



2008 Network Summary

New Jersey Department of Environmental Protection

NETWORK DESIGN

In 2008, the Bureau of Air Monitoring maintained 43 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.njaginow.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: Ambient air monitoring sampler located on the roof of the Camden County Municipal Utilities Authority Building

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, and meteorological data by automated instruments (not all pollutants are measured at all sites). Last year, the Bureau of Air Monitoring installed a new 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 and the parameters recorded at each site are displayed in Table 2 (page 3). Changes to the Continuous Network are summarized in Table 1. Many of the continuous site locations are also part of the Manual Monitoring Network, which is described in the next section.

Figure 2
2008 – Continuous Monitoring Network

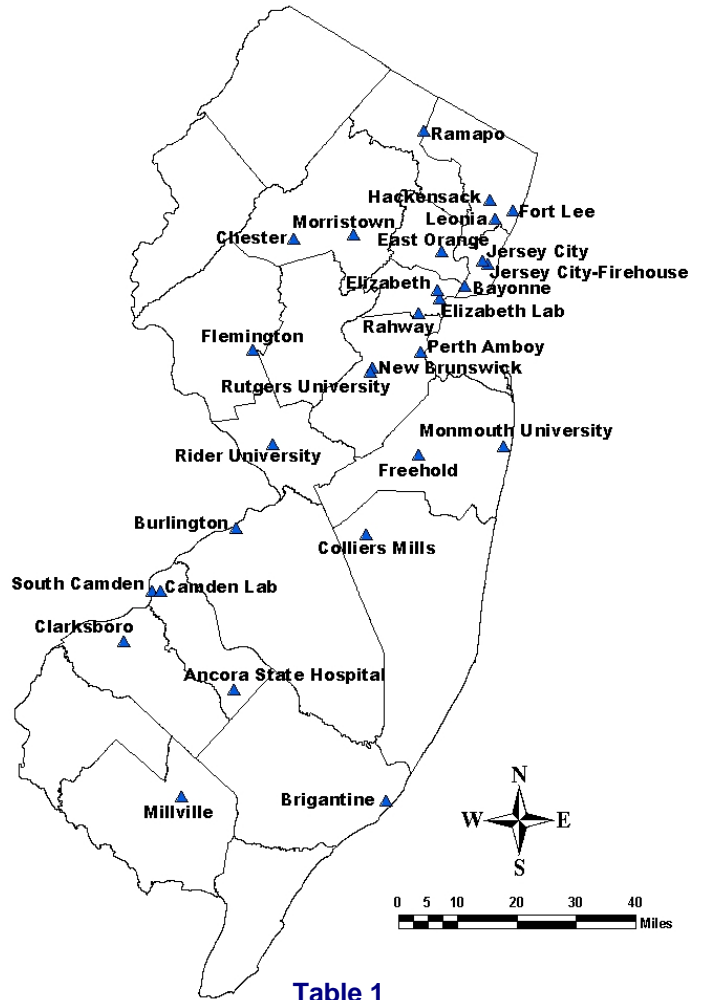


Table 1

2007-2008 Continuous Network Changes			
Monitoring Site	Parameter(s)	Action	Date
Brigantine	O ₃	Start-up	04/01/07
	SO ₂		08/30/07
	TEOM		08/10/07
	Nephelometer		09/06/07
Camden Lab	CO, NO _x , O ₃ , SO ₂ , SS	Shutdown	09/29/08
	TEOM	Shutdown	09/30/08
	MET	Shutdown	07/08/08
Elizabeth	CO, SO ₂	Temporary Shutdown	03/07/07
Elizabeth	CO, SO ₂	Start-up	07/01/08
Leonia	NO _x	Start-up	12/07/07
	O ₃	Start-up	12/08/07
Nacote Creek Research Station	O ₃ , SO ₂	Shutdown	12/18/07
Teaneck	NO _x , O ₃	Shutdown	01/17/07

Table 2
2008 – 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 | | |

SITE	CO	NO _x	O ₃	SO ₂	SS	TEOM	MET
Ancora State Hospital	U		U	U			
Bayonne		U	N	N			
Brigantine			U	U		U	
Burlington	N			N	N		
Camden Lab	N	N	U	N	N	N	N
Chester		U	U	U			N
Clarksboro			U	U			
Colliers Mills			U				
East Orange	N	N					N
Elizabeth	Mi			M	N		
Elizabeth Lab	N	N		N	N	N	N
Flemington			U			N	N
Fort Lee	M					M	
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	
Perth Amboy	N			N	N		
Rahway						N	
Ramapo			U				
Rider University		N	N				N
Rutgers University		N	N				U*
South Camden						N	
TOTAL	12	9	14	13	9	10	7

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), lead (Pb), Total Suspended Particulates (TSP), 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. While these ozone precursors are automatically measured every hour, the data are retrieved once a day and require extensive review before they are validated. Changes to the Manual Network are summarized 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 5).

Figure 3
2008 – Manual Monitoring Network

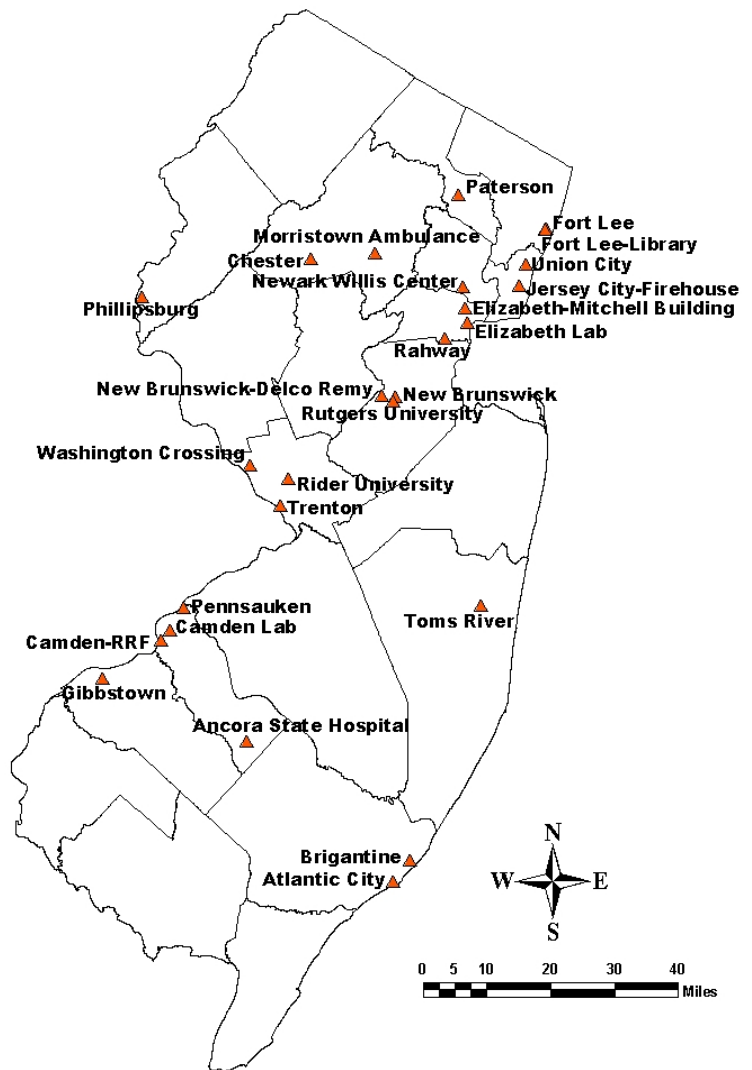


Table 3

2007-2008 Manual Network Changes			
Monitoring Site	Parameter(s)	Action	Date
Brigantine	PM _{2.5}	Start-up	01/06/07
Camden Lab	PM _{2.5} , PM ₁₀ , PAMS, PM _{2.5} Spec, CARB, VOCs	Shutdown	09/28/08
Gibbstown (new location)	PM _{2.5}	Start-up	02/02/07
New Brunswick – Delco Remy	Pb	Shutdown	05/30/08
Newark-Wills Center	PM _{2.5}	Shutdown	07/23/08

**Table 4
2008 - Manual Air Monitoring Network**

Manual Parameter Codes

- | | |
|---|--|
| PM_{2.5} - FRM (Federal Reference Method) Manual PM _{2.5} Sampler | PAMS - Photochemical Assessment Monitoring Station (Ozone Precursors) |
| PM₁₀ - FRM Manual PM ₁₀ Sampler | CARB - Carbonyls |
| Pb - Particulates Analyzed for Lead | VOCs - Volatile Organic Compounds |
| TSP - Total Suspended Particulates | SVOCs - Semi-Volatile Organic Compounds |
| PM_{2.5} Spec - PM _{2.5} Speciation Trends Network Sampler | Acid Deposition - Acidity (pH scale) in precipitation |

SITE	PM _{2.5}	PM ₁₀	Pb	TSP	PM _{2.5} Spec	PAMS	CARB	VOCs	Acid Deposition
Ancora State Hospital									U
Atlantic City	N	N							
Brigantine	U								
Camden Lab	N	N			N	N	N	N	
Camden-RRF		M							
Chester	U				U		U	U	
Elizabeth Lab	N				N		N	N	
Elizabeth-Mitchell Building	N								
Fort Lee		M							
Fort Lee-Library	N								
Gibbstown	N								
Jersey City-Firehouse	N	N							
Morristown-Ambulance Squad	N								
New Brunswick	N				N		N	N	
New Brunswick-Delco Remy			Mi	Mi					
Newark-Willis Center	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	6	1	1	4	3	4	4	2

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

REFERENCES

Ball, R. J. and G. E. Andersen, *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

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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 USEPA, 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 PM_{10}* , 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.