Ambient Air Monitoring Network Plan 2018

This document, a description of the New Jersey Ambient Air Monitoring Network for 2018, is available for public comment. Please email comments by **June 22, 2018** to bamweb@dep.nj.gov, or write to:

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NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Air Monitoring
www.njaqinow.net

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EXECUTIVE SUMMARY

New Jersey's Ambient Air Monitoring Network Plan provides a complete description of the monitoring network, and summarizes any changes made in the previous year and any planned for the next year. The New Jersey Department of Environmental Protection (NJDEP) is required to submit a Network Plan to the U.S. Environmental Protection Agency (USEPA) each year.

Here is a list of network changes that occurred from March 2017 to March 31, 2018:

1. Shut down the Gibbstown PM$_{2.5}$ (FRM) monitoring site because of proposed construction and duplicated efforts at nearby monitors;
2. Installed the Gibbstown FRM monitor at Clarksboro.

These changes are summarized in Table 1.

Proposed Changes

In 2017 USEPA granted NJDEP's request for a waiver from the requirement to establish a Photochemical Assessment Monitoring Station (PAMS) at New Jersey's National Core (NCore) station, and to instead allow continued operation of the long-standing PAMS site at Rutgers University. Also approved was NJDEP's request to be an early adopter of upgraded PAMS monitoring equipment.

NJDEP will implement the monitoring of the required PAMS parameters in two stages in order to meet the June 1, 2019, deadline.

In the first stage, NJDEP will begin collecting the following measurements by June 1, 2018:
- Priority and optional PAMS target VOCs using the EPA-approved Agilent-Markes auto GC-FID (gas chromatography with flame ionization detector);
- True-NO$_2$ concentrations using a Teledyne-API Model T500U CAPS NO$_2$ analyzer; and
- Meteorological parameters: ambient temperature, wind direction, wind speed, atmospheric pressure, relative humidity, precipitation, solar radiation, ultraviolet radiation and mixing height.

In the second stage, NJDEP will begin collecting the following measurements by June 1, 2019:
- Total reactive oxides of nitrogen (NOy) and nitric oxide (NO) using a Thermo 42iy analyzer; and
- Three 8-hour-averaged carbonyl samples per day on a 1-in-3-day schedule using an ATEC 8000 sampler and subsequent TO-11A analysis by ERG.

NJDEP is required to submit an Enhanced Monitoring Plan (EMP) for ozone in accordance with 40 CFR Part 58 Appendix D, paragraph 5(h) by October 1, 2019. The EMP, which is included as Appendix F of the Network Plan, will include the measurement of ozone and ozone precursors at ground level and high elevations using specialized research-grade instruments provided by the National Aeronautics and Space Administration (NASA) and USEPA's Office of Research and Development. These specialized instruments will be located at the Rutgers University and Fort Lee Near Road stations.

The Bureau will also replace the Federal Reference Method (FRM) PM$_{2.5}$ sampler and the continuous non-FRM PM$_{2.5}$ analyzer at Rahway with one continuous Federal Equivalent Method (FEM) PM$_{2.5}$ analyzer by December 31, 2018. This replacement was proposed in the 2017 Network Plan and has been approved by EPA Region 2.

REGULATORY REQUIREMENTS

NJDEP is required by 40 CFR Part 58 to submit an Annual Monitoring Network Plan to the USEPA Region 2 Regional Administrator by July 1 of each year, and to have the Plan available for public inspection for at least 30 days prior to its submittal to the USEPA. The Plan describes New Jersey's State and Local Air Monitoring Stations (SLAMS), National Core (NCore) stations, Chemical Speciation Network (CSN) stations, Urban Air Toxics Monitoring Program (UATMP) stations, Special Purpose Monitor (SPM) stations, and Photochemical Assessment Monitoring Stations (PAMS).

This 2018 Network Plan contains information required by the regulations; descriptions of the air monitoring sites; large- and small-scale maps of the monitoring station locations; a summary of the changes to the Air Monitoring Network that NJDEP expects to implement during the year; comments received following the 30-day public comment period; and the NJDEP's responses to the comments. It is available for download from the Bureau of Air Monitoring's website, www.njaqinow.net, or as a hard copy by calling 609-292-0138.

THE NEW JERSEY AIR MONITORING NETWORK

NJDEP currently operates 32 air monitoring stations throughout the state. Table 2 lists all the monitoring sites along with the pollutants, pollutant categories, or meteorological parameters that are measured at each site. Figure 1 shows the locations of the monitoring stations across New Jersey.

Data used for comparison to the National Ambient Air Quality Standards (NAAQS) must be measured by USEPA-approved real-time analyzers or USEPA-approved manual samplers. The real-time data is also used to generate a rating of air quality called the Air Quality Index (AQI), which is updated hourly on the Bureau of Air Monitoring's webpage.

Real-time sampling instruments collect and analyze data continuously, and transmit the data to a centralized computer system once every minute. Several parameters, including carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), fine particulate matter ($PM_{2.5}$), and meteorological data are measured this way.

NJDEP also uses USEPA-approved manual particulate samplers for comparison to the PM NAAQS. Three types of airborne particles are collected on a filter over a 24-hour period: fine particles (particles smaller than 2.5 micrometers in diameter, or "$PM_{2.5}$"); inhalable particulate (particles smaller than 10 micrometers in diameter, or "PM_{10}"); and PM_{coarse} (particles between 2.5 micrometers in diameter and 10 micrometers in diameter). At the end of the 24-hour collection period, the samples are manually retrieved and sent to NJDEP's laboratory for gravimetric analysis.

NJDEP monitors other pollutants, some of which are grouped together into categories by their method of sampling or analysis. These categories are listed in the headings of Table 2. "Toxics" monitoring is part of the USEPA's Urban Air Toxics Monitoring Program (UATMP), in which certain volatile organic compounds (VOCs) and carbonyls are analyzed using whole air samples or adsorbent media (see Appendices A and B). Pollutants in the "$PM_{2.5}$ Speciation" category include trace elements, heavy metals, and carbon compounds (see Appendix C); they are analyzed through the Chemical Speciation Network (CSN) program using $PM_{2.5}$ particles. The site at Rutgers University that monitors for ozone precursors (pollutants that promote ozone formation in the atmosphere) is part of the national Photochemical Assessment Monitoring Station (PAMS) program. Ozone precursors (see Appendix D) are often referred to as PAMS pollutants. The $PM_{2.5}$ speciation, VOC, and carbonyl samples are collected by NJDEP and sent to USEPA-approved contract laboratories for analysis. Several urban monitoring stations measure near-real-time benzene, toluene, ethylbenzene, and xylenes (with a "BTEX" analyzer), and black carbon (with an aethalometer). In addition, NJDEP also measures acid deposition, mercury, and visibility (using a nephelometer) at a number of sites.

CHANGES TO THE NETWORK

TABLE 1. Air Monitoring Network Changes, March 2016 – March 2017

Monitoring Site	Parameter(s)	Action	Date
Clarksboro	PM$_{2.5}$ FRM	Moved from Gibbstown	8/8/2017
Gibbstown	PM$_{2.5}$ FRM	Site shut down	8/8/2017

TABLE 2. Summary of Current New Jersey Air Monitoring Sites

| #	Station Name	CO	NOx	NOy	O3	SO2	Lead	PM2.5	Real-Time PM2.5	PM10	PM coarse	PM2.5-Speciation [a]	O3 Precursors [b]	Toxics [c]	Urban Pollutants [d]	Acid Deposition	Mercury	Visibility	Meteorological [e]	Rain	Solar Radiation
1	Ancora State Hospital				1																
2	Atlantic City							1													
3	Bayonne		1		1	1									1				1	1	
4	Brigantine				1	1		1	1									1			
5	Camden RRF										1										
6	Camden Spruce St	1	1		1	1		2	1			1		1	1				1	1	
7	Cattus Island															1					
8	Chester		1		1	1			1			1		1							
9	Clarksboro				1			1													
10	Colliers Mills				1																
11	Columbia WMA		1		1	1		1	1										1	1	
12	Elizabeth	1				1															
13	Elizabeth Lab	1	1			1		2	1			1		1	1		1		1	1	
14	Flemington				1				1										1	1	
15	Fort Lee Library							1													
16	Fort Lee Near Road	1	1					1							1				1	1	
17	Jersey City	1	1			1															
18	Jersey City Firehouse							2	1	2											
19	Leonia				1																
20	Millville		1		1				1												
21	Monmouth University				1																
22	Newark Firehouse	1	1	1	1	1	1	1	1	1		1			1				1	1	1
23	Paterson							1													
24	Pennsauken							1													
25	Rahway							1	1												
26	Ramapo				1																
27	Rider University				1				1										1		
28	Rutgers University		1		1			1	1			2	1	1			1				
29	Toms River							1													
30	Trenton							1													
31	Union City High School							1													
32	Washington Crossing															1					
	CURRENT TOTAL	6	10	1	16	9	1	20	12	4	1	6	1	4	5	2	2	1	8	7	1

a – See Appendix C
b – See Appendix D
c – See Appendices A and B
d – Urban pollutants include black carbon and select volatile organic compounds (BTEX compounds; see Appendix E).
e - Meteorological parameters include temperature, barometric pressure, relative humidity, wind direction, and wind speed.
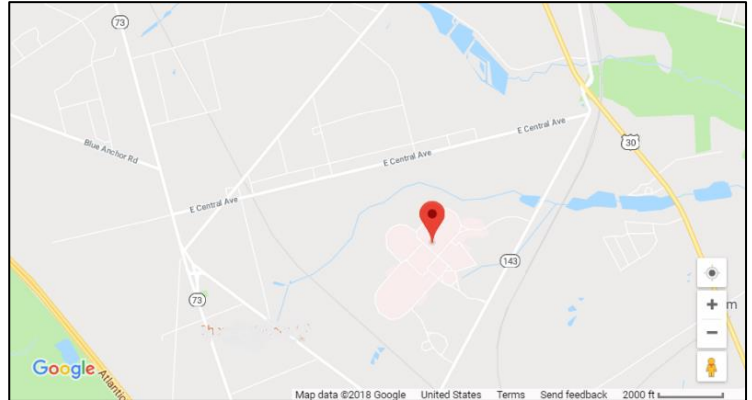
FIGURE 1. Map of Current New Jersey Air Monitoring Network
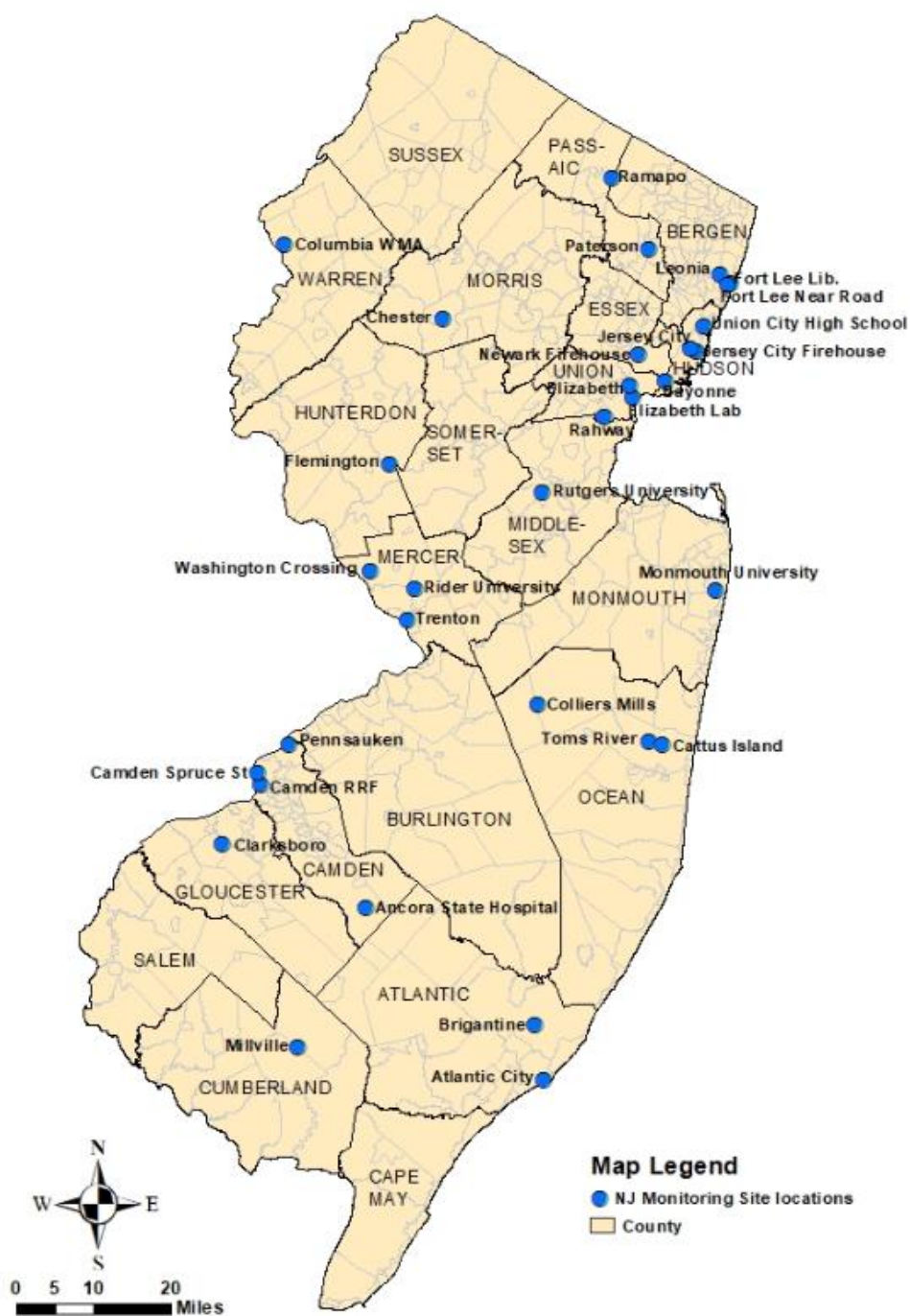
NEW JERSEY AIR MONITORING SITE DESCRIPTIONS

SITE INFORMATION

Site Name	Ancora State Hospital
Address	301 Spring Garden Road
City, State, Zip	Hammonton, NJ 08037
AQS Code	34 007 1001
NJ County	Camden
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.684250
Longitude	-74.861491
Date Established	1/1/1966
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Thermo 49C	Ultraviolet	047	Continuous	Urban	Population Exposure

Site Purpose	To measure background concentrations for the southern part of New Jersey. May also measure maximum ozone concentrations downwind from the Philadelphia metropolitan area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Atlantic City
Address	Atlantic Cape Community College, 1535 Bacharach Boulevard
City, State, Zip	Atlantic City, NJ 08401
AQS Code	34 001 1006
NJ County	Atlantic
MSA/CSA	Atlantic City MSA
Latitude	39.363260
Longitude	-74.431000
Date Established	7/27/2001
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

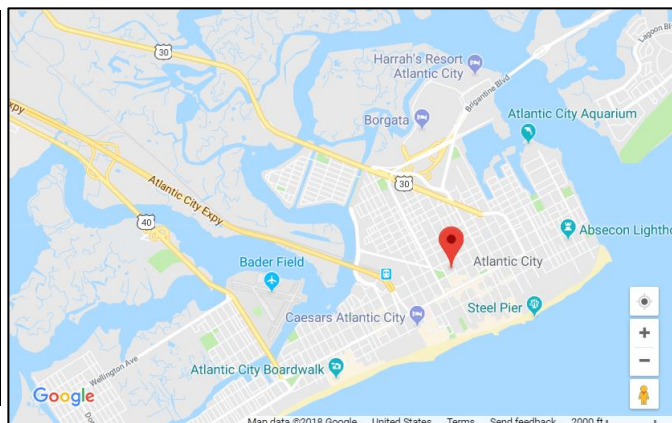| Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure fine particle concentrations in the commercial area of Atlantic City.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Bayonne
Address	Park Road at end of W. 25th St.
City, State, Zip	Bayonne, NJ 07002
AQS Code	34 017 0006
NJ County	Hudson
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.670250
Longitude	-74.126081
Date Established	1/1/1983
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	074	Continuous	Urban	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	074	Continuous	Urban	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	074	Continuous	Urban	Population Exposure
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Sulfur Dioxide (SO$_2$)	42401	Thermo 43i	Pulsed fluorescence	060	Continuous	Neighborhood	Population Exposure
Black Carbon	84313	Teledyne API Model 633 Aethalometer	Optical absorption	861	Continuous	Neighborhood	Population Exposure
BTEX	Appendix E	Syntech Spectras GC 955 BTEX analyzer	Auto GC-PID	092	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	To measure population exposure in the Hudson County area
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Brigantine
Address	Edwin B. Forsythe National Wildlife Refuge Visitor Center, 800 Great Creek Road
City, State, Zip	Galloway, NJ 08231
AQS Code	34 001 0006
NJ County	Atlantic
MSA/CSA	Atlantic City MSA
Latitude	39.464872
Longitude	-74.448736
Date Established	1/1/2007
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Teledyne T400	Ultraviolet	087	Continuous	Urban	Background
Sulfur Dioxide (SO$_2$)	42401	Thermo 43iTLE	Pulsed fluorescence	560	Continuous	Urban	Background
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Urban	Background
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Urban	Background
Real-time PM$_{2.5}$	88347	Nephelometer	Light-scattering	011	Continuous	Urban	Background

Site Purpose	To measure pollutant concentrations and visibility in Class I protected areas.
Plans for the next 18 months	No changes.
Other Comment	SO$_2$ is measured by a "trace-level" analyzer. Also an IMPROVE station, part of NESCAUM visibility network. Real-time PM$_{2.5}$ data by nephelometer data not submitted to USEPA's AQS database. The US Fish & Wildlife Service collects a weekly acid deposition sample which is sent to the National Atmospheric Deposition Program (NADP) for analysis.

SITE INFORMATION

Site Name	Camden RRF (Resource Recovery Facility)
Address	600 Morgan Street
City, State, Zip	Camden, NJ 08104
AQS Code	34 007 0009
NJ County	Camden
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.912431
Longitude	-75.116864
Date Established	5/8/1994
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Inhalable Particles (PM$_{10}$)	81102	Thermo 2025 Low-volume sequential sampler	Gravimetric	127	Every 6 days	Middle	Source Oriented

Site Purpose	To measure the impact of mobile sources in heavily used roadways in southern Camden.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Camden Spruce Street
Address	226-298 Spruce Street
City, State, Zip	Camden, NJ 08103
AQS Code	34 007 0002
NJ County	Camden
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.934446
Longitude	-75.125291
Date Established	4/11/2012
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

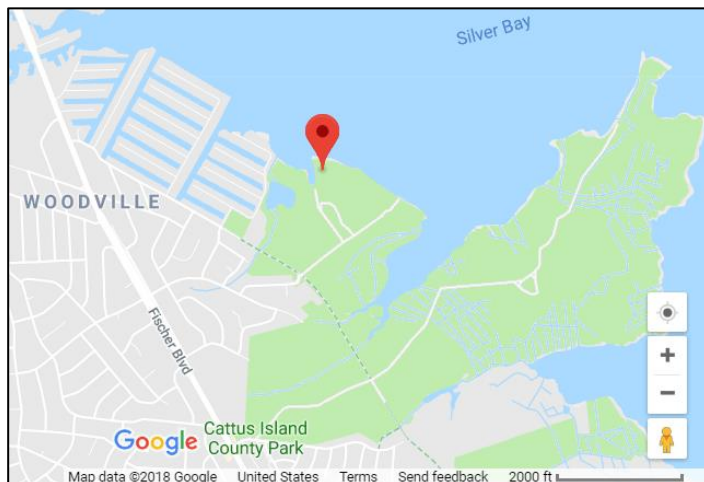| Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Carbon Monoxide (CO)	42101	Thermo 48C	Nondispersive-infrared	054	Continuous	Neighborhood	Population Exposure
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Sulfur Dioxide (SO$_2$)	42401	Thermo 43iTLE	Pulsed fluorescence	060	Continuous	Neighborhood	Population Exposure
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025i Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
PM$_{2.5}$ Speciation	Appendix C	Met One & URG-3000N	XRF, IC, TOR	Appendix C	Every 6 days	Neighborhood	Population Exposure
Volatile Organic Compounds	Appendix A	Canister	TO-15	Appendix A	Every 6 days	Neighborhood	Population Exposure
Carbonyls	Appendix B	DNPH cartridge	TO-11A	Appendix B	Every 6 days	Neighborhood	Population Exposure
Black Carbon	84313	Teledyne API Model 633 Aethalometer	Optical absorption	861	Continuous	Neighborhood	Population Exposure
BTEX	Appendix E	Syntech Spectras GC 955 BTEX analyzer	Auto GC-PID	092	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	

PARAMETER SUMMARY (Camden Spruce Street, continued)

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	Comprehensive air monitoring station in the Philadelphia-Camden metro area of southern New Jersey.
Plans for the next 18 months	No changes.
Other Comment	PM$_{2.5}$ gravimetric sampler is collocated for precision. See Appendices A, B and C for more information on PM$_{2.5}$ speciation, volatile organic compounds and carbonyls.

SITE INFORMATION

Site Name	Cattus Island
Address	Cattus Island County Park, end of Bandon Road
Municipality	Toms River NJ 08753
AQS Code	None
NJ County	Ocean
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	39.989636
Longitude	-74.134132
Date Established	10/23/2012
Suitable for Comparison to PM2.5 NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Acid Deposition		Wet Deposition Collector	Ion Chromatography		Weekly	Neighborhood	Population Exposure

Site Purpose	To measure population exposure and transported fine particle concentrations.
Plans for the next 18 months	No changes.
Other Comment	Acid deposition samples are sent to the National Atmospheric Deposition Program (NADP) for analysis. Acid deposition data are not submitted by NJDEP or NADP to USEPA's AQS database.

SITE INFORMATION

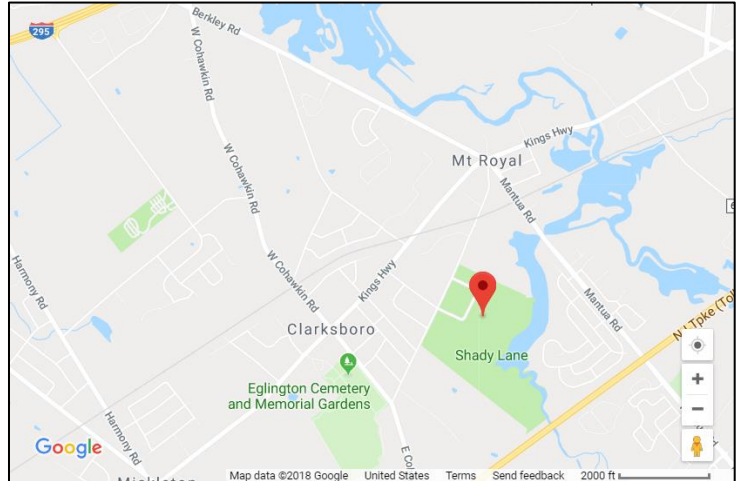|	
Site Name	Chester
Address	Department of Public Works Building # 1, 50 North Road
City, State, Zip	Chester, NJ 07930
AQS Code	34 027 3001
NJ County	Morris
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.787628
Longitude	-74.676301
Date Established	1/1/1978
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Teledyne T200	Chemiluminescence	099	Continuous	Urban	Background
Nitrogen Dioxide (NO$_2$)	42602	Teledyne T200	Chemiluminescence	099	Continuous	Urban	Background
Oxides of Nitrogen (NO$_x$)	42603	Teledyne T200	Chemiluminescence	099	Continuous	Urban	Background
Ozone (O$_3$)	44201	Teledyne T400	Ultraviolet	087	Continuous	Urban	Population Exposure
Sulfur Dioxide (SO$_2$)	42401	Teledyne T100	Pulsed fluorescence	060	Continuous	Urban	Background
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Urban	Population Exposure
PM$_{2.5}$ Speciation	Appendix C	Met One & URG-3000N	XRF, IC, TOR	Appendix C	Every 6 days	Neighborhood	Population Exposure
Volatile Organic Compounds	Appendix A	Canister	TO-15	Appendix.A	Every 6 days	Neighborhood	Population Exposure
Carbonyls	Appendix B	DNPH cartridge	TO-11A	Appendix B	Every 6 days	Neighborhood	Population Exposure

Site Purpose	To measure background concentrations in northern New Jersey.
Plans for the next 18 months	No changes.
Other Comment	See Appendices A, B and C for more information on PM$_{2.5}$ speciation, volatile organic compounds and carbonyls.

SITE INFORMATION

Site Name	Clarksboro
Address	Shady Lane Complex, 256 County House Road
City, State, Zip	Clarksboro, NJ 08020
AQS Code	34 015 0002
NJ County	Gloucester
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.800339
Longitude	-75.212119
Date Established	1/1/1981
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Urban	Highest Concentration
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure highest concentrations of ozone downwind from Philadelphia metropolitan area and population exposure to PM$_{2.5}$.
Plans for the next 18 months	
Other Comment	PM2.5 installed 8/8/2017

SITE INFORMATION

Site Name	Colliers Mills
Address	Colliers Mills Wildlife Management Area, Success Rd. near Hawkin Road
City, State, Zip	Jackson, NJ 08527
AQS Code	34 029 0006
NJ County	Ocean
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.064830
Longitude	-74.444050
Date Established	1/1/1985
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Teledyne T400	Ultraviolet	087	Continuous	Urban	Highest Concentration

Site Purpose	To measure highest concentrations for ozone downwind from the Philadelphia metropolitan area and central New Jersey.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Columbia WMA
Address	Columbia Wildlife Management Area, 105 Delaware Avenue
City, State, Zip	Knowlton Township, NJ 07832
AQS Code	34 041 0007
NJ County	Warren
MSA/CSA	Allentown-Bethlehem-Easton-PA-NJ MSA
Latitude	40.924580
Longitude	-75.067815
Date Established	9/23/2010
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Sulfur Dioxide (SO$_2$)	42401	Teledyne T100U	Pulsed fluorescence	100	Continuous	Neighborhood	Highest Concentration
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	To measure population exposure for NO$_2$, O$_3$ and PM$_{2.5}$; and highest concentrations for SO$_2$.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Elizabeth
Address	7 Broad Street
City, State, Zip	Elizabeth, NJ 07201
AQS Code	34 039 0003
NJ County	Union
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.662493
Longitude	-74.214800
Date Established	1/1/1970
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Carbon Monoxide (CO)	42101	Thermo 48i	Nondispersive-infrared	054	Continuous	Micro	Highest Concentration
Sulfur Dioxide (SO$_2$)	42401	Teledyne T100	Pulsed fluorescence	100	Continuous	Middle	Population Exposure

Site Purpose	To measure the highest concentrations in the central commercial area of Elizabeth.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Elizabeth Lab
Address	Interchange 13 Toll Plaza, NJ Turnpike
City, State, Zip	Elizabeth, NJ 07202
AQS Code	34 039 0004
NJ County	Union
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.641440
Longitude	-74.208365
Date Established	1/1/1972
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

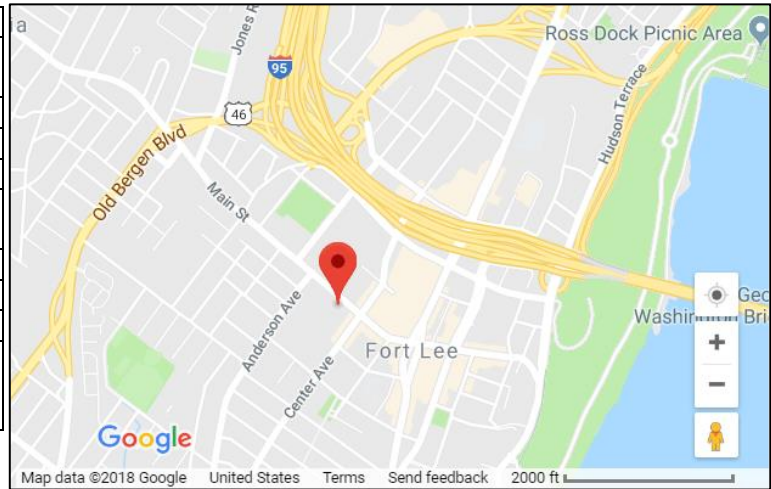| Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Carbon Monoxide (CO)	42101	Thermo 48i	Nondispersive-infrared	054	Continuous	Neighborhood	Highest Concentration
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Highest Concentration
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Highest Concentration
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Highest Concentration
Sulfur Dioxide (SO$_2$)	42401	Thermo 43i	Pulsed fluorescence	060	Continuous	Neighborhood	Highest Concentration
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025i Low-volume sequential sampler	Gravimetric	145	Daily	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
PM$_{2.5}$ Speciation	Appendix C	Met One & URG-3000N	XRF, IC, TOR	Appendix C	Every 3 days	Neighborhood	Highest Concentration
Volatile Organic Compounds	Appendix A	Canister	TO-15	Appendix A	Every 6 days	Neighborhood	Population Exposure
Carbonyls	Appendix B	DNPH cartridge	TO-11A	Appendix B	Every 6 days	Neighborhood	Population Exposure
Mercury (Hg)		Tekran 2537x	CVAF Spectrometry		Hourly	Neighborhood	Population Exposure
Black Carbon	84313	Teledyne API Model 633 Aethalometer	Optical absorption	861	Continuous	Neighborhood	Population Exposure
BTEX	Appendix E	Syntech Spectras GC 955 BTEX analyzer	Auto-GC PID	092	Continuous	Neighborhood	Population Exposure
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

PARAMETER SUMMARY (Elizabeth Lab, continued)

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	The comprehensive air monitoring site in the northeast metropolitan region of New Jersey.
Plans for the next 18 months	No changes.
Other Comment	$PM_{2.5}$ gravimetric sampler is collocated for precision. See Appendices A, B and C for more information on $PM_{2.5}$ speciation, volatile organic compounds and carbonyls.

SITE INFORMATION

Site Name	Flemington
Address	Raritan Township Municipal Utilities Authority, 365 Old York Road
City, State, Zip	Flemington, NJ 08822
AQS Code	34 019 0001
NJ County	Hunterdon
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.515262
Longitude	-74.806671
Date Established	1/1/1980
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Teledyne T400	Ultraviolet	087	Continuous	Urban	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Solar Radiation	63301	Qualimetrics	Pyrometer	011	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	To measure ozone concentrations in the northwestern region of New Jersey.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Fort Lee Library
Address	320 Main Street, Fort Lee Public Library
City, State, Zip	Fort Lee, NJ 07024
AQS Code	34 003 0003
NJ County	Bergen
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.852256
Longitude	-73.973314
Date Established	1/23/1986
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure the population exposure in the Fort Lee area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Fort Lee Near Road
Address	2047 Central Avenue, adjacent to George Washington Bridge Toll Plaza
City, State, Zip	Fort Lee, NJ 07024
AQS Code	34 003 0010
NJ County	Bergen
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.853550
Longitude	-73.966180
Date Established	4/1/2014
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	074	Continuous	Microscale	Near-Road Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	074	Continuous	Microscale	Near-Road Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	074	Continuous	Microscale	Near-Road Exposure
Carbon Monoxide (CO)	42101	Thermo 48i	Nondispersive infrared	054	Continuous	Microscale	Near-Road Exposure
Real-time PM$_{2.5}$	88101	Met One BAM 1022	Beta Particle attenuation	209	Continuous	Microscale	Near-Road Exposure
Black Carbon	84313	Teledyne API Model 633 Aethalometer	Optical absorption	861	Continuous	Neighborhood	Population Exposure
BTEX	Appendix E	Syntech Spectras GC 955 BTEX analyzer	Auto-GC PID	092	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	To measure near-road exposure for NO$_2$, CO and PM$_{2.5}$.
Plans for the next 18 months	BEACON (Vaisala CarboCap GMP343) sensor for carbon dioxide and BEACON (Alphasense) sensor for NO2, SO2, O3 and CO will be installed in April 2018 as part of the Enhanced Monitoring Plan, see Appendix F
Other Comment	

SITE INFORMATION

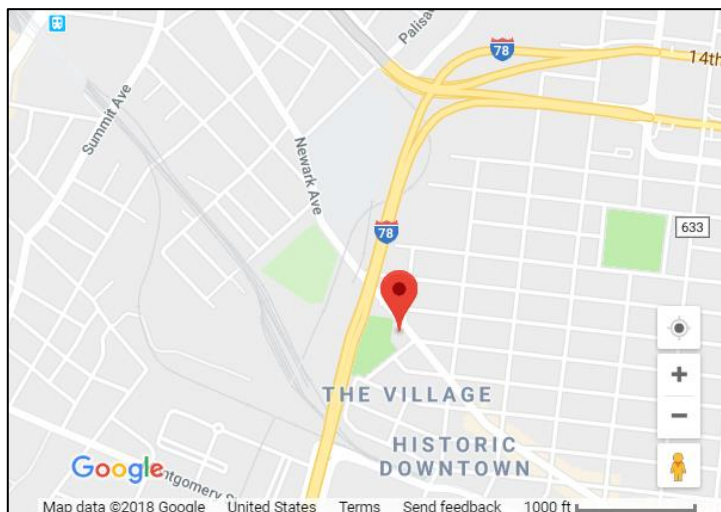|	
Site Name	Gibbstown
Address	Municipal Maintenance Yard, 61 North School Street
City, State, Zip	Gibbstown, NJ 08027
AQS Code	34 015 0004
NJ County	Gloucester
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.830837
Longitude	-75.284682
Date Established	2/2/2007
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Gibbstown area.
Plans for the next 18 months	Site shut down August 2017 and monitor relocated to Clarksboro because of changes at the site causing it to no longer meet siting criteria.
Other Comment	

SITE INFORMATION

Site Name	Jersey City
Address	2828 John F. Kennedy Boulevard
City, State, Zip	Jersey City, NJ 07306
AQS Code	34 017 1002
NJ County	Hudson
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.731645
Longitude	-74.066308
Date Established	1/1/1970
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Carbon Monoxide (CO)	42101	Thermo 48*i*TLE	Nondispersive-infrared	054	Continuous	Micro	Highest Concentration
Sulfur Dioxide (SO$_2$)	42401	Teledyne T100	Pulsed fluorescence	100	Continuous	Neighborhood	Highest Concentration
Nitric Oxide (NO)	42601	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure

Site Purpose	To measure highest concentrations in the central commercial area of Jersey City.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

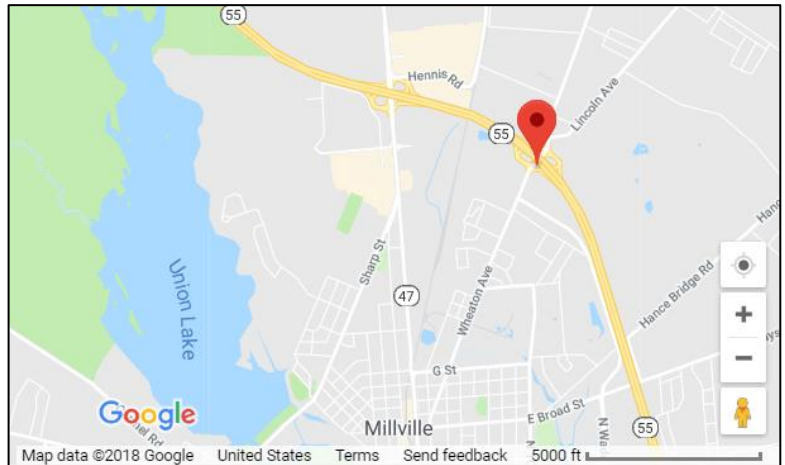|	
Site Name	Jersey City Firehouse
Address	Jersey City Fire Department Engine 6, 355 Newark Avenue,
City, State, Zip	Jersey City, NJ 07302
AQS Code	34 017 1003
NJ County	Hudson
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.725454
Longitude	-74.052290
Date Established	1/1/1967
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Daily	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
Inhalable Particles (PM$_{10}$)	81102	Thermo 2000 Low-volume single sampler	Gravimetric	126	Every 6 days	Neighborhood	Highest Concentration

Site Purpose	To measure population exposure in the Jersey City area.
Plans for the next 18 months	No changes.
Other Comment	Gravimetric PM$_{2.5}$ and PM$_{10}$ are collocated for precision measurements. Sample taken every 6 days. The AQS method code for the collocated PM$_{2.5}$ monitor is 143.

SITE INFORMATION

Site Name	Leonia
Address	40 Fort Lee Road, Overpeck Park,
City, State, Zip	Leonia, NJ 07605
AQS Code	34 003 0006
NJ County	Bergen
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.870436
Longitude	-73.991994
Date Established	12/7/2007
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Thermo 49C	Ultraviolet	047	Continuous	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Leonia and Teaneck areas.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Millville
Address	Next to 4425 South Main Road
City, State, Zip	Millville, NJ 08332
AQS Code	34 011 0007
NJ County	Cumberland
MSA/CSA	Vineland-Millville-Bridgeton MSA
Latitude	39.422273
Longitude	-75.025204
Date Established	1/1/1983
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Teledyne T200	Chemiluminescence	099	Continuous	Neighborhood	Population Exposure
Ozone (O$_3$)	44201	Thermo 49C	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Vineland and Millville areas.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Monmouth University
Address	Edison Science Bldg., 400 Cedar Avenue
City, State, Zip	West Long Branch, NJ 07764
AQS Code	34 025 0005
NJ County	Monmouth
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.277647
Longitude	-74.005100
Date Established	5/13/1989
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Neighborhood	Highest Concentration

Site Purpose	To measure highest concentrations of ozone in the eastern Monmouth County area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Newark Firehouse
Address	Newark Fire Department Engine 10, 360 Clinton Avenue,
City, State, Zip	Newark, NJ 07108
AQS Code	34 013 0003
NJ County	Essex
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.720989
Longitude	-74.192892
Date Established	5/1/2009
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Carbon Monoxide (CO)	42101	Thermo 48iTLE	Nondispersive-infrared	554	Continuous	Neighborhood	Population Exposure
Nitric Oxide (NO)	42601	Thermo 42i-Y	Chemiluminescence	674	Continuous	Neighborhood	Population Exposure
NO$_y$-NO Difference	42612	Thermo 42i-Y	Chemiluminescence	674	Continuous	Neighborhood	Population Exposure
Total Reactive Oxides of Nitrogen (NO$_y$)	42600	Thermo 42i-Y	Chemiluminescence	674	Continuous	Neighborhood	Population Exposure
Nitric Oxide (NO)	42601	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42i	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Sulfur Dioxide (SO$_2$)	42401	Thermo 43iTLE	Pulsed fluorescence	560	Continuous	Neighborhood	Highest Concentration
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure
Lead (Pb)	85129	Thermo 2025 Low-volume sequential sampler	XRF with PM$_{10}$	811	Every 6 days	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure

PARAMETER SUMMARY (Newark Firehouse, continued)

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
PM coarse	86101	Thermo 2025 Sequential Sampler Pair	Paired Gravimetric Difference	176	Every 3 days	Neighborhood	Population Exposure
Inhalable Particles (PM$_{10}$)	81102	Thermo 2025 Sequential Sampler	Gravimetric	127	Every 3 days	Neighborhood	Population Exposure
PM$_{2.5}$ Speciation	Appendix C	Met One & URG-3000N	XRF, IC, TOR	Appendix C	Every 3 days	Neighborhood	Population Exposure
BTEX	Appendix E	Syntech Spectras GC 955 BTEX analyzer	Auto-GC PID	092	Continuous	Neighborhood	Population Exposure
Black Carbon	84313	Teledyne API Model 633 Aethalometer	Optical absorption	861	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Solar Radiation	63301	Qualimetrics	Pyrometer	011	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Precipitation	65102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Resultant Wind Direction	61104	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Resultant Wind Speed	61103	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	

Site Purpose	New Jersey's NCore site
Plans for the next 18 months	No changes.
Other Comment	CO and SO$_2$ data are measured by "trace-level" analyzers. See Appendix C for more information on PM$_{2.5}$ speciation.

SITE INFORMATION

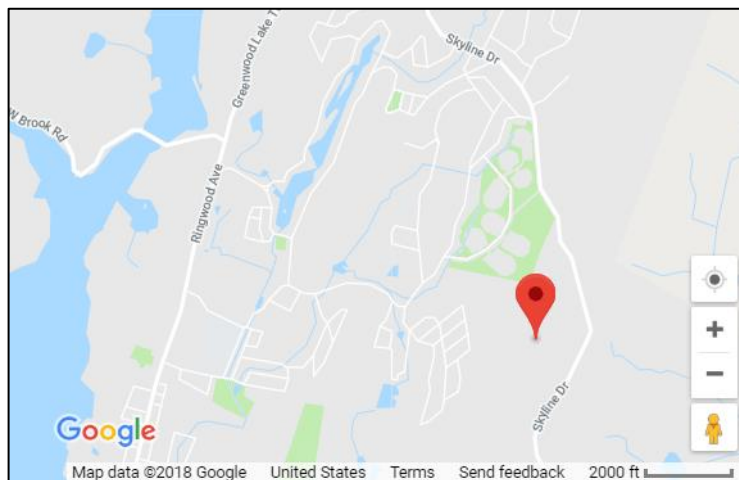|	
Site Name	Paterson
Address	Paterson City Board of Health, 176 Broadway
City, State, Zip	Paterson, NJ 07505
AQS Code	34 031 0005
NJ County	Passaic
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.918381
Longitude	-74.168092
Date Established	1/1/1978
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Paterson area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Pennsauken
Address	Morris-Delair Water Treatment Plant, 8998 Zimmerman Avenue
City, State, Zip	Pennsauken, NJ 08110
AQS Code	34 007 1007
NJ County	Camden
MSA/CSA	Philadelphia-Camden-Wilmington CSA
Latitude	39.989036
Longitude	-75.050008
Date Established	9/1/1983
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Pennsauken area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

|	
Site Name	Rahway
Address	Rahway Fire Department Headquarters, 1300 Main Street
City, State, Zip	Rahway, NJ 07065
AQS Code	34 039 2003
NJ County	Union
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.603943
Longitude	-74.276174
Date Established	12/11/1999
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure
Real-time PM$_{2.5}$	88502	Thermo 1400 TEOM	Gravimetric, Acceptable PM$_{2.5}$	703	Continuous	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Rahway area.
Plans for the next 18 months	Replace TEOM with a new federal equivalent method real-time sampler. Remove filter-based PM$_{2.5}$ sampler.
Other Comment	Real-time PM$_{2.5}$ TEOM sampler is operating without the FDMS at 50° Celsius.

SITE INFORMATION

Site Name	Ramapo
Address	Ramapo Mountain State Forest Access Road off Skyline Drive
City, State, Zip	Wanaque, NJ 07465
AQS Code	34 031 5001
NJ County	Passaic
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	41.058617
Longitude	-74.255544
Date Established	6/5/1998
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Not Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O$_3$)	44201	Thermo 49i	Ultraviolet	047	Continuous	Urban	Background

Site Purpose	To measure background, transport and upwind concentrations of ozone.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Rider University
Address	2083 Lawrenceville Road, Athletic Fields
City, State, Zip	Lawrenceville, NJ 08648
AQS Code	34 021 0005
NJ County	Mercer
MSA/CSA	Trenton-Ewing MSA
Latitude	40.283092
Longitude	-74.742644
Date Established	6/1/1981
Suitable for Comparison to PM₂.₅ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Ozone (O₃)	44201	Thermo 49C	Ultraviolet	047	Continuous	Neighborhood	Population Exposure
Barometric Pressure	64101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Solar Radiation	63301	Qualimetrics	Pyrometer	011	Continuous	Neighborhood	
Temperature	62101	Vaisala WXT	Capacitive sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Vaisala WXT	Ultrasonic sensor	060	Continuous	Neighborhood	
Real-time PM2.5	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure

Site Purpose	To measure population exposure.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Rutgers University
Address	Horticultural Farm #3, 67 Ryders Lane
City, State, Zip	East Brunswick, NJ 08901
AQS Code	34 023 0011
NJ County	Middlesex
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.462182
Longitude	-74.429439
Date Established	10/1/1994
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes
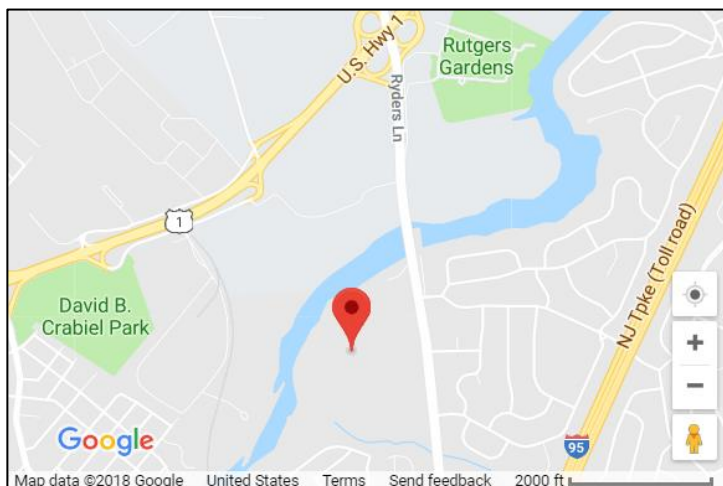
PARAMETER SUMMARY

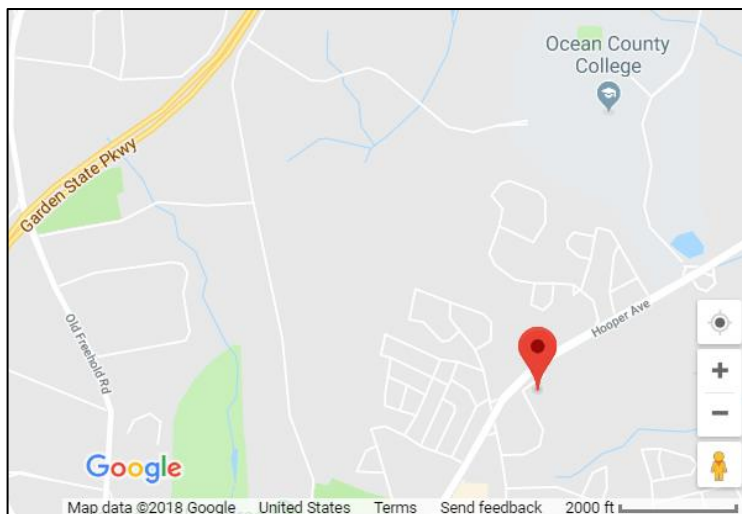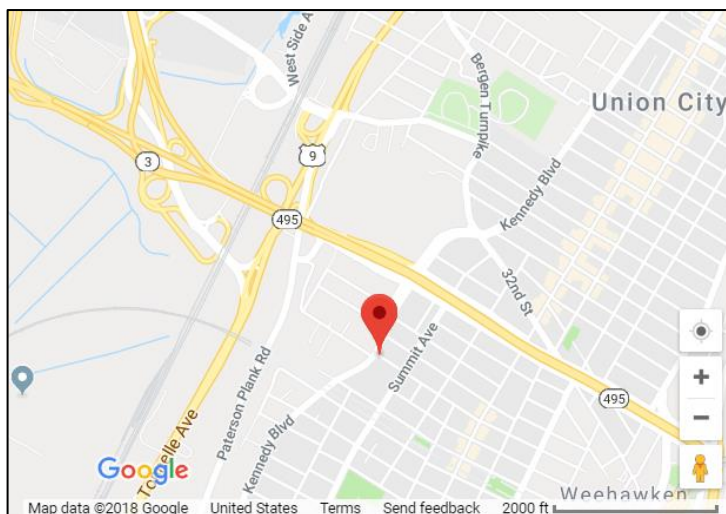| Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Nitric Oxide (NO)	42601	Thermo 42	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Nitrogen Dioxide (NO$_2$)	42602	Thermo 42	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
Oxides of Nitrogen (NO$_x$)	42603	Thermo 42	Chemiluminescence	074	Continuous	Neighborhood	Population Exposure
True-NO2	42602	Teledyne T500U	Cavity attenuated phase shift	212	Continuous	Neighborhood	Population Exposure
Ozone (O$_3$)	44201	Teledyne T400	Ultraviolet	087	Continuous	Neighborhood	Population Exposure
Ozone Precursors (PAMS)	Appendix D	Agilent-Markes	Auto GC-FID	Appendix D	Hourly	Urban	Background
Real-time PM$_{2.5}$	88101	Thermo 5014i	Beta Particle attenuation	183	Continuous	Neighborhood	Population Exposure
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure
Volatile Organic Compounds	Appendix A	Canister	TO-15	Appendix A	Every 6 days	Neighborhood	Population Exposure
Carbonyls	Appendix B	DNPH cartridge	TO-11A	Appendix B	Every 6 days	Neighborhood	Population Exposure
PM$_{2.5}$ Speciation	Appendix C	Met One & URG-3000N	XRF, IC, TOR	Appendix C	Every 3 days	Neighborhood	Population Exposure
Mercury (Hg)		Tekran 2537x	CVAF Spectrometry		Hourly	Neighborhood	Population Exposure

PARAMETER SUMMARY (Rutgers University, continued)

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Barometric Pressure	64101	Rotronic MP101A	Capacitive sensor	060	Continuous	Neighborhood	
Relative Humidity	62201	Rotronic MP101A	Capacitive sensor	060	Continuous	Neighborhood	
Solar Radiation	63301	Kipp&Zonen CMP-11	Pyranometer	011	Continuous	Neighborhood	
Temperature	62101	Rotronic MP101A	Capacitive sensor	060	Continuous	Neighborhood	
Wind Direction	61102	Gill Windmaster HS 3D	Ultrasonic sensor	060	Continuous	Neighborhood	
Wind Speed	61101	Gill Windmaster HS 3D	Ultrasonic sensor	060	Continuous	Neighborhood	
Precipitation	65102	Geonor T-200B	Rain gauge	012	Continuous	Neighborhood	
Ultraviolet Radiation	63302	Eppley TUVR	UV Radiometer	011	Continuous	Neighborhood	
Mixing Height	61301	Vaisala CL51	Ceilometer	011	Continuous	Neighborhood	

Site Purpose	To measure population exposure and ozone precursors – downwind for Philadelphia metropolitan area and upwind for New York metropolitan area.
Plans for the next 18 months	Agilent-Markes auto GC-FID installed in March 2018. Ceilometer and true-NO2 analyzer installed in April 2018. Pandora spectrometer (NO2 and formaldehyde) and ozone LIDAR will be installed in summer 2018 as part of EMP, see Appendix F. Total reactive oxides of nitrogen (NOy) and carbonyl samples will begin operation in June 2019.
Other Comment	Upper air and lower air meteorological measurements are collected at this site by Rutgers University; see Appendix D for more information on ozone precursors, also known as PAMS. See Appendices A, B and C for more information on PM$_{2.5}$ speciation, volatile organic compounds and carbonyls.

SITE INFORMATION

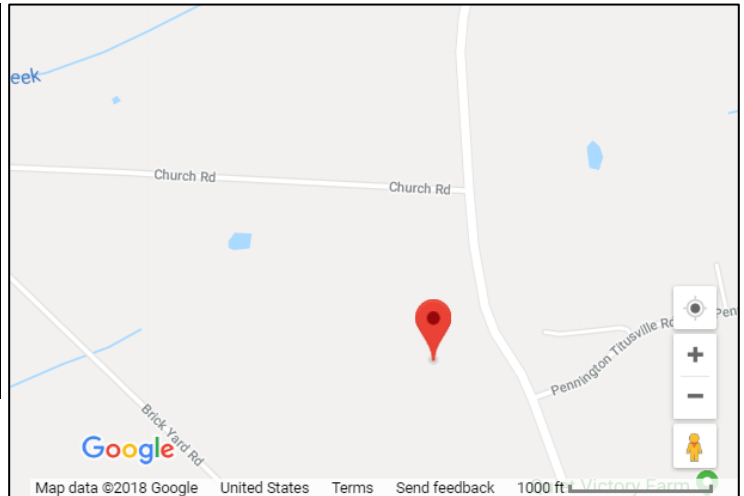|	
Site Name	Toms River
Address	Hooper Avenue Elementary School, 1517 Hooper Avenue
City, State, Zip	Toms River, NJ 08753
AQS Code	34 029 2002
NJ County	Ocean
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	39.994908
Longitude	-74.170447
Date Established	2/11/1999
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Daily	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Toms River area.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Trenton
Address	Trenton Public Library, 120 Academy Street
City, State, Zip	Trenton, NJ 08608
AQS Code	34 021 0008
NJ County	Mercer
MSA/CSA	Trenton-Ewing MSA
Latitude	40.222411
Longitude	-74.763167
Date Established	9/1/1982
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Daily	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the downtown commercial district of Trenton.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Union City High School
Address	2500 John F. Kennedy Blvd.
City, State, Zip	Union City, NJ 07087
AQS Code	34 017 0008
NJ County	Hudson
MSA/CSA	New York-Northeast New Jersey-Connecticut CSA
Latitude	40.770908
Longitude	-74.036218
Date Established	1/1/2016
Suitable for Comparison to PM$_{2.5}$ NAAQS?	Yes

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Fine Particles (PM$_{2.5}$)	88101	Thermo 2025 Low-volume sequential sampler	Gravimetric	145	Every 3 days	Neighborhood	Population Exposure

Site Purpose	To measure population exposure in the Union City and Hudson County areas.
Plans for the next 18 months	No changes.
Other Comment	

SITE INFORMATION

Site Name	Washington Crossing
Address	1240 Bear Tavern Road, Washington Crossing State Park
City, State, Zip	Titusville, NJ 08560
AQS Code	
NJ County	Mercer
MSA/CSA	Trenton-Ewing MSA
Latitude	40.315359
Longitude	-74.853613
Date Established	1/1/1989
Suitable for Comparison to PM₂.₅ NAAQS?	No Applicable

PARAMETER SUMMARY

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code	AQS Sample Frequency	AQS Spatial Scale	AQS Monitoring Objective
Acid Deposition		Wet Deposition Collector	Ion Chromatography		Weekly	Neighborhood	Population Exposure

Site Purpose	To measure population exposure and transported fine particle concentrations.
Plans for the next 18 months	No changes.
Other Comment	The weekly acid deposition samples are sent to the National Atmospheric Deposition Program (NADP) for analysis. The event acid deposition samples are analyzed by the Bureau of Air Monitoring. The weekly and event acid deposition data are not submitted by NJDEP or NADP to USEPA's AQS database.

GLOSSARY OF ABBREVIATIONS AND TERMS

ABBREVIATIONS

AQS – Air Quality System, USEPA's database for air quality data nationwide
CSA – Combined Statistical Area, defined by U.S. Office of Management and Budget as a geographic area having 2 or more Metropolitan Statistical Areas
CSN – Chemical Speciation Network
CFR – Code of Federal Regulations
CO – Carbon monoxide
CVAF Spectrometry – Cold Vapor Atomic Fluorescence Spectrometry, method for analyzing mercury
DNPH cartridge – Di-Nitro-Phenyl-Hydrazine, an adsorbent for trapping carbonyls in air
auto GC-FID – automated gas Chromatograph Flame Ionization Detection
Hg – Mercury
IC – Ion Chromatography, a method for analyzing for ionic compounds from fine particles
IMPROVE – Interagency Monitoring of Protected Visual Environments
MSA – Metropolitan Statistical Area, 1 or more counties having a population greater than 50,000
NAAQS – National Ambient Air Quality Standard
NADP – National Atmospheric Deposition Program
NCore – National Core, a monitoring site having a group of parameters specified by USEPA
NESCAUM – Northeast States for Coordinated Air Use Management
NJDEP – New Jersey Department of Environmental Protection
NO – Nitric oxide
NO$_2$ – Nitrogen dioxide
NO$_x$ – Oxides of nitrogen
NO$_y$ – Total reactive oxides of nitrogen
O$_3$ – Ozone
PAMS – Photochemical Assessment Monitoring Station; site which measures ozone precursors
Pb – Lead
PM$_{2.5}$ – Fine particles, 2.5 micrometers in aerodynamic diameter or smaller
PM$_{10}$ – Inhalable particles, 10 micrometers in aerodynamic diameter or smaller
PM$_{10-2.5}$ – Coarse particles, between 10 and 2.5 micrometers in aerodynamic diameter
PM$_{2.5}$-Speciation – a group of elements, ionic compounds and carbon compounds that are analyzed from fine particles
RRF – Resource Recovery Facility; trash incineration facility
SLAMS – State and Local Air Monitoring Station; designation for monitoring site or sampler from which data can be used for comparison to the National Ambient Air Quality Standards
SO$_2$ – Sulfur dioxide
SPM – Special Purpose Monitor; designation for monitoring site or sampler from which data are not used for comparison to the National Ambient Air Quality Standards
TLE – Trace Level Enhanced; type of analyzer which measures very low concentrations
TO-11A – a standard method approved by USEPA to analyze carbonyls
TO-15 – a standard method approved by USEPA to analyze volatile organic compounds
TOA – Thermal Optic Analysis, a method for analyzing carbon compounds from fine particles
TSP – Total suspended particles; all particles that are captured by a high-volume sampler
UATMP - Urban Air Toxics Monitoring Program
USEPA - United States Environmental Protection Agency
VOC – Volatile organic compound, a carbon-based chemical that is gaseous
XRF – X-ray fluorescence, a method for analyzing elements from fine particles

Acid deposition – acid rain, the phenomenon by which air pollutants raise the acidity of rain and snow
Ambient air – air in areas that are accessible to the general public
Background – a monitoring site in an area which is not affected by air pollution sources
Canister – a stainless steel container used for collecting an air sample to be analyzed for VOCs
Capacitive sensor – an instrument used for measuring relative humidity
Carbonyls – a group of aldehydes, or a carbon chain with an oxygen molecule at one end
Chemiluminescence – the method used for analyzing for NO, NO_2 and NO_x
Coarse particles – also $PM_{10-2.5}$; particles between 10 and 2.5 micrometers in aerodynamic diameter
Collocated – two samplers operating side-by-side in order to collect data used for precision statistics
Continuous – an instrument that collects data instantaneously, without stopping, throughout the year, and transmits the data to a central data acquisition system every minute
Fine particles – also $PM_{2.5}$; particles 2.5 micrometers in aerodynamic diameter or smaller
Gravimetric – weighing a filter in a controlled environment by a highly accurate balance
High-volume sampler – an instrument used to collect Total Suspended Particles
Highest concentration – a monitoring instrument or site which is designated to measure the maximum concentration of a pollutant in a given area
Inhalable particles – also PM_{10}; particles 10 micrometers in aerodynamic diameter or smaller
Ion chromatography – also IC, a method used for analyzing for ionic compounds
Manual sampler– an instrument that collects an air sample over a 24-hour filter on a filter, adsorbent cartridge or canister which is then manually retrieved for subsequent analysis
Met One – a manufacturer of $PM_{2.5}$ speciation samplers
Micro-scale – the spatial scale of a monitoring site, from 10–100 meters around the monitor
Middle-scale – the spatial scale of a monitoring site, from 100–1000 meters around the monitor
Neighborhood-scale – the spatial scale of a monitoring site, from 1-10 km around the monitor
Nephelometer – an instrument that measures fine particles through light scattering
Nondispersive-infrared – the method used for analyzing for carbon monoxide
Ozone precursors – a group of 55 volatile organic compounds that affect ozone formation and destruction in the atmosphere; also called PAMS pollutants
Perkin Elmer – the manufacturer of an automated GC-FID
Population exposure – a monitoring instrument or site that is designated to measure the concentrations of a pollutant in a highly populated area
Pulsed fluorescence – the method used for analyzing for sulfur dioxide
Pyrometer – the method used for measuring solar radiation
Qualimetrics – the manufacturer of meteorological instruments
Real-time $PM_{2.5}$ – $PM_{2.5}$ concentrations that are measured continuously
Regional scale – the spatial scale of a monitoring site, from 100-1000 km around the monitor
Solar radiation – the intensity of energy from sunlight
TEOM-FDMS – Tapered Element Oscillating Microbalance with Filter Dynamic Measurement System; the analytical method used by a Thermo 1400 to measure real-time $PM_{2.5}$
Thermo 42 – the instrument manufactured by Thermo Environmental Corp. to measure nitrogen dioxide, nitric oxide and oxides of nitrogen
Thermo 43A – the instrument manufactured by Thermo Environmental Corp. to measure sulfur dioxide
Thermo 48 – the instrument manufactured by Thermo Environmental Corp. to measure carbon monoxide
Thermo 49 – the instrument manufactured by Thermo Environmental Corp. to measure ozone
Thermo 1400 – the instrument manufactured by Thermo Environmental Corp. to measure real-time $PM_{2.5}$
Thermo 2025 – the instrument manufactured by Thermo Environmental Corp. to measure $PM_{2.5}$; data from this instrument can be used for comparison to the NAAQS
Ultraviolet – the method used for analyzing ozone
Urban Scale – the spatial scale of a monitoring site, from 10-100 km around the monitor

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APPENDIX A: VOLATILE ORGANIC COMPOUNDS

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
1	1,1,1-Trichloroethane	43814	Canister	TO-15	101
2	1,1,2,2-Tetrachloroethane	43818	Canister	TO-15	101
3	1,1,2-Trichloroethane	43820	Canister	TO-15	101
4	1,1-Dichloroethane	43813	Canister	TO-15	101
5	1,1-Dichloroethene	43826	Canister	TO-15	101
6	1,2,4-Trichlorobenzene	45810	Canister	TO-15	101
7	1,2,4-Trimethylbenzene	45208	Canister	TO-15	101
8	1,2-Dibromoethane	43843	Canister	TO-15	101
9	1,2-Dichloroethane	43815	Canister	TO-15	101
10	1,2-Dichloropropane	43829	Canister	TO-15	101
11	1,3,5-Trimethylbenzene	45207	Canister	TO-15	101
12	1,3-Butadiene	43218	Canister	TO-15	101
13	Acetonitrile	43702	Canister	TO-15	101
14	Acetylene	43206	Canister	TO-15	101
15	Acrolein	43505	Canister	TO-15	101
16	Acrylonitrile	43704	Canister	TO-15	101
17	Benzene	45201	Canister	TO-15	101
18	Bromochloromethane	43836	Canister	TO-15	101
19	Bromodichloromethane	43828	Canister	TO-15	101
20	Bromoform	43806	Canister	TO-15	101
21	Bromomethane	43819	Canister	TO-15	101
22	Carbon Disulfide	42153	Canister	TO-15	101
23	Carbon Tetrachloride	43804	Canister	TO-15	101
24	Chlorobenzene	45801	Canister	TO-15	101
25	Chloroethane	43812	Canister	TO-15	101
26	Chloroform	43803	Canister	TO-15	101
27	Chloromethane	43801	Canister	TO-15	101
28	Chloroprene	43835	Canister	TO-15	101
29	cis-1,2-Dichloroethylene	43839	Canister	TO-15	101
30	cis-1,3-Dichloropropene	43831	Canister	TO-15	101
31	Dibromochloromethane	43832	Canister	TO-15	101
32	Dichlorodifluoromethane	43823	Canister	TO-15	101
33	Dichloromethane	43802	Canister	TO-15	101
34	Dichlorotetrafluoroethane	43208	Canister	TO-15	101
35	Ethyl Acrylate	43438	Canister	TO-15	101
36	Ethyl tert-Butyl Ether	43396	Canister	TO-15	101
37	Ethylbenzene	45203	Canister	TO-15	101
38	Hexachloro-1,3-Butadiene	43844	Canister	TO-15	101

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
39	m,p-Xylene	45109	Canister	TO-15	101
40	m-Dichlorobenzene	45806	Canister	TO-15	101
41	Methyl Isobutyl Ketone	43560	Canister	TO-15	101
42	Methyl Methacrylate	43441	Canister	TO-15	101
43	Methyl tert-Butyl Ether	43372	Canister	TO-15	101
44	n-Octane	43233	Canister	TO-15	101
45	o-Dichlorobenzene	45805	Canister	TO-15	101
46	o-Xylene	45204	Canister	TO-15	101
47	p-Dichlorobenzene	45807	Canister	TO-15	101
48	Propylene	43205	Canister	TO-15	101
49	Styrene	45220	Canister	TO-15	101
50	tert-Amyl Methyl Ether	43373	Canister	TO-15	101
51	Tetrachloroethylene	43817	Canister	TO-15	101
52	Toluene	45202	Canister	TO-15	101
53	trans-1,2-Dichloroethylene	43838	Canister	TO-15	101
54	trans-1,3-Dichloropropene	43830	Canister	TO-15	101
55	Trichloroethylene	43824	Canister	TO-15	101
56	Trichlorofluoromethane	43811	Canister	TO-15	101
57	Trichlorotrifluoroethane	43821	Canister	TO-15	101
58	Vinyl Chloride	43860	Canister	TO-15	101

APPENDIX B: CARBONYLS

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
1	2-Butanone	43552	DNPH Cartridge	TO-11A	202
2	2,5-Dimethylbenzaldehyde	45503	DNPH Cartridge	TO-11A	202
3	Acetaldehyde	43503	DNPH Cartridge	TO-11A	202
4	Acetone	43551	DNPH Cartridge	TO-11A	202
5	Benzaldehyde	45501	DNPH Cartridge	TO-11A	202
6	Butyraldehyde	43329	DNPH Cartridge	TO-11A	202
7	Crotonaldehyde	43528	DNPH Cartridge	TO-11A	202
8	Formaldehyde	43502	DNPH Cartridge	TO-11A	202
9	Hexaldehyde	43517	DNPH Cartridge	TO-11A	202
10	Isovaleraldehyde	43513	DNPH Cartridge	TO-11A	202
11	Propionaldehyde	43504	DNPH Cartridge	TO-11A	202
12	Tolualdehydes	45504	DNPH Cartridge	TO-11A	202
13	Valeraldehyde	43518	DNPH Cartridge	TO-11A	202

APPENDIX C: SPECIATED FINE PARTICLES

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
1	Aluminum	88104	Met One SASS Teflon	Energy Dispersive XRF	811
2	Ammonium	88301	Met One SASS Nylon	Ion Chromatography	812
3	Antimony	88102	Met One SASS Teflon	Energy Dispersive XRF	811
4	Arsenic	88103	Met One SASS Teflon	Energy Dispersive XRF	811
5	Barium	88107	Met One SASS Teflon	Energy Dispersive XRF	811
6	Bromine	88109	Met One SASS Teflon	Energy Dispersive XRF	811
7	Cadmium	88110	Met One SASS Teflon	Energy Dispersive XRF	811
8	Calcium	88111	Met One SASS Teflon	Energy Dispersive XRF	811
9	Cerium	88117	Met One SASS Teflon	Energy Dispersive XRF	811
10	Cesium	88118	Met One SASS Teflon	Energy Dispersive XRF	811
11	Chlorine	88115	Met One SASS Teflon	Energy Dispersive XRF	811
12	Chromium	88112	Met One SASS Teflon	Energy Dispersive XRF	811
13	Cobalt	88113	Met One SASS Teflon	Energy Dispersive XRF	811
14	Copper	88114	Met One SASS Teflon	Energy Dispersive XRF	811
15	EleCarbTor	88380	URG 3000N	EC1+EC2+EC3-(OP(TOR))	838
16	EleCarbTot	88357	URG 3000N	EC1+EC2+EC3-OP	838
17	Indium	88131	Met One SASS Teflon	Energy Dispersive XRF	811
18	Iron	88126	Met One SASS Teflon	Energy Dispersive XRF	811
19	Lead	88128	Met One SASS Teflon	Energy Dispersive XRF	811
20	Magnesium	88140	Met One SASS Teflon	Energy Dispersive XRF	811
21	Manganese	88132	Met One SASS Teflon	Energy Dispersive XRF	811
22	Nickel	88136	Met One SASS Teflon	Energy Dispersive XRF	811
23	Nitrate	88306	Met One SASS Nylon	Ion Chromatography	812
24	OrgCarbTor	88370	URG 3000N	OC1+OC2+OC3+OC4+(OP(TOR))	838
25	OrgCarbTot	88355	URG 3000N	OC1+OC2+OC3+OC4+OP	838
26	Phosphorus	88152	Met One SASS Teflon	Energy Dispersive XRF	811
27	Potassium	88180	Met One SASS Teflon	Energy Dispersive XRF	811
28	Potassium IC	88303	Met One SASS Nylon	Ion Chromatography	812
29	Rubidium	88176	Met One SASS Teflon	Energy Dispersive XRF	811
30	Selenium	88154	Met One SASS Teflon	Energy Dispersive XRF	811
31	Silicon	88165	Met One SASS Teflon	Energy Dispersive XRF	811
32	Silver	88166	Met One SASS Teflon	Energy Dispersive XRF	811
33	Sodium	88184	Met One SASS Teflon	Energy Dispersive XRF	811
34	Sodium IC	88302	Met One SASS Nylon	Ion Chromatography	812
35	Strontium	88168	Met One SASS Teflon	Energy Dispersive XRF	811
36	Sulfate	88403	Met One SASS Nylon	Ion Chromatography	812
37	Sulfur	88169	Met One SASS Teflon	Energy Dispersive XRF	811
38	Tin	88160	Met One SASS Teflon	Energy Dispersive XRF	811
39	Titanium	88161	Met One SASS Teflon	Energy Dispersive XRF	811
40	Vanadium	88164	Met One SASS Teflon	Energy Dispersive XRF	811
41	Zinc	88167	Met One SASS Teflon	Energy Dispersive XRF	811
42	Zirconium	88185	Met One SASS Teflon	Energy Dispersive XRF	811

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
1	Sum of PAMS	43000	Agilent-Markes	Auto-GC-FID	078
2	Total NMOC	43102	Agilent-Markes	Auto-GC-FID	078
3	Ethane	43202	Agilent-Markes	Auto-GC-FID	078
4	Ethylene	43203	Agilent-Markes	Auto-GC-FID	078
5	Propane	43204	Agilent-Markes	Auto-GC-FID	078
6	Propylene	43205	Agilent-Markes	Auto-GC-FID	078
7	Acetylene	43206	Agilent-Markes	Auto-GC-FID	078
8	n-Butane	43212	Agilent-Markes	Auto-GC-FID	078
9	Isobutane	43214	Agilent-Markes	Auto-GC-FID	078
10	trans-2-Butene	43216	Agilent-Markes	Auto-GC-FID	078
11	cis-2-Butene	43217	Agilent-Markes	Auto-GC-FID	078
12	n-Pentane	43220	Agilent-Markes	Auto-GC-FID	078
13	Isopentane	43221	Agilent-Markes	Auto-GC-FID	078
14	1-Pentene	43224	Agilent-Markes	Auto-GC-FID	078
15	trans-2-Pentene	43226	Agilent-Markes	Auto-GC-FID	078
16	cis-2-Pentene	43227	Agilent-Markes	Auto-GC-FID	078
17	3-Methylpentane	43230	Agilent-Markes	Auto-GC-FID	078
18	n-Hexane	43231	Agilent-Markes	Auto-GC-FID	078
19	n-Heptane	43232	Agilent-Markes	Auto-GC-FID	078
20	n-Octane	43233	Agilent-Markes	Auto-GC-FID	078
21	n-Nonane	43235	Agilent-Markes	Auto-GC-FID	078
22	n-Decane	43238	Agilent-Markes	Auto-GC-FID	078
23	Cyclopentane	43242	Agilent-Markes	Auto-GC-FID	078
24	Isoprene	43243	Agilent-Markes	Auto-GC-FID	078
25	2,2-Dimethylbutane	43244	Agilent-Markes	Auto-GC-FID	078
26	1-Hexene	43245	Agilent-Markes	Auto-GC-FID	078
27	2,4-Dimethylpentane	43247	Agilent-Markes	Auto-GC-FID	078
28	Cyclohexane	43248	Agilent-Markes	Auto-GC-FID	078
29	3-Methylhexane	43249	Agilent-Markes	Auto-GC-FID	078
30	2,2,4-Trimethylpentane	43250	Agilent-Markes	Auto-GC-FID	078
31	2,3,4-Trimethylpentane	43252	Agilent-Markes	Auto-GC-FID	078
32	3-Methylheptane	43253	Agilent-Markes	Auto-GC-FID	078
33	Methylcyclohexane	43261	Agilent-Markes	Auto-GC-FID	078
34	Methylcyclopentane	43262	Agilent-Markes	Auto-GC-FID	078
35	2-Methylhexane	43263	Agilent-Markes	Auto-GC-FID	078
36	1-Butene	43280	Agilent-Markes	Auto-GC-FID	078
37	2,3-Dimethylbutane	43284	Agilent-Markes	Auto-GC-FID	078
38	2-Methylpentane	43285	Agilent-Markes	Auto-GC-FID	078
39	2,3-Dimethylpentane	43291	Agilent-Markes	Auto-GC-FID	078
40	n-Undecane	43954	Agilent-Markes	Auto-GC-FID	078
41	2-Methylheptane	43960	Agilent-Markes	Auto-GC-FID	078

	Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
42	m/p Xylene	45109	Agilent-Markes	Auto-GC-FID	078
43	m/p Ethyltoluene	45116	Agilent-Markes	Auto-GC-FID	078
44	Benzene	45201	Agilent-Markes	Auto-GC-FID	078
45	Toluene	45202	Agilent-Markes	Auto-GC-FID	078
46	Ethylbenzene	45203	Agilent-Markes	Auto-GC-FID	078
47	o-Xylene	45204	Agilent-Markes	Auto-GC-FID	078
48	1,3,5-Trimethylbenzene	45207	Agilent-Markes	Auto-GC-FID	078
49	1,2,4-Trimethylbenzene	45208	Agilent-Markes	Auto-GC-FID	078
50	n-Propylbenzene	45209	Agilent-Markes	Auto-GC-FID	078
51	Isopropylbenzene	45210	Agilent-Markes	Auto-GC-FID	078
52	o-Ethyltoluene	45211	Agilent-Markes	Auto-GC-FID	078
53	m-Ethyltoluene	45212	Agilent-Markes	Auto-GC-FID	078
54	p-Ethyltoluene	45213	Agilent-Markes	Auto-GC-FID	078
55	m-Diethylbenzene	45218	Agilent-Markes	Auto-GC-FID	078
56	p-Diethylbenzene	45219	Agilent-Markes	Auto-GC-FID	078
57	Styrene	45220	Agilent-Markes	Auto-GC-FID	078
58	1,2,3-Trimethylbenzene	45225	Agilent-Markes	Auto-GC-FID	078

APPENDIX E: BTEX COMPOUNDS

Parameter	AQS Parameter Code	Sampling Instrument	Method of Analysis	AQS Method Code
Benzene	45201	Syntech Spectras BTEX analyzer GC 955	Gas Chromatography	092
Toluene	45202	Syntech Spectras BTEX analyzer GC 955	Gas Chromatography	092
Ethylbenzene	45203	Syntech Spectras BTEX analyzer GC 955	Gas Chromatography	092
m,p-Xylene	45109	Syntech Spectras BTEX analyzer GC 955	Gas Chromatography	092
o-Xylene	45204	Syntech Spectras BTEX analyzer GC 955	Gas Chromatography	092

Appendix F: Enhanced Monitoring Plan (EMP) for Ozone

I.   INTRODUCTION

Since current ozone levels in New Jersey classify areas of the state in the "moderate nonattainment" category, the New Jersey Department of Environmental Protection (NJDEP) is required to submit an Enhanced Monitoring Plan (EMP) for ozone in accordance with 40 CFR Part 58 Appendix D, paragraph 5 (h). The objective of the EMP is to implement additional monitoring efforts that are important to understanding the ozone problems in New Jersey.

Ozone is a regional pollutant, and New Jersey is part of the Ozone Transport Region (OTR), a group of northeast states from Virginia to Maine that are jointly addressing the ozone problem. An effective EMP would involve the cooperation of multiple bordering states, especially since the ozone concentrations are affected by transport and secondary atmospheric reactions. The NJDEP plans to include the following monitoring activities in the EMP:

- Measurement of ozone (O_3), volatile organic compounds (VOCs), carbon dioxide (CO_2), nitrogen oxides (NO_x), sulfur dioxide (SO_2) and formaldehyde (H_2CO) in various media, elevations and surfaces in the area of the Long Island Sound Tropospheric Ozone Study (LISTOS), and
- Enhanced measurement of meteorological parameters at Rutgers University.

Active participants in LISTOS include state agencies: NJDEP, New York State Department of Environmental Conservation (NYSDEC), New York State Energy Research & Development Authority (NYSERDA), Connecticut Department of Energy & Environmental Protection (CT DEEP), Rhode Island Department of Environmental Management (RIDEM), Maine Department of Environmental Protection (ME DEP), Massachusetts Department of Environmental Protection (MassDEP), Northeast States for Coordinated Air Use Management (NESCAUM); federal agencies: U.S. Environmental Protection Agency (USEPA), National Aeronautics and Space Administration (NASA); and universities: Rutgers University, Columbia University, City University of New York (CUNY), State University of New York at Albany (SUNY Albany) and the University of Maryland. The analysis of the data collected in LISTOS will provide a key for understanding the ozone problem in New Jersey and throughout the OTR.

II.   OZONE FORMATION AND TRANSPORT

Ground-level ozone is created when NO_x and VOCs react in the presence of sunlight. NO_x is primarily emitted by motor vehicles, power plants, and other sources of combustion. VOCs are emitted from motor vehicles, chemical plants, factories, consumer and commercial products, and even natural sources such as trees. The pollutants that form ozone, referred to as "precursor" pollutants, and ozone itself can also be transported into an area from sources hundreds of miles upwind.

Typical ozone episodes in the eastern U.S. often begin with the movement of a large high-pressure area from the Midwest to the middle or southern Atlantic states, where it combines with the Atlantic (Bermuda) high-pressure system. During its movement east, the combined air mass accumulates pollutants emitted by large coal-fired power plants and other sources located outside the OTR. As the air mass passes over the eastern U.S., sources within the OTR contribute additional air pollutants. This expansive weather system creates a vast area of clear skies and high temperatures that are conducive to the formation of ozone. These two prerequisites for enhanced ozone formation are further compounded by a circulation pattern favorable for pollution transport over large distances. In the worst cases, the high-pressure systems stall over the eastern U.S. for days, creating ozone episodes of strong intensity and long duration.

During ozone-exceedance episodes associated with high pressure systems, multiple transport features are embedded within a large ozone reservoir arriving from source regions to the south and west of the OTR. Thus, ozone exceedance episodes can contain elements of long-range air pollution transport from outside the OTR,

regional-scale transport within the OTR from channeled flows in nocturnal low-level air streams, and local transport along coastal shores due to bay, lake, and sea breezes.

Unhealthy ozone concentrations were measured in 2016 and 2017 at monitoring stations in Connecticut along the Long Island Sound. Although ozone levels were forecast to exceed the standard during these events, the magnitude of the exceedances were unexpected, and it was determined that more data was needed to understand the situation. Factors that have not been previously evaluated include the impact of land-water interfaces, given that there are no permanent monitoring stations on water surfaces or at elevated levels. These high ozone concentrations were the driving force behind the creation of the LISTOS project, which will measure ozone, ozone precursors and meteorological data from non-traditional monitoring locations, surfaces and elevations. The analysis of the data will help to understand the formation of these elevated ozone concentrations.

The state of New Jersey is in nonattainment for the ozone NAAQS, with the northern part of the state classified as being "moderate" and the southern part of the state classified as being "marginal." New Jersey's current classification with respect to the 2008 8-hour standard is shown in Figure 1.

Figure 1. Ozone Nonattainment Areas in New Jersey
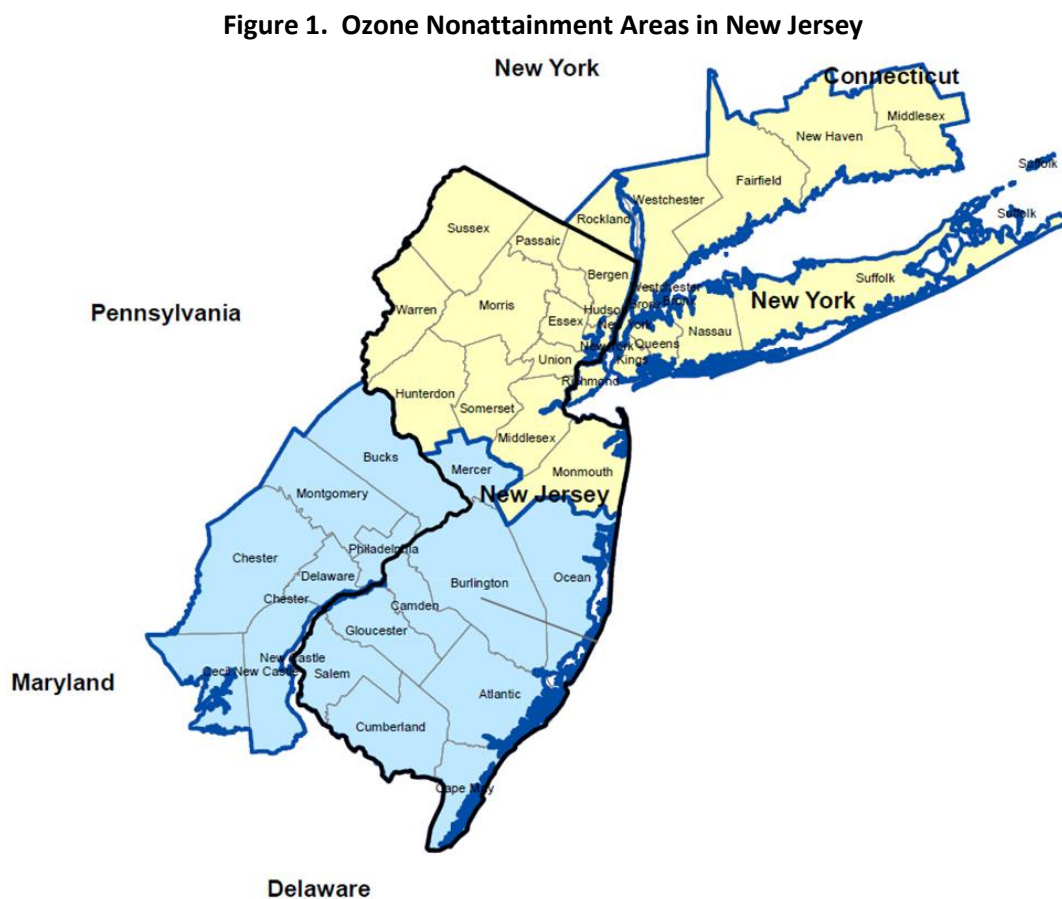
III.   MONITORING PROGRAM DESCRIPTION

The NJDEP Bureau of Air Monitoring, along with staff from Rutgers University's Institute of Earth, Ocean and Atmospheric Sciences (EOAS), will provide support for the installation and operation of NASA's Light Detection and Ranging (LIDAR) sensor trailer for a period of six weeks in late summer 2018 at the NJDEP Rutgers University air monitoring station. In addition, a Pandora spectrometer will be installed at the Rutgers station, and BEACON portable sensors will be installed at the NJDEP Fort Lee Near Road station. The duration of the operation of the Pandora and BEACON instruments will be determined jointly by NASA and USEPA's Office of Research and Development, who will provide the instruments. Table 1 lists the pollutants to be measured by the instruments.

Table 1. Pollutants to Be Measured

POLLUTANT	MONITOR/INSTRUMENT	LOCATION	COMMENT
Ozone	LIDAR trailer	Rutgers Univ	Operation during forecast ozone events
Nitrogen oxides (NO, NO_2, NO_x)	Pandora spectrometer	Rutgers Univ	Direct sun required
Formaldehyde	Pandora spectrometer	Rutgers Univ	Direct sun required
Carbon dioxide	BEACON (Vaisala CarboCap GMP343) sensor	Fort Lee Near Road	Portable outdoor sensor
Nitrogen oxides, sulfur dioxide, carbon monoxide	BEACON (Alphasense) sensor	Fort Lee Near Road	Portable outdoor sensor

The BEACON sensors operate continuously and record measurements every minute. The Pandora spectrometer operates during daylight hours and records 20-second average measurements every 2 minutes. The ozone LIDAR will take measurements only during forecast ozone events. NASA and EPA-ORD are responsible for installing, overseeing the routine operation, and calibration of the ozone LIDAR, the Pandora spectrometer and the BEACON instruments.

The Rutgers University air monitoring station is part of the USEPA Photochemical Assessment Monitoring Station (PAMS) program. EOAS operates a 20-meter meteorological tower and multiple meteorological sensors at the Rutgers station that operate continuously. Many of these measurements are not required by PAMS, but the data will provide additional information for the analysis of ozone transport and formation. These parameters are listed in Table 2.

Table 2. Meteorological Measurements at the Rutgers University Station

PARAMETER	INSTRUMENT	COMMENT
Wind direction	Vaisala LAP-3000 Wind Profiler with RASS	
Wind speed	Vaisala LAP-3000 Wind Profiler with RASS	
Wind direction	Gill Windmaster HS 3D Sonic Anemometer	10-meter, 20-meter
Wind speed	Gill Windmaster HS 3D Sonic Anemometer	10-meter, 20-meter
Barometric pressure	Rotronic MP101A Pbe Temp/RH Sensor	2-meter, 10-meter, 20-meter
Ambient temperature	Rotronic MP101A Pbe Temp/RH Sensor	2-meter, 10-meter, 20-meter
Relative humidity	Rotronic MP101A Pbe Temp/RH Sensor	2-meter, 10-meter, 20-meter
Precipitation	Geonor T-200B Rain Gauge (weighing gauge)	
Sun tracker	Kipp & Zonen SOLYS2 Sun Tracker	
Total incoming shortwave solar radiation	Kipp & Zonen CMP-22 Pyranometer	
Diffuse incoming shortwave solar radiation	Kipp & Zonen CMP-11 Pyranometer	
Direct normal irradiance solar radiation	Kipp & Zonen CHP-1 Normal Incedence Pyrheliometer	
Incoming longwave solar radiation	Kipp & Zonen CNR-4 Pyrgeometer	
Energy balance (net radiation)	Kipp & Zonen CNR-4 Net Radiometer	
Total and diffuse shortwave insolation	Delta-T SPN-1	
Total, direct, and diffuse of 6 specific wavelengths	Yankee Environmental Systems MFRSR-7	
Ultraviolet radiation	Eppley TUVR UV Radiometer	
Lightning	TOA Systems Lightning Detector	20-meter

IV.   MONITORING SITE DESCRIPTION

Rutgers University Air Monitoring Station

The Rutgers University air monitoring station is located at Horticultural Farm #3 on the Cook College Campus of Rutgers University, 67 Ryders Lane, East Brunswick, in Middlesex County. The farm is bordered on the east by Ryders Lane, to the north and west by Westons Mill Pond, and bordered on the south by Sawmill Brook. The land use at the farm is agricultural, and it is surrounded by suburban residential areas. Farther out, US Highway 1 is to the northwest, and the New Jersey Turnpike is to the south and the east. The topography in the vicinity is smooth or slightly rolling. Figure 2 provides a topographical map showing the station's location.

Figure 2. Topographical Map Showing Area Surrounding Rutgers University Station

Figures 3 through 6 provide aerial and ground views of the Rutgers University station.

Figure 3. Aerial View of Rutgers University Station

Figure 4. View of Rutgers University Station from the East

Figure 5. View of Rutgers University Station from the North

Figure 6. View of Rutgers University Station from the West

Fort Lee Near Road Air Monitoring Station

The Fort Lee Near Road station is located in a maintenance yard owned by the Port Authority of New York and New Jersey, at the corner of Hoyt Avenue and Central Road in Fort Lee, Bergen County. Access to the maintenance yard is limited to Port Authority and NJDEP staff only. The maintenance yard is bordered to the north by the George Washington Bridge Tollbooths and I-95, to the west and east by surface parking lots, and to the south by a high-rise residential building. Farther out from the station is a commercial and retail area that is interspersed with office and residential towers. The surrounding areas have a high amount of pedestrian activity due to the proximity of shopping and dining establishments and bus stops. The land use near the maintenance yard is commercial and residential, in a dense urban setting. The topography in the vicinity is smooth or slightly rolling, except further east from the station where there is a steep drop in elevation. This geographic feature is part of the New Jersey Palisades, a line of steep cliffs along the west side of the Hudson River. Figure 7 provides a topographical map showing the station's location.

Figure 7. Topographic Map of Area Surrounding Fort Lee Near Road Station

Figures 8 and 9 provide aerial and ground views of the Fort Lee Near Road station.

Figure 8. Aerial View of Fort Lee Near Road Station

Figure 9. Ground View of Fort Lee Near Road Station

V.   MONITORING EQUIPMENT DESCRIPTION

OZONE LIDAR

Although the vertical locations of atmospheric trace gases are remotely monitored by satellites (such as CO_2 by the Atmospheric Infrared Sounder [AIRS]), acquiring these measurements in the ultraviolet (UV) regime, especially near the surface, is difficult because the optically thick stratospheric ozone layer strongly attenuates the signal (Fishman et al., 1990). By monitoring and analyzing tropospheric ozone from a ground-based instrument, such as an ozone LIDAR, the signal is not affected by stratospheric ozone and the tropospheric ozone concentrations can be detected at a much higher temporal and vertical resolution.

The NASA Goddard Space Flight Center Tropospheric Ozone DIfferential Absorption LIDAR (GSFC TROPOZ DIAL) has been developed to be transported in a trailer, in order to take routine measurements of tropospheric ozone near the Baltimore–Washington, D.C. area (Greenbelt, MD 38.99o N, 76.84oW, 57ma.s.l.) and various other locations. This instrument was designed to be part of the ground-based Tropospheric Ozone Lidar Network (TOLNet), which currently consists of five stations across the United States (see http://www-air.larc.nasa.gov/missions/TOLNet/). The primary purpose of TOLNet is to provide regular high-fidelity profile measurements of ozone within the troposphere, particularly the changing ozone dynamics and laminae inside the planetary boundary layer (source: Atmos. Meas. Tech., 7, 3529–3548, 2014).

An image of the trailer is shown in Figure 10, and a schematic of the GSFC TROPOZ DIAL system is shown in Figure 11.

Figure 10. Exterior View of LIDAR Trailer

Figure 11. Schematic of Ozone LIDAR system
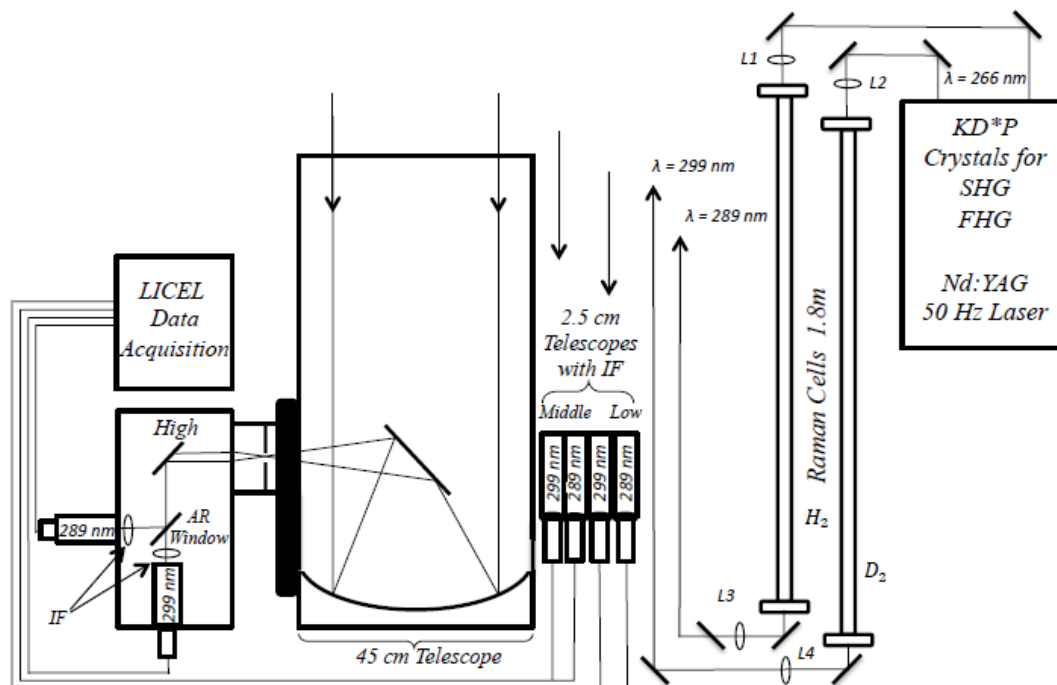
The ozone LIDAR will be handled by NASA personnel and will operate during forecast ozone events.

PANDORA

The Pandora instruments study the atmosphere by using spectroscopy. They deliver total column profiles of the atmosphere, including ozone, nitrogen dioxide and formaldehyde. Pandora tracks either the sun or moon to collect light through the total atmospheric column at wavelengths between 291 nm to 523 nm. This data gives information on the trace gases in the atmosphere, specifically, formaldehyde and NO_2 (source: https://acd-ext.gsfc.nasa.gov/Projects/Pandora/about.html).

The Pandora spectrometer system uses a temperature stabilized (1OC) symmetric Czerny-Turner system from Avantes over the range 280-525 nm (0.6 nm resolution with 4.5x oversampling) with a 2048 x 64 backthinned Hamamatsu CCD, 50 micron entrance slit, 1200 lines per mm grating, and fed light by a 400 micron core diameter fiber optic cable. The fiber optic cable obtains light from the sun, moon, or sky from front-end optics with a 2.2-degree field of view (FOV) for direct sun observations using a diffuser and 1.6O FOV for sky observations without a diffuser (source: https://acd-ext.gsfc.nasa.gov/Projects/Pandora/instrument.html).

The Pandora spectrometer will be installed by EPA-ORD personnel on the roof of the Rutgers University station. Output from the spectrometer will be recorded on a dedicated PC which will be located inside the shelter.

Figure 11. Exterior View of PANDORA Spectrometer

BEACON

Vaisala CarboCap GMP343 - the Vaisala CARBOCAP® is a silicon-based infrared (IR) absorption sensor that features an electronically tunable Fabry-Perot Interferometer (FPI) filter. Carbon dioxide (CO_2) has a characteristic absorbance band in the infrared (IR) region at a wavelength of 4.26 µm. This means that when IR radiation is passed through a gas containing CO_2, part of the radiation is absorbed. Therefore, the amount of radiation passing through the gas depends on the amount of CO_2 present, and this can be detected with an IR detector. The sensor is shown in Figure 12.

Figure 12: Vaisala CarboCap GMP343 Carbon Dioxide Sensor

Alphasense – the Alphasense carbon monoxide, nitric oxides and sulfur dioxide sensors are electrochemical cells that operate in the amperometric mode. They generate a current that is linearly proportional to the fractional volume of the pollutant. The cells contain an aqueous solution of Sulfuric Acid (H2SO4) or Propylene Carbonate, Polytetrafluoroethylene (PTFE), Polycarbonate (PC), Noryl Polymer and small quantities of Carbon (C), Platinum (Pt) and other precious metals. Electrochemical sensors have a finite lifespan and need to be replaced periodically.

The BEACON sensors will be installed by EPA-ORD personnel on the roof of the Fort Lee Near Road station. Output from the sensors will be recorded on a dedicated PC which will be located inside the shelter.

VI.   DATA VALIDATION AND REPORTING

Data from the ozone LIDAR will be recorded, reviewed, and validated by NASA personnel. Data from the Pandora spectrometer recorded on the dedicated PC may be viewed or downloaded remotely by accessing the PC through an open internet connection at the Rutgers University station. NASA and EPA-ORD personnel will routinely review the data and perform validation activities on the Pandora data. NJDEP staff members may perform on-site corrective action with instruction from EPA-ORD personnel. Data from the BEACON sensors will be stored as files on the PC at the Fort Lee Near Road Station. Since the Fort Lee Near Road station does not have an open internet connection, NJDEP staff will transfer the BEACON data files to a removable storage device and email the data to EPA-ORD personnel. EPA-ORD personnel will routinely review the BEACON data and perform validation activities.

Valid and final data from the ozone LIDAR, the Pandora spectrometer and BEACON sensors will be submitted by NASA and EPA-ORD to all the LISTOS participants.

VII.   QUALITY ASSURANCE

Since the objective of collecting the data described in the EMP is research, and not for comparison to the National Ambient Air Quality Standards, the comprehensive quality assurance requirements listed in 40 CFR Part 58 Appendix A will not apply to the ozone LIDAR, Pandora spectrometer or the BEACON sensors. Nevertheless, an appropriate effort of conducting quality control activities is needed to confirm the reliability and accuracy of the measurements. Such activities include calibration, routine checks, and traceability to known standards. NASA and EPA-ORD personnel will perform the necessary quality control activities with assistance from NJDEP and Rutgers staff members.