



2002 Network Summary

Department of Environmental Protection

NETWORK DESIGN

In 2002, the Bureau of Air Monitoring maintained 47 Ambient Air Monitoring Sites in New Jersey. These monitoring sites are designed to fulfill the following monitoring objectives for federal and state regulated pollutants: to measure maximum pollutant concentrations, to assess population exposure, to determine the impact of major pollution sources, to measure background levels, to determine the extent of regional pollutant transport, and to measure secondary impacts in rural areas. In addition, monitoring data is provided to various public and media outlets and are used to provide hourly updates on air quality to the Bureau's web page at www.state.nj.us/dep/airmon. 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 and constraints which affect the design of a monitoring network. Most importantly, a network design should consider pollutant characteristics, topographical features, and resource limitations when evaluating whether data collected at a particular site can meet monitoring objectives. To assist in designing an effective air monitoring network, the United States Environmental Protection Agency (USEPA) developed the concept of spatial scales of representativeness. The spatial scales define prospective sites in terms of the area surrounding a monitor where the pollutant concentrations are relatively similar. For each monitoring objective, appropriate spatial scales can be used to identify the general physical location of a suitable monitoring site. The list of various spatial scales are defined below:

Micro-scale (10 – 100m): Monitors that show significant concentration differences from as little as 10 meters or up to 50 meters away from the monitor are classified being



Figure 1: Ambient air monitoring trailer located at the Elizabeth Lab site

Micro-scale monitors. This often occurs when monitors are located right next to low-level emission sources, such as busy roadways, construction sites, and facilities with short stacks. These locations are in areas where the general public is exposed to the concentrations measured.

Middle Scale (100 – 1000m): These monitors show pollutant measurement variations between locations that are approximately 1 kilometer apart. These differences may occur near large industrial areas with many different operations or near large construction sites. Zones of representation for middle scale monitors 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 (1 – 10km): Neighborhood scale monitors do not show significant differences in pollutant concentrations with spacing of a few kilometers. A particular scale 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 zone of representation are often found in areas where people commonly reside.

Urban Scale (10 – 100km): Urban scale monitors show consistency among pollutant measurements with monitor separations of at least 10 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) show consistency among measurements for monitor separations 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 in a large area and evaluating transport emissions.

THE CONTINUOUS MONITORING NETWORK

The Continuous Monitoring Network consists of automated sites which measure carbon monoxide (CO), oxides of nitrogen (NO_x), ozone (O₃), sulfur dioxide (SO₂), particulate matter, and meteorological data (not all pollutants are measured at all sites). The data is transmitted to a centralized computer system in Trenton, New Jersey, once every minute, thus providing near real-time data. 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 1 (page 3). Many of these locations are also part of the Manual Monitoring network, which is described in the next section.

Figure 2
2002 – Continuous Monitoring Network

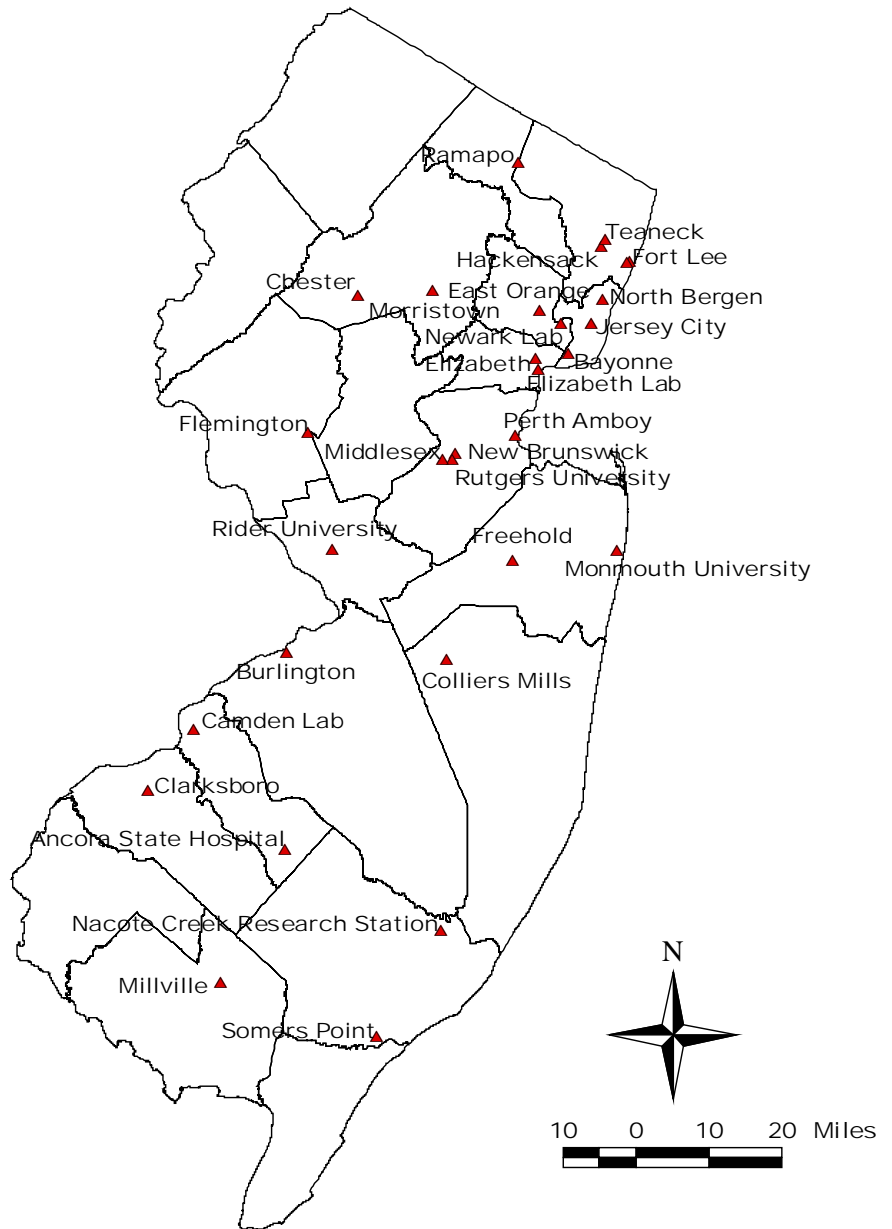


Table 1
2002 - Continuous Air Monitoring Network

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 | | |

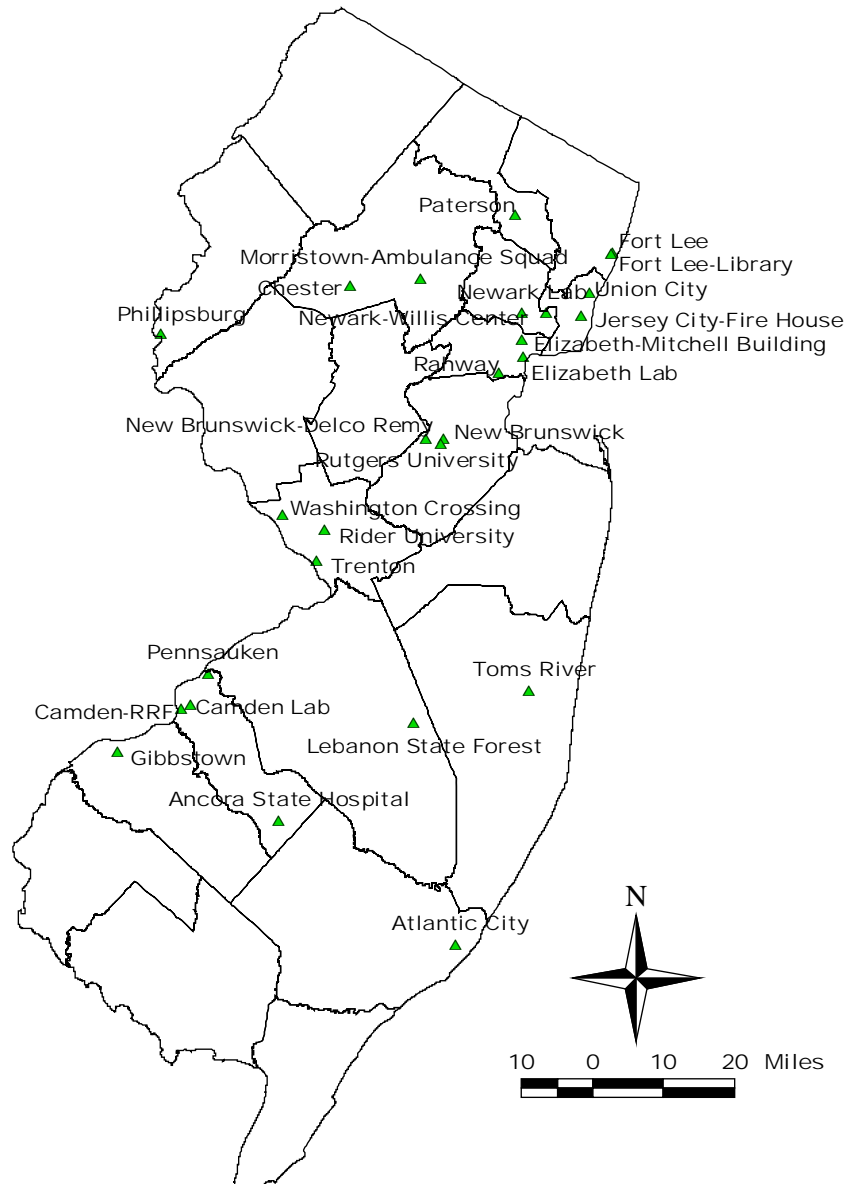
| SITE | CO | NO _x | O ₃ | SO ₂ | SS | TEOM | MET |
|-------------------------------|-----------|-----------------|----------------|-----------------|-----------|----------|----------|
| Ancora State Hospital | U | | U | U | | | |
| Bayonne | | U | N | N | | | |
| Burlington | Mi | | | N | N | | |
| Camden Lab | N | N | U | N | N | N | U |
| Chester | | U | U | U | | | U |
| Clarksboro | | | U | U | | | |
| Colliers Mills | | | U | | | | |
| East Orange | N | N | | | | | U |
| Elizabeth | Mi | | | M | N | | |
| Elizabeth Lab | N | N | | N | N | N | U |
| Flemington | | | U | | N | | U |
| Fort Lee | M | | | | | M | |
| Freehold | Mi | | | | N | | |
| Hackensack | N | | | N | N | | |
| Jersey City | Mi | | | N | N | | |
| Middlesex | N | | | | | | |
| Millville | | N | N | N | | | |
| Monmouth University | | | N | | | | |
| Morristown | Mi | | | | N | | |
| Nacote Creek Research Station | | | U | U | | | |
| Newark Lab | N | N | N | N | N | N | |
| New Brunswick | | | | | | N | |
| North Bergen | Mi | | | | | | |
| Perth Amboy | N | | | N | N | | |
| Ramapo | | | U | | | | |
| Rider University | | N | N | | | | U |
| Rutgers University | | N | N | | | | U |
| Somers Point | | N | | N | | | |
| Teaneck | | N | N | | | | |
| TOTAL | 15 | 11 | 15 | 15 | 11 | 5 | 7 |

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

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 equipment that collects 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 (PM_{10}), lead (Pb), several parameters associated with atmospheric deposition, pollutants important in the formation of ground level ozone (ozone precursors), and numerous organic compounds that are considered toxic pollutants. Sites that measure ozone precursors are part of the national Photochemical Assessment Monitoring Station (PAMS) program. While some ozone precursors are automatically measured every hour, the data are usually only retrieved once a day. 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 2 (page 5).

Figure 3
2002 – Manual Monitoring Network



**Table 2
2002 - 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 - Dry - Nitrates and Sulfates in PM ₁₀ Wet - Acidity (pH scale) in precipitation |

| SITE | PM _{2.5} | PM ₁₀ | Pb | TSP | PM _{2.5} Spec | PAMS | CARB | VOCs | SVOCs | Acid Deposition | |
|-----------------------------|-------------------|------------------|----------|----------|------------------------|----------|----------|----------|----------|-----------------|----------|
| | | | | | | | | | | Dry | Wet |
| Ancora State Hospital | | | | | | | | | | | U |
| Atlantic City | N | N | | | | | | | | | |
| Camden Lab | N | N | | | N | N | N | N | N | N | |
| Camden-RRF | | M | | | | | | | | | |
| Chester | U | | | | U | | U | U | U | | |
| Elizabeth Lab | N | N | | | N | | N | N | N | N | |
| Elizabeth-Mitchell Building | N | | | | | | | | | | |
| Fort Lee | | M | | | | | | | | M | |
| Fort Lee-Library | N | | | | | | | | | | |
| Gibbstown | N | | | | | | | | | | |
| Jersey City-Firehouse | N | N | | | | | | | | | |
| Lebanon State Forest | | | | | | | | | | | U |
| Morristown-Ambulance Squad | N | | | | | | | | | | |
| New Brunswick | N | | | | N | | N | N | N | | |
| New Brunswick-Delco Remy | | | Mi | Mi | | | | | | | |
| Newark Lab | N | N | | | | | | | | | |
| 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 | 8 | 1 | 1 | 4 | 3 | 4 | 4 | 4 | 3 | 3 |

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

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