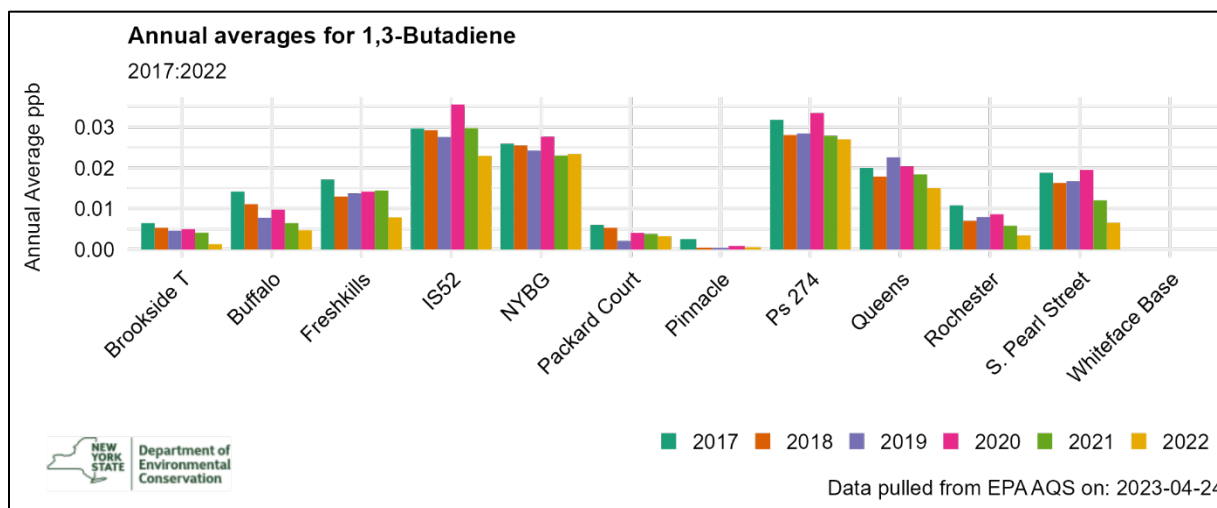


Figure 4-5 Annual Averages for 1,3-Butadiene

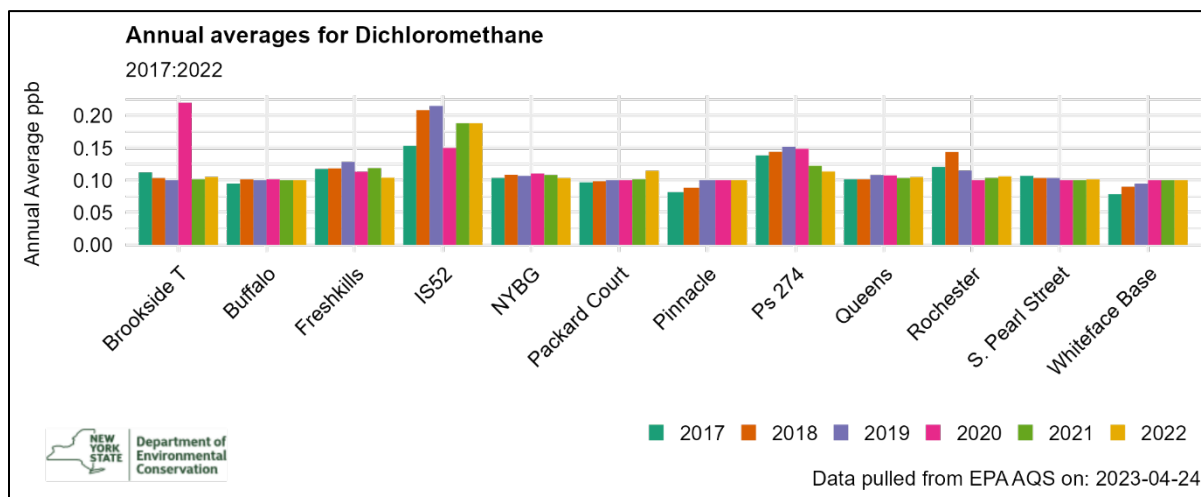


Figure 4-6 Annual Averages for Dichloromethane

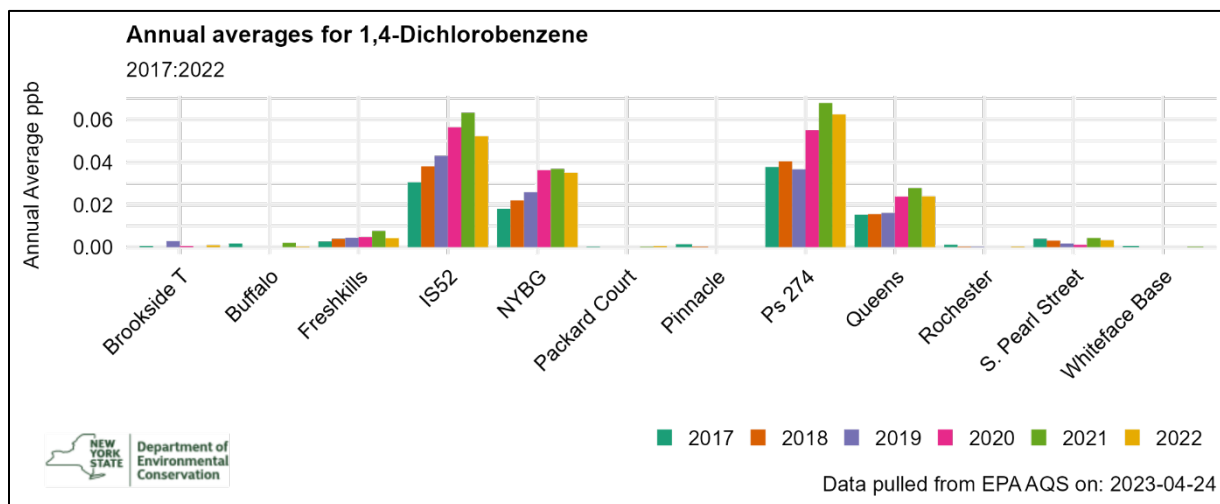


Figure 4-7 Annual Averages for 1,4-Dichlorobenzene

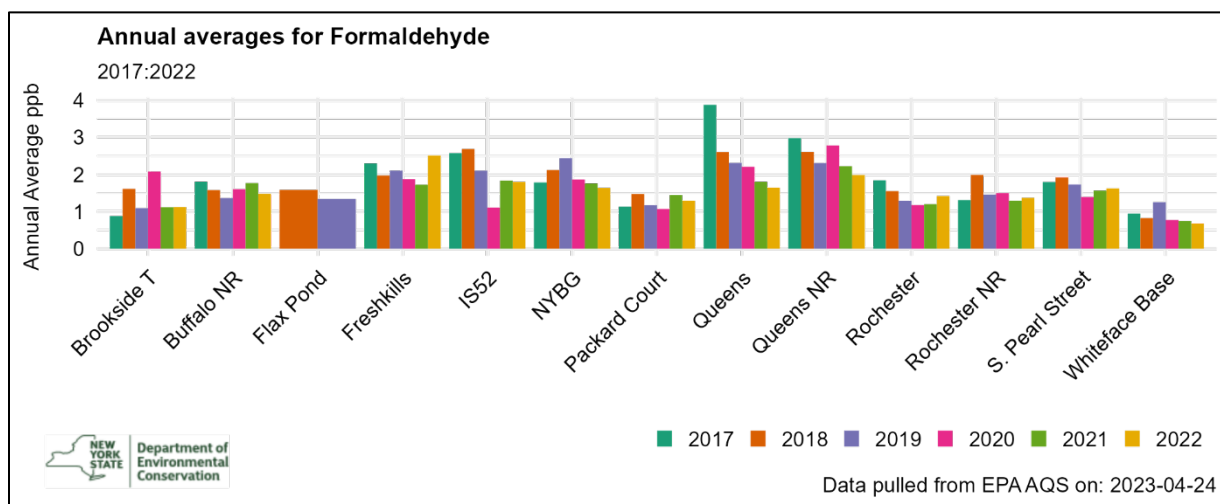


Figure 4-8 Annual Averages for Formaldehyde

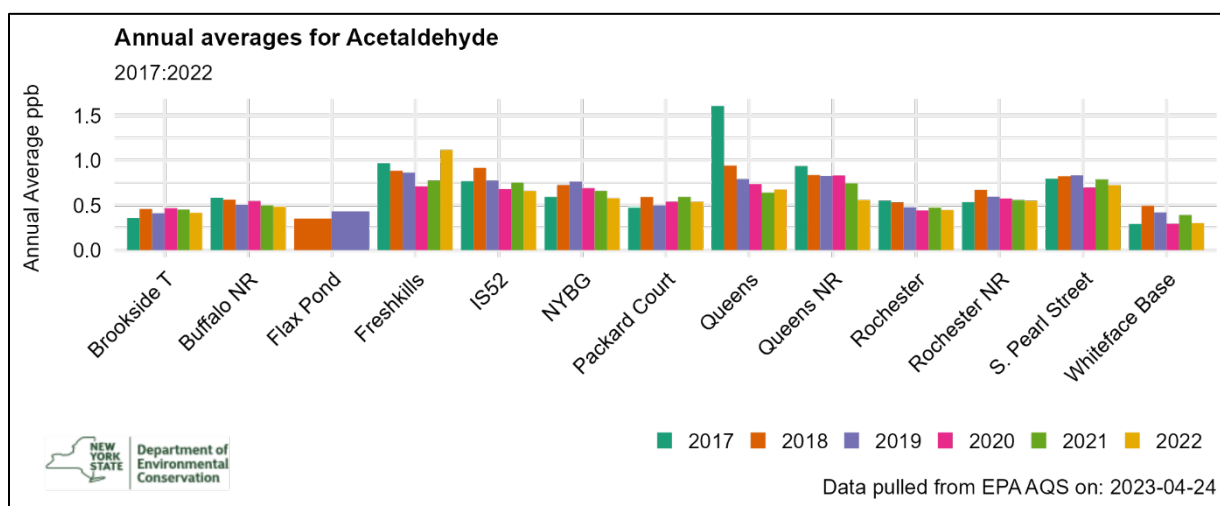


Figure 4-9 Annual Averages for Acetaldehyde

Currently, there are 12 toxics monitoring sites in operation for the measurement of VOCs, and 11 sites for carbonyls statewide. These locations are shown in Figure 4.10 below.

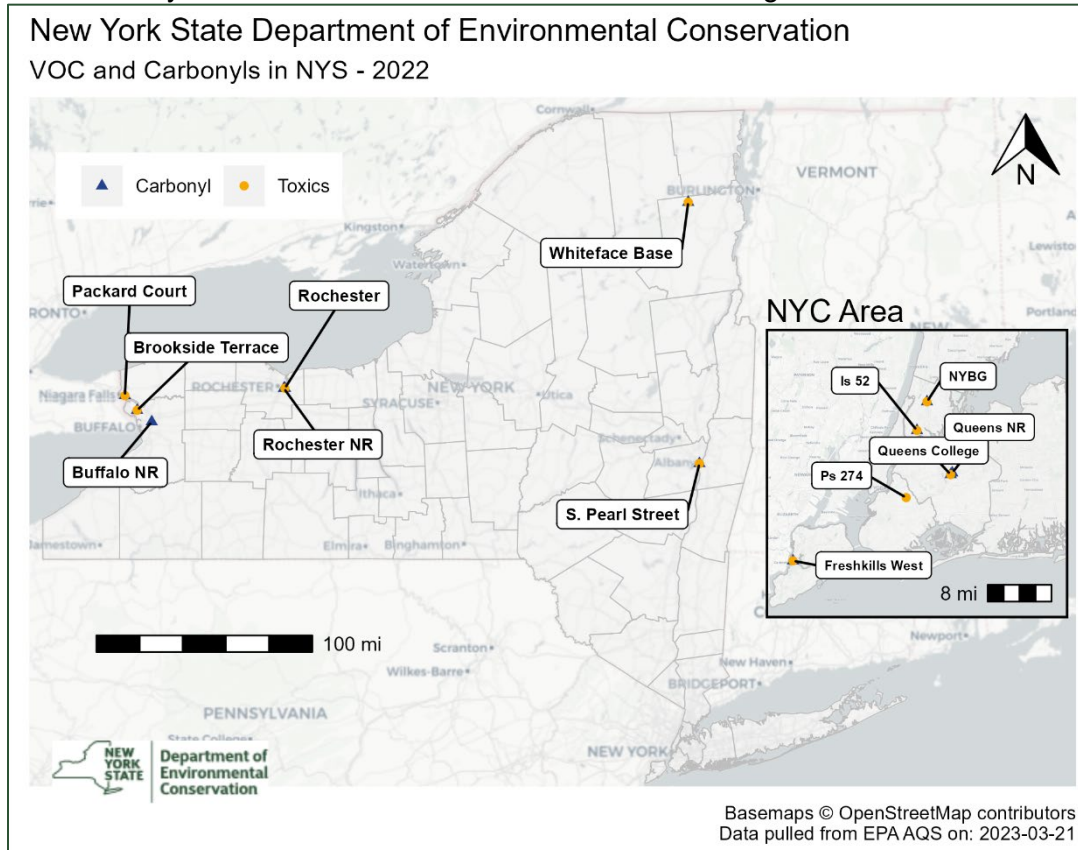


Figure 4-10 Map of Toxics Monitoring Sites

4.3 Photochemical Assessment Monitoring Stations (PAMS)

The 1993 revisions to 40 CFR Part 58 provide for the establishment and maintenance of network of Photochemical Assessment Monitoring Stations (PAMS). The purpose of the PAMS program is to provide an air quality database that will assist in evaluating and modifying control strategies for attaining the O₃ NAAQS. PAMS data will also be used to better characterize the nature and extent of the O₃ problem, track VOC and NO_x emission inventory reductions, assess air quality trends, and determine whether areas of New York remain in nonattainment of the O₃ NAAQS.

The parameters to be measured at a PAMS site varies with the site's O₃ nonattainment designation and whether a site is upwind or downwind from O₃ precursor source areas. These parameters are O₃, oxides of nitrogen, speciated VOCs and specific meteorological measurements. As part of the October 2015 Ozone rule, the EPA revised the PAMS Network requiring states that operate PAMS sites to measure nitrogen dioxide, hourly speciated VOCs, eight-hour averaged carbonyls on every third day and hourly averaged mixing height.

The two PAMS sites in New York were originally located in the Bronx at the New York Botanical Gardens and in Queens at the Queensborough Community College. The revised monitoring network plan for PAMS required PAMS sites to be installed at NCore sites in MSAs with a population over 1 Million. This requirement had placed PAMS stations in Queens and in Rochester. The NYSDEC received waivers to move the PAMS site from Queens to the existing site in the Bronx and from Rochester to a new location on Long Island north of Stony Brook.

The Bronx location was selected instead of Queens because the Bronx better represents a source region for O₃ precursors than Queens. This is important for determining how much local sources contribute to VOCs and nitrogen species that contribute to O₃ formation in downwind regions.

The Long Island location was selected instead of Rochester because counties in the New York Metro Area, lower Hudson Valley, Long Island, New Jersey, and Connecticut are not meeting the Ozone NAAQS. The highest O₃ design values in the non-attainment area are at locations on the southern shore of Connecticut. The area on the north shore of Long Island is well suited to determine O₃ precursor concentrations for pollutants likely to cross Long Island Sound and influence the high design value sites in Connecticut. Air masses typically travel from the Southwest to the Northeast in the summertime when O₃ levels are highest. The location selected for the new PAMS monitoring site on Long Island is in Flax Pond Marine Laboratory in the Village of Oldfield in Setauket, NY.

In 2021, the NYSDEC partnered with NESCAUM to open a temporary site at Goethals Field to investigate emissions related to industrial activities upwind of New York City. This site will operate for two summers and one winter to ascertain the significance of these upwind VOCs. The map in Figure 4-11 shows the location of these sites.

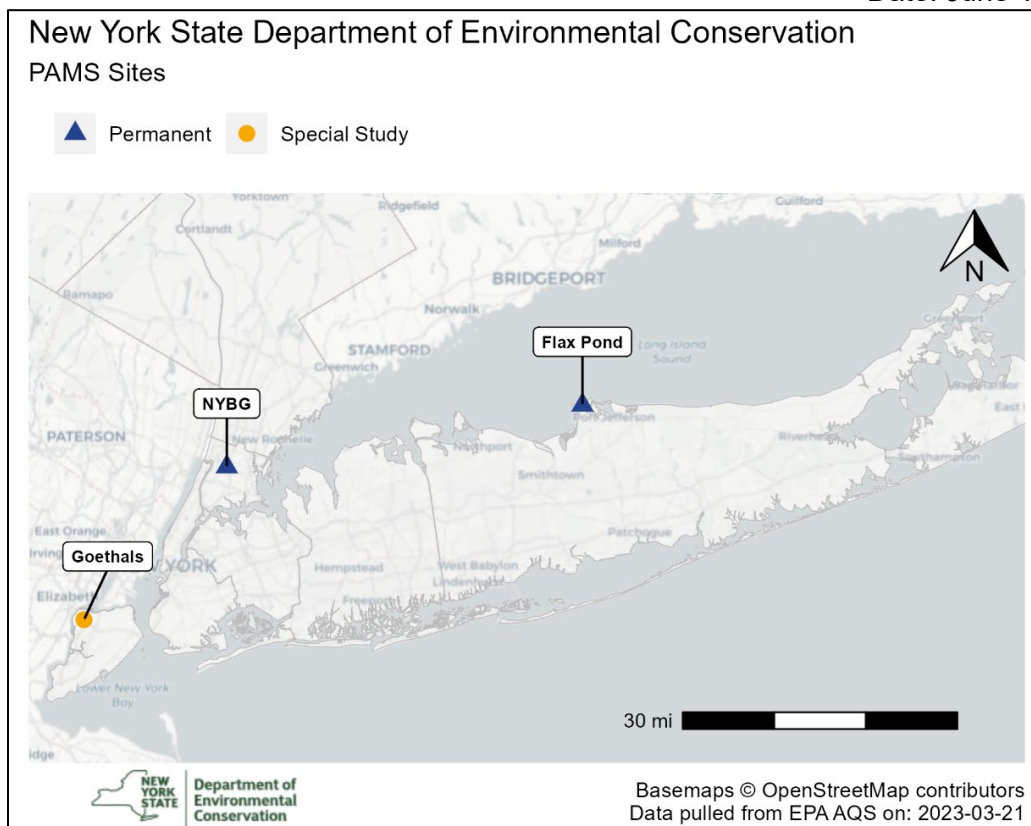
**Figure 4-11 Map of PAMS Sites in NYS**

Table 4.3 lists the chronology of monitoring at these sites.

Table 4-3 Information on PAMS Sites

Site Name	Parameters	Implementation Date
New York Botanical Garden	NO _x	June 1994
New York Botanical Garden	CO	June 1994
New York Botanical Garden	O ₃	June 1994
New York Botanical Garden	VOCs	June 1994
New York Botanical Garden	Carbonyls	June 1994
New York Botanical Garden	NMOC	September-1999
Flax Pond	NO ₂ / NO _y	June 2019
Flax Pond	O ₃	June 2018
Flax Pond	VOC	June 2018
Flax Pond	Carbonyls	June 2018
NY Mesonet Site	Boundary Height	June 2023
NY Mesonet Site	Solar Radiation	June 2023

For gaseous parameters, Table 4.4 lists the sampling instruments and analysis methods.

Table 4-4 Instrumentation for Gaseous Pollutants

Parameter	Instrument	Analysis Method	Frequency
NO	TEI 42C/API T200	Chemiluminescent	Continuous
NO ₂	TAPI T500	Cavity Attenuation	Continuous
NO _y	TEI 42C/API T200	Chemiluminescent	Continuous
O ₃	TEI 49C/API T400	Ultraviolet	Continuous
CO	TEI 48C/API T300	Infrared	Continuous

Volatile organic compounds are monitored with an on-site real-time GC. The on-site GC system consists of a Markes Unity Air Server-Thermal Desorber System integrated with an Agilent GC.

All parameters except for the summer intensive VOCs and carbonyls are run on a continuous basis year-round. VOC system startup is scheduled for June 1st each year. The VOC and carbonyl intensive sampling ends August 31st after the final system audit. Twenty-four-hour carbonyl and canister samples are continued on a 1-in-6-day schedule throughout the year.

The methods and sampling frequencies are provided in Table 4.5 below.

Table 4-5 VOC Methods and Sampling Frequencies

Sampling Method	Analytical Method	Frequency
Method TO-14a	GC/FID	Hourly

Carbonyls are sampled using DNPH cartridges and analyzed with HPLC according to EPA Method TO-11a. The target compound list is provided in Table 4.6 below.

Table 4-6 Target Compound List for Carbonyl Sampling

Compound	AIRS Code
acetaldehyde	43503
acetone	43551
benzaldehyde	45501
crotonaldehyde	43516
formaldehyde	43502
hexanal	43517
methacrolein	43515
<i>m</i> -tolualdehyde	45504
<i>n</i> -butyraldehyde	43510
propionaldehyde	43504
valeraldehyde	43518

The targeted compounds are listed below in Table 4.7:

Table 4-7 PAMS Target Compounds List

Compound	AIRS #
ethene	43203
acetylene	43206
ethane	43202
propene	43205
propane	43204
isobutane	43214
1-butene	43280
<i>n</i> -butane	43212
<i>trans</i> -2-butene	43216
<i>cis</i> -2-butene	43217
isopentane	43221
1-pentene	43224
<i>n</i> -pentane	43220
isoprene	43220
<i>trans</i> -2-pentene	43226
<i>cis</i> -2-pentene	43227
2,2-dimethylbutane	43227
cyclopentane	43242
2-,3-dimethylbutane	43284
2-methylpentane	43285
3-methylpentane	43230
<i>n</i> -hexane	43231
<i>n</i> -hexene <i>added 1997</i>	43245
Methylcyclopentane	43262
2,4-dimethylpentane	43247
benzene	45201
cyclohexane	43248

Compound	AIRS #
2-methylhexane	43263
2,3-dimethylpentane	43291
3-methylhexane	43249
2,2,4-trimethylpentane	43250
<i>n</i> -heptane	43232
Methylcyclohexane	43261
2,3,4-trimethylpentane	43252
toluene	45202
2-methylheptane	43960
3-methylheptane	43253
<i>n</i> -octane	43233
ethylbenzene	45203
<i>m,p</i> -xylene	45109
styrene	45220
<i>o</i> -xylene	45204
nonane	43235
isopropylbenzene	45210
<i>n</i> -propylbenzene	45209
<i>m</i> -ethyltoluen <i>added 1995</i>	45212
<i>p</i> -ethyltoluene <i>added 1995</i>	45213
1,3,5-trimethylbenzene	45207
<i>o</i> -ethyltoluene <i>added 1995</i>	45211
1,2,4-trimethylbenzene	45208
<i>n</i> -decane	43238
1,2,3trimethylbenzene <i>added 1995</i>	45225
1,3-diethylbenzene <i>added 1995</i>	45218
1,4 diethylbenzene <i>added 1995</i>	45219

Compound	AIRS #
<i>n</i> -undecane	43954
dodecane <i>added 1997</i>	45218
tnmoc	43102
pamshc	43000
1,3-Butadiene	43218
Isoprene	43243
2,2-Dimethylbutane	43244
alpha.-Pinene	43256
beta.-Pinene	43257

5.0 NCore Sites

The National Core Monitoring Program (NCore) is an EPA initiative to redesign a portion of the National air monitoring network. The existing compliance-oriented network is set up with a parameter specific design that is targeted at the relatively high concentrations near the NAAQS. The data from this network is not as accurate at the low levels needed for trends analysis and model validation. The single parameter design is also not well suited to multi-pollutant health studies, integrated model assessment or the analysis of source attribution through comparisons of co-pollutants from sources to receptors.

The NCore program has been designed around approximately 75 sites nationwide that are sited to represent large urban areas away from significant individual sources. A smaller subset of these sites are located in rural areas. The NYSDEC operates two urban NCore sites and one rural NCore site. The sites are listed in Table 5.1:

Table 5-1 NCore Sites

AQS ID #	Site Name	General Location
36-081-0124	Queens College	Located in Kew Gardens, Queens, NY
36-055-1007	Rochester	Located Southeast of Rochester, NY
36-101-0003	Pinnacle	Located 15 mi. Southwest of Corning, NY

Pinnacle is the only rural site of the three and it was also selected as one of ten pilot NCore sites. This site has hosted monitoring appropriate for the objectives of the NCore program due to its involvement with several research programs, so it was well suited to take on the more difficult monitoring parameters required from the NCore monitoring program. SUNY Albany ASRC researchers have been making low level trace gas measurements at this site for the past ten years. Home built analyzers for low level CO and NO_y were employed. These prototype instruments required extensive post sampling data processing. They measured “true” NO₂ using direct photolysis method. Commercially available instruments are used for monitoring trace level CO and SO₂.

5.1 NCore Monitoring Objectives

- a.) Timely Reporting of Data to the Public
- b.) Support for Development of Emission Strategies
- c.) Accountability of Emission Strategy Progress
- d.) Support for Long-Term Health Assessments
- e.) Compliance
- f.) Support to Scientific Studies
- g.) Support to Ecosystem Assessments

5.2 NCore Primary Monitoring Parameters

The NCore sites are required to be sited in conjunction with the PM_{2.5} FRM network and the PM_{2.5} speciation network. These parameters are supplemented with the NCore specific parameters that include NO_y, Low Level CO and Low Level SO₂.

NO_y which is defined as the sum of all reactive nitrogen oxides includes NO, and NO₂, and other nitrogen oxides referred to as NO_z. The NCore program requires NO_y monitoring because it is the best indicator of the results from NO_x reduction strategies, it is valuable for ecosystem

assessments, it is important for model evaluation, and it supports NO₂ estimates for health effects studies.

CO is important to the NCore program because it is used in model evaluation, it is a surrogate for many combustion related pollutants, it is included in health effect studies and it can be used to assess control programs. CO is also monitored under the existing criteria monitoring program but NCore requires more accuracy at lower concentrations and siting that makes the data more representative of wider areas than the existing network.

SO₂ is important for model evaluation because of its role in sulfate formation which is a large percentage of PM_{2.5} mass particularly in the Northeast. SO₂ is also important for some health effect studies and like CO it must be monitored accurately at low concentrations to meet the objectives of the NCore program.

Nitric acid (HNO₃) and ammonia (NH₃) are both compounds of interest in EPA's NCore program, but they are not yet required because the sampling methodology is not yet fully developed. Both compounds are useful for model evaluation because of their contribution to PM formation.

To meet the monitoring requirements, trace level instruments for SO₂ and CO as well as NO_y measurements were all operational at the three NCore sites since the beginning of 2011.

6.0 Acid Deposition Monitoring Network

At the end of 2012, NYSDEC discontinued the existing acid rain monitoring program and transitioned 7 monitoring locations to the National Acid Deposition Program (NADP). The old acid deposition program was established in response to the State Acid Deposition Control Act (SADCA) in 1985. This program was designed to provide measurements of acid deposition and related quantities necessary to assess the effectiveness of sulfur control policy and other strategies aimed at reducing the effects of acid rain. By all measures, the monitoring program, as well as the NO_x and SO_x control strategies have improved the environment. For example, the deposition of Sulfate statewide has decreased by more than 60% since the monitoring program began and the concentrations of acidic pollutants continue to decline.

The transition to the NADP has resulted in savings to NYSDEC, provided better and more useful data for use in Federal regulation development and allows for the comparison of data from New York with other acid sensitive regions across the country. Additionally, because the NADP program provides a uniform operational framework, the data from existing NADP sites within New York and in neighboring states can be utilized in the analysis of deposition in New York. The NADP program office transitioned from the University of Illinois to the University of Wisconsin on March 1, 2018. This should have no effect on field operations or data quality. Data from all the NADP sites can be accessed from: <http://nadp.slh.wisc.edu/data/>

Table 6-1 Acid Deposition Monitoring Network

The NYSDEC monitoring locations that were transitioned to the NADP in January 2013 and November 2015	The other NADP sites currently operating in New York but sponsored by other organizations are:
NY06 Bronx	NY01 Alfred
NY28 Piseco Lake	NY08 Aurora Research Farm
NY43 Rochester (Established 2013)	NY10 Chautauqua
NY92 Amherst (Established 2013)	NY20 Huntington Wildlife
NY94 Nick's Lake (Established 2015)	NY22 Akwesasne Mohawk-Fort Covington
	NY52 Bennett Bridge
	NY67 Ithaca (NADP/AirMoN)
	NY68 Biscuit Brook
	NY96 Cedar Beach, Southold
	NY98 Whiteface Base
	NY99 West Point
	NY93 Paul Smith's College

7.0 Anticipated Changes in the Next 18 Months

7.1 Miscellaneous Projects

Monitoring staff provide technical support and maintenance for several portable field instruments. The advanced leak detection and repair (LDAR) equipment purchased by EPA for NYSDEC has proven to be extremely valuable during recent field deployments at petroleum storage facilities and compressor stations. In addition to the Forward Looking Infrared (FLIR) camera, staff maintain and calibrate H₂S real-time instruments as well as train Regional staff for their proper field use. Also available for Regional field deployment are Purple Air sensors and wood smoke monitoring kits that measure black carbon, PM_{2.5} and wind speed/direction. Laboratory staff prepare, and ship evacuated canisters fitted with orifice flow devices to the Regions as needed for whole air grab sampling. These samples are returned to the laboratory facility for VOC analysis.

7.2 Proposed Changes and Additions at Existing Sites

As part of the requirements specified in the revised Monitoring Regulations Parts 53 and 58, a network assessment was performed to determine “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.” As a result of this exercise, NYSDEC is proposing the following modifications to the existing network

7.2.1 Relocation of Valley Central Ozone Site

Due to on site construction, the Valley Central site (36-071-5001) had to cease monitoring operations on March 31, 2021. A new site will be established nearby as soon as possible.

7.2.2 Closure of Susan Wagner Ozone Site

Roof work started at the site in 2017, requiring an extended closure of the monitors. At the completion of the project, the layout was no longer suitable to site an air quality monitor.

7.2.3 Reduction of FRM sampling to 1 in 6

The DEC proposes to change the FRM sampling frequency from 1-in-3 to 1-in-6 at IS-52, Albany County Health Dept, East Syracuse and Buffalo. These FRM monitors are collocated with FEMs which can provide hourly and daily averages for use in comparison to the NAAQS. The 1-in-6 FRM data are adequate to monitor the performance of the FEMs over time.

7.3 Previously proposed changes that did not occur

7.3.1 Relocation of Valley Central Ozone Site

Due to delays in construction, the reopening of the site did not occur as in 2022.

8.0 Monitoring Sites

The Bureau's tasks and responsibilities are carried out by staff in four Sections. While the field operators are stationed throughout the State, the managers are physically located in the Central Office in Albany (Northern Monitoring, Network Operations), our Region 2 Office in Long Island City (Southern Monitoring), and the SUNY East Campus in Rensselaer (Monitoring Support). Functionally, the Northern Monitoring Section is responsible for ambient air monitoring sites in upstate New York north of and including the counties of Rockland and Putnam. The Southern Monitoring Section is responsible for ambient air monitoring sites in the counties of Westchester, Nassau, Suffolk, and those counties comprising the City of New York. Currently there are 55 active sites statewide. Figures 9.1 and 9.2 show monitoring site locations for the two monitoring operations, respectively.

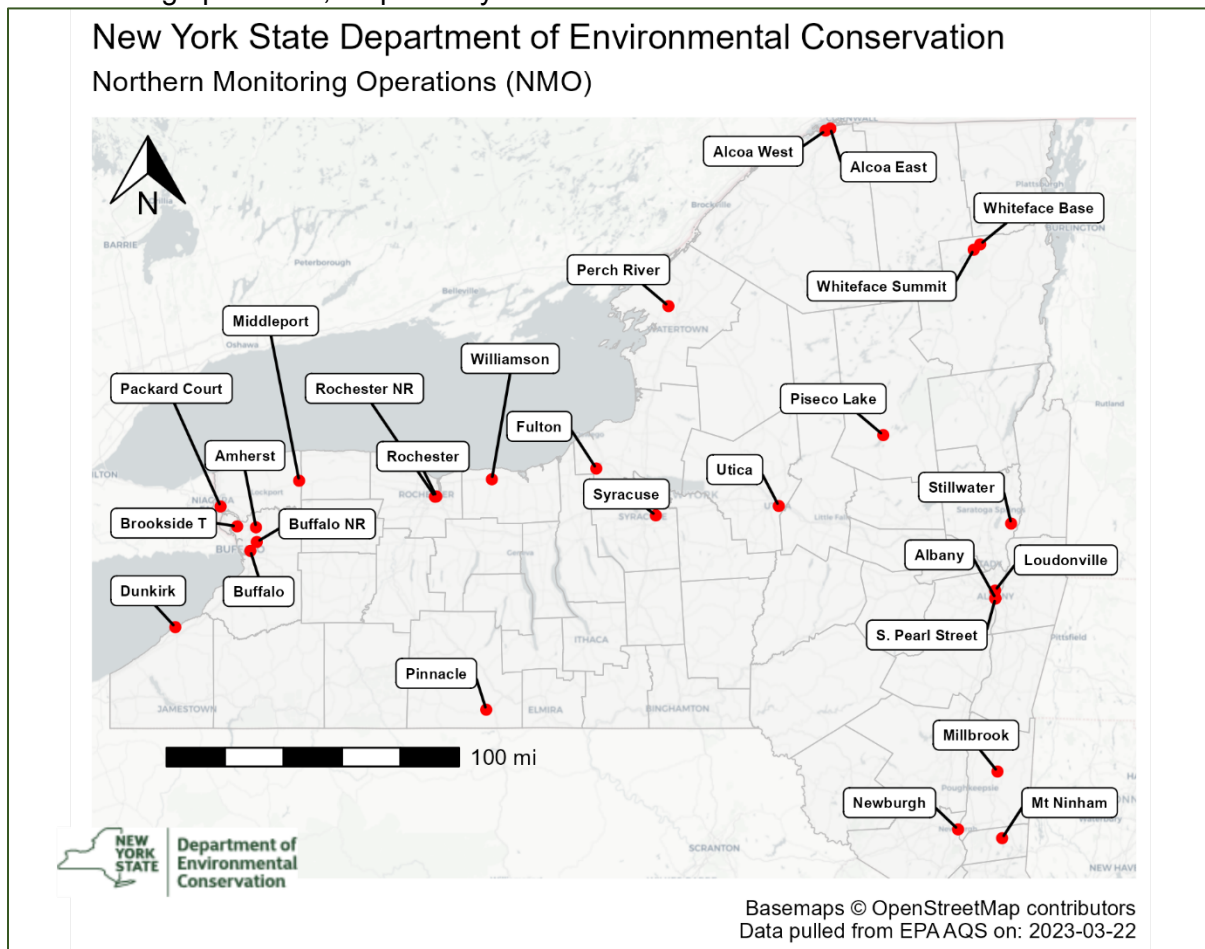


Figure 8-1 Map of Site Locations for Northern Monitoring Operation

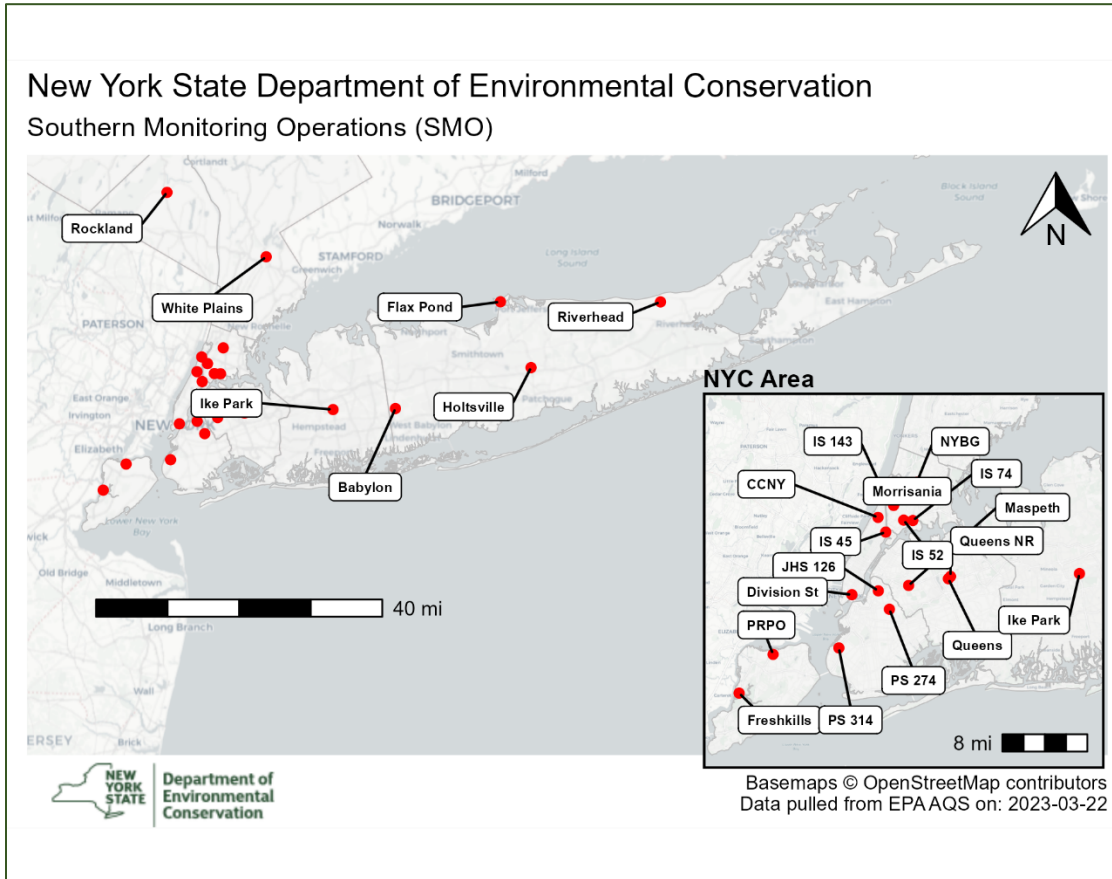


Figure 8-2 Map of Site Locations for Southern Monitoring Operation

Information pertaining to each monitoring site including, location, parameters monitored, sampling frequency, and analysis methodologies is provided below for the two monitoring operations.

Most of the monitoring sites meet the siting criteria requirements for the parameters monitored as specified in Appendix E of 40 CFR Part 50. For the few sites that do not meet all of the siting requirements, we have demonstrated to EPA that in all instances the site is as representative of the monitoring area as it would be if the siting criteria were being met, and that the monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints. Waivers have been granted by the Regional Administrator for these sites.

8.1 Southern Monitoring Operations (SMO) Sites

AQS ID	Local Site ID	NYSDEC Region	PEJ	County	Lat	Lon	Public Name	Location Notes	WBAN MET
36-059-0005	2950-10	1	No	Nassau	40.74316	-73.58549	Eisenhower Pk	740 Merrick Avenue	54787
36-103-0002	5150-02	1	No	Suffolk	40.74529	-73.41919	Babylon	72 Gazza Blvd - Water Authority	54787
36-103-0009	5151-10	1	No	Suffolk	40.82799	-73.05754	Holtsville/Suffolk	57 Division St.	04781
36-103-0004	5155-01	1	EJ	Suffolk	40.96074	-72.71233	Riverhead	3059 Sound Avenue	14719
36-103-0044	5151-12	1	No	Suffolk	40.96101	-73.13913	Flax pond	15 Shore Dr. Setauket-East	14719
36-005-0080	7094-05	2	EJ	Bronx	40.83607	-73.92005	Morrisania II	Family Care Ctr, 1225 Gerard Ave	14732
36-005-0110	7094-07	2	EJ	Bronx	40.81617	-73.90200	MS 302/ IS #52	681 Kelly Street, E 156th Street	94728
36-005-0112	7094-08	2	EJ	Bronx	40.81551	-73.88555	Hunts Point/ IS #74	730 Bryant Avenue	94728
36-005-0133	7094-10	2	EJ	Bronx	40.86798	-73.87808	NYBG/ Pfizer Lab	200th Street & Southern Blvd	14732
36-047-0052	7095-07	2	EJ	Kings	40.64182	-74.01865	PS #314	330 59th Street	94728
36-047-0122	7095-43	2	No	Kings	40.71961	-73.94771	JHS #126	424 Leonard Street	94728
36-047-0118	7095-98	2	EJ	Kings	40.69454	-73.92769	PS #274	800 Bushwick Ave	94728
36-061-0079	7093-08	2	EJ	New York	40.79971	-73.93436	River East/ JHS #45	2351 1st Avenue	94728
36-061-0115	7093-15	2	EJ	New York	40.84891	-73.93060	IS #143	511 W 182nd Street	94728
36-061-0128	7093-21	2	No	New York	40.73004	-73.98445	PS #19	185 1st Avenue	94728
36-061-0134	7093-24	2	EJ	New York	40.71445	-73.99520	Division Street	40 Division Street	94728
36-061-0135	7093-25	2	No	New York	40.81973	-73.94823	CCNY	160 Convent Ave	94728
36-081-0120	7096-13	2	EJ	Queens	40.72697	-73.89311	Maspeth	69-70 Grand Avenue	14732
36-081-0124	7096-15	2	EJ	Queens	40.73625	-73.82165	Queens College	148-20 Reeves Avenue	14732
36-081-0125	7096-16	2	EJ	Queens	40.73926	-73.81769	Queens College NR	I-495, H Harding Expwy & 153rd St	14732
36-085-0055	7097-03	2	EJ	Richmond	40.63306	-74.13715	Port Richmond	364 Port Richmond Avenue	94728
36-085-0111	7097-17	2	No	Richmond	40.58025	-74.19829	Fresh Kills West	310 West Service Road	94728
36-087-0005	43-5302	3	EJ	Rockland	41.18210	-74.02816	Rockland County	S Mountain Road	14719
36-119-2004	59-0204	3	EJ	Westchester	41.05189	-73.76364	White Plains	240 Orchard St - Pumping Station	94745
36-027-0007	1328-01	3	No	Dutchess	41.78553	-73.74132	Millbrook	Forest Research Station	64756

8.2 Northern Monitoring Operations (NMO) Sites

AQS ID	Local Site ID	NYSDEC Region	PEJ	County	Lat	Lon	Public Name	Location Notes	WBAN MET
36-071-0002	3502-04	3	EJ	Orange	41.49918	-74.00888	Newburgh	Public Safety Building	14714
36-071-5001	3527-01	3	No	Orange	41.52375	-74.21533	Valley Central	Valley Central High School	04789
36-071-3002	3566-09	3	EJ	Orange	41.45863	-74.35711	Walkill	Wakefern Food	04789
36-079-0005	3951-01	3	No	Putnam	41.45589	-73.70974	Mt. Ninham	NYSDEC Headquarters	14757
36-001-0005	0101-13	4	EJ	Albany	42.64225	-73.75457	Albany	Albany County Health Department	14735
36-001-0012	0101-33	4	No	Albany	42.68075	-73.75742	Loudonville	Reservoir	14735
36-001-0013	0101-34	4	No	Albany	42.64093	-73.75651	South Albany	S Pearl St	14735
36-031-0002	1567-03	5	No	Essex	44.36608	-73.90312	Whiteface Summit	Summit Building	94733
36-031-0003	1567-04	5	No	Essex	44.39313	-73.85895	Whiteface Base	ASRC (Base Lodge)	94733
36-041-0005	2050-01	5	No	Hamilton	43.44959	-74.51625	Piseco Lake	Airport	64775
36-091-0004	4567-01	5	No	Saratoga	43.01190	-73.64910	Stillwater	Saratoga Historical Park	14768
36-045-0002	2223-01	6	No	Jefferson	44.08746	-75.97319	Perch River	Game Management Building	94790
36-065-2001	3202-01	6	EJ	Oneida	43.09890	-75.22507	Utica	Utica Health Dept	64775
36-089-0004	4402-08	6	EJ	St. Lawrence	42.61319	-76.61520	Alcoa West	Alcoa West (Site #2 Clubhouse Rd)	94725
36-089-0005	4402-07	6	EJ	St. Lawrence	44.96541	-74.87500	Alcoa East	Alcoa East (Site #1 Rt. 131)	94725
36-067-1015	3353-09	7	No	Onondaga	43.05235	-76.05918	E. Syracuse	Enterprise Parkway	14771
36-075-0003	3754-01	7	EJ	Oswego	43.28427	-76.46318	Fulton	820 County Rt. 8	54773
36-055-1007	2701-22	8	No	Monroe	43.14618	-77.54821	Rochester	Yarmouth Rd (RG&E Substation)	14768
36-055-0015	2701-23	8	No	Monroe	43.14502	-77.55760	Rochester NR	I-490 and 1775 East Ave	14768
36-101-0003	5001-04	8	No	Steuben	42.09115	-77.20988	Pinnacle	Pinnacle State Park	14748
36-117-3001	5863-01	8	No	Wayne	43.23085	-77.17138	Williamson	Wayne County Occupational Center	14768
36-013-0006	0601-04	9	No	Chautauqua	42.49969	-79.31880	Dunkirk	Sewage Treatment Plant	14747
36-029-0002	1451-03	9	No	Erie	42.99327	-78.77147	Amherst	450 Maple Rd, Amherst Parks Dept	14747
36-029-0005	1401-18	9	No	Erie	42.87695	-78.80974	Buffalo	Off Dingens Street, near Weiss	14747
36-029-0023	1455-02	9	No	Erie	42.92111	-78.76611	Buffalo NR	I-90 Mile Post 424.6 East Bound	14747
36-029-1014	1472-14	9	No	Erie	42.99813	-78.89931	Brookside Ter W	192 Brookside Ter.W (Tonawanda II)	14747
36-063-1006	3120-02	9	No	Niagara	43.22384	-78.47888	Middleport	Sewage Treatment Plant	14768
36-063-7001	3102-26	9	EJ	Niagara	43.09654	-79.01050	Niagara Falls	Packard Court Community Center	14747

8.3 Continuous Hourly Gasses

AQS ID	Ozone	Sulfur Dioxide	Nitrogen Oxides	Carbon Monoxide	PAMS ¹
36-001-0012	Seasonal				
36-005-0110	Seasonal	Year-Round & 5 Min	Year-Round NO ₂		
36-005-0133	Seasonal	Year-Round & 5 Min	Year-Round NO ₂ & NO _y	Year-Round	Seasonal
36-013-0006	Seasonal				
36-027-0007	Seasonal				
36-029-0002	Seasonal				
36-029-0005		Year-Round & 5 Min	Year-Round NO ₂	Year-Round	
36-029-0023			Year-Round NO ₂	Year-Round	
36-029-1014		Year-Round & 5 Min			
36-031-0002	Seasonal				
36-031-0003	Seasonal	Year-Round & 5 Min			
36-041-0005	Seasonal	Year-Round & 5 Min			
36-045-0002	Seasonal				
36-055-0015			Year-Round NO ₂	Year-Round	
36-055-1007	Year-Round	Year-Round & 5 Min	Year-Round NO _y	Year-Round	
36-059-0005		Year-Round & 5 Min			
36-061-0135	Seasonal			Year-Round	
36-063-1006	Seasonal				
36-067-1015	Seasonal				
36-071-5001	Temporary Closure				
36-075-0003	Seasonal				
36-079-0005	Seasonal				
36-081-0124	Year-Round	Year-Round & 5 Min	Year-Round NO ₂ & NO _y	Year-Round	
36-081-0125			Year-Round NO ₂	Year-Round	
36-085-0111	Seasonal				
36-087-0005	Seasonal				
36-089-0004		Year-Round & 5 Min			
36-089-0005		Year-Round & 5 Min			
36-091-0004	Seasonal				
36-101-0003	Seasonal	Year-Round & 5 Min	Year-Round NO _y	Year-Round	
36-103-0002	Seasonal				
36-103-0004	Seasonal				
36-103-0009	Seasonal				
36-103-0044	Seasonal		Year-Round NO ₂ & NO _y	Year-Round	Seasonal
36-117-3001	Seasonal				
36-119-2004	Seasonal				

¹ Due to the method of collection and analysis, there is a several month delay in reporting.

8.4 Continuous Particulate Matter

AQS ID	PM _{2.5}	PM ₁₀	Elemental & Organic Carbon	Black Carbon	Ultrafine Particles
36-001-0005	FEM T640	Non-FEM T640		Magee A33	API 651 H ₂ O CPC
36-005-0080	Non-FEM TEOM				
36-005-0110	FEM T640	Non-FEM T640	Sunset 4	Magee A33	
36-005-0112	Non-FEM T640				
36-029-0005	Non-FEM T640				
36-029-0023	Non-FEM TEOM			Magee A33	API 651 H ₂ O CPC
36-029-1014	Non-FEM TEOM				
36-031-0003	Non-FEM T640			Magee A33	
36-047-0052	Non-FEM T640				
36-047-0118	Non-FEM T640				
36-055-0015	Non-FEM TEOM			Magee A33	API 651 H ₂ O CPC
36-055-1007	FEM T640	Non-FEM T640		Magee A21	
36-059-0005	Non-FEM TEOM				
36-061-0115	Non-FEM TEOM				
36-061-0134	Temporary Closure				
36-061-0135	Non-FEM TEOM				
36-065-2001	Non-FEM TEOM				
36-067-1015	FEM T640	Non-FEM T640			
36-071-0002	Non-FEM TEOM				
36-081-0120	Non-FEM TEOM				
36-081-0124	FEM T640	Non-FEM T640	Sunset 4		TSI 3783 H ₂ O CPC
36-081-0125	Non-FEM TEOM			TAPI 633	TSI 3783 H ₂ O CPC
36-085-0055	Non-FEM TEOM				
36-085-0111	Non-FEM TEOM				
36-087-0005	Non-FEM TEOM				
36-101-0003	FEM T640	Non-FEM T640		Magee A33	API 651 H ₂ O CPC
36-103-0009	Non-FEM TEOM				
36-119-2004	Non-FEM TEOM				

8.5 Non-Continuous Particulate Matter – 24-Hour Samples

AQS ID	Filter PM _{2.5}	Filter PM ₁₀	Speciation (PM _{2.5})	Lead TSP Low Vol	Metals (PM ₁₀)
36-001-0005	1-in-3		1-in-3		
36-001-0012	1-in-6				
36-005-0110	1-in-3	1-in-6	1-in-3		1-in-6 Colo
36-005-0133	1-in-6				
36-013-0006	1-in-6				
36-029-0002	1-in-6				
36-029-0005	1-in-3 Colo	1-in-3	1-in-3		
36-029-0023	1-in-3				
36-031-0003	1-in-6		1-in-3		
36-047-0122	1-in-3				
36-055-0015	1-in-3				
36-055-1007	1-in-3	1-in-3	1-in-3		1-in-6
36-061-0079	1-in-3 Colo				
36-061-0128	1-in-3				
36-061-0134	Temporary Closure	Temporary Closure	Temporary Closure		
36-067-1015	1-in-3				
36-071-0002	1-in-3				
36-071-3002				1-in-6	
36-081-0124	1-in-3	1-in-3	1-in-3		
36-081-0125	1-in-3				
36-085-0055	1-in-6				
36-101-0003	1-in-3		1-in-3		
36-103-0002	1-in-6				

Note: Due to the method of analysis, there is a delay in reporting the data.

8.6 Non-Continuous Gasses

AQS ID	Toxics TO15	Carbonyls TO11a	24 Hour PAMS	PAH
36-001-0013	1-in-6	1-in-6		
36-005-0110	1-in-6	1-in-6		1-in-6
36-005-0133	1-in-6	1-in-6		
36-029-0005	1-in-6			
36-029-0023		1-in-6		
36-029-1014	1-in-6	1-in-6		
36-031-0003	1-in-6	1-in-6		
36-047-0118	1-in-6			
36-055-0015		1-in-6		
36-055-1007	1-in-6	1-in-6		1-in-6
36-063-7001	1-in-6	1-in-6		
36-081-0124	1-in-6	1-in-6	Seasonal 1-in-6	
36-081-0125		1-in-6		
36-085-0111	1-in-6	1-in-6		
36-101-0003	1-in-6			
36-103-0044		1-in-6		

Revision Record

Table 9-1 Revision Record

Revision	Date	Responsible Entity	Description of Change
1.0	5/10/2023	DEC BAQS	Initial release.
1.1	6/12/2023	DEC BAQS	<ol style="list-style-type: none">1. Typo fixed in table 4.32. Clarifying edit regarding data met availability