2014 Network Summary

New Jersey Department of Environmental Protection

NETWORK DESCRIPTION

In 2014, the New Jersey Department of Environmental Protection (NJDEP) Bureau of Air Monitoring operated 40 ambient air monitoring stations. The monitoring stations vary in terms of the number and type of monitors operating at each site. The NJDEP air monitoring program is primarily focused pollutants for which National Ambient Air Quality Standards (NAAQS) have been established, also known as criteria pollutants. Criteria pollutant monitoring is regulated by the United States Environmental Protection Agency (USEPA), which prescribes the design of the monitoring networks, the acceptable monitoring methods, and the minimum quality assurance activities. Data which meet USEPA requirements can then be used to determine compliance with the NAAQS. There are six criteria air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), and particulate matter (PM). Because particulate matter encompasses such a wide range of contaminants, there are NAAQS for two different size fractions of particles. There are separate standards for particles less than 10 microns (1 micron = one millionth of a meter), or inhalable particles (PM_{10}), and for particles less than 2.5 microns, or fine particles ($PM_{2.5}$).

In New Jersey, O_3, CO, NO_2, and SO_2 are measured using USEPA-approved continuous monitoring methods, and data collected for these pollutants are transmitted to a central data acquisition system in real-time. The Bureau of Air Monitoring posts air quality data updates to its web site (www.njaqinow.net) and to the USEPA's Air Now web site (www.airnow.gov) once every hour. To measure $PM_{2.5}$, particles are collected by pulling ambient air through a size-selective inlet onto a filter over a 24-hour period using an USEPA-approved sampler. The filters are manually transported to the Bureau of Air Monitoring's Technical Center for gravimetric analysis. In order to provide hourly particulate measurements that can be disseminated to the public in real time, the Bureau operates two types of continuous particulate monitors: the Tapered Element Oscillating Microbalance (TEOM) analyzer, and the $PM_{2.5}$ Beta Attenuation Analyzer. These have been installed at many sites, such as the new Fort Lee Near Road site.

Figure 1
Rider University Air Monitoring Station
Lawrenceville, Mercer County

In addition to monitoring criteria pollutants, the NJDEP also measures non-criteria pollutants, or pollutants that currently do not have health standards. For convenience, several groups of non-criteria pollutants are labeled by their purpose. The Photochemical Assessment Monitoring Station (PAMS) program, for example, measures non-criteria pollutants that are important in the formation of ozone. Since most ozone is not directly emitted from sources but forms in the atmosphere when volatile organic compounds and oxides of nitrogen react in the presence of sunlight, it is important to know the levels of these "precursor" pollutants. The PAMS program is described in more detail in a separate section of this report.

Figure 2
USEPA-approved $PM_{2.5}$ Sampler in Toms River, Ocean County

Five sites in the monitoring network collect samples of particulate matter that are analyzed to determine the chemical makeup of the particles. These are termed "$PM_{2.5}$ Speciation Sites" and are part of the USEPA's Speciation Trends Network (STN). This data is used in helping to identify the primary sources of particles, and in assessing potential health effects.

At four monitoring sites, samples are taken and analyzed for non-criteria pollutants that are classified as "air toxics." These are pollutants that have potential health effects but for which NAAQS have not been established. They can be carcinogenic or have other serious health effects, and are very diverse in their chemical composition.

Other non-criteria monitoring pollutants measured are a group of pollutants that are commonly emitted by motor vehicles and other combustion sources: benzene, toluene, ethylbenzene, ortho-xylene, meta-xylene, para-xylene and black carbon. In addition, the Bureau takes measurements of mercury, atmospheric deposition, visibility, and weather parameters such as wind speed and direction. An example of an air monitoring station is the Rider University site located in Lawrenceville, Mercer County, shown in Figure 1. This site measures criteria pollutant data as well as weather parameters. Figure 2 shows a USEPA-approved manual sampler to measure $PM_{2.5}$ located on the roof of the Hooper Avenue Elementary School in Toms River, Ocean County.
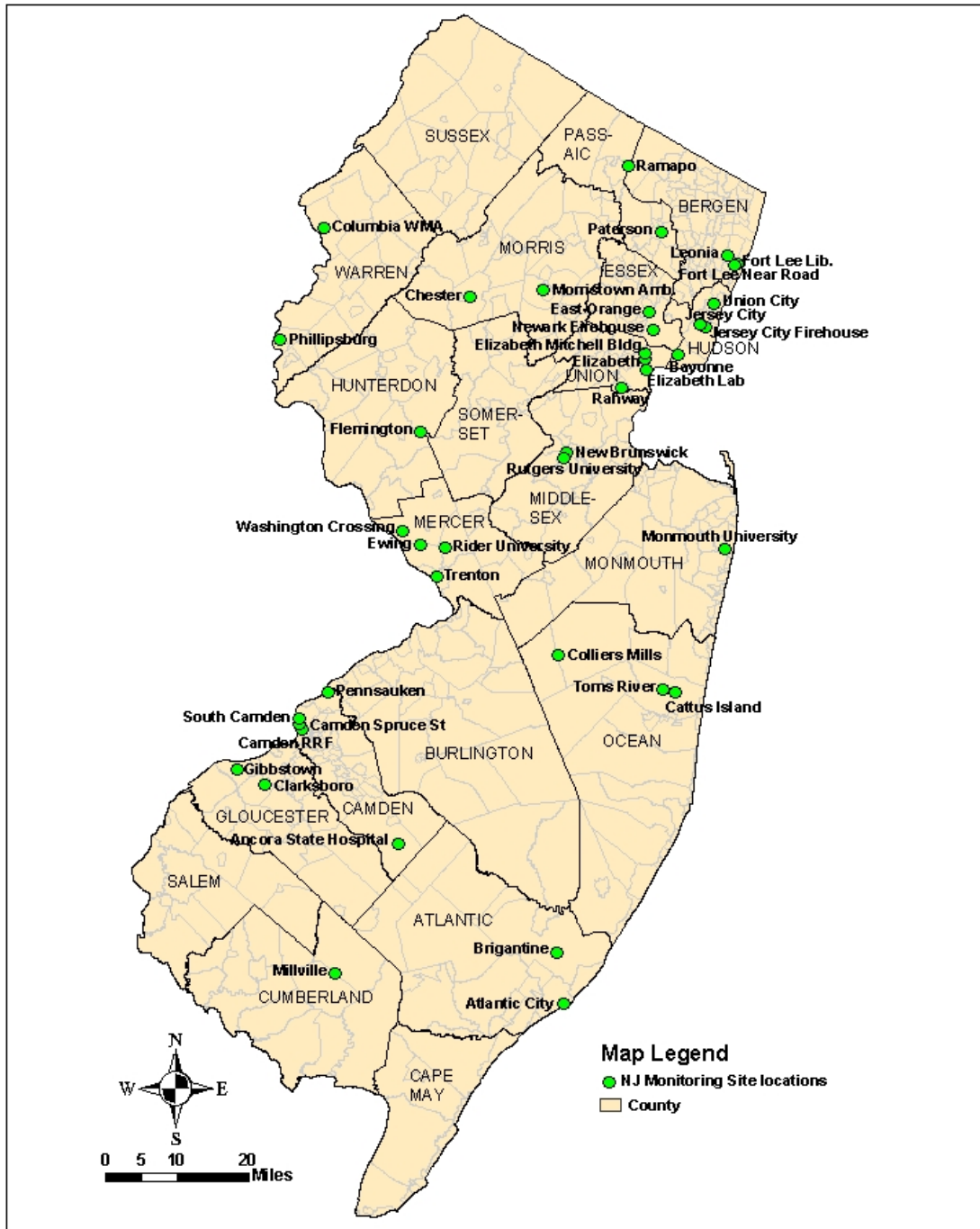
The map in Figure 3 shows the locations of all the sites that operated in 2014, and Table 1 shows which parameters were measured at each site.

Figure 3

New Jersey Air Monitoring Sites 2014
Network Summary

Table 1
2014 Monitoring Network Chart

	CO	NOx	NOy	O₃	SO₂	Smoke Shade	PM₂.₅	PM₂.₅-Speciation	Real-Time PM₂.₅ TEOM	Real-Time PM₂.₅ Beta	Visibility	PM₁₀	O₃ Precursors - PAMS	VOCs/ Carbonyls	BTEX/ Black Carbon	Lead	Acid Deposition	Mercury	Barometric Pres./ Relative Humidity	Solar Radiation	Temperature	Wind Speed/ Direction
Ancora State Hospital				Y																		
Atlantic City							Y															
Bayonne		Y		Y	Y										Y				Y		Y	Y
Brigantine				Y	Y		Y			Y	Y							Y				
Camden RRF												Y										
Camden Spruce Street	Y	Y		Y	Y		Y	Y		Y				Y	Y				Y		Y	Y
Cattus Island																	Y					
Chester		Y		Y	Y		Y	Y						Y				Y			Y	
Clarksboro		Y																				
Colliers Mills				Y																		
Columbia WMA		Y		Y	Y		Y			Y									Y		Y	Y
East Orange	Y	Y																	Y		Y	Y
Elizabeth	Y				Y	Y																
Elizabeth Lab	Y	Y			Y	Y	Y	Y		Y				Y	Y			Y				Y
Elizabeth Mitchell Bldg							Y															
Ewing									Y													
Flemington		Y							Y										Y	Y	Y	Y
Fort Lee Library							Y															
Fort Lee Near Road	Y	Y								Y												
Gibbstown							Y															
Jersey City	Y				Y	Y																
Jersey City Firehouse							Y		Y			Y										
Leonia				Y																		
Millville		Y		Y						Y												
Monmouth University				Y																		
Morristown Amb Squad							Y															
New Brunswick							Y	Y		Y				Y				Y				
Newark Firehouse	Y	Y	Y	Y	Y		Y	Y		Y					Y	Y			Y	Y	Y	Y
Paterson							Y															
Pennsauken							Y															
Phillipsburg							Y															
Rahway							Y		Y													
Ramapo				Y																		
Rider University				Y															Y	Y	Y	Y
Rutgers University		Y		Y									Y						Y²	Y²	Y²	Y²
South Camden									Y													
Toms River							Y															
Trenton							Y															
Union City							Y															
Washington Crossing							Y										Y					
TOTAL	7	10	1	16	9	3	21	5	5	8	1	2	1	4	4	1	2	4	8	5	8	9

Y – Parameter measured in 2014   ▮ Began measuring data in 2014. See Table 2 (page 5)

² - Meteorological measurements at the site are collected by Rutgers University

CHANGES TO THE NETWORK, 2014

In 2014, real-time $PM_{2.5}$ Beta Attenuation analyzers were installed at the Columbia WMA and Camden Spruce Street monitoring sites. At the Bayonne site, BTEX and black carbon analyzers were installed, along with a meteorological sensor that measures wind speed, wind direction, temperature, relative humidity, and barometric pressure. The new Fort Lee Near Road site began operating in 2014 and measures nitrogen oxides, carbon monoxide, and real-time $PM_{2.5}$ with a Beta Attenuation analyzer.

Table 2
2014 Network Changes (by Date)

Monitoring Site	Parameter(s)	Action	Date
Columbia WMA	Real-time $PM_{2.5}$ (Beta analyzer)	Start-up	01/10/14
Bayonne	BTEX, black carbon, wind speed, wind direction, temperature, relative humidity, barometric pressure	Start-up	03/11/14
Fort Lee Near Road	NO_x, CO	Start-up	04/01/14
Camden Spruce Street	Real-time $PM_{2.5}$ (Beta analyzer)	Start-up	04/04/14
Fort Lee Near Road	Real-time $PM_{2.5}$ (Beta analyzer)	Start-up	04/21/14

REFERENCES

Ball, R. J. and G. E. Anderson, Optimum Site Exposure Criteria for Sulfur Dioxide Monitoring, EPA-450/3-77-013, The Center for the Environment and Man, Inc., Hartford, CT, Prepared for USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1977.

Ludwig, F. L. and J. H. S. Kealoha, Selecting Sites for Carbon Monoxide Monitoring, EPA-450/3-75-077, Stanford Research Institute, Menlo Park, CA. Prepared for USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, September 1975.

Ludwig, F. L. and E. Shelar, Site Selection for the Monitoring of Photochemical Air Pollutants, EPA-450/3-78-013, Stanford Research Institute, Menlo Park, CA, Prepared for USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, April 1978.

Network Design for State and Local Air Monitoring Stations (SLAMS), National Air Monitoring Stations (NAMS), and Photochemical Assessment Monitoring Stations (PAMS), 40 CFR 58 Appendix D, US Government Printing Office, Washington DC, July 1997.

Pelton, D. J. and R. C. Koch, Optimum Sampling Exposure Criteria for Lead, EPA-450/4-84-012, GEOMET Technologies, Inc., Rockville, MD, Prepared for UESPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1984.

Watson, J. G., et. al., Guidance for Network Design and Optimum Site Exposure for $PM_{2.5}$ and PM10, EPA-454/R-99-022, Desert Research Institute, University and Community College System of Nevada, Reno, NV. Prepared for USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 1997.