



2010 Network Summary

New Jersey Department of Environmental Protection

NETWORK DESIGN

In 2010, the Bureau of Air Monitoring maintained 41 Ambient Air Monitoring Sites in New Jersey. These monitoring sites fulfill one or more of the following objectives: measure maximum pollutant concentration, assess population exposure, determine the impact of major pollution sources, measure background levels, determine the extent of regional pollutant transport, or measure secondary impacts in rural areas.

Data from the network is provided to various public and media outlets and is used to provide hourly updates on air quality to the Bureau's web page at

<http://www.njaqinow.net/Default.htm>. The Air Monitoring Sites can be divided into two primary networks: the Continuous Monitoring Network and the Manual Sampling Network.

SPATIAL SCALES

There are many factors which affect the design of a monitoring network. Among these are pollutant characteristics, topographical features, population distribution, location of pollution sources, meteorology, and logistics.

One of the most important factors to consider when selecting a site is the spatial area it actually represents. To assist with this, the United States Environmental Protection Agency (USEPA) developed specific scales of representativeness for air monitoring sites. The spatial scales specify the area surrounding a monitor where the pollutant concentrations should be relatively similar. For each monitoring objective, appropriate spatial scales can be used to identify the general physical location of a suitable monitoring site. The various spatial scales are defined below:

Micro-scale (10 – 100m): Monitors in locations that show significant concentration differences within 100 meters of the monitor are classified being Micro-scale monitors. This often occurs when monitors are located right next to low-level emission sources, such as busy roadways,



Figure 1: Photo of Brigantine Air Monitoring Station located on the grounds of the Edwin Forsythe National Wildlife Refuge in Atlantic County.

construction sites, and facilities with short stacks. These locations should be in areas where the general public is exposed to the concentrations measured.

Middle Scale (100 – 5000m): These monitors are in areas where pollutant levels are reasonably consistent over an area of up to 0.5 kilometer. Such sites may be near large industrial areas with many different operations or near large construction sites. Middle scale monitoring sites are often source oriented. Monitoring measurements of this type might be appropriate for the evaluation of short-term exposure to an emission source.

Neighborhood scale (0.5 – 4km): Neighborhood scale monitors are in locations that have fairly consistent pollutant concentrations over areas up to a few kilometers. A particular location can represent not only the immediate neighborhood but also neighborhoods of the same type in other parts of the city. Neighborhood scale monitors provide good data for trend analysis studies and compliance with National Ambient Air Quality Standards (NAAQS) because their zones of representation often encompass areas where people commonly reside.

Urban Scale (4 – 50km): Urban scale monitors show consistency among pollutant measurements with monitor separations up to 50 kilometers. Urban scale sites are usually located at higher elevations and away from highly traveled roads and industries. These locations are ideal for evaluating concentrations over an entire metropolitan and/or rural area.

Regional scale (100 – 1000km): Regional scale (background monitors) monitors can represent pollutant levels over an area of a few hundred kilometers. These monitors are best located in rural areas away from local sources, and at higher elevations. National parks, national wilderness areas, and many state and county parks and reserves are appropriate areas for regional scale sites. Data gathered at this scale location is most useful in assessing pollutant concentrations over a large area and evaluating transported emissions.

THE CONTINUOUS MONITORING NETWORK

The Continuous Monitoring Network consists of sites which measure carbon monoxide (CO), oxides of nitrogen (NO_x), ozone (O₃), sulfur dioxide (SO₂), particulate matter, smoke shade (SS), total reactive oxides of nitrogen (NO_y), mercury (Hg), and meteorological data which include wind speed (WS), wind direction (WD), barometric pressure, solar radiation, temperature, and relative humidity. The Bureau of Air Monitoring has a data acquisition system primarily for its continuous monitoring network. The system uses wireless communication technology to transmit data to a centralized computer station located in Trenton, NJ. The information is transmitted once every minute, thus providing real-time data retrieval capability. A map showing the location of the continuous monitoring sites is shown in Figure 2. Changes to the Continuous Network are summarized in Table 1 (page 3). The parameters recorded at each site are displayed in Table 2 (page 4). Many of the continuous site locations are also part of the Manual Monitoring Network, which is described in the next section.

Figure 2
2010 – Continuous Monitoring Network

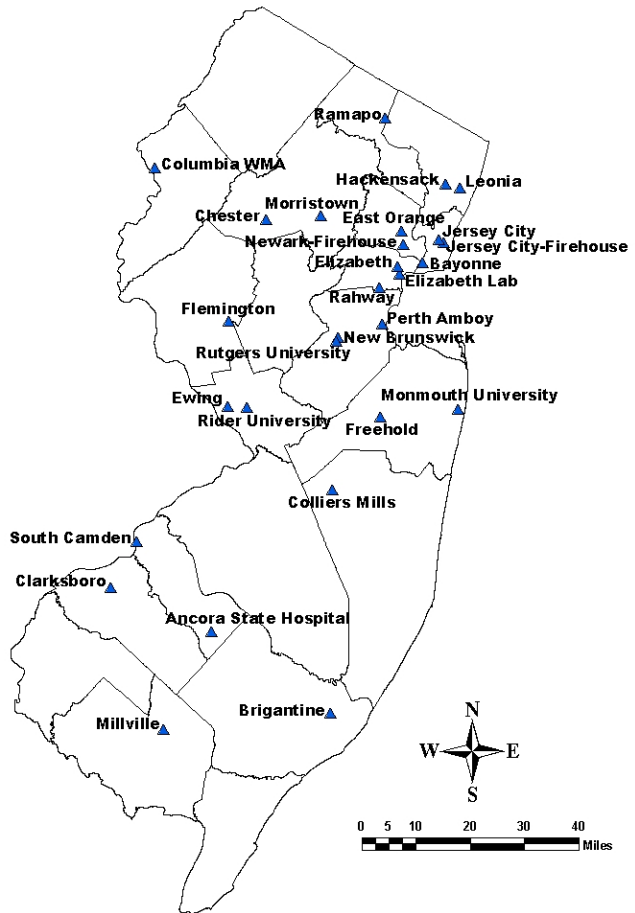


Table 1

2009-2010 Continuous Network Changes			
Monitoring Site	Parameter(s)	Action	Date
Burlington	CO, SO ₂ , SS	Shutdown	12/29/09
Columbia WMA	SO ₂	Start-up	09/23/10
	TEOM	Start-up	10/22/10
Ewing	TEOM	Start-up	01/01/09
Fort Lee	CO	Shutdown	11/04/09
	TEOM	Shutdown	10/16/09
Hackensack	CO, SO ₂ , SS	Shutdown	12/31/10
Newark Firehouse	CO, O ₃ , SO ₂	Start-up	06/01/09
	TEOM	Start-up	09/01/09
	NO _y , WS,WD, Barometric Pressure	Start-up	11/09/10
	Temperature, Solar Radiation	Start-up	11/10/10
	Relative Humidity	Start-up	12/17/10

Table 2
2010 – Continuous Air Monitoring Network

Continuous Parameter Codes

- | | | | |
|-----------------------|-------------------------------------|-----------------------|---|
| CO | - Carbon Monoxide | SS | - Smoke Shade |
| NO_x | - Nitrogen Dioxide and Nitric Oxide | TEOM | - Continuous PM _{2.5} Analyzer |
| O₃ | - Ozone | MET | - Meteorological Parameters |
| SO₂ | - Sulfur Dioxide | NO_Y | - Total Reactive Oxides of Nitrogen |
| Hg | - Mercury Station | | |

SITE	CO	NO _x	O ₃	SO ₂	NO _Y	SS	TEOM	MET	Hg
Ancora State Hospital	U		U	U					
Bayonne		U	N	N					
Brigantine			U	U			U		U
Chester		U	U	U				N	U
Clarksboro			U	U					
Colliers Mills			U						
Columbia WMA				U			U		
East Orange	N	N						N	
Elizabeth	Mi			M		N			
Elizabeth Lab	N	N		N		N	N	N	U
Ewing							N		
Flemington			U				N	N	
Freehold	Mi					N			
Hackensack	N			N		N			
Jersey City-Firehouse							N		
Jersey City	Mi			N		N			
Leonia		N	N						
Millville		N	N	N			N		
Monmouth University			N						
Morristown	Mi					N			
New Brunswick							N		U
Newark - Firehouse	N		N	N	N		N	N	
Perth Amboy	N			N		N			
Rahway							N		
Ramapo			U						
Rider University		N	N					N	
Rutgers University		N	N					U*	
South Camden							N		
TOTAL	10	8	14	13	1	7	11	7	4

Spatial Scale codes: Mi - **Micro**, M - **Middle**, N - **Neighborhood**, U - **Urban**, R - **Regional**

* Meteorological measurements at this site are collected by Rutgers University

MANUAL MONITORING NETWORK

The Manual Monitoring Network does not transmit data in near real-time as does the Continuous Monitoring Network. The manual network consists primarily of various instruments that collect samples for subsequent analysis in a laboratory. The network provides data on fine particulates (particles smaller than 2.5 micrometers in diameter or PM_{2.5}), inhalable particulates (particles smaller than 10 micrometers in diameter or PM₁₀), several parameters associated with atmospheric deposition, pollutants important in the formation of ground level ozone (ozone precursors), and a group of organic and inorganic compounds that are considered toxic pollutants. Sites that measure ozone precursors are part of the national Photochemical Assessment Monitoring Station (PAMS) program and operates from June to August. While these ozone precursors are automatically measured every hour, the data are retrieved daily and require extensive review before they are validated. Changes to the Manual Network are shown in Table 3. A map of the manual sampling sites is shown in Figure 3 and a list of the pollutants measured at each location is shown in Table 4 (page 6).

Figure 3
2010 – Manual Monitoring Network

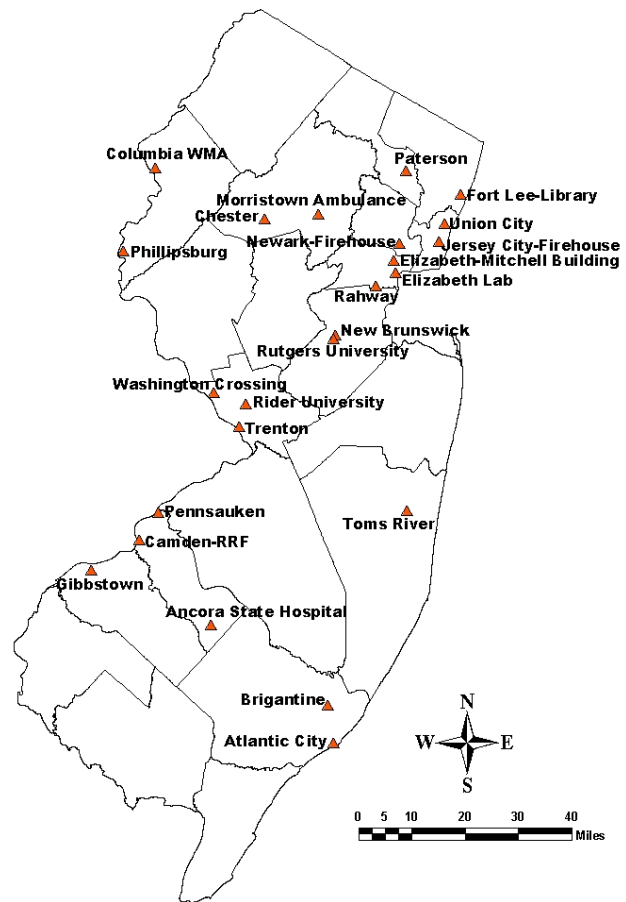


Table 3

2009-2010 Manual Network Changes			
Monitoring Site	Parameter(s)	Action	Date
Atlantic City	PM ₁₀	Shutdown	03/09/10
Columbia WMA	PM _{2.5}	Start-up	09/23/10
Fort Lee	PM ₁₀	Shutdown	12/03/09
Newark - Firehouse	PM _{2.5} , PM _{2.5} Spec	Start-up	07/03/09
Rider	PAMS	Shutdown	08/31/10

**Table 4
2010 - Manual Air Monitoring Network**

Manual Parameter Codes

PM_{2.5}	- PM _{2.5} Sampler: FRM (Federal Reference Method)	CARB	- Carbonyls
PM₁₀	- FRM Manual PM ₁₀ Sampler	VOCs	- Volatile Organic Compounds
PM_{2.5} Spec	- PM _{2.5} Speciation Trends Network Sampler	ACID Deposition	- Acidity (pH scale) in precipitation
PAMS	- Photochemical Assessment Monitoring (Ozone Precursors)		

SITE	PM_{2.5}	PM₁₀	PM_{2.5}Spec	PAMS	CARB	VOCs	ACID Deposition
Ancora State Hospital							U
Atlantic City	N	N					
Brigantine	U						U*
Camden-RRF		M					
Chester	U		U		U	U	
Columbia WMA	U						
Elizabeth Lab	N		N		N	N	
Elizabeth-Mitchell Building	N						
Fort Lee-Library	N						
Gibbstown	N						
Jersey City-Firehouse	N	N					
Morristown-Ambulance Squad	N						
New Brunswick	N		N		N	N	
Newark - Firehouse	N		N				
Paterson	N						
Pennsauken	N						
Phillipsburg	N						
Rahway	N						
Rider University				N			
Rutgers University				N			
Toms River	N						
Trenton	N	N					
Union City	N						
Washington Crossing	N						U
TOTAL	20	4	4	2	3	3	3

Spatial Scale codes: Mi - **Micro**, M - **Middle**, N - **Neighborhood**, U - **Urban**, R - **Regional**

*The United States Fish and Wildlife Service - Air Quality Branch (USFWS-AQB) is responsible for the sample collection.

REFERENCES

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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 USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 1984.

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