Commonwealth of Pennsylvania
Department of Environmental Protection

2010 FIVE-YEAR NETWORK ASSESSMENT FOR CRITERIA POLLUTANTS

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List of Acronyms

ANP	Annual Network Plan
APCA	Air Pollution Control Act
AQS	Air Quality System
ARL	Air Resources Laboratory
CASAC	Clean Air Scientific Advisory Committee
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COPAMS	Commonwealth of Pennsylvania Air Monitoring System
DV	Design Value
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NOAA	National Oceanic and Atmospheric Administration
O_3	Ozone
OMB	U.S. Office of Management and Budget
PA DEP	Pennsylvania Department of Environmental Protection
PAMS	Photochemical Assessment Monitoring Station
Pb	Lead
PM	Particulate matter
$PM_{2.5}$	Fine particulate Matter with aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10}	Particulate Matter with aerodynamic diameter less than or equal to 10 micrometers
ppb	parts per billion
ppm	parts per million
SES	Steam Electric Station
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur Dioxide
SPM	Special Purpose Monitor
TEOM	Tapered element oscillating microbalance
UV	Ultraviolet
$\mu g/m^3$	micrograms per cubic meter (unit of flow)
VOCs	Volatile Organic Compounds

Executive Summary

Article I, Section 27 of the Pennsylvania Constitution provides that all Pennsylvanians have a right to clean air. The Pennsylvania Department of Environmental Protection (Department or PA DEP), protects the right to clean air and is also responsible for implementing the provisions of the CAA in the Commonwealth of Pennsylvania in accordance with the Air Pollution Control Act (APCA), 35 P.S. §§ 4001—4014, and implementing regulations in Title 25 Article III (relating to air sources). The APCA declares that it is the policy of the Commonwealth to protect the air resources of the Commonwealth to the degree necessary for purposes including the protection of public health, safety and wellbeing of its citizens and the prevention of injury to animal life and to property.

The PA DEP regulates air pollution emitted from air contamination sources in the Commonwealth, except those sources that are subject to the "approved" local air pollution control programs administered by Health Departments in Allegheny and Philadelphia Counties.

The Department's ambient air monitoring network which consists of approximately 199 monitors at 56 monitoring stations, includes sites for assessing air quality in high population density areas and in areas were maximum concentrations of air contaminants are expected. This network also measures background concentrations and transported pollution. The goals of Pennsylvania's ambient air monitoring program are to evaluate compliance with federal and state ambient air quality standards, provide real-time monitoring of air pollution episodes, develop data for trend analysis, support the development and implementation of air quality regulations, and provide information to the public on daily air quality conditions.

The U.S. Environmental Protection Agency (EPA) requires, as part of it's air quality monitoring regulations, that all air monitoring agencies perform and submit to EPA's Regional Administrator every five years, an assessment of their air monitoring network as relates to the monitoring objectives detailed in the Code of Federal Regulations (CFR) under 40 CFR Part 58, Appendix D.

The 2010 Five-Year Network Assessment for criteria pollutants contains an evaluation of the Department's current air monitoring network for the six "criteria" pollutants - ozone, particulate matter ($PM_{2.5}$ and PM_{10}), lead, sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO). Based upon the information contained in this assessment, PA DEP will reevaluate the following and propose any changes to its air monitoring network in a future Annual Network Plan (ANP):

To meet network design requirements for a minimum number of monitors:

- The installation of an additional $PM_{2.5}$ monitor located within the Lancaster MSA
- The re-designation of the PM_{10} monitor located in Nazareth, PA (Allentown-Bethlehem-Easton MSA) from SPM to SLAMS

To meet network design requirements for the monitoring objective:

- The re-evaluation of monitoring objectives and/or site locations for the following sites & monitors:
    - Easton – Ozone
    - Hershey – Ozone
    - Kittanning – Ozone
    - Kutztown - Ozone
    - Lancaster Downwind – Ozone
    - Wilkes-Barre – Ozone, PM_{10} & SO_2
    - York Downwind – Ozone

- Pittsburgh MSA – designation of a maximum ozone concentration monitor

To meet network design requirements for spatial scale and/or siting requirements for roadway separation distances:

- The re-evaluation of spatial scale designations and/or site locations for the following sites & monitors:
    - Altoona – PM_{10} & SO_2
    - Beaver Falls – Ozone & $PM_{2.5}$
    - Easton – SO_2
    - Erie – $PM_{2.5}$ & PM_{10}
    - Farrell - Ozone & $PM_{2.5}$
    - Florence – SO_2
    - Greensburg - Ozone
    - Hookstown – SO_2
    - Kittanning – Ozone & $PM_{2.5}$
    - Kutztown – Ozone
    - Nanticoke – Ozone
    - New Castle – PM_{10} & SO_2
    - Montoursville - Ozone & PM_{10}
    - State College – Ozone & $PM_{2.5}$
    - Strongstown - Ozone
    - Wilkes-Barre – Ozone, PM_{10} & SO_2
    - York – $PM_{2.5}$ & PM_{10}

To meet siting requirements for distance from trees:

- The re-evaluation of site locations for the following sites & monitors:
    - Murrysville – Ozone

To support monitoring in the Lebanon MSA

- The installation of an ozone and $PM_{2.5}$ monitor in the Lebanon MSA

To correct a clerical error, the monitoring objective and spatial scale for the Charleroi PM_{10} monitor will be corrected in the next ANP submitted to EPA.

Document Description

The Network Assessment document consists of four key sections. The first section of the document describes the applicable monitoring objectives and requirements of 40 CFR Part 58, Appendices D and E. An overall evaluation of the Commonwealth of Pennsylvania's Air Monitoring (COPAMS) Network in relation to the minimum number of monitors required by 40 CFR Part 58, as well as a listing of all sites in the COPAMS network along with their designations as relates to the requirements of the Code of Federal Regulations is described in this section.

The second section, Appendix A, provides a network evaluation, using a site-by-site analysis, for all air monitoring sites located in the sixteen Metropolitan Statistical Areas (MSAs) in Pennsylvania. Each MSA has a specific section number (for example, the Allentown-Bethlehem-Easton MSA is identified as A-1). Each MSA section is further divided into subsections for individual sites as well as specific analyses (Subsection A-1.1 is the Allentown site information, A-1.7.1 provides the ozone network analysis for the Allentown-Bethlehem-Easton MSA, etc.)

The third section, Appendix B, provides a network evaluation for sites not located in an MSA area. The formatting method is identical to Appendix A, with the exception of using a "B" as the initial identifier.

Finally, the fourth section, Appendix C provides site-specific wind roses, pollutant-specific back trajectories and regional maps of major pollutant sources. Appendix C is common to both appendices A and B.

1. Introduction

Pennsylvania's Department of Environmental Protection (PA DEP) monitors ambient air quality in the Commonwealth of Pennsylvania for the six criteria pollutants – ozone, particulate matter ($PM_{2.5}$ and PM_{10}), lead, sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO) – according to applicable provisions in Title 40 of the Code of Federal Regulations (CFR).

This assessment satisfies the periodic assessment requirement set forth in 40 CFR Part 58, Section 58.10(d), which provides:

> *The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For PM2.5, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The first assessment is due July 1, 2010.*

The goal of this assessment is to provide ambient air quality network planners with information useful in the design of the monitoring network for the calendar years of 2011 through 2015. Modifications to the ambient monitoring network identified in five-year assessment will occur through the Annual Network Plan (ANP) process. The ANP is a forward looking document that captures changes to the network for the year following its submission. The ANP is required to be open for public comment prior to submission to the EPA Regional Administrator.

1.1 Program History

The Pennsylvania Air Pollution Control Act (APCA), enacted originally on January 8, 1960, 35 P.S. Section 4001 et seq., established the framework for the Commonwealth's air pollution control program. The Declaration of Policy set forth in Section 2 of the APCA, 35 P.S. Section 4002, provides:

> *It is hereby declared to be the policy of the Commonwealth of Pennsylvania to protect the air resources of the Commonwealth to the degree necessary for the (i) protection of public health, safety and well-being of its citizens; (ii) prevention of injury to plant and animal life and to property; (iii) protection of the comfort and convenience of the public and the protection of the recreational resources of the Commonwealth; (iv) development, attraction and expansion of industry, commerce and agriculture; and (v) implementation of the provisions of the Clean Air Act in the Commonwealth.*

Section 4 of the APCA empowers the Department of Environmental Protection (formerly the Department of Environmental Resources) to implement the provisions of the Clean Air Act in the Commonwealth. 35 P.S. Section 4004(1).

The Air Pollution Control Act of 1955 (APCA) was the first federal legislation involving air pollution. This Act provided funds for federal research in air pollution. The Clean Air Act of 1963 was the first federal legislation regarding air pollution *control*. It established a federal program within the U.S. Public Health Service and authorized research into techniques for monitoring and controlling air pollution. In 1967, the Air Quality Act was enacted in order to expand federal government activities. In accordance with this law, enforcement proceedings were initiated in areas subject to interstate air pollution transport. As part of these proceedings, the federal government for the first time conducted extensive ambient monitoring studies and stationary source inspections.[1] The federal Clean Air Act Amendments of 1970 included provisions which established criteria pollutants authorized EPA to set national ambient air quality standards (NAAQS) and required states to develop state implementation plans (SIPs), which include enforceable requirements and control measures to attain and maintain the standards.

When established in 1971, the Department of Environmental Resources implemented air pollution control programs to protect the air resources of the Commonwealth that, with a great deal of success, have resulted in substantial improvements in public health and the environment. Significant changes have occurred during the past twenty years due mainly to the implementation of the Clean Air Act Amendments of 1990, APCA and regulations adopted under the acts to attain and maintain the national ambient air quality standards. Currently, the Pennsylvania Department of Environmental Protection (PA DEP or Department) has an extensive monitoring program that not only monitors

[1] http://www.epa.gov/air/caa/caa_history.html

for the criteria pollutants, but also for air toxics including volatile organic compounds (VOCs).

1.2 General Description of Criteria Pollutants

1.2.1 Ozone (O_3)

Ground-level ozone, or photochemical smog, is a secondary pollutant. Ozone is generally not emitted directly into the atmosphere as ozone, but rather is formed by chemical reactions between other air pollutants. The primary pollutants involved in these reactions -- volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) -- form ozone in the presence of sunlight and warm temperatures. Air contamination sources that emit these ozone precursors are sources of ozone. Nitrogen oxides result from fossil fuel combustion and sources commonly include power plants, industrial boilers, and motor vehicles. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries and even natural (biogenic) sources. Ozone and the precursor pollutants that cause ozone also can be transported into an area from pollution sources located hundreds of miles away. Because the formation of ozone is boosted by increasing sunlight and temperatures, changing weather patterns contribute to yearly differences in ozone concentrations, with peak concentrations occurring during the summer months.

Ground-level ozone is a strong irritant to the eyes and upper respiratory system and can hamper breathing. It also damages vegetation, including forest and agricultural crops, and man-made materials such as monuments and statues.

Ozone is measured by ultraviolet absorption photometry. Air is drawn through a sample cell where ultraviolet light (254 nm wavelength) passes through it. Any light that is not absorbed by the ozone is then converted into an electrical signal proportional to the ozone concentration.

1.2.2 Fine Particulate Matter ($PM_{2.5}$)

Fine particulate emissions result primarily from industrial processes and fuel combustion - including motor vehicles, residential wood burning and forest or agricultural fires.

Fine particles can accumulate in the respiratory system and are associated with numerous adverse health effects including decreased lung function and increased respiratory symptoms and disease. Sensitive groups that appear to be at greatest risk include the elderly, individuals with cardiopulmonary disease such as asthma, and children. $PM_{2.5}$ is the major cause of reduced visibility in parts of the United States. Other environmental impacts occur when particles deposit onto soil, plants, water, or man-made materials such as monuments or statues.

$PM_{2.5}$ is sampled by drawing air through a specially designed inlet that excludes particles larger than 2.5 microns in diameter. For the manual Federal Reference Method (FRM) sampler, the particles are collected on a Teflon™ Microfiber filter that is weighed to determine the particulate mass. The normal sampling schedule is for a 24-hour sample to be taken everyday. In addition, PA DEP has 19 monitors that record $PM_{2.5}$ data continuously. PA DEP utilizes the Met One Model 1020 Federal Equivalent Method (FEM) and the Thermo-Fisher TEOM-FDMS monitors.

1.2.3 Particulate Matter (PM_{10})

PM_{10} (including $PM_{2.5}$) appears to represent essentially all of the particulate emissions from transportation sources and most of the emissions in the other traditional categories (coal-burning power plants, steel mills, mining operations, etc). Although $PM_{2.5}$ is technically included in the definition of PM_{10}, the terms "PM_{10}" or "coarse" particles are commonly used to refer to particles greater than $PM_{2.5}$, but less than 10 micrometers in diameter.

Sources of coarse particles any include dust-producing process, such as crushing or grinding operations, as well as dust stirred up by vehicles traveling on roads. While they are not as much of a health concern as are fine particles, they can aggravate respiratory conditions and irritate the linings of the eyes, nose, throat and lungs. In the environment, PM_{10} contributes to reduced visibility and degradation of man-made materials.

PM_{10} is sampled continuously using a tapered element oscillating microbalance (TEOM). Air is drawn through a specially designed inlet that excludes particles larger than 10 microns in diameter. Particle accumulation causes changes in the microbalance oscillation that are recorded by the instrument.

1.2.4 Lead (Pb)

Lead is emitted into the atmosphere by vehicles burning leaded fuel and from certain industrial processes, primarily battery manufacturers and lead smelters. As a result of the removal of lead from gasoline, metal processing and battery manufacture is now the major source of lead emissions. Lead levels in ambient air have decreased over 90 percent since 1980.

Lead is a highly toxic metal when ingested or inhaled. It is a suspected carcinogen of the lungs and kidneys and has adverse effects on the cardiovascular, nervous, and renal systems. In the body, lead is stored in both bone and soft tissue, such as the kidneys, liver, and the brain. During a several month period in 2008 when the lead NAAQS was being researched and reviewed by the Clean Air and Scientific Advisory Committee (CASAC), it was determined there was no safe level of lead in the bloodstream and even low lead levels in the bloodstream can be attributed to adverse nervous system effects such as IQ loss, as well other neurological developmental delays, primarily in young children. Based on these factors and other medical evidence set forth, EPA lowered the lead NAAQS from 1.5 micrograms per cubic meter to 0.15 micrograms per cubic meter on November 12, 2008.

The amount of lead in ambient air is measured by laboratory analysis of TSP filters by Inductively Coupled Argon Plasma-Optical Emission Spectrometry.

1.2.5 Sulfur Dioxide (SO_2)

Sulfur dioxide is a gaseous pollutant that is emitted primarily by industrial furnaces or power plants burning sulfur-containing coal or oil. The major health effects associated with high exposures to sulfur dioxide include effects on breathing and respiratory illness

symptoms. The population most sensitive to sulfur dioxide includes asthmatics and individuals with chronic lung disease or cardiovascular disease. Sulfur dioxide damages vegetation, including forests and agricultural crops, and acts as a precursor to acid rain. Finally, sulfur dioxide can accelerate the corrosion of natural and man-made materials that are used in buildings and monuments, as well as paper, iron-containing metals, zinc, and other protective coatings.

Sulfur dioxide is measured with a fluorescence analyzer. Air is drawn through a sample cell where it is then subjected to high intensity ultraviolet light. This causes in the sulfur dioxide molecules in the air to fluoresce and release light. The fluorescence is detected with a photomultiplier tube and converted to an electrical signal proportional to the SO_2 concentration.

1.2.6 Nitrogen Dioxide (NO_2)

Nitrogen dioxide is a highly toxic, reddish brown gas that is created primarily from fuel combustion in industrial sources and vehicles. It creates an odorous brown haze that causes eye and sinus irritation, blocks natural sunlight and reduces visibility. It can severely irritate the respiratory system and has been associated with acute effects in individuals diagnosed with respiratory disease. Nitrogen dioxide contributes to the creation of acid rain and plays a key role in nitrogen loading, adversely impacting forests and other ecosystems.

Nitrogen oxides are measured using the chemiluminescence reaction of nitric oxide (NO) with ozone (O_3). Air is drawn into a reaction chamber where it is mixed with a high concentration of ozone from an internal ozone generator. Any nitric oxide mixes with ozone to produce NO_2. Light from this reaction is detected with a photomultiplier tube and converted to an electrical signal proportional to the nitric oxide concentration. Total nitrogen oxides (NO_x) are measured by passing the air through a converter where any NO_2 in the air is reduced to nitric oxide before the air is passed to the reaction chamber. By alternately passing the air directly to the reaction chamber, and through the converter before the reaction chamber, the analyzer alternately measures nitric oxide and NO_x. Nitrogen dioxide (NO_2) is measured indirectly by a subtraction of the NOx and NO_2 concentrations.

1.2.7 Carbon Monoxide (CO)

Carbon monoxide is a byproduct of the incomplete burning of fuels. Industrial processes contribute to carbon monoxide pollution levels, but the largest man-made source of carbon monoxide is motor vehicle emissions. CO is a health concern in areas of high traffic density or near industrial sources. Peak carbon monoxide concentrations typically occur during the colder months of the year when automotive emissions are greater and nighttime inversion (a weather-related phenomenon) conditions are more frequent.

Carbon monoxide is a colorless, odorless, poisonous gas that has an affinity for hemoglobin, 210 times that of oxygen. By combining with the hemoglobin in the blood, it inhibits the delivery of oxygen to the body's tissue, thereby causing or shortness of

breath, asphyxia and eventually death. The health threat from carbon monoxide is most serious for those who suffer from cardiovascular disease. At much higher levels of exposure, healthy individuals are also affected.

Carbon monoxide is measured by infrared absorption photometry. A continuous flow of air is drawn through a sample cell where infrared light passes through it. The carbon monoxide molecules absorb a portion of the infrared light. This reduces the amount of light getting to the sensor. The light is then converted into an electrical signal related to the concentration of carbon monoxide in the sample cell.

2. Network Assessment General Procedures

The Pennsylvania Department of Environmental Protection maintains an air quality monitoring network in all regions of Pennsylvania, with the exceptions of Allegheny and Philadelphia counties, which administer and enforce approved local air pollution control programs in the Commonwealth. Air quality monitoring for these counties is performed by the Allegheny County Health Department and the City of Philadelphia's Air Management Services, respectively). This network assessment focuses primarily on evaluating the Commonwealth of Pennsylvania's Air Monitoring System (COPAMS) for specific ambient air quality monitoring network design criteria specified in 40 CFR Part 58, Appendix D.

Each monitoring site and individual site pollutant assessment is documented in Appendix A (for monitoring sites within an MSA) and Appendix B (non-MSA site locations) of this document. For both Appendices A and B, each section provides an assessment, using a site-by-site analysis, for a specific geographical region of the Commonwealth, and can be generally outlined as follows:

--- Site Summary – includes the site name and AQS coding, followed by address, site location, pollutants monitored, spatial scale, monitoring objectives, and distance from the monitor inlet probe to the nearest trees and roadways, for each site in the region.

--- Population Analysis – focuses on site location and how well the location serves the intended population now and over time. This analysis may also include other aspects such as objectives and spatial scale needs.

---Specific Criteria Pollutant Analysis– includes evaluation on the minimum number of required monitors and other pollutant specific network design criteria, as well as site monitoring objectives in relation to pollutant source locations using data from meteorological back trajectories and wind roses.

---Recommendations – uses analyses from previous subsections to recommend changes to the air quality monitoring network.

3. Monitoring Requirements of 40 CFR Part 58, Appendix D

A listing of all air monitoring sites in PA DEP's COPAMS network is provided at the end of this section. The sites are listed by pollutant, and are further grouped by location into MSA and non-MSA regions. For each monitoring site in the network, the monitoring purpose and spatial scale of representativeness described in section 1.1 are provided in this section.

3.1 Monitoring Objectives and Measurement Scales

3.1.1 Monitoring Objectives:

The ambient air monitoring network is designed to meet the following objectives in accordance with 40 CFR Part 58, Appendix D:

- Provide air pollution data to the general public in a timely manner
- Support compliance with ambient air quality standards and emissions strategy development
- Support for air pollution research studies

To accomplish these objectives, a variety of types of monitoring sites are employed. The types of monitoring sites include the following:

- Sites located to determine the highest concentrations expected to occur in the area covered by the network
- Sites located to measure typical concentrations in areas of high population density
- Sites located to determine the impact of significant sources or source categories on air quality
- Sites located to determine general background concentration levels
- Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards
- Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts

3.1.2 Spatial Measurement Scales:

The goal in locating monitors is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring site type, air pollutant to be measured, and the monitoring objective. Therefore, spatial scale of representativeness is described in terms of the physical dimensions of the air parcel nearest to a monitoring site throughout which actual pollutant concentrations are reasonably similar. In general, the spatial scales have the following general dimensions:

1. Microscale – defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters

2. Middle scale – defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer
3. Neighborhood scale – defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range (0.3 to 2.5 miles). The neighborhood and urban scales listed below have the potential to overlap in applications that concern secondarily formed or homogeneously distributed air pollutants
4. Urban scale – defines concentrations within an area of city-like dimensions, on the order of 4 to 50 kilometers (2.5 to 31 miles). Within a city, the geographic placement of sources may result in there being no single site that can be said to represent air quality on an urban scale
5. Regional scale – defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers
6. National and global scales – these measurement scales represent concentrations characterizing the nation and the globe as a whole

The following table presents the spatial scales recommended in 40 CFR Part 58 Appendix D for specific monitor types (monitor objectives).

Table 3-1. Recommended Spatial Scales Based on Specific Pollutant Monitoring

Site Type	Appropriate Siting Scales
Highest Concentration	Micro, middle, neighborhood (sometimes urban or regional for secondarily formed pollutants)
Population Oriented	Neighborhood, urban
Source Impact	Micro, middle, neighborhood
General / Background & Regional Transport	Urban, regional
Welfare-related Impacts	Urban, regional

The following table presents the spatial scales recommended in 40 CFR Part 58, Appendix D. for specific pollutant networks. There are six regulated (or "criteria") pollutants – ozone, particulate matter ($PM_{2.5}$ and PM_{10}), lead, sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and carbon monoxide (CO). Note that not all scales are appropriate for a given pollutant.

Table 3-2. Recommended Spatial Scales Based on Specific Monitor Types

Pollutant	Recommended Spatial Scales of Representativeness
Ozone	Neighborhood, Urban and Regional
$PM_{2.5}$	All Scales
PM_{10}	Microscale, Middle and Neighborhood
Lead	Microscale, Middle and Neighborhood
SO_2	Microscale, Middle and Neighborhood
NO_2	Microscale, Middle, Neighborhood, Urban
CO[1]	Microscale and Middle

[1]The majority of PA DEP's CO monitors are designated as neighborhood scale. These monitors are not purposely sited in "areas near major roadways and intersections with high traffic density and often poor atmospheric ventilation", as required in 40 CFR Part

58, Appendix D, Section 4.2(b) for micro- or middle scale CO monitoring, and are thus more in keeping with neighborhood scale as noted

Spatial scale designation definitions and recommendations are further defined in 40 CFR Part 58, Appendix D, and are included in the network design criteria for specific pollutants.

3.2 Metropolitan Statistical Areas (MSAs)

The network design criteria set forth in 40 CFR Part 58, Appendix D contain several requirements for the minimum number of monitors based on population. The U.S. Office of Management and Budget (OMB) defines urbanized areas of concentrated population of 50,000 or greater as Metropolitan Statistical Areas (MSAs). Based on the most recently available OMB bulletin, the Commonwealth of Pennsylvania encompasses sixteen MSAs, either wholly or in part. The following table lists each MSA in Pennsylvania with population estimates for 2009, obtained for the most currently-available census data at http://www.census.gov.

Table 3-3. Metropolitan Statistical Areas and Populations.

Metropolitan Statistical Areas	Population
Allentown-Bethlehem-Easton, PA-NJ	816,012
Altoona	126,122
Erie	280,291
Harrisburg-Carlisle	536,919
Johnstown	143,998
Lancaster	507,766
Lebanon	130,506
New York-Northern New Jersey-Long Island, NY-NJ-PA	19,069,796
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	5,968,252
Pittsburgh	2,354,957
Reading	407,125
Scranton-Wilkes-Barre	549,454
State College	146,212
Williamsport	116,840
York-Hanover	428,937
Youngstown-Warren-Boardman, OH-PA	562,963

3.3 Minimum Number of Monitors by Pollutant

Network design criteria set forth in 40 CFR Part 58 Appendix D include requirements for a minimum number of monitors for several of the criteria pollutants. Although the method for determining the minimum number of monitors may vary between pollutant networks, the requirements are based on any one, or a combination of, three factors for a given area; the population exposed, the measured pollutant concentration, and the proximity of pollutant sources.

3.3.1 Ozone (O_3) Network Design Criteria

Network design criteria for ozone require a minimum number of monitors considering both the population and measured pollutant concentration of a given area. Appendix D of 40 CFR, Part 58 sets a graduated schedule for the minimum number of monitors required, applicable to concentrated population centers and based on the area's measured ozone concentration in relation to the ozone National Ambient Air Quality Standard (NAAQS). As provided in 40 CFR Part 50, the ozone NAAQS is an 8-hour average of 75 parts per billion (ppb) and is based on an ozone design value (a 3-year mean of the 4th yearly maximum 8-hour average); 85% of this standard is 64 ppb. The following tables detail the CFR requirement and PA DEP's compliance with the requirement.

Table 3-4. Network Design Criteria for Minimum Number of Ozone Monitors Required.

MSA Population	Most recent 3-year design value concentrations ≥85% of any ozone NAAQS	Most recent 3-year design value concentrations <85% of any ozone NAAQS[1]
> 10 million	4	2
4 to10 million	3	1
350,000 to < 4 million	2	1
50,000 to 350,000	1	0

[1] These minimum monitoring requirements apply in the absence of a design value

As part of its ambient air monitoring strategy, PA DEP is currently taking steps to install an ozone monitor in Lebanon MSA. In 2003, the OMB created the Lebanon MSA, separating out an area that was previously grouped with the Harrisburg-Carlisle, PA MSA. Although PA DEP has not previously located an ozone monitor specifically within the Lebanon MSA boundaries, the design value for the formerly-inclusive Harrisburg-Carlisle MSA exceeds 85% of the 8-hour ozone NAAQS. PA DEP will install an ozone monitor in the Lebanon MSA, to begin monitoring for the 2011 ozone season.

On January 6, 2010 EPA proposed to strengthen the NAAQS for ground-level ozone. The proposed rule published in the Federal Register on January 19, 2010, included in a modification to the urban monitoring requirements (75 FR 2918). The proposed rule requires at least one monitor for MSAs where there "is no current monitor and no history of ozone monitoring within the previous 5 years indicating a design value of less than 85% of the revised NAAQS." If this proposed amendment is adopted in the final rule, the new ozone monitor being installed in the Lebanon MSA will satisfy this requirement for the PA DEP.

Table 3-5. Number of Monitors Required and Existing in the COPAMS Ozone Network.

Metropolitan Statistical Area (MSA)	2007-2009 Design Value(ppb)	Minimum Number of Required Monitors	Number of Current Monitors
Allentown-Bethlehem-Easton[1]	76	2	3
Altoona	70	1	1
Erie	75	1	1
Harrisburg-Carlisle	74	2	2
Johnstown	67	1	1
Lancaster	77	2	2
Lebanon[2]	*	0	0
New York-Northern New Jersey-Long Island[3]	84	4	21/0
Philadelphia-Camden-Wilmington[4]	88	3	12/4
Pittsburgh[5]	82/77	2	12/9
Reading	79	2	2
Scranton-Wilkes-Barre	71	2	4
State College	70	1	1
Williamsport	74	1	1
York-Hanover	77	2	2
Youngstown-Warren-Boardman[6]	77	2	4/1

* No Design Value available

[1] MSA overlaps NJ and includes the PA counties of Carbon, Lehigh and Northampton. All monitors in the Allentown-Bethlehem-Easton MSA are within these PA counties.

[2] PA DEP currently does not operate a monitor in the Lebanon MSA; but is scheduled to install a Lebanon MSA ozone monitor prior to 2011.

[3] MSA overlaps NJ, NY and includes Pike County, PA. PA DEP does not operate a monitor in Pike County. The states of NJ and NY operate nine and twelve monitors, respectively, within the New York-Northern New Jersey-Long Island MSA.

[4] MSA overlaps DE, MD, NJ and includes the PA counties of Bucks, Chester, Delaware, Philadelphia and Montgomery. PA DEP operates four monitors in the Philadelphia-Camden-Wilmington MSA outside or Philadelphia County. The City of Philadelphia Air Management Services operates two monitors in Philadelphia County, PA. The states of DE, MD and NJ operate three, one and two monitors, respectively, within the Philadelphia-Camden-Wilmington MSA. The 2007-2009 design value shown is for the PA DEP-operated monitor in Chester County, PA, which is also the maximum design value within the Philadelphia-Camden-Wilmington MSA.

[5] MSA includes Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland Counties PA DEP operates nine monitor in counties in the Pittsburgh MSA outside of Allegheny County. The Allegheny County Health Department operates three monitors in Allegheny County. The 2007-2009 design value displays two values – the first is the maximum for the Pittsburgh MSA, the second is the maximum for PA DEP-operated monitors within the Pittsburgh MSA.

[6] MSA overlaps OH and includes Mercer County, PA. The state of Ohio operators three ozone monitors in the Youngstown-Warren-Boardman MSA. PA DEP operates one monitor in Farrell, Mercer County, PA. The 2007-2009 design value is the value for the Farrell site, which is also the maximum value for the Youngstown-Warren-Boardman MSA.

3.3.2 $PM_{2.5}$ Network Design Criteria

Network design criteria for $PM_{2.5}$ require a minimum number of monitors considering both the population and measured pollutant concentration of a given area. Appendix D of 40 CFR, Part 58 sets a graduated schedule for the minimum number of monitors required, applicable to concentrated population centers and based on the area's measured ozone concentration in relation to the National Ambient Air Quality Standard (NAAQS) for ozone. There are two $PM_{2.5}$ NAAQS defined in 40 CFR Part 50, a 24-hour maximum average and an annual mean. The 24-hour $PM_{2.5}$ NAAQS is 35 micrograms per cubic meter ($\mu g/m^3$), based on a $PM_{2.5}$ 24-hour design value (a 3-year average of yearly 98^{th} percentile concentrations); 85% of this standard is 30 $\mu g/m^3$. The annual hour $PM_{2.5}$ NAAQS is 15 $\mu g/m^3$, based on a $PM_{2.5}$ annual design value (a 3-year average of annual arithmetic means); 85% of this standard is 12.8 $\mu g/m^3$. The following tables detail the CFR requirement and PA DEP's compliance with the requirement.

Table 3-6. Network Design Criteria for Minimum Number of $PM_{2.5}$ Monitors Required.

MSA population	Most recent 3-year design value ≥85% of any PM2.5NAAQS	Most recent 3-year design value <85% of any PM2.5NAAQS[1]
>1,000,000	3	2
500,000–1,000,000	2	1
50,000–<500,000	1	0

[1]These minimum monitoring requirements apply in the absence of a design value.

As a result of the population growth rate for Lancaster County in recent years, the population now meets the threshold requiring an additional $PM_{2.5}$ monitor. As defined in 40 CFR, Part 58, Appendix D, any MSA with a population between 500,000 and 1,000,000 and a design value greater than 85% of the NAAQS is required to have two $PM_{2.5}$ monitors in the MSA. The Lancaster MSA qualifies for an additional monitor based on both the population and design value criteria. PA DEP will take steps to address this deficiency and will propose to add an additional $PM_{2.5}$ in the Lancaster area in the next ANP submitted to the EPA Regional Administrator.

As part of its ambient air monitoring strategy, PA DEP is currently taking steps to install a $PM_{2.5}$ monitor in Lebanon MSA. In 2003, the OMB created the Lebanon MSA, separating out and area that was previously grouped with the Harrisburg-Carlisle, PA MSA. Although PA DEP has not previously located a $PM_{2.5}$ monitor specifically within the Lebanon MSA boundaries, the both design values for the formerly-inclusive Harrisburg-Carlisle MSA exceed 85% of the annual and 24-hour $PM_{2.5}$ NAAQS. PA DEP will install a $PM_{2.5}$ monitor in the Lebanon MSA, to begin monitoring in 2011.

Table 3-7. Number of Monitors Required and Existing in the COPAMS $PM_{2.5}$ Network.

Metropolitan Statistical Area (MSA)	2007-2009 24-Hr Design Value ($\mu g/m^3$)	2007-2009 Annual Design Value ($\mu g/m^3$)	Minimum Number of Required Monitors	Number of Current Monitors
Allentown-Bethlehem-Easton[1]	35/34	13.0/12.5	2	3/2
Altoona[2]	*	*	0	0
Erie	31	10.8	1	1
Harrisburg-Carlisle	34	13.2	2	2
Johnstown	32	13.4	1	1
Lancaster	35	13.8	2	1
Lebanon[2]	*	*	0	0
New York-Northern New Jersey-Long Island[3]	33	13.9	3	26/0
Philadelphia-Camden-Wilmington[4]	34	14.0	3	16/4
Pittsburgh[5]	50/33	17.0/14.2	3	14/6
Reading	30	12.9	1	1
Scranton-Wilkes-Barre	28	10.2	1	1
State College	29	10.7	0	1
Williamsport[2]	*	*	0	0
York-Hanover	32	13.7	1	1
Youngstown-Warren-Boardman[6]	31/30	13.0/11.7	3	3/1

* No Design Value available

[1] MSA overlaps NJ and includes the PA counties of Carbon, Lehigh and Northampton. The state of NJ operates one monitor in the Allentown-Bethlehem-Easton MSA. PA DEP operates two monitors in the Allentown-Bethlehem-Easton MSA. Both 2007-2009 design values display two values - the first value is the maximum value for the Allentown-Bethlehem-Easton MSA, the second value is the design value for the PA sites.

[2] PA DEP currently does not operate a monitor in the Lebanon MSA; but is scheduled to install a Lebanon MSA ozone monitor prior to 2011. PA DEP currently does not operate a $PM_{2.5}$ monitor in the Altoona or Williamsport MSAs.

[3] MSA overlaps NY, NJ and Pike County, PA. PA DEP does not operate a monitor in Pike County. The states of NJ and NY each operate thirteen monitors within the New York-Northern New Jersey-Long Island MSA.

[4] MSA overlaps DE, MD, NJ and the PA counties of Bucks, Chester, Delaware, Philadelphia and Montgomery. PA DEP operates three monitors in the Philadelphia-Camden-Wilmington MSA outside or Philadelphia County. The City of Philadelphia Air Management Services operates five monitors in Philadelphia County, PA. The states of DE, MD and NJ operate four, one and two monitors, respectively, within the Philadelphia-Camden-Wilmington MSA. Both 2007-2009 design values shown are for the PA DEP-operated monitor in Chester County, PA, which are also the maximum design values within the Philadelphia-Camden-Wilmington MSA..

[5] MSA includes Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland Counties PA DEP six monitors in the Pittsburgh MSA outside of Allegheny County. The Allegheny County Health Department operates eight monitors in Allegheny County. The maximum 2007-2009 24-Hour concentration displays two values – the first is the maximum for the Pittsburgh MSA, the second is the maximum for PA DEP-operated monitors within the Pittsburgh MSA

[6] MSA overlaps OH and Mercer County, PA. The state of Ohio operates two monitors in the Youngstown-Warren-Boardman MSA. PA DEP operates one monitor in Farrell, Mercer County, PA. Both 2007-2009 design values display two values - the first value is the maximum value for the Youngstown-Warren-Boardman MSA, the second value is the design value for the Farrell site.

3.3.3 PM_{10} Network Design Criteria

Network design criteria for PM_{10} require a minimum number of monitors considering both the population and measured pollutant concentration of a given area. Appendix D of 40 CFR, Part 58, sets a graduated schedule for the minimum number of monitors required, applicable to concentrated population centers and based on the area's measured ozone concentration in relation to the National Ambient Air Quality Standard (NAAQS) for ozone. As provided in 40 CFR Part 50, the PM_{10} NAAQS is 150 micrograms per cubic meter ($\mu g/m^3$), based on a 3-year average of 24-hour concentrations; 85% of this standard is 30 $\mu g/m^3$; 120% of this standard is 180 $\mu g/m^3$, 80 percent of this standard is 120 $\mu g/m^3$. The following tables summarize the CFR requirement and PA DEP's compliance with the requirement.

Table 3-8. Network Design Criteria for Minimum Number of PM_{10} Monitors Required.

Population Category[1]	High Concentration [2]	Medium Concentration[3]	Low Concentration[4,5]
> 1,000,000	6-10	4-8	2-4
500,000 to 1,000,000	4-8	2-4	1-2
250,000 to 500,000	3-4	1-2	0-1
100,000 to 250,000	1-2	0-1	0

[1] Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.
[2] High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20 percent or more
[3] Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS
[4] Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS
[5] These minimum monitoring requirements apply in the absence of a design value

As shown in the table below, the Allentown-Bethlehem-Easton MSA requires a minimum of two PM_{10} monitors. In addition to the monitor noted in Table 3-9, PA DEP currently operates a PM_{10} monitor in Nazareth, PA, as a Special Purpose Monitor (SPM). This monitor meets the monitor design and siting criteria of 40 CFR, Part 58 required for the State and Local Air Monitoring Stations (SLAMS), and if designated as such can be counted towards the network design criteria for the minimum number of monitors. PA DEP will propose this re-designation in the next ANP submitted to the EPA Regional Administrator in order to satisfy the minimum number of monitors requirement for the Allentown-Bethlehem-Easton MSA.

Pike County, PA comprises 0.3% of the total population of the New York-Northern New Jersey-Long Island MSA and any monitors installed in Pike County, a predominately rural area of the Commonwealth, would not provide data representative of this predominately urban MSA.

Table 3-9. Number of Monitors Required and Existing in the COPAMS PM_{10} Network.

Metropolitan Statistical Area (MSA)	Maximum 24-Hour Concentration 2007-2009 (µg/m^3)	Minimum Number of Required Monitors[1]	Number of Current Monitors
Allentown-Bethlehem-Easton[1]	138	2-4	1
Altoona	70	0	1
Erie	65	0-1	1
Harrisburg-Carlisle	59	1-2	1
Johnstown	71	0	1
Lancaster	55	1-2	1
Lebanon[2]	*	0	0
New York-Northern New Jersey-Long Island[3]	93	4-8*	2/0
Philadelphia-Camden-Wilmington[4]	94/64	2-4	6/1
Pittsburgh[5]	129/89	4-8	12/2
Reading	82	0-1	1

Table 3-9. Number of Monitors Required and Existing in the COPAMS PM_{10} Network (cont).

Metropolitan Statistical Area (MSA)	Maximum 24-Hour Concentration 2007-2009 (µg/m^3)	Minimum Number of Required Monitors[1]	Number of Current Monitors
Scranton-Wilkes-Barre	58	1-2	1
State College[2]	*	*	0
Williamsport	49	0	1
York-Hanover	61	0-1	1
Youngstown-Warren-Boardman[6]	62	1-2	4

* No 24-hour Maximum available

[1] MSA overlaps NJ and includes the PA counties of Carbon, Lehigh and Northampton. All monitors in the Allentown-Bethlehem-Easton MSA are within these PA counties.

[1] PA DEP currently does not operate a PM_{10} monitor in the Lebanon and State College MSAs

[2] MSA overlaps NY, NJ and Pike County, PA. PA DEP does not operate a monitor in Pike County. The state of NJ operates two monitors within the New York-Northern New Jersey-Long Island MSA.

[3] MSA overlaps DE, MD, NJ and the PA counties of Bucks, Chester, Delaware, Philadelphia and Montgomery. PA DEP operates one monitor in Delaware County, PA. The City of Philadelphia Air Management Services operates three monitors in Philadelphia County, PA. The states of MD and DE each operate one monitor. The maximum 2007-2009 24-Hour concentration displays two values – the first is the maximum for the Philadelphia-Camden-Wilmington MSA, the second is the maximum for the PA DEP-operated monitor within the Philadelphia-Camden-Wilmington MSA.

[4] MSA includes Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland Counties PA DEP operates two monitors in the Pittsburgh MSA outside of Allegheny County. The Allegheny County Health Department operates ten monitors in Allegheny County. The maximum 2007-2009 24-Hour concentration displays two values – the first is the maximum for the Pittsburgh MSA, the second is the maximum for PA DEP-operated monitors within the Pittsburgh MSA.

[5] MSA overlaps OH and Mercer County, PA. The state of Ohio operates four PM_{10} monitors in the Youngstown-Warren-Boardman MSA. PA DEP does not operate a PM_{10} monitor Mercer County, PA.

3.3.4 Lead (Pb) Network Design Criteria

Network design criteria for lead require a minimum number of monitors considering proximity to lead-emitting sources. At a minimum, there must be one source-oriented site located to measure the maximum lead concentration in ambient air from each lead source that emits 1.0 or more tons of lead per year (tpy). If EPA lowers the source-oriented monitor threshold to 0.5 tpy, additional monitors would be necessary to meet the requirements for source-oriented lead monitors. It is estimated that lowering the lead emissions threshold from 1.0 to 0.5 tpy may increase the number of existing source-oriented lead monitors under PA DEP's jurisdiction from 11 to 20 monitors. The following map and table show lead sources in Pennsylvania (excluding Allegheny and Philadelphia counties) and lead site in the COPAMS network correlated to those sources.

Figure 3-1. Map of Lead Sources in Pennsylvania Emitting ≥ 1 Ton of Lead Annually.

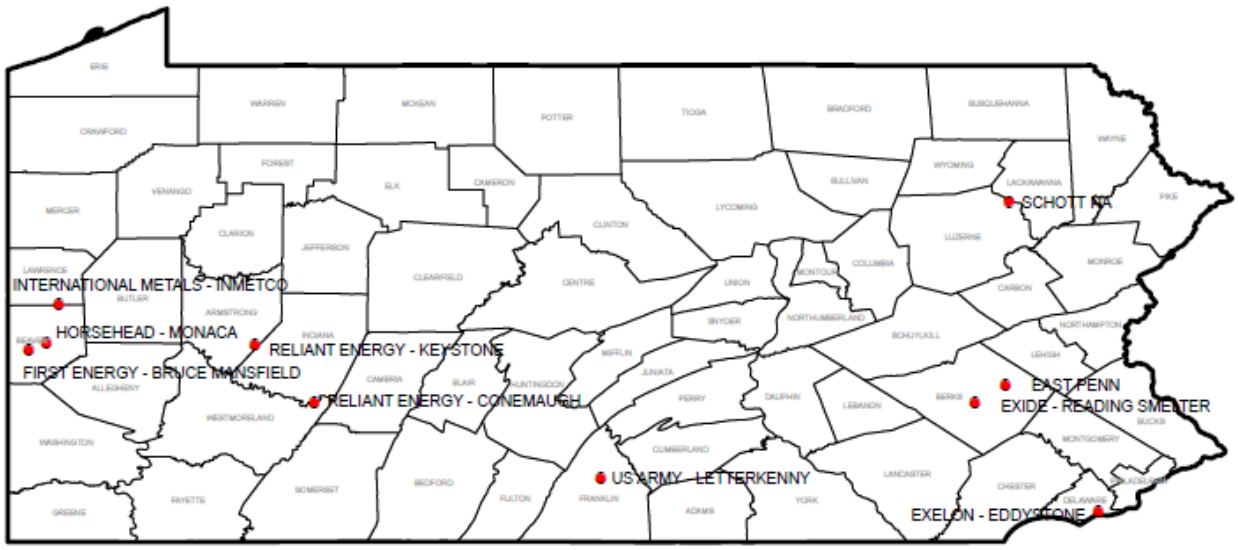


Table 3-10. Lead Monitoring Sites in the COPAMS Network and Correlated Lead Sources.

Site	Source
BEAVER VALLEY	HORSEHEAD - MONACA
CONEMAUGH	RELIANT ENERGY - CONEMAUGH
DURYEA	SCHOTT NORTH AMERICA
ELLWOOD CITY	INTERNATIONAL METALS - INMETCO
LAURELDALE NORTH	EXIDE – READING SMELTER
LYONS BORO	EAST PENN
LYONS PARK	EAST PENN
POTTER TOWNSHIP	FIRST ENGERY – BRUCE MANSFIELD
RIDLEY PARK	EXELON - EDDYSTONE
SHELOCTA	RELIANT ENERGY - KEYSTONE
UPPER STRASBURG	US ARMY - LETTERKENNY

EPA Region III has notified the PA DEP that population-based ambient monitoring for lead is awaiting new regulatory development. PA DEP will take the necessary steps to fulfill any new requirements when such regulation is adopted.

3.3.5 Sulfur dioxide (SO_2) Nitrogen dioxide (NO_2), and Carbon monoxide (CO) Networks

There are no minimum requirements for the number of SLAMS monitoring sites for these criteria pollutants.

3.4 COPAMS Sites Listing by Pollutant Network

The following tables list all criteria pollutant monitors in PA DEP's COPAMS air monitoring network. For each pollutant, the sites are grouped by location into MSA and non-MSA regions. The MSA and non-MSA regions are further defined in Appendices A and B of this document.

Table 3-11. Ozone Network Sites.

COPAMS Ozone Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
ALLENTOWN	Lehigh	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
EASTON	Northampton	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
FREEMANSBURG	Northampton	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Altoona, PA					
ALTOONA	Blair	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
HARRISBURG	Dauphin	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
HERSHEY	Dauphin	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
PERRY COUNTY	Perry	Regulatory Compliance	General/ Background	Regional Scale	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Lancaster, PA					
LANCASTER	Lancaster	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
LANCASTER DOWNWIND	Lancaster	Regulatory Compliance	Extreme Downwind	Urban Scale	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
BRISTOL	Bucks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHESTER	Delaware	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
NEW GARDEN	Chester	Regulatory Compliance	Regional Transport	Regional Scale	SLAMS
NORRISTOWN	Montgomery	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Pittsburgh, PA					
BEAVER FALLS	Beaver	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
BRIGHTON TWP	Beaver	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHARLEROI	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
FLORENCE	Washington	Specific Location Characterization	Regional Transport	Regional Scale	SLAMS
GREENSBURG	Westmoreland	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
HOOKSTOWN	Beaver	Specific Location Characterization	Regional Transport	Regional Scale	SLAMS
KITTANNING	Armstrong	Regulatory Compliance	Extreme Downwind	Urban Scale	SLAMS
MURRYSVILLE	Westmoreland	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
PITTSBURGH	Allegheny	Population Exposure	Population Exposure	Neighborhood	SPM
WASHINGTON	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Reading, PA					
KUTZTOWN	Berks	Regulatory Compliance	Extreme Downwind	Urban Scale	SLAMS
READING AIRPORT	Berks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS

Table 3-11. Ozone Network Sites (cont.).

COPAMS Ozone Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Scranton-Wilkes-Barre, PA					
NANTICOKE	Luzerne	Regulatory Compliance	General/ Background	Urban Scale	SLAMS
PECKVILLE	Lackawanna	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
SCRANTON	Lackawanna	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
WILKES BARRE	Luzerne	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
State College, PA					
STATE COLLEGE	Centre	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Williamsport, PA					
MONTOURSVILLE	Lycoming	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
York-Hanover, PA					
YORK	York	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
YORK DOWNWIND	York	Regulatory Compliance	Extreme Downwind	Urban Scale	SLAMS
Youngstown-Warren-Boardman, OH-PA					
FARRELL	Mercer	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Northeast PA					
POCONO	Monroe	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Southcentral PA					
BIGLERVILLE	Adams	Specific Location Characterization	General/Background	Regional Scale	SPM
METHODIST HILL	Franklin	Regulatory Compliance	Regional Transport	Regional Scale	SLAMS
Northcentral PA					
MOSHANNON	Clearfield	Specific Location Characterization	General/Background	Regional Scale	SLAMS
TIOGA COUNTY	Tioga	Specific Location Characterization	General/Background	Regional Scale	SLAMS
Southwest PA					
HOLBROOK	Greene	Regulatory Compliance	Regional Transport	Regional Scale	SLAMS
STRONGSTOWN	Indiana	Regulatory Compliance	Population Exposure	Regional Scale	SLAMS
Northwest PA					
NEW CASTLE	Lawrence	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS

Table 3-12. $PM_{2.5}$ Network Sites.

COPAMS $PM_{2.5}$ Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
FREEMANSBURG	Northampton	Population Exposure	Population Exposure	Neighborhood	SLAMS
LEHIGH VALLEY	Northampton	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
CARLISLE	Cumberland	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
HARRISBURG	Dauphin	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Population Exposure	Population Exposure	Neighborhood	SLAMS
Lancaster, PA					
LANCASTER	Lancaster	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
BRISTOL	Bucks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHESTER	Delaware	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
NEW GARDEN	Chester	Regulatory Compliance	Regional Transport	Regional Scale	SLAMS
NORRISTOWN	Montgomery	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Pittsburgh, PA					
BEAVER FALLS	Beaver	Population Exposure	Population Exposure	Urban Scale	SLAMS
CHARLEROI	Washington	Population Exposure	Population Exposure	Neighborhood	SLAMS
FLORENCE	Washington	Regulatory Compliance	Regional Transport	Regional Scale	SLAMS
GREENSBURG	Westmoreland	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
KITTANNING	Armstrong	Population Exposure	Extreme Downwind	Urban Scale	SLAMS
WASHINGTON	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Reading, PA					
READING AIRPORT	Berks	Population Exposure	Population Exposure	Neighborhood	SLAMS
Scranton-Wilkes-Barre, PA					
SCRANTON	Lackawanna	Population Exposure	Population Exposure	Urban Scale	SLAMS
State College, PA					
STATE COLLEGE	Centre	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
York-Hanover, PA					
YORK	York	Population Exposure	Population Exposure	Urban Scale	SLAMS
Youngstown-Warren-Boardman, OH-PA					
FARRELL	Mercer	Regulatory Compliance	Maximum Concentration	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Southcentral PA					
ARENDTSVILLE	Adams	Population Exposure	General/Background	Urban Scale	SLAMS
Northeast PA					
POCONO	Monroe	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS

Table 3-13. PM_{10} Network Sites.

COPAMS PM_{10} Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
ALLENTOWN	Lehigh	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
NAZARETH	Northampton	Specific Location Characterization	Source-oriented	Neighborhood	SPM
Altoona, PA					
ALTOONA	Blair	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
HARRISBURG	Dauphin	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Lancaster, PA					
LANCASTER	Lancaster	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
CHESTER	Delaware	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Pittsburgh, PA					
BEAVER FALLS	Beaver	Regulatory Compliance	Source-oriented	Urban Scale	SLAMS
CHARLEROI	Washington	Regulatory Compliance	Population Exposure	Middle Scale	SLAMS
Reading, PA					
READING AIRPORT	Berks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Scranton-Wilkes-Barre, PA					
WILKES BARRE	Luzerne	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Williamsport, PA					
MONTOURSVILLE	Lycoming	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
York-Hanover, PA					
YORK	York	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Northwest PA					
NEW CASTLE	Lawrence	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS

Table 3-14. Lead Network Sites.

COPAMS Lead Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
RIDLEY PARK	Delaware	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
CHESTER	Delaware	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Pittsburgh, PA					
BEAVER VALLEY	Beaver	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
CONEMAUGH	Westmoreland	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
POTTER TOWNSHIP	Beaver	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
VANPORT	Beaver	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Reading, PA					
LYONS PARK	Berks	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
LYONS BORO	Berks	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
LAURELDALE NORTH	Berks	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
LAURELDALE SOUTH	Berks	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Scranton-Wilkes-Barre, PA					
DURYEA	Luzerne	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Sites in Non-MSA Areas					
Southcentral PA					
UPPER STRASBURG	Franklin	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Southwest PA					
SHELOCTA	Indiana	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS
Northwest PA					
ELLWOOD CITY	Lawrence	Regulatory Compliance	Source-oriented	Middle Scale	SLAMS

Table 3-15. SO2 Network Sites.

COPAMS SO_2 Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
EASTON	Northampton	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Altoona, PA					
ALTOONA	Blair	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
PERRY COUNTY	Perry	Regulatory Compliance	General/ Background	Regional Scale	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
BRISTOL	Bucks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHESTER	Delaware	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
NORRISTOWN	Montgomery	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Pittsburgh, PA					
BRIGHTON TWP	Beaver	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHARLEROI	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
FLORENCE	Washington	Specific Location Characterization	Regional Transport	Regional Scale	SLAMS
HOOKSTOWN	Beaver	Specific Location Characterization	Regional Transport	Regional Scale	SLAMS
PITTSBURGH	Allegheny	Population Exposure	Population Exposure	Neighborhood	SPM
Reading, PA					
READING AIRPORT	Berks	Population Exposure	Population Exposure	Neighborhood	SLAMS
Scranton-Wilkes-Barre, PA					
WILKES BARRE	Luzerne	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
State College, PA					
STATE COLLEGE	Centre	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
York-Hanover, PA					
YORK	York	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Southwest PA					
HOLBROOK	Greene	Specific Location Characterization	Regional Transport	Regional Scale	SPM
STRONGSTOWN	Indiana	Regulatory Compliance	Population Exposure	Regional Scale	SLAMS
Northwest PA					
NEW CASTLE	Lawrence	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
WARREN OVER LOOK	Warren	Regulatory Compliance	Maximum Concentration	Neighborhood	SLAMS

Table 3-16. NO_2 Network Sites.

COPAMS NO_2 Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
FREEMANSBURG	Northampton	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
HARRISBURG	Dauphin	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
PERRY COUNTY	Perry	Regulatory Compliance	General/Background	Regional Scale	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Lancaster, PA					
LANCASTER	Lancaster	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
BRISTOL	Bucks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
CHESTER	Delaware	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Pittsburgh, PA					
BEAVER FALLS	Beaver	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
CHARLEROI	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
PITTSBURGH	Allegheny	Population Exposure	Population Exposure	Neighborhood	SPM
Reading, PA					
READING AIRPORT	Berks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Scranton-Wilkes-Barre, PA					
SCRANTON	Lackawanna	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
State College, PA					
STATE COLLEGE	Centre	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
York-Hanover, PA					
YORK	York	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Southcentral PA					
ARENDTSVILLE	ADAMS	Specific Location Characterization	General/Background	Urban Scale	SPM

Table 3-17. CO Network Sites.

COPAMS CO Monitors					
Site Name	**County**	**Monitor Purpose**	**Monitoring Objective**	**Spatial Scale**	**Network**
Sites in Metropolitan Statistical Areas (MSA)					
Allentown-Bethlehem-Easton, PA-NJ					
FREEMANSBURG	Northampton	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Erie, PA					
ERIE	Erie	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Harrisburg-Carlisle, PA					
HARRISBURG	Dauphin	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Johnstown, PA					
JOHNSTOWN	Cambria	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD					
BRISTOL	Bucks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Pittsburgh, PA					
CHARLEROI	Washington	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
PITTSBURGH	Allegheny	Population Exposure	Population Exposure	Neighborhood	SPM
Reading, PA					
READING AIRPORT	Berks	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
Scranton-Wilkes-Barre, PA					
SCRANTON	Lackawanna	Regulatory Compliance	Population Exposure	Neighborhood	SLAMS
York-Hanover, PA					
YORK	York	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS
Sites in Non-MSA Areas					
Southcentral PA					
ARENDTSVILLE	Adams	Specific Location Characterization	General/Background	Urban Scale	SPM
Northwest PA					
NEW CASTLE	Lawrence	Regulatory Compliance	Population Exposure	Urban Scale	SLAMS

4. Siting Requirements of 40 CFR, Part 58, Appendix E

Appendix E contains requirements for minimum distances that should be maintained between the monitoring inlet and objects such as buildings, trees and roadways, which may influence the pollution concentration measurements recorded by the monitor. While most of these site conditions remain relatively stable over time, tree growth and roadway traffic density are more variable, and may change quite dramatically over a short period of time. Appendices A and B of this document include the analysis of separation distances for trees and roadways, based on the most currently available information.

4.1 Distance from Trees

Appendix E requires a minimum separation distance of 10 meters from the drip line of a tree for ozone, SO_2 and NO_2 monitors. Due to the increased scavenging effect of trees for ozone (over SO_2 and NO_2), the impact of trees should be carefully considered for all ozone monitoring sites.

4.2 Roadway Distances

Requirements regarding roadway separation distances for most of the criteria pollutants are provided in 40 CFR Part 58, Appendix E; these requirements are based on the Annual Average Daily Traffic (AADT) count. The following tables and figure are taken directly from Appendix E. These tables and Figure 4-1 are used to determine the minimum distances required for specific pollutant monitors presented in the roadway separation distance summary tables in Appendices A and B of this document.

Table 4-1. Roadway Separation Distance Requirement for Ozone and NO_2 Monitors.

Table E–1 to Appendix E of 40 CFR Part 58—Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood and Urban Scale Ozone (O_3) and Oxides of Nitrogen (NO, NO_2, NO_X, NO_y)		
Roadway average daily traffic, vehicles per day	**Minimum distance[1](meters)**	**Minimum distance[1,2](meters)**
≤1,000	10	10
10,000	10	20
15,000	20	30
20,000	30	40
40,000	50	60
70,000	100	100
≥110,000	250	250

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.
[2]Applicable for ozone monitors whose placement has not already been approved as of December 18, 2006.

Figure 4-1. Roadway Separation Distance Requirement for $PM_{2.5}$, PM_{10} and Lead Monitors.

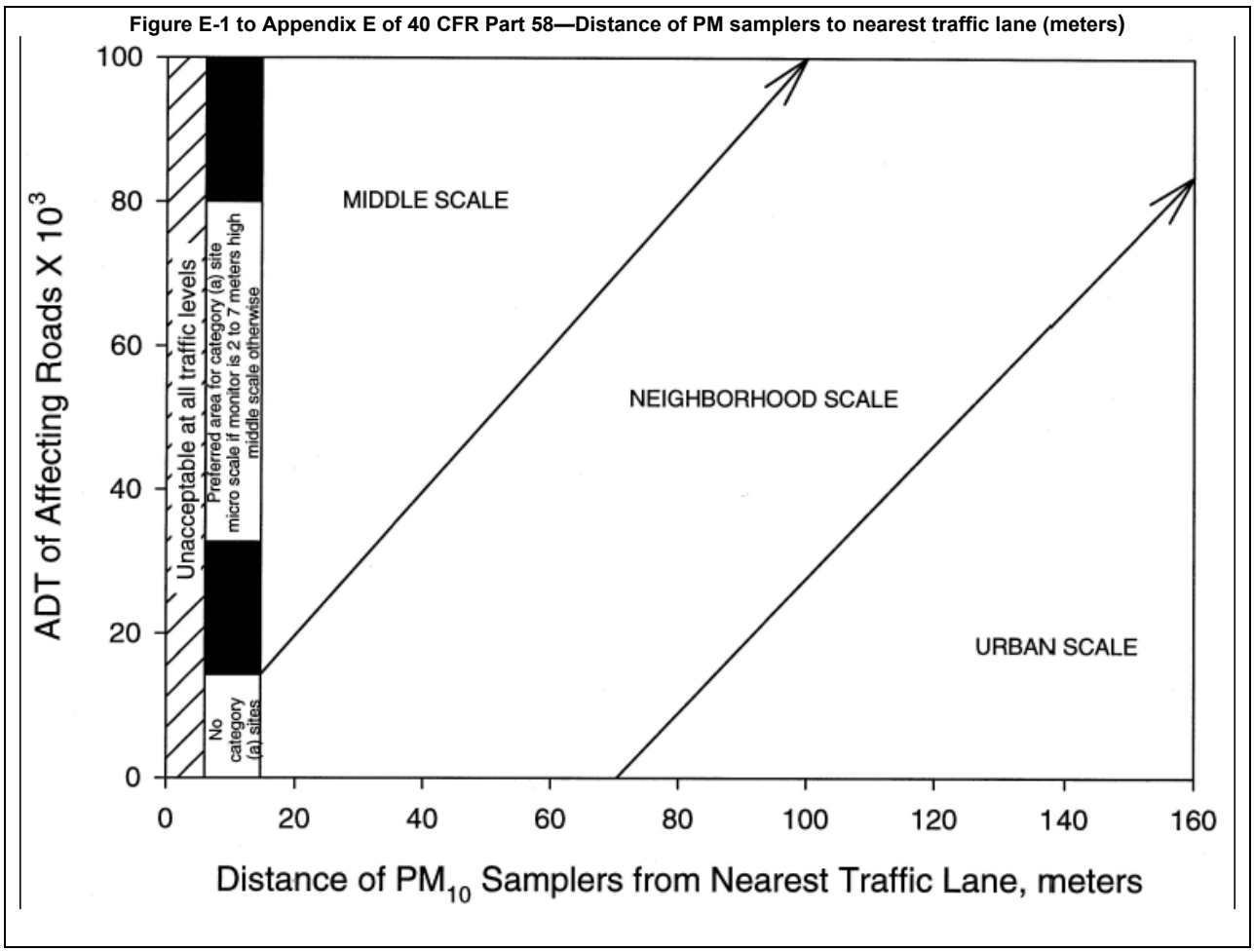


Table 4-2. Roadway Separation Distance Requirement for CO Monitors.

Table E–2 to Appendix E of 40 CFR Part 58—Minimum Separation Distance Between Roadways and Probes or Monitoring Paths for Monitoring Neighborhood Scale Carbon Monoxide	
Roadway average daily traffic, vehicles per day	**Minimum distance[1](meters)**
≤10,000	10
15,000	25
20,000	45
30,000	80
40,000	115
50,000	135
≥60,000	150

[1]Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

Appendix A. Metropolitan Statistical Areas: Sites, Analyses and Recommendations

A-1 Allentown-Bethlehem-Easton MSA

The Allentown-Bethlehem-Easton MSA consists of Carbon, Lehigh and Northampton Counties. The PA DEP air monitoring program currently has five sites located in the Allentown-Bethlehem-Easton MSA that monitor for criteria pollutants: Site Name, AQS Code, County

Allentown – 42-077-0004, Lehigh County
Easton – 42-095-8000, Northampton County
Freemansburg – 42-095-0025, Northampton County
Lehigh Valley – 42-095-0027, Northampton County
Nazareth – 42-095-1000, Northampton County

A-1.1 Allentown – 42-077-0004

Location: Rear of Allentown State Hosp., 1600 Hanover Ave, Allentown, PA
Site is on Hospital grounds on a rise behind the main building complex.

Distance from trees: 16 meters

Table A-1.1a. Parameters Monitored at the Allentown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood

Table A-1.1b. Roadway Separation Distances for the Allentown Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
S. Maxwell St.	≤10,000	142.0	10	15
E, Union St.	≤10,000	148.7	10	15
E. Walnut St	≤10,000	162.6	10	15
E. Turner St.	≤10,000	183.0	10	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Allentown air monitoring site are shown in Table A-1.1a and Table A-1.1b, respectively. The monitoring objectives and spatial scales for all monitors are described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for both pollutants.

A-1.2 Easton – 42-095-8000

Location: 17th St. & Spring Garden St, Easton, PA
Site is located on property owned by Bean Contracting.

Distance from trees: 19 meters

Table A-1.2a. Parameters Monitored at the Easton Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Urban

Table A-1.2b. Roadway Separation Distances for the Easton Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	SO_2
Spring Garden St.	<10,000	29.0	10	N/A
N. 17th St.	<10,000	79.5	10	N/A
Wood Ave.	4,400	95.5	10	N/A
US22	41,000	221.7	50	N/A

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Easton air monitoring site are shown in Table A-1.2a and Table A-1.2b, respectively. The monitoring objective and spatial scale are correct as described in Sections 3.1.1 and 3.1.2 of this document for ozone. However, for SO_2 monitoring, the urban scale is not an appropriate spatial scale for population oriented sites. In addition there are a significant number of major sources of NO_x PM_{10}, SO_2, and VOC's in the area. These sources may limit the scale at the site to neighborhood. Therefore PA DEP will evaluate changing this scale in a future Annual Network Plan (ANP). The minimum separation distance from the monitor probe to the nearest traffic lane is met for both pollutants.

A-1.3 Freemansburg – 42-095-0025

Location: Washington St. & Cambria St, Freemansburg, PA
Site is located in a county recreation area.

Distance from trees: 10 meters

Table A-1.3a. Parameters Monitored at the Freemansburg Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-1.3b. Roadway Separation Distances for the Freemansburg Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	$PM_{2.5}$	NO2	CO
Cambria St.	≤10,000	49.7	10	15	10	10
Karoly St.	≤10,000	73.4	10	15	10	10
Juniata St.	≤10,000	110.0	10	15	10	10
Washington St.	7,100	131.3	10	15	10	10
Pembroke Rd./ Freemansburg Ave.	16,000	155.0	30	16	30	29

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Freemansburg air monitoring site are shown in Table A-1.3a and Table A-1.3b, respectively. The monitoring objectives and spatial scales for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-1.4 Lehigh Valley – 42-095-0027

Location: Rear parking lot of 2604 Schoenersville Road, Bethlehem, PA
Site is east of the Lehigh Valley Hospital, Muhlenberg Campus and south east of the Allentown-Bethlehem airport.

Distance from trees: 20 meters

Table A-1.4a. Parameters Monitored at the Lehigh Valley Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood

Table A-1.4b. Roadway Separation Distances for the Lehigh Valley Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			$PM_{2.5}$
Roselawn Dr.	≤1,000	35.0	15
Wynnewood Dr.	≤1,000	45.6	15
Whitewood Rd.	≤1,000	89.5	15
Schoenersville Rd.	21,000	117.0	21
Briarcliff Dr.	≤10,000	134.5	15
Stonewood Dr.	≤10,000	155.5	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Lehigh Valley air monitoring site are shown in Table A-1.4a and Table A-1.4b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

In general, this site is positioned to capture emissions from the high population center to the west, the Allentown-Bethlehem Airport and from vehicular traffic on US Route 22.

A-1.5 Nazareth – 42-095-1000

Location: S Green & Delaware, Nazareth, PA
Site is located in a public ball field, 0.12 km east of a large quarrying operation.

Distance to nearest tree: 25 meters

Table A-1.5a. Parameters Monitored at the Nazareth Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
PM_{10}	SPM	Automated TEOM gravimetric	Continuous, year-round	Source-oriented	Neighborhood

Table A-1.5b. Roadway Separation Distances for the Nazareth Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
S. Green St...	≤1,000	29.3	15
Delaware St.	≤1,000	44.6	15
S. Main St.	≤10,000	101.0	15
W. Mulberry St.	≤1,000	104.0	15
South St.	≤10,000	120.0	15
W. Evergreen St.	≤10,000	127.7	15
Easton Rd. (State Route 248/191)	8,000	229.9	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Nazareth air monitoring site are shown in Table A-1.5a and Table A-1.5b, respectively. The PM_{10} monitor at Nazareth is designated as a Special Purpose Monitor (SPM). However, the monitoring objective and spatial scale for the Nazareth monitor meet SLAMS requirements as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is also met according to SLAMS requirements.

A-1.6 Population Density and Changes

A-1.6.1 Lehigh County

As shown in Figure A-1.6.1a, the Allentown air monitoring site is located within the highest population density area. Although this same area is not exhibiting any growth it is surrounded by areas of significant population increases (Figure A-1.6.1b). This site is correctly identified as a neighborhood site with the maximum amount of population covered.

Figure A-1.6.1a. Population Density for Lehigh County, 2008 Estimate Data.

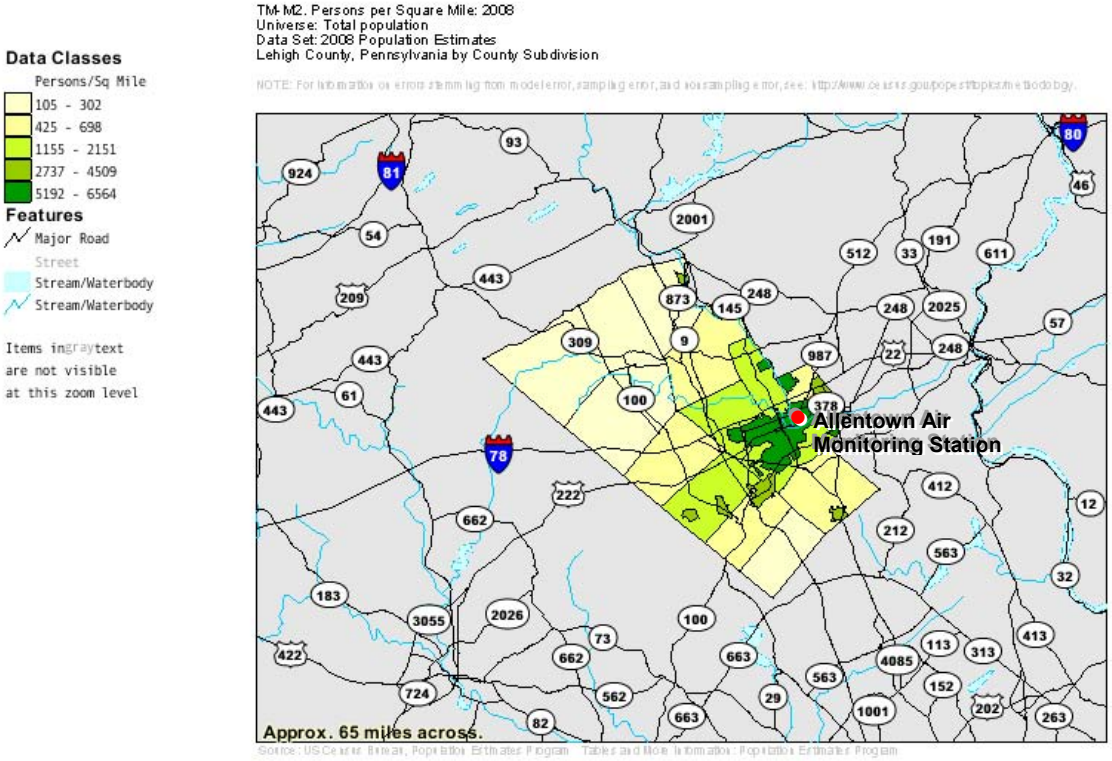
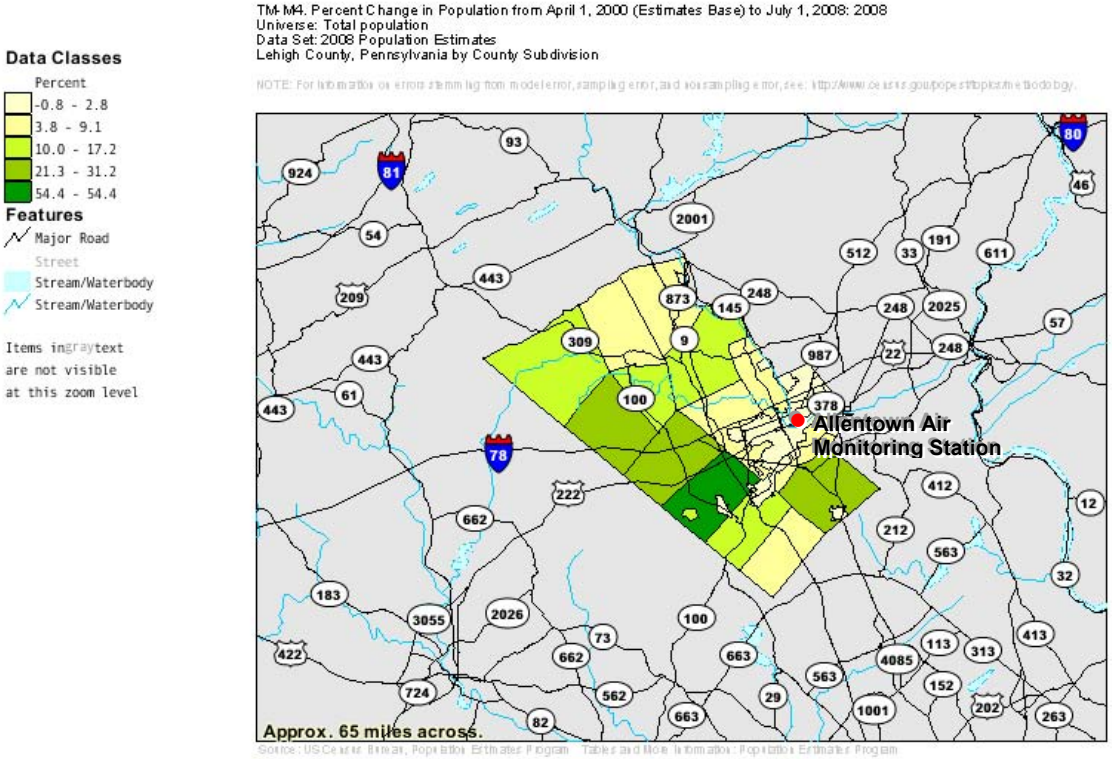


Figure A-1.6.1b. Percent Population Change for Lehigh County, 2000 - 2008 Estimate Data.



A-1.6.2 Northampton County

As shown in Figures A-1.6.2a and A-1.6.2b, the Easton air monitoring site is located within one of the reasonably high population density areas. It is also located in a relatively high growth area. This site is correctly identified as an urban or neighborhood scale site with the maximum amount of population covered.

The Freemansburg and Lehigh Valley air monitoring sites are located within the highest population density areas. Although these same areas are not exhibiting growth, the sites are surrounded by areas of significant population increases. These sites are correctly identified as a neighborhood sites with the maximum amount of population covered.

Figure A-1.6.2a. Population Density for Northampton County, 2008 Estimate Data.

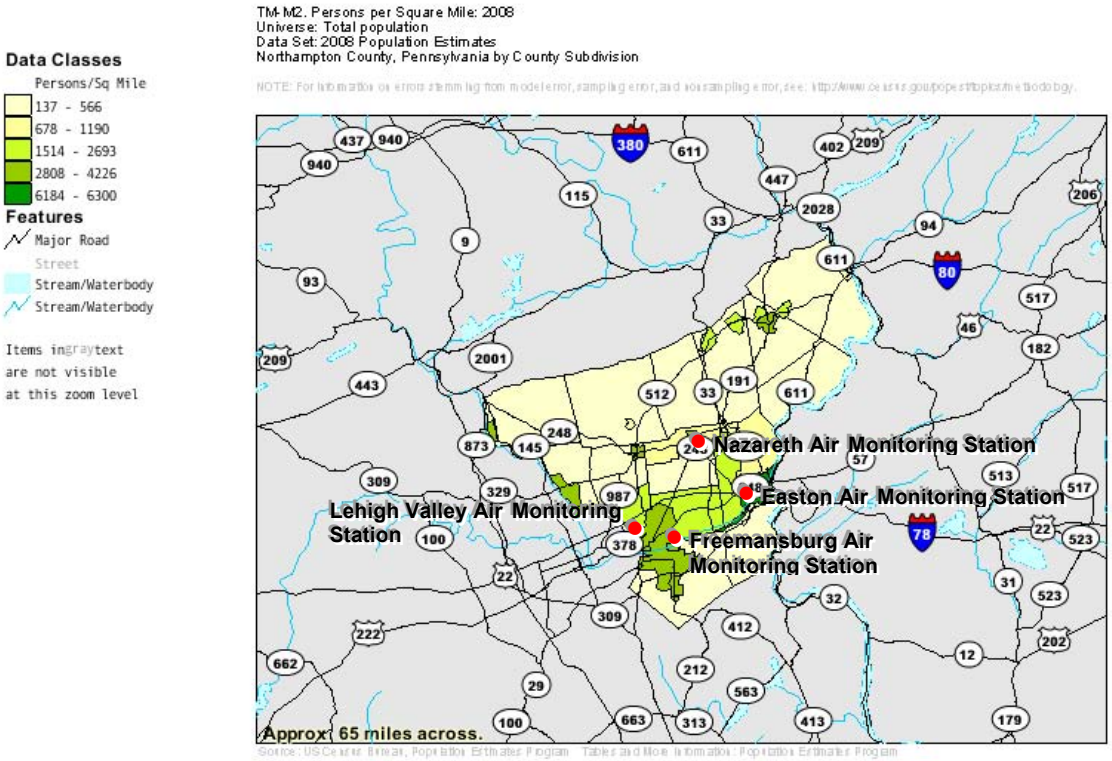
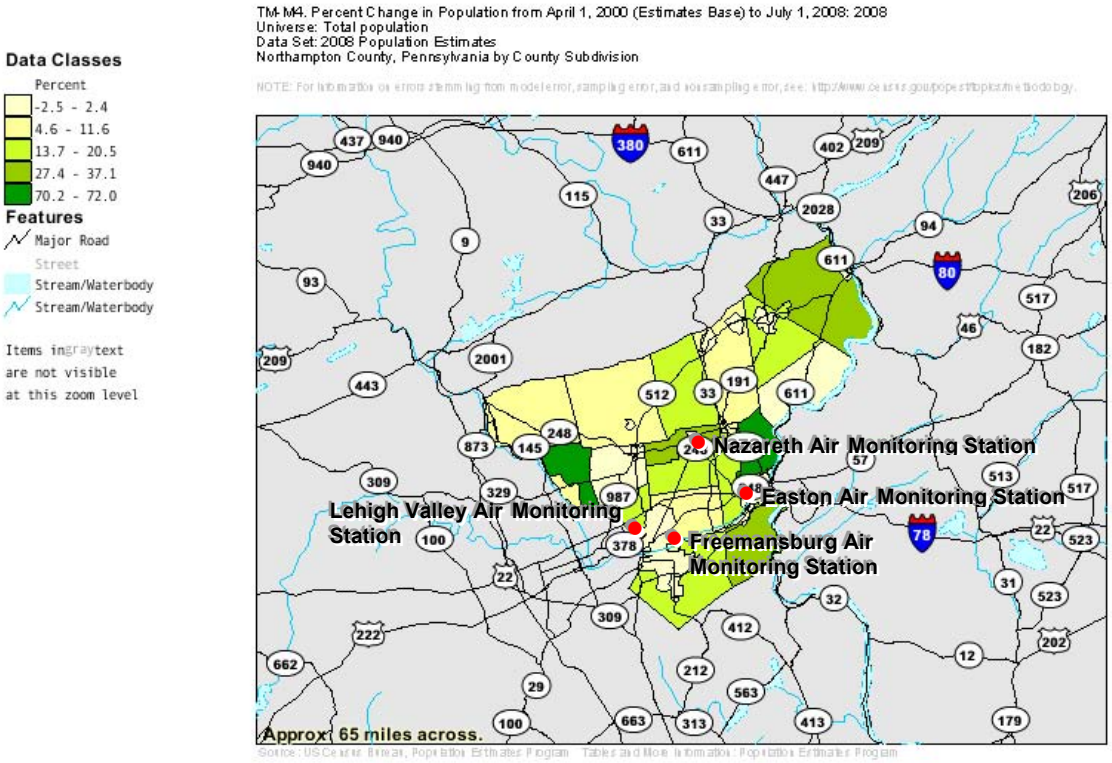


Figure A-1.6.2b. Percent Population Change for Northampton County, 2000 - 2008 Estimate Data.



A-1.7 Criteria Pollutant Discussion

A-1.7.1 Ozone

As provided in Section 3.3.1 of this document, based on population and design value, the Allentown-Bethlehem-Easton MSA is required to have a minimum of three ozone monitors. The three monitors at the Allentown, Easton, and Freemansburg sites fulfill this requirement.

As shown in the ozone back trajectories (Figures C-1.1a through C-1.1g), all ozone sites (Allentown, Easton, Freemansburg) measured maximum concentrations during periods of southern and southwesterly winds. This is consistent with the discussions for the MSAs in southcentral and southeastern Pennsylvania.

In addition, as shown in Figure C-3b, all these ozone sites may be under the influence of the major VOC and NOx sources that are found throughout the MSA and in the MSAs to the south (Reading, Philadelphia) and southwest (Lancaster).

40 CFR Part 58, Appendix D requires that at least one ozone site for each MSA must be designed to record maximum concentration. The Easton site has been designated as the maximum downwind ozone site. However, design values for this site are not the highest in the MSA. Easton has a design value of 73 ppb, whereas Allentown has a

design value of 76 ppb and Freemansburg 75 ppb. Thus the Department may consider moving the Easton site or re-designating a new maximum ozone location, pending further guidance from EPA

A-1.7.2 $PM_{2.5}$

As described in Section 3.3.2 of this document, based on population and design value, the Allentown-Bethlehem-Easton MSA is required to have a minimum of two $PM_{2.5}$ monitors. The two monitors at Allentown and Lehigh Valley fulfill this requirement.

As shown in the $PM_{2.5}$ back trajectory (Figure C-1.1h), the Freemansburg site maximum concentrations were measured during periods of predominately westerly wind patterns. There were significantly less $PM_{2.5}$ events originating from the south and southwest, as were evident for ozone. This westerly direction is consistent with the wind rose data (Figure C-1.1c) which indicates prominent wind directions out of the west. It is also consistent with the location of major PM_{10} sources to the west and northwest of the site (Figure C-3b).

Appendix D of 40 CFR Part 58 requires that at least one PM2.5 monitor must be sited as population-oriented and to record the maximum concentration. Of the two existing sites, Freemansburg and Lehigh Valley, neither has been designated as a maximum concentration, population-oriented monitoring site. The Lehigh Valley site has been in operation for less than a year and no concentration averages are available. Therefore, the maximum concentration site designation will be determined at a future date.

A-1.7.3 PM_{10}

As set forth in Section 3.3.3 of this document, based on population and pollutant concentration, the Allentown-Bethlehem-Easton MSA is required to have a minimum of two PM_{10} monitors. The PM_{10} monitors at Allentown and Nazareth fulfill this requirement.

Both sites are located close to four major sources of PM_{10} (See Figure C-3b). As expected, the Nazareth site has a consistently higher annual mean than the Allentown site. Nazareth is a source-oriented site located a short distance to the east from a quarrying operation. As shown in Figure C-1.1d, the quarry is in the direction of the prevailing winds.

A-1.7.4 SO_2, NO_2, CO

There are no minimum requirements for the number of monitoring sites for these pollutants, and the monitoring scales are appropriately labeled as neighborhood scale.

Although the ideal scales for CO is micro- or middle scale, distances and traffic density information on all the roadways surrounding the Freemansburg site indicate that neighborhood scale is more appropriate. It can be determined from Table E-2 of 40 CFR Part 58, Appendix E that the appropriate scale should be neighborhood scale as indicated in section A-1.3.

As seen in Figure C-3b, SO_2 and NO_2 monitors at Easton and Freemansburg are downwind of at least five major sources. Therefore, they are located at a point of maximum concentration as required by 40 CFR Part 58, Appendix D.

A-1.8 MSA Site Recommendations

As noted in the Easton site summary, Section A-1.2, urban scale is not an appropriate spatial scale for SO_2 monitoring at population oriented sites. Therefore PA DEP will reevaluate the spatial scale assigned to the Easton SO_2 monitor.

As noted in Section A-1.7.1, the Easton site has been designated as the maximum downwind ozone site. However, design values for this site are not the highest in the MSA. Consequently, the Department may consider moving the Easton site or re-designating a new maximum ozone location, pending further guidance from EPA.

The Department will recommend any changes in a future Annual Network Plan.

A-2 Altoona MSA

The Altoona MSA consists of Blair County. The air monitoring program currently has one site located in the Altoona MSA: Site Name, AQS Code, County

Altoona – 42-013-0801, Blair County

A-2.1 Altoona – 42-013-0801 Site Summary

Location: 2nd Ave. & 7th St, Altoona, PA
Site is located inside Ward Trucking Terminal. Site distance from center city Altoona to monitoring site is 2.5 km to the northeast.

Distance from trees: 29 meters

Table A-2.1a. Parameters Monitored at the Altoona Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Urban
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Urban

Table A-2.1b. Roadway Separation Distances for the Altoona Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			Ozone	PM_{10}	SO_2
7th St.	<1,000	171.0	10	70	N/A
2nd Ave.	<1,000	172.0	10	70	N/A

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Altoona air monitoring site are shown in Table A-2.1a and Table A-2.1b, respectively. The monitoring objective and spatial scale for the ozone monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The monitoring objective and spatial scale designations for the PM_{10} and SO_2 monitors, however, do not meet the design requirements as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

Currently, the spatial scale for the PM_{10} monitor is designated as urban scale. The urban spatial scale is not defined or recommended for PM_{10} in the monitoring in the network design criteria of 40 CFR Part 58, Appendix D. Based on the dispersion characteristics of PM_{10}, and the definitions of spatial scales found in 40 CFR Part 58, Appendix D, the Altoona site is more accurately considered a neighborhood scale monitor for PM_{10}.

Currently, the spatial scale for the SO_2 monitor is designated as urban scale. Section 4.4 of Appendix D, 40 CFR Part 58, does not list urban spatial scale as a valid spatial scale for SO_2.

PA DEP will study the necessity and/or feasibility of re-designating the spatial scale of the PM_{10} and SO_2 monitor. Any recommendations will be included in a future ANP

A-2.2 Population Density and Changes

As shown in Figure A-2.2a, the Altoona air monitoring site is located in the second highest population density area, and next to the densest population centers. The population growth indicated in the Figure A-2.2b shows that the largest percentage of increase has occurred in areas near and surrounding the Altoona air monitoring site location. PA DEP has determined that the site is appropriately sited to measure urban population with the maximum amount of population covered.

Figure A-2.2a. Population Density for Blair County, 2008 Estimate Data.

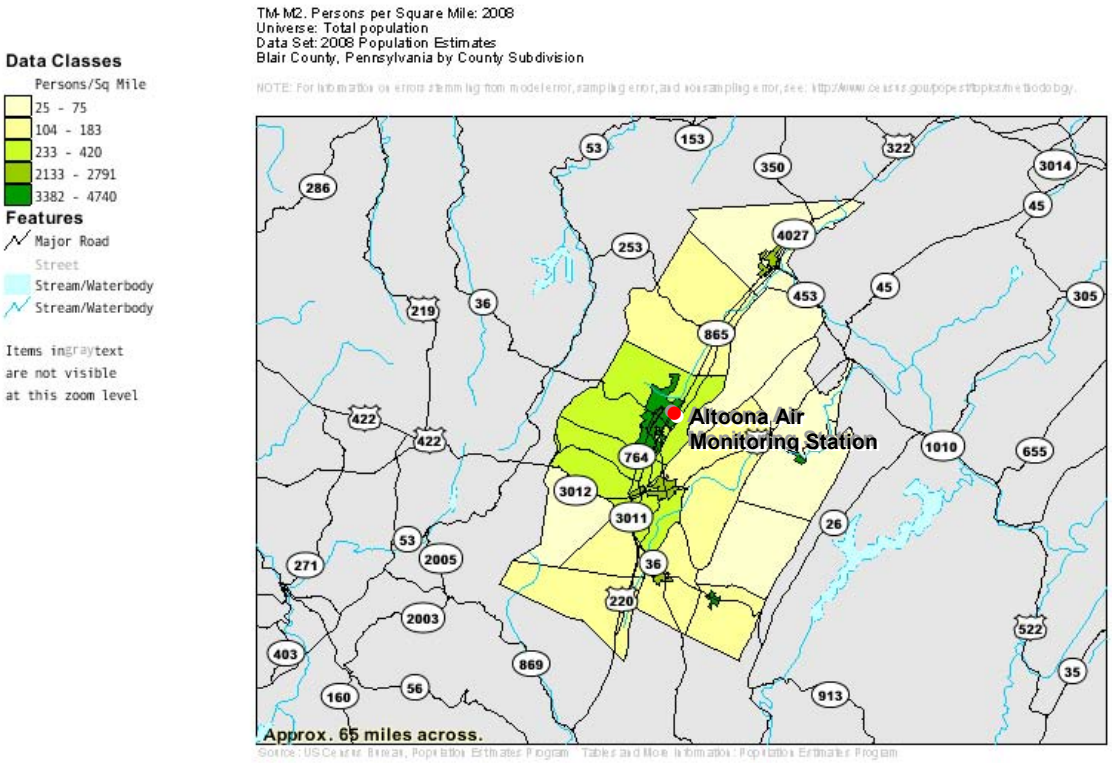
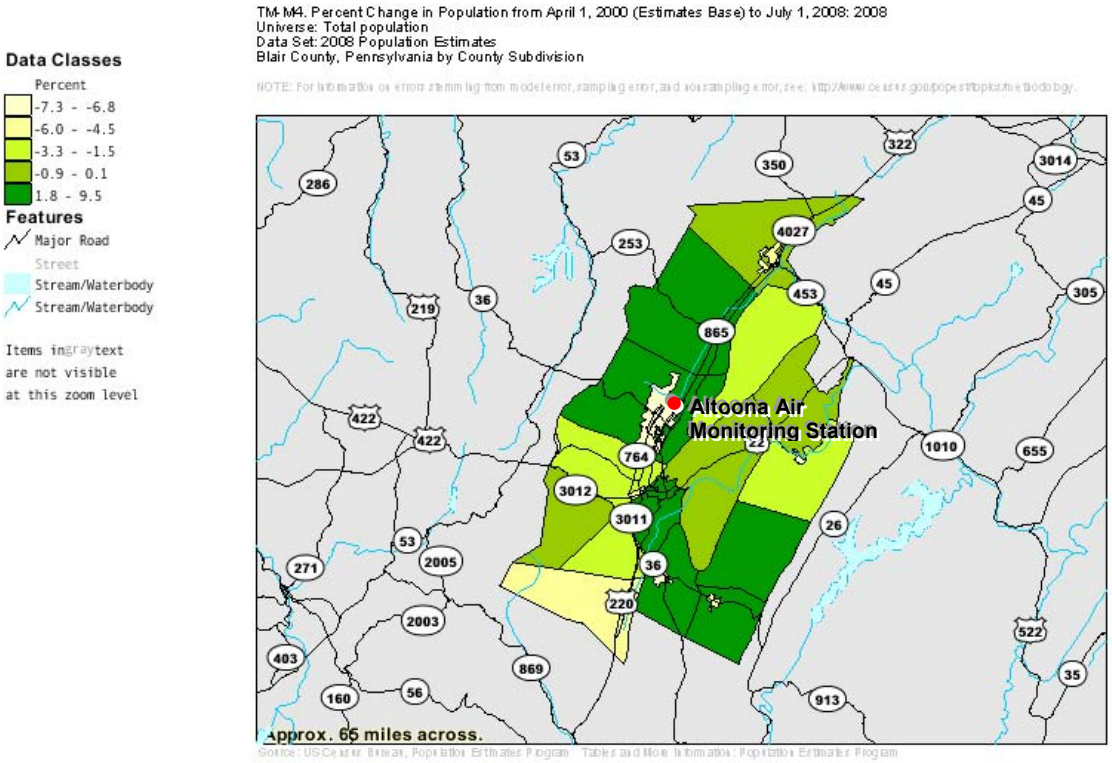


Figure A-2.2b. Percent Population Change for Blair County, 2000 - 2008 Estimate Data.



A-2.3 Criteria Pollutant Discussion

A-2.3.1 Ozone

As specified in Section 3.3.1 of this document, based on population and design value, the Altoona MSA is required to have a minimum of one ozone monitor active for the ozone season. The ozone monitor at the Altoona site meets this requirement.

Pursuant to 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. As shown in Figure C-1.2a (Appendix C of this document), the Altoona air monitoring site has predominating westerly wind directions. The ozone back trajectory map (Figure C-1.2b) for the Altoona site shows the highest ozone concentrations mostly come from air masses that have their origins upwind of the site. The Altoona site is downwind of major ozone sources emitting ozone precursors (Figure C-1.3c); both of these sources emit nitrogen oxides (NO_x), and one is also a major emitter of volatile organic compounds (VOC). In addition, the Altoona site is located downwind of a NO_x source, using the second predominating wind direction of northeast. Based on these considerations, the site is well suited to measure maximum concentrations.

A-2.3.2 $PM_{2.5}$

As explained in Section 3.3.2 of this document, based on population and design value, the Altoona MSA is not required to have a $PM_{2.5}$ monitor. There is currently no $PM_{2.5}$ monitor at the Altoona air monitoring site, however, to support $PM_{2.5}$ monitoring in the MSA, a FEM continuous $PM_{2.5}$ monitor is expected to be installed before the end of 2010.

A-2.3.3 PM_{10}

As shown in the table in Section 3.3.3 of this document, based on population and design value the Altoona MSA is not required to have a PM_{10} monitor. However, in order to support particulate air monitoring for the Altoona MSA, PA DEP maintains one PM_{10} monitor at the Altoona air monitoring site.

A-2.3.4 Sulfur Dioxide

There are no minimum requirements for the number of SO_2 monitors in the Altoona MSA. With major NO_x and SO_2 sources to the west, south and north of Altoona the SO_2 monitor at this location will serve as a maximum pollutant monitoring site for this MSA.

A-2.4 MSA Site Recommendations

As noted in the site summary, the Department will study the necessity and/or feasibility of re-designating the spatial scale of the PM_{10} and SO_2 monitors at the Altoona air monitoring station. Any recommendations will be included in a future ANP

A-3 Erie MSA

The Erie MSA consists of Erie County. The air monitoring program currently has one site located in the Erie MSA that monitors for criteria pollutants: Site Name, AQS Code, County

Erie – 42-0049-0003, Erie County

A-3.1 Erie – 42-049-0003

Location: 10th St. & Marne St, Erie, PA
Site is1.2 km south of Lake Erie waterfront and 0.8 km southwest of GE Locomotive plant.

Distance from trees: 10 meters

Table A-3.1a. Parameters Monitored at the Erie Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-3.1b. Roadway Separation Distances for the Erie Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO
Marne Rd.	4,000	11.2	10	15	15	N/A	10	10
10th St.	≤10,000	15.3	10	15	15	N/A	10	10
E. 11th St.	≤10,000	115.0	10	15	15	N/A	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Erie air monitoring site are shown in Table A-3.1a and Table A-3.1b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants except particulate matter ($PM_{2.5}$ and PM_{10}).

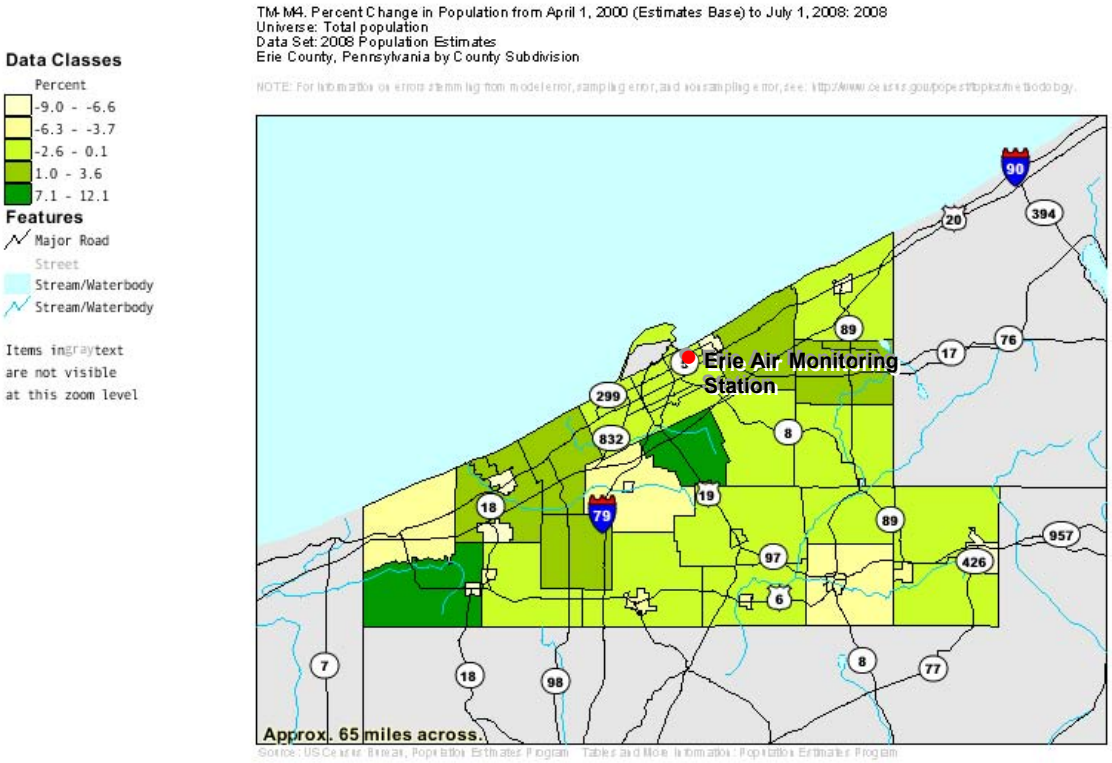
As noted in Table A3.1.b, the distance from the particulate matter monitors to the nearest roadway traffic lane falls short of the minimum distance required for the neighborhood spatial scale. PA DEP will study the necessity and feasibility of moving the Erie air monitoring site to obtain the required minimum distance, and/or re-designating the spatial scale of these monitors. Any recommendations will be included in a future ANP.

A-3.2 Population Density and Changes

As shown in the Figure A.3.2a below, the Erie air monitoring site is located in the City of Erie, an area represented by the highest population density. Although this same area is not one of the highest growth areas, the city is surrounded by townships and boroughs that have significant growth (Figure A-3.2b). Being within the highest population area and surrounded by high growth area, the Erie air monitoring site is ideally suited for its monitoring objective of population exposure.

Figure A-3.2a. Population Density for Erie County, 2008 Estimate Data.

Figure A-3.2b. Percent Population Change for Erie County, 2000 - 2008 Estimate Data.



A-3.3 Criteria Pollutant Discussion

A-3.3.1 Ozone

As described in section 3.3.1 of this document, based on population and design value, the Erie MSA is required to have a minimum of one ozone monitor active for the ozone season. The ozone monitor at the Erie site meets this requirement.

Under 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. As shown in figure C-1.3a (Appendix C of this document), the Erie air monitoring site has predominating southwest through southeast wind direction. The ozone back trajectory map (Figure C-1.3b) shows the highest ozone concentrations mostly come from air masses that have their origins upwind of the site, outside of the Erie MSA. Figure C-3f shows that the Erie air monitoring site is located approximately 30 miles downwind of a major VOC (an ozone precursor) source. This location is well suited to measure maximum concentrations from the source. The Erie air monitoring site is located in close proximity to two major ozone precursor sources. However, as a secondary air pollutant, ozone requires time, and thus distance, to form. The Erie site's proximity to these two sources likely limits the monitor's detection of ozone caused by their emissions.

A-3.3.2 $PM_{2.5}$

As provided in table in Section 3.3.2 of this document, based on population and design value, the Erie MSA is required to have a minimum of one $PM_{2.5}$ monitor. The $PM_{2.5}$ monitor at the Erie site meets this requirement.

Noting in Figure C-3e that there are no major sources of particulate matter near the Erie site, and using the surface wind rose and $PM_{2.5}$ back trajectory (Figures C-1.3a and C-1.3c respectively), it is evident that if any major sources of particulate matter as a primary pollutant impact the Erie monitor, they are located outside the Erie MSA. There is one major source for particulate matter to the south, in an adjacent county.

A-3.3.3 PM_{10}

As indicated in Section 3.3.3, based on population and concentration value, the Erie MSA is required to have 0 to 1 PM_{10} monitors. The PM_{10} monitor at the Erie site meets this requirement. Because of the historical value and geographical coverage of the Erie site, the Department will continue to maintain a PM_{10} sampler at Erie. As noted above, there are no major particulate matter sources within the Erie MSA, therefore any major source impact from for PM_{10} is likely originating outside the Erie MSA.

A-3.3.4 SO_2, NO_2, CO

There are no current minimum requirements for the number of monitoring sites for these three pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the Erie MSA.

In accordance with 40 CFR Part 58, Appendix D, at least one site for each MSA must be designed to record maximum concentration for SO_2, NO_2, and CO. As shown in Figure C-3f, the Erie air monitoring site is located in close proximity to the only major sources of SO_2 and NO_x in the Erie MSA. In addition, based upon the evaluation of air flow previously described in Section A-3.3.1 and A-3.3.2, pollutant-laden air masses from the west through southeast are impacting the Erie air monitoring site. Therefore the site is well suited to measure maximum concentrations for the Erie MSA.

A-3.4 MSA Site Recommendations

As noted in the site summary, the Department will investigate the necessity and feasibility of relocating the Erie particulate matter monitors and/or re-designating the spatial scales, if appropriate. Any recommendation will be included in a future ANP.

A-4 Harrisburg-Carlisle MSA

The Harrisburg-Carlisle MSA consists of Cumberland, Dauphin and Perry Counties. The air monitoring program currently has four sites located in the Harrisburg-Carlisle MSA: Site Name, AQS Code, County

Carlisle – 42-041-0101, Cumberland County
Harrisburg – 42-043-0401, Dauphin County
Hershey – 42-0043-1100, Dauphin County
Perry County – 42-099-0301, Perry County

A-4.1 Carlisle – 42-041-0101 Site Summary

Location: Imperial Ct. & Heather Dr, Carlisle, PA
This site is located 5 km north northeast of center city Carlisle.

Distance from trees: 19 meters

Table A-4.1a. Parameters Monitored at the Carlisle Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Urban
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Urban

Table A-4.1b. Roadway Separation Distances for the Carlisle Air Monitoring Site.

Roadway[1]	AADT[1]	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			$PM_{2.5}$
Heather Dr.	≤10	8.3	70
Imperial Ct.	≤100	38.3	70
Summit View Dr.	≤1,000	95.4	70
Tower Circle	≤1,000	102.0	70
Regal View	≤1,000	145.2	70
Cranes Gap Rd.	≤10,000	206.5	80

[1] Except for Cranes Gap Road, roadways near the Carlisle air monitoring are local residential development roadways or private drives. Heather Drive is a gated road accessible only with a key. These roads have minimal traffic and are not used by the general motoring public. AADT is estimated from visual estimates.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Carlisle air monitoring site are shown in Table A-4.1a and Table A-4.1b, respectively. The monitoring objectives and spatial scales for the $PM_{2.5}$ monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

For the years 2007 and 2008 PA DEP maintained a second $PM_{2.5}$ site, named Carlisle West, located at the extreme west end of Walnut Street in Carlisle, Pa. Data from this

site correlated well with the current Carlisle site location and the and the distance between the sites is greater than the 4 km lower limitation for urban scale. Thus, the monitoring objective of population exposure and urban spatial scale is acceptable based on the above study.

A-4.2 Harrisburg – 42-043-0401 Site Summary

Location: 1833 UPS Dr., Harrisburg, PA
Site is just east of the Harrisburg UPS terminal.

Distance from trees: 13 meters

Table A-4.2a. Parameters Monitored at the Harrisburg Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-4.2b. Roadway Separation Distances for the Harrisburg Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)				
			Ozone	$PM_{2.5}$	PM_{10}	NO_2	CO
UPS Dr.	≤10,000	101.7	10	15	15	10	10
Gibson Blvd.	≤10,000	115.1	10	15	15	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Harrisburg air monitoring site are shown in Table A-4.2a and Table A-4.2b, respectively. The monitoring objectives and spatial scales for the $PM_{2.5}$ monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

The Harrisburg Air Monitoring Site is within 0.8 km of the Harrisburg Incinerator. Due to the closeness of this major source, the monitoring objective of population exposure and neighborhood spatial scale is appropriate.

A-4.3 Hershey – 42-0043-1100

Location: Sipe Ave. & Mae St, Hershey, PA
Site is located at the rear of the Hershey Foods Corporation Engineering Building.

Distance from trees: 16 meters

Table A-4.3a. Parameters Monitored at the Hershey Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban

Table A-4.3b. Roadway Separation Distances for the Hershey Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Sipe Ave[1].	<1,000	10	10
W. Chocolate Ave.	1,200	152.5	10
Benjamin Franklin Hwy (US422)	21,000	107.9	31

[1] Sipe Avenue is a local residential road. AADT estimate is based upon observation

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Hershey air monitoring site are shown in Table A-4.2a and Table A-4.2b, respectively. The monitoring objective and spatial scale for the ozone monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-4.4 Perry County – 42-099-0301

Location: 720 Gill Hill Rd., Newport, PA
The site is located within the Little Buffalo State Park.

Distance from trees: 15 meters

Table A-4.4a. Parameters Monitored at the Perry County Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	General/background	Regional
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	General/background	Regional
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	General/background	Regional

Table A-4.4b. Roadway Separation Distances for the Perry County Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			Ozone[1]	SO_2	NO_2[1]
Gill Hill Rd.	450	70.5	N/A	N/A	N/A
Little Buffalo Rd.	900	120.0	N/A	N/A	N/A

[1] Table 4.1 of this document applies only to neighborhood or urban spatial scales

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Perry County air monitoring site are shown in Table A-4.4a and Table A-4.4b, respectively. The monitoring objectives and spatial scales for the $PM_{2.5}$ monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

The Perry County site has been the Commonwealth's historical background site. There have been no significant changes in the area surrounding the site and there are no significant sources upwind of the location. Since roadway traffic is minimal and a significant distance away, the monitoring objectives and spatial scales are appropriate.

A-4.5 Population Density and Changes

A-4.5.1 Cumberland County

As shown in Figures A-4.5.1a and A-4.5.1b, the Carlisle site is located in a residential area that is experiencing a high rate of population growth. The site is also located north-northeast of downtown Carlisle, one of the highest population centers for Cumberland County. As noted earlier, the current site has been shown to be comparable in its measurements with a center city monitoring site that has since been discontinued. Therefore, population coverage of Carlisle's major population center is made possible by the existing urban scale site.

A second high population density area is found in the extreme eastern portion of Cumberland County. Although this location is downwind from the Carlisle site, the area in question is provided with pollution monitoring coverage from the Harrisburg site which is located just 4 km downwind from the population center.

Figure A-4.5.1a. Population Density for Cumberland County, 2008 Estimate Data.

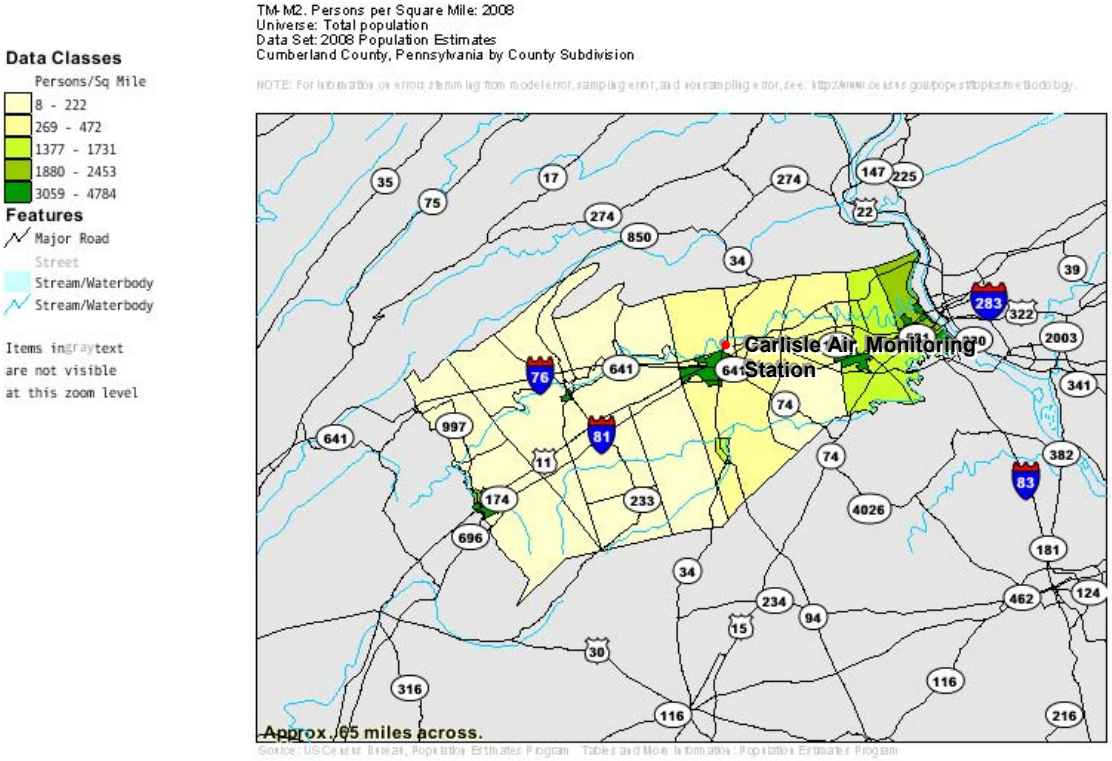
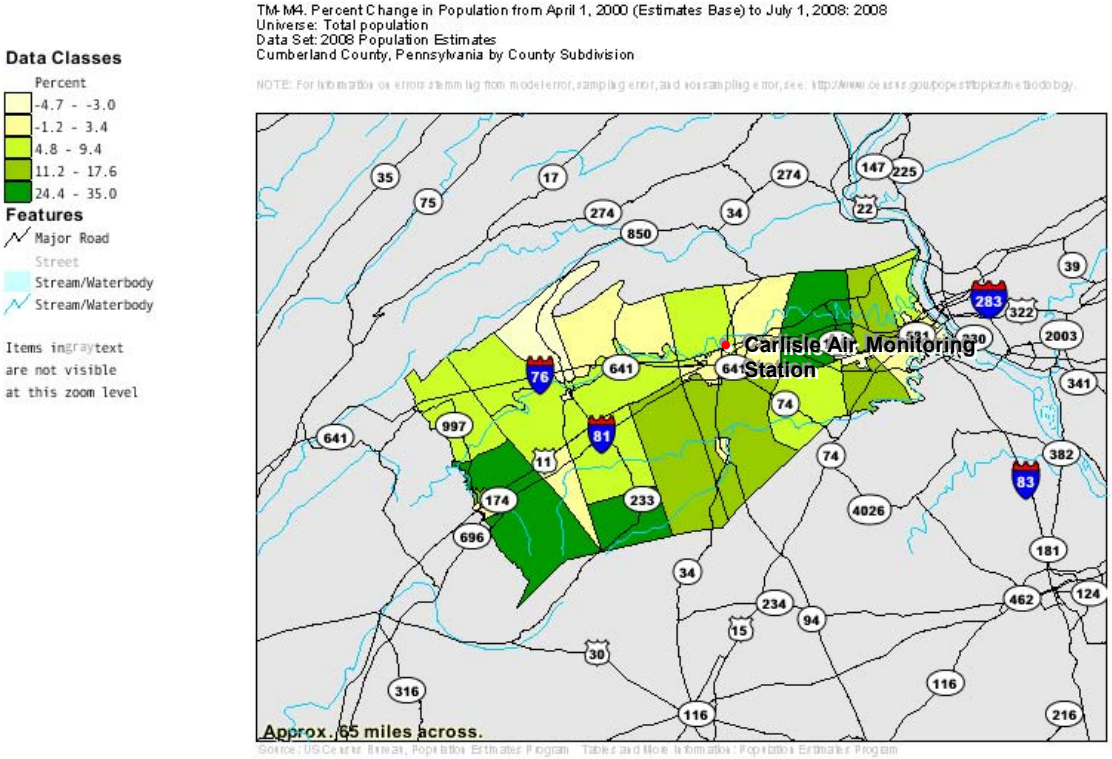


Figure A-4.5.1b. Percent Population Change for Cumberland County, 2000 - 2008 Estimate Data.



A-4.5.2 Dauphin County

As shown in Figures A-4.5.2a and A-4.5.2b, the Harrisburg site is located in the highest population density area in Dauphin County, and is surrounded by areas representing large increases in percentage change of population growth.

The Hershey site is located 9 miles east of Harrisburg and is in an area of low population density. Areas of high population growth can be found to the east and west of the site. Because of the low population density, and no significant geographical features in the surrounding area, downwind ozone monitoring on an urban scale is appropriate.

Figure A-4.5.2a. Population Density for Dauphin County, 2008 Estimate Data.

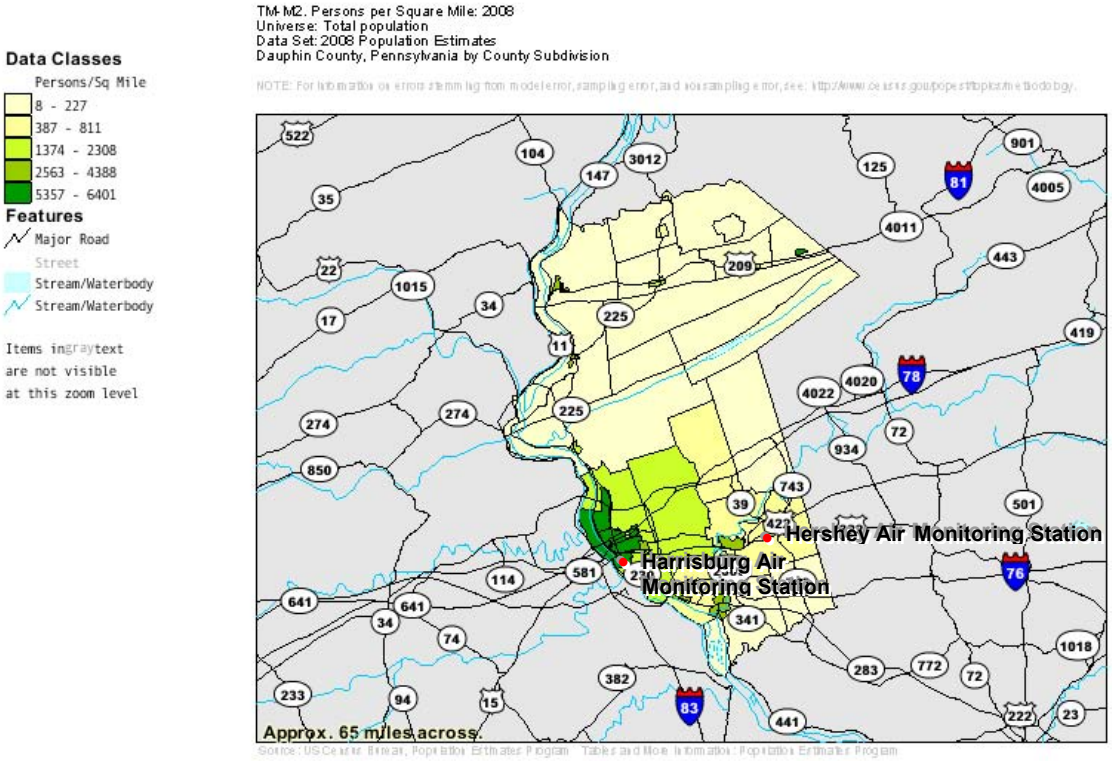
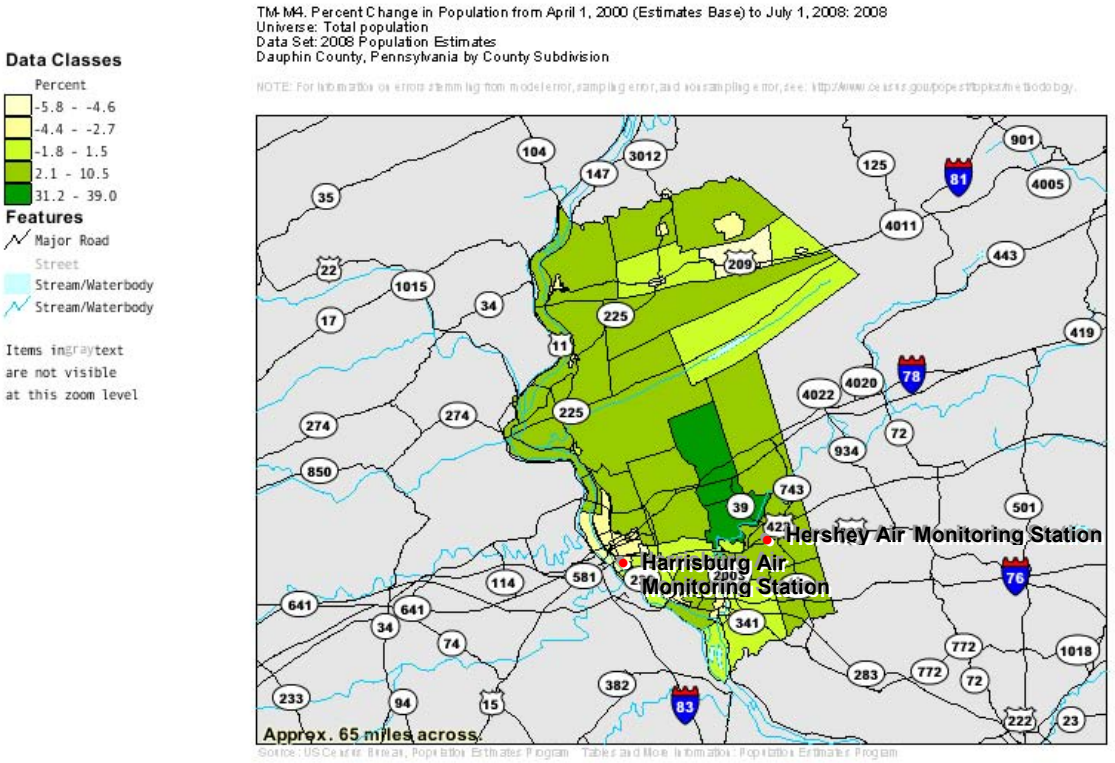


Figure A-4.5.2b. Percent Population Change for Dauphin County, 2000 - 2008 Estimate Data.



A-4.5.3 Perry County

Figures A-4.5.3a and A-4.5.3b show the Perry County site is located in an area of low population density. The site is located in the Little Buffalo State Park with no local influences. Therefore, regional scale monitoring is appropriate.

Figure A-4.5.3a. Population Density for Perry County, 2008 Estimate Data.

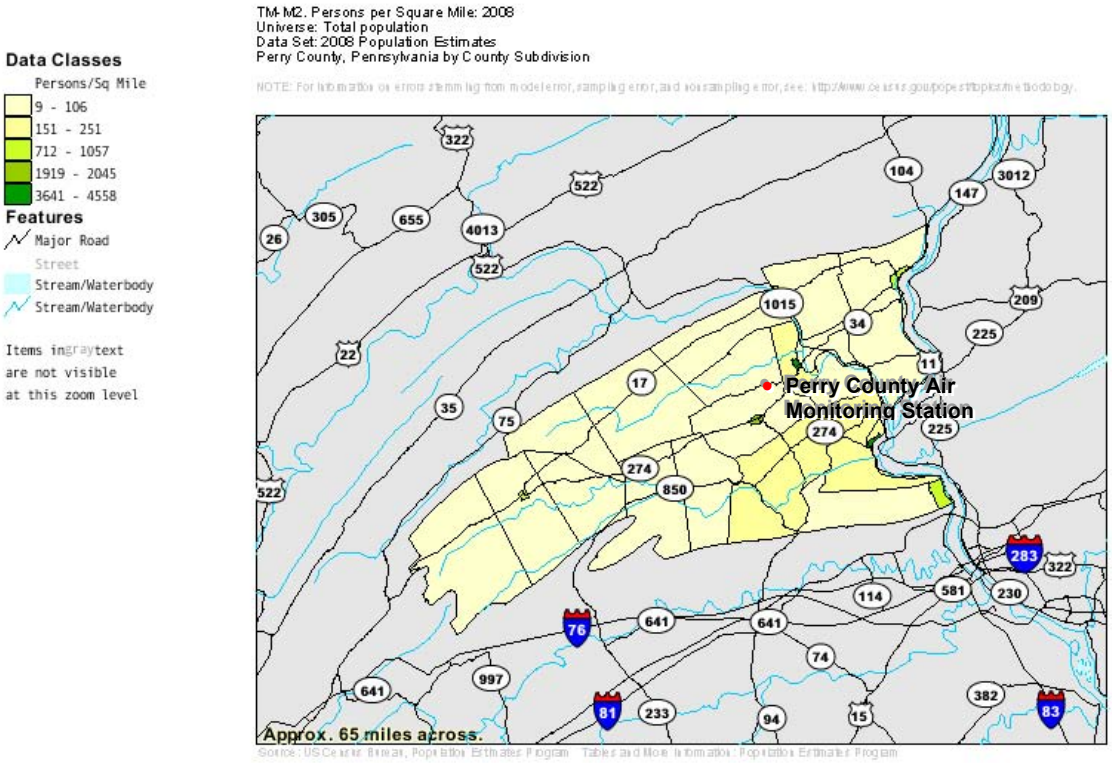
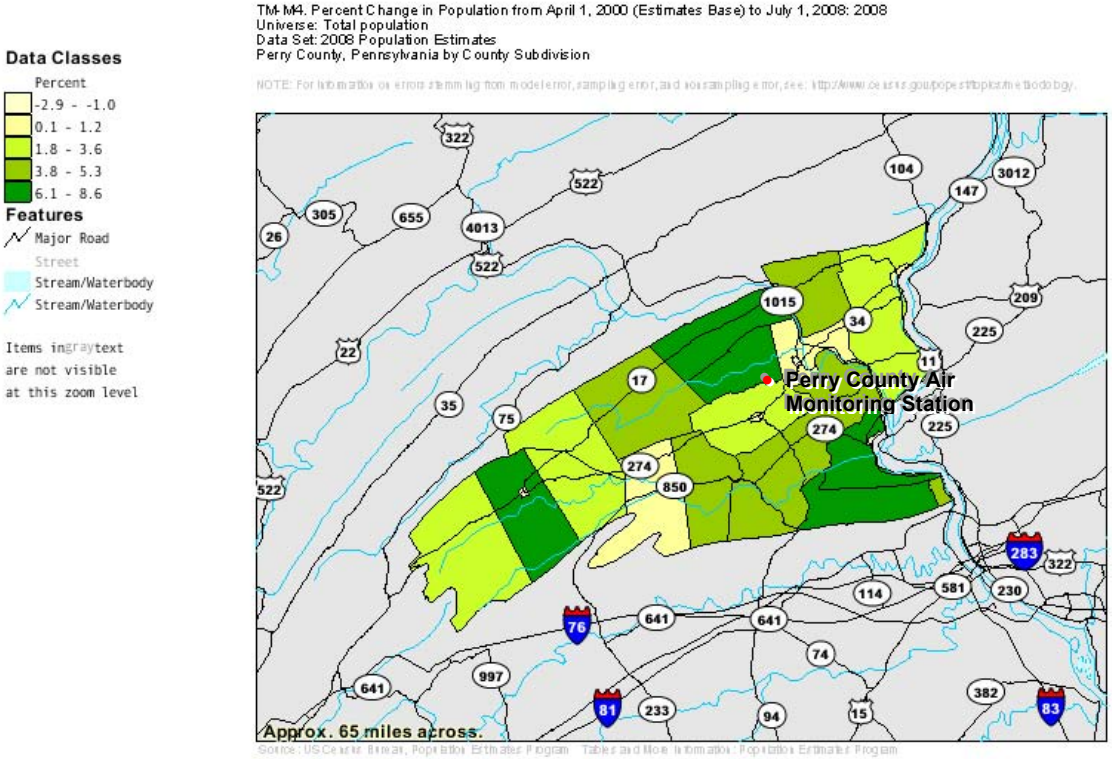


Figure A-4.5.3b. Percent Population Change for Perry County, 2000 - 2008 Estimate Data.



A-4.6 Criteria Pollutant Discussion

A-4.6.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the Harrisburg-Carlisle MSA is required to have a minimum of two ozone monitors active during the ozone season. The three ozone monitors, one installed at each of the Harrisburg, Hershey, and Perry County sites meet this requirement.

Under 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. As shown in Figure C-1.4b (Appendix C of this document, wind rose information for the Hershey air monitoring site indicates predominating wind direction is from the west. The site Hershey air monitoring site appears to be in the correct direction to capture ozone transport out of the Harrisburg area. However, both the Harrisburg and Hershey air monitoring sites have the same ozone design value of 74 ppb. For this reason, PA DEP may need to reevaluate the maximum concentration objective of the Hershey site at some future time. Unlike the York Downwind and Lancaster Downwind air monitoring sites, where the ozone design values are lower than their upwind counterparts, the Hershey air monitoring site will not be considered for relocation until additional data is obtained and EPA gives its forthcoming guidance on maximum downwind distances and other siting criteria.

From back trajectories of all three Harrisburg-Carlisle MSA sites shown in Figures C-1.4d through C-1.4f, it is evident that the sites are picking up maximum ozone events from air masses originating from the Baltimore/Washington corridor to the south, and from Virginia and West Virginia to the southwest. Therefore, these sites are well suited to record and measure ozone resulting from transport from southerly air masses. These patterns are similar to the results shown in many other Pennsylvania sites such as the York-Hanover and Reading MSA.

From Figure C-3c, it is evident that there are not as many major sources in the MSA as in the neighboring MSAs of Reading, Lebanon, Lancaster and York counties. However, the major sources of these MSA, particularly VOC sources, may be partially responsible for some of the ozone events coming from the south.

A-4.6.2 $PM_{2.5}$

As indicated in Section 3.3.2 of this document, based on population and design value this MSA is required to have a minimum of two $PM_{2.5}$ monitors. The monitors at Carlisle and Harrisburg fulfill this requirement.

Pursuant to 40 CFR Part 58, Appendix D, at least one $PM_{2.5}$ monitor must be sited as population-oriented and to record the maximum concentration. Of the two sites in the Harrisburg-Carlisle MSA, the Harrisburg air monitoring site serves as the population oriented area of expected maximum $PM_{2.5}$ concentration.

Using the back trajectory maps of Figures C-1.4g and C-1.4h, a similar pattern of mixing can be shown for $PM_{2.5}$ as was previously described for ozone.

There is only one major source of particulate matter in the MSA. This source, as shown in C-3c, is south of Carlisle.

A-4.6.3 PM_{10}

As indicated in Section 3.3.3 of this document, based on population and design value this MSA is required to have a minimum of one PM_{10} monitor. The continuous PM_{10} monitor at Harrisburg fulfills this requirement.

A-4.6.4 SO_2, NO_2, and CO

There are no minimum requirements for the number of SO_2, NO_2, or CO monitors in the MSA. With major sources of NO_x, and SO_2 to the west, south and east of Harrisburg, the Harrisburg site fulfills the requirement for a maximum concentration site for the MSA.

A-4.7 MSA Site Recommendations

As discussed in Section A-4.6.1, the location of the maximum ozone concentration site, Hershey, may need to be reevaluated pending further guidance from EPA on more precise distances from major population centers.

A-5 Johnstown MSA

The Johnstown MSA consists of Cambria County. The air monitoring program currently has one site located in the Johnstown MSA: Site Name, AQS Code, County

Johnstown – 42-0021-0011, Cambria County

A-5.1 Johnstown – 42-021-0011 Site Summary

Location: 1 Messenger St., Johnstown, PA
This site is on the east side of the Little Conemaugh River, and 1.7 km south of downtown center city Johnstown.

There are no trees within any significant distances of the Johnstown air monitoring site.

Table A-5.1a. Parameters Monitored at the Johnstown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-5.1b. Roadway Separation Distances for the Johnstown Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO
Franklin St.	11,000	110.1	12	15	15	N/A	12	13
Messenger St.	≤10,000	115.0	10	15	15	N/A	10	10
Elder Street	≤10,000	166	10	15	15	N/A	10	10
Menoher Blvd.	7,900	237.5	10	15	15	N/A	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Johnstown air monitoring site are shown in Table A-5.1a and Table A-5.1b, respectively. The monitoring objectives and spatial scales for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-5.2 Population Density and Changes

As shown in Figure A-5.2a, the population density of most of the Johnstown MSA is fairly low, indicating that the major urban population areas remain in Johnstown. Figure A-5.2b shows that the largest percentage increase in population growth has occurred in townships in northern Cambria County. Based on this population pattern and the site's topography, the Johnstown site can be correctly classified as a neighborhood scale site, since it may not be completely representative of pollutant levels in the growth areas of the MSA.

Figure A-5.2a. Population Density for Cambria County, 2008 Estimate Data.

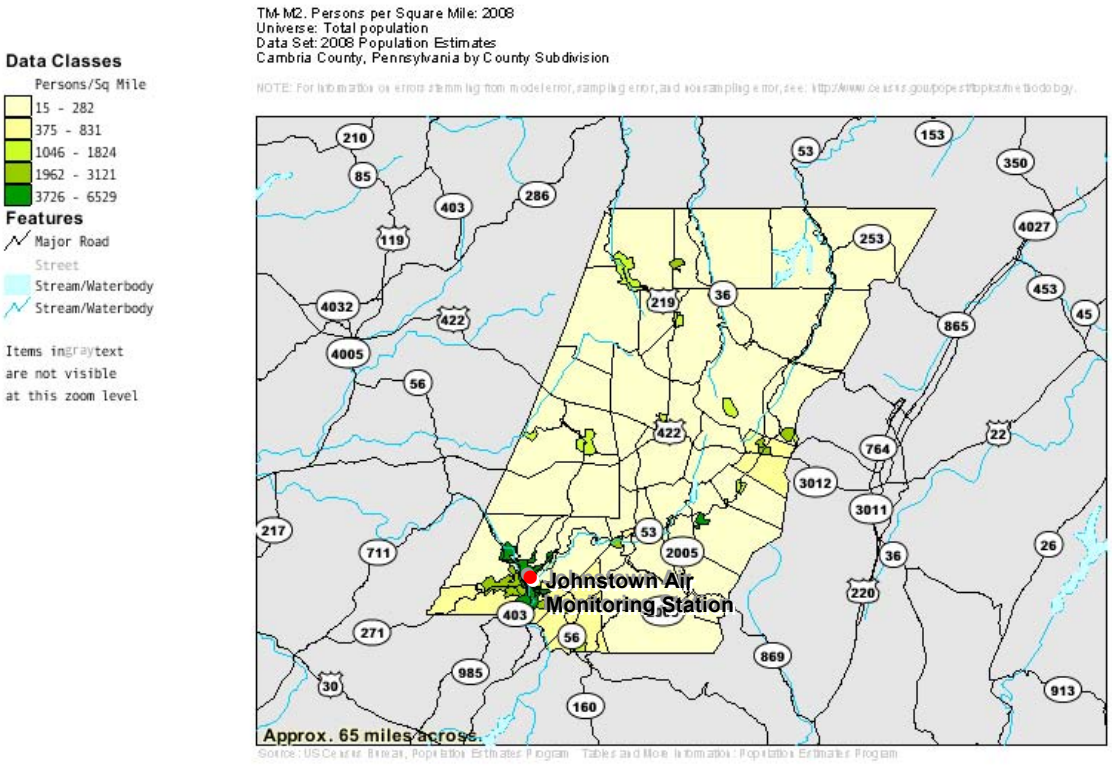
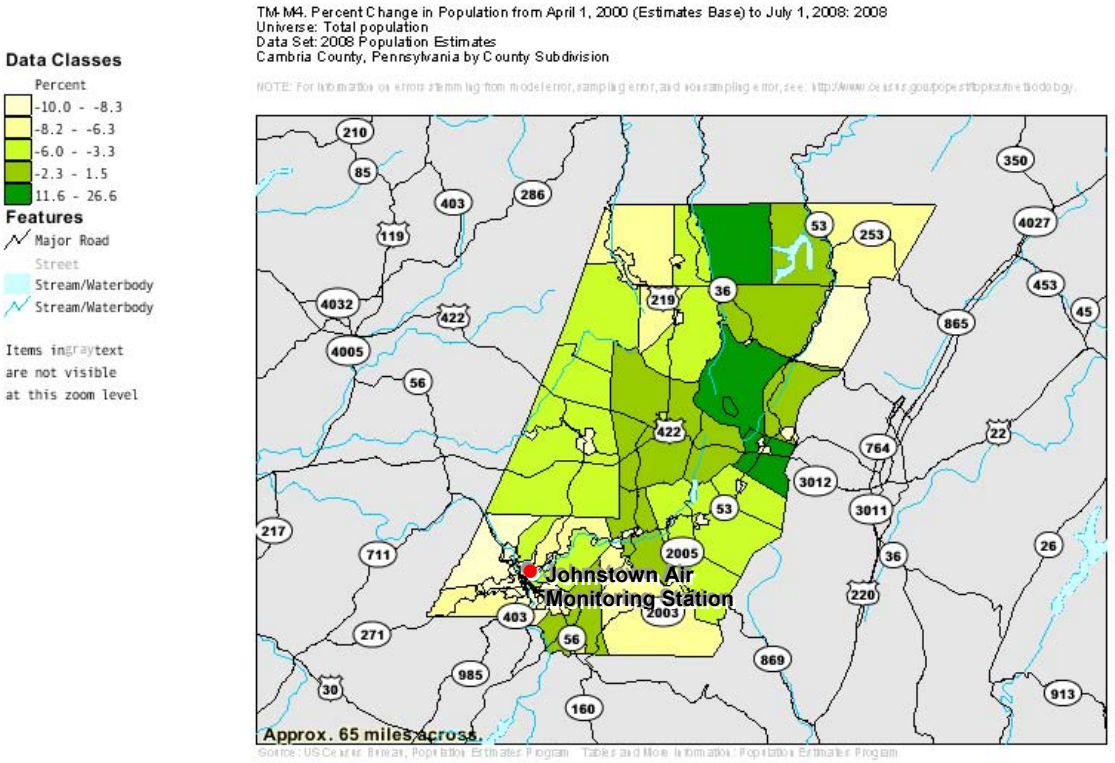


Figure A-5.2b. Percent Population Change for Cambria County, 2000 - 2008 Estimate Data.



A-5.3 Criteria Pollutant Discussion

A-5.3.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the Johnstown MSA is required to have a minimum of one ozone monitor active for the ozone season. The ozone monitor at the Johnstown site meets this requirement.

Appendix D of 40 CFR Part 58 requires that at least one ozone site for each MSA must be designed to record maximum concentration. As shown in Figure C-1.5a (Appendix C of this document), the Johnstown air monitoring site yields a surface wind rose with predominating southerly wind directions. However, given the abrupt variations in the terrain around this site, the ozone back trajectory (Figure C-1.5b) was created using a height of 200 meters above ground level, and shows the Johnstown site is capturing its highest ozone concentrations from air masses originating across the Ohio River Valley and points southwest. This demonstrates a valley effect at the Johnstown site; southwest winds aloft are mixing down into the Conemaugh Valley on high ozone days, thus the monitor is capturing pollutants from well outside of the Conemaugh Valley. As shown in Figure C-3e, the Johnstown air monitoring site is located downwind of major ozone precursor (NO_x and VOC) sources. For these considerations, the site is well suited to measure maximum concentrations.

A-5.3.2 $PM_{2.5}$

As summarized in table in Section 3.3.2 of this document, based on population and design value, the Johnstown MSA is required to have a minimum of one $PM_{2.5}$ monitor. The $PM_{2.5}$ monitor at the Johnstown site meets this requirement.

Using the surface wind rose and $PM_{2.5}$ back trajectory (Figures C-1.5a and C-1.5b, respectively), a similar pattern of mixing can be demonstrated for $PM_{2.5}$ similar to the one described in A-5.3.1 for ozone. As shown in Figure C-3e, the Johnstown air monitoring site is located downwind of four major particulate matter sources. For these considerations, as with ozone, the site is well suited to measure maximum concentrations.

A-5.3.3 PM_{10}

According to Section 3.3.3 of this document, based on population and concentration value, the Johnstown MSA is not required to have a PM_{10} monitor. However, because of the historical value and geographical coverage of the Johnstown site, the Department maintains a PM_{10} sampler at Johnstown.

A-5.3.4 SO_2, NO_2, CO

There are no minimum requirements for the number of monitoring sites for these pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the Johnstown MSA.

In accordance with 40 CFR Part 58, Appendix D, at least one site for each MSA must be designed to record maximum concentration for SO_2, NO_2 and CO. Based upon the evaluations of air flow as described in the previous sections, air masses from the northwest, west and south are measured at the Johnstown location. Figure C-3e shows the Johnstown site is located downwind of major sources of NO_x, and SO_2.

A-5.4 MSA Site Recommendations

As a result of this assessment, no changes are proposed for the Johnstown MSA site.

A-6 Lancaster MSA

The Lancaster MSA consists of Lancaster County. The air monitoring program currently has two sites located in the Lancaster MSA: Site Name, AQS Code, County

Lancaster – 42-071-0007, Lancaster County
Lancaster Downwind – 42-071-0012, Lancaster County

A-6.1 Lancaster – 42-071-0007 Site Summary

Location: Lehigh Ave. & Grofftown Rd., Lancaster, PA
Site is located 69 meters east of the Abraham Lincoln Junior High School.

Distance from trees: 20 meters

Table A-6.1a. Parameters Monitored at the Lancaster Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated FDMS Gravimetric	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood

Table A-6.1b. Roadway Separation Distances for the Lancaster Air Monitoring Site.

Roadway[1]	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	$PM_{2.5}$	PM_{10}	NO_2
Grofftown Rd.	(≤10,000)	26.6	10	15	15	10
Rank Ave.	(≤10,000)	67.8	10	15	15	10
E. Walnut St. (State Route 23)	16,000	185.5	22	16	16	22

[1] In addition to the roadways listed, there are two school access roads that are near the Lancaster air monitoring station: Lehigh Avenue and McCaskey Ave. Both roads have minimal traffic and are not used by the general motoring public.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Lancaster air monitoring site are shown in Table A-6.1a and Table A-6.1b, respectively. The monitoring objectives and spatial scales for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

As noted in Table A-6.1a, there are two $PM_{2.5}$ sensors at the Lancaster site. In May-June 2010, the continuous unit was upgraded to FEM status. Upon completion of a

comparison study, if the data is found to be comparable, the manual method will be discontinued.

A-6.2 Lancaster Downwind – 42-071-0012 Site Summary

Location: 3545 W Newport Rd., Intercourse, PA
Site is located north and next to the Leacock Township Building complex.

Distance from trees: 40 meters

Table A-6.2a. Parameters Monitored at the Lancaster Downwind Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Extreme Downwind	Neighborhood

Table A-6.2b. Roadway Separation Distances for the Lancaster Downwind Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
W. Newport Rd.	3,100	62.0	13

The monitoring objective, spatial scale and roadway separation distance for the ozone monitor at Lancaster Downwind air monitoring site are shown in Table A-6.2a and Table A-6.2b, respectively. The monitoring objective and spatial scale for the ozone monitor may not meet the network design requirements as described in Sections 3.1.1 and 3.1.2 of this document. Deficiencies are discussed in the following paragraph and in Section 6.3.1 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

As shown in Table A-6.2a, the ozone monitor at the Lancaster Downwind site has an objective of Extreme Downwind. For ozone this is not a recognized objective. The objective of Extreme Downwind is reserved for PAMS facilities. According to 40 CFR Part 58, Appendix D, Section 4, the urban scale is the preferred spatial scale for a maximum concentration objective. Therefore, the monitoring objective and spatial scale for the Lancaster Downwind monitor should be changed to “maximum concentration”, with an urban or neighborhood spatial scale. However, an analysis of ozone concentration data indicates that the Lancaster Downwind site may not be meeting the monitoring objective of maximum ozone concentration. This analysis is discussed in Section A-6.4.1.

PA DEP will evaluate the need for site relocation and/or re-designation of the ozone monitor at the Lancaster Downwind site. Recommendations will be included in a future ANP.

A-6.3 Population Density and Changes

As shown in Figure A-6.3a, the population density of most of the Lancaster MSA is fairly low, indicating that area of greatest population concentration for the county remains in the city of Lancaster. Figure A-6.3b shows that the entire Lancaster MSA is growing, with the largest percentage increase in population growth occurring in northern Lancaster County. Based on this population pattern, the Lancaster site can be correctly classified as a neighborhood scale site since it may not be completely representative of pollutant levels in the high growth areas of the MSA. The Lancaster Downwind site was located to be an ozone downwind site and is outside the major population areas.

Figure A-6.3a. Population Density for Lancaster County, 2008 Estimate Data.

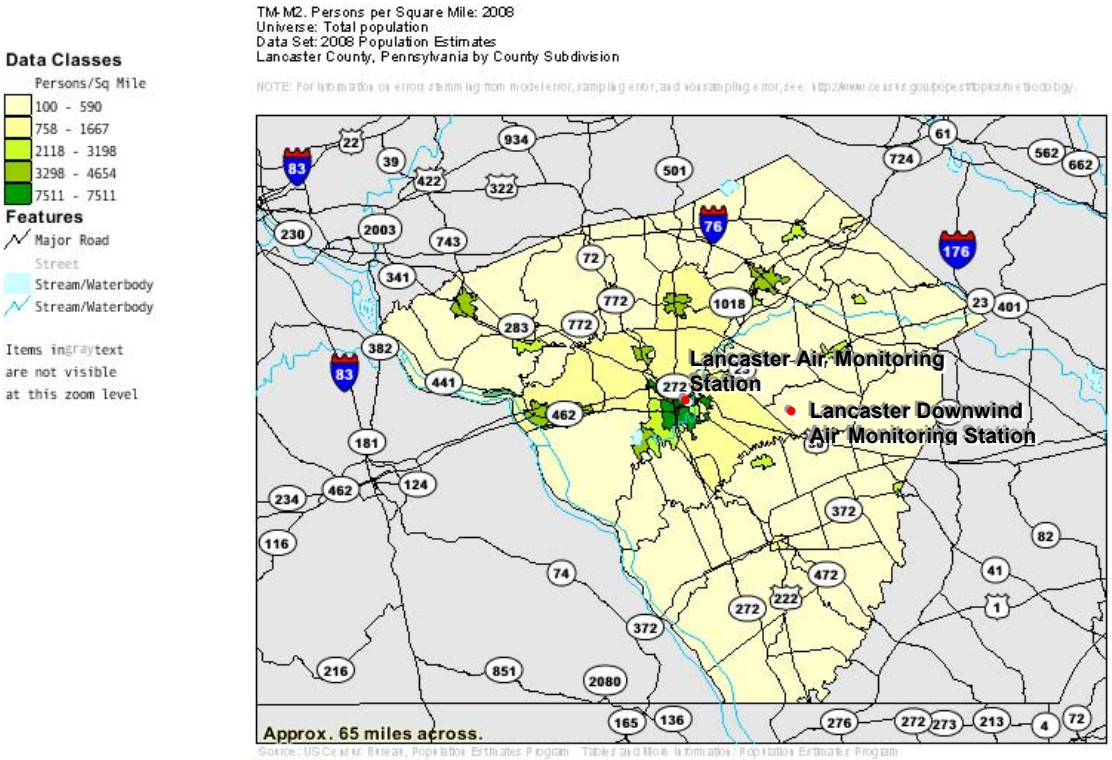
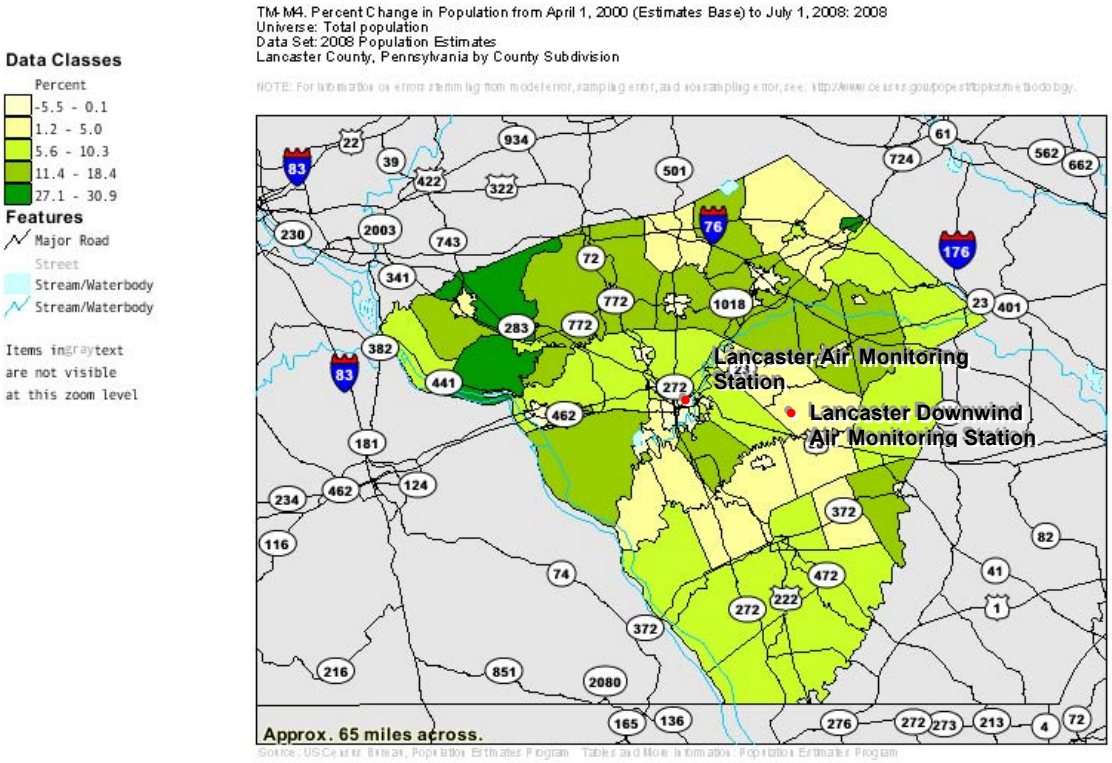


Figure A-6.3b. Percent Population Change for Lancaster County, 2000 - 2008 Estimate Data.



A-6.4 Criteria Pollutant Discussion

A-6.4.1 Ozone

The Lancaster MSA is required to have a minimum of two ozone monitors active during the ozone season, as indicated in Section 3.3.1 of this document, based on population and design value, the ozone monitors at the Lancaster and Lancaster Downwind sites meet this requirement.

Under 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. PA DEP sited the Lancaster Downwind air monitoring station to record maximum concentrations. However, ozone concentration data analysis of the Lancaster and Lancaster Downwind sites indicates design values of 77 and 71 ppb, respectively. In addition, wind rose information (Figure C-1.6a) indicates the predominating wind direction for Lancaster is out of the northwest. Since the Lancaster Downwind site has the lower design value and is due east of the Lancaster site, it may become necessary to reevaluate the downwind site location if EPA changes the distance requirements when identifying maximum downwind concentration locations.

Figure C-1.6b displays ozone back trajectory patterns for the Lancaster air monitoring station. While the predominating wind direction for the Lancaster site is from the

northwest, the back trajectories show that many of the high value ozone days can be attributed to air masses originating from a northern and southerly direction. Figure C-1.6c displays a similar ozone back trajectory pattern for the Lancaster Downwind site. Source data for the Southcentral Region (Figure C-3c) shows more than 10 major sources of VOC and/or NOx (ozone precursors) in Lancaster County and surrounding counties relatively close to both the Lancaster and Lancaster Downwind sites. Most of these sources are to the west and east of the monitoring locations. Because of their proximity to the monitoring stations, many of these sources should have little effect on local ozone concentrations. As a secondary air pollutant, ozone requires time, and thus distance, to form. There are at least three sources, however, 15-20 miles to the north, southwest and south of the Lancaster sites which are likely contributing to the ozone concentration measurements. In addition, during times of southerly wind flow, ozone monitoring sites in Lancaster and York Counties are likely affected by pollutant transport from the Baltimore-Washington area.

A-6.4.2 $PM_{2.5}$

As provided in table in Section 3.3.2 of this document, based on population and design value, the Lancaster MSA is required to have a minimum of one $PM_{2.5}$ monitor. Currently, PA DEP operates one monitor located in the Lancaster MSA, at the Lancaster air monitoring site. The location of the second monitor will be a subject of discussion under the 2012 Network Plan.

As shown in Figure C-1.6d, back trajectory analysis shows a multi-directional pattern for high $PM_{2.5}$ days. Several of these trajectories may be attributed to pollutant transport from the Baltimore-Washington area.

In addition, elevated $PM_{2.5}$ concentrations may result from the formation of $PM_{2.5}$ from ammonia and its related compounds, which are endemic to the agricultural industry in the Lancaster area. In response to this question, the Department conducted an ammonia study in 2006-2008. However, due to unreliable monitoring equipment, the study was inconclusive. The Department upgraded the ammonia samplers in 2009 and intends to conduct a second ammonia study when time, manpower, and materials become available.

There are no major stationary sources of particulate matter in the Lancaster MSA. However, there are three major sources in neighboring York County, due west of the Lancaster MSA. The $PM_{2.5}$ design values for Lancaster are 35 $\mu g/m^3$ (24 hour) and 13.8 $\mu g/m^3$ (annual). These values correspond to York design values of 32 $\mu g/m^3$ and 13.7 $\mu g/m^3$. Therefore, the combined effect of transport plus possible agricultural influences may be the reason for a higher concentration of PM-2.5 in Lancaster over that of York.

From the back trajectory information, and its population-oriented location, the Lancaster site performs the function of the expected maximum concentration as required by Section 4.7 of 40 CFR Part 58, Appendix D.

A-6.4.3 PM_{10}

As shown in Section 3.3.3 of this document, based on population and concentration value, the Lancaster MSA is required to have one PM_{10} monitor. The PM_{10} monitor at the Lancaster site meets this requirement. It is also the maximum expected concentration site, based on its population-oriented location and results of back trajectory information examined under the above $PM_{2.5}$ discussion.

A-6.4.4 NO_2

There are no minimum requirements for the number of monitoring sites for this pollutant, however, the Department maintains an NO_2 monitor at the Lancaster site to support air quality monitoring for these pollutants in the Lancaster MSA.

As shown in Figure C-3c, there are three major sources of NOx in Lancaster County plus an additional six sources in neighboring York County. The Lancaster NO_2 monitor will serve as a maximum concentration monitor for the MSA.

A-6.5 MSA Site Recommendations

As noted in Sections A-6.2 and A-6.4.1, the spatial scale, monitoring objective and location of the Lancaster Downwind air monitoring site requires further analysis. The Department will seek guidance from EPA before making a relocation decision. Any changes will be included in a future ANP.

Based upon the minimum monitoring requirements of 40 CFR Part 58, Appendix D, one additional $PM_{2.5}$ sensor is required for the Lancaster MSA. The Department will indicate a proposed location and tentative completion date for a continuous FEM $PM_{2.5}$ monitor in the 2012 Network Plan.

A-7 Lebanon MSA

The air monitors within the Lebanon MSA ares not yet operational. As noted in the Department's 2010 Network Plan, an air monitoring site in this region is expected to be installed by the end of 2010. This site will contain one ozone and one continuous $PM_{2.5}$ monitor.

The address of the current proposed site is: 1275 Birch Road, Lebanon, PA 17042

A-8 New York-Northern New Jersey-Long Island, NY-NJ-PA MSA

PA DEP does not operate an air monitor within the New York-Northern New Jersey-Long Island, NY-NJ-PA MSA nor are there any plans to install a monitor in this MSA. The Pennsylvania portion of this MSA is Pike County. Because of the low population density and low major source density, the Department does not believe that the installation of a monitor in Pike County, PA is necessary.

A-9 Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA

This MSA is rather complex and covers a four-state area consisting of counties in Pennsylvania, New Jersey, Delaware and Maryland. The Pennsylvania portion of the Philadelphia-Camden-Wilmington MSA consists of Bucks, Chester, Delaware, Philadelphia and Montgomery Counties. The City of Philadelphia's Department of Public Health, Air Management Services monitors air quality in Philadelphia County. The remaining four Pennsylvania counties are monitored by PA DEP. The New Jersey Department of Environmental Protection, Maryland Department of the Environment and Delaware Department of Natural Resources monitor air quality for the Philadelphia-Camden-Wilmington MSA counties located in their respective states.

PA DEP currently has five sites located in the Philadelphia-Camden-Wilmington MSA: Site Name, AQS Code, County

Bristol – 42-017-0012, Bucks County
New Garden – 42-029-0100, Chester County
Chester – 42-045-0002, Delaware County
Ridley Park – 42-045-004, Delaware County
Norristown – 42-091-0013, Montgomery County

A-9.1 Bristol – 42-017-0012

Location: Rockview Dr, Bristol, PA.
Site is located at the rear of the FDR Junior High School.

Distance from trees: 10 meters

Table A-9.1a. Parameters Monitored at the Bristol Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-9.1b. Roadway Separation Distances for the Bristol Air Monitoring Site.

Roadway[1]	AADT[1]	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)				
			Ozone	$PM_{2.5}$	SO_2	NO_2	CO
Rockview Dr.	<1,000	16.0	10	15	N/A	10	10
Penn Valley Ave.	<1,000	43.4	10	15	N/A	10	10
Arthur Ave.	<1,000	67.0	10	15	N/A	10	10

[1] All roadway traffic densities are estimated based on site observations. All nearby roads are residential, non through way roads with low traffic flows.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Bristol air monitoring site are shown in Table A-9.1a and Table A-9b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-9.2 New Garden – 42-029-0100

Location: New Garden Airport, Toughkenamon, Chester County, PA.
Site is located just to the north of the airport.

Distance from trees: 65 meters

Table A-9.2a. Parameters Monitored at the New Garden Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Regional Transport	Regional
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Regional Transport	Regional

Table A-9.2b. Roadway Separation Distances for the New Garden Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
Airport Way[1]	≤1000[1]	63	10	70

[1] Airport Way is an access road for the airport and is not a through street. Traffic density is estimated by staff observation of airport activity.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the New Garden air monitoring site are shown in Table A-9.2a and Table A-9.2b, respectively. The monitoring objectives and spatial scales for both monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for both pollutants.

As a regional transport site, the New Garden air monitoring site is located four miles northwest of the state of Delaware and 8 miles north of the Maryland border.

A-9.3 Chester – 42-045-0002

Location: Front St. & Norris St., Chester, Delaware County, PA.
Site is on the property of Degussa Corp. approximately 50 meters north of the Delaware River.

Distance from trees: 26 meters

Table A-9.3a. Parameters Monitored at the Chester Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
Lead	SLAMS	Manual Gravimetric	Every 6th day	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood

Table A-9.3b. Roadway Separation Distances for the Chester Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	Lead	SO_2	NO_2
Norris St.[1]	≤10[1]	7.3	10	15	15	15	N/A	10
Delaware Ave.	≤10,000	156.7	10	15	15	15	N/A	10
Broomall St.	≤10,000	189.3	10	15	15	15	N/A	10

[1]Norris Street east of Delaware Ave. is an abandoned roadway that is also dead ended. Traffic density is near zero. Its inclusion in Table A-9.3b is for informational and site geographic information.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Chester air monitoring site are shown in Table A-9.3a and Table A-9.3b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-9.4 Ridley Park – 42-045-004

Location: Industrial Hwy, Eddystone, PA.
Site is on property owned by Boeing Corporation and near Boeing gate No. 14.

Distance from trees: 10 meters

Table A-9.4a. Parameters Monitored at the Ridley Park Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-9.4b. Roadway Separation Distances for the Ridley Park Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Industrial Hwy.	21,000	16	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Ridley Park air monitoring site are shown in Table A-9.4a and Table A-9.4b, respectively. The monitoring objective, spatial scale, and minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

The Ridley Park air monitoring site is a lead source-oriented monitor located 0.3 miles north of the Exelon Steam Electric Station (SES).

A-9.5 Norristown – 42-091-0013

Location: 1046 Belvoir Rd, Norristown, PA.
Site is located at the Pennsylvania National Guard State Armory.

Distance from trees: 10 meters

Table A-9.5a. Parameters Monitored at the Norristown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated FDMS Gravimetric	Continuous year-round	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood

Table A-9.5b. Roadway Separation Distances for the Norristown Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			Ozone	$PM_{2.5}$	SO_2
Belvoir Rd.	11,000	16.7	12	15	N/A
Johnson Rd.	1,800	158.8	10	15	N/A
Woods Dr.[1]	≤1,000[1]	167.3	10	15	N/A
Gallagher Rd.[1]	≤1,000[1]	210.0	10	15	N/A

[1] Woods Drive and Gallagher Road are local residential roads with minimal observed traffic density. Both roads are dead ended.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Norristown air monitoring site are shown in Table A-9.5a and Table A-9.5b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-9.6 Population Density and Changes

A-9.6.1 Bucks County

As shown in Figure A-9.6.1a, the Bristol site is located in one of the highest population density areas of Bucks County. At the same time, this area is also in an area of negative growth (Figure 9.6.1b). Currently, the Bristol site is effective in measuring the air quality exposure for much of the population of Bucks County. However, future changes in population density may render this site inappropriate for population exposure on a neighborhood scale. Wind rose information (Figure C-1.9a) shows that the predominating air flow is from the north and northwest, a direction which brings the air masses from the high population density areas to the monitoring site.

Figure A-9.6.1a. Population Density for Bucks County, 2008 Estimate Data.

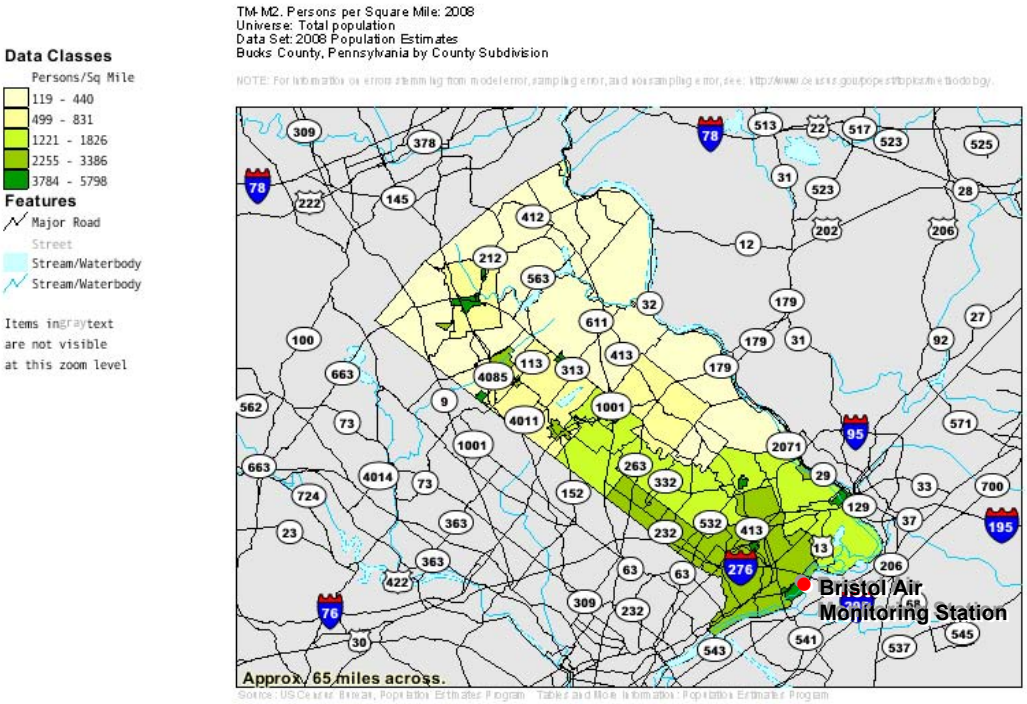
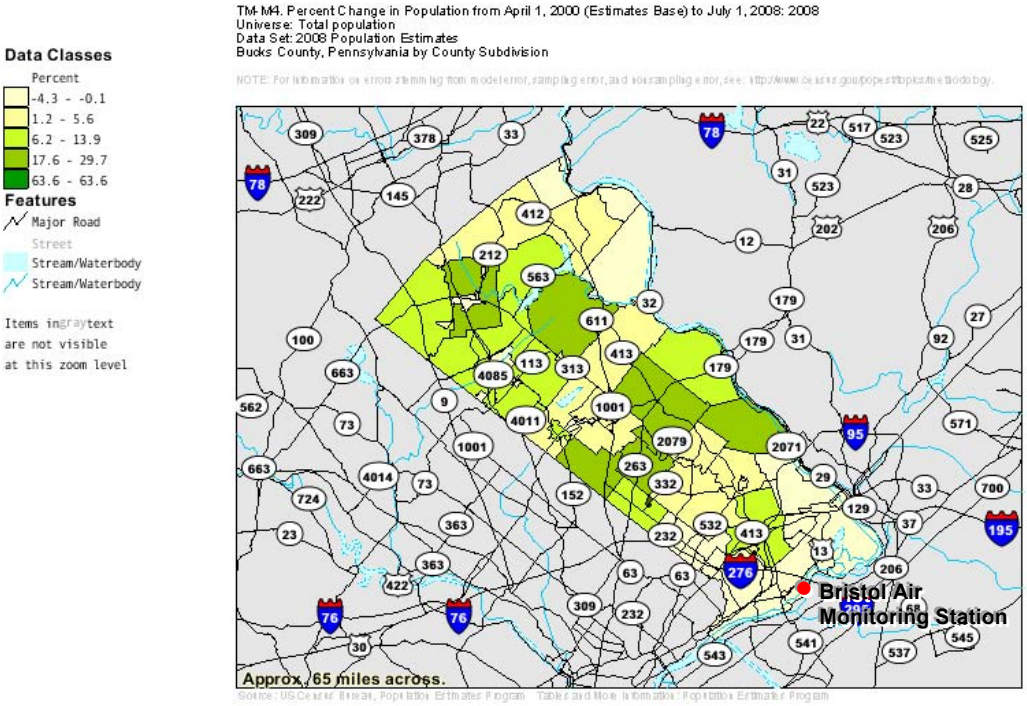


Figure A-9.6.1b. Percent Population Change for Bucks County, 2000 - 2008 Estimate Data.



A-9.6.2 Chester County

Population density (Figure A-9.6.2a) remains low across the entire southern portion of Chester County, including the areas between the site and the Delaware-Maryland state border. As a transport site, this is ideal for the New Garden air monitoring site. With minimal influences from local air masses, transported pollutants should be the predominating component of the pollutants measured at New Garden. In the future, this site may be influenced more by local conditions as population growth in the southern areas continues to increase (Figure A-9.6.2b).

Figure A-9.6.2a. Population Density for Chester County, 2008 Estimate Data.

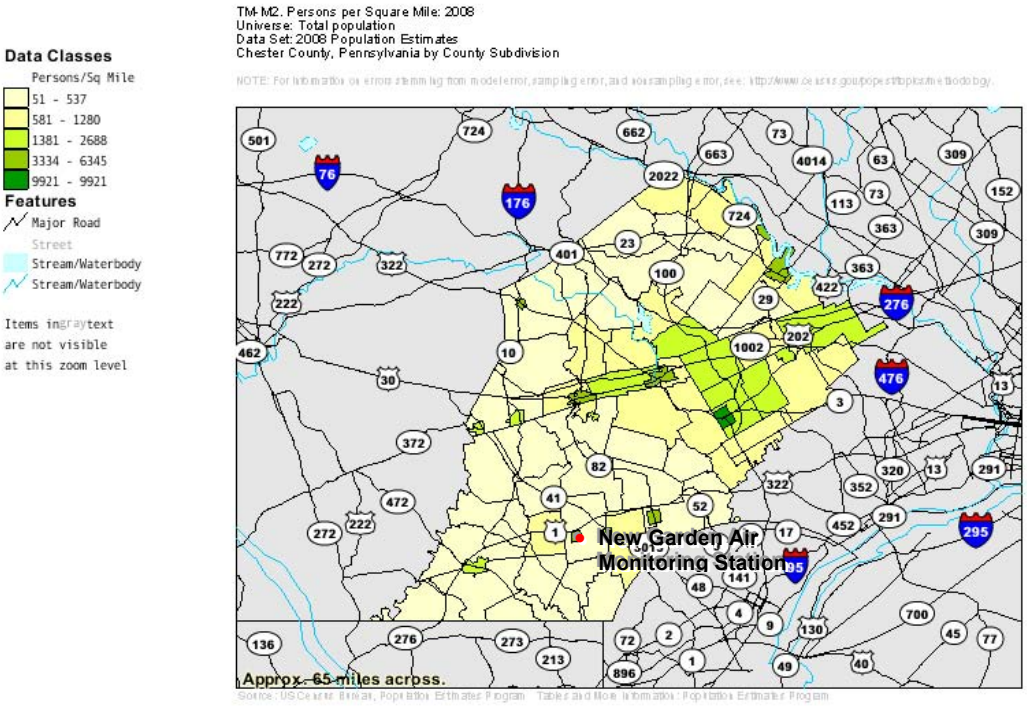
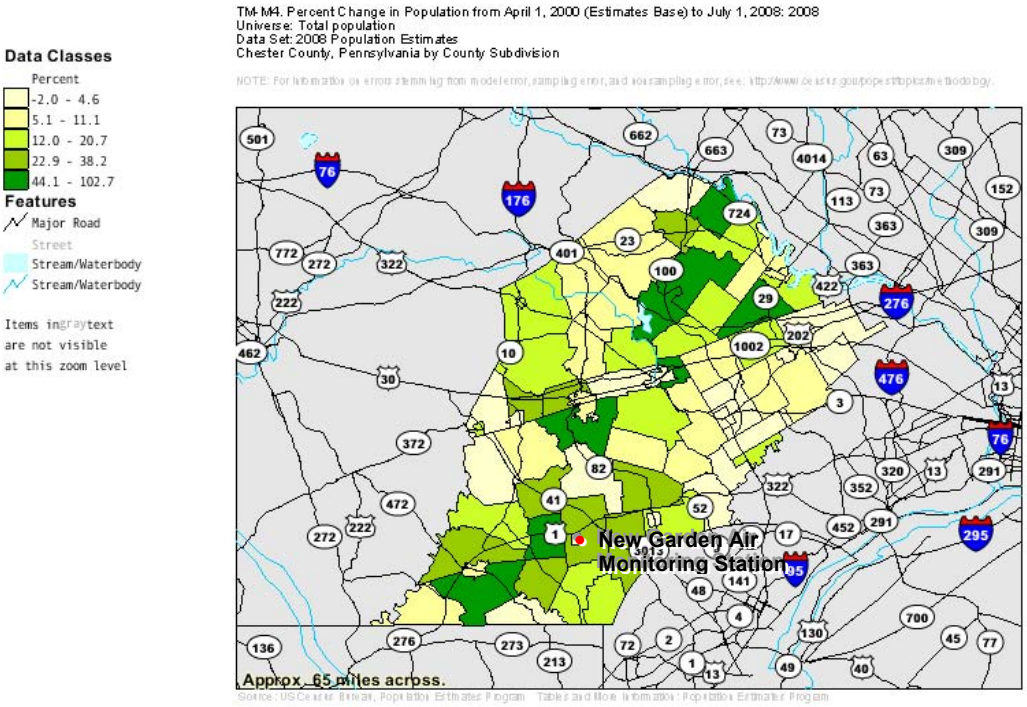


Figure A-9.6.2b. Percent Population Change for Chester County, 2000 - 2008 Estimate Data.



A-9.6.3 Delaware County

The Chester air monitoring site is located in an area which has a high population density (Figure A-9.6.3a). Although local population growth (Figure A-9f) appears low or non-existent in the immediate area of the air monitoring site, this location may become surrounded by areas of significant population increases in the future. As shown in the wind rose pattern for the site (Figure C-1.9.6.3b) these growth areas will be upwind from the monitoring site. Therefore, future major population areas will be covered by the current monitoring location

The Ridley Park site is also located in Delaware County. This site is a source oriented lead monitoring site, and it is not sited for general population exposure. Therefore, further analysis of the site is not needed in this section.

Figure A-9.6.3a. Population Density for Delaware County, 2008 Estimate Data.

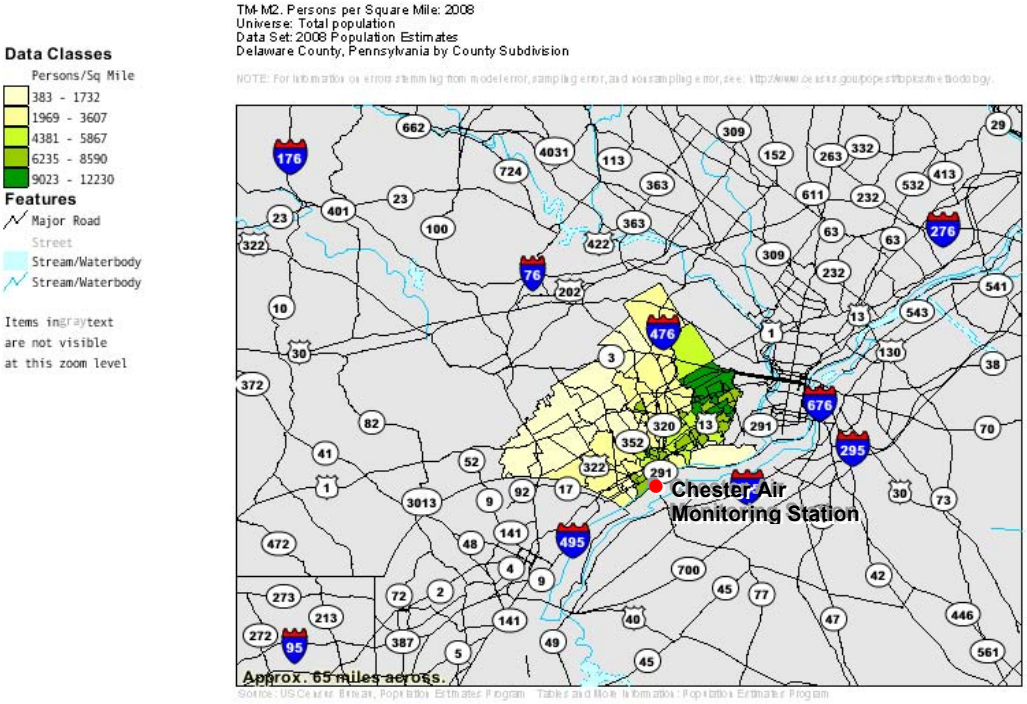
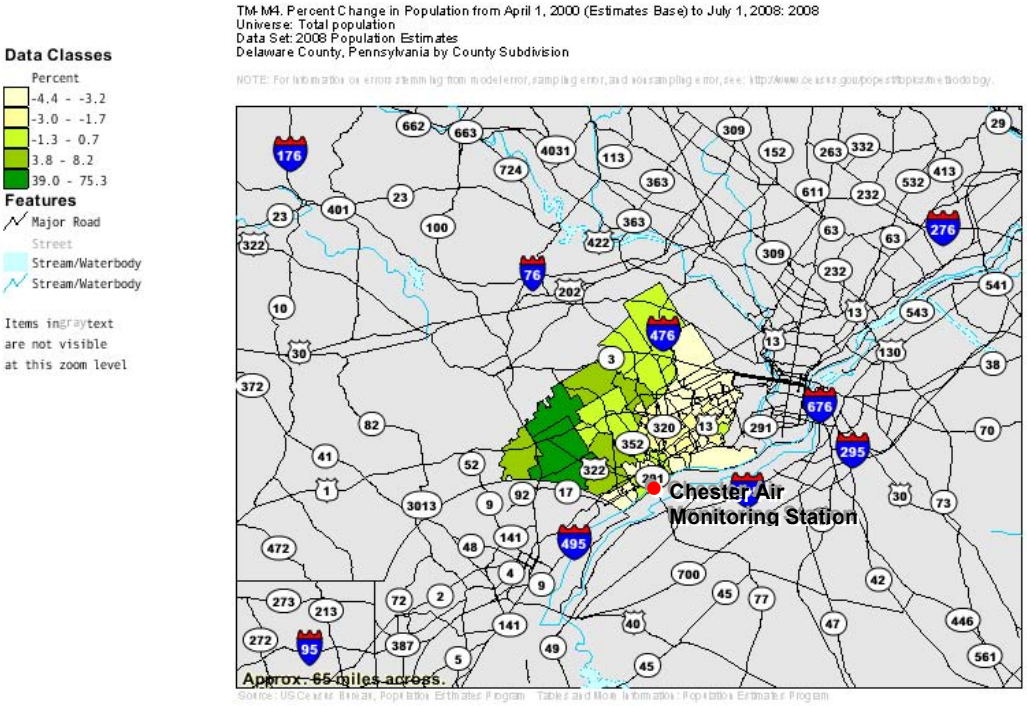


Figure A-9.6.3b. Percent Population Change for Chester County, 2000 - 2008 Estimate Data.



A-9.6.4 Montgomery County

The Norristown air monitoring site is located in the lowest population density, lowest growth area of Montgomery County (Figures A-9.6.4a and A-9.6.4b). However, the site is directly downwind of the highest populated area, Norristown, Pa., and downwind (southeast) of the highest population change areas of the county. Wind rose patterns for the site shown in Figure C-1.9d confirm that the monitor gathers information from air masses originating from the northwest direction. As populations shift, relocation of the site to a location further to the northwest may become appropriate.

Figure A-9.6.4a. Population Density for Delaware County, 2008 Estimate Data.

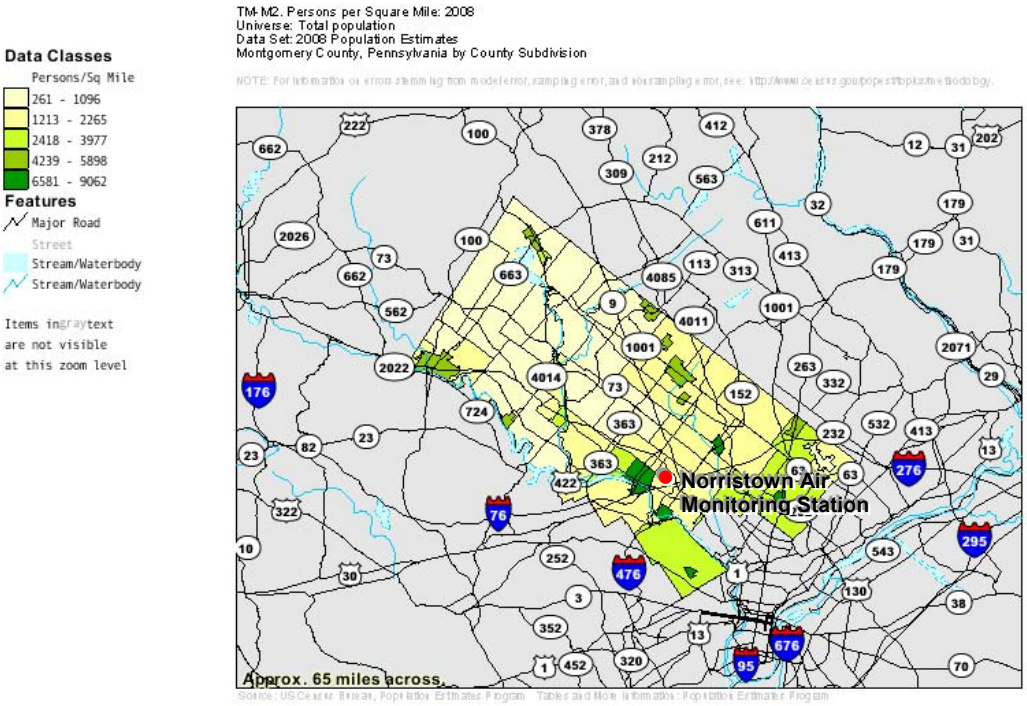
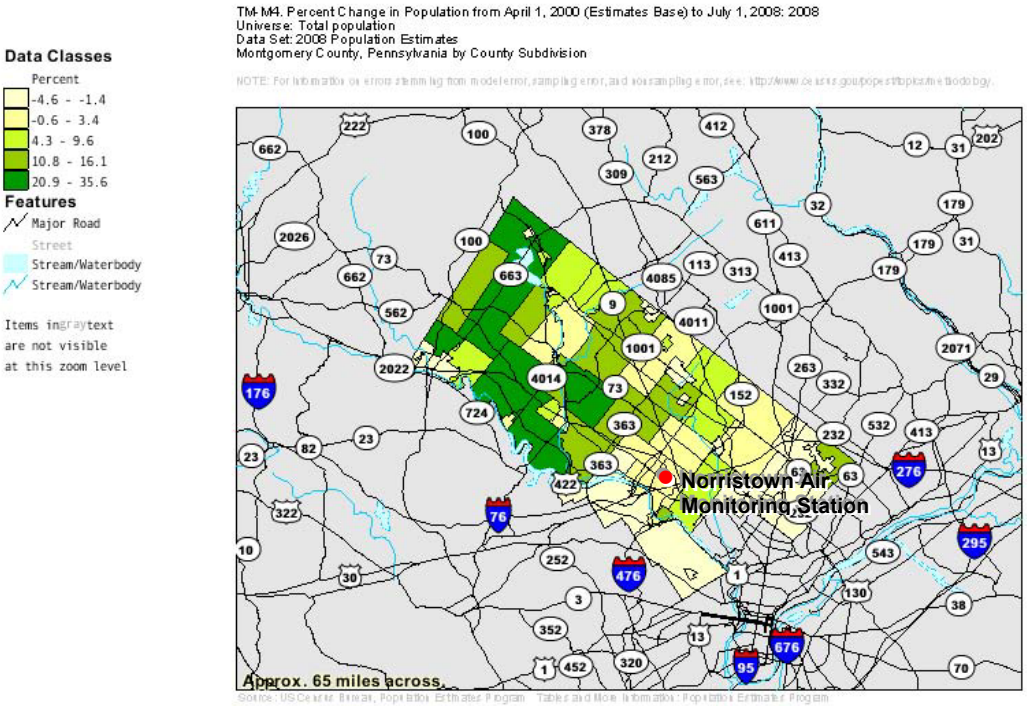


Figure A-9.6.4b. Percent Population Change for Chester County, 2000 - 2008 Estimate Data.



A-9.7 Criteria Pollutant Discussion

A-9.7.1 Ozone

As shown in Section 3.3.1 of this document, based on population and design value, the Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA is required to have a minimum of three monitors active during the ozone season. This requirement is fulfilled through the operation of 12 ozone monitoring sites in the MSA. The states of Delaware, Maryland and New Jersey operate three, one and two monitors, respectively, within the Philadelphia-Camden-Wilmington MSA. The City of Philadelphia Air Management Services operates two monitors in Philadelphia County. PA DEP's air monitoring program currently operates four ozone monitors in the surrounding Pennsylvania counties. Only PA DEP monitors are included in the analyses contained in this section

Under 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. To meet this requirement, the ozone monitor at Philadelphia's Northeast Airport has been designated as a maximum concentration site.

All four ozone back trajectories for New Garden, Bristol, Chester and Norristown (Figures C-1.9e through C-1.9h) show strong agreement in the direction of air masses that result in highest maximum concentrations measured by the sites in the MSA. As can be observed, air masses out of the south and southwest produce the majority of

high ozone readings. This is consistent with what was found in most southeast and southcentral Pennsylvania monitoring locations.

With the New Garden monitoring site south of any major source of VOC or NO_2, (See Figure C-3a) maximum ozone concentrations monitoring at the site must be attributed to pollutants transported from out of state. Therefore, the New Garden site is ideally sited to measure the interstate transportation of ozone.

The location of the four major sources of VOC and 12 sources of NO_x (Figure C-3a) throughout the MSA supports the spatial scale of "neighborhood". Larger scales would not be appropriate, based upon impact by one or more of the major sources.

A-9.7.2 $PM_{2.5}$

As shown in table in Section 3.3.2 of this document, based on population and design value, the Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA is required to have a minimum of three $PM_{2.5}$ monitors. This requirement is fulfilled through the operation of 15 $PM_{2.5}$ monitoring sites in the MSA. The states of Delaware, Maryland and New Jersey operate four, one and two monitors, respectively, within the Philadelphia-Camden-Wilmington MSA. The City of Philadelphia Air Management Services operates five monitors in Philadelphia County. PA DEP's air monitoring program currently operates four $PM_{2.5}$ monitors in the surrounding Pennsylvania counties. Only PA DEP monitors are included in the analyses contained in this section

According to 40 CFR Part 58, Appendix D, at least one $PM_{2.5}$ monitor must be sited as population-oriented and to record the maximum concentration. Philadelphia's Spring Garden Street site is currently designated as a maximum concentration site.

$PM_{2.5}$ back trajectories for all four PA DEP sites are less defined than in the case of ozone. As shown in Figures C-1.9i through C-1.9l, maximum $PM_{2.5}$ concentrations were detected from air masses originating from both westerly and southerly directions.

A-9.7.3 PM_{10}

As shown in Section 3.3.3 of this document, based on population and design value this MSA is required to have a minimum of four PM_{10} monitors. This requirement is met through the three monitors in Philadelphia County and one monitor operated in Delaware County by PA DEP. The States of Maryland and Delaware each operate one monitor. There is no maximum value site designated in Pennsylvania since the maximum value in the MSA, 94 $\mu g/m^3$ (24-hr), is well below the 150 $\mu g/m^3$ standard.

It can be reasonably assumed that the single monitor at PA DEP's Chester site is measuring PM_{10} from the same air masses as was described by the $PM_{2.5}$ discussions noted earlier.

A-9.7.4 Lead

The lead monitoring site in Chester is located downwind and near the more densely populated areas in Delaware County, in an industrial area near the Delaware River and near the heart of the city of Chester. This site is not a source-oriented monitoring site that is not sited for population exposure.

A-9.7.5 SO2, NO2, CO

In accordance with 40 CFR Part 58 Appendix D, Section 4, there are no minimum requirements for the number of monitoring sites for these parameters.

However, at least one monitor should be sited for maximum concentration of SO_2 and NO_2 in the MSA. The designated maximum concentration site for SO_2 is the Ritner monitoring site operated by the City of Philadelphia. For NO_2, the maximum concentration designated site is the Broad Street monitoring site, which is also operated by the City of Philadelphia.

A-9.8 MSA Site Recommendations

As a result of this assessment, no changes are proposed for PA DEP's Philadelphia-Camden-Wilmington MSA sites.

A-10 Pittsburgh MSA

The Pittsburgh MSA consists of Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland Counties. The Allegheny County Health Department monitors air quality across Allegheny County; however, as part of an air quality exhibit, PA DEP does collect data from ambient air monitors located in the Carnegie Science Center in Pittsburgh, PA, Allegheny County. PA DEP's air monitoring program currently has thirteen additional sites located in four of the remaining six counties of the Pittsburgh MSA: The sites are listed below by: Site Name, AQS Code, County

Pittsburgh – 42-003-0010, Allegheny County
Kittanning – 42-005-0001. Armstrong County
Beaver Falls – 42-007-0014, Beaver County
Beaver Valley – 42-007-0007, Beaver County
Brighton Township – 42-007-0005, Beaver County
Hookstown – 42-007-0002, Beaver County
Potter Township – 42-007-0006, Beaver County
Vanport – 42-007-0505, Beaver County
Charleroi – 42-125-0005, Washington County
Florence – 42-125-5001, Washington County
Washington – 42-125-0200, Washington County
Conemaugh – 42-129-0009, Westmoreland County
Greensburg – 42-129-0008, Westmoreland County
Murrysville – 42-129-0006, Westmoreland County

A-10.1 Pittsburgh – 42-003-0010 Site Summary

Location: Carnegie Science Center, 1 Allegheny Ave, Pittsburgh, PA
Site is located approximately 140 meters to the west of Heinz Field.

Distance from trees: Carnegie Science Center building is a five story structure. The air monitoring inlet is at the fifth level roof line and is at least three stories above any tree line.

Table A-10.1a. Parameters Monitored at the Pittsburgh Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SPM	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
SO_2	SPM	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SPM	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SPM	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-10.1b. Roadway Separation Distances for the Pittsburgh Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	SO_2	NO_2	CO
N. Shore Dr.	≤10,000	92.0	10	N/A	10	10
Allegheny Ave.	≤10,000	162.0	10	N/A	10	10
Sproat Way	≤10,000	183.3	10	N/A	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Pittsburgh air monitoring site are shown in Table A-10.1a and Table A-10.1b, respectively. With the exception of CO, the monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

As an SPM-designated site, data from the Pittsburgh air monitoring site monitors are reported to EPA's AQS database. Measurement data are not utilized for compliance purposes, unless an exceedance of the NAAQS is noted. In addition, the probe height above ground is 23 meters, exceeding the 2 to 15 meter SLAMS siting requirement of 40 CFR Part 58, Appendix E.

A-10.2 Kittanning – 42-005-0001

Location: Glade Dr. & Nolte Rd., Kittanning.
Site is located approximately 0.1 mile south of US Route 422 in the parking lot of the Kittanning State Police Barracks.

Distance from trees: 55 meters

Table A-10.2a. Parameters Monitored at the Kittanning Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Extreme downwind	Urban
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Extreme downwind	Urban

Table A-10.2b. Roadway Separation Distances for the Kittanning Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
Glade Dr.	≤10,000	25.0	10	70
Nolte Rd.	≤10,000	52.1	10	70
Glade Park E	≤10,000	64.7	10	70
Benjamin Franklin Hwy (US422)	13,000	220.5	16	83

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Kittanning air monitoring site are shown in Table A-10.2a and Table A-10.2b, respectively.

The monitoring objective for ozone is correct. However, the spatial scale may need to be changed. Two major VOC sources exist 25 km northwest of the site and four major NO_x sources surround the site. These sources may provide an influence that result in non-uniform ozone concentrations within the urban scale dimensions. Further examination of this will be discussed in a future ANP.

For $PM_{2.5}$, the roadway distances are not in accordance with the required minimum distances. Therefore, this site is more appropriate as a neighborhood scale. A proposal to change from an urban to neighborhood scale will be assessed in a future ANP.

As shown in Table A-10.2a, the ozone and $PM_{2.5}$ monitor at the Kittanning site has an objective of Extreme Downwind. For ozone and $PM_{2.5}$ this is not a recognized objective. The objective of Extreme Downwind is reserved for PAMS facilities. Therefore, the monitoring objective should be changed to Maximum Concentration, with an urban or neighborhood spatial scale. According to 40 CFR Part 58, Appendix D, Section 4, the urban scale is the preferred spatial scale for a maximum concentration objective.

A-10.3 Beaver Falls – 42-007-0014

Location: 8th St. & River Alley, Beaver Falls, PA.
The site is located on property owned by the City of Beaver Falls, 85 meters from the bank of the Monongahela River.

Distance from trees: 9 to 10 meters

Table A-10.3a. Parameters Monitored at the Beaver Falls Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Urban
$PM_{2.5}$	SLAMS	Automated FDMS Gravimetric	Continuous year-round	Population exposure	Urban
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Urban
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Urban

Table A-10.3b. Roadway Separation Distances for the Beaver Falls Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	$PM_{2.5}$	PM_{10}	NO_2
8th St.	<10,000	13.6	10	70	70	10
2nd Ave. East	<10,000	45.4	10	70	70	10
3rd Ave.	<10,000	135.0	10	70	70	10
9th St.	<10,000	146.0	10	70	70	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Beaver Falls air monitoring site are shown in Table A-10.3a and Table A-10.3b, respectively.

The monitoring objective for ozone is correct. However, the spatial scale may need to be changed. A major VOC source exists southwest of the site and four major NO_x sources are found north and southwest of the site. These sources may provide an influence that result in non-uniform ozone concentrations within the urban scale dimensions. Wind rose information (Figure C-1.10c) indicates this site will be influenced by these sources. Further examination of this influence will be evaluated in a future ANP.

For particulate matter monitoring, the roadway separation distances are not in accordance with the required minimum distances. It is physically impossible to meet urban scale roadway separation distances at the present location. However, none of the streets located near the site are through streets, and in all probability have traffic densities a fraction of the 10,000 cars per day noted in the Table A-10.3b. For this reason, the Department may request an EPA waiver based upon the premise that the local traffic density is not a factor in the measure of local pollutant concentrations. Otherwise, the site may be more appropriate as a neighborhood scale. Further examination of this influence and subsequent waiver will be evaluated in a future ANP.

A-10.4 Beaver Valley – 42-007-0007

Location: 760 Beaver Valley Mall, Monaca, PA
Site is located in the southwest portion of the Beaver Valley Mall at the Home and Garden Center.

Distance from trees: 21 meters

Table A-10.4a. Parameters Monitored at the Beaver Valley Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-10.4b. Roadway Separation Distances for the Beaver Valley Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Lead
Humane Society Dr.	≤10,000	46.8	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Beaver Valley air monitoring site are acceptable as shown in Table A-10.4a and Table A-10.4b, respectively.

The Beaver Valley air monitoring site is a lead source-oriented monitor located 1.4 km north northeast of the major lead source, Horsehead Corp., and as close as possible to the modeled maximum concentration point.

A-10.5 Brighton Township – 42-007-0005

Location: 1015 Sebring Rd, Beaver, PA
Site is located in a residential area.

Distance from trees: Residential shrubbery is located within 10 meters of this site—however, they average only 2-3 meters tall, which is below the inlet probe of the sampler.

Table A-10.5a. Parameters Monitored at the Brighton Township Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood

Table A-10.5b. Roadway Separation Distances for the Brighton Township Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	SO_2
Sebring Rd.[1]	≤10,000[1]	22.0	10	N/A

[1] The actual AADT for Sebring Rd near the Brighton Township air monitoring site is not available, but by observation is most likely less than 1000 vehicles/day.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Brighton Township air monitoring site are shown in Table A-10.5a and Table A-10.5b, respectively. The monitoring objectives and spatial scales are correct as described in Sections 3.1.1 and 3.1.2 of this document.

A-10.6 Hookstown – 42-007-0002

Location: Route 168 & Tomlinson Church Rd, Hookstown, PA.
Site is near FAA microwave relay tower, and is 1.2 km east of the State of Ohio Border.

Distance from trees: 12 meters

Table A-10.6a. Parameters Monitored at the Hookstown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Regional transport	Regional
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Regional transport	Regional

Table A-10.6b. Roadway Separation Distances for the Hookstown Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	SO_2
Tomlinson Church Rd[1].	≤10,000[1]	35.3	10	N/A

[1] The actual AADT for Tomlinson Church Rd near the Hookstown air monitoring site is not available, but by observation is most likely to be less than 1000 vehicles/day

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Hookstown air monitoring site are shown in Table A-10.6a and Table A-10.6b, respectively. The monitoring objective and spatial scale for ozone are acceptable due to the lack of any major sources of NO_x or VOC to the west, south or north (Figure C3-e). Wind rose patterns are predominately from the west and southwest as shown in Figure C-1.10e.

According to 40 CFR Part 58, Appendix D, Section 4.4, only micro-, middle, and neighborhood scales are appropriate for SO_2 monitoring. Regional scale is not defined for SO_2 monitoring. Therefore a reevaluation of the monitoring objective and scale are needed and will be conducted in a future ANP.

A-10.7 Potter Township – 42-007-0006

Location: 206 Mowry Rd., Shippingport, PA
Site is located on the flat roof at the rear of the Potter Township Building.

Distance from trees: 53 meters

Table A-10.7a. Parameters Monitored at the Potter Township Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-10.7b. Roadway Separation Distances for the Potter Township Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Lead
Mowry Rd.	≤10,000	56.3	15
Fishport Rd.	≤10,000	146.3	15
Anderson Dr.	≤10,000	156.0	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Potter Township air monitoring site are shown in Table A-10.7a and Table A-10.7b, respectively. The monitoring objective, spatial scale and minimum separation distance from the monitor probe to the nearest traffic lane are acceptable.

This site is a source-oriented monitor sited as near as possible for maximum concentration from the Bruce Mansfield SES. The site location was determined through computer modeling.

A-10.8 Vanport – 42-007-0505

Location: Tamaqui Dr, Vanport, PA.
Site is located at the Vanport Water Works.

Distance from trees: 17 meters

Table A-10.8a. Parameters Monitored at the Vanport Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Population exposure	Neighborhood

Table A-10.8b. Roadway Separation Distances for the Vanport Air Monitoring Site.

Roadway[1]	AADT[1]	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Lead
W. Tamaqui Dr.	≤10,000	47.0	15
Tamaqui Dr.	≤10,000	100.0	15
N. Tamaqui Dr.	≤10,000	147.0	15
River Ave.	≤10,000	100.0	15
Locust St.	≤10,000	121.7	15
Oak St.	≤10,000	164.5	15
State St. (State Route 68)	17,000	240.5	15

[1] By observation and estimation, all nearby roads except for State Street have traffic densities less than 1,000 vehicles per day. No actual traffic density measurement is available.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Vanport air monitoring site are shown in Table A-10.8a and Table A-10.8b, respectively. The monitoring objective and spatial scale and

minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

The Vanport monitoring station is located at this site for historical purposes and supports the source monitoring at the Beaver Valley site. A lead source, Horsehead Corp., is located 2.4 km northeast of the Vanport air monitoring site.

A-10.9 Charleroi – 42-125-0005

Location: 12th St, Charleroi, PA
Site is located at the Charleroi Borough Waste Treatment Plant.

Distance from trees: 11 meters

Table A-10.9a. Parameters Monitored at the Charleroi Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Manual gravimetric	Every 6th day	Source-oriented	Middle Scale
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-10.9b. Roadway Separation Distances for the Charleroi Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO
12th St.	≤10,000	32.0	10	15	15	N/A	10	10
10th St.	≤10,000	177.5	10	15	15	N/A	10	10
Railroad Way	≤10,000	202.5	10	15	15	N/A	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Charleroi air monitoring site are shown in Table A-10.9a and Table A-10.9b, respectively. The monitoring objectives and spatial scales for all but PM_{10} are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

For PM_{10}, the most appropriate monitoring objective and spatial scale for a monitor at this site is a population exposure objective at neighborhood scale. It is believed the source-oriented objective and middle scale spatial scale assigned to the current PM_{10} monitor is due to a documentation error in PA DEP's site information database. Prior to 2009, PM_{10} monitoring at Charleroi was achieved using a continuous method, and

designated as neighborhood scale with a monitoring objective of population exposure. The current manual method PM_{10} monitor was installed at Charleroi in January 2009. Previous to 2009, this monitor had been located at a former PA DEP air monitoring site in Monessen, PA, where it was designated as a middle scale, source-oriented monitor. It is believed that a clerical error was made in the database, whereby the spatial scale and monitoring objective from the Monessen site were copied into the Charleroi site file. The 2009 Annual Network Plan, under the "Site Activity within the Next 18 Months", PA DEP noted a replacement of the continuous monitor with a manual method. No changes in monitor objective and spatial scale were noted at that time. Therefore, PA DEP will note a correction in objective and spatial scale in the next ANP.

A-10.10 Florence – 42-125-5001

Location: Hillman State Park, Florence, PA
Site is located in State Game Lands #432.

Distance from trees: 36 meters

Table A-10.10a. Parameters Monitored at the Florence Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Regional transport	Regional
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Regional transport	Regional
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Regional transport	Regional

Table A-10.10b. Roadway Separation Distances for the Florence Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			Ozone	$PM_{2.5}$	SO_2
Miller Airport Rd.	≤100	18.0	10	160+	N/A

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Florence air monitoring site are shown in Table A-10.10a and Table A-10.10b, respectively. The monitoring objective and spatial scale for ozone and $PM_{2.5}$ are correct. However regional scale is not an appropriate spatial scale for SO_2 monitoring. Re-designation of the monitoring objective and spatial scale for the SO_2 monitor at the Florence air monitoring site will be investigated in a future ANP. There are no major sources near this location.

The minimum separation distance from the monitor probe to the nearest traffic lane appears to not meet appropriate siting requirements. However the only road near the site, Miller Airport Road, is an unpaved gravel covered rear access road to the Airport. There is little activity on this stretch of the roadway. Consequently, the Department believes that the site monitoring objectives and designated spatial scales for ozone and $PM_{2.5}$ are appropriate.

A-10.11 Washington – 42-125-0200

Location: McCarrell Ave. & Fayette St., Washington, PA
Site is located in a residential area.

Distance from trees: No trees within reasonable distances.

Table A-10.11a. Parameters Monitored at the Washington Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Regional transport	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood

Table A-10.11b. Roadway Separation Distances for the Washington Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
McCarrell Ave.[1].	≤500[1]	11.5	10	15
Fayette St.	≤10,000	16.0	10	15
Catfish Ave.	≤10,000	32.3	10	15
Basset Ave.	≤10,000	75.1	10	15
Addison St.	≤10,000	86.2	10	15
Baird Ave.	≤10,000	139.0	10	15
Hoge Ave.	≤10,000	144.5	10	15
W. Chestnut Ave (US40)	12,000	130.0	14	15

[1] By observation, PA DEP estimates the AADT for McCarrell Avenue to be less than 500 cars per day.

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Washington air monitoring site are shown in Table A-10.11a and Table A-10.11b, respectively. The monitoring objectives and spatial scales for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. There are no major sources near the Washington site. The minimum separation distance from the monitor probe to the nearest traffic lane is met for both pollutants. For $PM_{2.5}$ monitoring, although the distance to McCarrell Ave is less than the required 15 meters, the separation distance, in the opinion of the Department, is adequate for a neighborhood spatial scale designation, due to the minimal impact possible from traffic on McCarrell Ave.

A-10.12 Conemaugh – 42-129-0009

Location: Sugar Run Rd, Seward, PA.
Site is located at High Ridge Water Works.

Distance from trees: 23 meters

Table A-10.12a. Parameters Monitored at the Conemaugh Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-10.12b. Roadway Separation Distances for the Potter Township Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Lead
Sugar Run Rd.	≤10,000	77.4	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Conemaugh air monitoring site are shown in Table A-10.12a and Table A-10.12b, respectively. The monitoring objective, spatial scale and distance to traffic lanes is acceptable.

The Conemaugh air monitoring site is a source-oriented lead monitoring location located 3.2 km east northeast of Conemaugh SES.

A-10.13 Greensburg – 42-129-0008

Location: Donohoe Rd., Greensburg, PA
Site is located at the PENNDOT garage.

Distance from trees: 19 meters

Table A-10.13a. Parameters Monitored at the Greensburg Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Urban

Table A-10.13b. Roadway Separation Distances for the Greensburg Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
Sheraton Dr.	15,000	80.5	20	86
Lincoln Hwy (US30)	52,000	123.2	65	126
Donohoe Rd.	15,000	146.3	20	86

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Greensburg air monitoring site are shown in Table A-10.13a and Table A-10.13b, respectively. The monitoring objectives and spatial scales for both monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for both pollutants.

There are no major sources of ozone or PM near the Greensburg site.

A-10.14 Murrysville – 42-129-0006

Location: Old William Penn Hwy. & Sardis Rd., Murrysville, PA
Site is located at the rear of the Murrysville volunteer fire company.

Distance from trees: 9 meters. Tree growth to the west and shrubbery to the south may render this site unusable. Negotiations with property owner to trim or cut down bordering trees/scrubs are being pursued. If it is not possible to trim or cut down the vegetation, a site move will be necessary.

Table A-10.14a. Parameters Monitored at the Murrysville Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban

Table A-10.14b. Roadway Separation Distances for the Murrysville Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Sardis Rd.	(≤10,000)	36.5	10
Old Wm Penn Hwy.	(≤10,000)	67.9	10
William Penn Hwy. (US22)	24,000	189.0	34
N. Hills Rd.	(≤10,000)	190.6	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Murrysville air monitoring site are shown in Table A-10.14a and Table A-10.14b, respectively. The monitoring objective and spatial scale are acceptable due to a lack of major VOC and NO_x sources within urban scale distances. The minimum separation distance from the monitor probe to the nearest traffic lane is met for ozone monitoring.

A-10.15 Population Density and Changes

A-10.15.1 Pittsburgh Air Monitoring Site (Allegheny County)

As shown in Figure A-10.15.1a, the Pittsburgh site is located in downtown metropolitan Pittsburgh, an area of highest population density in Allegheny County. It is also in the area of low growth Figure A-10.15.1b. However this area is the home of many major league baseball and football sporting events and a significant amount of tourism. Thus its population exposure coverage is more significant than what is indicated in the previously mentioned population figures. Also, since this site is designated a Special Purpose Monitor (SPM), its continued presence is not related to any specific population trend or other regulatory need.

Figure A-10.15.1a. Population Density for Allegheny County, 2008 Estimate Data.

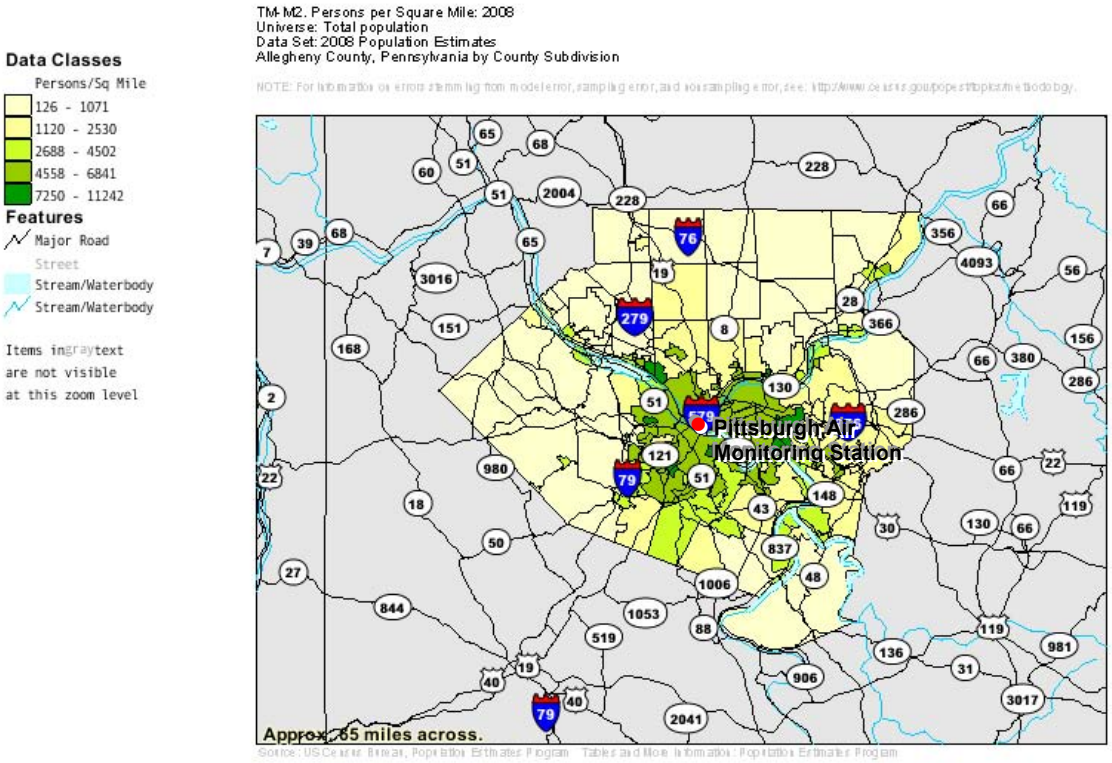
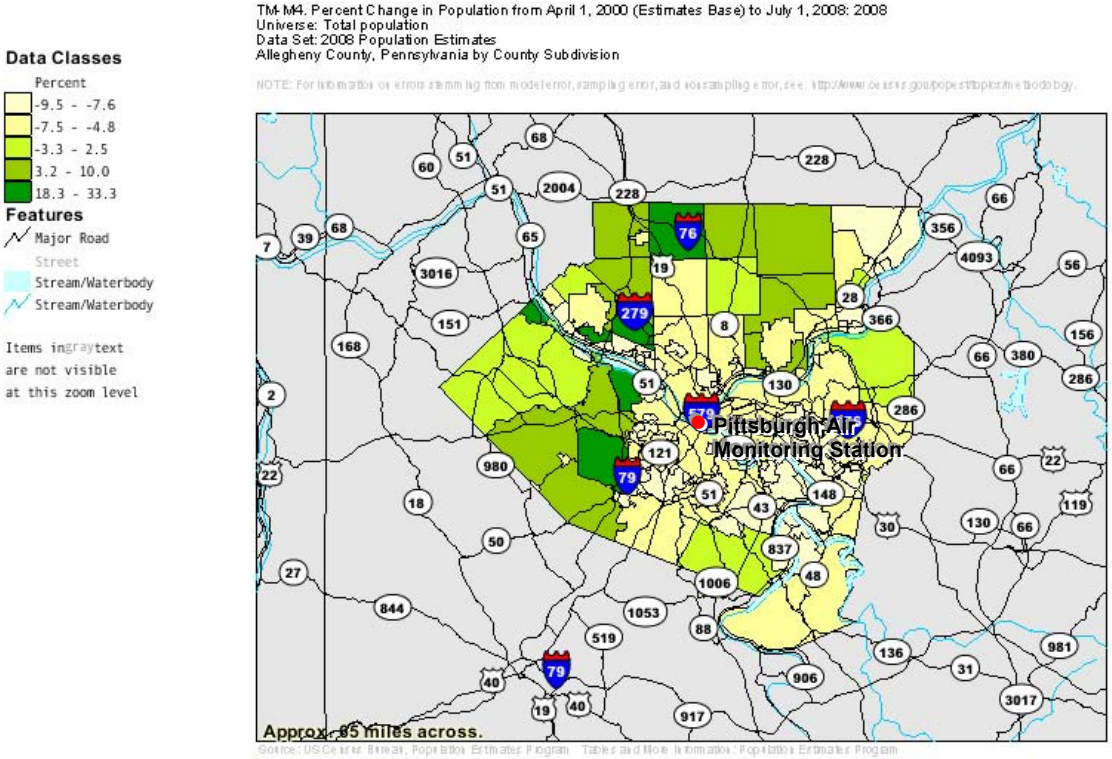


Figure A-1.15.1b. Percent Population Change for Allegheny County, 2000 - 2008 Estimate Data.

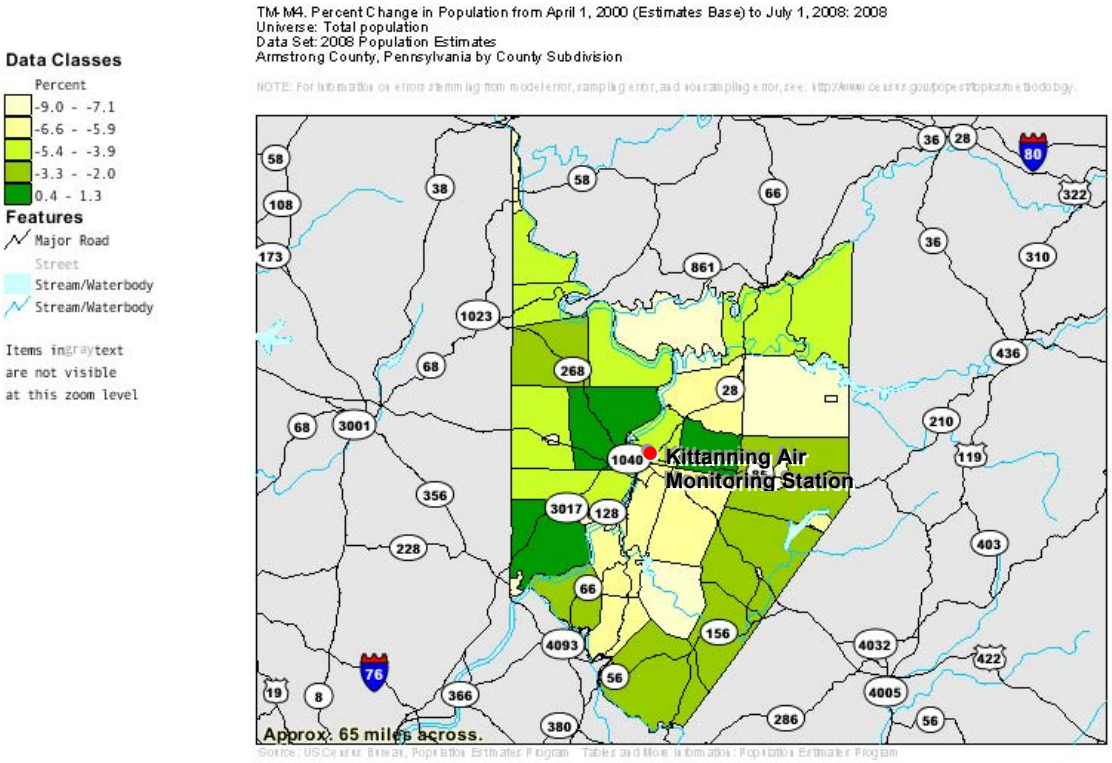


A-10.15.2 Armstrong County

Population density (Figure A-10.15.2a) remains low across the entire Armstrong county area where this site is located. In addition, only a modest growth can be found both east and west of the site, as well as areas to the southwest (Figure A-10.15.2b). This rather constant population growth provides us with an ideal area by which maximum concentrations can be monitored over a long-term historical perspective without the influence of local population changes.

Figure A-10.15.2a. Population Density for Armstrong County, 2008 Estimate Data.

Figure A-10.15.2b. Percent Population Change for Armstrong County, 2000 - 2008 Estimate Data.



A-10.15.3 Beaver County

Beaver Falls and Brighton Township Air Monitoring Sites

These sites are located in areas of maximum population density. While population growth is low in the immediate vicinity of the air monitoring sites, they are surrounded by areas of significant population increases (Figures A-10.15.3a and A-10.15.3b). The major population areas follow the waterways that at one time provided the logistical support for the Pennsylvania steel industry.

Hookstown Air Monitoring Site

Hookstown is located in an area of low population density in the southwest part of Beaver County. However, growth has been good across the area in the vicinity of the site. As can be seen in Figures A-10.15.3a and A-10.15.3b, Hookstown is located less than a mile from the Ohio border. The Hookstown site provides excellent monitoring of pollutants that cross the Ohio Pennsylvania state border.

Beaver Valley Air Monitoring Site

This lead source monitoring site is located in an area of high population density and modest growth appears west of the site. Since this location is a lead “source” monitoring site, and not sited for general population exposure, further analysis of the site is not needed.

Potter Township Air Monitoring Site

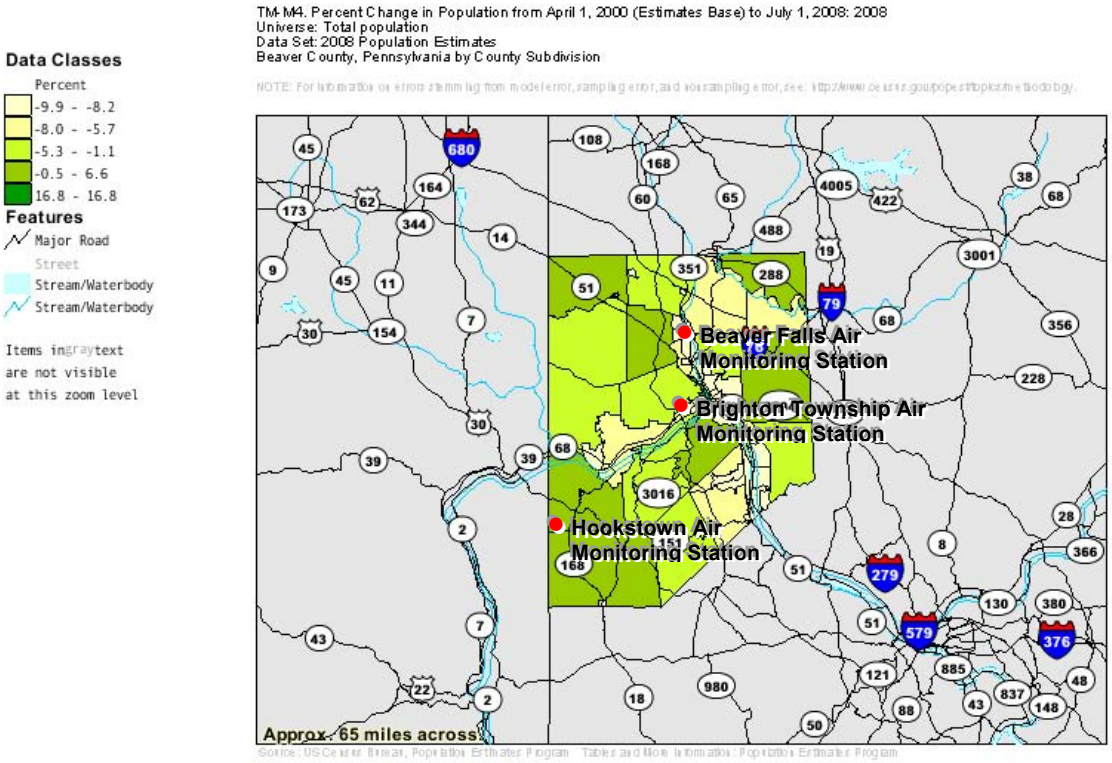
This lead source monitoring site is located in a low density, low growth population area of Beaver county. Since this location is a lead "source" monitoring site, and not sited for general population exposure, further analysis of the site is not needed.

Vanport Air Monitoring Site

This lead monitoring site is located in one of the more densely populated areas in Beaver County, in an industrial area across the river and just north of the Beaver valley lead monitoring site. The location around the site, has been growing in population over the past eight years, albeit slowly.

Figure A-10.15.3a. Population Density for Beaver County, 2008 Estimate Data.

Figure A-1.15.3b. Percent Population Change for Beaver County, 2000 - 2008 Estimate Data.



A-10.15.4 Washington County

Charleroi Air Monitoring Site

Figures A-10.15.4a and A-10.15.4b show Charleroi is located close by to some of the most densely populated eastern areas of Washington County, along the Monongahela River. However, there has been little or no growth in the population close to the site over the past eight years. Some of the biggest growth in the county has been northwest and south of Charleroi. Additional nearby growth is due north and south in Allegheny and Fayette Counties, respectively (Figures A-1.15.1b and A-10.15.4c).

Looking at the wind rose for Charleroi in Figure C-1.10f (Appendix C of this document), it can be seen that the predominate wind patterns from the north, west, and south would pass over the higher population areas noted above. The Charleroi site is monitoring air parcels from more of a population area than that area in which it is sited.

Florence Air Monitoring Site

Similar to the Hookstown discussion, the population density and growth in the area of Florence is rather low and growth is non existent (Figures A-10.15.4a and A-10.15.4b). However, due to it closeness to the Ohio-Pennsylvania border, this site is ideal for monitoring transport pollutant concentrations.

Washington Air Monitoring Site

The site is located in one of the most densely populated (although small) areas in central Washington county. Its growth is limited but its surrounding areas show relatively stable, with some growth to the west and northeast.

Figure A-10.15.4a. Population Density for Washington County, 2008 Estimate Data.

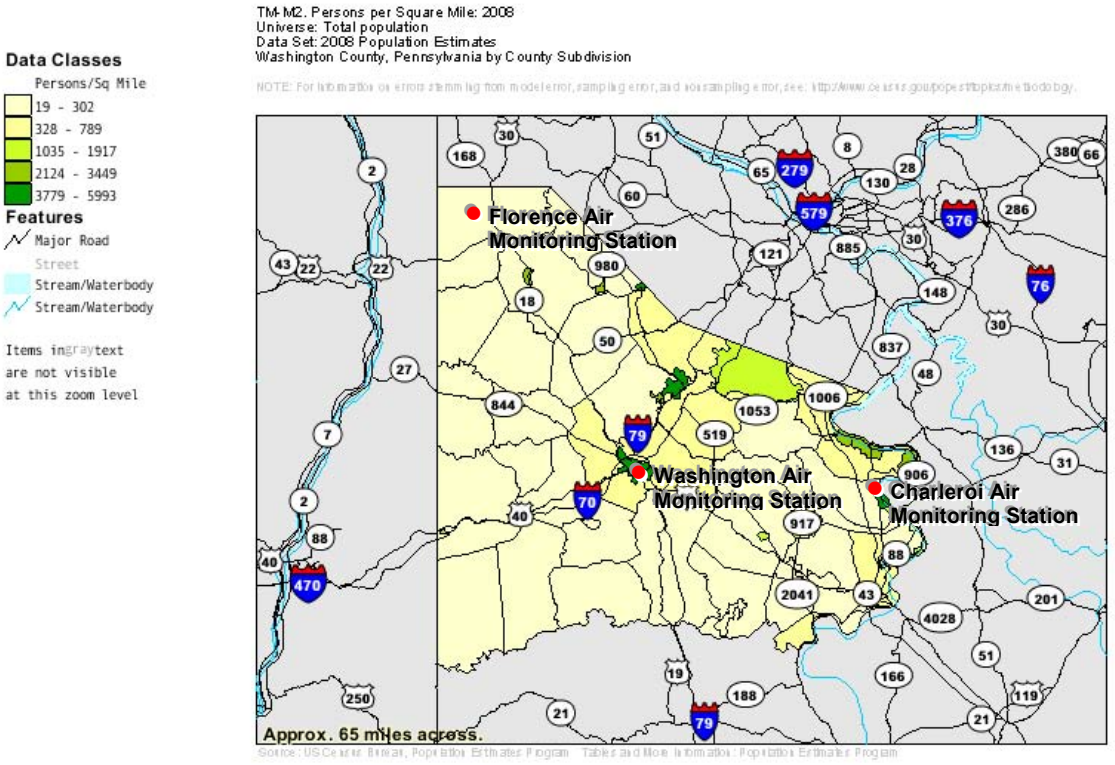


Figure A-10.15.4b. Percent Population Change for Washington County, 2000 - 2008 Estimate Data.

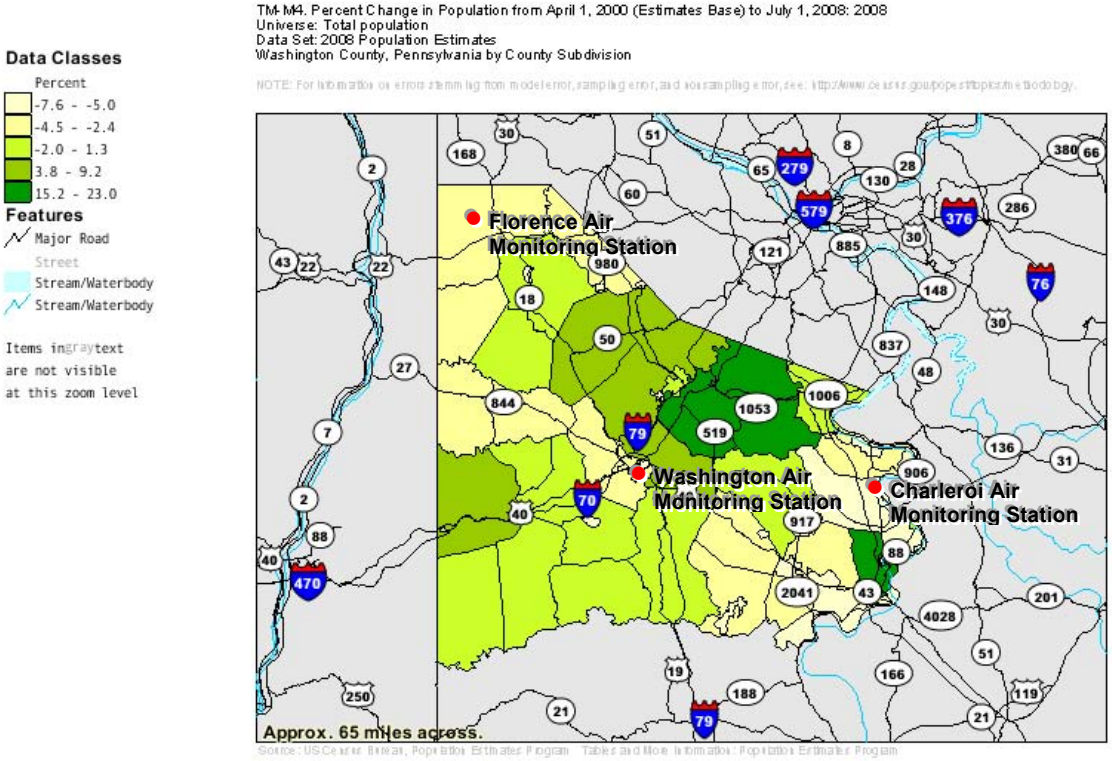
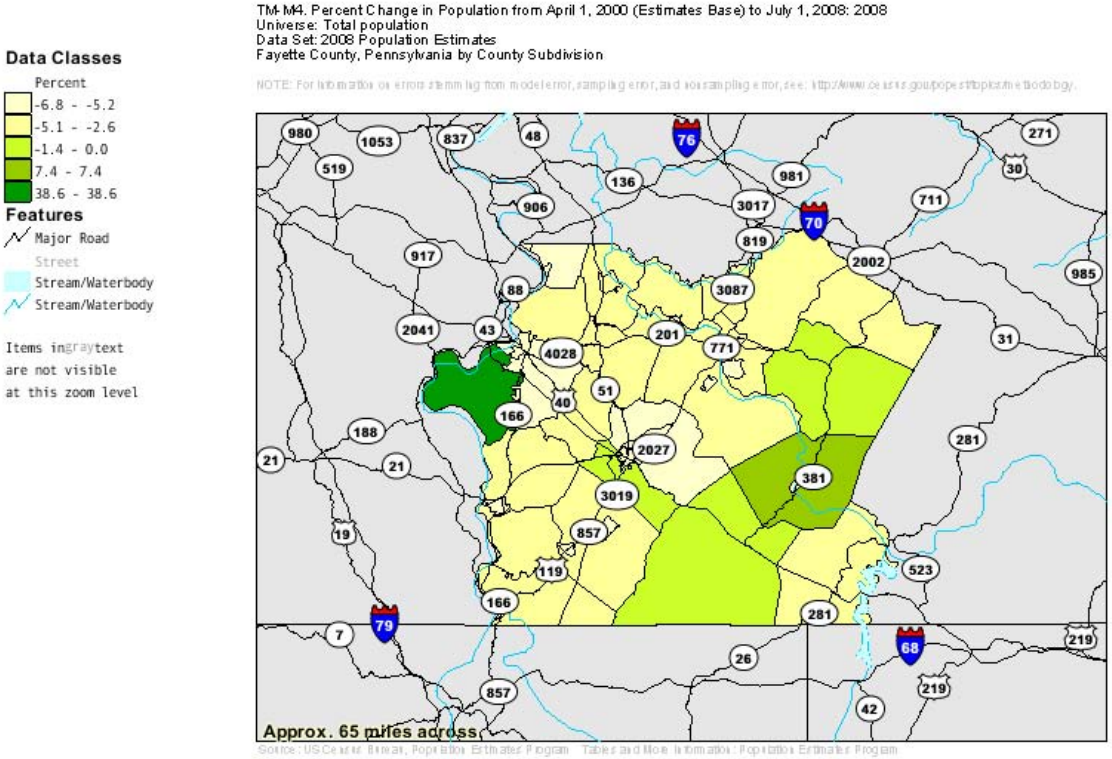


Figure A-10.15.4c. Percent Population Change for Fayette County, 2000 - 2008 Estimate Data.



A-10.15.5 Westmoreland County

Conemaugh Air Monitoring Site

This lead source monitoring site is located in a low density, no growth population area of Westmoreland County. Since this location is a lead "source" monitoring site, and not sited for general population exposure, further analysis of the site is not needed.

Greensburg Air Monitoring Site

The site is located in downtown Greensburg, one of the few areas in Westmoreland County with a high population density (Figure A-10.15.5a). The site is surrounded with a large slow but stable growth area (Figure A-10.15.5b).

Murrysville Air Monitoring Site

Lower population density surrounds this site (Figure A-10.15.5a). However, the slow rates of growth across most of Westmoreland County surround the site (Figure A-10.15.5b). This site is located 16 miles due east of Pittsburgh, in keeping with its maximum concentration designation.

Figure A-10.15.5a. Population Density for Westmoreland County, 2008 Estimate Data.

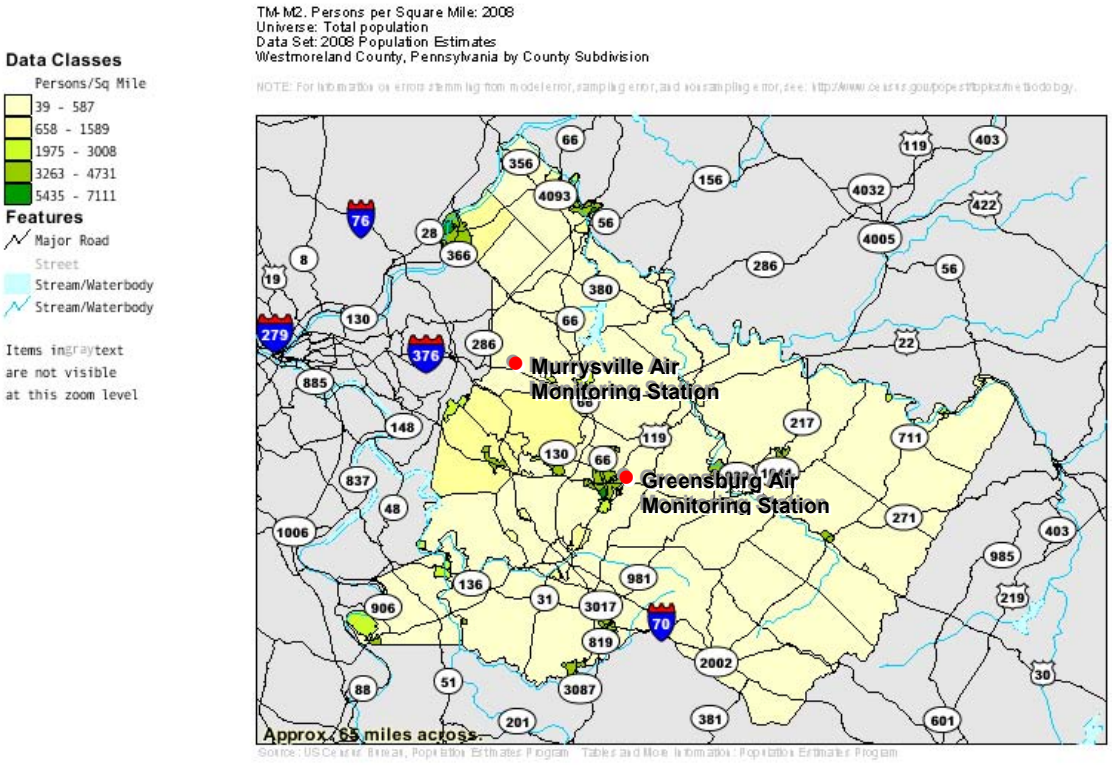
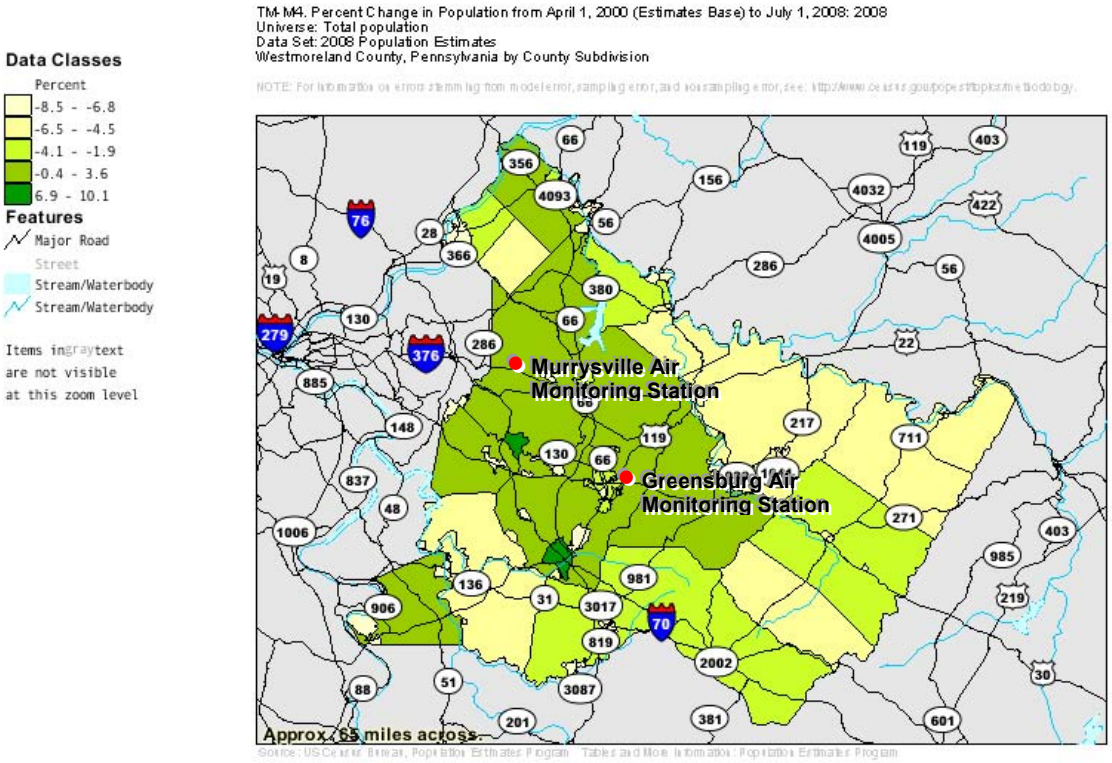


Figure A-10.15.5b. Percent Population Change for Westmoreland County, 2000 - 2008 Estimate Data.



A-10.16 Criteria Pollutant Discussion

A-10.16.1 Ozone

As noted in Section 3.3.1 of this document, based on population and design value, the Pittsburgh MSA is required to have a minimum of two ozone monitors active during the ozone season. This requirement is fulfilled through the operation of 12 ozone monitoring sites in the MSA. These include three ozone monitors operated by the Allegheny County Health Department, and the remaining nine monitors are operated by PA DEP. Only PA DEP monitors are included in the analyses contained in this section.

According to 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. Since Allegheny County has not designated any of its sites as such, PA DEP has designated Kittanning (DV= 77 ppb) and Murrysville (DV= 71 ppb) as maximum ozone concentration sites. However, the Murrysville site has a DV less than six other sites. This lower concentration may be a result of scavenging by nearby vegetative growth. As noted earlier vegetative growth trimming is being pursued. Site relocation may also be needed if the property owner disapproves the trimming or removal of the vegetative growth.

The nine PA DEP-operated ozone sites are in Kittanning, Beaver Falls, Brighton Township, Hookstown, Charleroi, Florence, Washington, Greensburg and Murrysville,

Pa. In addition, DEP operates an ozone monitor at a Science exhibit at the Carnegie Science Center, as a Special Purpose Monitor (SPM). Figures detailing wind rose patterns and ozone back trajectory analyses for these sites are given in Section C-1.10 (Appendix C of this document). The following analysis is provided based on the back trajectories and wind roses:

Pittsburgh Air Monitoring Site

The ozone back trajectory analysis for the Pittsburgh air monitoring site (Figure C-1.10k) indicates that maximum ozone concentrations are prevalent when wind directions are out of the west and southwest, whereas wind rose information (Figure C-1.10a) indicates that predominate wind direction is from the west to north direction. Valley effects and building interferences from the decorative architecture may be affecting the meteorological instrumentation at this site. Since this site is an SPM site, and as indicated earlier not sited utilizing 40 CFR Appendix E criteria, no specific reasons for any discrepancies in air mass characteristics can be made. Figure C-3c also shows that there are no significant sources of VOC or NO_x in the immediate area of the site.

Kittanning Air Monitoring Site

Similar to the Pittsburgh site, ozone back trajectory analysis for the Kittanning air monitoring site (Figure C-1.10l) indicates that maximum ozone concentrations are prevalent when wind directions are out of the west and southwest. This is consistent with wind rose information (Figure C-1.10b) that shows predominate wind directions are from the south, through to the west, and around to the north. Figure C-3c shows there is no major source of VOC in the immediate area of the site. However. there are three major NO_x sources directly west, south and east of the monitoring location.

Beaver Falls Air Monitoring Site

Back trajectory data is less defined at this site. Figure C-10.m shows the site's measured ozone maximums occur from air masses originating from all directions except the southwest. This is consistent with the wind rose data which shows data from all directions. It is speculated that wind direction instrumentation at the site may be compromised by the close proximity of some tall trees. As noted in Section A-10.3, the distance to these trees is only 9 to 10 meters. In the past, these trees have been marked for trimming or removal in the near future. However. Trimming or removal have been delayed pending land owner approval of this trimming/removal project.

Figure C-3e shows a major source of VOC just south of the air monitoring site in Brighton Township (which is located south of Beaver Falls), and three major sources of NO_x to the south and southwest. There are also three to four major NO_x sources to the north and northeast of the site. This arrangement of ozone precursors may also be the reason for the less defined trajectories at this site

Brighton Township Air Monitoring Site

The Brighton Township ozone back trajectory (Figure C-1.10n) is reasonably consistent with the prevalent winds and the north to west to south pattern of maximum pollutant air

masses. The wind rose pattern for Brighton Township (Figure C-1.10d) also indicates predominating wind directions from the west and northwest, with lesser directions from the north and southwest. This direction is consistent with typical Pennsylvania weather patterns.

The Brighton Township air monitoring site is located near three major sources of NO_x to the southeast, south and southwest, and one major VOC source to the south (Figure C-3e). Based on the site location, the population exposure objective and neighborhood scale is appropriate for this monitoring location.

Hookstown Air Monitoring Site

Ozone back trajectory information for the Hookstown air monitoring site (Figure C-1.10o) shows strong influences from air masses coming up from the south to west. Likewise the wind rose (Figure C-1.10e) shows a significant south west to west wind pattern.

These findings support the Regional Transport objective for this monitoring location. Strengthened by the fact that there are no major sources of NO_x or VOC upwind of the site, all major ozone events appear to come from across state borders.

Charleroi Air Monitoring Site

The ozone back trajectory analysis for the Charleroi air monitoring site (Figure C-1.10p) indicates most of the maximum concentration days originate from air masses coming from the north, west and south. The northern maximums may be a result of the four major NO_x sources located due north of the site (Figure C-3e). Also, the city of Pittsburgh is due north. There are no major sources of VOC within reasonable distances of the site. The remainder of the maximum ozone concentrations are attributed to flows from westerly and southerly directions are similar to findings at many of the sites in the MSA.

Station wind rose information (Figure C-1.10f) is consistent with ozone back trajectory information, predominately out of the north to west to south. Easterly winds are minimal.

Other than the major sources mentioned previously, no other sources are located within a reasonable distance of the monitoring site. Thus population exposure on a neighborhood scale is appropriate.

Florence Air Monitoring Site

The ozone back trajectory analysis for the Florence air monitoring site (Figure C-1.10q) shows a strong transport component coming from the west and south of Florence. There are no components coming from the north or west. Wind rose information (Figure C-1.10g) confirms that the wind direction is predominately from the west and southwest.

With no major sources of NO_x or VOC either west or south of Florence, pollutant transport issues become the only source of concern. Therefore, the transport objective and regional spatial scale are appropriate for this monitoring location.

Washington Air Monitoring Site

PA DEP's ozone back trajectory analysis for the Washington air monitoring site (Figure C-1.10r) indicates a very strong southwest component of maximum concentration air masses. As noted earlier, similar results are found within other monitoring locations within the MSA. There are two major sources, both for VOC and NO_x, to the southwest of Washington in Greene County which may or may not be contributing to the trajectory result shown in Figure C-1.10r.

Washington's wind rose pattern (Figure C-1.10h) is consistent with the back trajectory and indicates that the predominating wind direction is west to southwest.

Greensburg Air Monitoring Site

Greensburg's back trajectory pattern for maximum ozone concentration measurements (Figure C-1.10s) is typical of the other monitoring sites within the MSA. Maximum ozone concentrations are detected from air masses originating from the south to northwest directions. This is consistent with wind rose data which shows predominating wind patterns from the west to south west, with some components reaching the north, northeast and south southeast.

Because of its location further east and north of the Pennsylvania border, this site has an objective of population exposure with and urban spatial scale. There are five major NO_x sources northwest and southwest of the site (Figure C-3e) and within the 50 km maximum dimension of the urban spatial scale. Further study of the possibility of a change to neighborhood scale may be conducted in a future Annual Network Plan.

Murrysville Air Monitoring Site

Tree growth and shrubs may be interfering with the meteorological instrumentation at this site resulting in an abnormal wind rose (Figure C-1.10j). As noted earlier, PA DEP is attempting to resolve this problem.

Since back trajectory analysis is independent of site meteorological measurement, the back trajectory analysis for the Murrysville air monitoring site is valid. Ozone back trajectory information (Figure C-1.10t) indicates that high ozone data measured at the Murrysville site is predominately originating from air masses coming from the southwest to westerly directions. This is consistent with the trajectories reported earlier at other sites. However, since Murrysville is west of Allegheny County and the city of Pittsburgh, the site is classified as a maximum concentration site, not regional transport.

Murrysville has no major sources except for six major NO_x sources west of Murrysville. Under these circumstances, urban spatial scale is appropriate.

In summary, the back trajectories of all nine ozone sites are reasonably consistent and show that the sites are picking up maximum ozone events from air masses originating from Ohio and West Virginia. Therefore, these sites are well suited to record and measure ozone resulting from transport from the west and southerly air masses

A-10.16.2 $PM_{2.5}$

As indicated in Section 3.3.2 of this document, based on population and design value the Pittsburgh MSA is required to have a minimum of three $PM_{2.5}$ monitors. This requirement is fulfilled through the operation of 14 $PM_{2.5}$ monitoring sites in the MSA. These include eight monitors operated by the Allegheny County Health Department (ACHD), and the remaining six by PA DEP. Only PA DEP monitors are included in the site-specific analyses contained in this section.

The maximum $PM_{2.5}$ concentrations measured in the Pittsburgh MSA occur at the Liberty site operated by ACHD, which has a $PM_{2.5}$ Design Value of 17.0 micrograms per cubic meter ($\mu g/m^3$). Accordingly, the Liberty site is considered as the maximum population-oriented site of maximum concentration as specified in 40 CFR Part 58 Appendix D, Section 4.7.1. The maximum $PM_{2.5}$ Design Value for any PA DEP-operated site is 14.2 $\mu g/m^3$, obtained at the Beaver Falls monitoring location.

The six PA DEP-operated $PM_{2.5}$ sites are in Kittanning, Beaver Falls, Charleroi, Florence, Washington and Greensburg, Pa. Figures detailing wind rose patterns and ozone back trajectory analyses for these sites are given in Section C-1.10 (Appendix C of this document). From the back trajectories and wind roses the following can be surmised:

Kittanning Air Monitoring Site

The $PM_{2.5}$ back trajectory analysis for the Kittanning air monitoring site (Figure C-1.10u) yields similar results to the ozone trajectory for the site. There are three major sources of Particulate Matter (PM) surrounding the site (Figure C-3e), of which none are in the predominately southeast trajectory direction. Thus these three major sources appear to have little effect on reported maximum concentration values.

Site objective and spatial scale for $PM_{2.5}$ monitoring at the Kittanning site are under reconsideration as noted earlier in the Kittanning site summary discussion in Section A-10.2

Beaver Falls Air Monitoring Site

As with the Kittanning site, $PM_{2.5}$ back trajectory analysis for the Beaver Falls air monitoring site (Figure C-1.10v) yields similar results to the ozone trajectory for the site.

As shown in Figure C-3e, there are four nearby major sources of PM located in the upwind direction of the back trajectory pattern. Therefore, some influence from these sources may be contributing to the maximum concentration values.

The spatial scale currently assigned to $PM_{2.5}$ monitoring at the Beaver Falls site scale is under reconsideration as noted earlier in the Beaver Falls site summary discussion in Section A-10.3.

In addition, there are two $PM_{2.5}$ sensors currently operating at the site, one a continuous FEM and the other a manual FRM at this location. When a comparison study has been completed, the FRM monitor may be removed.

Charleroi Air Monitoring Site

Contrary to the previous two sites, $PM_{2.5}$ back trajectory analysis for the Charleroi air monitoring site (Figure C-1.10w) yields results slightly different then the ozone trajectory for the site. The $PM_{2.5}$ results show a more defined southerly component versus the more scattered north through west to south pattern for ozone.

There are two major sources of PM northwest of the site and two more distant major sources to the south and southwest. However, valley effects from the Monongahela River valley may be the determining factor in the southerly trajectory noted above.

Florence Air Monitoring Site

The $PM_{2.5}$ back trajectory analysis for the Florence air monitoring site (Figure C-1.10x) yields similar results to the ozone trajectory for the site.

There are no major sources of PM to the west and southwest of the site.

Washington Air Monitoring Site

PA DEP's $PM_{2.5}$ back trajectory analysis for the Washington air monitoring site (Figure C-1.10y) yields results slightly different then the ozone trajectory for the site; Back trajectory $PM_{2.5}$ results are less defined than the ozone trajectory. Ozone back trajectory analysis shows air masses contributing to maximum concentration measurements originated predominately from the south west, whereas maximum $PM_{2.5}$ concentrations were affected predominately from the south, west and north directions. This may be partially due to the two major sources found to the southwest and southeast of the site (Figure C-3e). Otherwise, pollutant transport may be an issue in the other directions.

Greensburg Air Monitoring Site

The $PM_{2.5}$ back trajectory analysis for the Greensburg air monitoring site (Figure C-1.10z) yields similar results to the ozone trajectory for the site.

There are two scattered major PM sources at some distance from the site in the westerly direction near Charleroi, Pa and others further east. Within these distances, population exposure objective and urban special scale is appropriate.

A-10.16.3 PM_{10}

As indicated in Section 3.3.3 of this document, based on population and design value this MSA is required to have a minimum of four PM_{10} monitors. This requirement is fulfilled through the operation of 12 PM_{10} monitoring sites in the MSA. These include ten monitors operated by the Allegheny County Health Department (ACHD), and two

monitors operated by PA DEP. Only PA DEP monitors are included in the site-specific analyses contained in this section.
The maximum PM_{10} concentrations measured in the Pittsburgh MSA occur at the Lincoln site operated by ACHD, which has a $PM_{2.5}$ Design Value of 33 micrograms per cubic meter ($\mu g/m^3$). The maximum $PM_{2.5}$ Design Values for PA DEP-operated sites are 21.8 $\mu g/m^3$ and 19.7 $\mu g/m^3$, obtained at the Beaver Falls and Charleroi monitoring locations, respectively.

The two PA DEP-operated PM_{10} sites are in Beaver Falls and Charleroi, Pa. Figures detailing wind rose patterns and ozone back trajectory analyses for these sites are given in Section C-1.10 (Appendix C of this document). From the back trajectories and wind roses the following can be surmised:

Beaver Falls Air Monitoring Site
It can be reasonably assumed that this monitor is measuring PM_{10} from the same air masses as was described by the $PM_{2.5}$ discussions noted earlier.

Charleroi Air Monitoring Site
As noted in the Charleroi site summary discussion in Section A-10.9, there appears to be a discrepancy with the site objective and spatial scale. Since this is a manual sampler that was moved from a discontinued site location, it appears that the objective and scale were simply copied over to the Charleroi site details. The appropriate monitoring objective and spatial scale for PM_{10} monitoring at the Charleroi air monitoring site is population exposure objective at neighborhood scale.

A-10.16.4 SO_2, NO_2, CO

There are no current minimum requirements for the number of monitoring sites for these three pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the Pittsburgh MSA.

At least one site for each MSA must be designed to record maximum concentration for SO_2, NO_2 and CO, according to 40 CFR Part 58, Appendix D. For maximum SO2 concentrations the Liberty site operated by ACHD serves as the maximum concentration site for the Pittsburgh MSA. However there are no maximum concentration sites for NO_2 or CO. Therefore PA DEP and will need to study which site within the MSA is to be designated as the maximum concentration site.

As noted previously, there is no regional spatial scale defined for SO_2 (See 40 CFR Part 58, Appendix D, Section 4.4). Therefore, the regional transport/regional scale will need to be evaluated for Hookstown and Florence.

A-10.17 MSA Site Recommendations

Kittanning Air Monitoring Site
The monitoring objective of "Extreme Downwind" for ozone and $PM_{2.5}$ is not correct. As noted the objectives should be correctly identified for these sites as "Maximum Concentration".

Along with this change is a need for reevaluation of the designated spatial scales for both monitors at this site. For ozone monitoring, major VOC and NO_x sources located around the site may provide an influence that result in non-uniform ozone concentrations within the urban scale dimensions. Further examination of this will be found in a future ANP. For $PM_{2.5}$ monitoring, the roadway separation distances are not in accordance with the required minimum distances. A proposal to change urban to neighborhood scale will be found in a future ANP.

Beaver Falls Air Monitoring Site
The spatial scales currently assigned to the ozone and PM monitors at this site need to be reevaluated. For ozone monitoring, major VOC and NO_x sources located around the site may provide an influence that result in non-uniform ozone concentrations within the urban scale dimensions. Further examination of this will be found in a future ANP. For PM monitoring, the roadway separation distances are not in accordance with the required minimum distances. It is physically impossible to meet urban traffic distances at the present location. Therefore, a proposal to change urban to neighborhood scale will be found in a future ANP.

Hookstown and Florence Air Monitoring Sites:
In 40 CFR, Part 58 Appendix D, Section 4.4, only micro, middle, and neighborhood scales are defined as appropriate for SO_2. Therefore, reevaluations of the monitoring objectives and spatial scales currently assigned to the SO_2 monitors at these sites are needed, and will be included in a future ANP.

Murrysville Air Monitoring Site
Vegetative growth may require the relocation of the site. Further investigation is indicated.

Charleroi Air Monitoring Site
Due to a clerical error, the monitoring objective and spatial scale for PM_{10} is incorrect. These criteria will be corrected in a future ANP.

Greensburg Air Monitoring Site

A reevaluation of the spatial scale assigned to the Greensburg ozone monitor may be necessary.

Other

PA DEP and ACHD need to study which site within the Pittsburgh MSA is to be designated as the maximum concentration site for NO_2 and CO. Any changes to the designations of monitors operated by PA DEP will be included in a future ANP.

A-11 Reading MSA

The Reading MSA consists of Berks County. The air monitoring program currently has six sites located in the Reading MSA: Site Name, AQS Code, County

Kutztown – 42-011-0006, Berks County
Laureldale North – 42-011-0020, Berks County
Laureldale South – 42-011-1717, Berks County
Lyons Boro – 42-011-0021, Berks County
Lyons Park – 42-011-0022, Berks County
Reading Airport – 42-011-0011, Berks County

A-11.1 Kutztown – 42-011-0006 Site Summary

Location: Kutztown University Campus, roughly 340 meters east of US 222, on the western side of the main campus and 21 km northeast of the Reading Airport site.

Distance from trees: 50 meters

Table A-11.1a. Parameters Monitored at the Kutztown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Extreme downwind	Urban

Table A-11.1b. Roadway Separation Distances for the Kutztown Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
College Garden Dr.	≤10,000	188.2	20

The monitoring objective, spatial scale and roadway separation distance for the ozone monitor at the Kutztown air monitoring site are shown in Table A-11.1a and Table A-11.1b, respectively. The monitoring objective and spatial scale for the monitor are not correct as described in Sections 3.1.1 and 3.1.2 of this document.

As shown in Table A-6.2a, the ozone monitor at the Kutztown site has an objective of Extreme Downwind. For ozone this is not a recognized objective. The objective of Extreme Downwind is reserved for PAMS facilities. Therefore the objective should be changed to “Maximum Concentration”, with an urban or neighborhood spatial scale. According to 40 CFR Part 58, Appendix D, Section 4, the urban scale is the preferred spatial scale for a maximum concentration objective.

However, an analysis of ozone concentration data indicates that the Kutztown site may not be meeting monitoring objective of maximum concentration. This analysis is

detailed in Section 11.8.1. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-11.2 Laureldale North – 42-011-0020 Site Summary

Location: Rosedale Ave., Laureldale, PA
Site is located in the Gethsemane Cemetery, 108 meters from the northern property line of Exide Technologies.

Distance from trees: 24 meters

Table A-11.2a. Parameters Monitored at the Laureldale North Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-11.2b. Roadway Separation Distances for the Laureldale North Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Rosedale Ave.	≤10,000	24.0	15 meters
Montrose Ave.	≤10,000	103.0	15 meters
Duke St.	≤10,000	116.5	15 meters

The monitoring objective, spatial scale and roadway separation distance for the lead monitor at the Laureldale North air monitoring site are shown in Table A-11.2a and Table A-11.2b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-11.3 Laureldale South – 42-011-1717 Site Summary

Location: Spring Valley Rd., Laureldale, PA
Site is 102 meters southwest of the southern property line of Exide Technology.

Distance from trees: <10 meters. Corrective action will be taken to remove a scrub tree growing in close proximity to the monitor.

Table A-11.3a. Parameters Monitored at the Laureldale South Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Population exposure	Neighborhood

Table A-11.3b. Roadway Separation Distances for the Laureldale South Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Lead
Spring Valley Rd.	≤10,000	15.0	15 meters
James St.	≤10,000	27.5	15 meters
Bennett St.	≤10,000	73.6	15 meters
Nolan St.	≤10,000	94.3	15 meters
N. 12th St.	≤10,000	111.5	15 meters

The monitoring objective, spatial scale and roadway separation distance for the lead monitor at the Laureldale South air monitoring site are shown in Table A-11.3a and Table A-11.3b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

A-11.4 Lyons Boro – 42-011-0021 Site Summary

Location: S. Kemp St., Lyons, PA
Site is 80 meters northeast of the eastern property line of the East Penn Manufacturing Co. at the Lyons Borough Hall.

Distance from trees: 25 meters

Table A-11.4a. Parameters Monitored at the Lyons Boro Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-11.4b. Roadway Separation Distances for the Lyons Boro Air Monitoring Site

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
S. Kemp St.	3,300	19.0	15 meters
Fleetwood Rd.	7,200	140.6	15 meters
S. Birch St.	≤10,000	153.3	15 meters
S. Main St.	5,900	238.0	15 meters

The monitoring objective, spatial scale and roadway separation distance for the lead monitor at the Lyons Boro air monitoring site are shown in Table A-11.4a and Table A-11.4b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-11.5 Lyons Park – 42-011-0022 Site Summary

Location: Park Ave, Lyons, PA
Site is 0.37km northeast of the eastern property line of the East Penn Manufacturing Co. and south of the Lyons Fire Co. at a community baseball field.

Distance from trees: 11 meters

Table A-11.5a. Parameters Monitored at the Lyons Park Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table A-11.5b. Roadway Separation Distances for the Lyons Park Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Park Ave.	≤100	6.6	15
S. Main St.	5,900	96.3	15
Fleetwood Rd.	7,200	121.8	15

The monitoring objective, spatial scale and roadway separation distance for the lead monitor at the Lyons Park air monitoring site are shown in Table A-11.5a and Table A-11.5b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met, as Park Avenue is a residential access road with minimal impact to the lead monitor.

A-11.6 Reading Airport – 42-011-0011 Site Summary

Location: 1059 Arnold Rd, Reading, PA
Site is located at the northern end of the Reading Airport, at the base of the twin FAA communications and navigational towers.

Distance from trees: 40 meters

Table A-11.6a. Parameters Monitored at the Reading Airport Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated FDMS Gravimetric	Continuous year-round	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood

Table A-11.6a. Parameters Monitored at the Reading Airport Air Monitoring Site (cont.).

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-11.6b. Roadway Separation Distances for the Reading Airport Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO
Arnold Rd...	≤10,000	33.9	20	15	15	N/A	20	10
Stemson Rd.	≤10,000	48.0	20	15	15	N/A	20	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Reading Airport air monitoring site are shown in Table A-11.6a and Table A-11.6b, respectively. The monitoring objectives and spatial scales for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-11.7 Population Density and Changes

Two sites, the Reading Airport and Kutztown air monitoring sites, are discussed in this section. All other sites in the Reading MSA are located for lead source sampling, and are not sited with regard to population exposure.

The Reading Airport site is the third in a series of relatively recent station moves. Originally located south of downtown Reading (site named “Reading”), the station was moved to northern Reading (“Reading Temp”), followed by a move to its current location further north (“Reading Airport”). Both the Reading and Reading Temp locations were in the high population density area of the city of Reading represented by the dark green area in Figure A-11.7a. However, the current location is located a few kilometers north of and outside of the high population area of the city.

A comparison of historical measured ozone and particulate matter concentrations from the Reading site against recent concentration data from the Reading Airport site indicates that the two sites are statistically comparable; the Reading Airport site is monitoring an ambient concentration that in all likelihood is similar to that what would have been monitored at the old Reading location. The monitoring objective is being met by the Reading Airport air monitoring site, as air quality in the high population area of the City of Reading is being monitored.

This conclusion is supported by EPA in its document “Addendum to the Pennsylvania Air Designations for 2006” for particulate matter designations:

Please note that the Pennsylvania department of Environmental Protection (PADEP) moved the Berks County monitor twice between 2005 and 2007. The first location, (AQS monitor #420110009) was located at Morgantown Road and Prospect Street in Reading. PADEP lost the lease for that location, and in 2006 moved the monitor to a temporary location, 503 North 6thStreet in Reading (AQS monitor # 420110010). Finally, in 2007, the monitor was moved to its new permanent location, 1059 Arnold Road, also in Reading (AQS monitor # 420110011). For calculating design values, EPA considers these monitoring locations to be one and the same.

Also from the same document:

The Reading area does not have any geographical or topographical barriers significantly limiting air-pollution transport within its air shed. Therefore, this factor did not play a significant role in the decision-making process.

As shown in the Figures A-11.7a and A-11.7b, the Kutztown air monitoring site is located in both a high population density area and high percentage change area for Berks County. Thus providing support for the monitoring objective of population exposure.

Figure A-11.7a. Population Density for Berks County, 2008 Estimate Data.

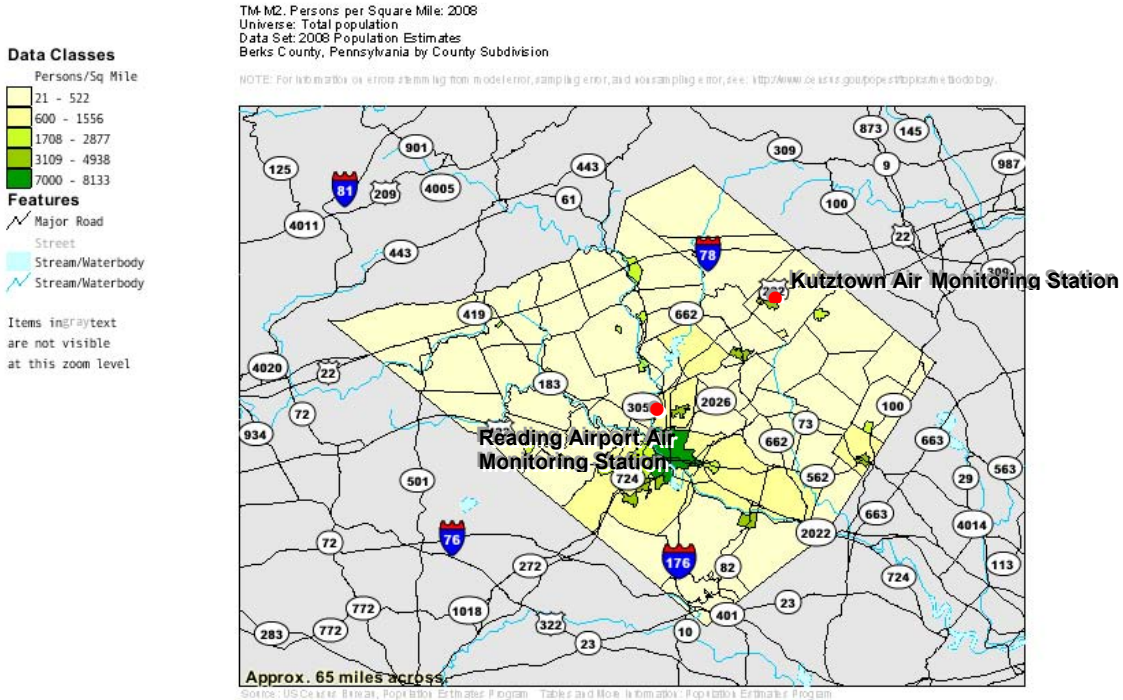
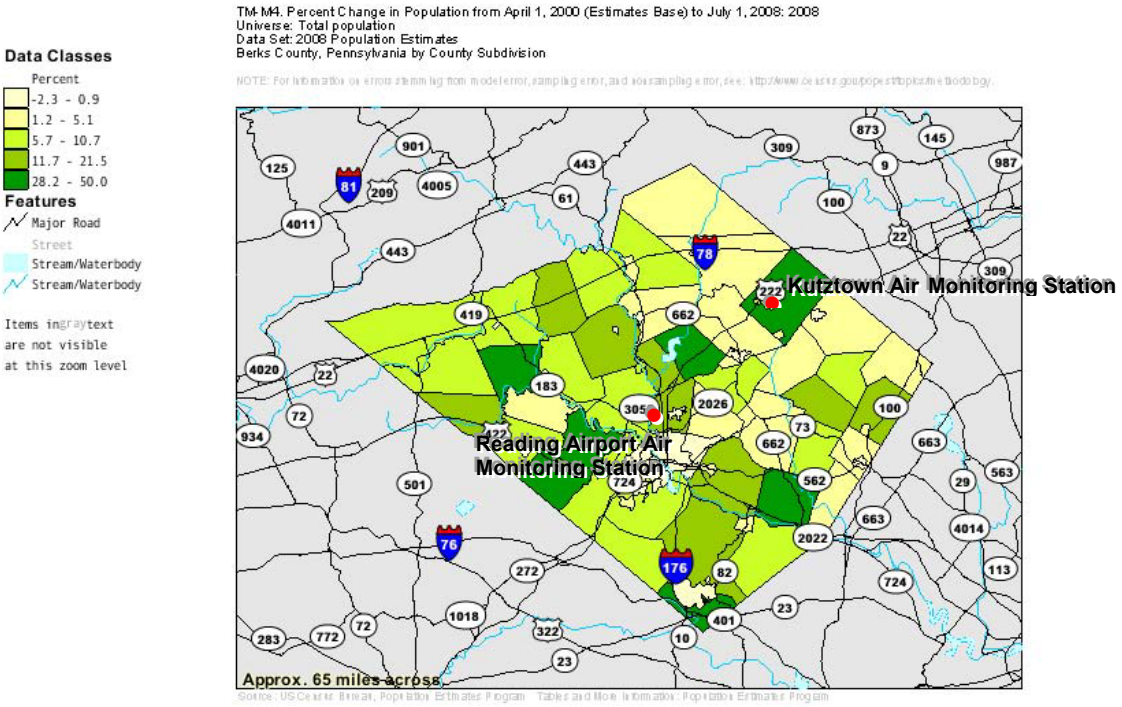


Figure A-11.7b. Percent Population Change for Berks County, 2000 - 2008 Estimate Data.



A-11.8 Criteria Pollutant Discussion

A-11.8.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the Reading MSA is required to have a minimum of two ozone monitors active for the ozone season. The ozone monitors at the Kutztown and Reading Airport sites meet this requirement.

The requirements of 40 CFR Part 58, Appendix D state that at least one ozone site for each MSA must be designed to record maximum concentration. Kutztown, located 21 km northeast of the Reading Airport site, was designated for this purpose. Wind rose data for the Kutztown air monitoring site is shown in Figure C-1.11a (Appendix C of this document), indicates predominating wind patterns from both the southwest and northeast directions. The high population area of Reading is southwest of the Kutztown site. However, ozone concentration data analysis of the Reading Airport and Kutztown sites indicates design values of 79 and 70 ppb, respectively. Because the Kutztown site has the lower design value, it may be necessary to reevaluate the downwind site location if EPA revises the distance requirements when identifying maximum downwind concentration locations.

As noted in the previous paragraph, the predominating wind pattern for the Kutztown air monitoring site is from both the southwest and northeast directions. Wind rose data for the Reading Airport air monitoring site is shown in Figure C-1.11b, and indicates a

predominating wind pattern from the northwest direction. However, the ozone back trajectories for both the Kutztown and Reading Airport sites (Figures C-1.11c and C-1.11d) show that maximums concentrations measurements are attributed to air masses originating from southerly flows. Figure C-3c shows several major sources for NO_x and VOC (ozone precursors) are located south of the Reading MSA air monitoring sites, both in the Reading MSA, as well as in neighboring counties. Lancaster County, in particular, has numerous VOC emitters which may be contributing to a higher ozone design value for Reading Airport (79 ppb) over that of Lancaster air monitoring site (77 ppb). In addition, the Reading MSA air monitoring sites are likely impacted by pollution transport from both the Baltimore-Washington and Philadelphia areas. Therefore, the Reading MSA air monitoring sites are well suited to record and measure ozone resulting from transport from southerly air masses.

A-11.8.2 $PM_{2.5}$

As indicated in table in Section 3.3.2 of this document, based on population and design value, the Reading MSA is required to have a minimum of one $PM_{2.5}$ monitor. The $PM_{2.5}$ monitor at the Reading Airport site meets this requirement.

The $PM_{2.5}$ back trajectory analysis for the Reading Airport air monitoring site (Figure C-1.11e) shows maximum concentrations are mainly coming from the south and the Baltimore/Washington corridor. In addition, there are a few components of the trajectory from the and west. This is not surprising since there are only few major sources of PM in the west within 100 km of the site.

There are two major sources of PM in the Reading MSA -one to the south and one to the northeast of Reading Airport. These apparently have no significant impact at the Reading Airport $PM_{2.5}$ monitor, since the design value at the Reading Airport is 12.9 $\mu g/m^3$as compared to its neighbor Lancaster at 13.8 $\mu g/m^3$.

As stated in 40 CFR Part 58, Appendix D, at least one $PM_{2.5}$ monitor must be sited as population-oriented and to record the maximum concentration. From the back trajectory information, and its population oriented location, the Reading Airport site performs the function of the expected maximum $PM_{2.5}$ concentration site for the Reading MSA.

As noted in Table A-11.6a, there are two $PM_{2.5}$ sensors at the Reading Airport site. In May-June 2010, the continuous FDMS unit was upgraded to FEM status. At the completion of a comparison study, and if the data is found to be comparable, the manual method will be shut down.

A-11.8.3 PM_{10}

As indicated in table in Section 3.3.3 of this document, based on population and design value, the Reading MSA falls in the minimum requirement category of 0-1 PM_{10} monitors. The PM_{10} monitor at the Reading Airport site meets this requirement. It also serves as the expected maximum PM_{10} concentration site for the Reading MSA, based on its population-oriented location and results of back trajectory information examined in the above $PM_{2.5}$ discussion.

A-11.8.4 Lead

Three lead sites in the Reading MSA are source-oriented, and have been sited at or near the maximum modeled ambient air ground level lead concentration. The major lead sources and associated lead monitoring sites are noted in Section 3.3.4 of this document. PA DEP maintains the fourth lead site, Laureldale South, for historical purposes and to support population exposure lead monitoring within the Reading MSA.

A-11.8.5 SO2, NO2, CO

There are no minimum requirements for the number of monitoring sites for these pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the Reading MSA. The Reading Airport site is encircled by five major NO_x and two major SO_2 sources

At least one site for each MSA must be designed to record maximum concentration for SO_2, NO_2 and CO, as stated in 40 CFR Part 58, Appendix D. The historical movements of the Reading sites noted in Section A-11.7 shows that the air mass in the Reading MSA is fairly uniform around the City of Reading (the MSA's major population center); therefore, the Reading Airport site can be considered the maximum value site at its current location.

A-11.9 MSA Site Recommendations

The objective and spatial scale of the Kutztown ozone monitor will be reconsidered. The current Extreme Downwind objective for ozone is not appropriate for this location and should be changed to Maximum Concentration. Appropriate changes to spatial scale may be needed.

Also, as noted in the Kutztown Site Summary and Section A-11.8.1, the Department will request EPA guidance on re-locating the Kutztown air monitoring site, if necessary, to meet its monitoring objective as a maximum concentration downwind site for ozone monitoring.

A-12 Scranton-Wilkes-Barre MSA

The Scranton-Wilkes-Barre consists of Lackawanna, Luzerne and Wyoming Counties. The air monitoring program currently has five sites located in the Scranton-Wilkes-Barre MSA: Site Name, AQS Code, County

Peckville – 42-069-0101, Lackawanna County
Scranton – 42-069-2006, Lackawanna County
Duryea – 42-079-0036, Luzerne County
Nanticoke – 42-079-1100, Luzerne County
Wilkes-Barre – 42-079-1101, Luzerne County

A-12.1 Peckville – 42-069-0101

Location: Pleasant Ave. & Erie St., Peckville, PA
Site is located in the parking lot of the Wilson Fire Company.

Distance to trees: 11 meters

Table A-12.1a. Parameters Monitored at the Peckville Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban

Table A-12.1b. Roadway Separation Distances for the Peckville Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Pleasant Ave.[1]	≤100[1]	-[1]	10
Depot St.	2,500	59.2	10
Erie St.	≤10,000	62.0	10
Mill St.	≤10,000	70.6	10
Main St.	≤10,000	94.7	10
River St.	5,100	115.0	10

[1]Pleasant Avenue dead ends as a parking lot for the Fire Company and no definitive distance to the traffic lane can be defined. Traffic density is minimal. Staff observations estimate that traffic density on Pleasant Ave, at the site is less than 100 vehicles/day.

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Peckville air monitoring site are shown in Table A-12.1a and Table A-12.1b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-12.2 Scranton – 42-069-2006

Location: George St., Scranton, PA
Site is located on the Penn State- Worthington Scranton athletic field.

Distance to trees: 15 meters

Table A-12.2a. Parameters Monitored at the Scranton Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Urban
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Neighborhood

Table A-12.2b. Roadway Separation Distances for the Scranton Air Monitoring Site.

Roadway[1]	AADT[1]	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	$PM_{2.5}$	NO2	CO
George St.	≤1,000	26.5	10	70	10	10
Edgar St.	≤1,000	90.0	10	70	10	10
Blair Ct.	≤1,000	107.0	10	70	10	10
Hulse St.	≤1,000	111.2	10	70	10	10
Charles St.	≤10,000	179.0	10	(70-80)	10	10
Olyphant Ave.	≤1,000	179.0	10	70	10	10

[1]With the exception of Charles Street, all roads are residential access. PA DEP staff observation put traffic density at less than 1,000 vehicles/day. George Street is a dead end at the athletic field.

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Scranton air monitoring site are shown in Table A-12.2a and Table A-12.2b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-12.3 Duryea – 42-079-0036

Location: 401 York Ave., Duryea, PA
Site is located next to the Pride Mobility Company building.

Distance to trees: 14 meters

Table A-12.3a. Parameters Monitored at the Duryea Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6^{th} day	Source-oriented	Middle Scale

Table A-12.3b. Roadway Separation Distances for the Duryea Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
York Ave.	2,600	68.5	15
Wood St.	≤10,000	159.0	15

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Duryea air monitoring site are shown in Table A-12.3a and Table A-12.3b, respectively. The monitoring objective, spatial scale, and minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

The Duryea air monitoring site is a lead source-oriented monitor located 0.3 miles northeast from the Schott Glass Company.

A-12.4 Nanticoke – 42-079-1100

Location: 255 Lower Broadway St., Nanticoke, PA
Site is located next to Leon and Eddy's Auto Center.

Distance to Trees: 13 meters

Table A-12.4a. Parameters Monitored at the Nanticoke Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	General/Background	Urban

Table A-12.4b. Roadway Separation Distances for the Nanticoke Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Lower Broadway St.	7,300	18.0	10
Industrial Park Rd.	≤10,000	162.6	10
Walnut St.	≤10,000	169.0	10

The monitoring objective, spatial scale and roadway separation distances for the criteria pollutant monitor at the Nanticoke air monitoring site are shown in Table A-12.1a and Table A-12.1b, respectively. The monitoring objective and spatial scale for the monitor may not be correct as described in Sections 3.1.1 and 3.1.2 of this document. This issue is discussed in Section A-12.7.1 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-12.5 Wilkes-Barre – 42-079-1101

Location: Chilwick St & N. Washington St, Wilkes-Barre, PA
Site is adjacent to the Hollenback Golf course.

Distance from trees: 20 meters

Table A-12.5a. Parameters Monitored at the Wilkes-Barre Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood

Table A-12.5b. Roadway Separation Distances for the Wilkes-Barre Monitoring Site.

Roadway[1]	AADT[1]	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			Ozone	PM_{10}	SO_2
Chilwick St.	≤1,000	11	10	15	N/A
N. Washington St.	≤10,000	50.5	10	15	N/A
Coon St.	≤1,000	80.7	10	15	N/A
Grist Lane	≤1,000	81.8	10	15	N/A
W. Beatty St.	≤1,000	85.3	10	15	N/A
Miller St.	≤1,000	131.0	10	15	N/A

[1]All roads, except of North Washington are local traffic, residential streets. PA DEP staff observations put all the surrounding residential streets at a traffic density of less than 1,000 vehicles per day. The roadway distance to Chilwick Street is of no concern to the Department since only PM_{10} is affected.

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Wilkes-Barre air monitoring site are shown in Table A-15.2a and Table A-12.5b, respectively. The monitoring objective and spatial scale for all monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

A-12.6 Population Density and Changes

A-12.6.1 Lackawanna County

Peckville Air Monitoring Site

As shown in Figure A-12.6.1a, the population density in the immediate area around the Peckville air monitoring site location is moderate, with the highest densities to the south and west. In addition, Figure A-12.6.1b shows that population growth rates near the site are low to non existent, with the highest growth occurring in the southern portion of the county. Wind rose patterns for this site (Figure C-1.12a) indicate that pollutant air masses are predominately from the west. Based on the population and wind pattern analyses, the Peckville monitoring station has the potential to monitor air masses from the areas subjected to population growth.

Scranton Air Monitoring Site

This site is located in a moderately high population density area and just outside and north of the highest population center, the city Scranton (Figure A-12.6.1a). However, the highest growth rates have been occurring in the communities surrounding Scranton, particularly to the south of Scranton (Figure A-12.6.1b).

Wind rose patterns for this site (Figure C-1.12b) indicate that pollutant air masses are predominately from the west and northwest. This pattern will, along with an easterly component, will pick up the air masses from the areas prone to population growth. PA DEP believes that this site will continue to be a viable location for many years.

Figure A-12.6.1a. Population Density for Lackawanna County, 2008 Estimate Data.

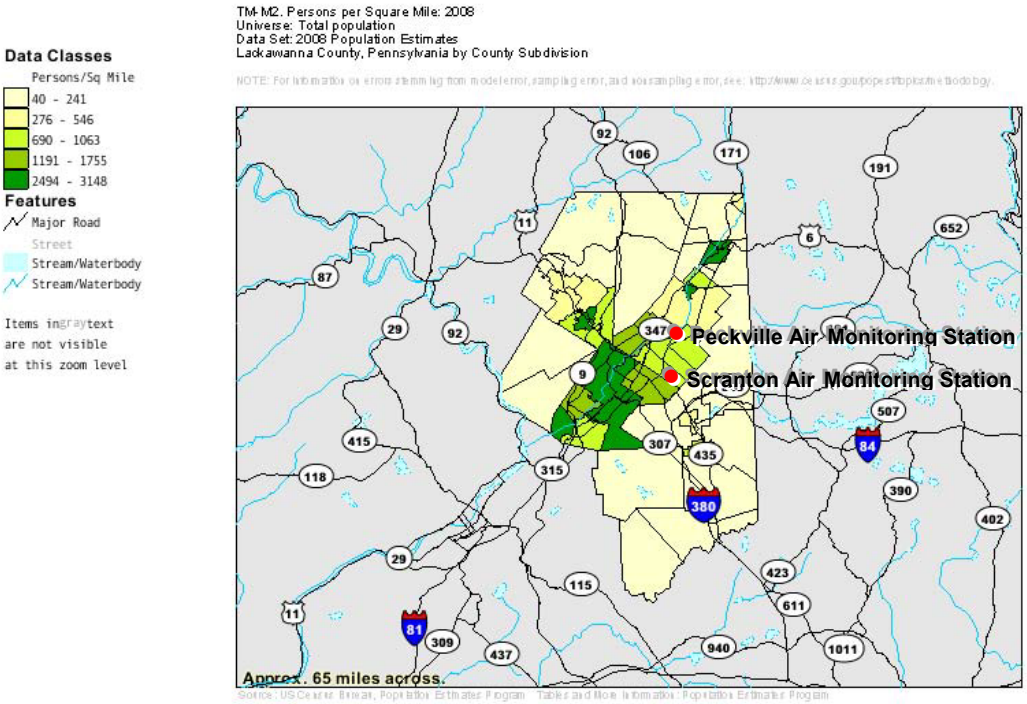
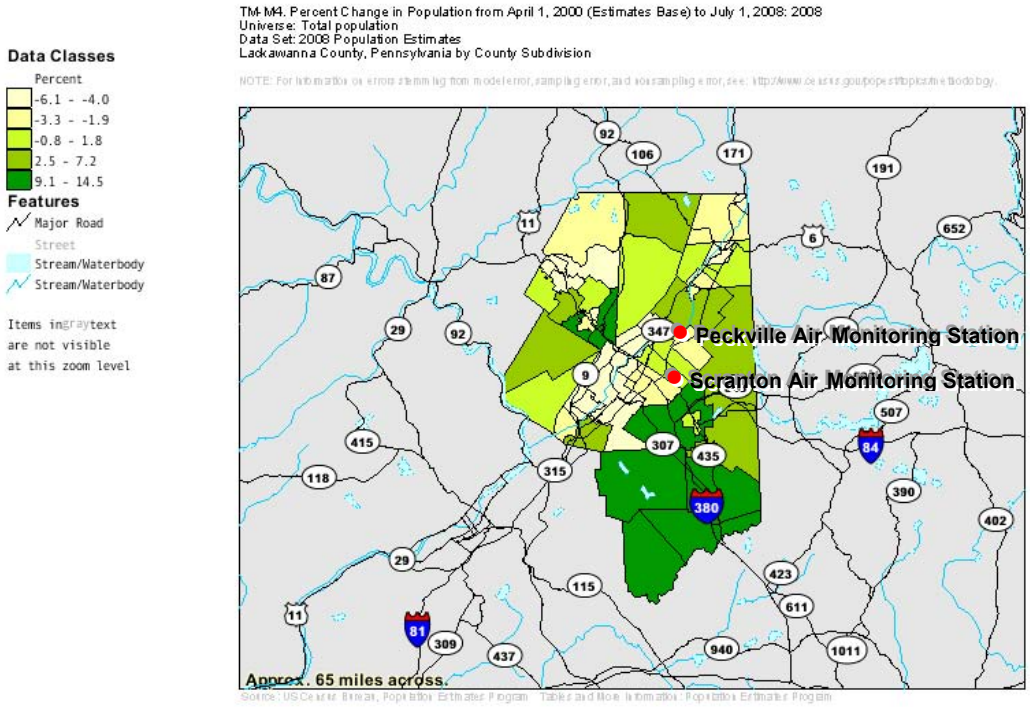


Figure A-12.6.1b. Percent Population Change for Lackawanna County, 2000 - 2008 Estimate Data.



A-12.6.2 Luzerne County

Nanticoke Air Monitoring Site

This site is located to the southwest of Wilkes-Barre, in an area of moderately high population (Figure A-12.6.2a). Like the Wilkes-Barre site, population growth has been slow or declining in the area immediately around the site (Figure A-12.6.2b). Moderate rates of growth are occurring both to the north and south of Nanticoke.

Assuming the same wind directions patterns as the Wilkes-Barre location, the Nanticoke air monitoring site monitors air masses from a major source just west of the site and from the metropolitan area of Wilkes-Barre. However, it may miss air masses from much of the growth areas of the county.

Wilkes-Barre Air Monitoring Site

The site is located just to the northeast of the city of Wilkes-Barre, which is the most densely populated area in Luzerne County (Figure A-12.6.2a). However the population near the site and the city itself has been declining (Figure A-12.6.2b).

Based in predominating wind directions (Figure C-1.12d), the Wilkes-Barre air monitoring site monitors air masses from some of the areas of population growth. However, the site does not appear to be able to capture air masses from the highest growth areas in the south. This lack of southerly flows may be a result of faulty meteorological equipment or a wind direction bias from valley effects. This situation will be evaluated by PA DEP staff.

Figure A-12.6.2a. Population Density for Luzerne County, 2008 Estimate Data.

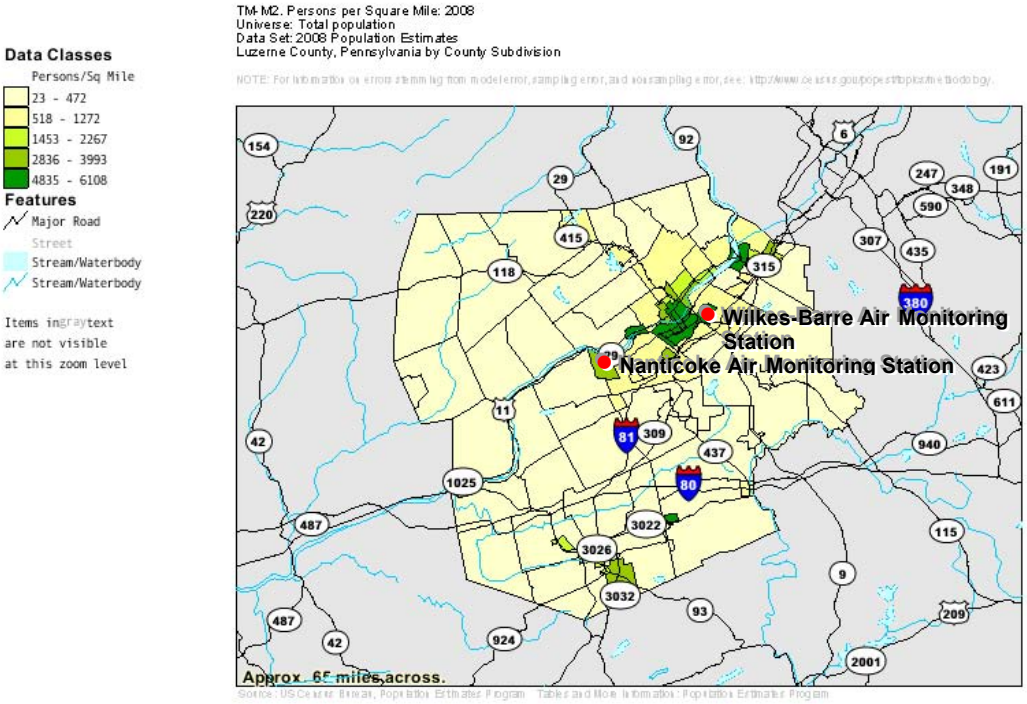
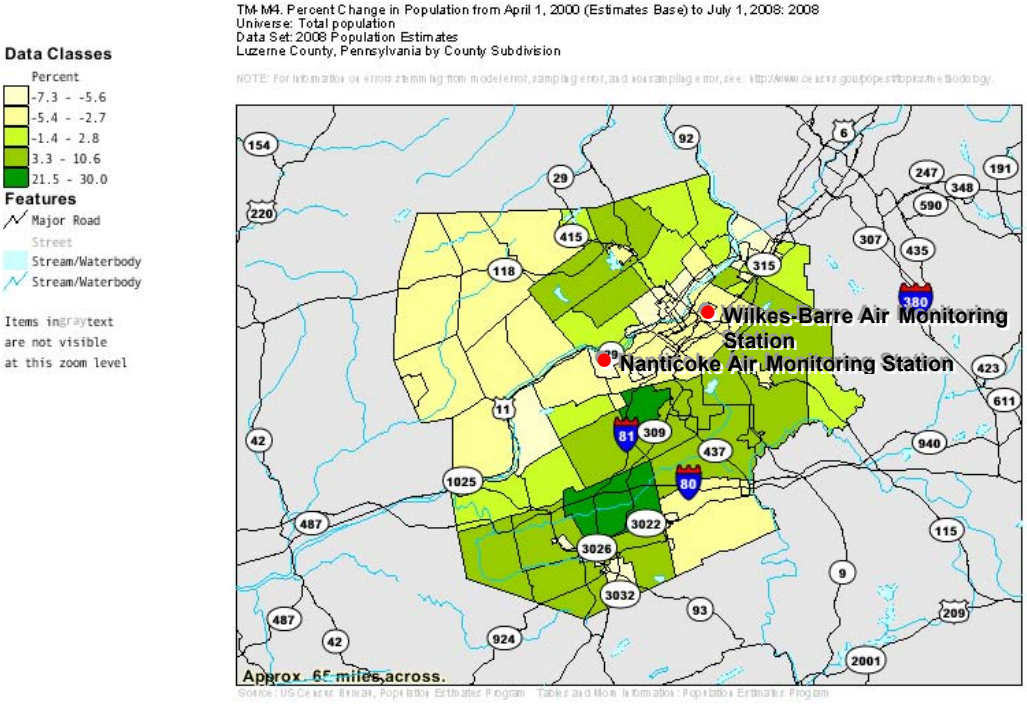


Figure A-12.6.2b. Percent Population Change for Luzerne County, 2000 - 2008 Estimate Data.



A-12.7 Criteria Pollutant Discussion

A-12.7.1 Ozone

As shown in Section 3.3.1 of this document, based on population and design value, the Scranton-Wilkes-Barre MSA is required to have a minimum of two ozone monitors active during the ozone season. The ozone monitors at all four PA DEP air monitoring sites in the MSA meet this requirement.

As indicated in 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. To meet this requirement, the ozone monitor at Peckville has been designated as a maximum concentration site. At 68 ppb, the ozone design value for the Peckville air monitoring site is the highest design value of any of the monitors found in the MSA. Therefore the Peckville site is properly located.

For Nanticoke, the sampling objective of general background monitoring, and the spatial scale designation of urban spatial scale, may need to be reevaluated. As shown in Figure C-3b, the Nanticoke air monitoring site is near several sources of NO_x and VOC which may influence the ozone concentrations measured at the site. At 63 ppb, the ozone design value for the Nanticoke site is greater than neighboring upwind Wilkes-Barre's ozone design value of 55 ppb. Therefore, local sources may be influencing the Nanticoke site and the spatial scale may need to be changed to neighborhood scale. Any changes to the designations of the ozone monitor at the Nanticoke site will be given in a future ANP.

Ozone back trajectory analyses for the Scranton, Wilkes-Barre, Peckville, and Nanticoke air monitoring sites are shown in Figures C-1.12d through C-1.12g. All four back trajectories show strong agreement in the direction of air masses that result in highest maximum concentrations. As can be observed, air masses out of the south and southwest produce the majority of high ozone readings measured at these sites. This finding is consistent with what was found in most southeast and southcentral Pennsylvania monitoring locations. This consistency may also be a result of valley effects from the Wyoming Valley, the valley in which all four ozone sites are located.

It is also consistent with the downwind direction from a cluster of major NOx and VOC sources. According to Figure C-3b there are five major VOC sources and seven NOx sources to the south in Luzerne and neighboring Carbon and Schuylkill Counties.

A-12.7.2 $PM_{2.5}$

As indicated in table in Section 3.3.2 of this document, based on population and design value, the Scranton-Wilkes-Barre MSA is required to have a minimum of one $PM_{2.5}$ monitor. PA DEP's $PM_{2.5}$ at Scranton fulfills this requirement.

At least one $PM_{2.5}$ site be designated as an area of expected maximum concentration, as stated in 40 CFR Part 58, Appendix D. With the Scranton site the only $PM_{2.5}$ site in the MSA, this site will serve this requirement.

The $PM_{2.5}$ back trajectory analysis for Scranton is shown in Figure C-1.12h. This analysis produced the same general result that was found for ozone. That is, most maximum concentration measurements result from air masses out of the southwest. Figure C-3b shows there are five major sources of PM in that direction located in the MSA and neighboring counties.

A-12.7.3 PM_{10}

As indicated in Section 3.3.3 of this document, based on population and design value this MSA is required to have a minimum of one PM_{10} monitor. This requirement is met through the monitor located in Wilkes-Barre. There is no maximum value site designated in the MSA, since the maximum 24-hour PM_{10} concentration value for the only PM_{10} site (Wilkes-Barre) is 43 $\mu g/m^3$, well below the 150 $\mu g/m^3$ PM_{10} NAAQS.

It can be reasonably assumed that the single monitor at PA DEP's Chester site is measuring PM_{10} from the same air masses as was described by the $PM_{2.5}$ discussions noted earlier.

A-12.7.4 Lead

The lead source monitoring site in Duryea is near the modeled maximum concentration location for emissions from Schott Glass. As noted, this site is not a source monitoring site but is sited for population exposure and no further discussion is needed.

A-12.7.5 SO_2, NO_2, CO

There are no minimum requirements for the number of monitoring sites for these parameters, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the Scranton-Wilkes-Barre MSA.

According to the requirements set forth in 40 CFR Part 58, Appendix D, at least one site for each MSA must be designed to record maximum concentration for SO_2 and NO_2 in the MSA. With only one NO_2 monitor at Scranton, and one SO_2 monitor at Wilkes-Barre, these two units will fulfill this requirement.

A-12.8 MSA Site Recommendations

As noted in Section A-12.6.2 of this document, there is a need to evaluate the effectiveness of the wind direction sensor at the Wilkes-Barre air monitoring site. If wind patterns are accurate as reported, the lack of minimal southerly flow impact on the Wilkes-Barre air monitoring site results in a limited ability to capture air masses from the high growth areas of Luzerne County.

A noted in Section A-12.7.1 of this document, the Department will investigate the feasibility of changing the spatial scale designation for ozone monitoring at the Nanticoke air monitoring site from urban to neighborhood. Nearby major sources may be too close for an urban scale designation.

Any recommendations for changes to the current designations will be given in a future ANP.

A-13 State College MSA

The State College MSA consists of Centre County. The air monitoring program currently has one site located in the State College MSA: Site Name, AQS Code, County

State College – 42-027-0100, Centre County

A-13.1 State College – 42-027-0100 Site Summary

Location: Penn State University Arboretum, State College, PA
Site is located 2.2 km northwest of downtown State College.

Distance from trees: 60 meters

Table A-13.1a. Parameters Monitored at the State College Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Neighborhood
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Neighborhood
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Neighborhood
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Neighborhood

Table A-13.1b. Roadway Separation Distances for the State College Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	$PM_{2.5}$	NO_2	SO_2
Bellefonte Central	≤10,000	143.6	10	15	10	N/A

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the State College air monitoring site are shown in Table A-13.1a and Table A-13.1b, respectively. Although the neighborhood scale is an appropriate spatial scale for population monitoring (as described in Sections 3.1.1 and 3.1.2 of this document), the State College site has characteristics of both neighborhood and of urban scale monitoring. These characteristics are detailed in the following paragraphs. The minimum separation distance from the monitor probe to the nearest traffic lane is met for all pollutants.

As shown in TableA-13a, all monitors at the State College air monitoring site are designated as neighborhood scale. Since the State College site is located less than 3.5 km from a major source of both SO_2 and NO_x, the spatial scales for the State College SO_2 and NO_x monitors are accordingly designated as neighborhood. However, the State College site's proximity to the NO_x major source, coupled with the lack of NO_x and VOC sources further upwind of the site, may indicate that the ozone monitor is most appropriately classified as an urban scale monitor. NO_x and VOC serve as ozone precursors. As a secondary air pollutant, ozone requires time, and thus distance, to

form. For this reason, a site located too close to a major ozone precursor source may not adequately measure ozone pollution generated from the source. In addition to the site's location in relation to ozone precursor sources, topography of the area indicates that the air mass represented by the State College monitor is uniform to 50 km, which is acceptable for an urban spatial scale.

With regard to the $PM_{2.5}$ monitor, as shown in Figure 4-1 of this document, the separation distance from the monitor probe to the nearest traffic lane should between 15 and 70-80 meters (maximum distance of range is dependent on actual AADT). As noted in Table A-13b, this separation distance range is exceeded by significant number, and is actually within the urban scale range.

The Department will study these issues over the next few years and recommend any changes to the spatial scale designations in a future ANP.

A-13.2 Population Density and Changes

As shown in Figure A-13a, the State College air monitoring site is located in the highest population density area. The population growth indicated in the Figure A-13b shows that the largest percentage of increase has occurred in the townships south of Interstate 80 and surrounding the town of State College. However, these high-growth areas remain significantly less populated than the State College region of the MSA. Thus, the site is appropriately sited to measure urban population with the maximum amount of population covered.

Figure A-13a. Population Density for Centre County, 2008 Estimate Data.

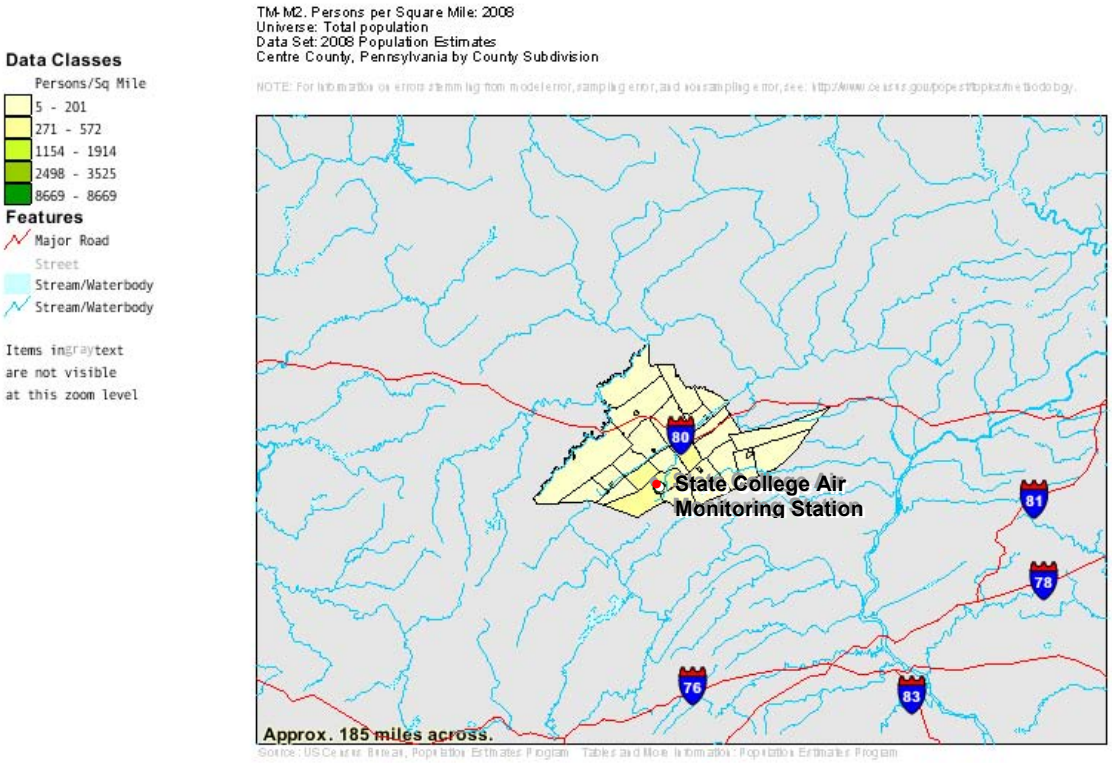
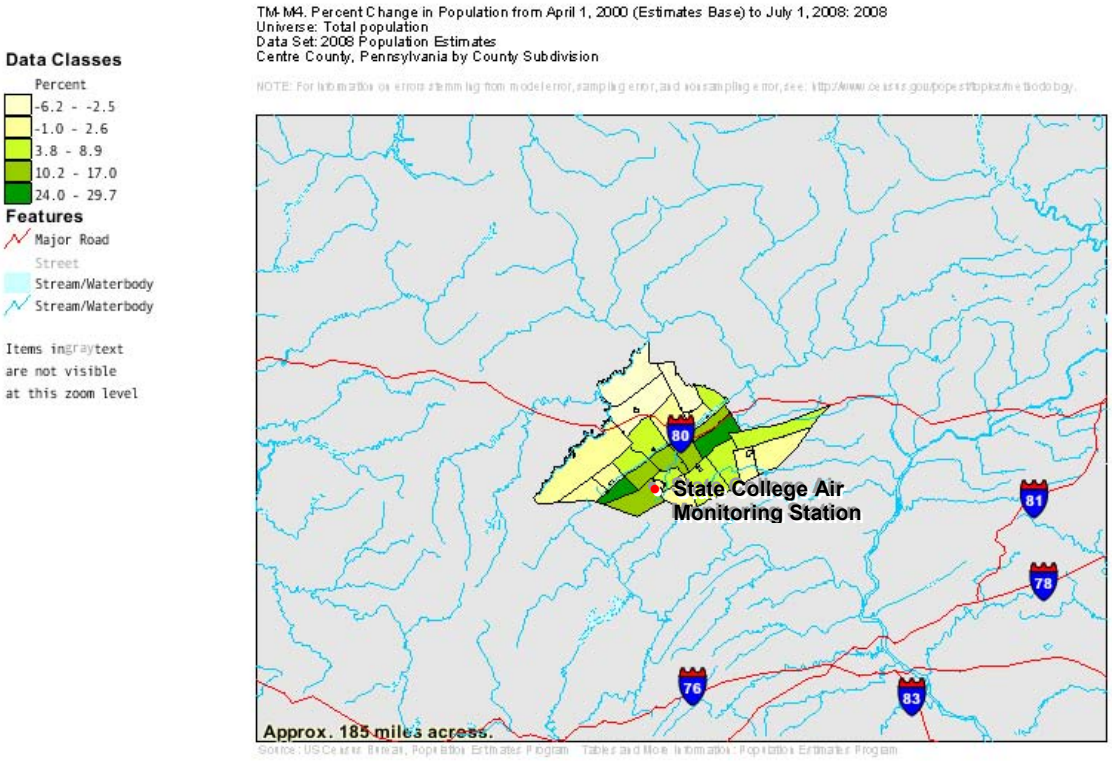


Figure A-13b. Percent Population Change for Centre County, 2000 - 2008 Estimate Data.



A-13.3 Criteria Pollutant Discussion

A-13.3.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the State College MSA is required to have a minimum of one ozone monitor active for the ozone season. The ozone monitor at the State College site meets this requirement.

At least one ozone site for each MSA must be designed to record maximum concentration as listed in 40 CFR Part 58, Appendix D. As shown in Figure C-1.13a (Appendix C of this document), the predominating wind direction for the State College site is from the southwest. Figure C-1.13b demonstrates that on many high ozone days, the measured ozone concentration is produced from air currents originating from southwest. In addition, Figures C-3d and C-3e show that the State College ozone monitor is located in a downwind direction from a number of ozone precursor (NOx) sources. For these considerations, the location is well sited to record maximum ozone concentrations.

A-13.3.2 $PM_{2.5}$

As indicated in table in Section 3.3.2, based on population and concentration value, the State College MSA is not required to have a $PM_{2.5}$ monitor. However, because of the historical value and educational interests associated with State College site, the Department will continue to maintain a $PM_{2.5}$ monitor at State College site.

According to 40 CFR Part 58, Appendix D, at least one $PM_{2.5}$ monitor must be sited as population-oriented and to record the maximum concentration. As shown in Figure C-1.13a and C-1.13c, the State College monitor is sited is located in such a location as to capture $PM_{2.5}$ generated from a number of downwind and transported sources. Thus, the location is well sited to record maximum concentrations from multiple directions, especially from the south and west. Wind rose information (Figure C-1.13a) confirms the predominating wind direction at State College is from the west and southwest.

A-13.3.3 SO_2, NO_2

There are no minimum requirements for the number of monitoring sites for these pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the State College MSA.

A minimum of one site per MSA must be designed to record maximum concentration for SO_2 and NO_2, as stated in 40 CFP Part 58, Appendix D. Figures C-3d and C-3e show the State College site is located downwind of major NO_x and SO_2 sources.

A-13.4 MSA Site Recommendations:

The Department will study issues related to the spatial scale designations for both the ozone and $PM_{2.5}$ monitors at the State College air monitoring site. The Department will recommend any changes to the spatial scale designations in a future ANP.

A-14 Williamsport MSA

The Williamsport MSA consists of Lycoming County. The air monitoring program currently has one site located in the Williamsport MSA: Site Name, AQS Code, County

Montoursville – 42-081-0100, Lycoming County

A-14.1 Montoursville – 42-081-0100 Site Summary

Location: 899 Cherry St., Montoursville, PA
Site is in the rear parking lot of the Montoursville State Police Barracks.

Distance from trees: 40 meters

Table A-14.1a. Parameters Monitored at the Montoursville Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban
PM_{10}	SLAMS	Manual gravimetric	Every 6th day	Population exposure	Urban

Table A-14.1b. Roadway Separation Distances for the Montoursville Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	PM_{10}
Mulberry St.	≤10,000	22.5	10	70
Cherry St.	≤10,000	115.0	10	70
Elm St.	≤10,000	122.0	10	70
Tule St.	≤10,000	122.0	10	70

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Montoursville air monitoring site are shown in Table A-14.1a and Table A-14.1b, respectively. The monitoring objectives and spatial scales for both the ozone and PM_{10} monitors do not meet the network design requirements as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for the ozone monitor. The minimum separation distance is not met for the PM_{10} monitor. Deficiencies in the current designations are outlined in the following paragraphs.

As shown in Table A-14.1a, the ozone monitor at the Montoursville site is currently designated as an urban scale monitor. However, due to the topography of the Susquehanna River Valley, the air mass for which this monitor is representative is uniform to only a few kilometers. This characteristic indicates that the ozone monitor may be more accurately classified as neighborhood scale.

Currently, the spatial scale for the PM_{10} monitor is designated as urban. The urban spatial scale is not defined or recommended for PM_{10} in the monitoring in the network

design criteria of 40 CFR Part 58, Appendix D. In addition, based upon an urban spatial scale, the minimum separation distance from the monitor probe to the nearest traffic lane for particulate matter is a minimum of 70 meters (dependant upon actual AADT). As shown in Table A-14.1b, however, the minimum separation distance from the monitor probe to the nearest traffic lane at the Montoursville site falls within the neighborhood scale range, given in Figure 4-1 of this document.

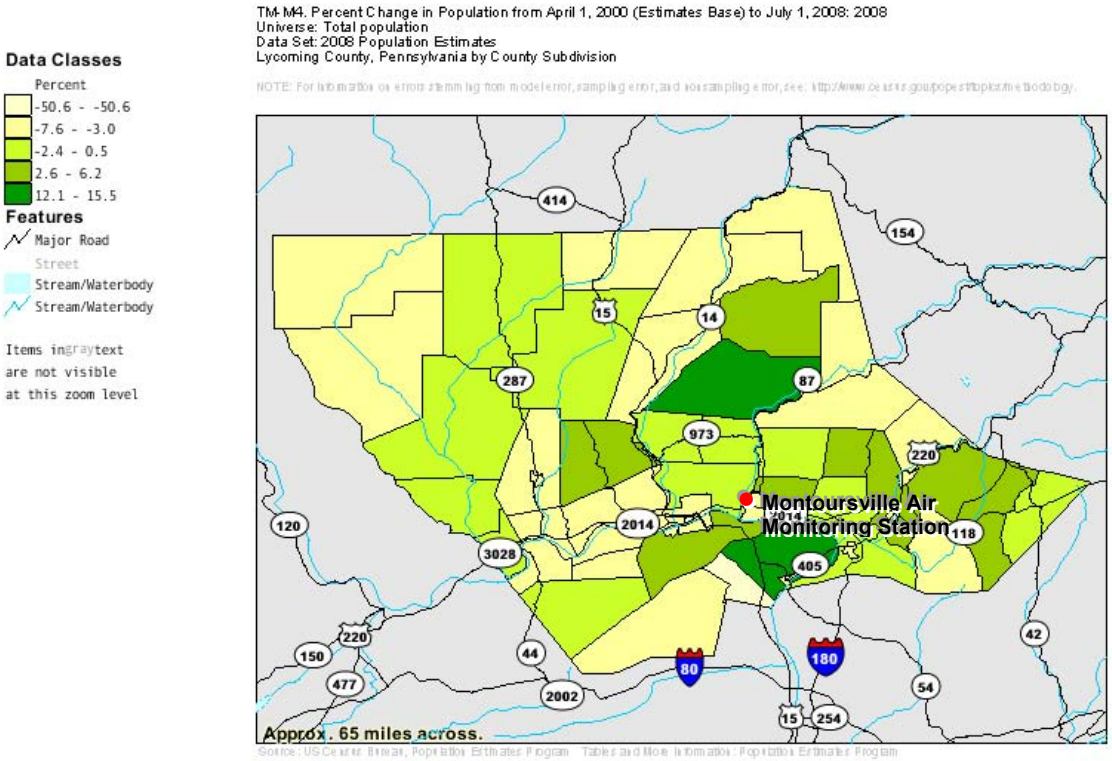
The Department will study these issues over the next few years and recommend any changes to the spatial scale designations in a future ANP.

A-14.2 Population Density and Changes

Figure A-14a shows that major population areas are located in the Williamsport area. The Montoursville site is located downwind (7.5 km due east) of center city Williamsport. As indicated in Figure A-14b, the largest percentage increase in population growth around the Montoursville site has occurred in Montoursville proper, and the surrounding townships, particularly to the south and east of the city of Williamsport. Based on this population pattern and the site's topography, the Montoursville site can be correctly classified as neighborhood scale since it may not be completely representative of pollutants levels in the highest population density areas of the MSA.

Figure A-14a. Population Density for Lycoming County, 2008 Estimate Data.

Figure A-14b. Percent Population Change for Lycoming County, 2000 - 2008 Estimate Data.



A-14.3 Criteria Pollutant Discussion

A-14.3.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the Williamsport MSA is required to have a minimum of one ozone monitor active for the ozone season. The ozone monitor at the Montoursville site meets this requirement.

According to 40 CFR Part 58, Appendix D, at least one ozone site for each MSA must be designed to record maximum concentration. As shown in Figure C-1.14a (Appendix C of this document), the Montoursville air monitoring site yields a surface wind rose with predominating northwest and west directions. However, given the abrupt variations in the terrain around this site, the ozone back trajectory (Figure C-1.14b) was created using a height of 200 meters above ground level, and shows the Montoursville site is capturing its highest ozone concentrations from air masses south and west of the site. This demonstrates a possible valley effect at the Montoursville site where southern and westerly winds aloft mix down into the Susquehanna River Valley on high ozone days. If the Montoursville site is subject to valley effect, the site is well sited to measure maximum concentration. Figure C-3d shows several major VOC sources south of the site, which places the Montoursville ozone monitor in a prime downwind location. There is one major VOC source 12.6 km west of the site, which also shows impact to the

monitor as demonstrated in Figure C-14b; westerly winds are the second most frequent direction of origination on high ozone days.

However, a second explanation for the wind rose and back trajectory analysis is that while the Montoursville ozone monitor is well sited distance-wise to capture ozone generated from the southern ozone precursor sources, it may be limited to capturing these pollutant concentrations during an infrequent number of days when wind is originating from a southern direction. In this case, the monitor still shows a downwind impact from the VOC source to the west. For these considerations, the monitor is well sited to measure maximum concentrations.

A-14.3.2 PM_{10}

As indicated in Section 3.3.3, based on population and concentration value, the Williamsport MSA is not required to have a PM_{10} monitor. However to support PM_{10} monitoring in the northcentral region of Pennsylvania, the Department will continue to maintain a PM_{10} sampler at the Montoursville site.

A-14.4 MSA Site Recommendations

As noted in the site summary, the Department will study the necessity and/or feasibility of re-designating the spatial scale of the ozone and PM_{10} monitors at the Montoursville air monitoring site. Any recommendations will be included in a future ANP.

A-15 York-Hanover MSA

The York-Hanover MSA consists of York County. The air monitoring program currently has two sites located in the York-Hanover MSA: Site Name, AQS Code, County

York – 42-133-0008
York Downwind – 42-133-0011

A-15.1 York – 42-133-0008 Site Summary

Location: Hill St. & 6th Ave., York, PA

Site is located at Phineas T. Davis Junior High School, 1.3 miles east of center-city York

Distance from trees: 55 meters

Table A-15.1a. Parameters Monitored at the York Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
$PM_{2.5}$	SLAMS	Manual Gravimetric	Daily	Population exposure	Urban
$PM_{2.5}$	SLAMS	Automated FDMS Gravimetric	Continuous year-round	Population exposure	Urban
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Urban
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Urban
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Urban
CO	SLAMS	Automated non-dispersive infrared	Continuous year-round	Population exposure	Urban

Table A-15.1b. Roadway Separation Distances for the York Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)					
			Ozone	$PM_{2.5}$	PM_{10}	SO_2	NO_2	CO
Hill St.	≤10,000	9.9	10	(70-80)	(70-80)	N/A	10	10
6th Ave.	≤10,000	69.5	10	(70-80)	(70-80)	N/A	10	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Montoursville air monitoring site are shown in Table A-15.1a and Table A-15.1b, respectively. The monitoring objectives and spatial scales are correct as described in Sections 3.1.1 and 3.1.2 of this document for the all pollutants except PM_{10}, SO_2 and CO. The minimum separation distance from the monitor probe to the nearest traffic lane is met at the York air monitoring site for all

pollutants except particulate matter ($PM_{2.5}$ and PM_{10}). Deficiencies in the current designations are outlined in the following paragraphs.

Currently, the spatial scales for all monitors at the York air monitoring site are designated as urban scale. However, the urban spatial scale is not defined as part of the specific network design criteria in 40 CFR Part 58, Appendix D, for PM_{10}, SO_2 and CO.

As shown in Table A-15.1b, based upon an urban spatial scale, for particulate matter monitoring ($PM_{2.5}$ and PM_{10}), the minimum separation distance from the monitor probe to the nearest traffic lane is a minimum of 70-80 meters (dependant upon actual AADT). This minimum distance requirement is not met for the particulate monitors at the York air monitoring site. The York air monitoring site is located between a light industrial area to the west and a residential area to the east. With its proximity to a high traffic road (Hill Street), this monitor could be correctly defined as middle-scale, since it is along a traffic corridor that would influence its measurements. With its proximity to the Junior high school, this monitor represents particulate exposure to a susceptible population.

PA DEP will study the necessity and feasibility of moving the York air monitoring site to obtain the required minimum distance, and/or re-designating the spatial scale of these monitors. Any recommendations will be included in a future ANP.

A-15.2 York Downwind – 42-133-0011 Site Summary

Location: 2632 Delta Road, Brogue, PA

Site is located at Collinsville Community Library, within 50 yards of Clearview Elementary School (Red Lion Area School District)

Site is 15.6 miles southeast of center-city York

Distance from trees: 60 meters

Table A-15.2a. Parameters Monitored at the York Downwind Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Extreme downwind	Urban

Table A-15.2b. Roadway Separation Distances for the York Downwind Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Delta Rd.	6,200	78.0	13

The monitoring objective, spatial scale and roadway separation distance for the ozone monitor at York Downwind air monitoring site are shown in Table A-15.2a and Table A-

15.2b, respectively. The monitoring objective and spatial scale for ozone monitor are not correct as described in Sections 3.1.1 and 3.1.2 of this document.

The ozone monitor at the York site has an objective of Extreme Downwind. For ozone this is not a recognized objective. The objective of Extreme Downwind is reserved for PAMS facilities. Therefore the objective should be changed to Maximum Concentration with an urban or neighborhood spatial scale. According to 40 CFR Part 58, Appendix D, Section 4, the urban scale is the preferred spatial scale for a maximum concentration objective.

Also, an analysis of ozone concentration data, however, indicates that the York Downwind site may not be meeting a maximum concentration monitoring objective. This analysis is detailed in Section 15.4.1 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

A-15.3 Population Density and Changes

Population growth as indicated in Figure A-15.3b shows that the largest percentage increase has occurred in townships surrounding York City and along the Maryland border. The population density of most of the York-Hanover MSA is fairly low (Figure A-15.3a), indicating that the major urban population areas remain in York City and Hanover. Based on this population pattern, the York air monitoring site can be correctly classified as a neighborhood scale site since it may not be completely representative of pollutant levels in the growth areas of the MSA. The York Downwind site was located to be an ozone downwind site and is outside the population areas.

Figure A-15.3.a. Population Density for York County, 2008 Estimate Data.

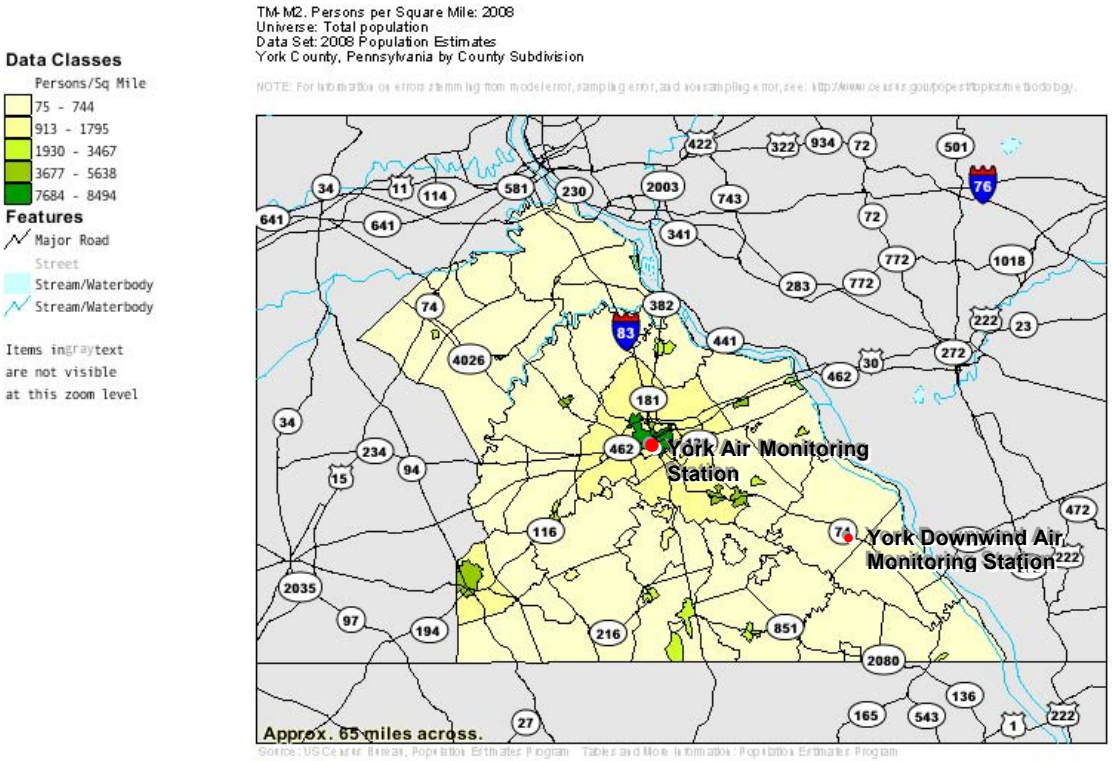
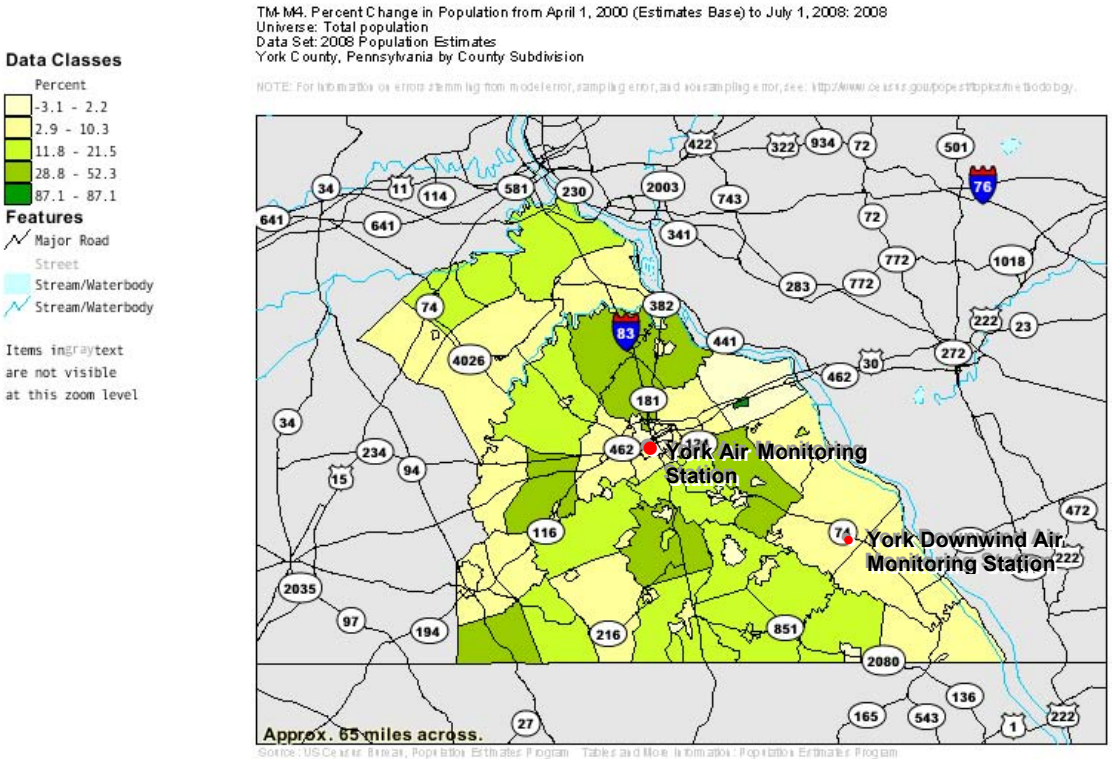


Figure A-15.3.b. Percent Population Change for York County, 2000 - 2008 Estimate Data.



A-15.4 Criteria Pollutant Discussion

A-15.4.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the York-Hanover MSA is required to have a minimum of two ozone monitors active during the ozone season. The ozone monitors at the York and York Downwind sites meet this requirement

Appendix D of 40 CFR Part 58, requires that at least one ozone site for each MSA must be designed to record maximum concentration. PA DEP sited the York Downwind air monitoring station to record maximum concentrations. However, ozone concentration data analysis of the York and York Downwind site indicates design values of 77 and 72 ppb, respectively. Because the Lancaster Downwind site has the lower design value, it may be necessary to reevaluate the downwind site location. (We understand EPA currently may be in the process of reevaluating distance requirements when identifying maximum downwind concentration locations.)

Figures C-1.15a, C-1.15b (Appendix C of this document) display the wind rose and ozone back trajectory patterns, respectively, for the York air monitoring station. While the predominating wind direction for the York site is from a westerly direction, the back trajectories show that many of the high value ozone days can be attributed to air masses originating from a southerly direction. Figure C-1.15c displays a similar ozone back trajectory pattern for the York Downwind site. Source data for the Southcentral Region (Figure C-3c) show both sites are downwind from several major NO_x and VOC (ozone precursor) sources. The York site is downwind of four major NO_x and VOC sources. York Downwind is downwind of an additional major VOC source. Although these sources are located upwind and at a reasonable distance from the York-Hanover sites to impact ozone concentration measurements at the sites, the ozone back-trajectory analyses show that the highest concentrations captured at the York-Hanover sites originate from a southerly direction. These elevated concentrations may be attributed to the transport of the ozone precursors from the Baltimore-Washington area.

A-15.4.2 $PM_{2.5}$

As indicated in Section 3.3.2 of this document, based on population and design value, the York-Hanover MSA is required to have a minimum of one $PM_{2.5}$ monitor. The $PM_{2.5}$ monitor at the York site meets this requirement.

As shown in Figure C-1.15d, back trajectory analysis shows a multi-directional pattern for high $PM_{2.5}$ days. As shown in the source data map (Figure C-3c), some of these back trajectories may be attributed to several PM sources surrounding the York air monitoring site. However, a considerable number of maximum $PM_{2.5}$ concentrations captured by the York air monitoring site originate from southerly directions, and are likely attributable to pollution precursors transported from the Baltimore-Washington area.

A-15.4.3 PM_{10}

As indicated in Section 3.3.3 of this document, based on population and design value, the York-Hanover MSA falls in the minimum requirement category of 0-1 PM_{10} monitors. The PM_{10} monitor at the York site meets this requirement.

As shown in Figure C-3c, the York air monitoring site is located downwind of two major particulate matter sources.

A-15.4.4 SO_2, CO

There are no minimum requirements for the number of monitoring sites for these pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in the York-Hanover MSA.

Appendix D of 40 CFR Part 58 requires that at least one site for each MSA must be designed to record maximum concentration for SO_2 and CO. Figure C-3c shows the York site is located downwind of two major sources of and SO_2.

A-15.5 MSA Site Recommendations:

The York Downwind site objective of Extreme Downwind should be changed to Maximum Concentration with appropriate changes made to the spatial scale.

Pending EPA guidance, the Department will study the necessity and feasibility of moving the York air monitoring site and/or re-designating the spatial scales from urban to neighborhood to meet the network design criteria of 40 CFR Part 58, Appendix D. Any recommendations will be included in a future ANP.

A-16 Youngstown-Warren-Boardman, OH-PA MSA

The Pennsylvania portion of the Youngstown-Warren-Boardman, OH-PA MSA consists of Mercer County. The air monitoring program currently has one site located in the Youngstown-Warren-Boardman, OH-PA MSA: Site Name, AQS Code, County

Farrell – 42-085-0100, Mercer County

A-16.1 Farrell – 42-085-0100 Site Summary

Location: Sharon New Castle Rd. & Union St., Farrell, PA
Site is 47 meters northwest of Farrell High School.

Distance from trees: 26 meters

Table A-16.1a. Parameters Monitored at the Farrell Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Maximum concentration	Urban
$PM_{2.5}$	SLAMS	Manual gravimetric	Daily	Maximum concentration	Urban

Table A-16.1b. Roadway Separation Distances for the Farrell Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
Sharon New Castle Rd...	11,000	15.0	12	81
Union St.	≤10,000	99.8	10	70
Lions Club Lane	≤10,000	122.5	10	70
Rhoda St.	≤10,000	189.0	10	70

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Farrell air monitoring site are shown in Table A-16.1a and Table A-16.1b, respectively. The monitoring objectives and spatial scales may not meet network design criteria as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met for the ozone monitor. The minimum separation distance is not met for the $PM_{2.5}$ monitor. Deficiencies in the current designations are outlined in the following paragraphs.

As shown in Table A-16.1a, the ozone monitor at the Farrell site is currently designated as urban scale. As shown in Table A-16b, the Farrell site meets the minimum separation distance for urban scale ozone monitoring. However, for reasons discussed in Section A-16.2, PA DEP may consider reclassifying the Farrell ozone as neighborhood scale (as noted in Figure 4-1, the roadway separation distance for ozone monitoring applies equally to urban and neighborhood spatial scales).

As shown in Table A-16a, the $PM_{2.5}$ monitor at the Farrell site is currently designated as an urban scale monitor. Based upon an urban spatial scale, however, the minimum probe distance to Sharon New Castle Rd. should be a minimum of 81 meters. This distance is not being met. The current proximity to the nearest roadway falls within the neighborhood spatial scale. In addition, land use patterns are consistent only to a dimension of a few kilometers. Both of these conditions indicate that the $PM_{2.5}$ monitor, as currently located, is more accurately classified as neighborhood scale.

The Department will study these issues over the next few years and recommend any changes to the spatial scale designations in a future ANP.

A-16.2 Population Density and Changes

The following figures detail population data for Mercer County, the Pennsylvania portion of the Youngstown-Warren-Boardman, OH-PA MSA. Figure A-16a shows that major population areas remain in the Sharon-Farrell area. As indicated in Figure A-16b, the largest percentage increase in population growth has occurred in townships surrounding, to the east, and to the south, of Farrell. At this time, most of these high-growth areas remain significantly less populated than the Sharon-Farrell region of the Mercer County. This site is appropriately sited to measure urban population with the maximum amount of population covered. However, there are several high population densities distributed throughout the high growth areas of Mercer County. Based on this population pattern the Farrell site may be classified as a neighborhood scale site since it may not be completely representative of pollution levels in the growth areas of the Mercer County. Further population analysis is indicated for this MSA.

Figure A-16a. Population Density for Mercer County, 2008 Estimate Data.

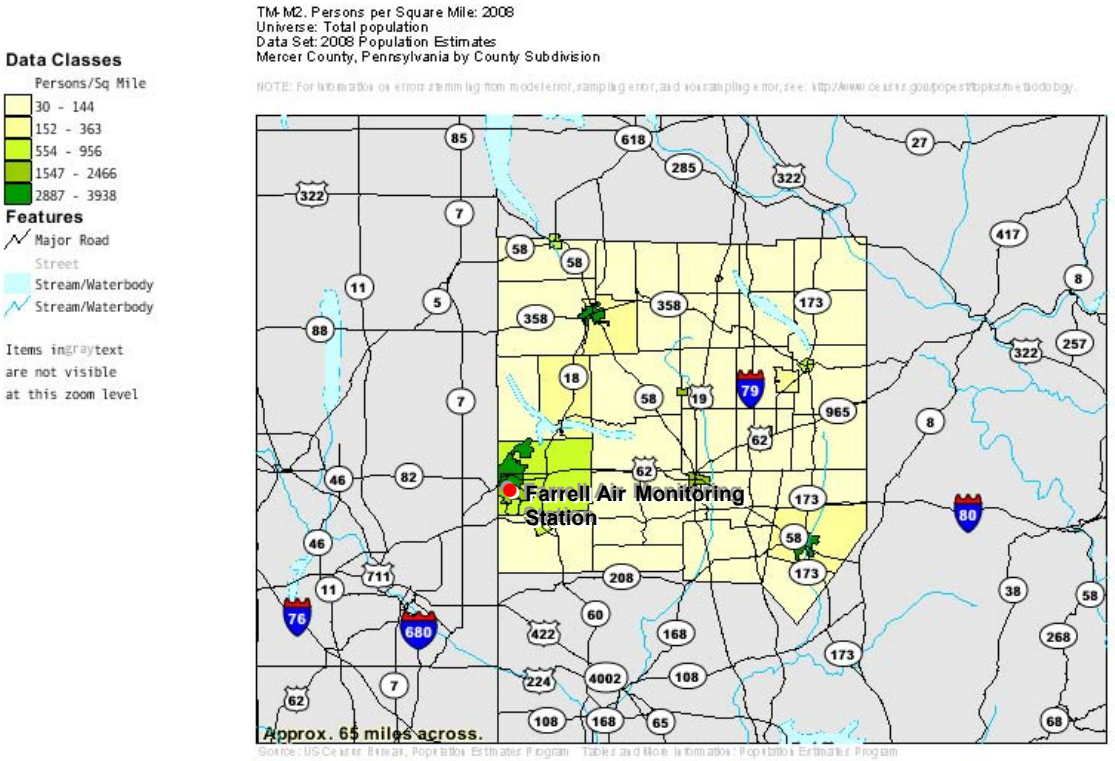
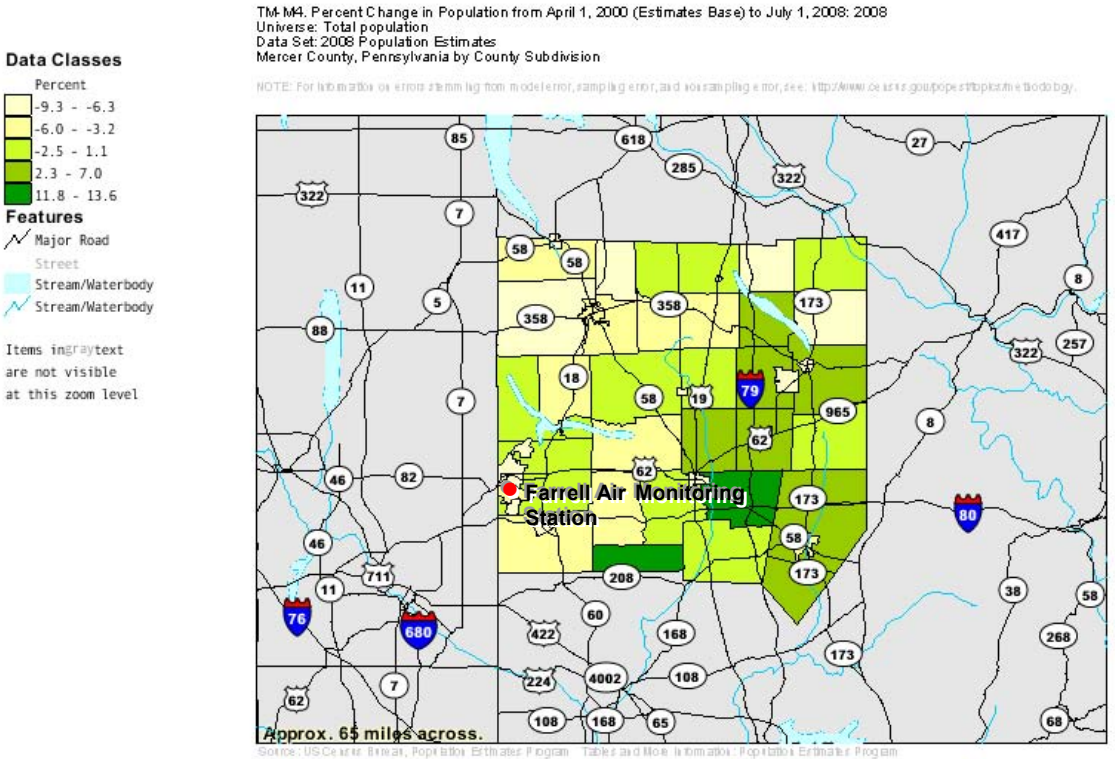


Figure A-16b. Percent Population Change for Mercer County, 2000 - 2008 Estimate Data.



A-16.3 Criteria Pollutant Discussion

A-16.3.1 Ozone

As indicated in Section 3.3.1 of this document, based on population and design value, the Youngstown-Warren-Boardman, OH-PA MSA is required to have a minimum of two ozone monitors active for the ozone season. The ozone monitor at the Farrell site, along with the state of Ohio's three ozone monitors, meets this requirement.

As shown in Figure C-3f, the Farrell ozone monitor is located within 4km of both a major NO_x and VOC source in Pennsylvania. Therefore, the air mass represented by the monitor is uniform only to a few kilometers, which is more indicative of neighborhood scale monitoring. However, because ozone is a secondary pollutant, needing time to form in the atmosphere, the Farrell site's proximity to the major NOx and VOC sources in Pennsylvania likely precludes the ozone monitor from measuring the majority of ozone pollution generated by these ozone precursor emitters, on a neighborhood scale. As shown in Figure C-1.16a, the predominating wind directions for the Farrell site are from southeast and southwest of the site. As shown in Figure C-1.16b, on maximum ozone days, the vast majority of incidents occur from air masses originating in Ohio and West Virginia. Concentration data indicate that the design value of 0.077 parts per million (ppm) for the Farrell ozone monitor is the highest in the MSA. According to information obtained from the State of Ohio, the design value for the MSA counties in Ohio is 0.075 ppm. This indicates that because of the increased distance and time relationship of the transported air mass, the Farrell site is site is ideally placed to measure regional transport, as well as highest concentration in the Youngstown-Warren-Boardman, OH-PA MSA. As described in Section 3.1.2 of this document, 40 CFR Part 58, Appendix D notes that urban scale monitoring is an appropriate spatial scale for maximum concentration sites, when monitoring for secondary pollutants such as ozone.

At least one ozone site for each MSA must be designed to record maximum concentration in accordance with 40 CFR Part 58, Appendix D. Based on the information detailed in the above paragraph, the Farrell ozone monitor meets this requirement.

A-16.3.2 $PM_{2.5}$

As indicated in Section 3.3.2 of this document, based on population and design value, the Youngstown-Warren-Boardman, OH-PA MSA is required to have a minimum of three $PM_{2.5}$ monitors. The $PM_{2.5}$ monitor at the Farrell site, along with the state of Ohio's two $PM_{2.5}$ monitors, meets this requirement.

As with ozone, the $PM_{2.5}$ back trajectory analysis (Figure C-1.16c) shows, maximum $PM_{2.5}$ concentrations are measured from transport from Ohio and West Virginia sources. However, as indicated in the site summary, the Farrell $PM_{2.5}$ monitor fails to meet the minimum distances required for the urban scale and related transport site type, and is

more accurately classified as neighborhood scale, which is an appropriate scale for a $PM_{2.5}$ maximum concentration site.

PA DEP will further evaluate this monitor and recommend any changes to the monitoring objective, spatial scale or site location in a future ANP.

16.4 MSA Site Recommendations:

As noted, further study will be needed to consider the appropriateness of the current monitoring objective and spatial scale designations assigned to the Farrell site monitors. For ozone, the Farrell site has characteristics of both neighborhood and urban spatial scale monitoring; back trajectory analysis indicates that this site is a good transport site, with pollutants appearing to come from Ohio and West Virginia, as well as a good maximum ozone concentration site for the Youngstown-Warren-Boardman, OH-PA MSA. For the $PM_{2.5}$ monitor, if it is necessary to retain an urban scale monitor in this portion of the MSA, the site will need to be moved approximately 60 meters south of its current location. The Department will consult with EPA and recommend any changes in a future ANP.

Appendix B. Non MSA Regions: Sites, Analyses and Recommendations

In non-MSA regions, there are no minimum sampling requirements or maximum concentration site requirements. Therefore, no such discussions are included for the following analyses.

B-1 Southeast Region

The Southeast PA Region is entirely encompassed by the Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA, discussed in Section A-9 of this document.

B-2 Northeast Region

The Northeast Pennsylvania Non-MSA Region consists of Monroe, Schuylkill, Susquehanna and Wayne Counties. The air monitoring program currently has one site located in the Northeast Pennsylvania Non-MSA Region: Site Name, AQS Code, County

Pocono/Swiftwater – 42-089-0002, Monroe County

B-2.1 Pocono/Swiftwater – 42-089-0002 Site Summary

Location: PA DEP/DCNR Pocono District Office, Swiftwater, PA
This site is located on U.S. Route 611

Distance from trees: 30 meters

Table B-2.1a. Parameters Monitored at the Pocono/Swiftwater Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	Population exposure	Neighborhood

Table B-2.1b. Roadway Separation Distances for the Pocono/Swiftwater Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	$PM_{2.5}$
Shepherd Lane	≤10,000	34.0	10	15
SR 611.	21,000	57.5	30	25
Wiscasset Ave	≤10,000	102.5	10	15

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Pocono/Swiftwater air monitoring site are shown in Table B-2.1a and Table B-2.1b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-2.2 Criteria Pollutant Discussion

B-2.2.1 Ozone

As shown in Figure C-2.2b, the ozone back trajectory analysis indicates most maximum readings occur when winds are coming from the south and to a lesser degree from the west. This is consistent with the knowledge that although there

are no major sources in Monroe County a significant number of major sources can be found to the south and west of the site (See Figure C-3b).

B-2.2.2 $PM_{2.5}$

Neighborhood scale is appropriate for this pollutant because of the relatively close distance of U.S. Route 611.

The $PM_{2.5}$ monitor was recently installed and as a result no trajectory information is available. However as noted in Figure C-3c, there are a number of major PM sources to the south and west of the site.

B-2.3 Regional Site Recommendations

As a result of this assessment, no changes are proposed for the Northeast Region site.

B-3 Southcentral Region

The Southcentral Pennsylvania Non-MSA Region consists of Adams, Bedford, Franklin, Fulton, Huntingdon, Juniata and Mifflin Counties. The air monitoring program currently has four sites located in the Southcentral Pennsylvania Non-MSA Region: Site Name, AQS Code, County

Arendtsville – 42-001-0001, Adams County
Biglerville – 42-001-0002, Adams County
Methodist Hill – 42-055-0001, Franklin County
Upper Strasburg – 42-055-0002, Franklin County

B-3.1 Arendtsville 42-001-0001 Site Summary

Location: Near the intersection of Winding Road and Cashtown Road, 0.8 km west of Arendtsville.
Site is on property owned by Boyer Nursery.

Distance from trees: 32 meters. Although numerous, these trees are fruit-bearing orchard trees that do not exceed a height of more than 8 feet.

Table B-3.1a. Parameters Monitored at the Arendtsville Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
$PM_{2.5}$	SLAMS	Automated Beta Attenuation	Continuous year-round	General/Background	Urban
NO_2	SPM	Automated chemiluminescence	Continuous, during ozone season	General/Background	Urban
CO	SPM	Automated non-dispersive infrared	Continuous, during ozone season	General/Background	Urban

Table B-3.1b. Roadway Separation Distances for the Arendtsville Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)		
			$PM_{2.5}$	NO_2	CO[1]
Winding Rd	≤10,000	142.0	70	10	N/A

[1] Table 4-2 of the document applies only to neighborhood scale monitoring

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Arendtsville air monitoring site are shown in Table B-3.1a and Table B-3.1b, respectively. The monitoring objectives and spatial scales for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-3.2 Biglerville

Location: Penn State Research Orchard, University Drive

Table B-3.2a. Parameters Monitored at the Biglerville Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SPM	Automated UV absorption	Continuous, during ozone season	General/Background	Regional

Subject to EPA approval of the Department's 2010-2011 Annual Network Plan, this site may be shut down by July 1, 2011. The Biglerville air monitoring site was established in conjunction with Penn State University to study the effects of ozone on grape leaves. The grant under which this study was funded expires on July 1, 2011.

B-3.3 Methodist Hill

Location: Stillhouse Hollow Rd, Shippensburg, PA.
Site is a high elevation ozone site, located at the SBA Leasing tower site.

Distance from trees: 30 meters. Although numerous trees are found in the forested areas surrounding the site, the site inlet probe is more than 10 meters off the ground on the SBA radio tower. The inlet is higher than many of the surrounding trees.

Table B-3.3a. Parameters Monitored at the Methodist Hill Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SPM	Automated UV absorption	Continuous, during ozone season	Regional transport	Regional

Table B-3.3b. Roadway Separation Distances for the Methodist Hill Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Stillhouse Hollow Rd.[1]	≤1,000[1]	68.6	N/A

[1] Stillhouse Hollow Road is a mountain road, mostly unpaved and less than two car widths wide at several locations. Actual traffic density is most likely less than 100 cars per day.

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Methodist Hill air monitoring site are shown in Table B-3.3a and Table B-3.3b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-3.4 Upper Strasburg

Location: Upper Strasburg Community Road, Strasburg, PA
Site is located in the rear of the Upper Strasburg Church of God, or to the front of the Upper Strasburg Community Center.

Distance from trees: 19 meters

Table B-3.4a. Parameters Monitored at the Upper Strasburg Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table B-3.4b. Roadway Separation Distances for the Upper Strasburg Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Upper Strasburg Rd (SR 533).	1,500	89.0	15
Community Rd.	≤10,000	60.0	15
Mountain Rd.	≤10,000	72.9	15

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the Upper Strasburg air monitoring site are shown in Table B-3.4a and Table B-3.4b, respectively. The monitoring objective, spatial scale, and minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

The Upper Strasburg air monitoring site is a lead source-oriented monitor. The source being monitored is the Letterkenny Army Supply Depot. At this site, the source of lead emissions is the disposal of outdated munitions. The detonation site is 2 km southwest of the monitoring location.

B-3.5 Criteria Pollutant Discussion

B-3.5.1 Ozone

The Methodist Hill site is the highest (in altitude) ozone monitoring site in the Department's air monitoring network. With the inlet at over 2000 feet, the sampler measures ozone above the inversion layer found in the surrounding areas. This site has been an ideal transport measurement location. As shown in the ozone back trajectory (Figure C-2.3b), the maximum ozone concentrations come from varied air masses originating from all directions, including the Baltimore/Washington corridor.

As shown in Figure C-3c, there are no Pennsylvania VOC or NO_x sources to the west and south of this site.

B-3.5.2 $PM_{2.5}$

As shown in the back trajectory (Figure C-2.3c), Arendtsville historical $PM_{2.5}$ maximums are predominately coming from air masses from the south, southwest, and the Baltimore/Washington corridor. This finding supports the "background" objective for this location. The Department's findings also conclude that urban scale is adequate for this location. There are no major PM sources in Adams County 60 miles to the west and northwest of the site. (Figure C-3c) We could also consider this site as a transport monitoring objective. However, PA DEP has historically identified this location as General/Background. Unless otherwise required by EPA, PA DEP will keep this site as a "background" location.

B-3.5.3 NO_2, CO

There are no regulatory assessment requirements for these monitors. There are also no major sources of CO or NO_2 within 60 miles of the Arendstville air monitoring site. For this reason, the Arendtsville site provides a rural background and an historical reference for air masses that will eventually pass into the more populated areas of the Commonwealth

B-3.6 Regional Site Recommendations

As a result of this assessment, no changes are proposed for the Southcentral Region sites.

B-4 Northcentral Region

The Northcentral Pennsylvania Non-MSA Region consists of Bradford, Cameron, Clearfield, Clinton, Columbia, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union Counties. The air monitoring program currently has two sites located in the Northcentral Pennsylvania Non-MSA Region: Site Name, AQS Code, County

Moshannon – 42-033-4000, Clearfield County
Tioga – 42-117-4000, Tioga County

B-4.1 Moshannon

Location: S.B. Elliott State Park, Moshannon State Forest, Clearfield, PA

Distance from trees: 14 meters

Table B-4.1a. Parameters Monitored at the Moshannon Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SPM	Automated UV absorption	Continuous, during ozone season	General/Background	Regional

Table B-4.1b. Roadway Separation Distances for the Moshannon Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Old Rte 153	≤10,000	192.0	N/A

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Moshannon air monitoring site are shown in Table B-4.1a and Table B-4.1b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-4.2 Tioga

Location: near Tioga State Forest, Gleason, PA

Distance from trees: 40 meters

Table B-4.2a. Parameters Monitored at the Moshannon Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SPM	Automated UV absorption	Continuous, during ozone season	General/Background	Regional

Table B-4.2b. Roadway Separation Distances for the Moshannon Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Hurley Rd.	(≤10,000)	41.6	N/A

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Tioga air monitoring site are shown in Table B-4.2a and Table B-4.2b, respectively. The monitoring objective and spatial scale for the monitor are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-4.3 Criteria Pollutant Discussion

B-4.3.1 Ozone

The ozone back trajectory analysis for the Moshannon air monitoring site (Figure C-2.4a) shows that the maximum ozone concentrations measured at this site come from air masses originating from the west, southwest and southerly directions. In these directions there are no major NO_x or VOC sites within 60 km of the site (Figure C-3d and C-3e). The ozone back trajectory analysis for the Tioga air monitoring site (Figure C-2.4b) shows that the maximum ozone concentrations measured at this site come from air masses originating from all directions, many times from the south and southwest. In these directions there are no major NO_x or VOC sites within 30 to 40 km of the site (Figure C-3d). Therefore, the site monitoring objectives are correctly identified as general/background monitoring locations for ozone. Although these distances do not represent air masses out to hundreds of kilometers, as required for regional scale, the high altitude of the sites make them more susceptible to monitoring emissions from more distant sources. Based on this analysis, the Department recommends that the spatial scale remains regional.

B-4.4 Regional Site Recommendations

As a result of this assessment, no changes are proposed for the Northcentral Region sites.

B-5 Southwest Region

The Southwest Pennsylvania Non-MSA Region consists of Greene, Indiana and Somerset Counties. The air monitoring program currently has three sites located in the Southwest Pennsylvania Non-MSA Region: Site Name, AQS Code, County

Holbrook – 42-059-0002, Greene County
Strongstown – 42-063-0004, Indiana County
Shelocta – 42-063-0005, Indiana County

B-5.1 Holbrook

Location: Bluff Ridge Rd, Holbrook, PA

Distance from trees: 20 meters

Table B-5.1a. Parameters Monitored at the Holbrook Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Regional transport	Regional
SO_2	SPM	Automated UV fluorescence	Continuous, during ozone season	Regional transport	Regional

Table B-5.1b. Roadway Separation Distances for the Holbrook Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)	
			Ozone	SO_2
Bluff Ridge Rd. (SR 3014)	150	112.2	N/A	N/A

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Holbrook air monitoring site are shown in Table B-5.1a and Table B-5.1b, respectively. The monitoring objectives and spatial scales for both monitors are correct as described in Sections 3.1.1 and 3.1.2 of this document. The minimum separation distance from the monitor probe to the nearest traffic lane is met.

B-5.2 Strongstown

Location: Rte. 403, Strongstown, PA
Site is located north of Strongstown, at the rear of the Pennsylvania Department of Transportation Maintenance Facility

Distance from trees: 50 meters

Table B-5.2a. Parameters Monitored at the Strongstown Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Regional
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Regional

No roads – access only w/i250m

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Strongstown air monitoring site are shown in Table B-5.2a. There are no roads, except the access to the site, within 250 meters of the site.

Due to the back trajectory analyses and presence of major sources within 50 km of the Strongstown air monitoring site, the spatial scales may more accurately be classified as urban scale monitoring for both ozone and SO_2.

B-5.3 Shelocta

Location: 182 South Ridge Rd, Shelocta, PA. Site can be found just south of the Shelocta Community United Presbyterian Church.

Distance from trees: 55 meters, where greater than 10 meters is required.

Table B-5.3a. Parameters Monitored at the Shelocta Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table B-5.3b. Roadway Separation Distances for the Shelocta Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
S. Ridge Rd.	300	5.4	15
Shelocta Rd.	(≤10,000)	173.5	15
Unnamed Rd.	(≤10,000)	123.5	15
Benjamin Franklin Hwy. (US422)	13,000	232.7	15

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Shelocta air monitoring site are shown in Table B-5.3a and Table B-5.3b, respectively. The monitoring objective, spatial scale, and minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

Although the closest roadway to the site, South Ridge Road, is only 5.4 meters away, this is a very low travel density road and has minimal, if any, affect on monitored lead emissions. Therefore, the Department will retain the spatial scale of middle scale.

The Shelocta air monitoring site is a lead source-oriented monitor located 4.2 km east from the Reliant Energy-Keystone plant.

B-5.4 Criteria Pollutant Discussion

B-5.4.1 Ozone

The ozone back trajectory analysis for the Holbrook air monitoring site (Figure C-2.5c) shows that the maximum ozone concentrations monitored at this site come from air masses originating in a large part from the south and southwest. The wind rose pattern for the Holbrook site (Figure C-2.5a) shows predominating wind directions of south and west. In these directions there are no major Pennsylvania NO_x or VOC sources between the site and the Pennsylvania border. Therefore, the site is ideally placed to monitor the transport of pollution on a regional scale (see Figure C-3e).

The ozone back trajectory analysis for the Strongstown air monitoring site (Figure C-2.5d) shows that the maximum ozone concentrations monitored at this site come from air masses originating in a large part from the west to southeast. The wind rose pattern for the Strongstown site (Figure C-2.5b) shows predominating wind directions of west to southeast. In these directions there are major NO_x or VOC sources located within 50 km of the site. Therefore, the Department believes that the spatial scale should be changed from regional to urban scale (see Figure C-3c).

B-5.4.2 SO_2

There are no minimum requirements for the number of monitoring sites for these pollutants, however, the Department maintains these monitors to support air quality monitoring for these pollutants in southwestern Pennsylvania. For the Holbrook site, as noted previously, there are no major sources of SO_2 south or west of the site to the Pennsylvania Border. This site is ideally located to monitor the transport of pollution a regional scale (see Figure C-3e). For the Strongstown site, however, there are major SO_2 sources located within 50 km west, south and east of the site (see Figure C-3e). Therefore, the Department believes that the spatial scale for the Strongstown site would be more correctly described as urban, not regional.

B-5.5 Regional Site Recommendations

As noted in the above discussions, due to the presence of major sources within 50km of the Strongstown air monitoring site, the spatial scale for both criteria pollutant monitors located there are more accurately described as urban scale monitoring. The Department will make any recommendations for re-designating the spatial scales in a future ANP.

B-6 Northwest Region

The Northwest Pennsylvania Non-MSA Region consists of Clarion, Crawford, Elk, Forest, Jefferson, Lawrence, McKean, Venango and Warren Counties. The air monitoring program currently has three sites located in the Northwest Pennsylvania Non-MSA Region: Site Name, AQS Code, County

Ellwood City – 42-073-0011, Lawrence County
New Castle – 42-073-0015, Lawrence County
Warren Overlook – 42-123-0004, Warren County

B-6.1 Ellwood City

Location: Clyde St., Ellwood City, PA
Site is located on property next to Heraeus Electro-Nite Co.

Distance from trees: There are no trees in the immediate area of the site.

Table B-6.1a. Parameters Monitored at the Ellwood City Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Pb	SLAMS	Manual Gravimetric	Every 6th day	Source-oriented	Middle Scale

Table B-6.1b. Roadway Separation Distances for the Ellwood City Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)
			Ozone
Spring Ave. Exd.	≤10,000	50.0	15
Clyde St	≤10,000	50.0	15
Pittsburgh Cir.	≤10,000	101.5	15
Center St.	≤10,000	119.8	15
Portersville Rd. (SR 488)	8,700	150.0	15
Spring Ave.	≤10,000	170.5	15

The monitoring objectives, spatial scales and roadway separation distances for the criteria pollutant monitor at the Ellwood City air monitoring site are shown in Table B-6.1a and Table B-6.1b, respectively. The monitoring objective, spatial scale, and minimum separation distance from the monitor probe to the nearest traffic lane is acceptable.

The Ellwood City air monitoring site is a lead source-oriented monitor located 0.35 km northwest from INMETCO Corporation. The monitoring site was located through the use of modeling for maximum concentration determination.

B-6.2 New Castle

Location: S Croton Ave & S Jefferson St, New Castle, PA
Site is located next to the Neshannock Creek, just east of South Jefferson Street.

Distance from trees: 12 meters (result of 2010 shrub and tree removal activity).

Table B-6.2a. Parameters Monitored at the New Castle Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
Ozone	SLAMS	Automated UV absorption	Continuous, during ozone season	Population exposure	Urban
PM_{10}	SLAMS	Automated TEOM gravimetric	Continuous, year-round	Population exposure	Urban
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Population exposure	Urban
NO_2	SLAMS	Automated chemiluminescence	Continuous, year-round	Population exposure	Urban

Table B-6.2b. Roadway Separation Distances for the New Castle Air Monitoring Site.

Roadway	AADT	Distance from Roadway (meters)	Required Minimum Separation Distances (meters)			
			Ozone	PM_{10}	SO_2	NO_2
S. Croton Ave.	3,500	10.9	10	72	N/A	10
S. Jefferson St.	14,000	31.0	18	84	N/A	18
Margaret St.	≤10,000	129.3	10	70-80	N/A	10
Grove St.	8,300	134.0	10	78	N/A	10
S. Cochran Way	≤10,000	154.8	10	70-80	N/A	10
S. Mill St.	≤10,000	200.0	10	70-80	N/A	10

The monitoring objectives, spatial scales and roadway separation distances for air all criteria pollutant monitors at the New Castle air monitoring site are shown in Table B-6.1a and Table B-6.2b, respectively. The monitoring objectives, spatial scales and roadway separation criteria for ozone and NO_2 monitoring are correct as described in Sections 3.1.1, 3.1.2 and 4.2 of this document.

The remaining monitors at the New Castle air monitoring site do not meet the spatial scale and/or roadway separation criteria described in Section 3.1.2 and 4.2. The details of these discrepancies are found in Section 6.4 below.

B-6.3 Warren Overlook

Location: Overlook Site near Stone Hill Rd, Warren, PA.
Site is located on top of a mountain ridge 2.3 km west of center city Warren.

Distance from nearest trees: 15 meters

Table B-6.3a. Parameters Monitored at the Warren Overlook Air Monitoring Site.

Parameter	Network	Methodology	Operating Schedule	Monitoring Objective	Spatial Scale
SO_2	SLAMS	Automated UV fluorescence	Continuous year-round	Maximum concentration	Neighborhood

The monitoring objectives, spatial scales and roadway separation distances for all criteria pollutant monitors at the Warren Overlook air monitoring site are shown in Table B-6.3a. There are no roads, except the access to the site, within 250 meters of the site.

B-6.4 Criteria Pollutant Discussion

B-6.4.1 Ozone

The ozone back trajectory analysis for the New Castle air monitoring site (Figure C-2.5c) indicates most maximum readings occur when winds are coming from the south and to a lesser degree from the west. This is consistent with the presence of major NO_x sources to the south and west of the site (See figure C-3e) in Lawrence County. In addition, there are a significant number of NO_x and one VOC major source in neighboring Beaver County. The wind rose pattern in Figure C-2.6a for the New Castle site shows predominating wind directions consistent with the ozone back trajectory analysis.

B-6.4.2 PM_{10}, SO_2

The previously noted, the spatial scale of "urban" for SO_2 and PM_{10} monitoring at the New Castle air monitoring site is inappropriate. Appendix D of 40 CFR Part 58 indicates that the largest appropriate scale is neighborhood for these pollutants. In addition, a significant number of major SO_2 and PM sources are located to the west and south of the New Castle site. Therefore, it is recommended that the spatial scale for these two pollutants be changed to neighborhood.

Warren Overlook SO_2 Monitoring

To address historical concerns with short term SO_2 exposure, the SO_2 monitor at Warren Overlook is set to detect short term, high concentration levels, as required by the Warren County SO_2 Maintenance Plan. Under this plan, quarterly reports are sent to EPA Region III, noting all periods where the SO_2 5-minute averages are greater than 0.6 ppm. SO_2 monitoring will continue at the Warren Overlook site in accordance with the monitoring requirements specified in the Warren County SO_2 Maintenance Plan.

The Warren Overlook air monitoring site was established and located for maximum SO_2 concentration, determined by modeling. As shown by the SO_2 back trajectory analysis (Figure C-2.6d), the Warren Overlook site is capturing SO2 concentrations from all directions. In addition, there is no easily-defined predominating wind direction shown by the wind rose pattern for the site (Figure C-2.6b). PA DEP has determined that the Warren Overlook site is unaffected by topographic features of the valley formed by the Allegheny River.

B-6.5 Regional Site Recommendations

As noted in the above discussions, due to the roadway separation distances and the presence of major sources upwind of the New Castle air monitoring site, the spatial scale for the PM_{10} and SO_2 monitors located there are more accurately described as neighborhood scale monitoring. The Department will make any recommendations for re-designating the spatial scales in a future ANP.

Appendix C. Wind Roses, Back Trajectories and Source Locations

The following figures present data relating to COPAMS air monitoring sites, grouped by the six specific regions in Pennsylvania and/or MSAs contained in those regions:

- Southeast Region – Bucks, Chester, Delaware, Montgomery and Philadelphia (not shown) Counties. The Southeast Region is entirely contained in the Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA.
- Northeast Region – Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne and Wyoming Counties. The Northeast Region contains the Allentown-Bethlehem-Easton PA-NJ (part), New York-Northern New Jersey-Long Island, NY-NJ-PA (part) and Scranton-Wilkes-Barre MSAs.
- Southcentral Region – Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry and York Counties. The Southcentral Region contains the Altoona, Harrisburg-Carlisle, Lancaster, Lebanon, Reading and York-Hanover MSAs.
- Northcentral Region – Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga and Union Counties. The Northcentral Region contains the State College and Williamsport MSAs.
- Southwest Region – Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington and Westmoreland Counties. The Southwest Region contains the Johnstown and Pittsburgh (part) MSAs.
- Northwest Region – Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango and Warren Counties. The Northwest Regions contains the Erie, Pittsburgh (part) and Youngstown-Warren-Boardman, OH-PA (part) MSAs

The wind roses were created using E-DAS ATX software developed by Environmental Systems Corporation, Knoxville, TN. The back trajectories were created using the Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT) modeling program developed by the National Oceanic and Atmospheric Administration's (NOAA) Air Resources Laboratory (ARL).

C-1. Site-Specific Meteorological Data by MSA

C-1.1 Allentown-Bethlehem-Easton MSA

Figure C-1.1a. Wind Rose for the Allentown Air Monitoring Site, 2007-2009.

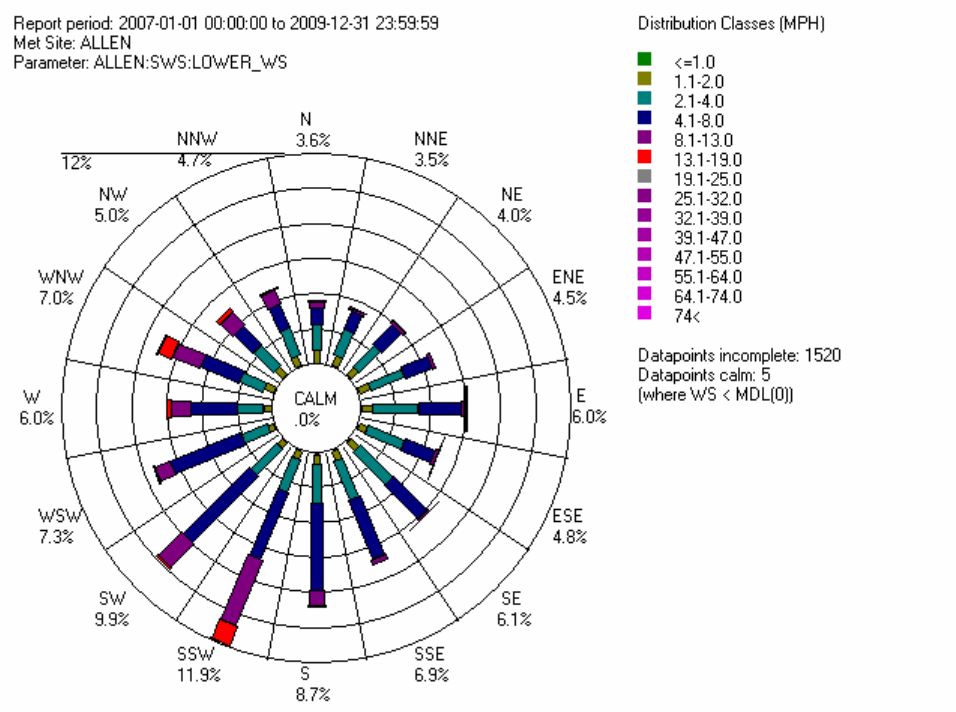


Figure C-1.1b. Wind Rose for the Easton Air Monitoring Site, 2007-2009.

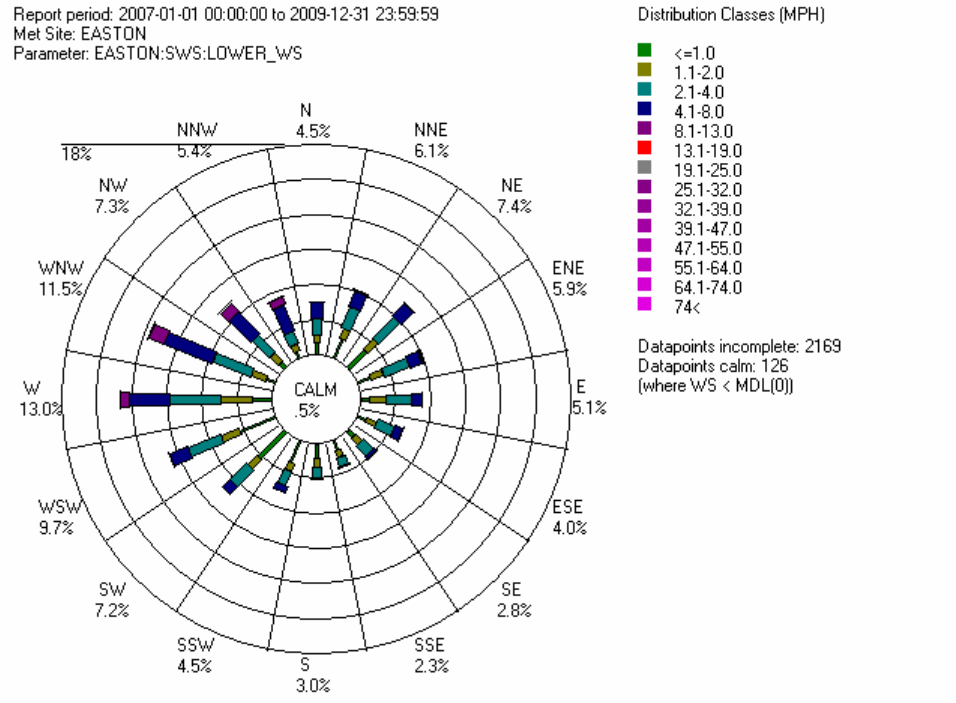


Figure C-1.1c. Wind Rose for the Freemansburg Air Monitoring Site, 2007-2009.

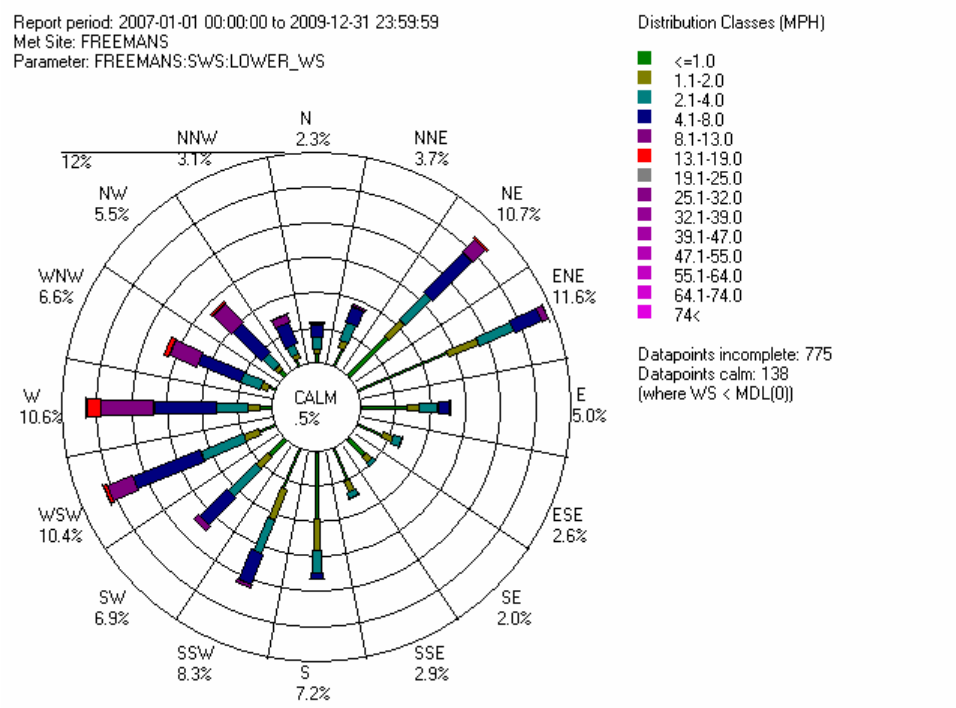


Figure C-1.1d. Wind Rose for the Nazareth Air Monitoring Site, 2007-2009.

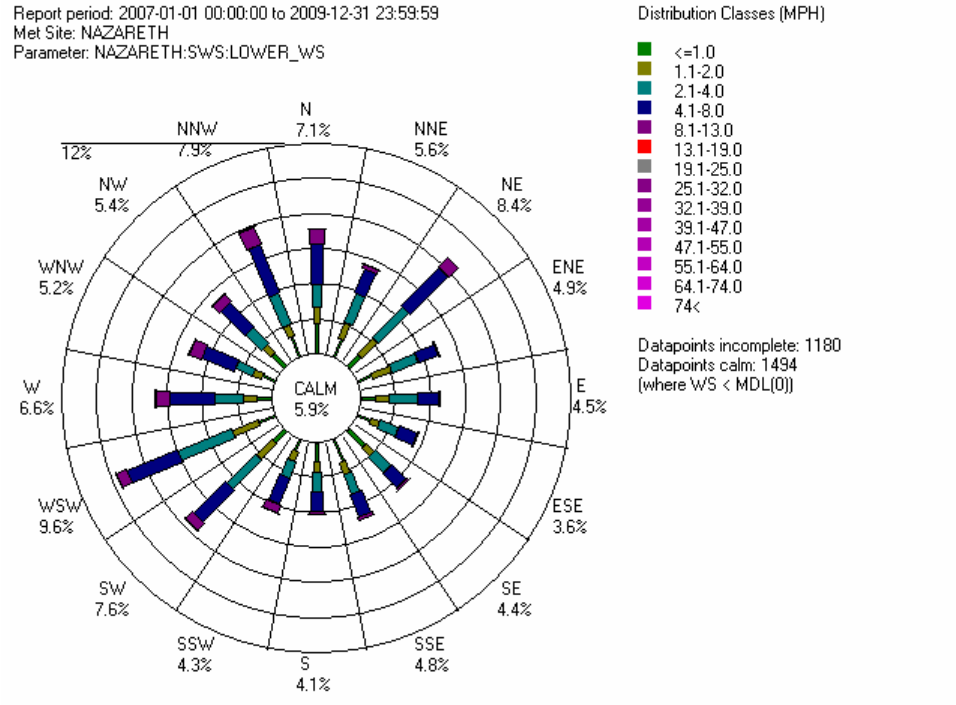


Figure C-1.1e. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Allentown Air Monitoring Site.

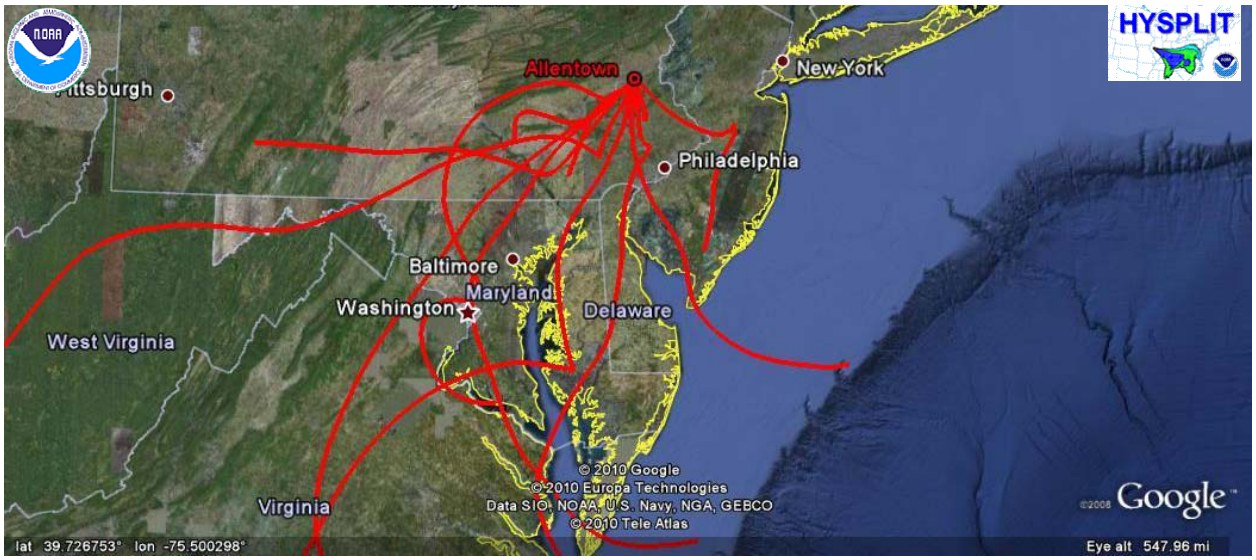


Figure C-1.1f. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Easton Air Monitoring Site.

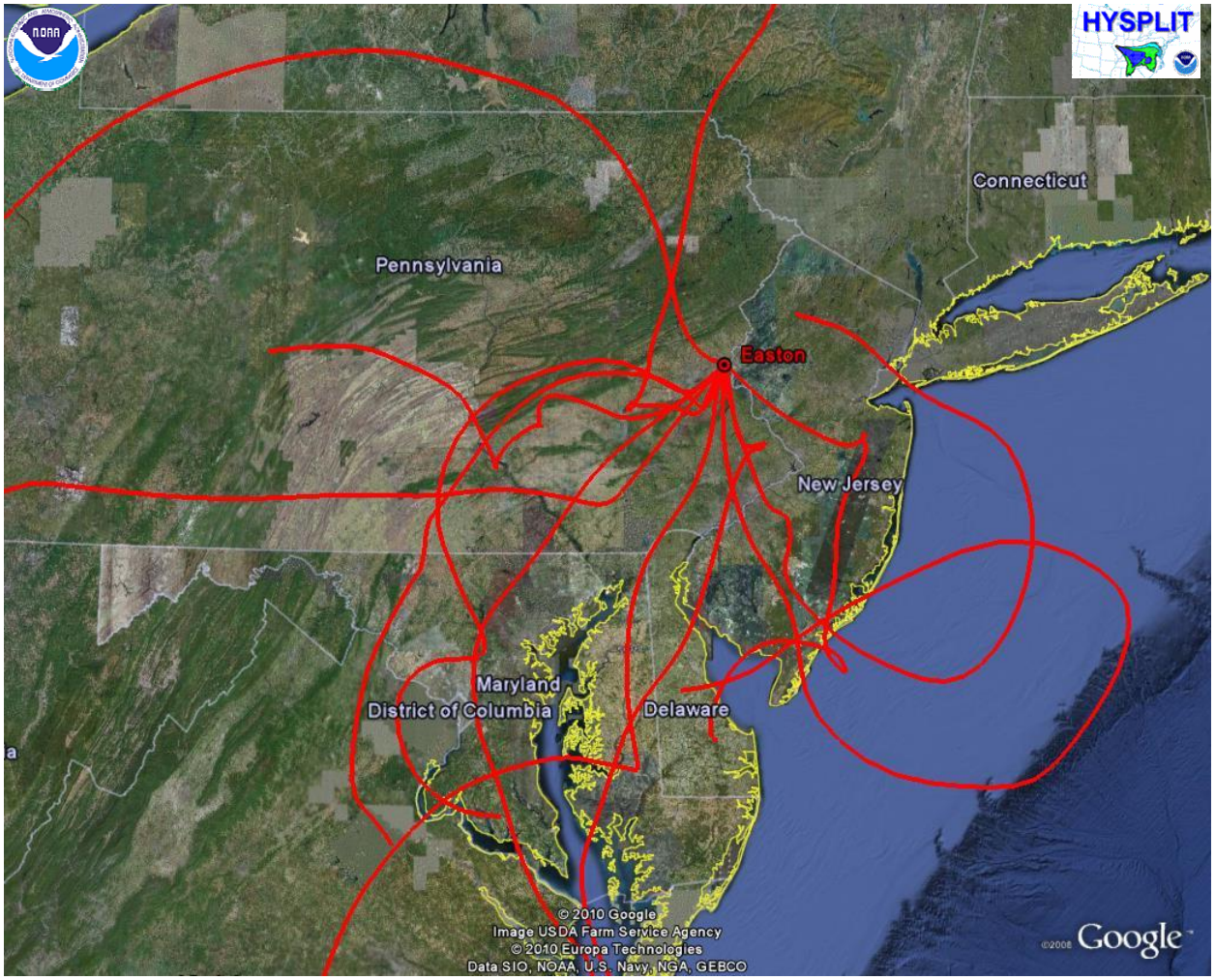


Figure C-1.1g. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Freemansburg Air Monitoring Site.

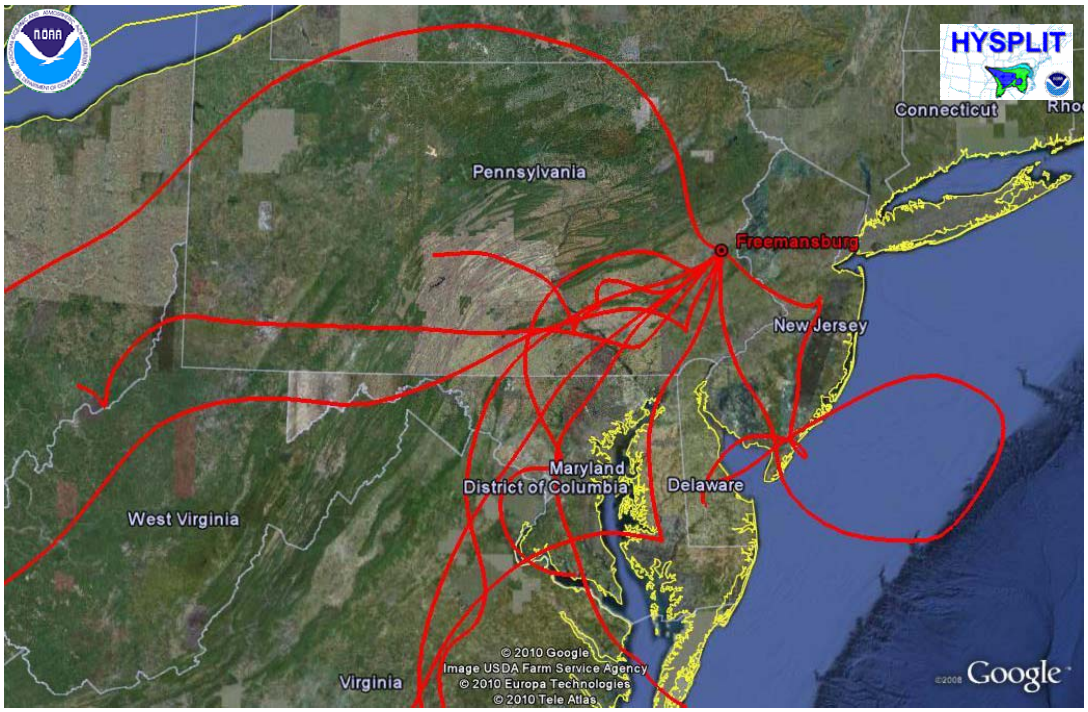
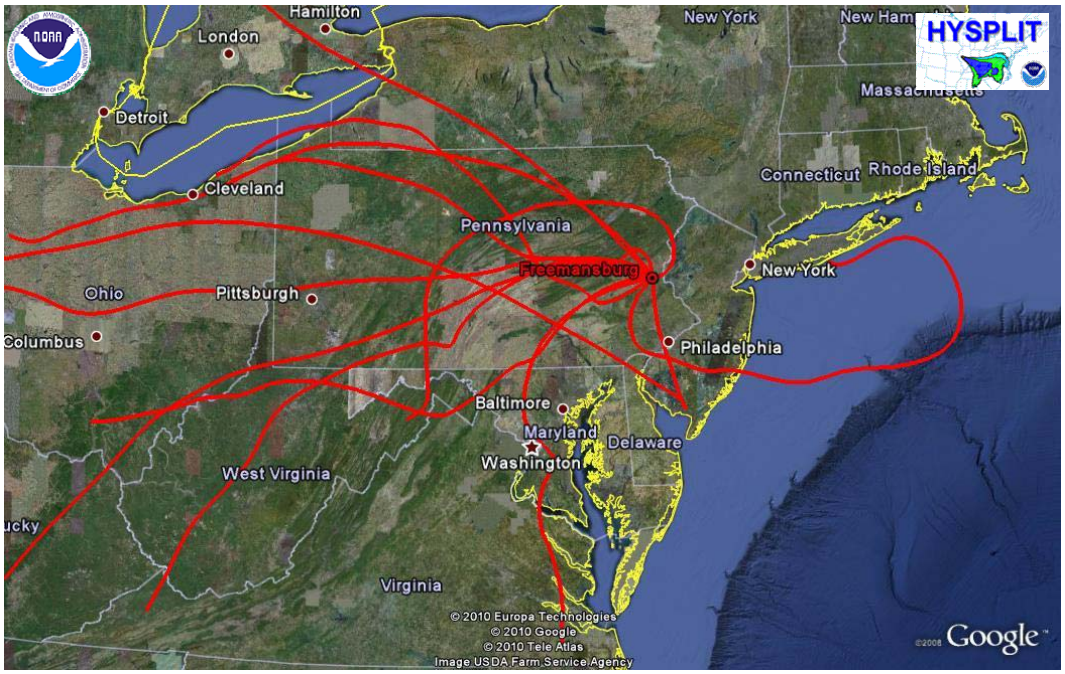


Figure C-1.1h. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Freemansburg Air Monitoring Site.



C-1.2 Altoona MSA

Figure C-1.2a. Wind Rose for the Altoona Air Monitoring Site, 2007-2009.

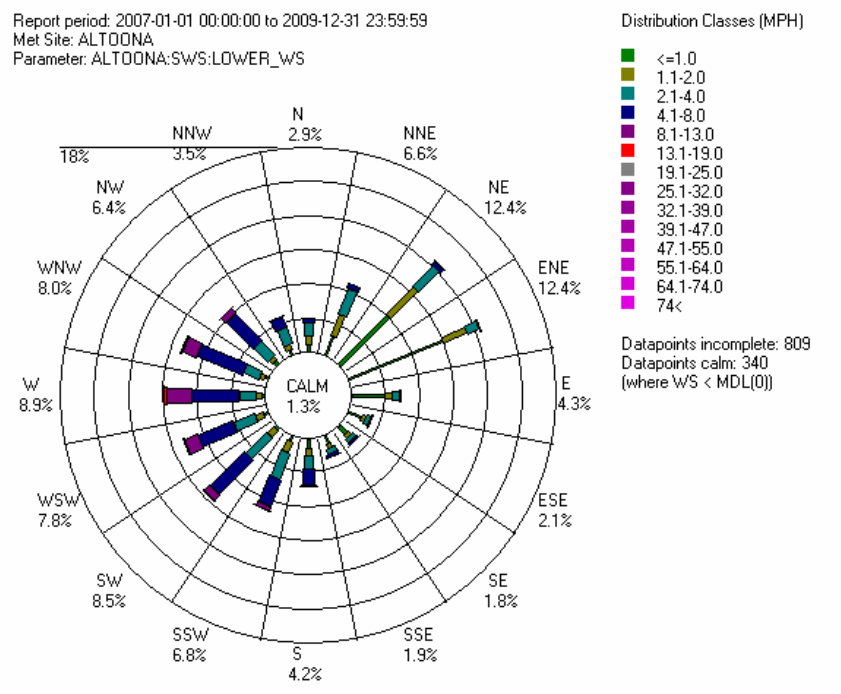
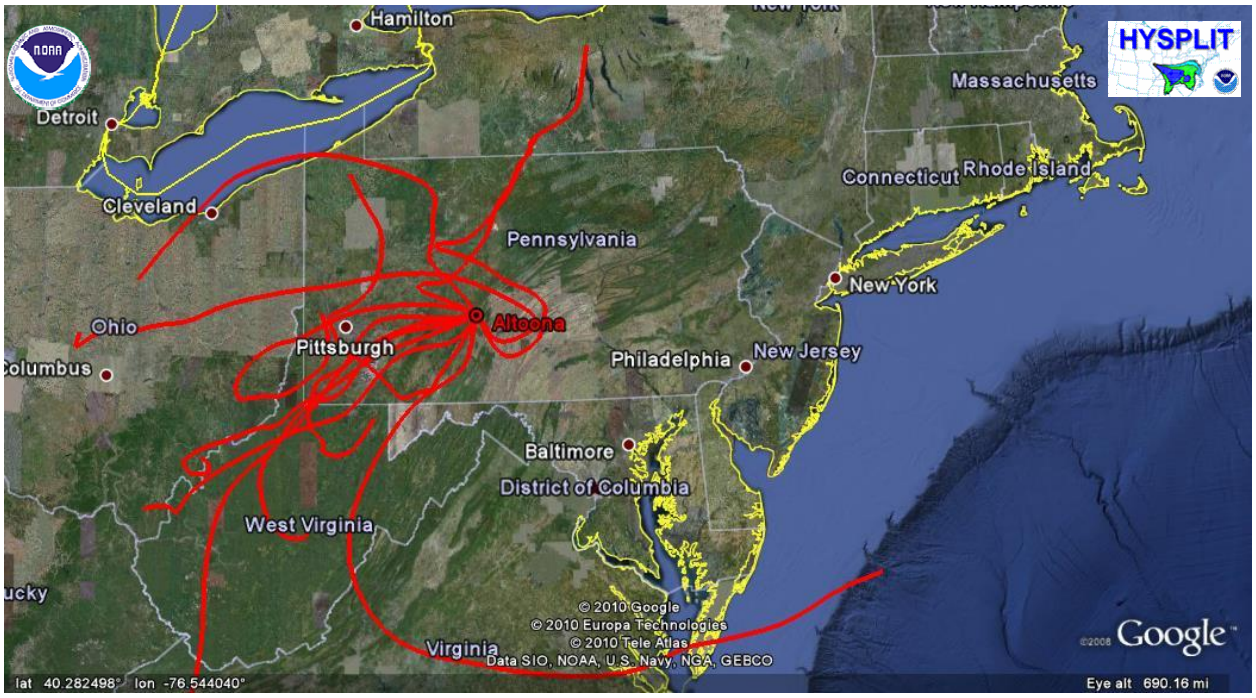


Figure C-1.2b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Altoona Air Monitoring Site.



C-1.3 Erie MSA

Figure C-1.3a. Wind Rose for the Erie Air Monitoring Site, 2007-2009.

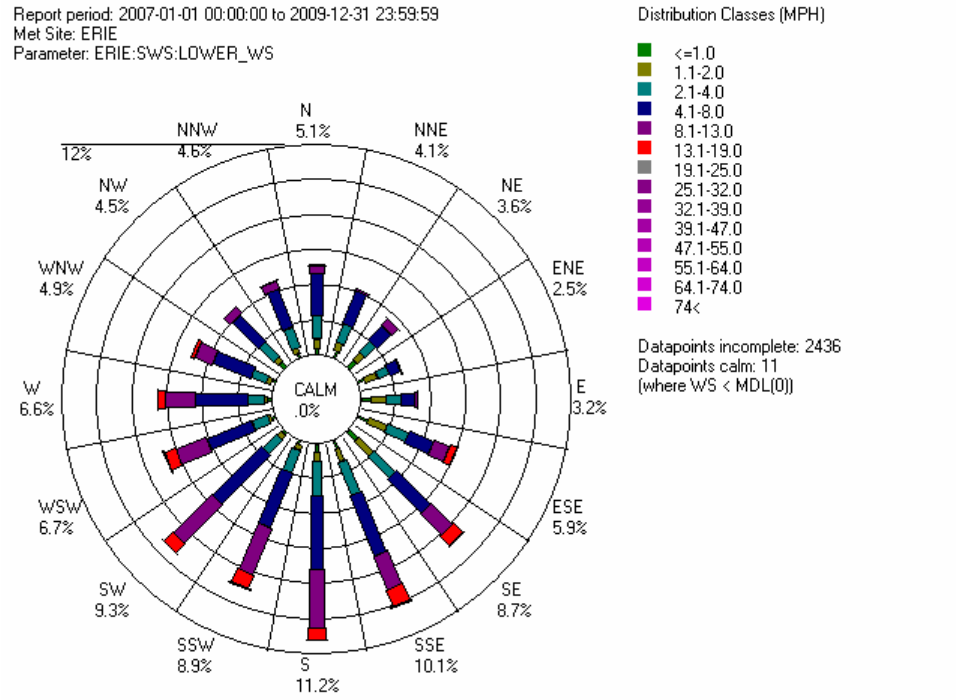


Figure C-1.3b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Erie Air Monitoring Site.

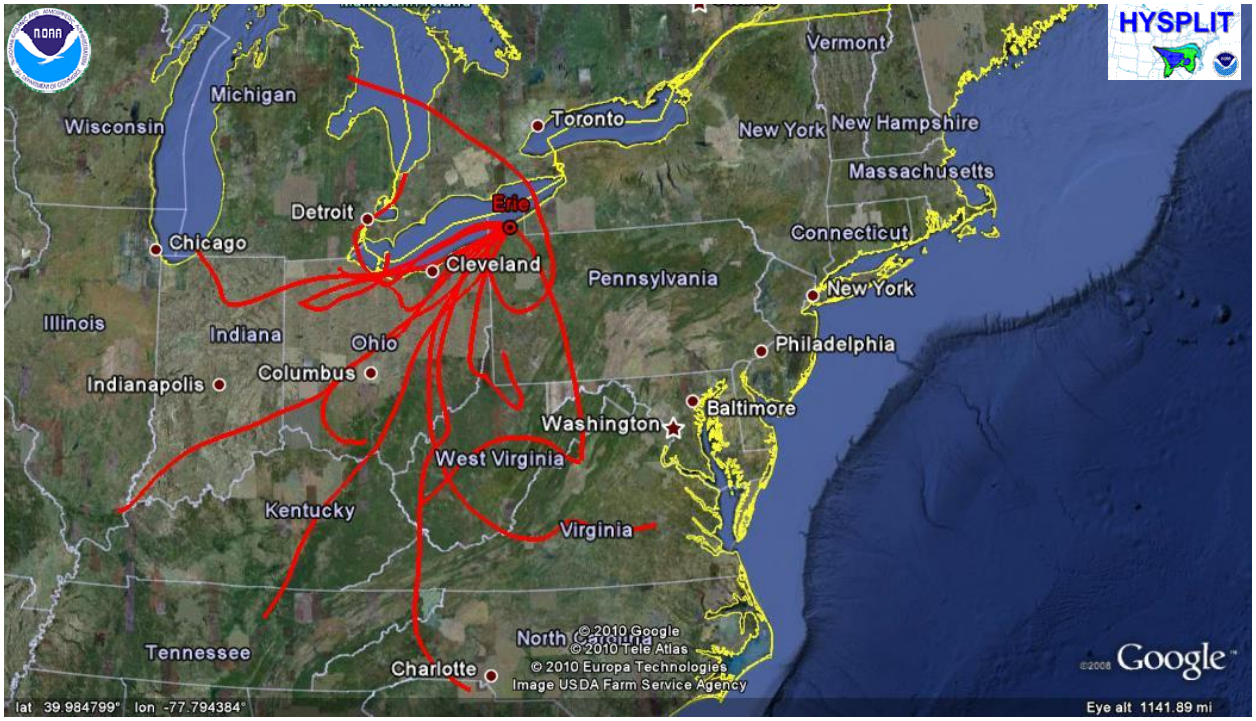
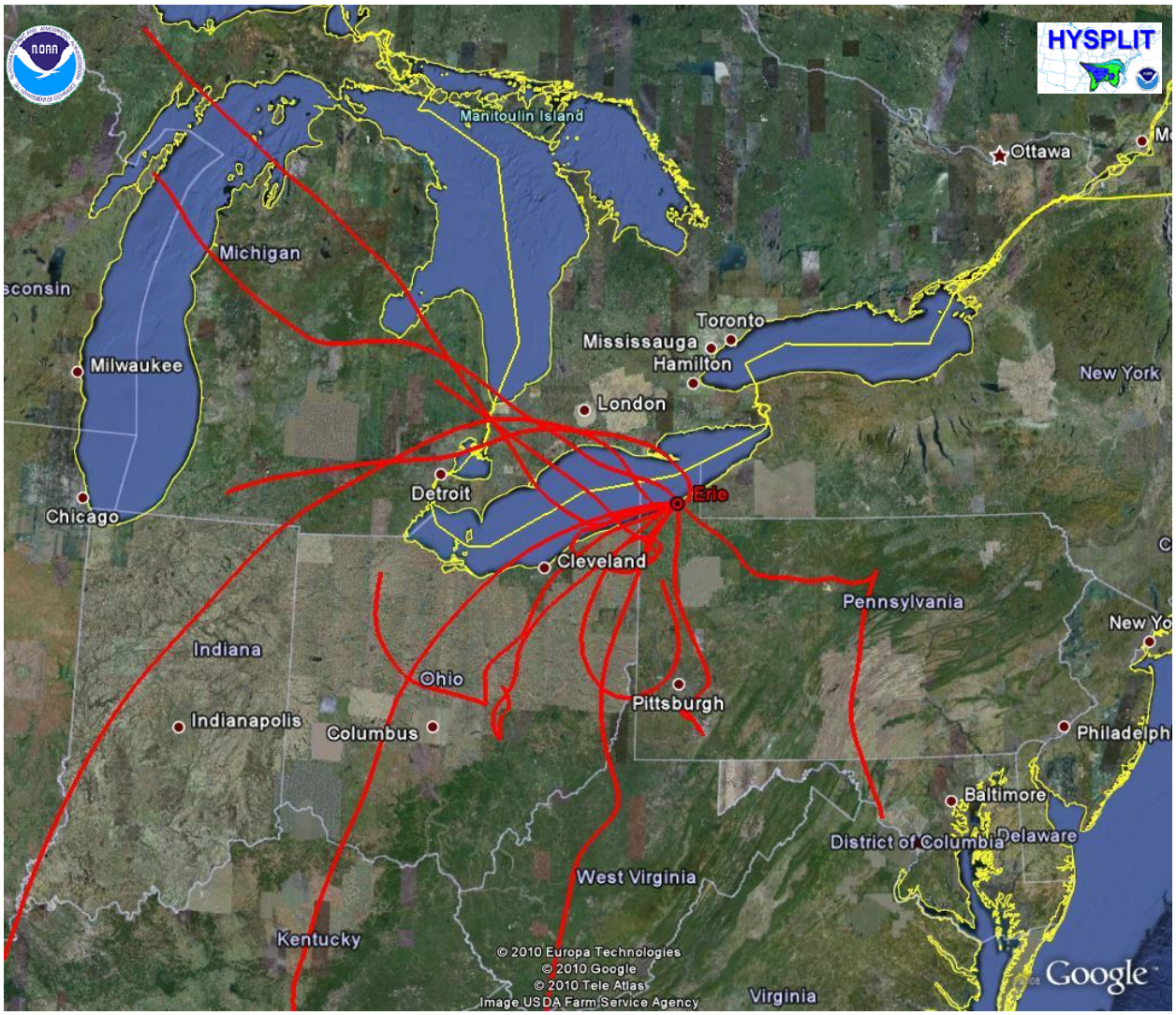


Figure C-1.3c. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Erie Air Monitoring Site.



C-1.4 Harrisburg-Carlisle MSA

Figure C-1.4a. Wind Rose for the Harrisburg Air Monitoring Site, 2007-2009.

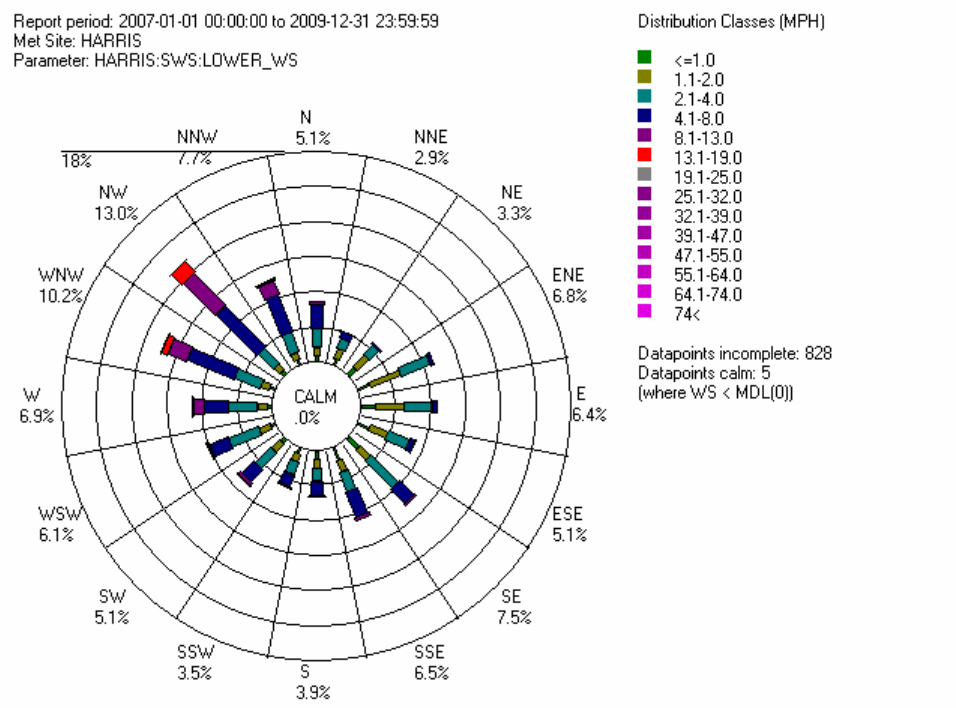


Figure C-1.4b. Wind Rose for the Hershey Air Monitoring Site, 2007-2009.

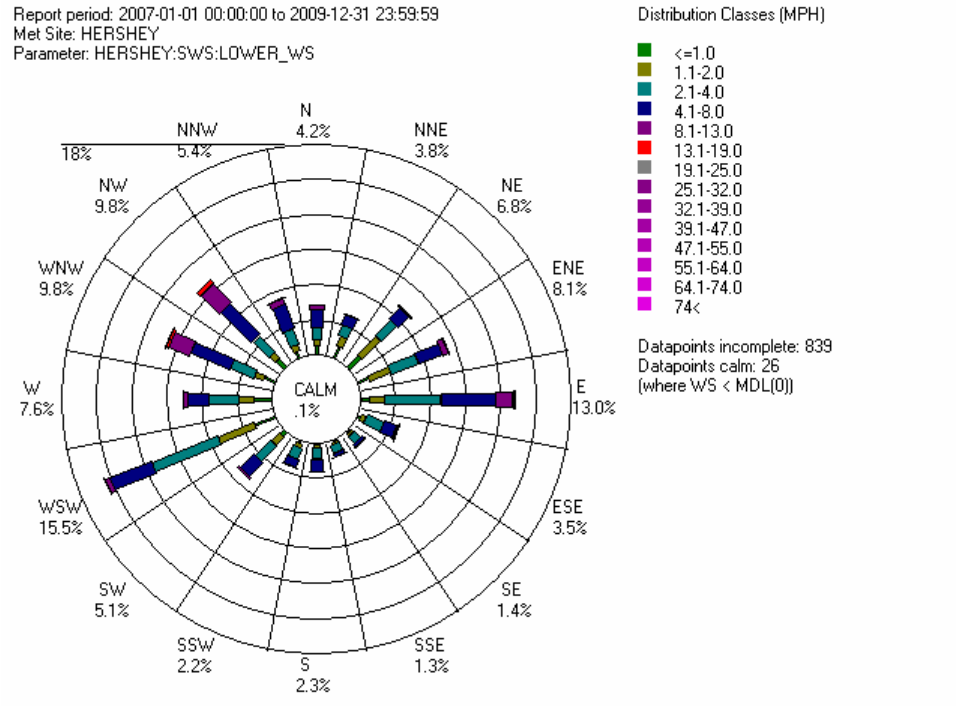


Figure C-1.4c. Wind Rose for the Perry County Air Monitoring Site, 2007-2009.

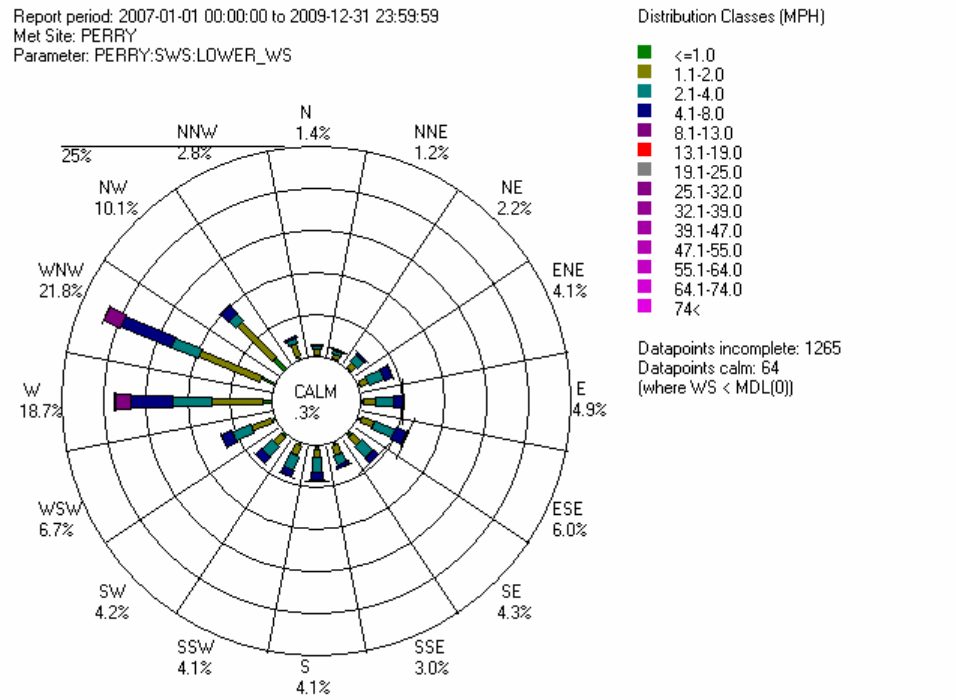


Figure C-1.4d. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Harrisburg Air Monitoring Site.

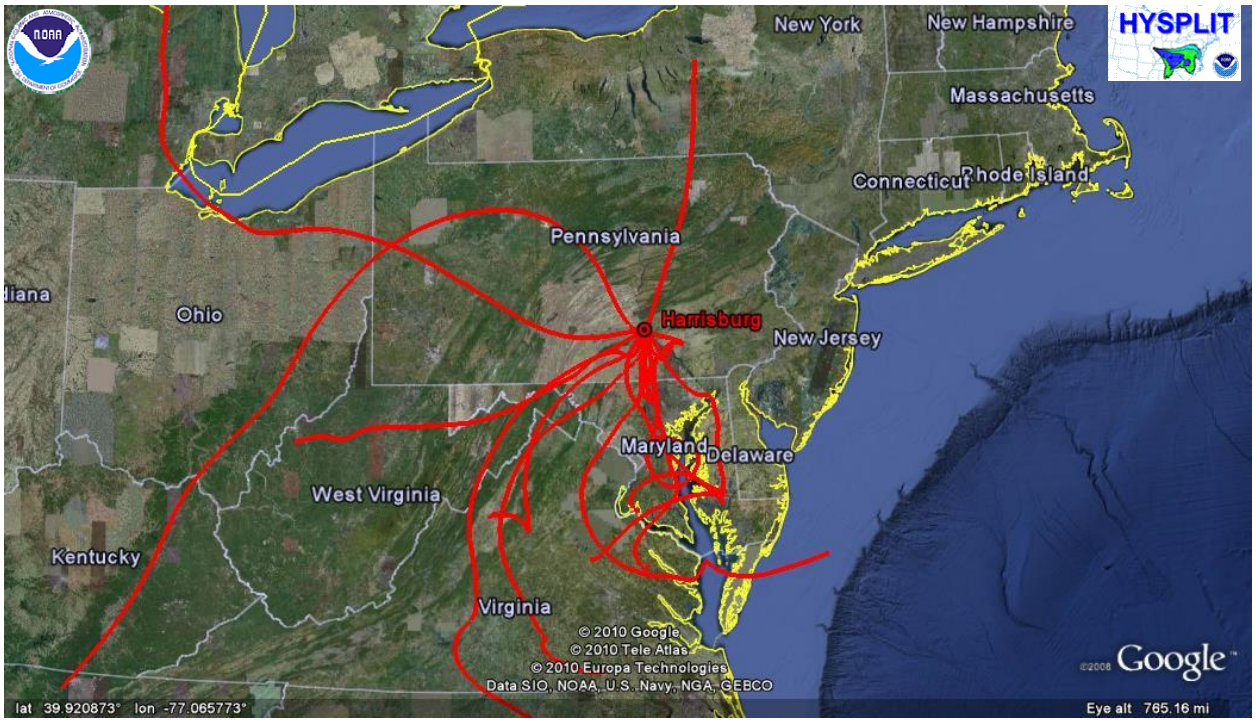


Figure C-1.4e. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Hershey Air Monitoring Site.

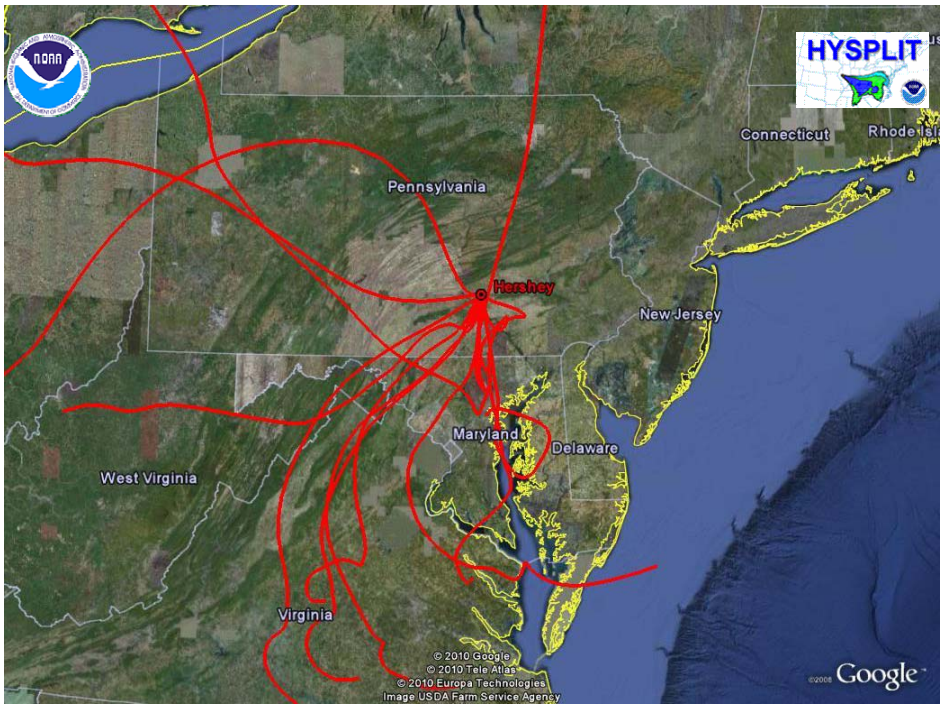


Figure C-1.4f. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Perry County Air Monitoring Site.

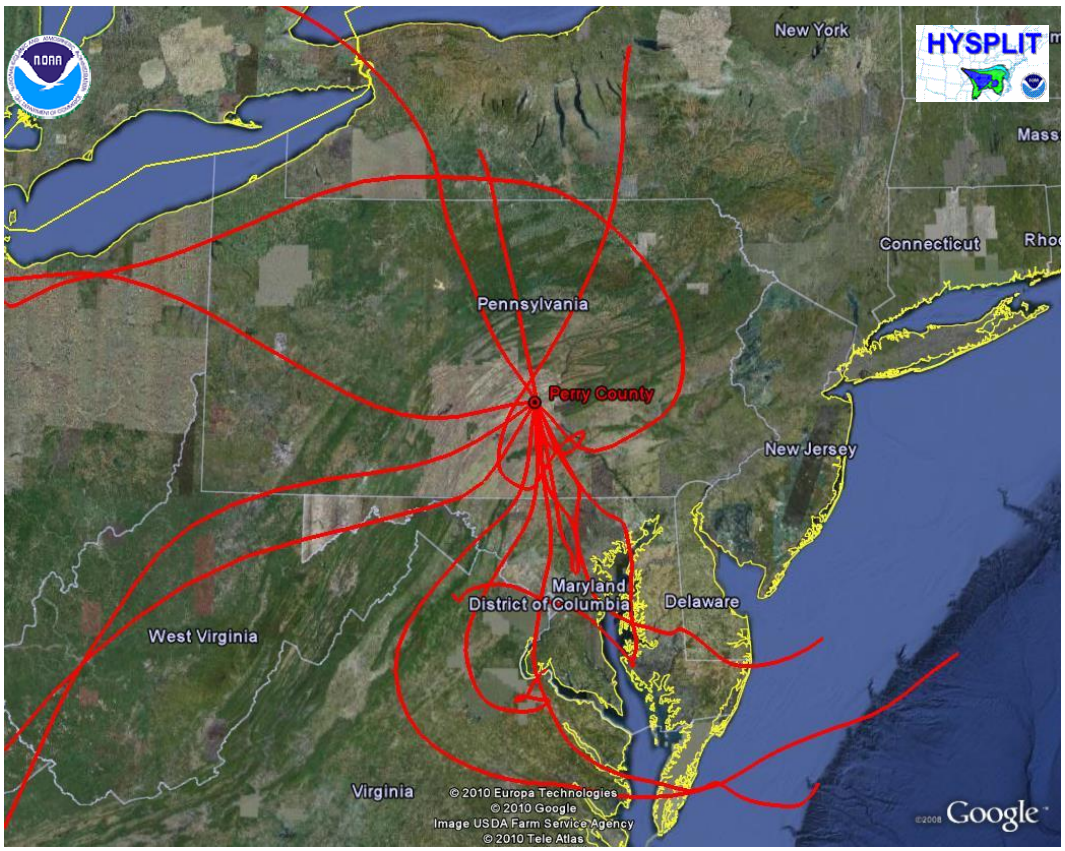


Figure C-1.4g. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Carlisle Air Monitoring Site.

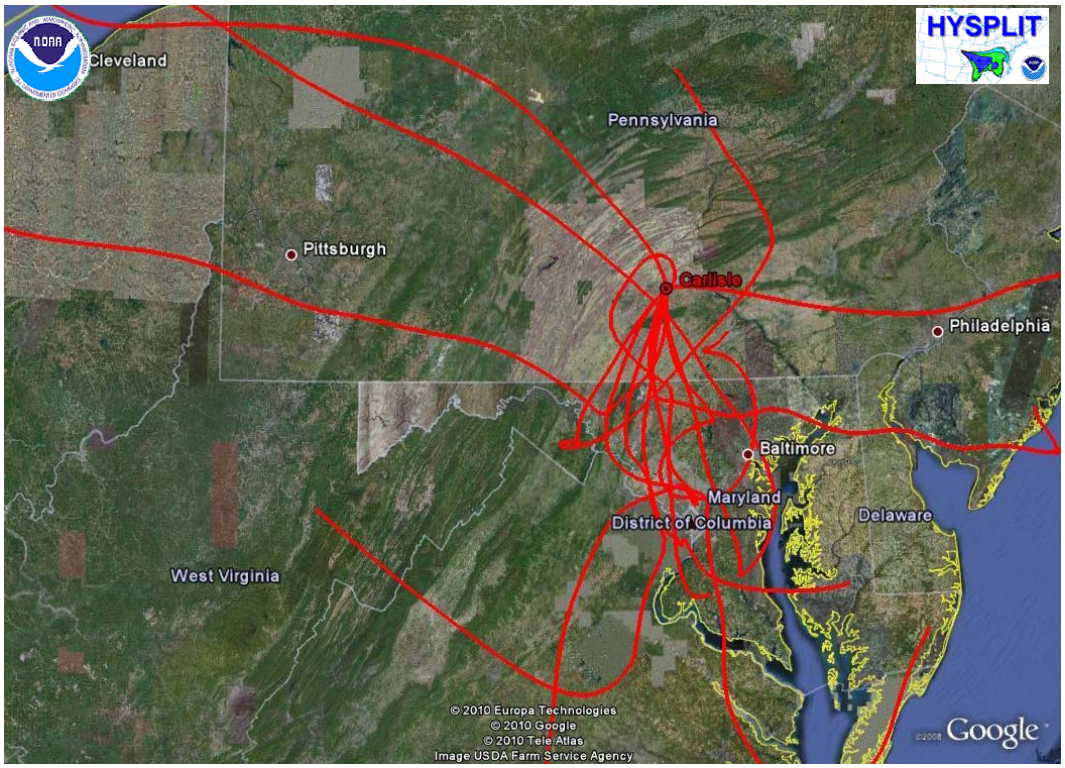
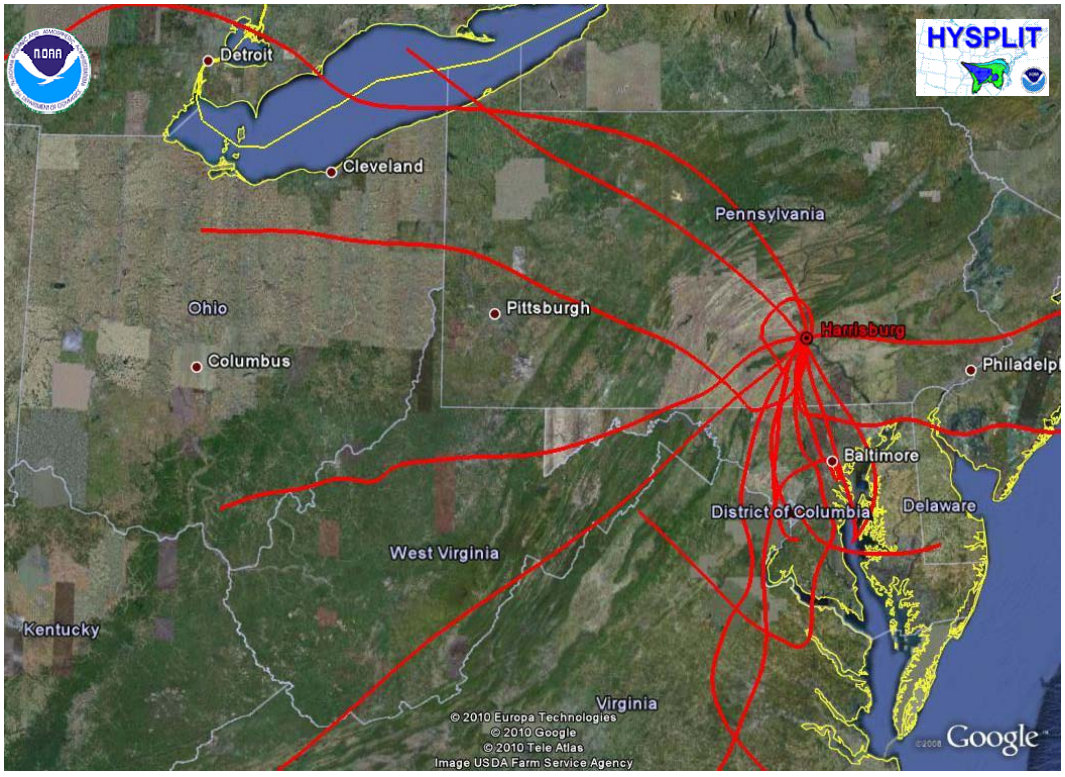


Figure C-1.4h. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Harrisburg Air Monitoring Site.



C-1.5 Johnstown MSA

Figure C-1.5a. Wind Rose for the Johnstown Air Monitoring Site, 2007-2009.

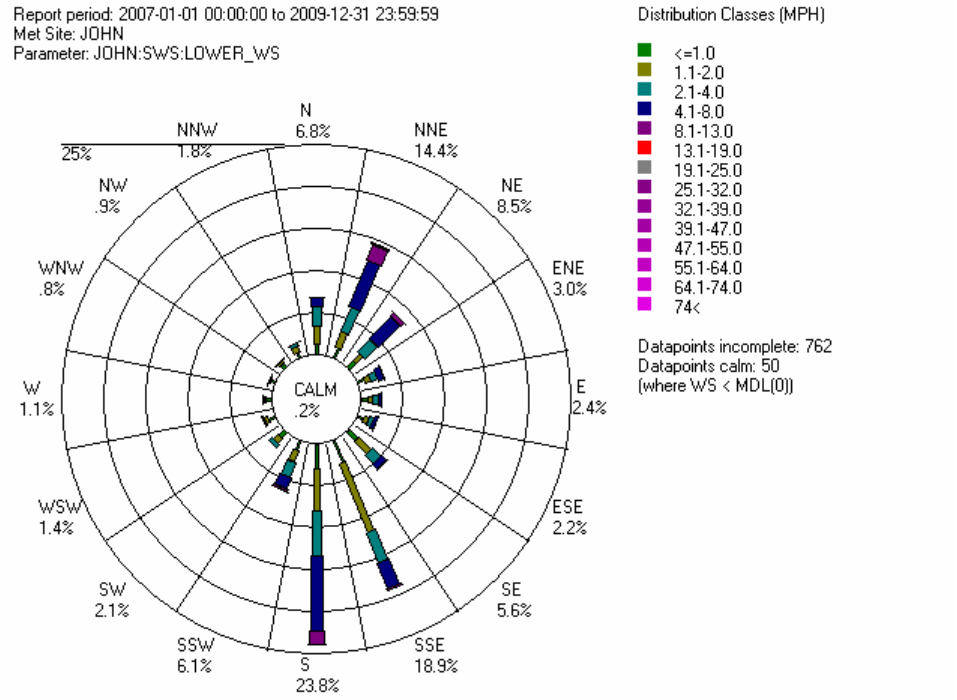


Figure C-1.5b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Johnstown Air Monitoring Site.

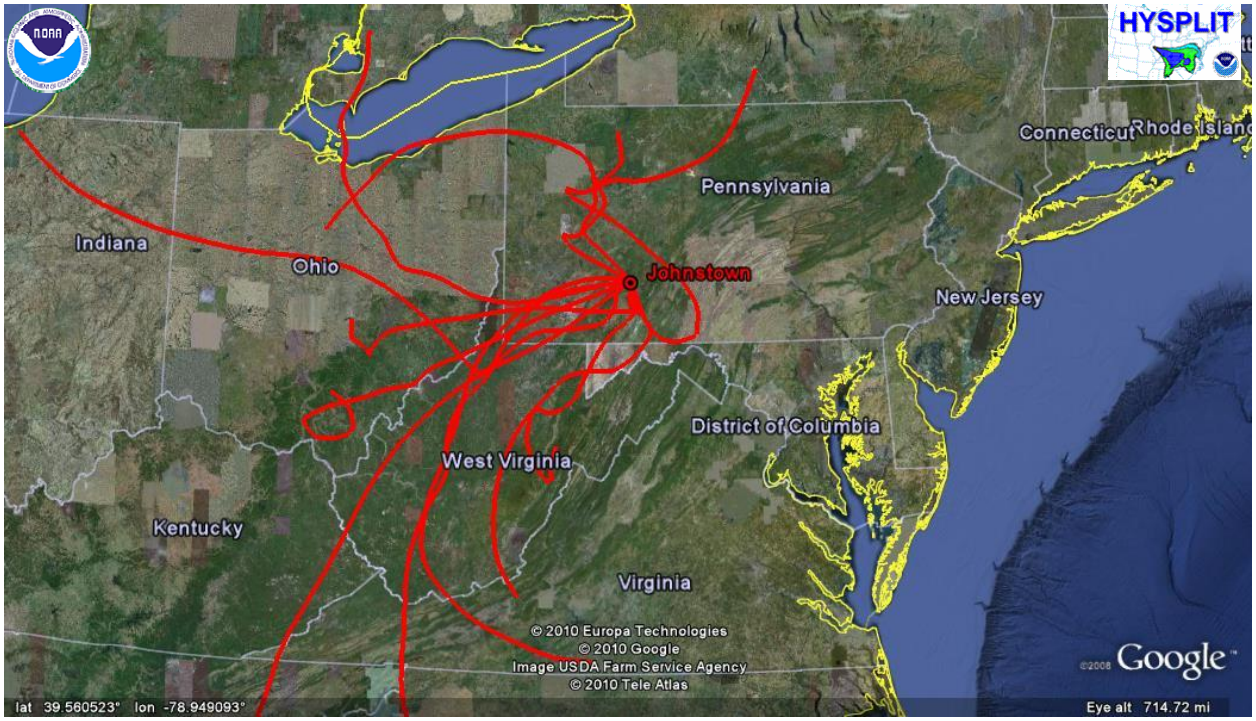
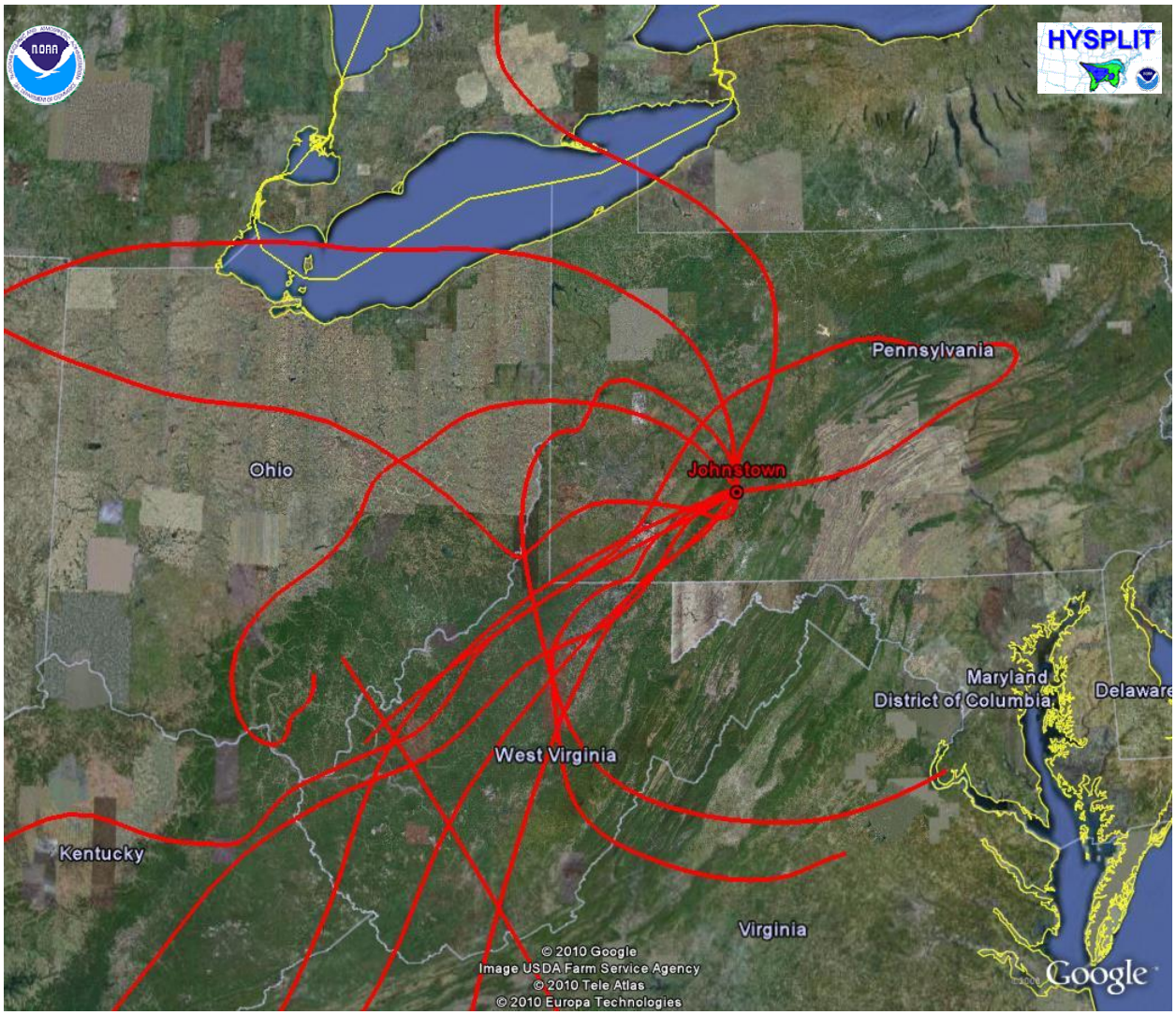


Figure C-1.5c. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Johnstown Air Monitoring Site.



C-1.6 Lancaster MSA

Figure C-1.6a. Wind Rose for the Lancaster Air Monitoring Site, 2007-2009.

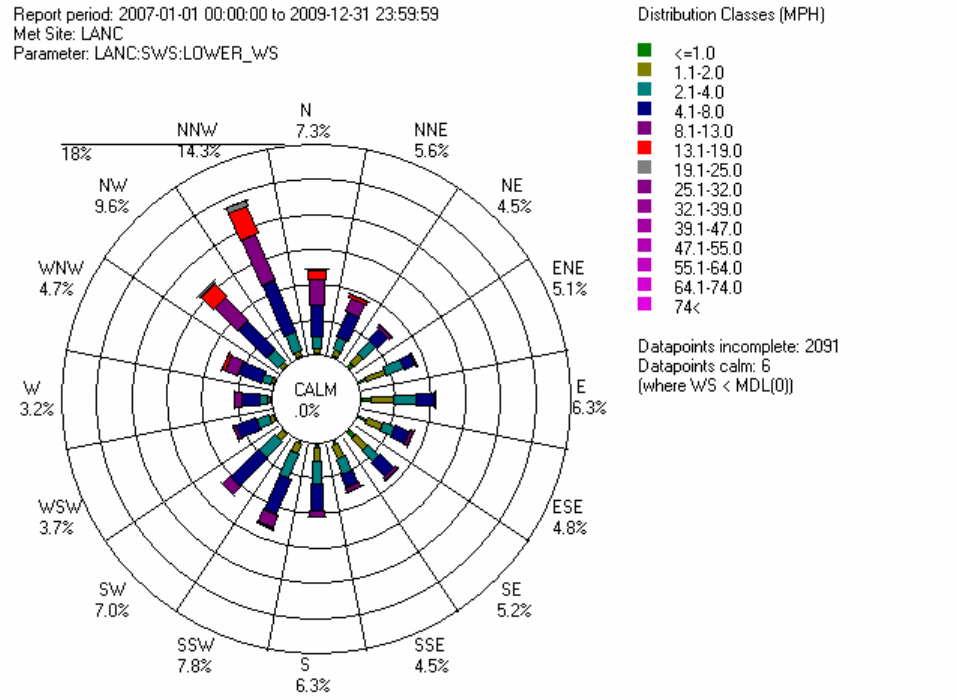


Figure C-1.6b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Lancaster Air Monitoring Site

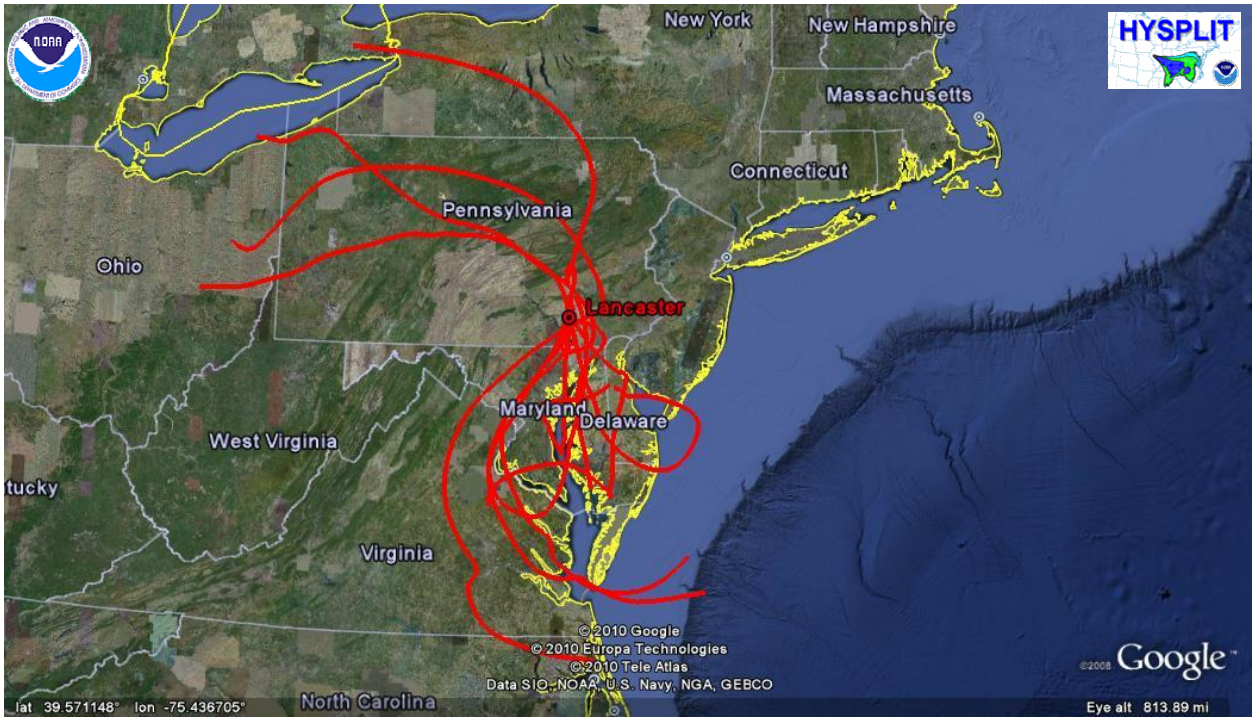


Figure C-1.6c. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Lancaster Downwind Air Monitoring Site

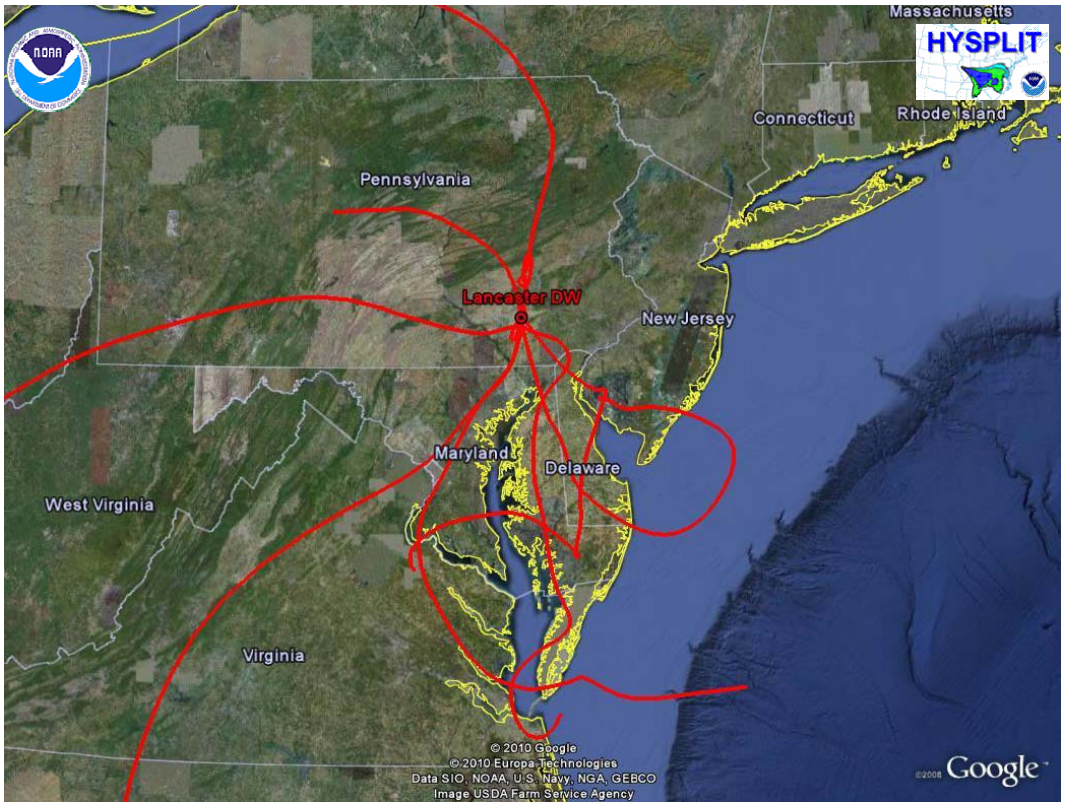
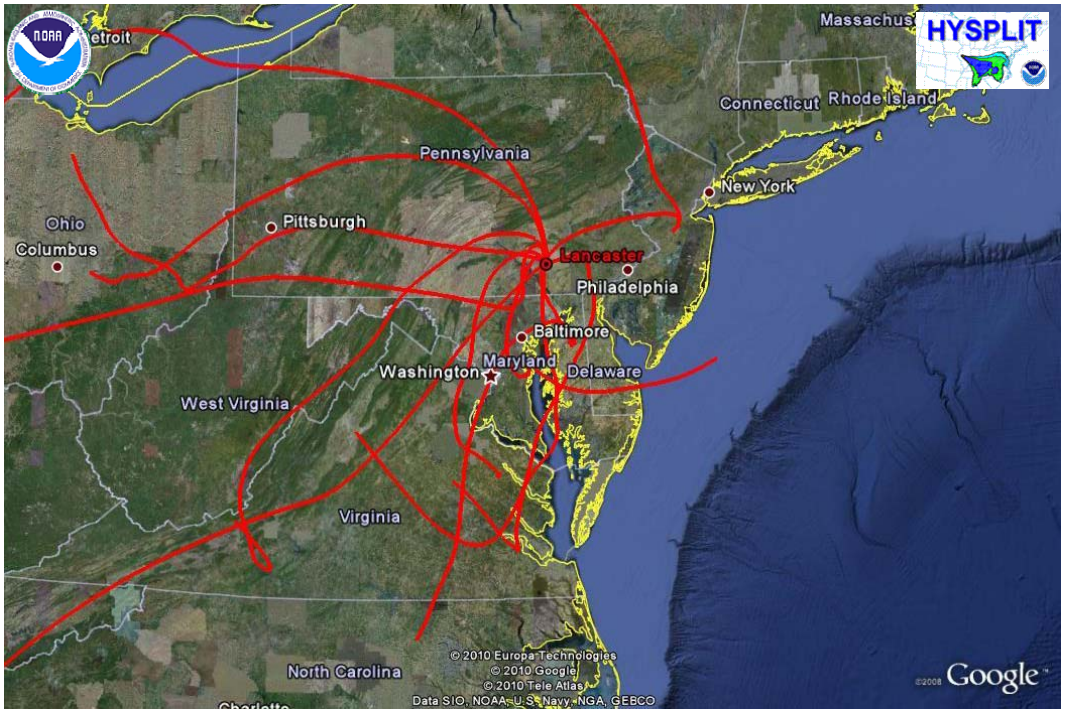


Figure C-1.6d. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Lancaster Air Monitoring Site.



C-1.7 Lebanon MSA

There are currently no sites operated by PA DEP in the Lebanon MSA.

C-1.8 New York-Northern New Jersey-Long Island, NY-NJ-PA MSA

There are currently no sites operated by PA DEP in the New York-Northern New Jersey-Long Island, NY-NJ-PA MSA.

C-1.9 Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA

Figure C-1.9a. Wind Rose for the Bristol Air Monitoring Site, 2007-2009.

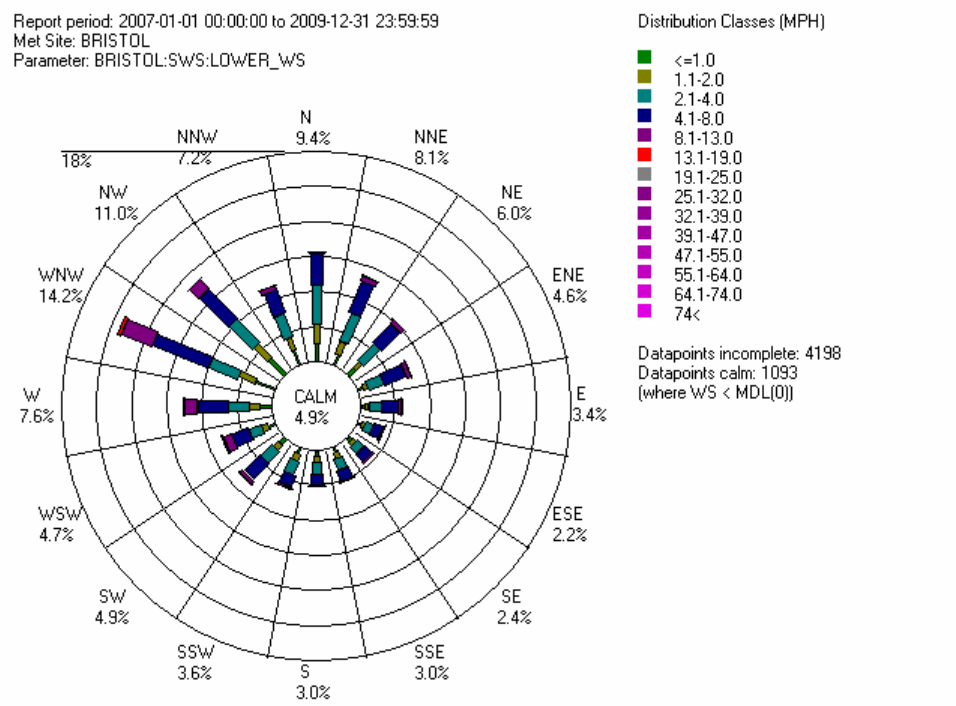


Figure C-1.9b. Wind Rose for the New Garden Air Monitoring Site, 2007-2009.

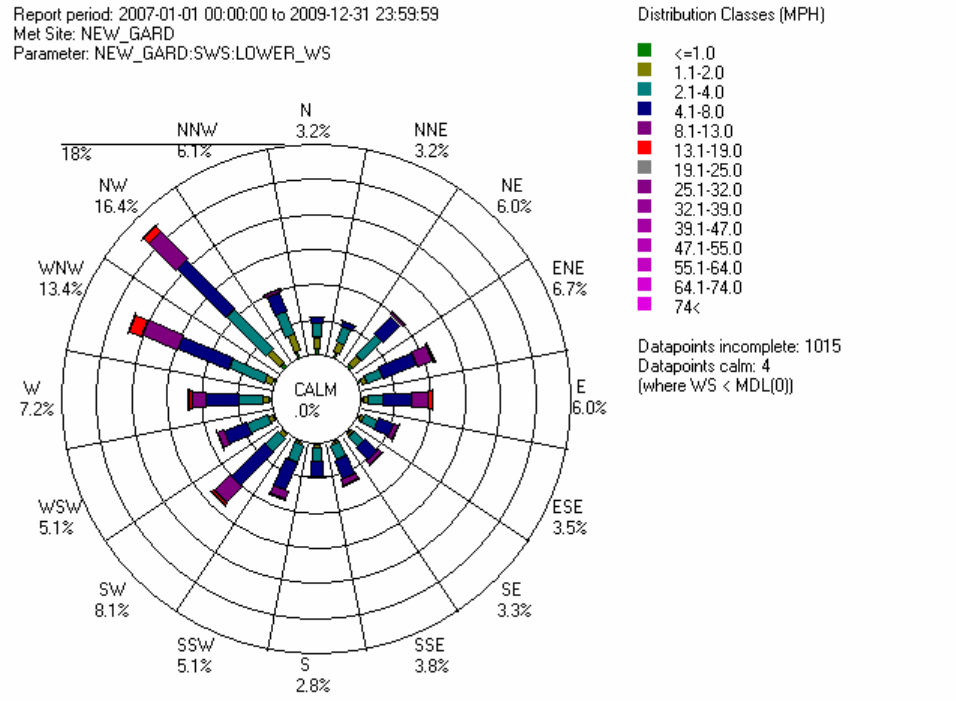


Figure C-1.9c. Wind Rose for the Chester Air Monitoring Site, 2007-2009.

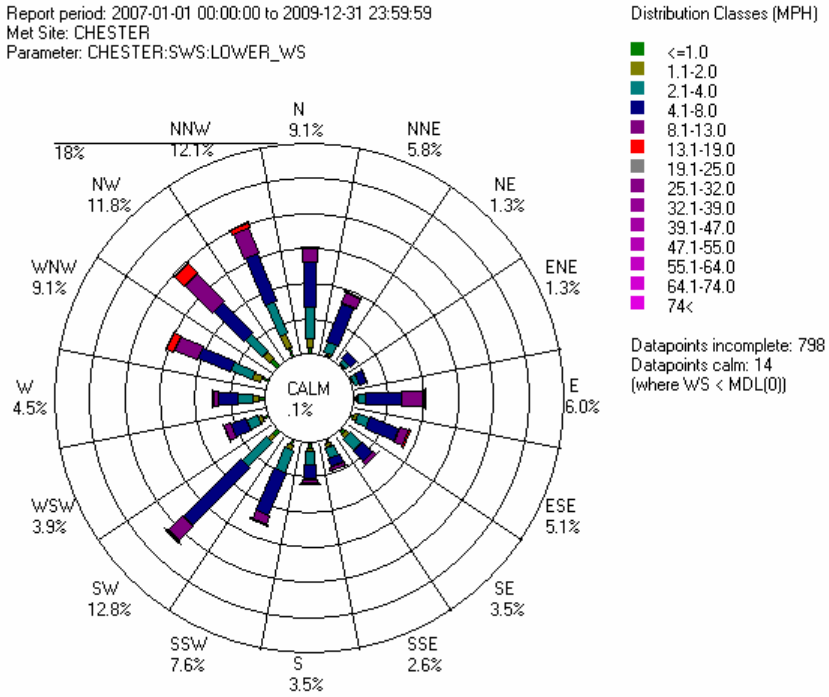


Figure C-1.9d. Wind Rose for the Norristown Air Monitoring Site, 2007-2009.

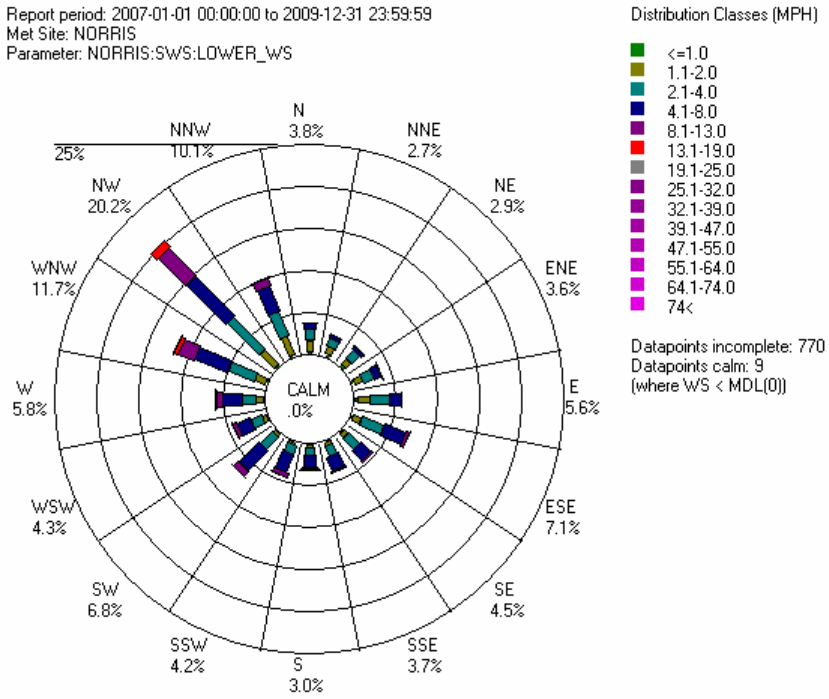


Figure C-1.9e. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Bristol Air Monitoring Site.

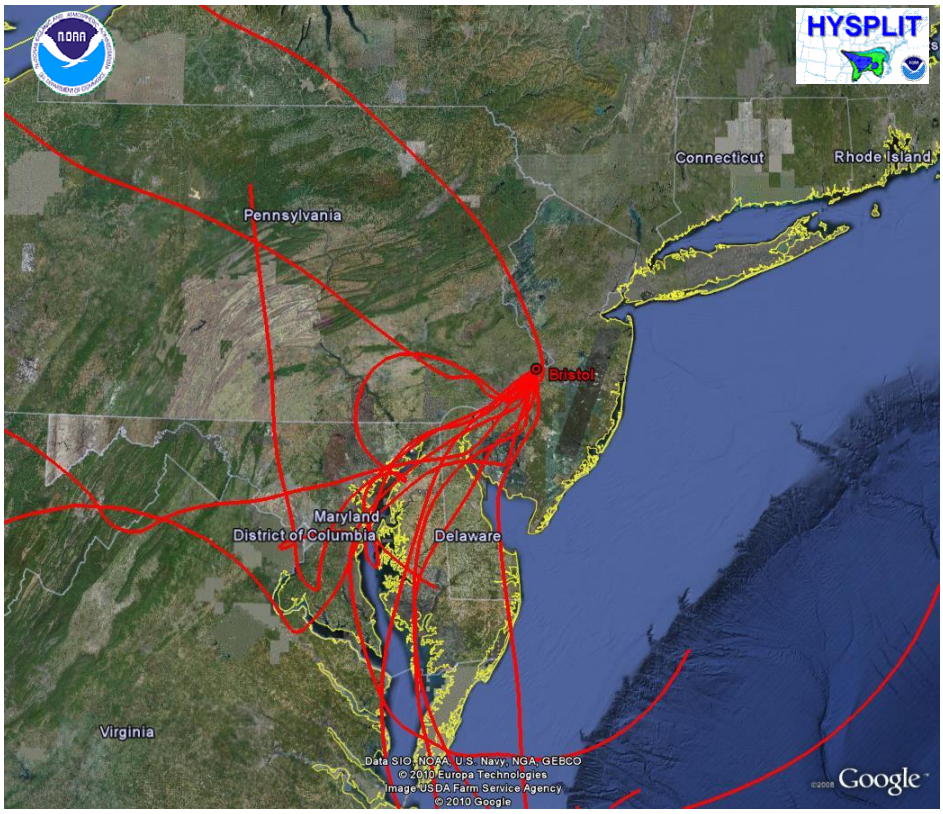


Figure C-1.9f. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, New Garden Air Monitoring Site.

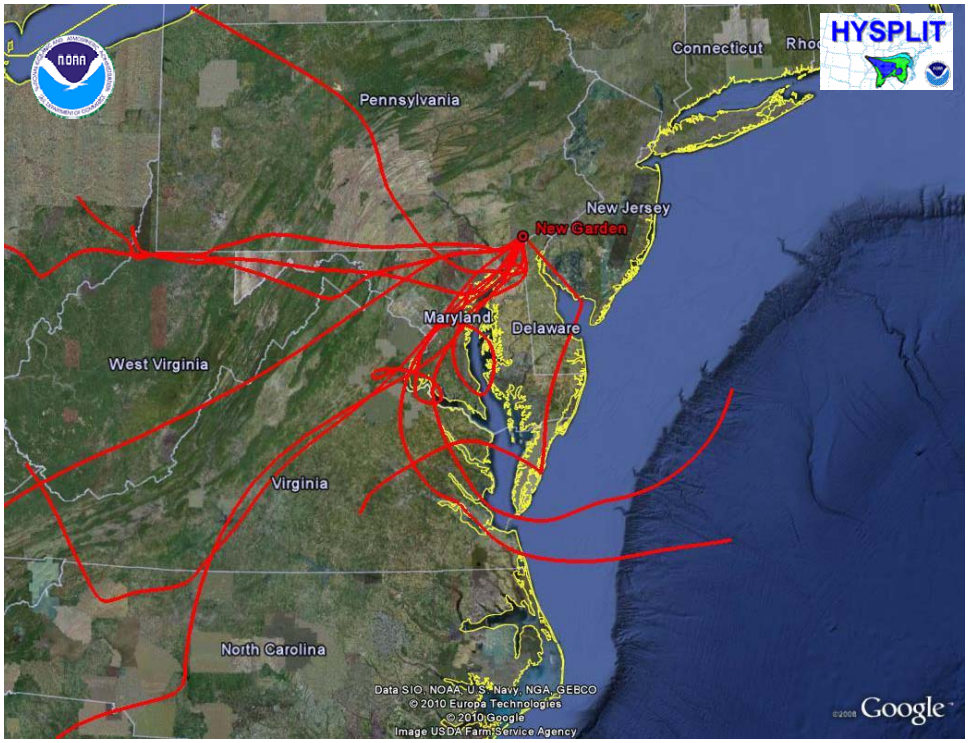


Figure C-1.9g. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Chester Air Monitoring Site.

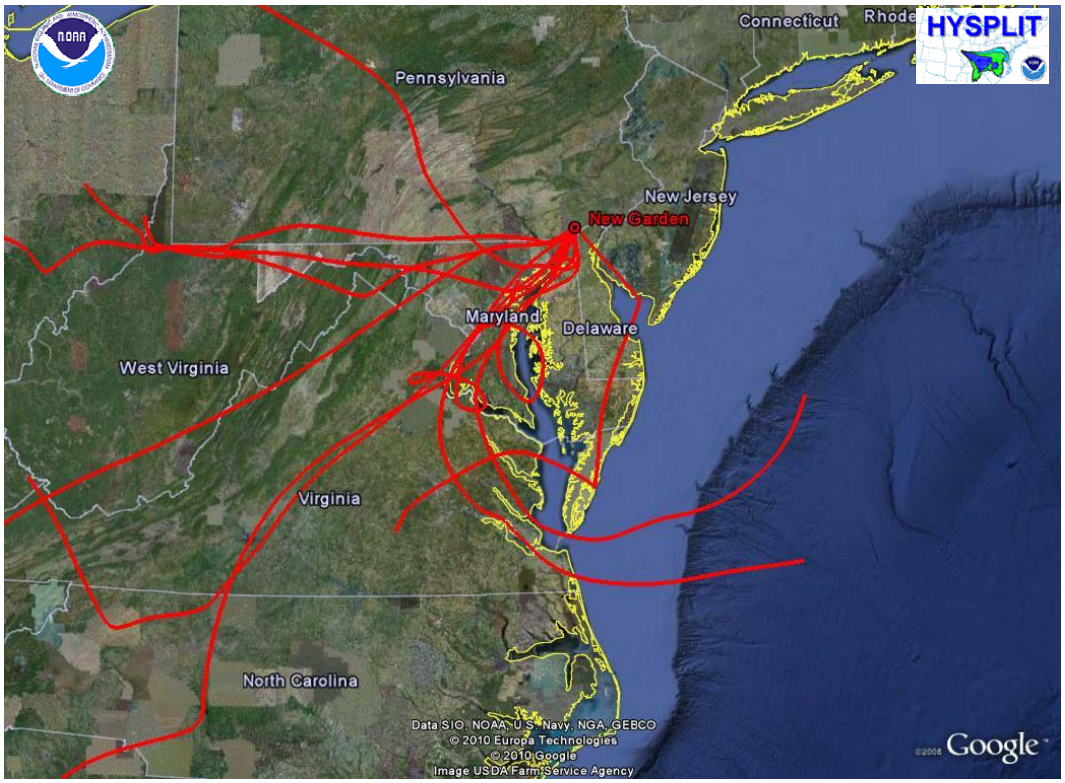


Figure C-1.9h. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Norristown Air Monitoring Site.

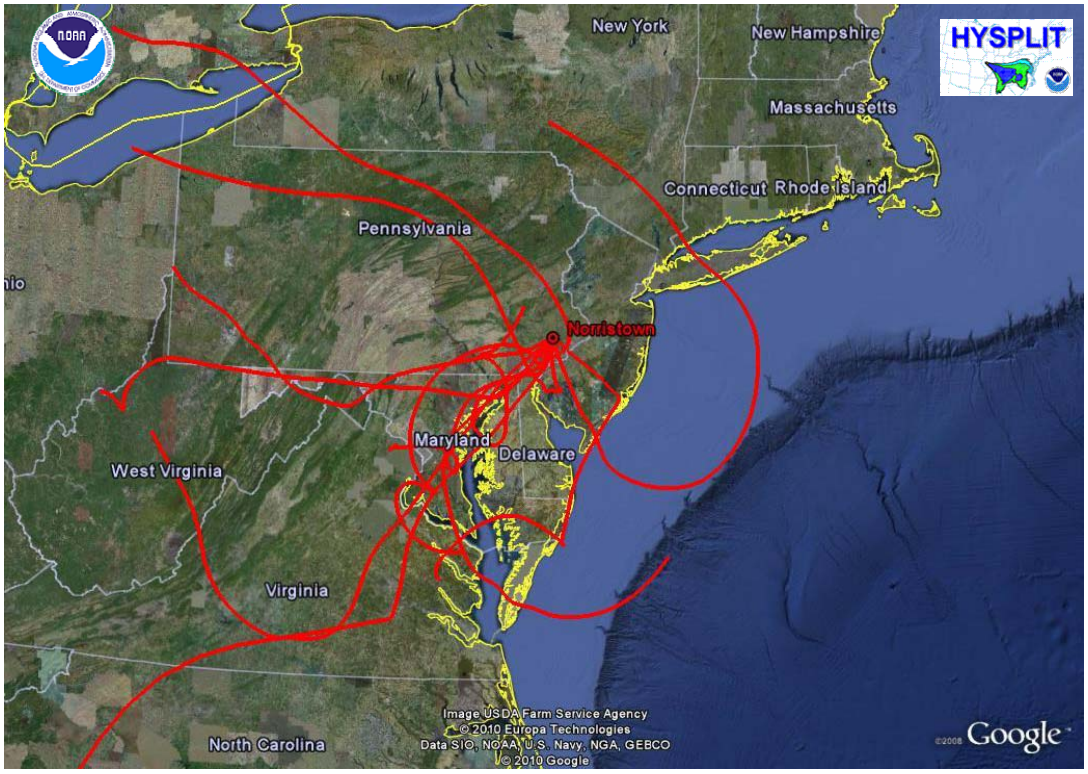


Figure C-1.6i. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Bristol Air Monitoring Site.

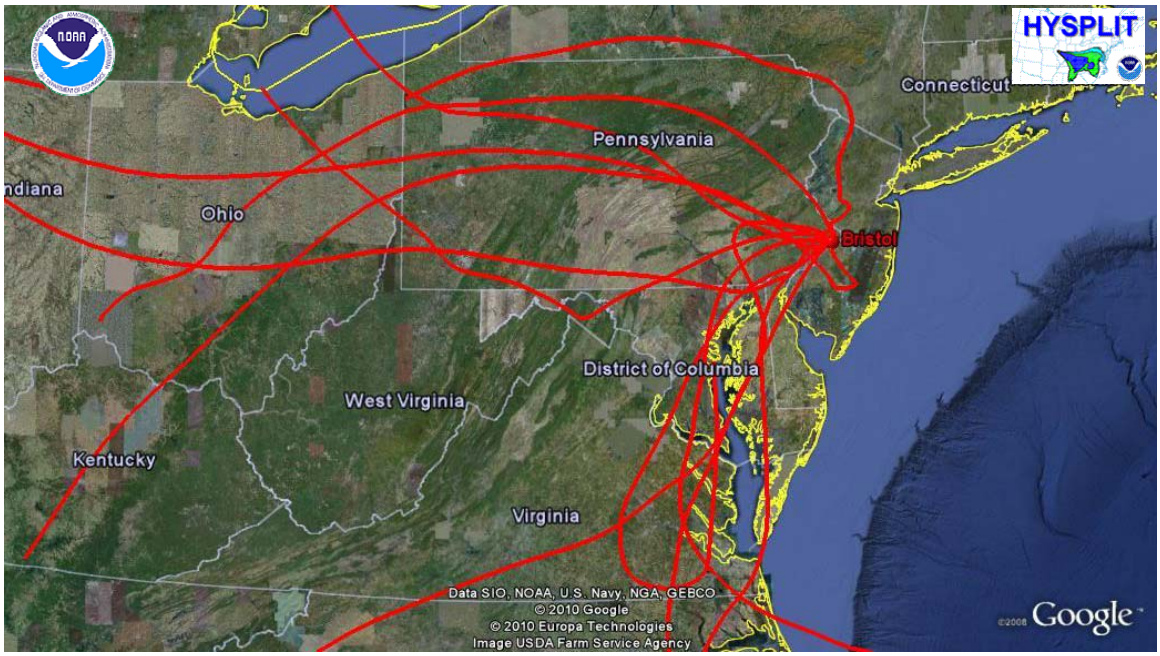


Figure C-1.6j. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, New Garden Air Monitoring Site.

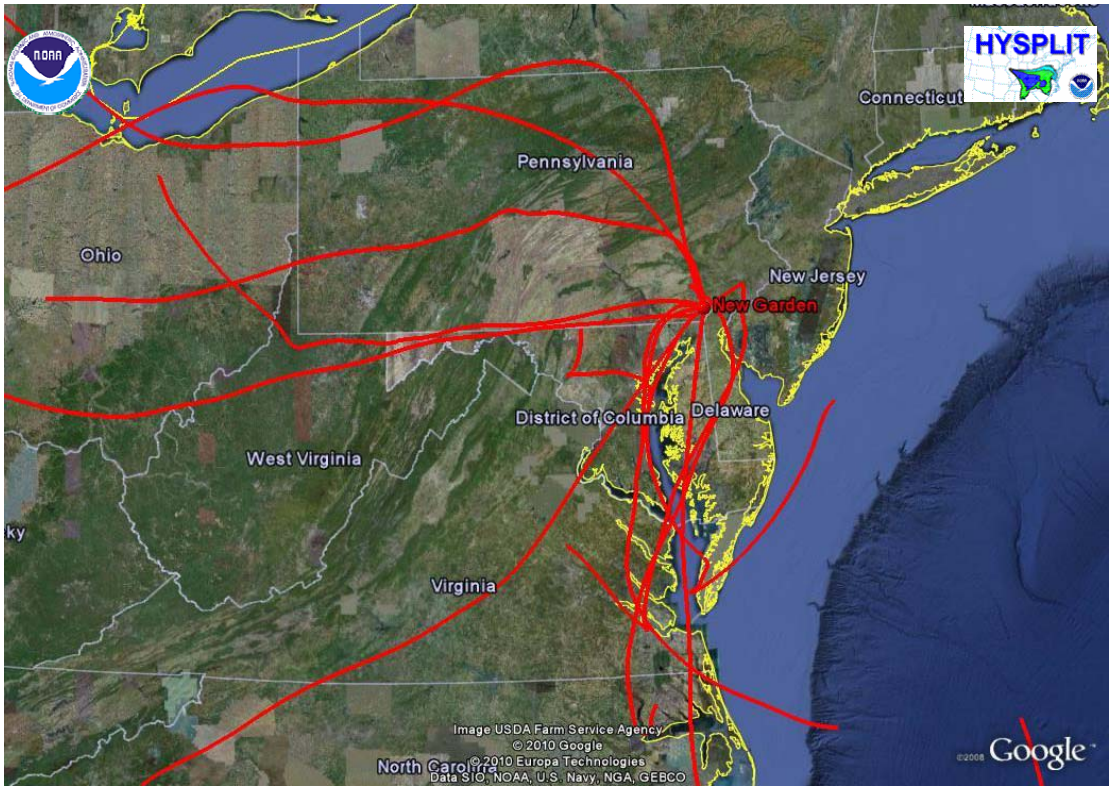


Figure C-1.6k. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Chester Air Monitoring Site.

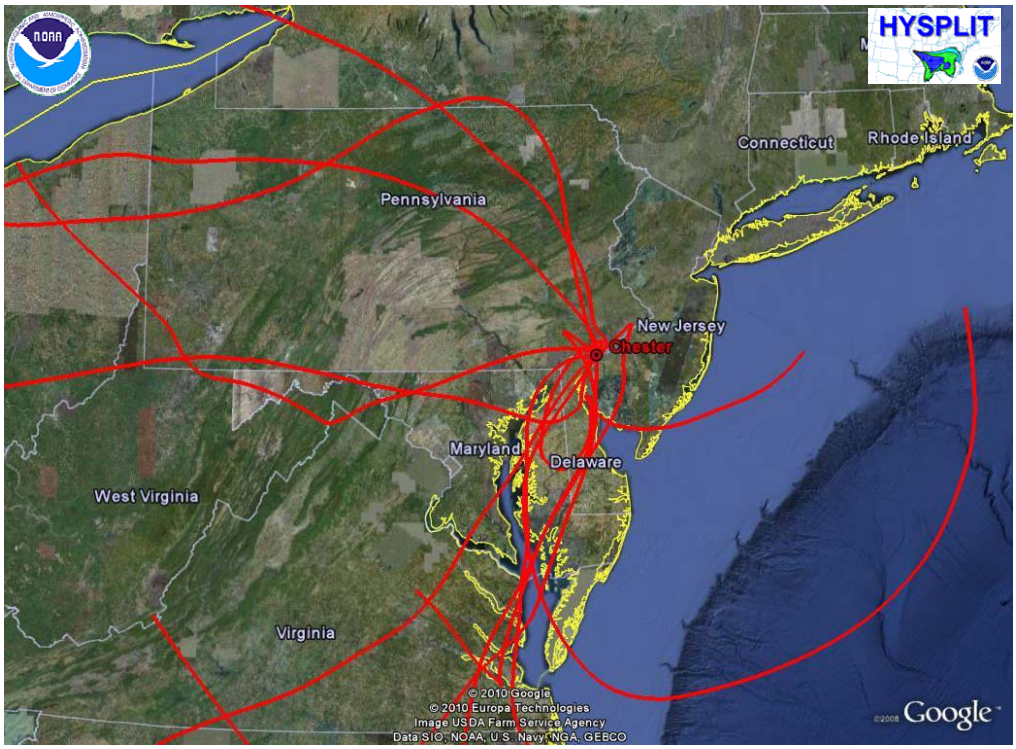
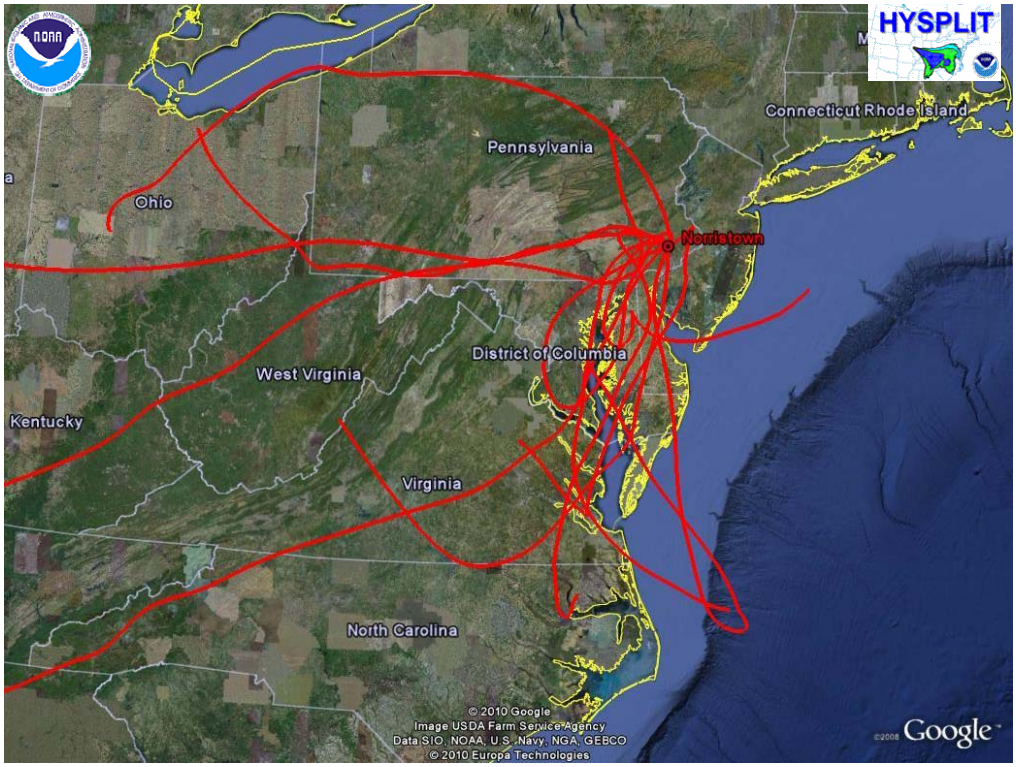


Figure C-1.6l. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Norristown Air Monitoring Site.



C-1.10 Pittsburgh MSA

Figure C-1.10a. Wind Rose for the Pittsburgh Air Monitoring Site, 2007-2009.

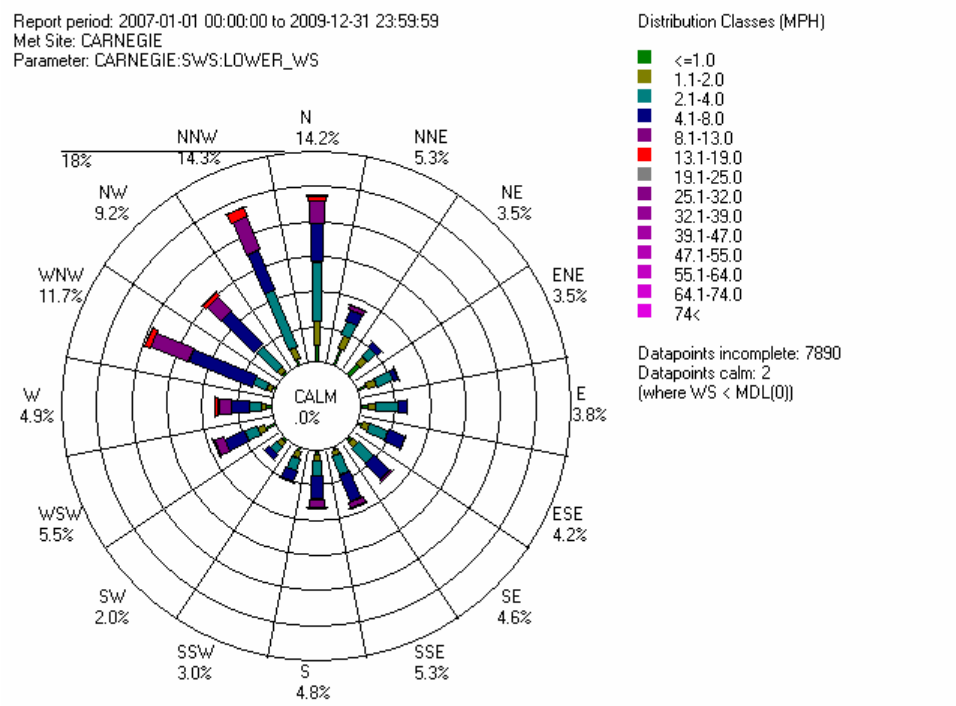


Figure C-1.10b. Wind Rose for the Kittanning Air Monitoring Site, 2007-2009.

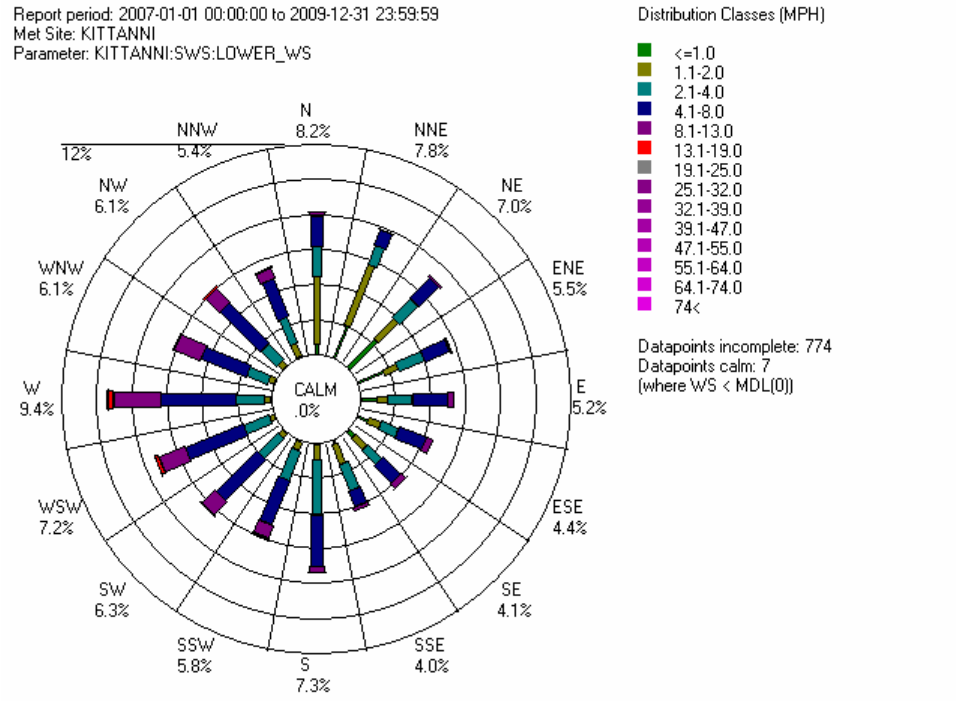


Figure C-1.10c. Wind Rose for the Beaver Falls Air Monitoring Site, 2007-2009.

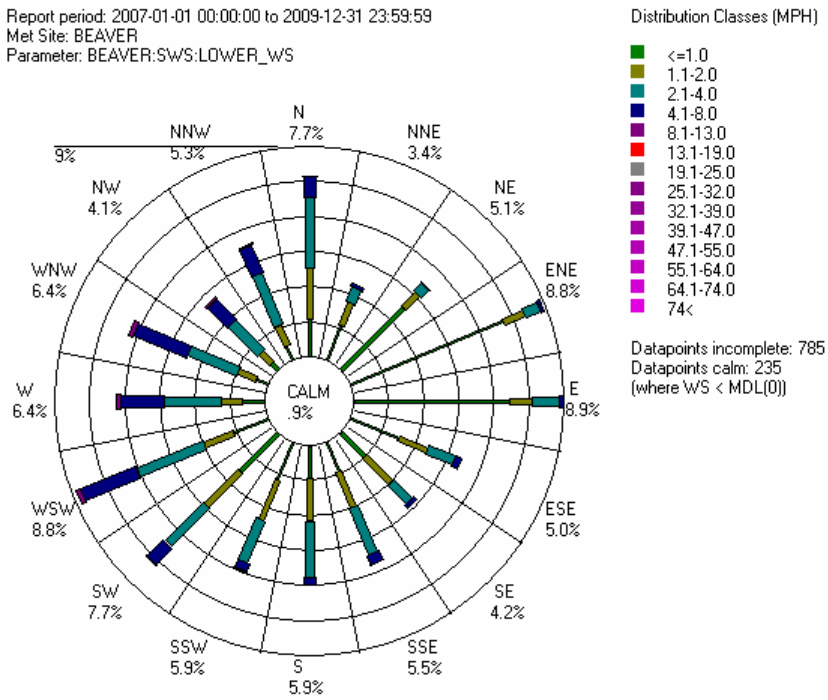


Figure C-1.10d. Wind Rose for the Brighton Township Air Monitoring Site, 2007-2009.

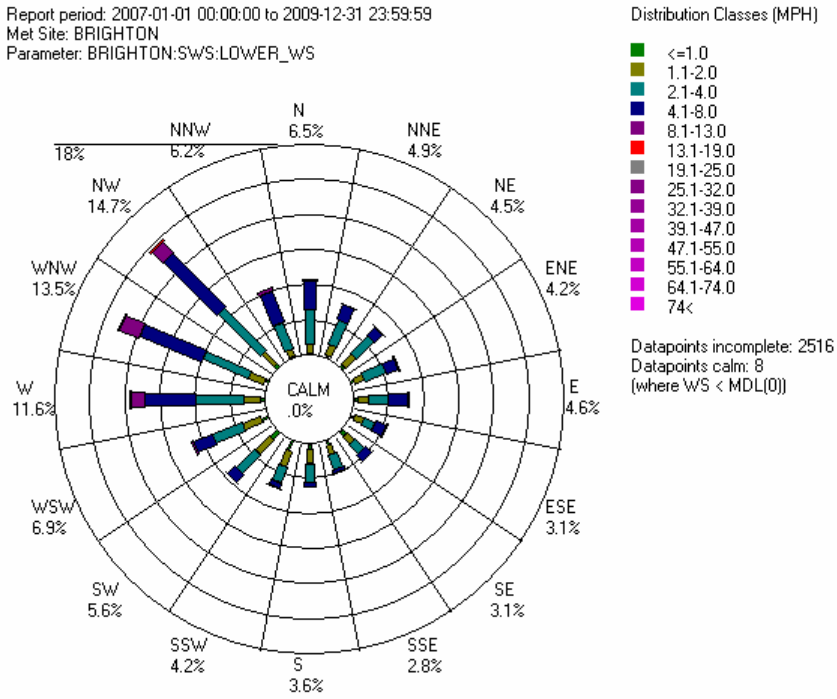


Figure C-1.10e. Wind Rose for the Hookstown Air Monitoring Site, 2007-2009.

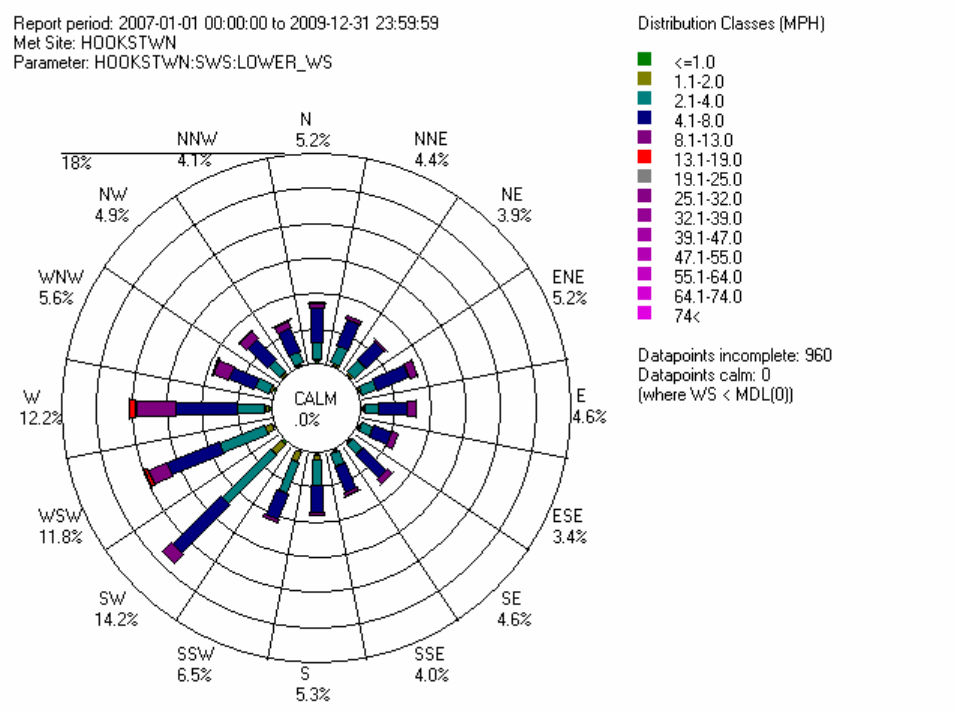


Figure C-1.10f. Wind Rose for the Charleroi Air Monitoring Site, 2007-2009.

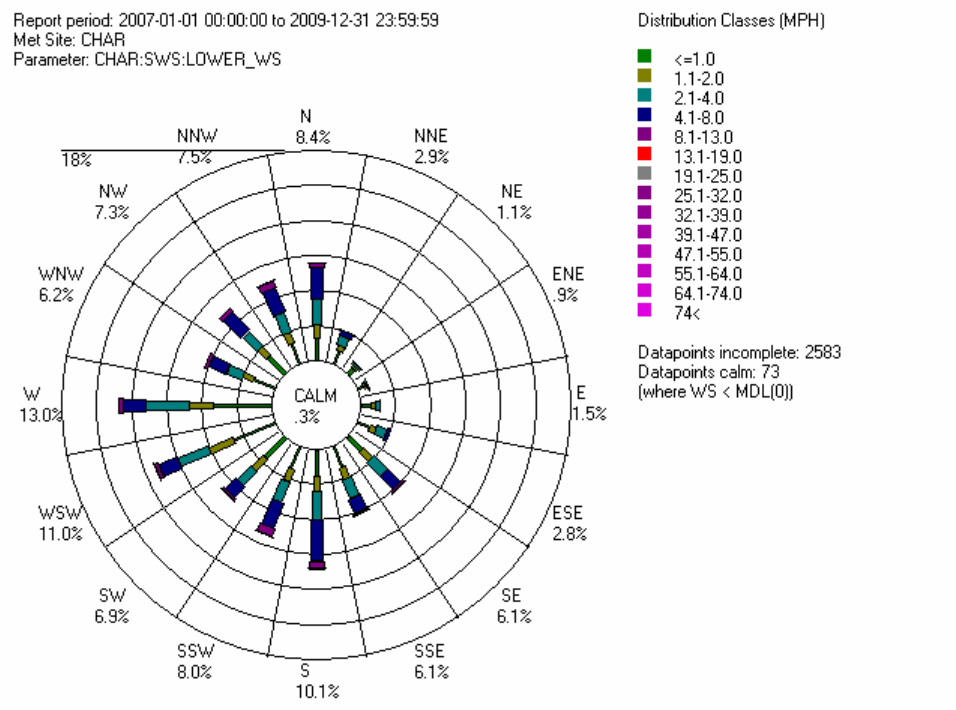


Figure C-1.10g. Wind Rose for the Florence Air Monitoring Site, 2007-2009.

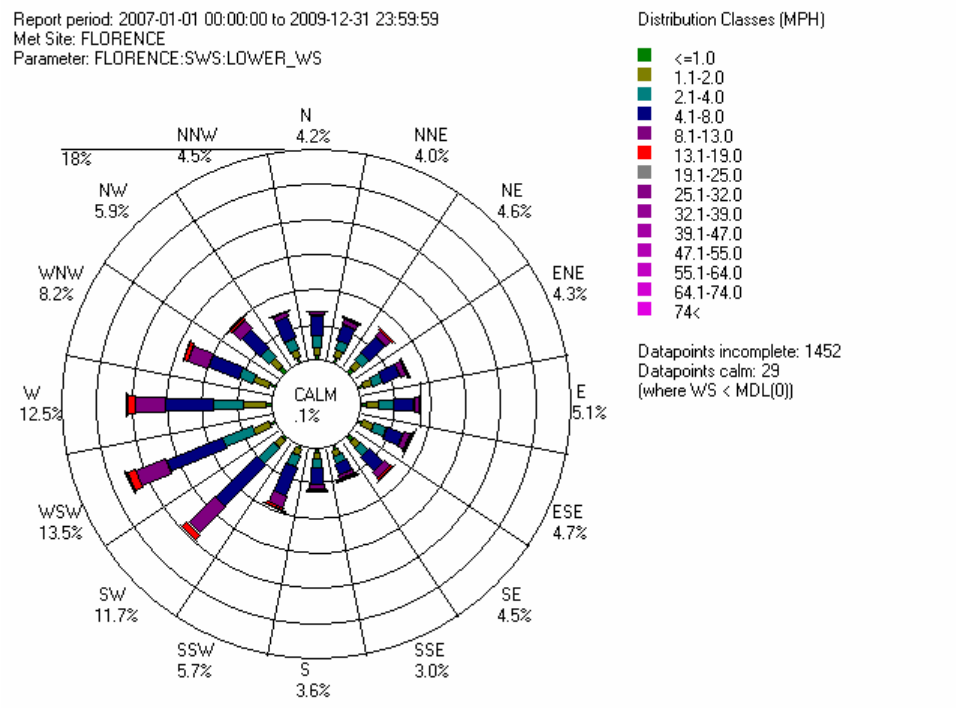


Figure C-1.10h. Wind Rose for the Washington Air Monitoring Site, 2007-2009.

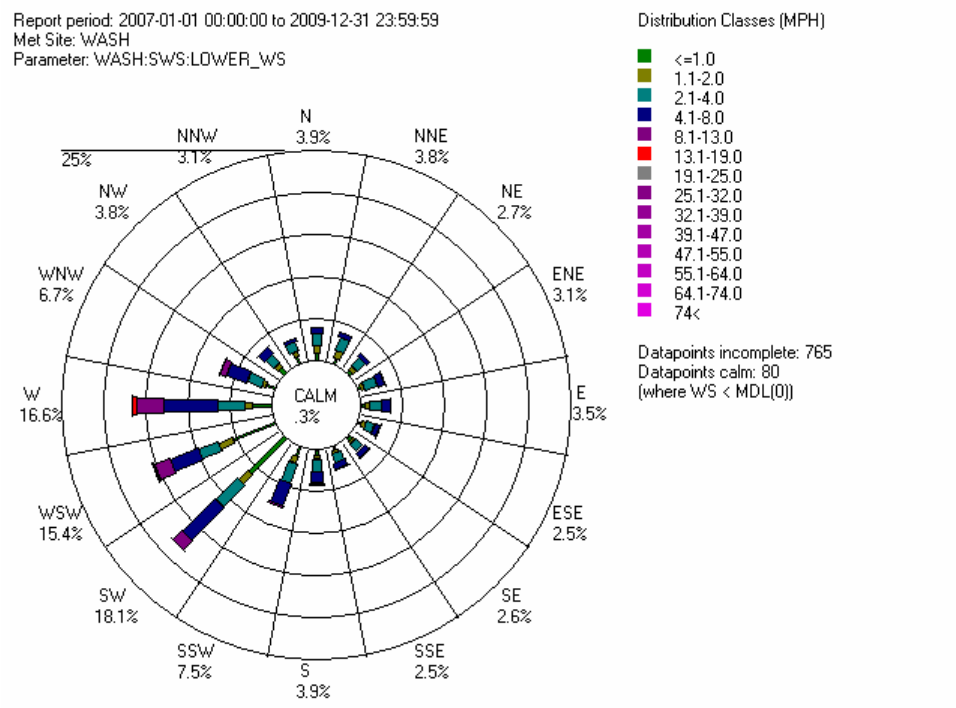


Figure C-1.10i. Wind Rose for the Greensburg Air Monitoring Site, 2007-2009.

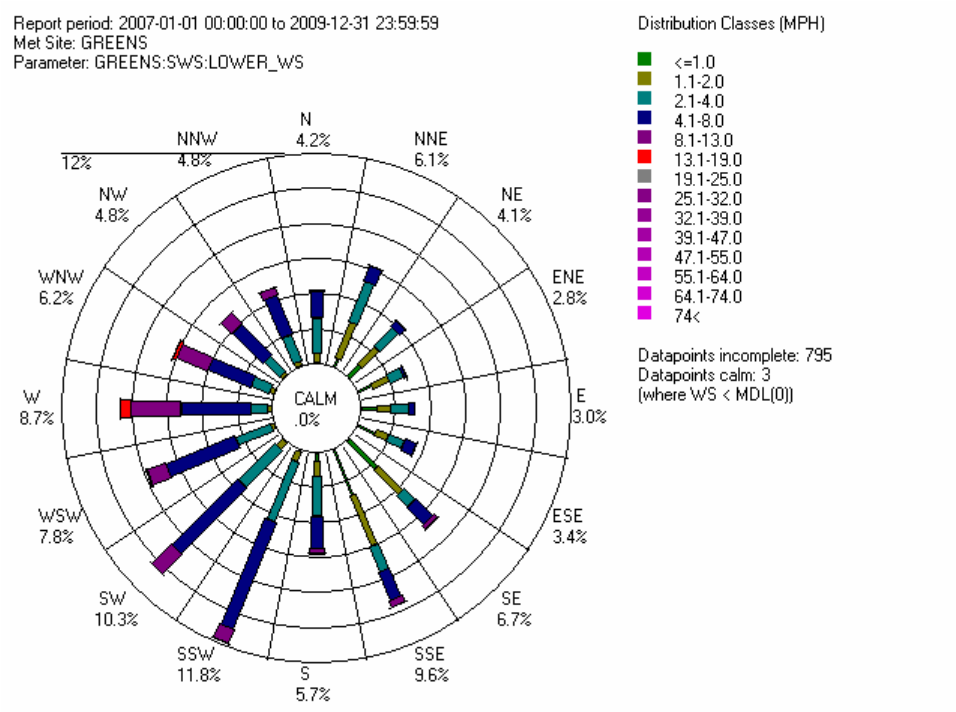


Figure C-1.10j. Wind Rose for the Murrysville Air Monitoring Site, 2007-2009.

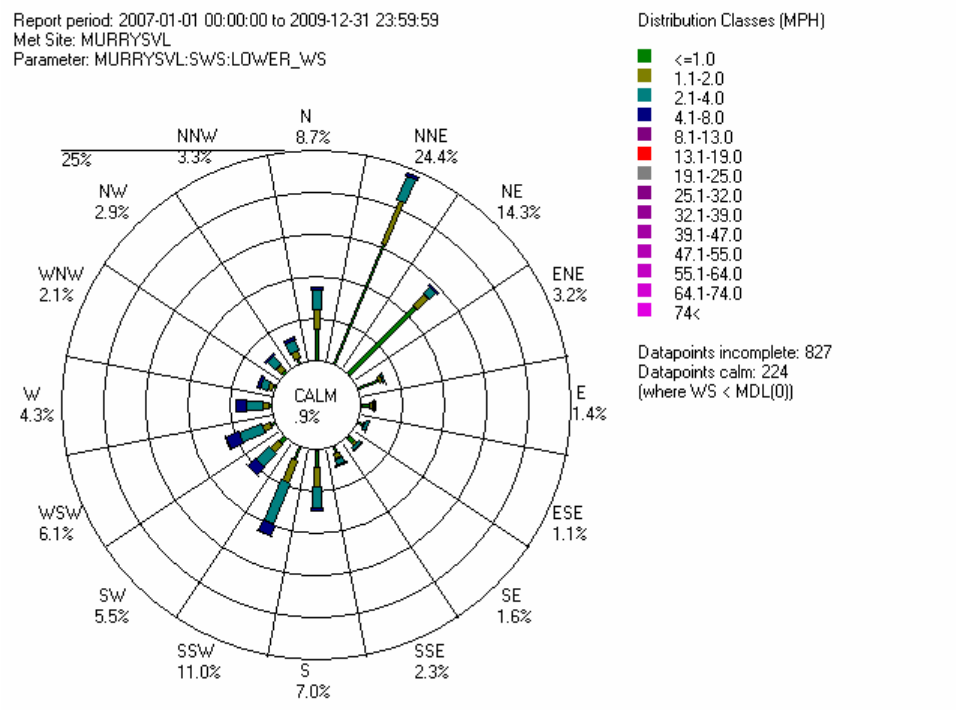


Figure C-1.10k. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Pittsburgh Air Monitoring Site

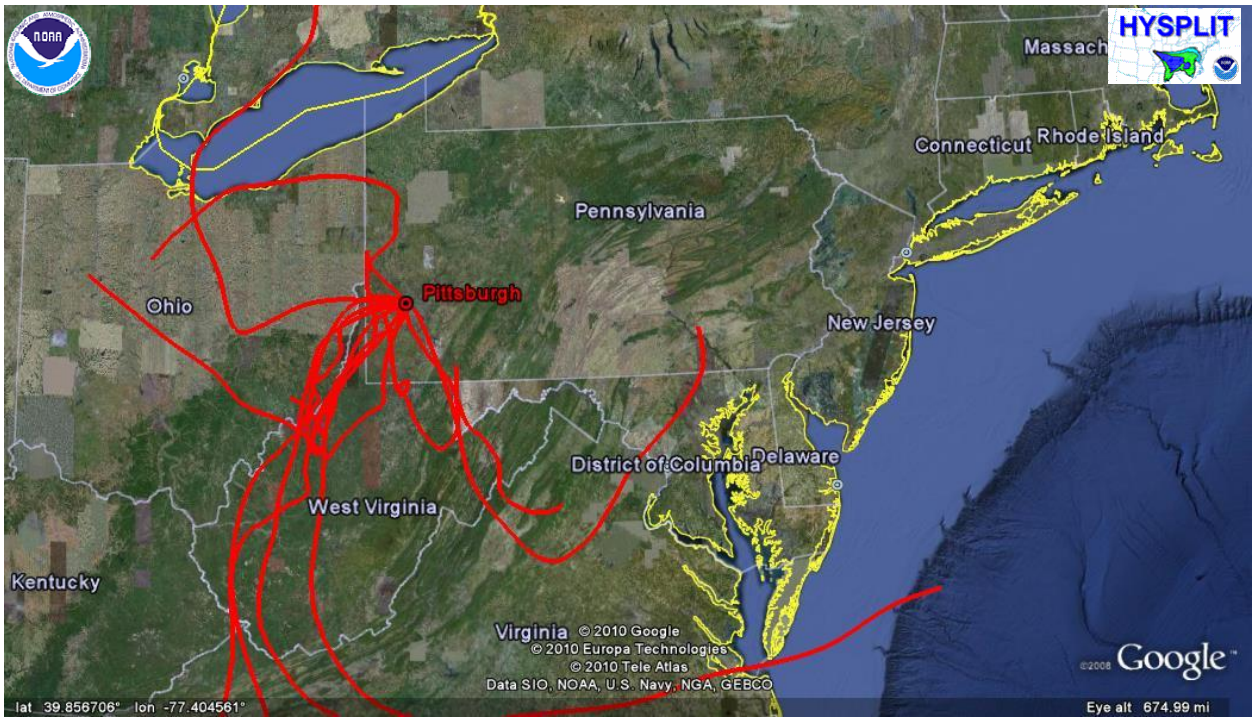


Figure C-1.10l. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Kittanning Air Monitoring Site

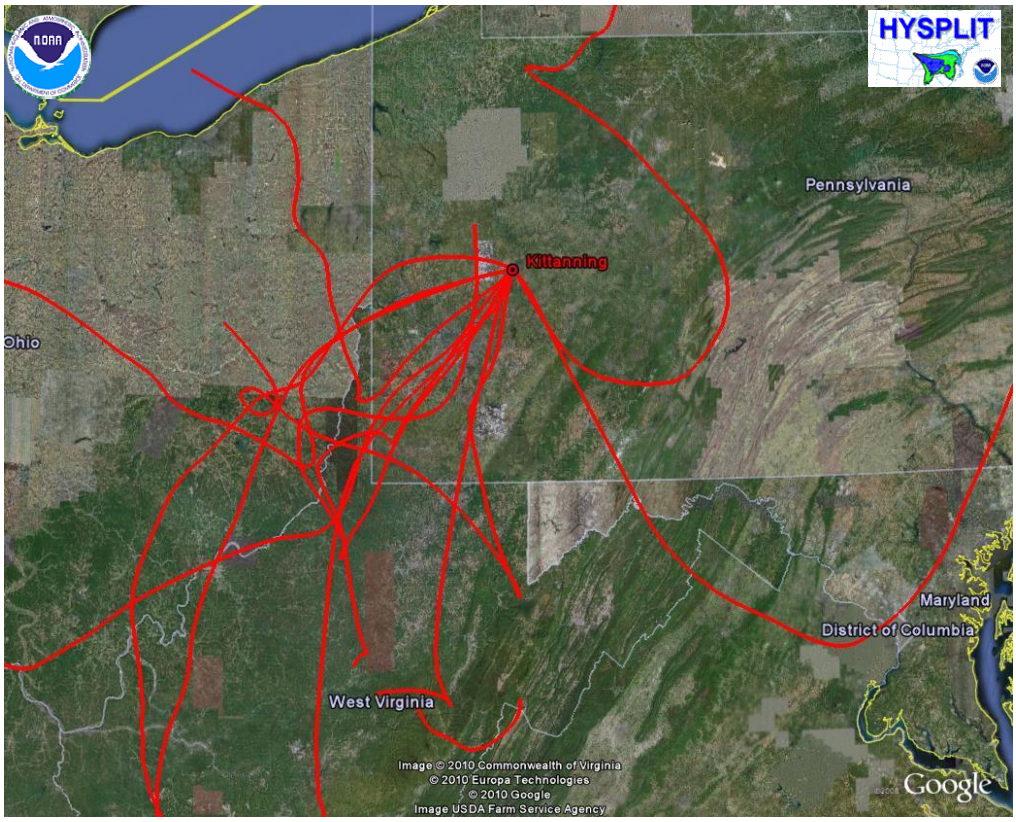


Figure C-1.10m. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Beaver Falls Air Monitoring Site

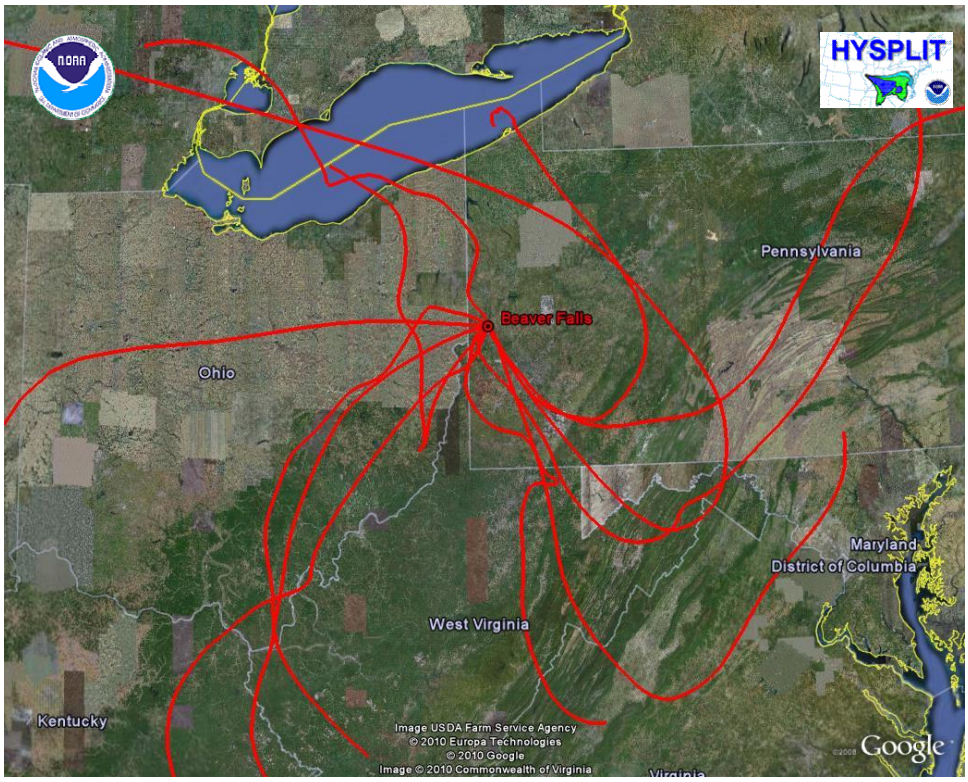


Figure C-1.10n. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Brighton Township Air Monitoring Site

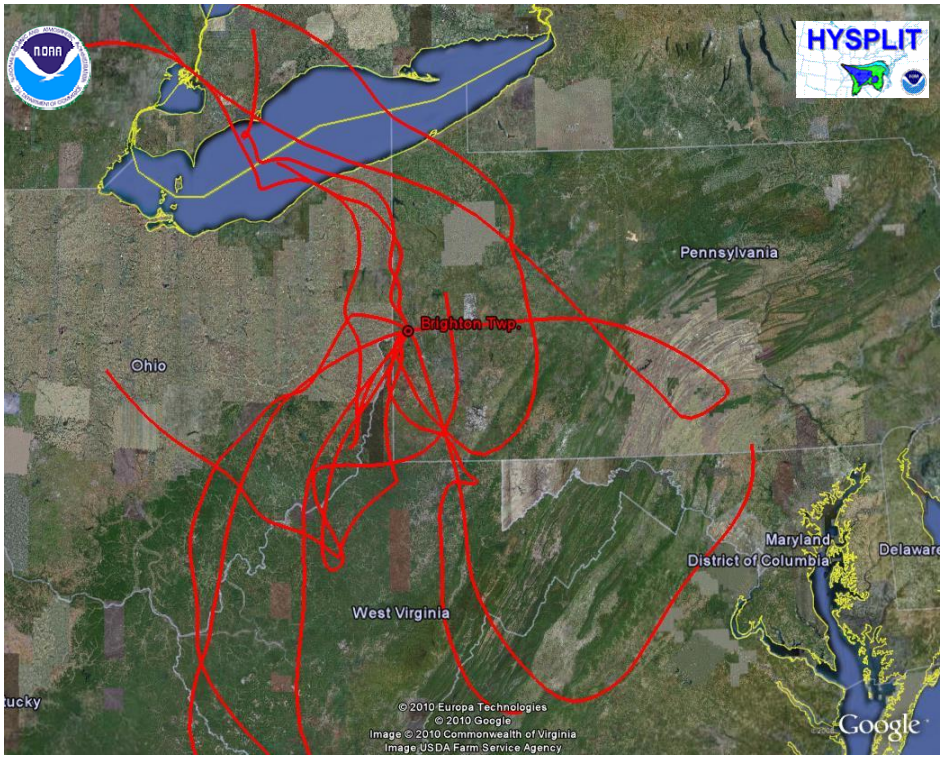


Figure C-1.10o. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Hookstown Air Monitoring Site

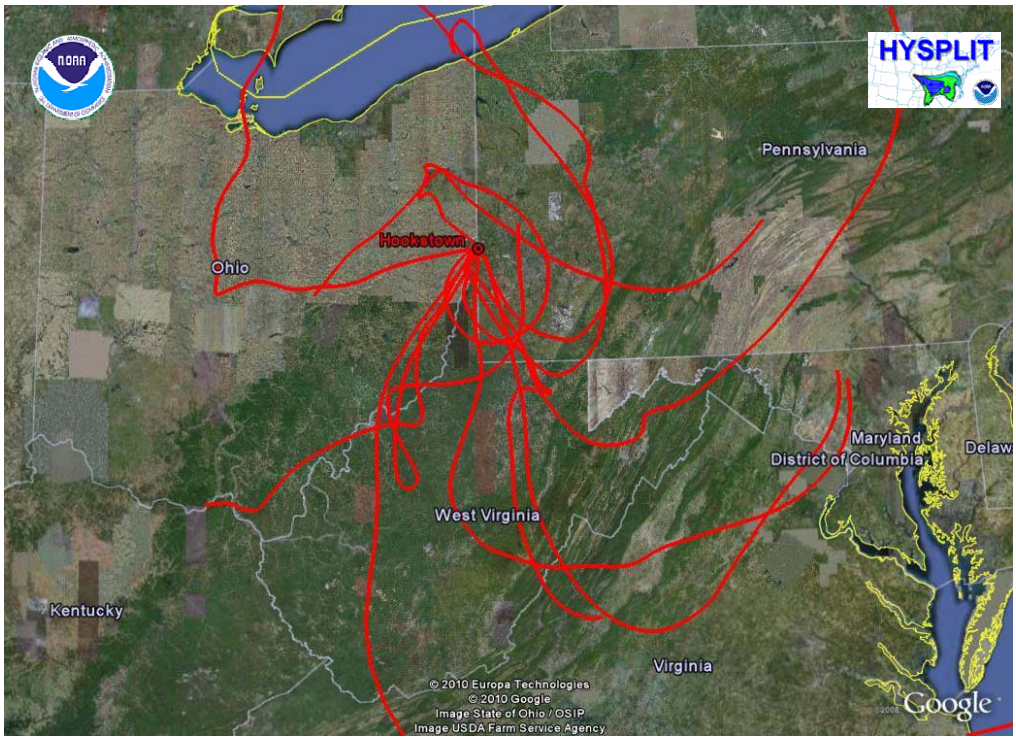


Figure C-1.10p. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Charleroi Air Monitoring Site

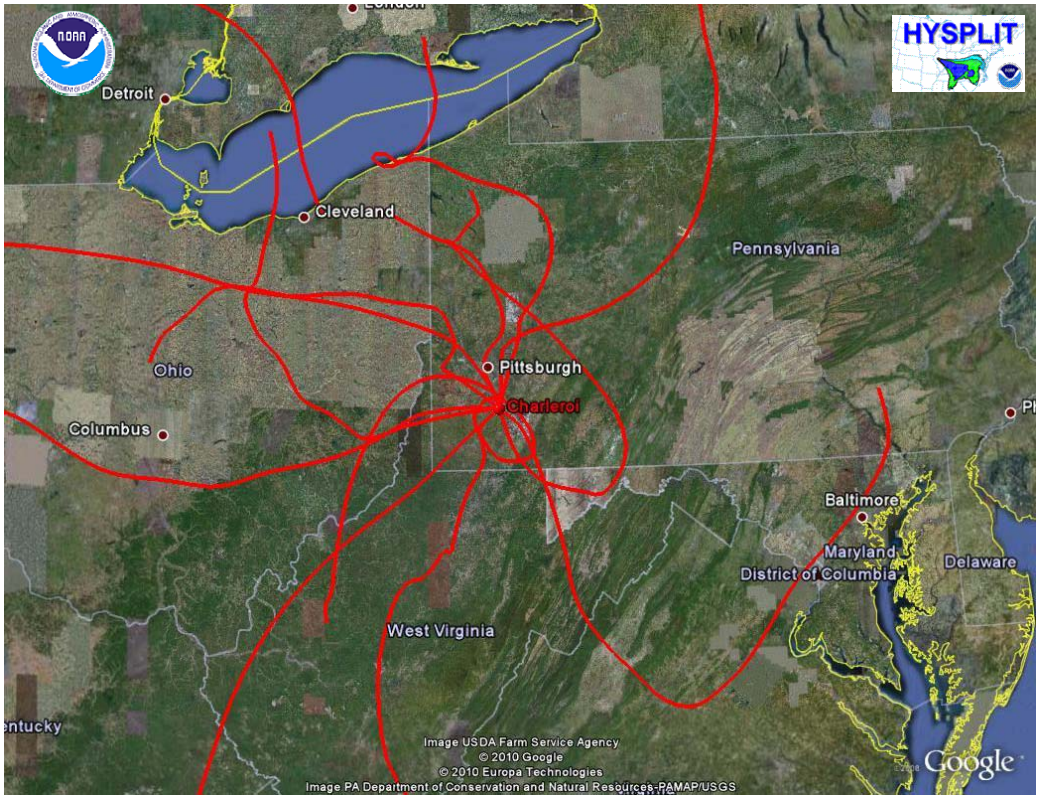


Figure C-1.10q. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Florence Air Monitoring Site

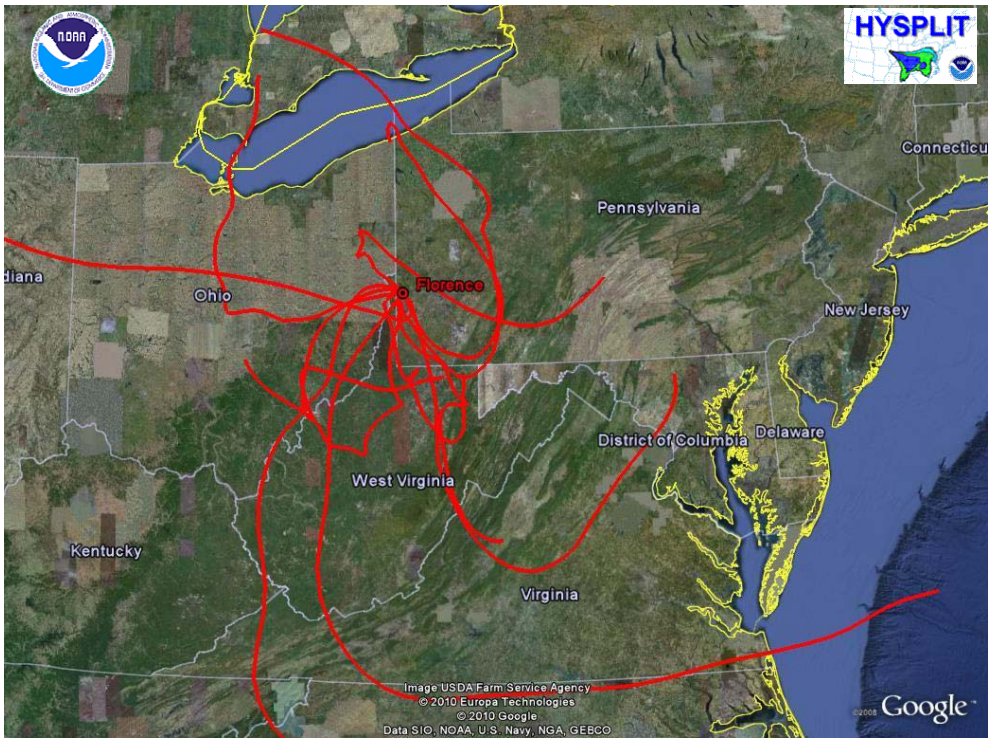


Figure C-1.10r. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Washington Air Monitoring Site

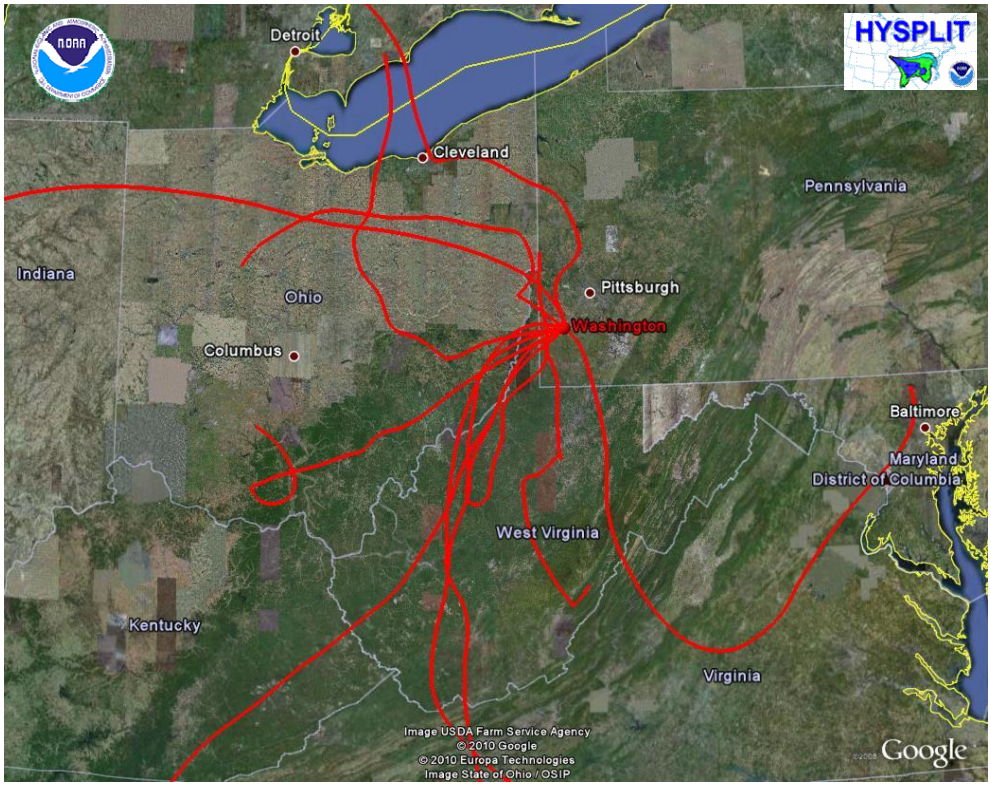


Figure C-1.10s. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Greensburg Air Monitoring Site

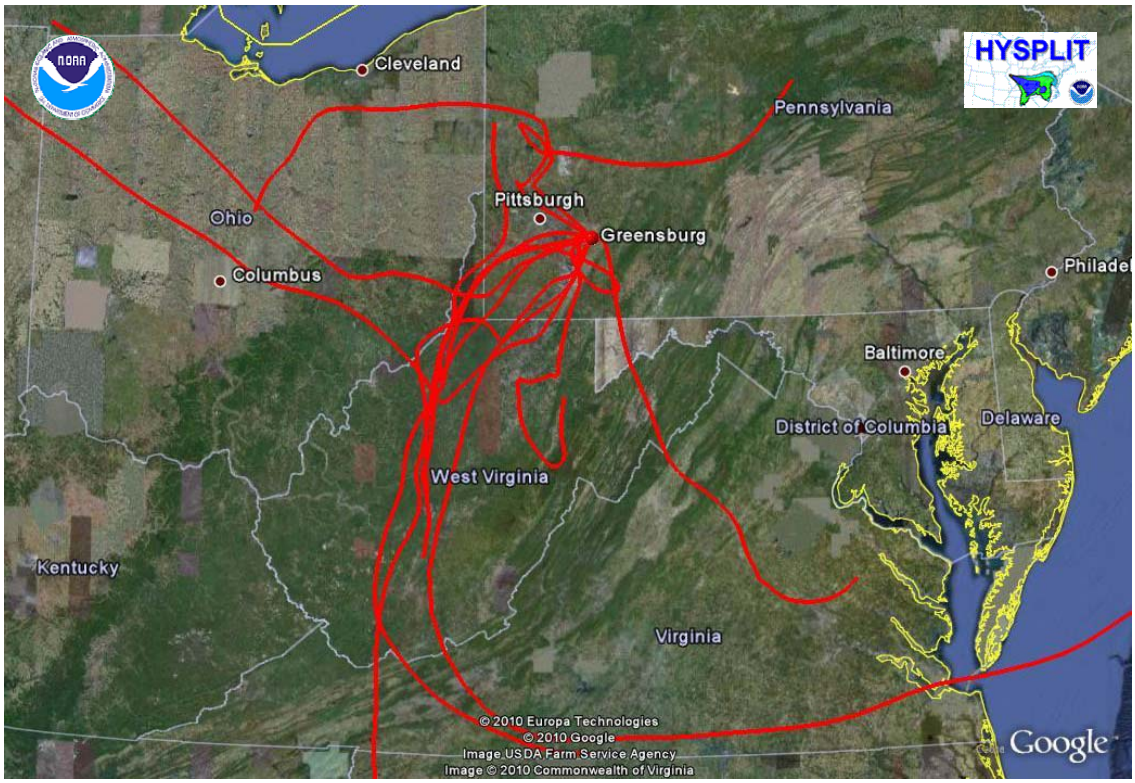


Figure C-1.10t. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Murrysville Air Monitoring Site

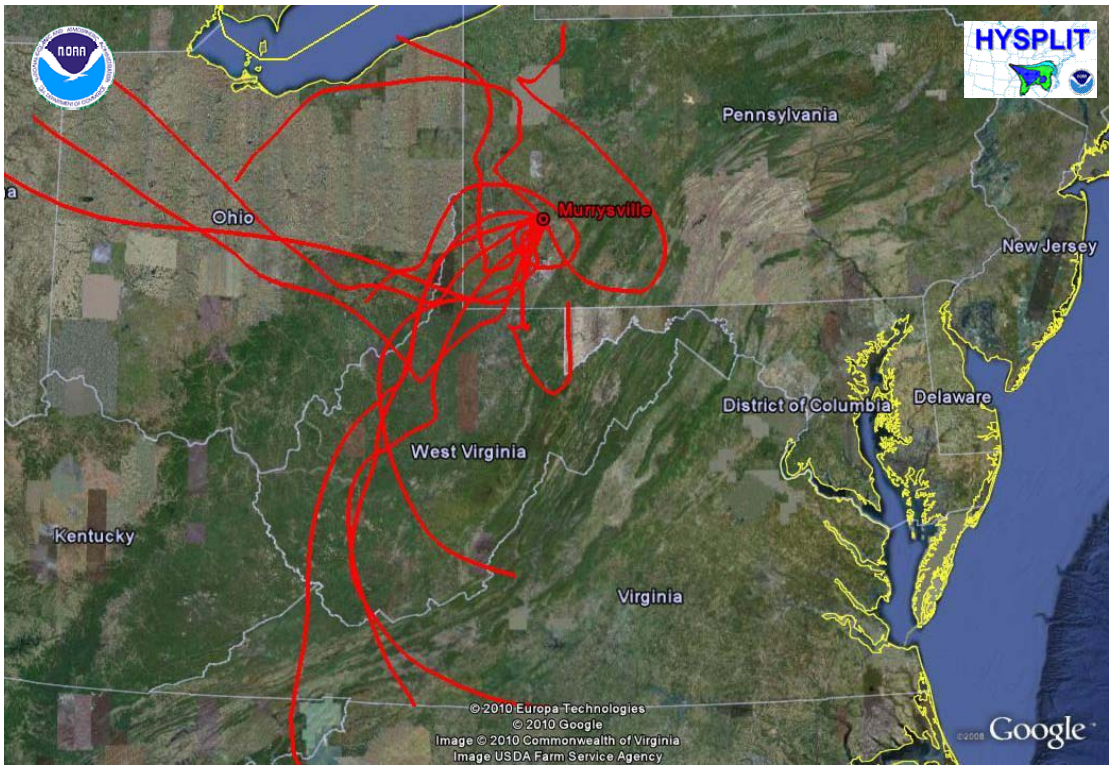


Figure C-1.10u. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Kittanning Air Monitoring Site.

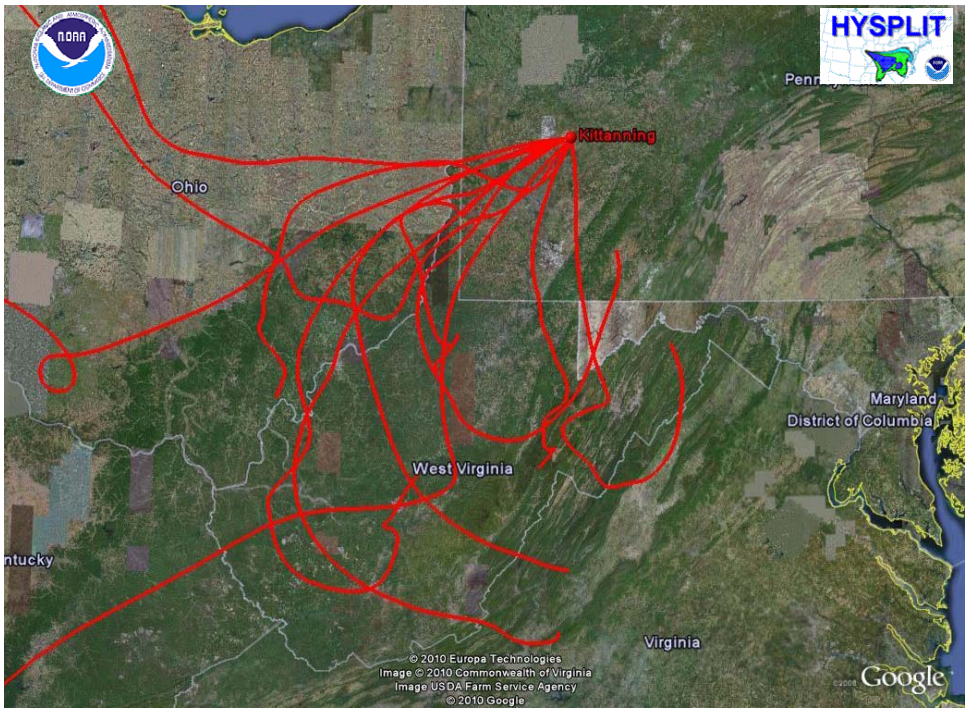


Figure C-1.10v. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Beaver Falls Air Monitoring Site.

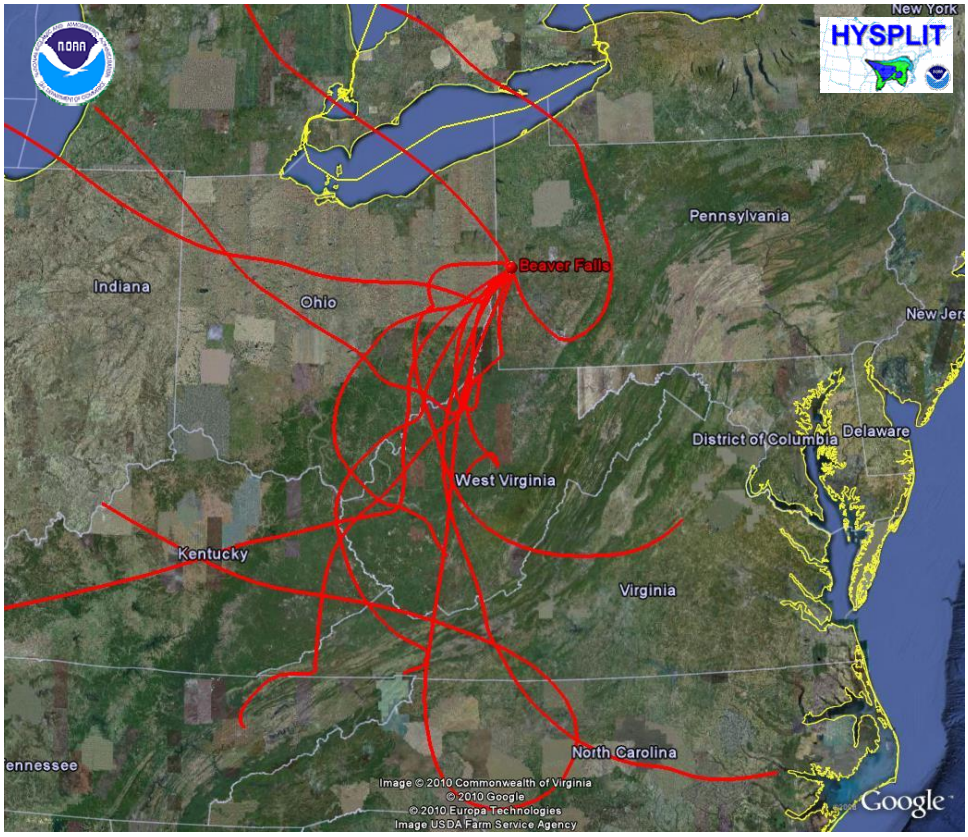


Figure C-1.10w. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Charleroi Air Monitoring Site.

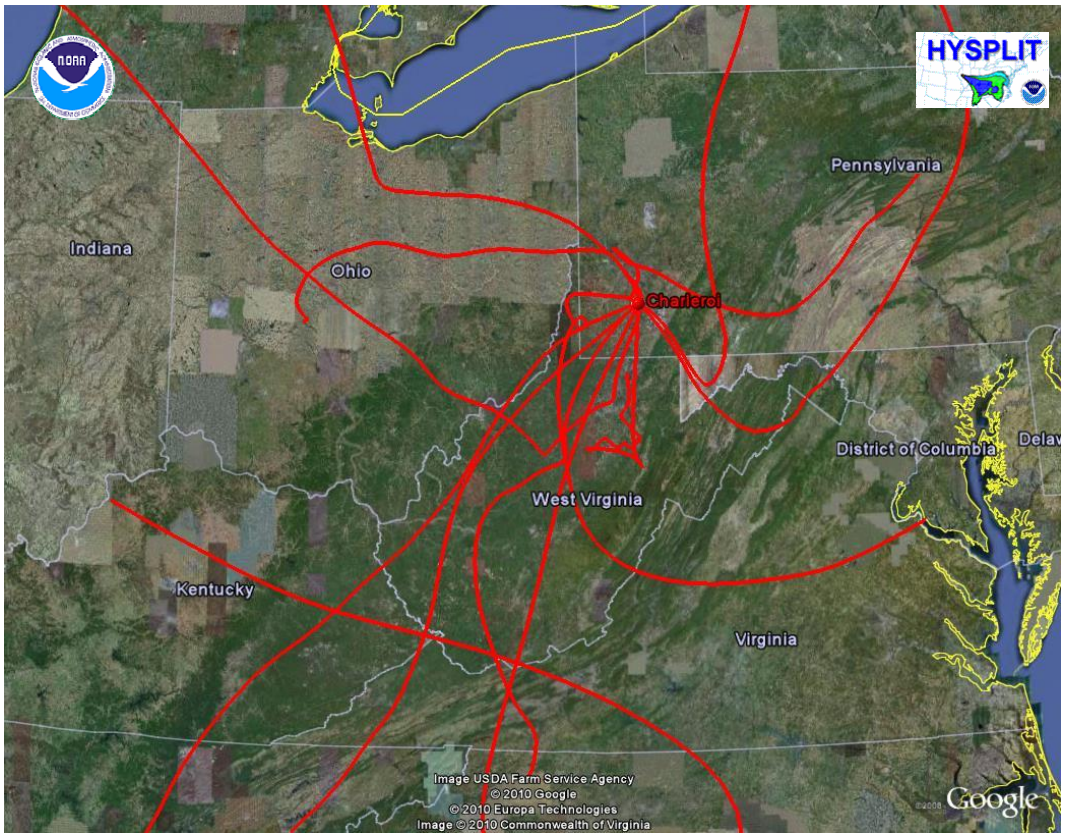


Figure C-1.10x. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Florence Air Monitoring Site.

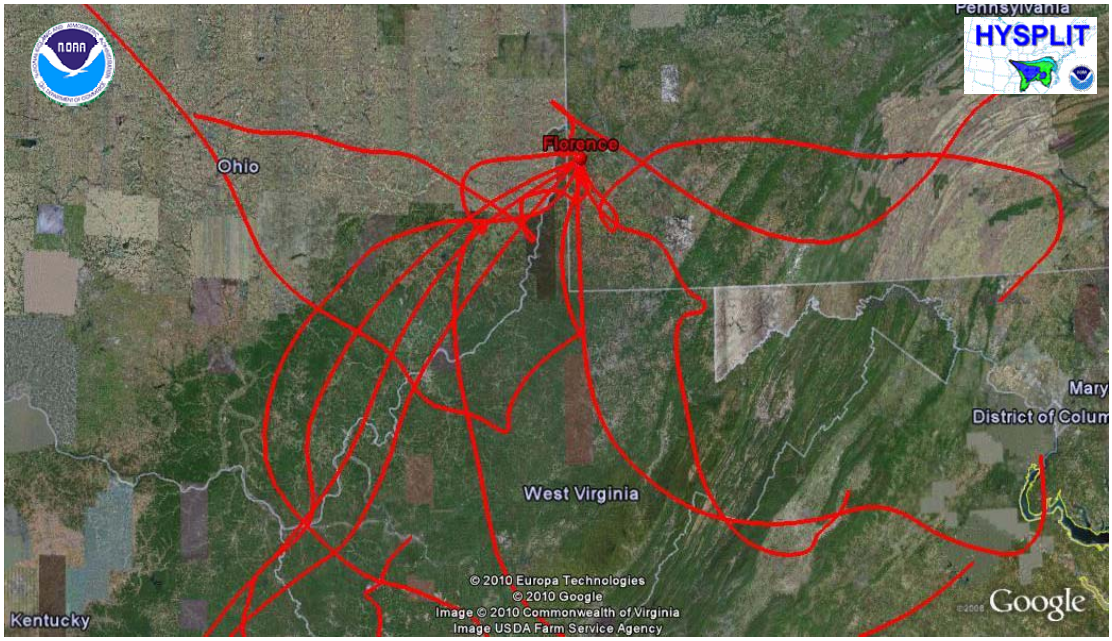


Figure C-1.10y. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Washington Air Monitoring Site.

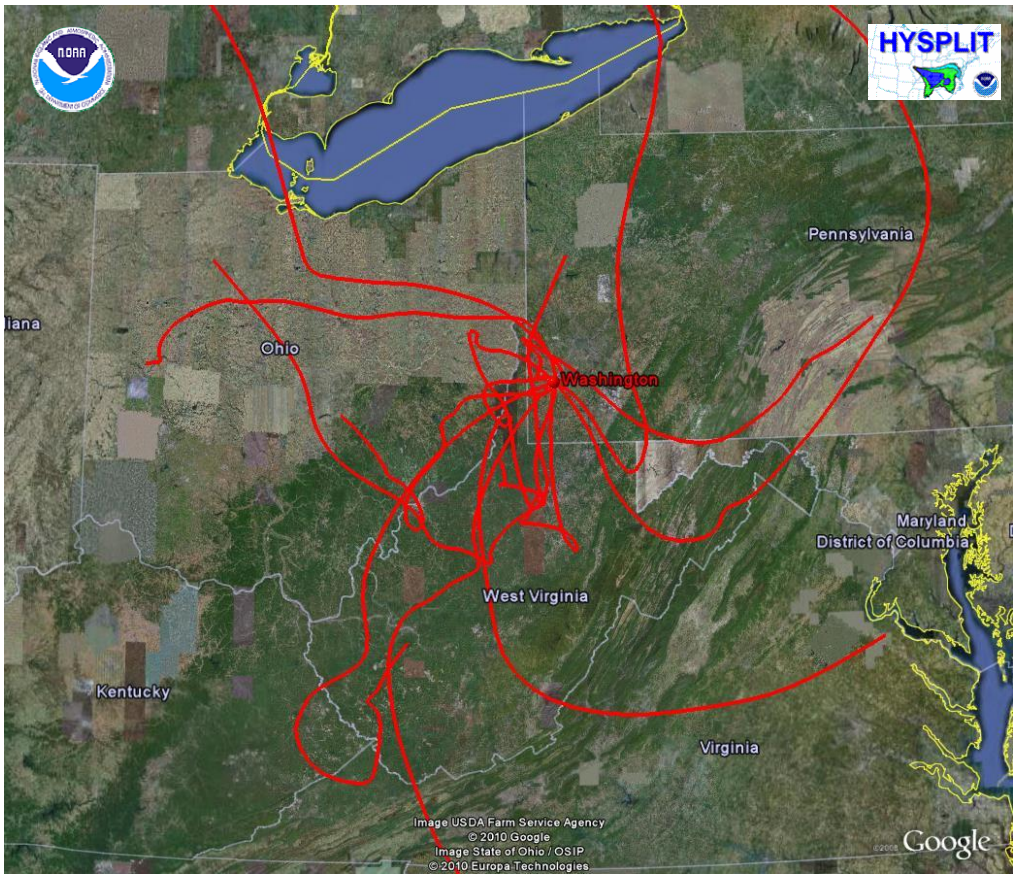
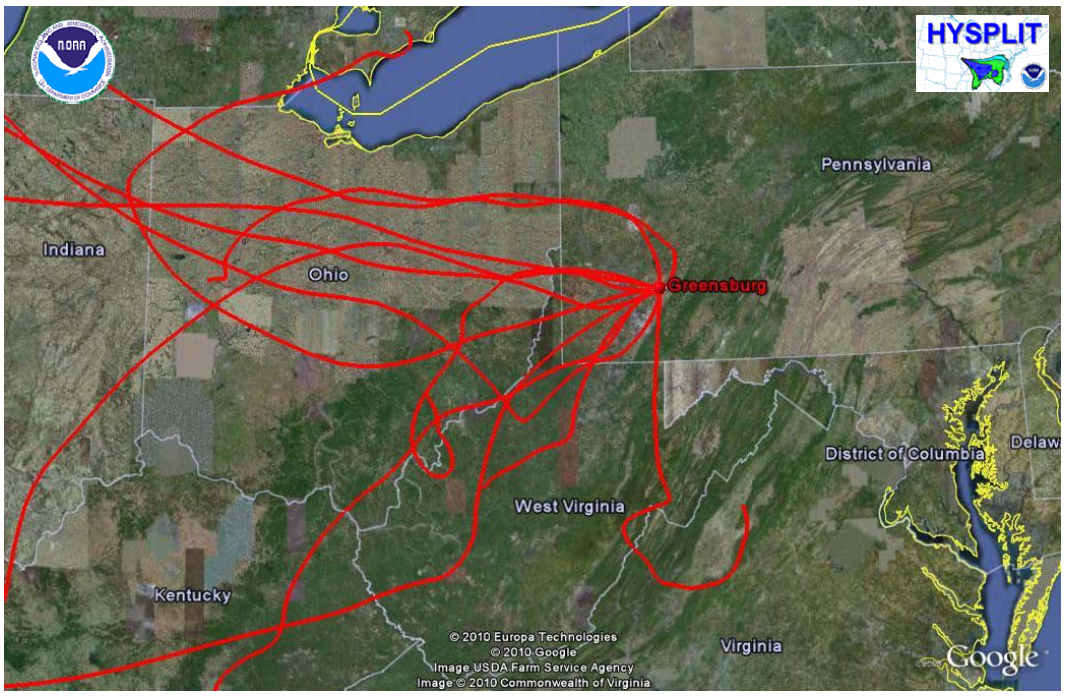


Figure C-1.10z. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Greensburg Air Monitoring Site.



C-1.11 Reading MSA

Figure C-1.11a. Wind Rose for the Kutztown Air Monitoring Site, 2007-2009.

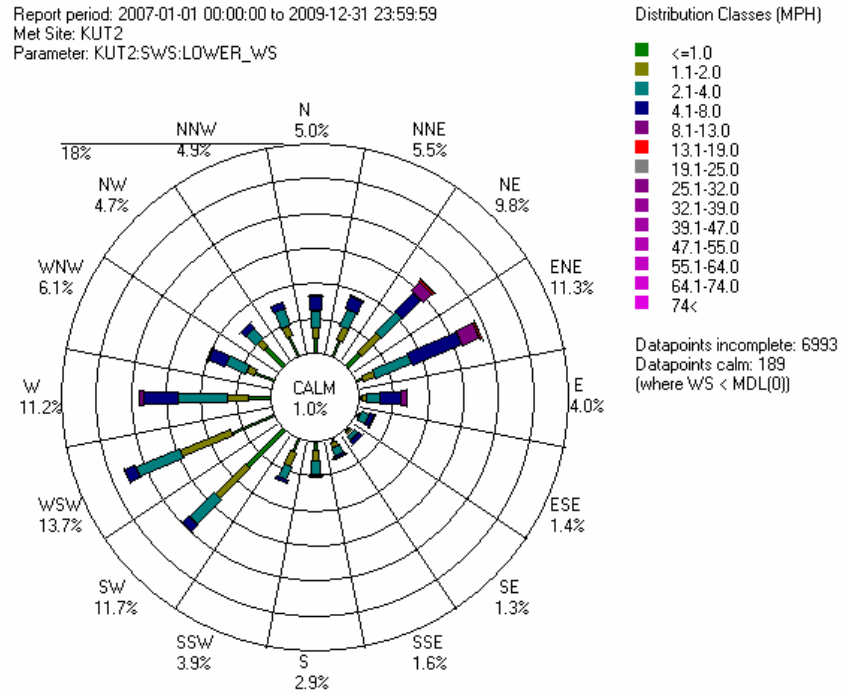


Figure C-1.11b. Wind Rose for the Reading Airport Air Monitoring Site, 2007-2009.

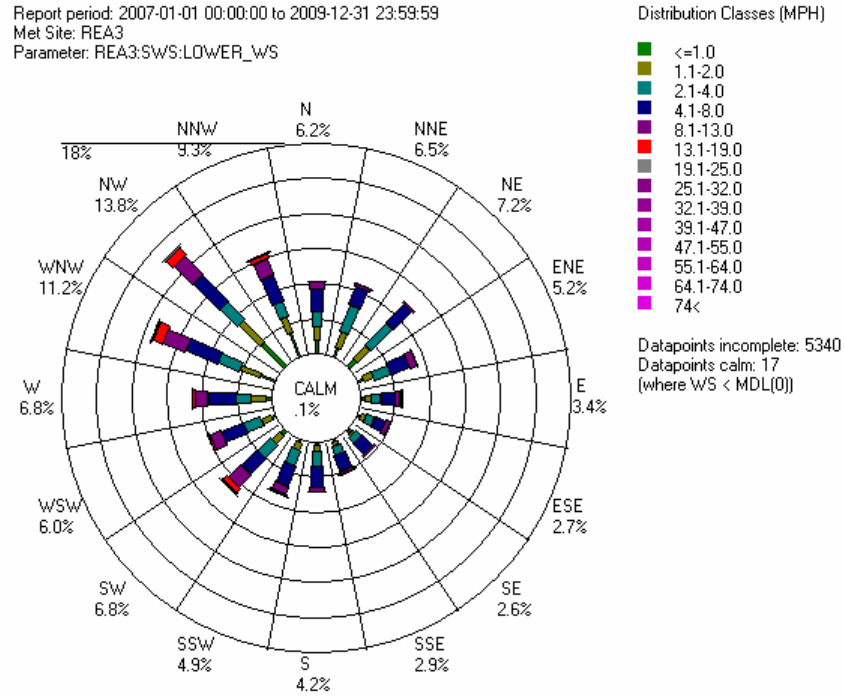


Figure C-1.11c. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Kutztown Air Monitoring Site.

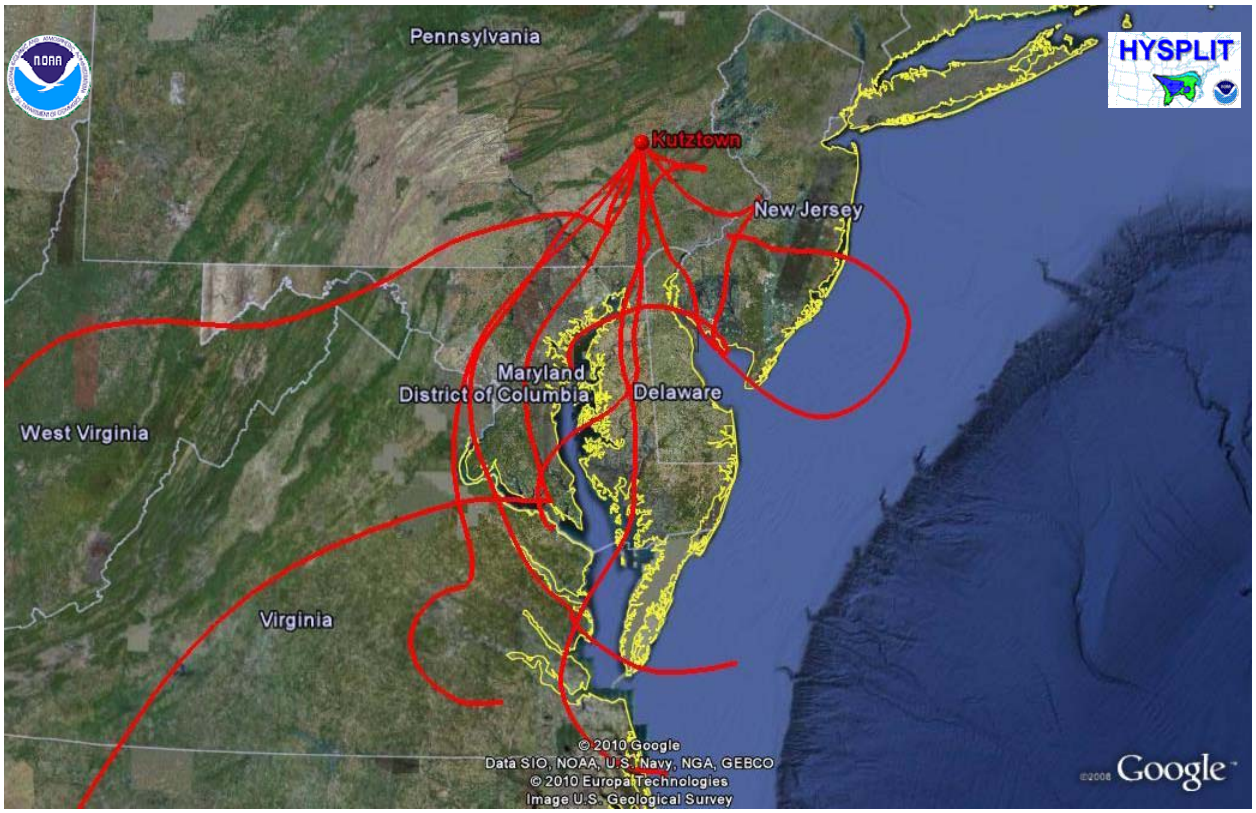


Figure C-1.11d. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Reading Airport Air Monitoring Site.

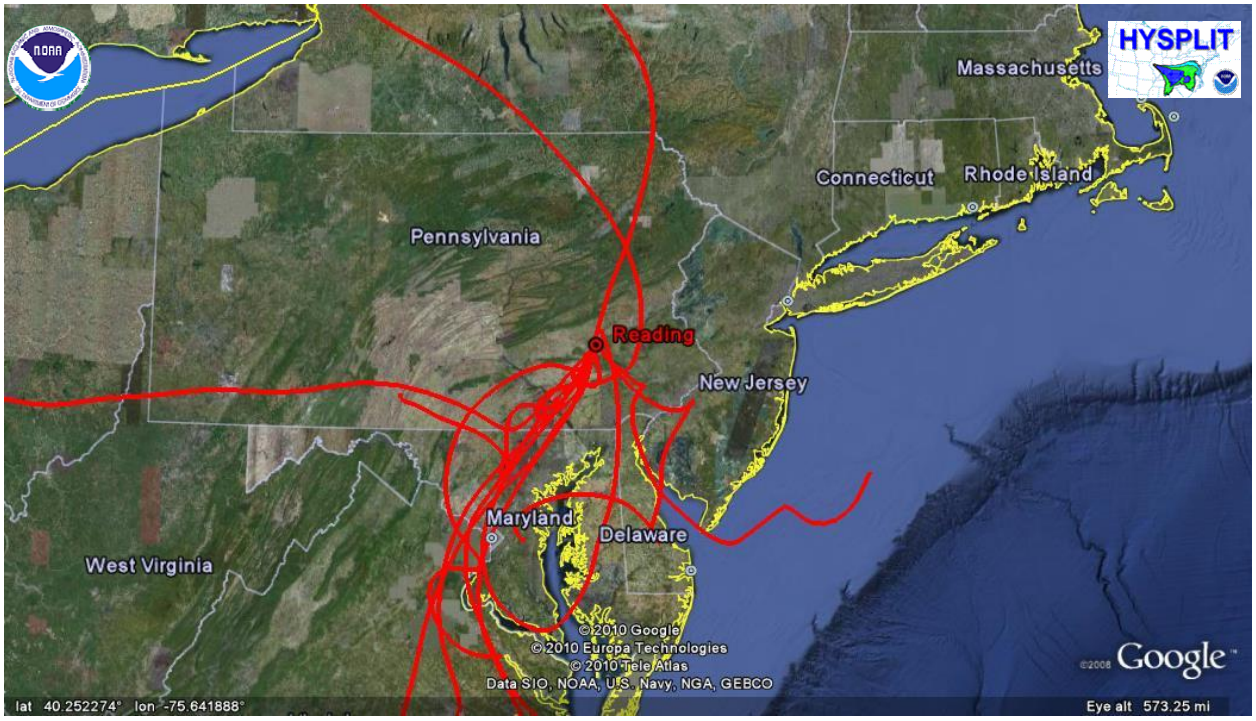
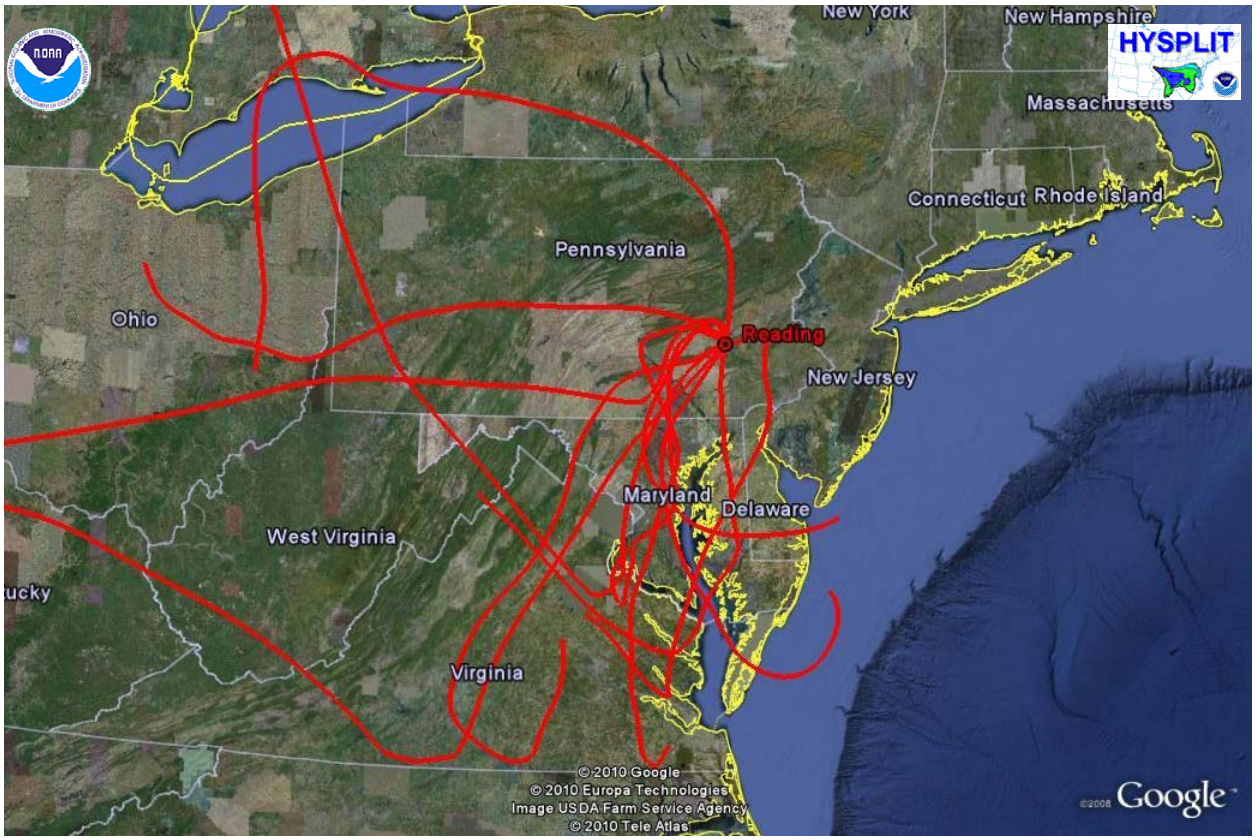


Figure C-1.11e. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Reading Airport Air Monitoring Site.



C-1.12 Scranton-Wilkes-Barre MSA

Figure C-1.12a. Wind Rose for the Peckville Air Monitoring Site, 2007-2009.

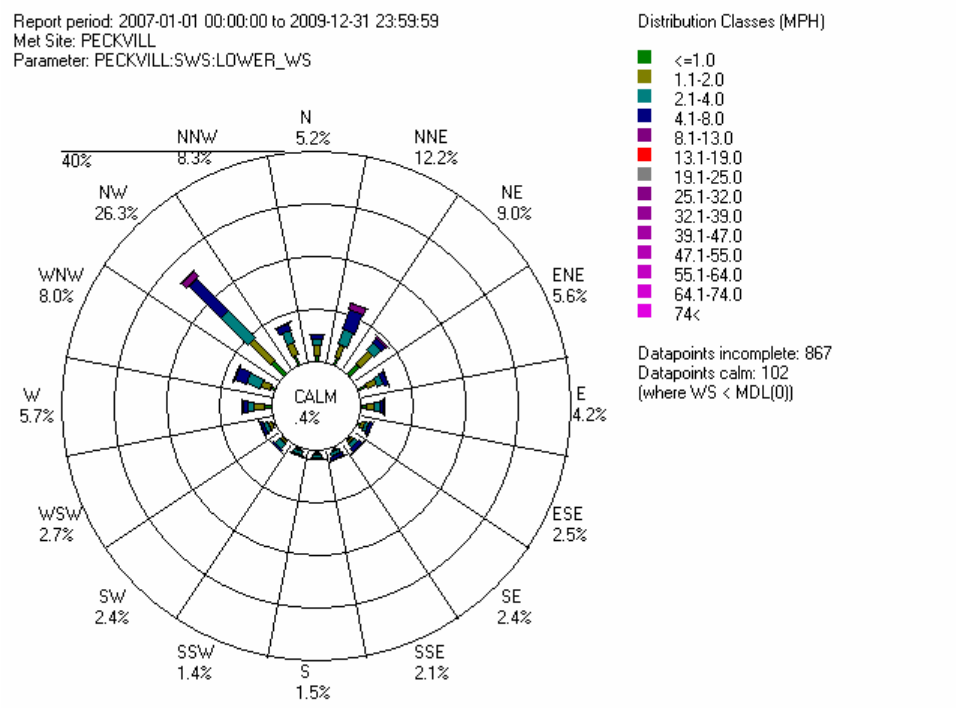


Figure C-1.12b. Wind Rose for the Scranton Air Monitoring Site, 2007-2009.

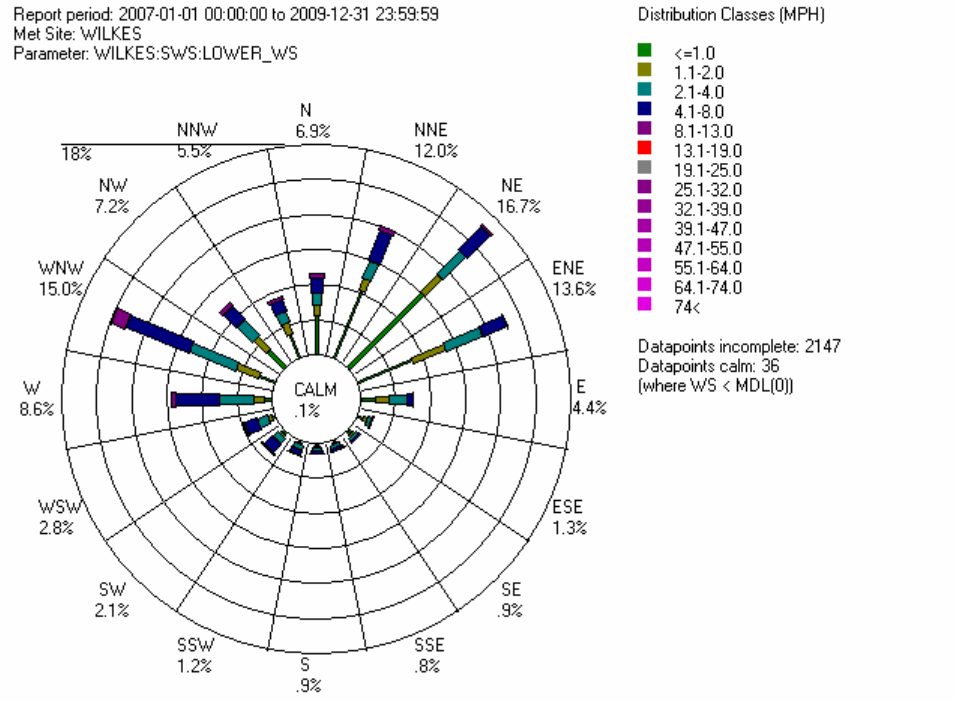


Figure C-1.12c. Wind Rose for the-Wilkes-Barre Air Monitoring Site, 2007-2009.

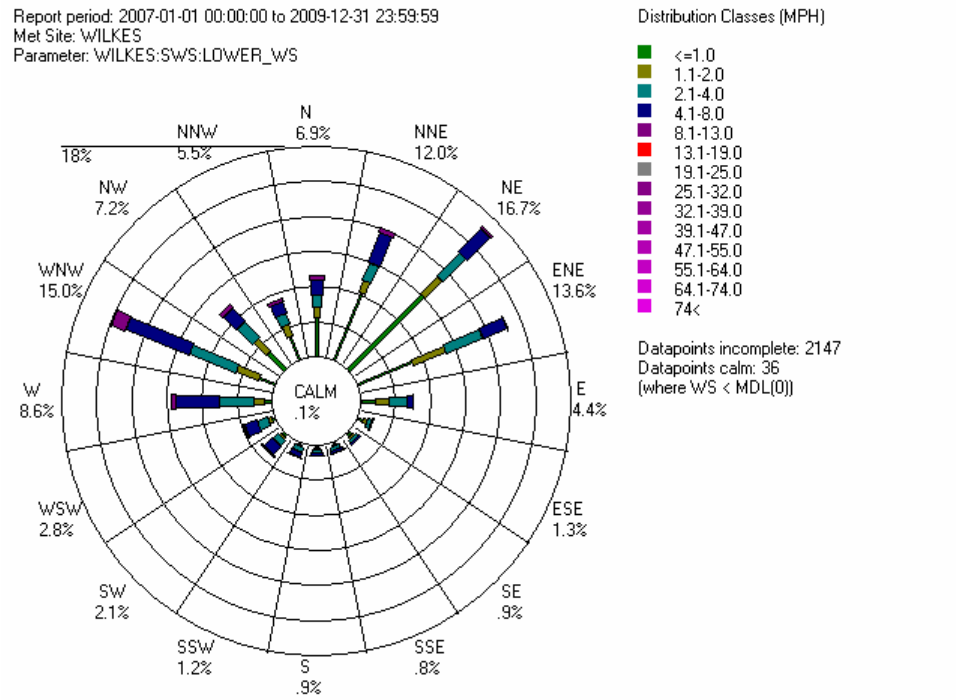


Figure C-1.12d. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Peckville Air Monitoring Site.

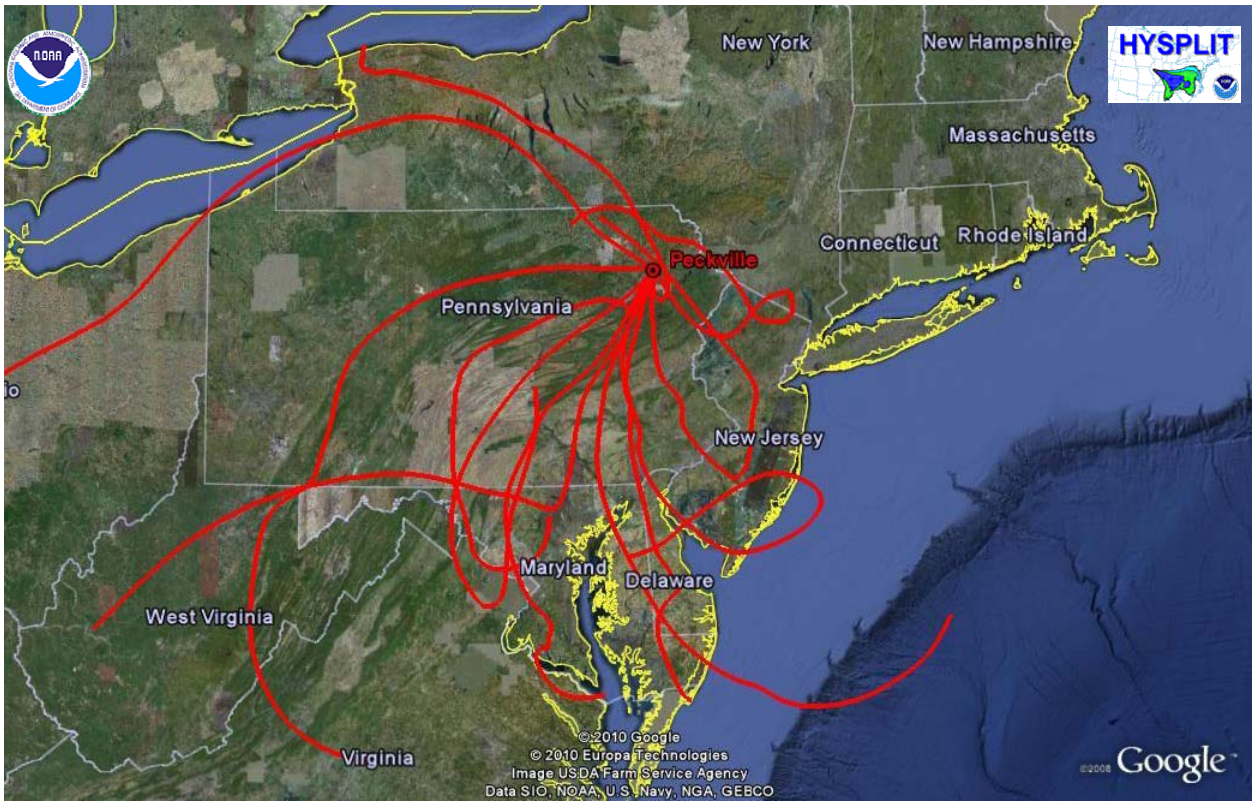


Figure C-1.12e. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Scranton Air Monitoring Site.

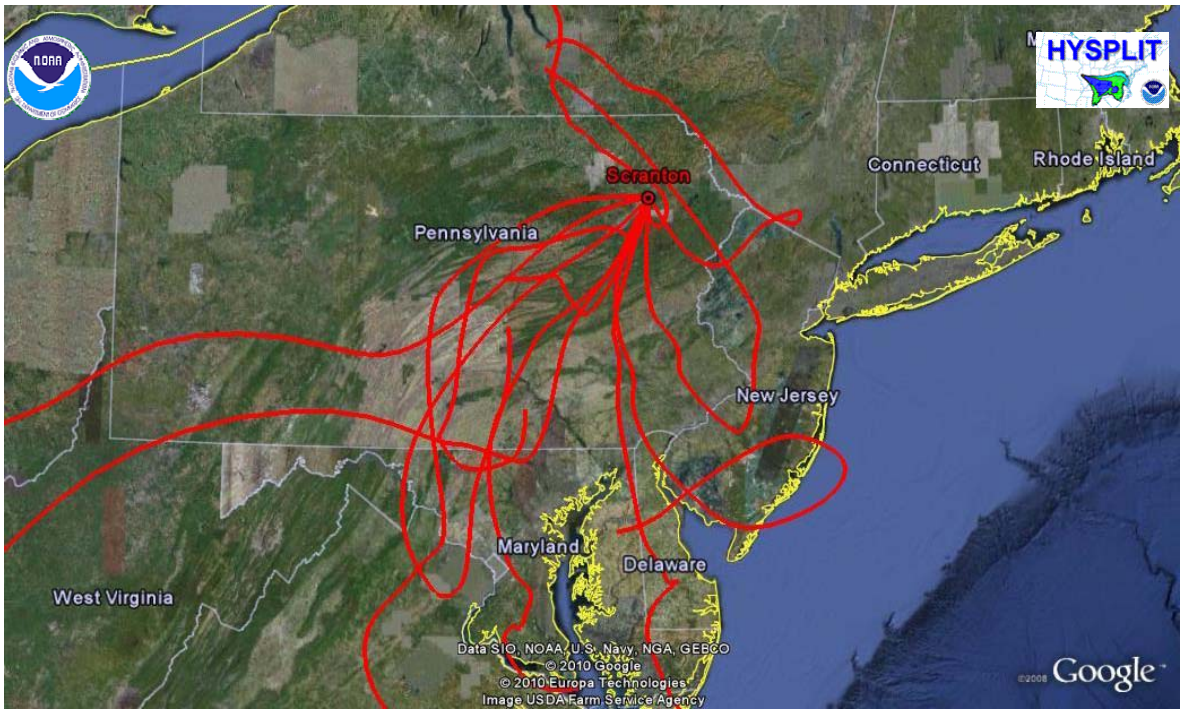


Figure C-1.12f. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Nanticoke Air Monitoring Site.

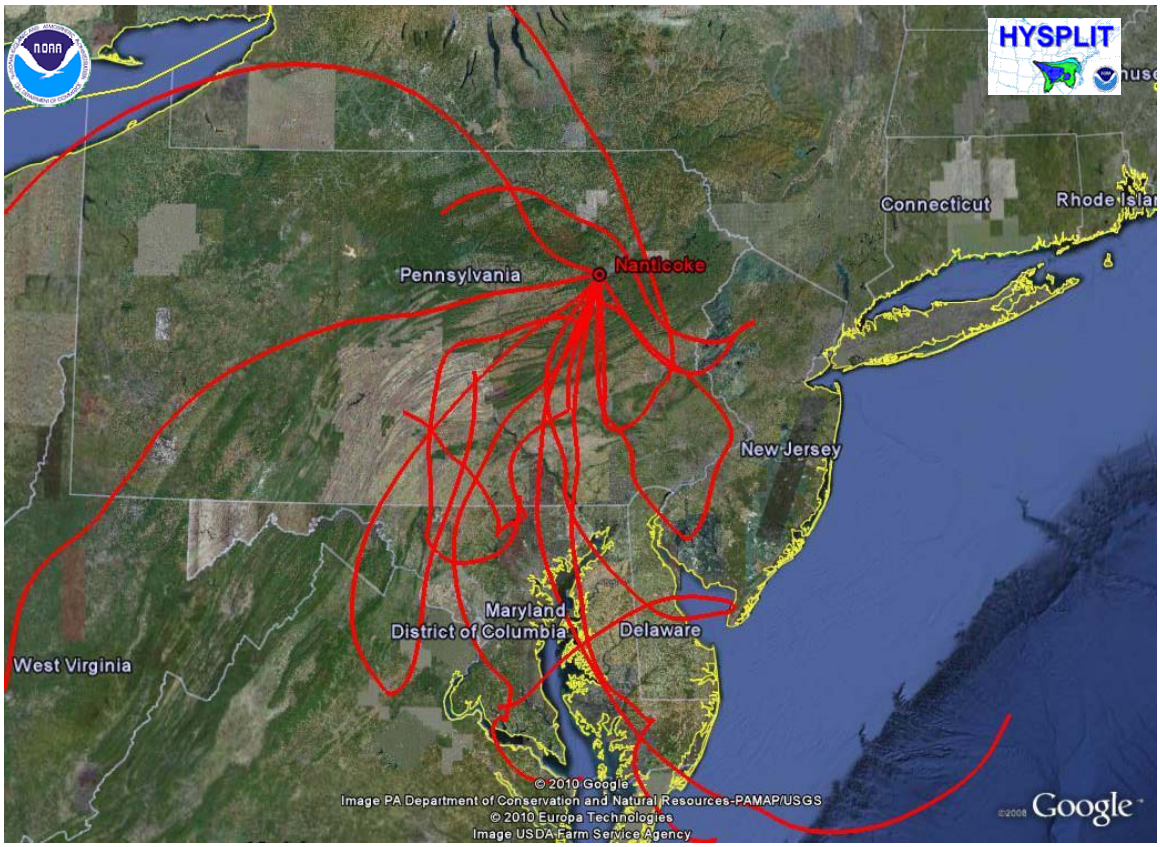


Figure C-1.12g. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Wilkes-Barre Air Monitoring Site.

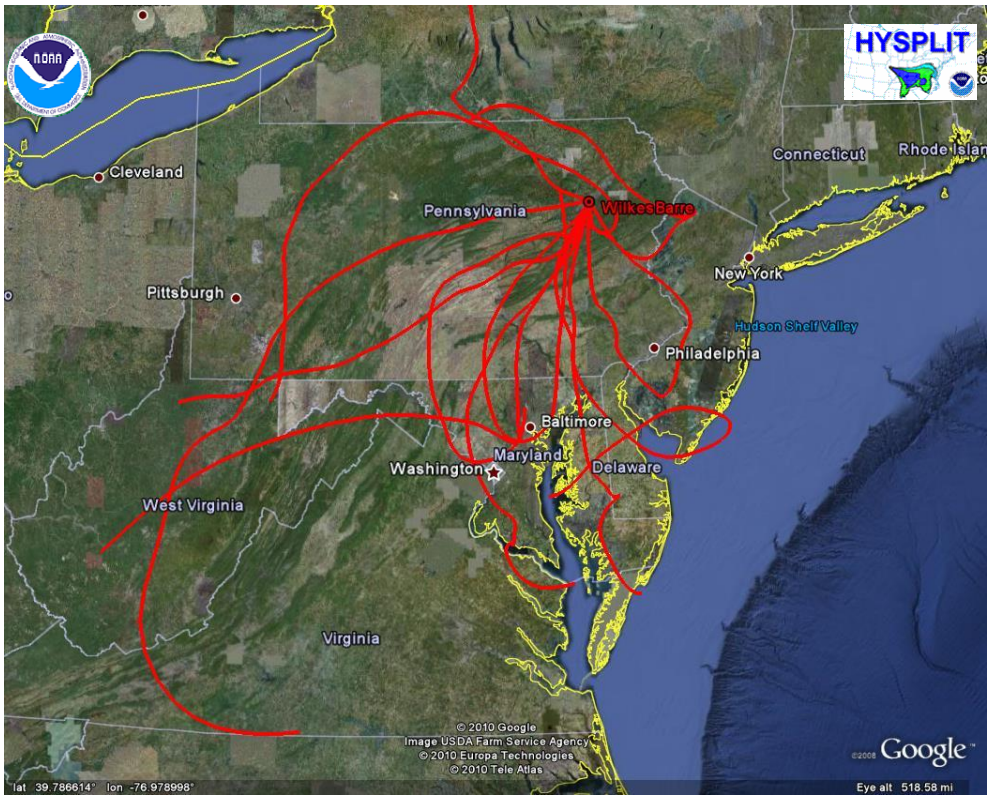
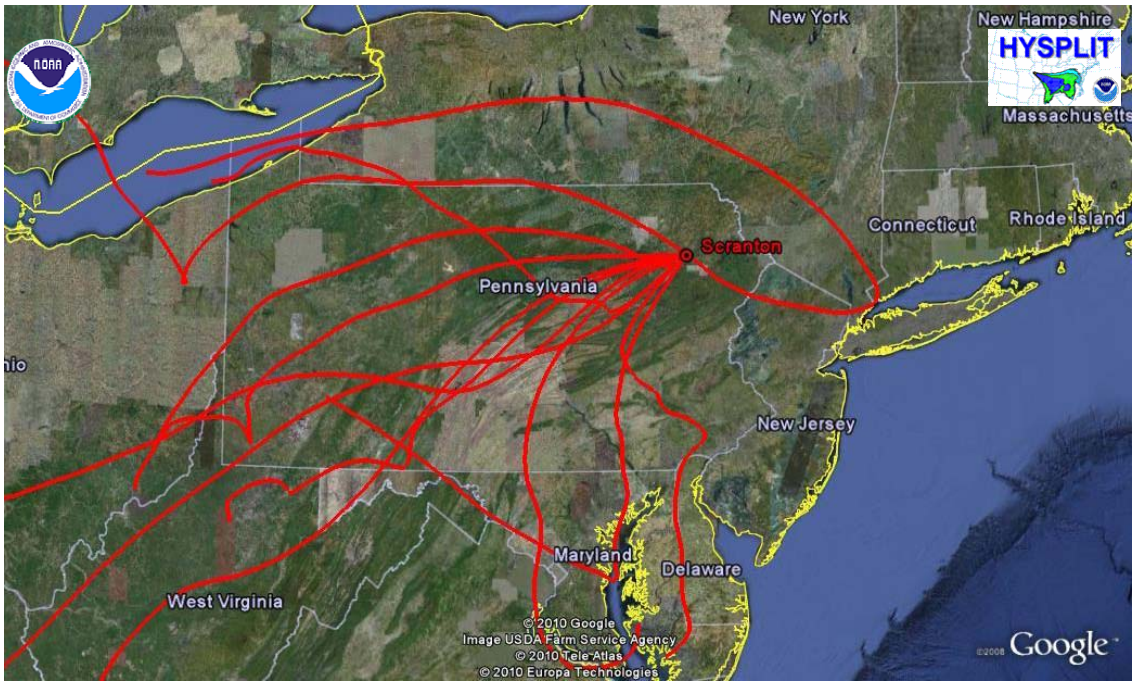


Figure C-1.12h. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Scranton Air Monitoring Site.



C-1.13 State College MSA

Figure C-1.13a. Wind Rose for the State College Air Monitoring Site, 2007-2009.

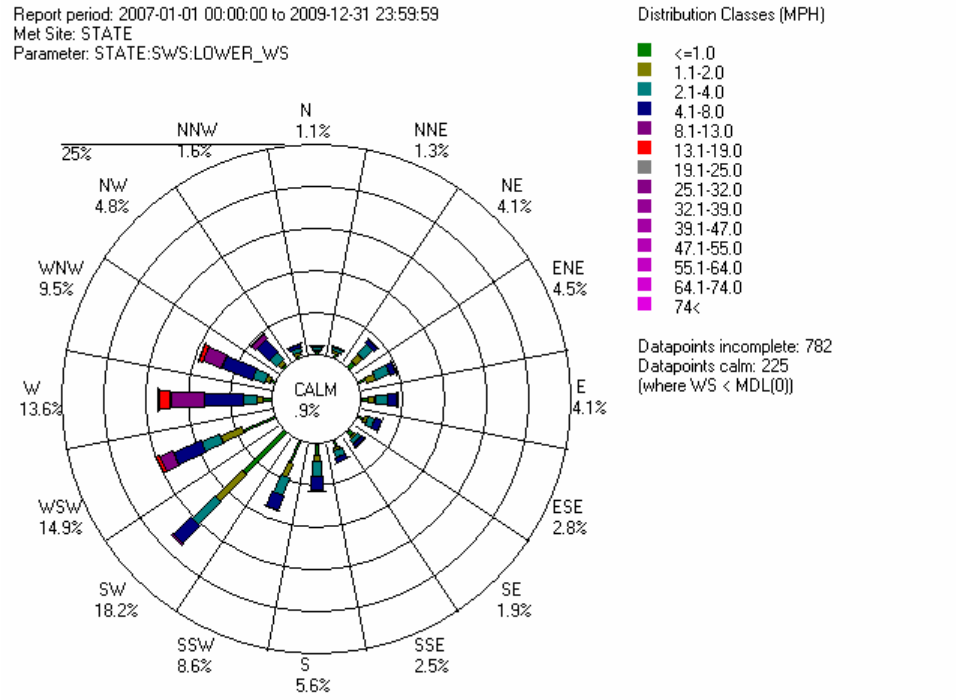


Figure C-1.13b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, State College Air Monitoring Site.

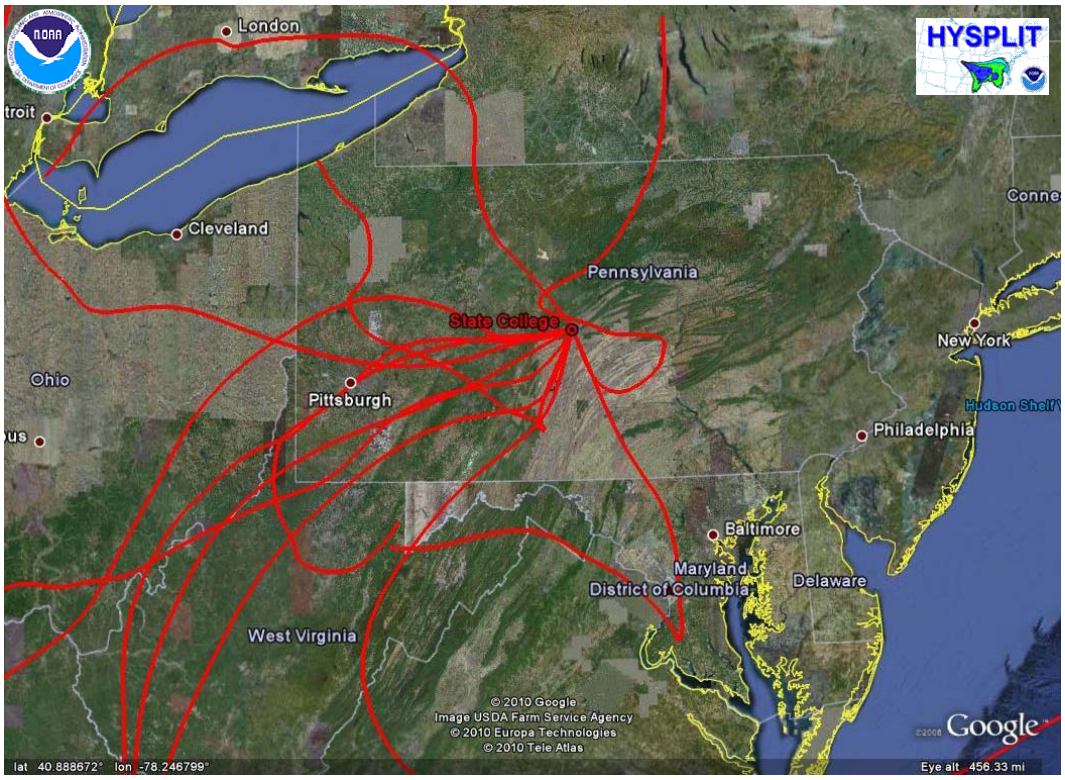
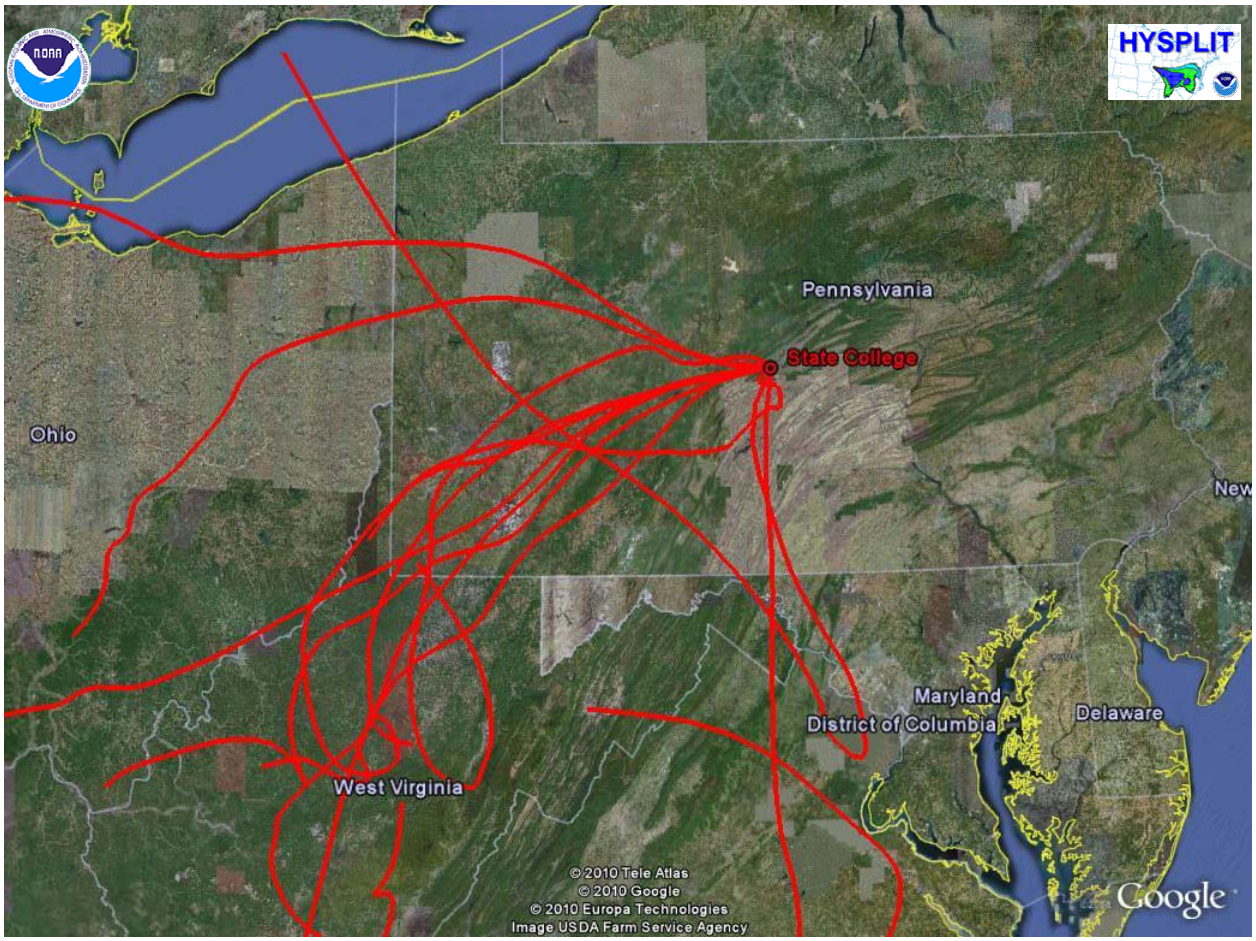


Figure C-1.13c. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, State College Air Monitoring Site.



C-1.14 Williamsport MSA

Figure C-1.14a. Wind Rose for the Montoursville Air Monitoring Site, 2007-2009.

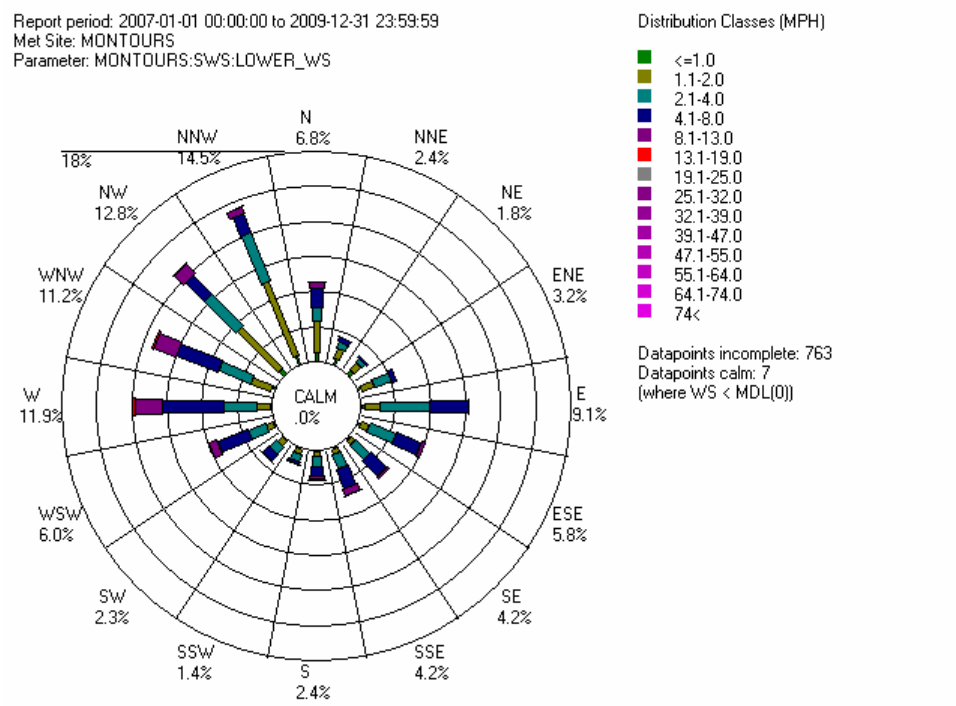
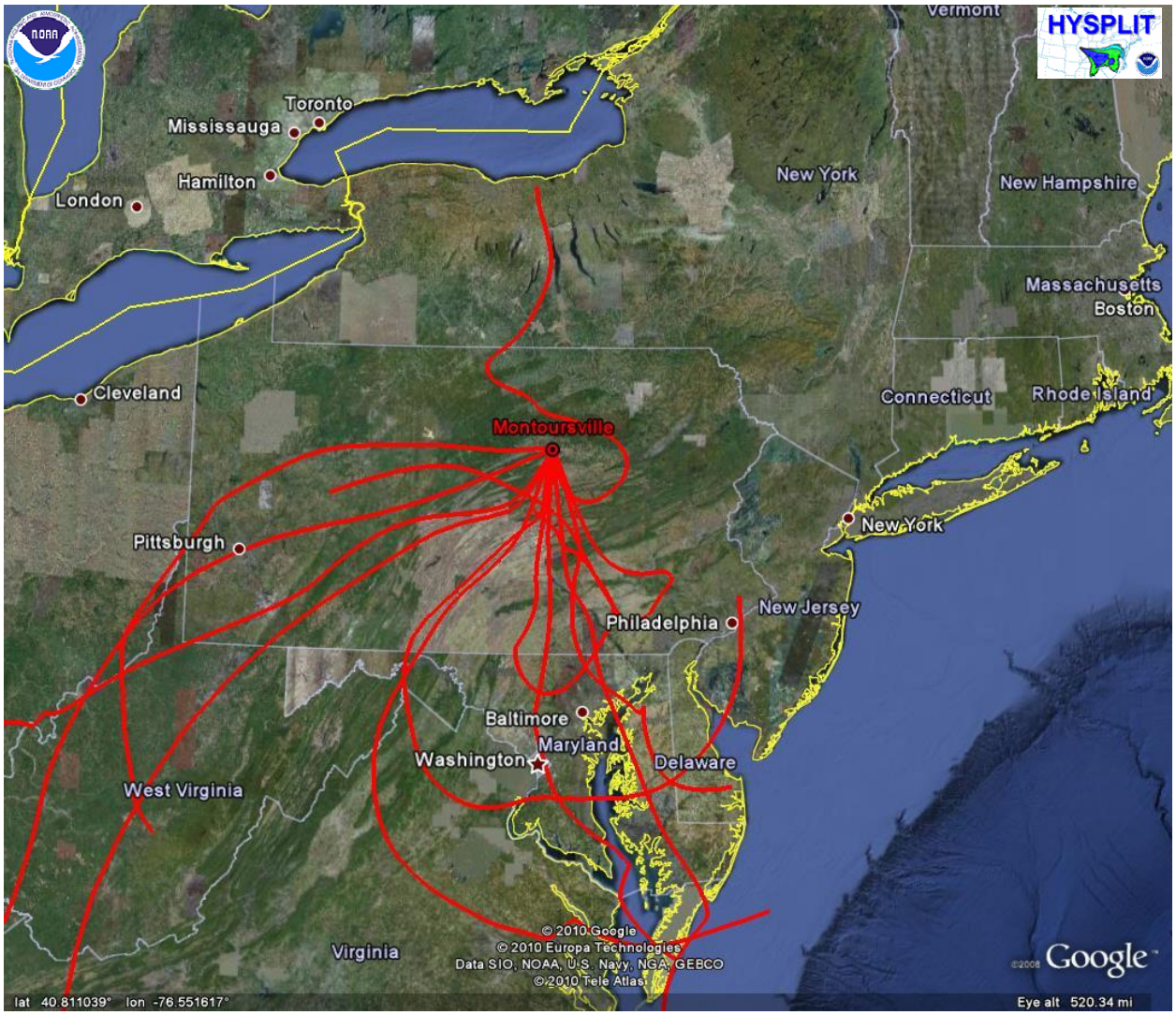


Figure C-1.14b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Montoursville Air Monitoring Site.



C-1.15 York-Hanover MSA

Figure C-1.15a. Wind Rose for the York Air Monitoring Site, 2007-2009.

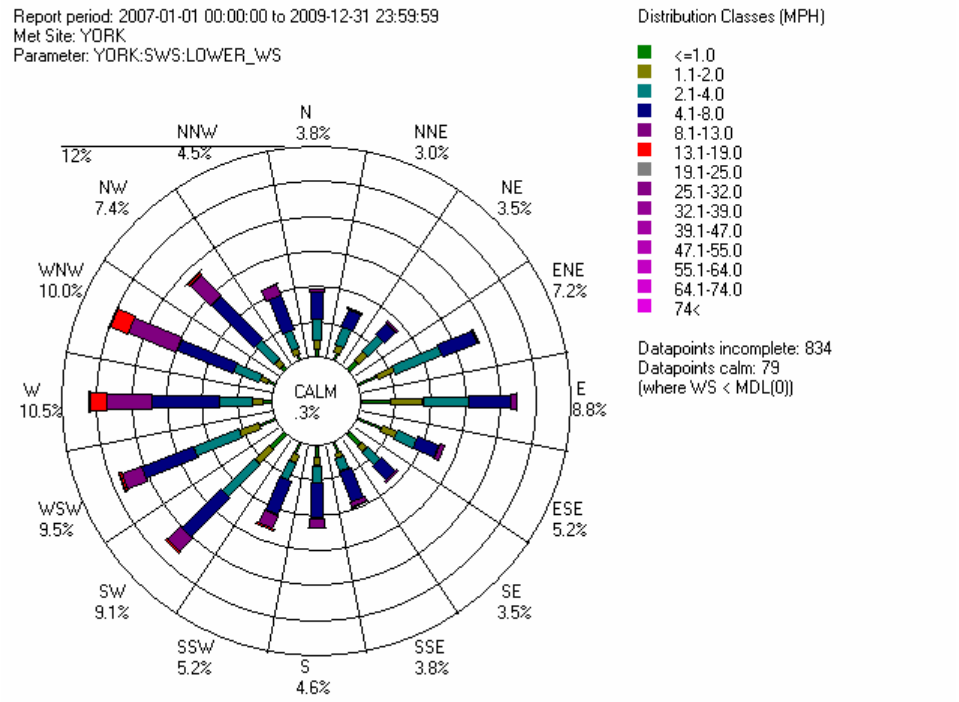


Figure C-1.15b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, York Air Monitoring Site.

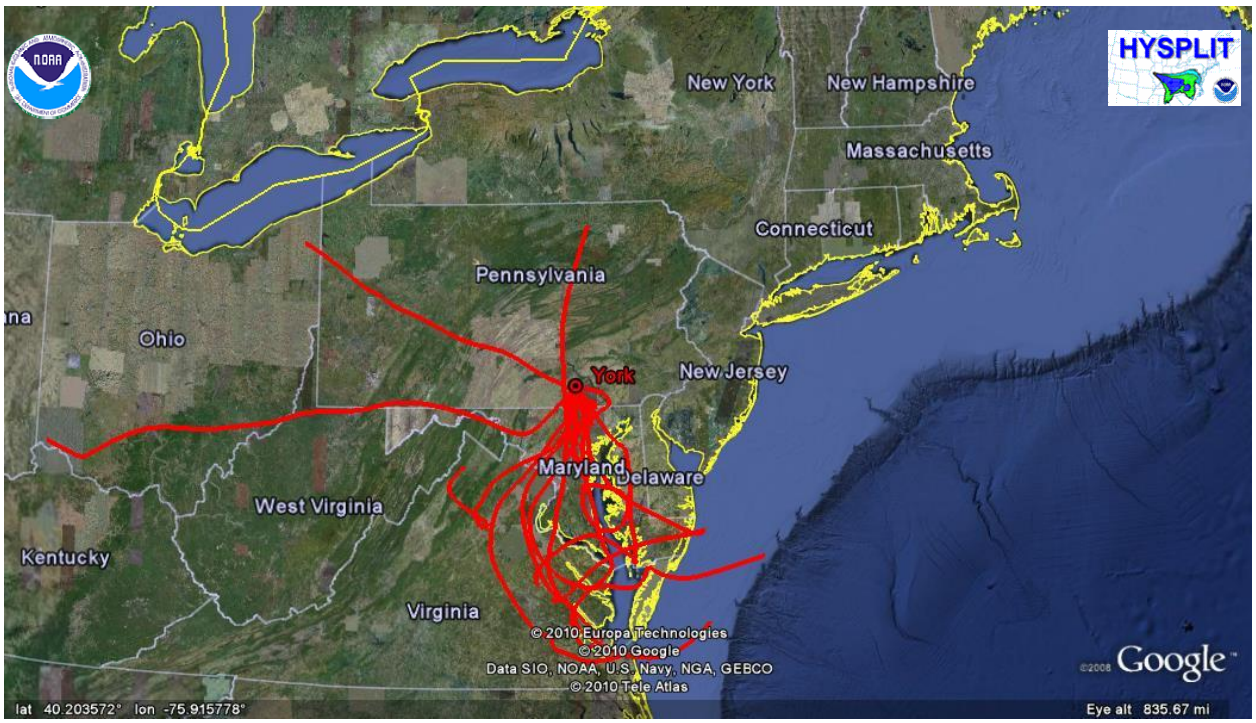


Figure C-1.15c. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, York Downwind Air Monitoring Site.

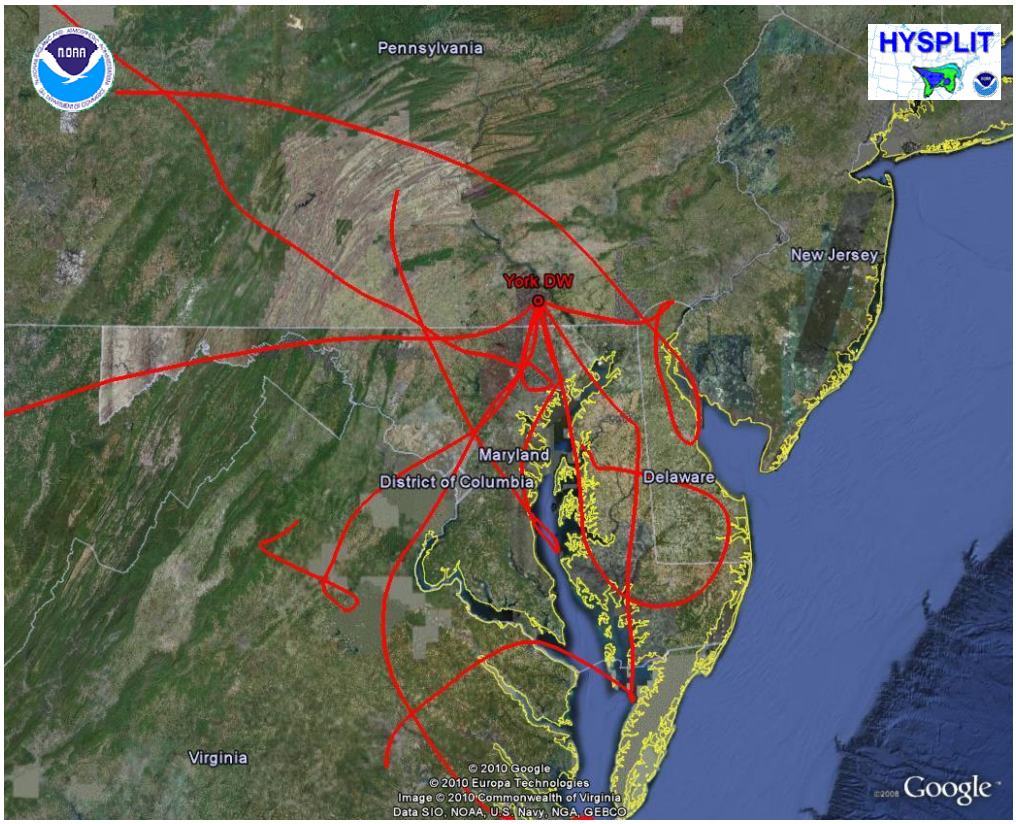
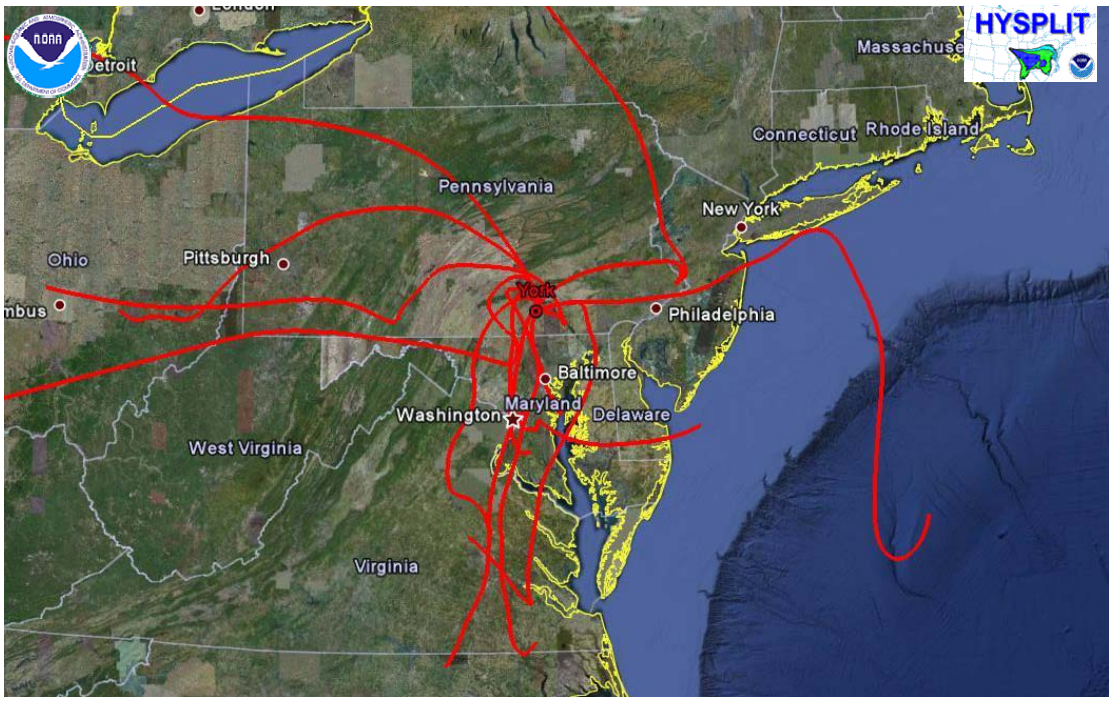


Figure C-1.15d. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, York Air Monitoring Site.



C-1.16 Youngstown-Warren-Boardman, OH-PA MSA

Figure C-1.16a. Wind Rose for the Farrell Air Monitoring Site, 2007-2009.

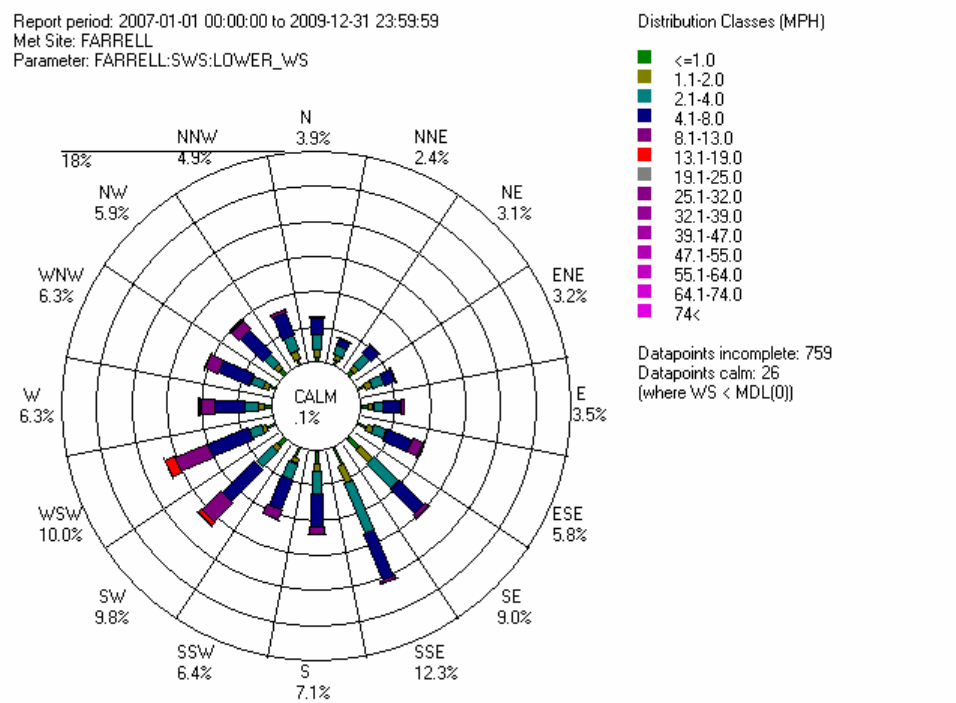


Figure C-1.16b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Farrell Air Monitoring Site.

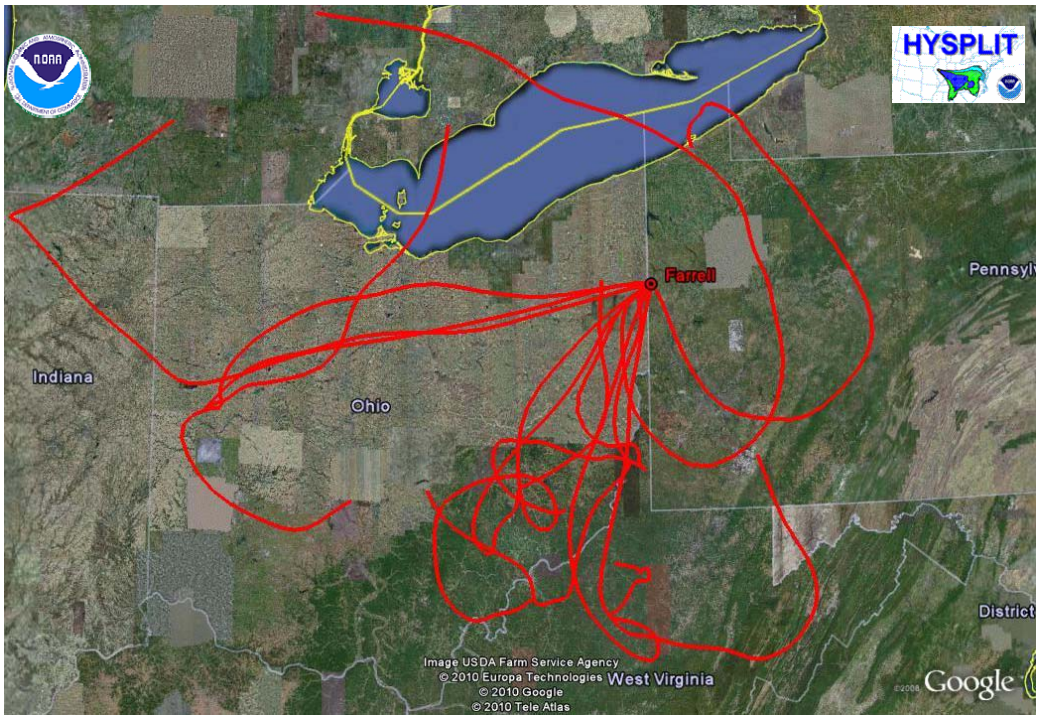
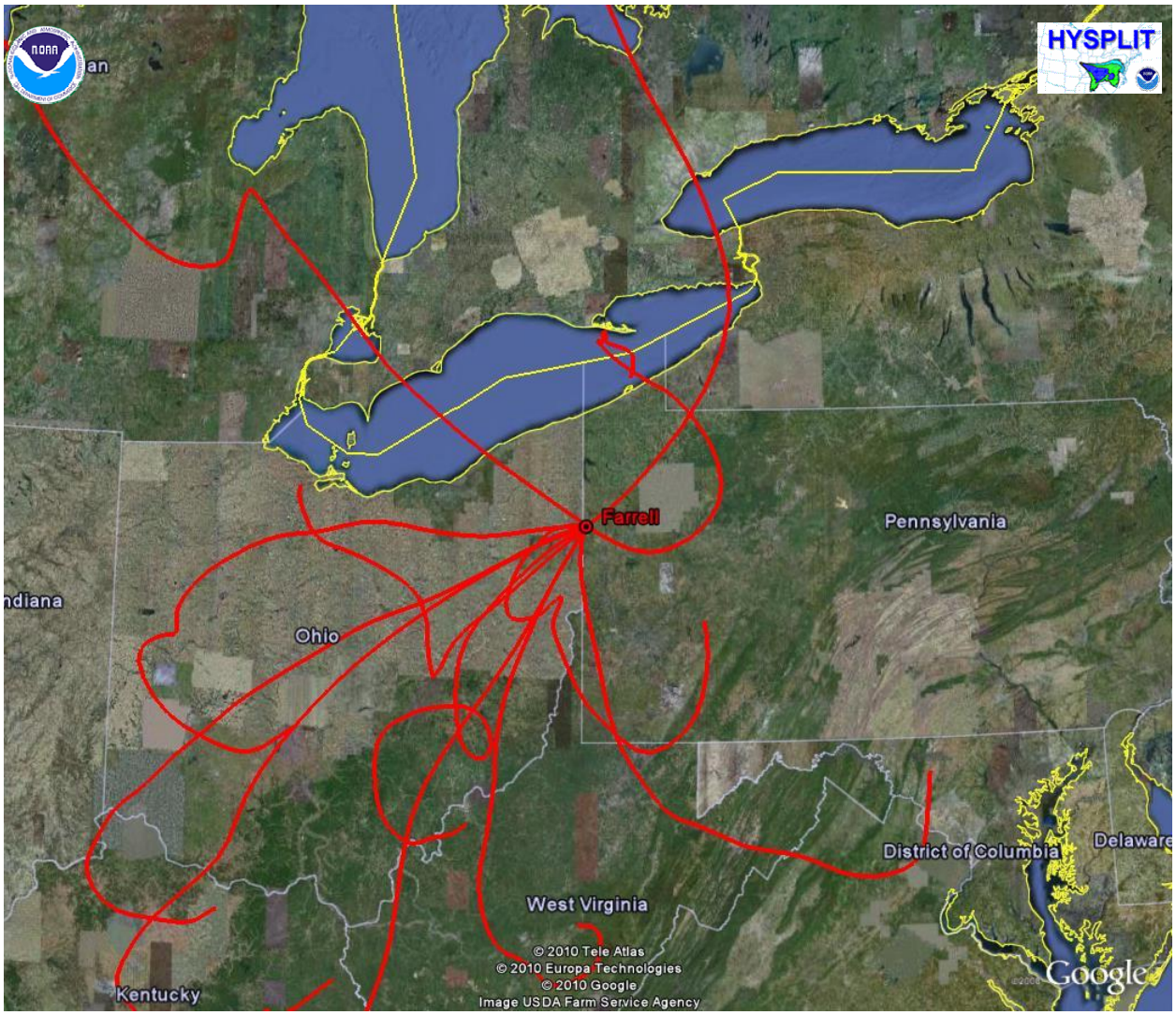


Figure C-1.16c. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Farrell Air Monitoring Site.



C-2. Site-Specific Meteorological Data by Non-MSA Regions.

C-2.1 Southeast Region

The Southeast Region is entirely encompassed by the Philadelphia-Camden-Wilmington PA-NJ-DE-MD MSA. Figures for this region are found in C-1.9 of this document.

C-2.2 Northeast Region

Figure C-2.2a. Wind Rose for the Pocono/Swiftwater Air Monitoring Site, 2007-2009.

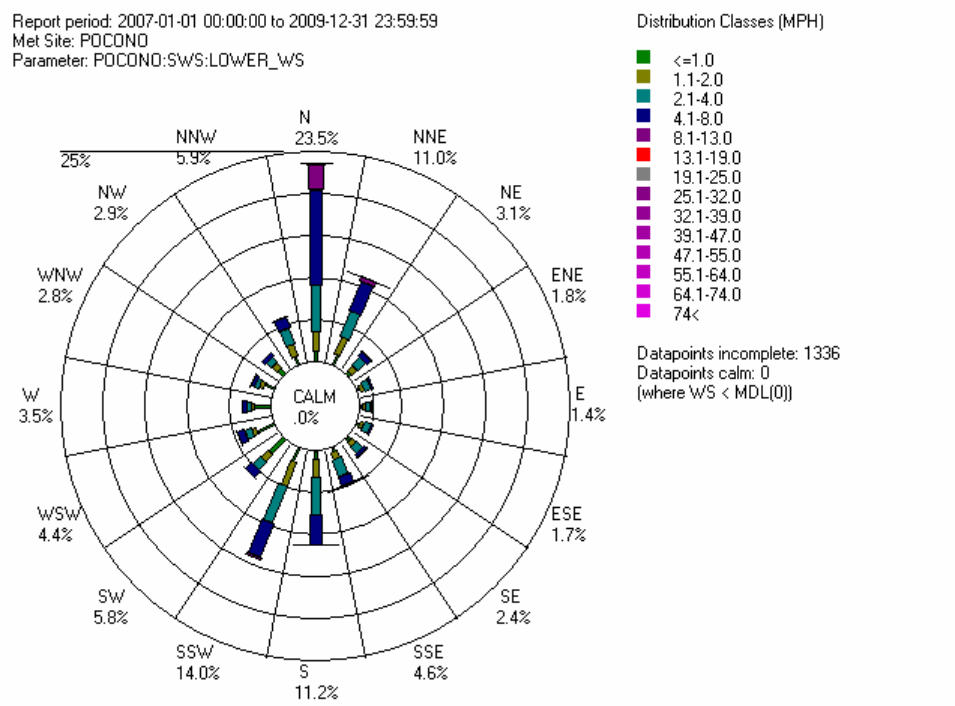
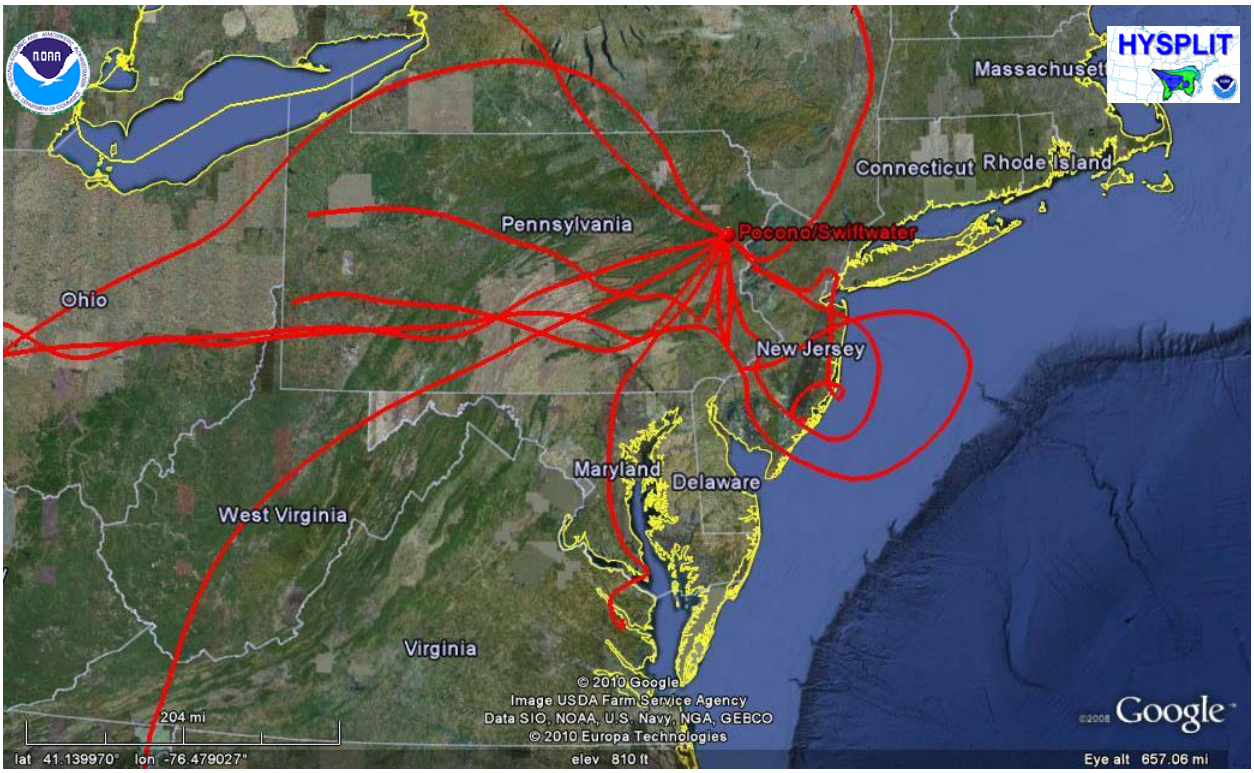


Figure C-2.2b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Pocono/Swiftwater Air Monitoring Site.



C-2.3 Southcentral Region

Figure C-2.3a. Wind Rose for the Methodist Hill Air Monitoring Site, 2007-2009.

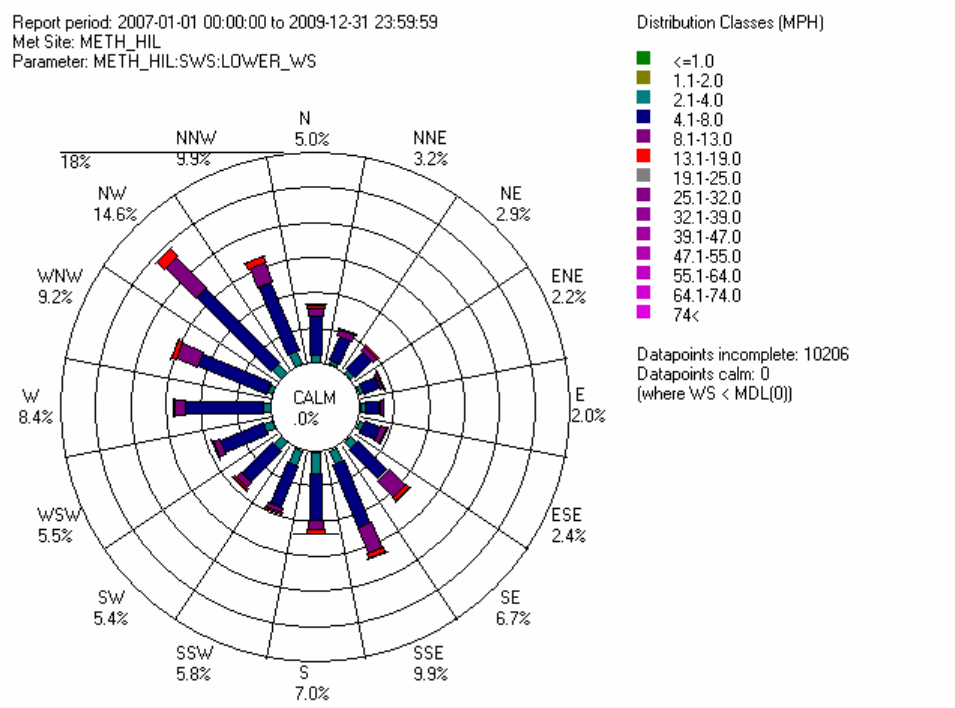


Figure C-2.3b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Methodist Hill Air Monitoring Site.

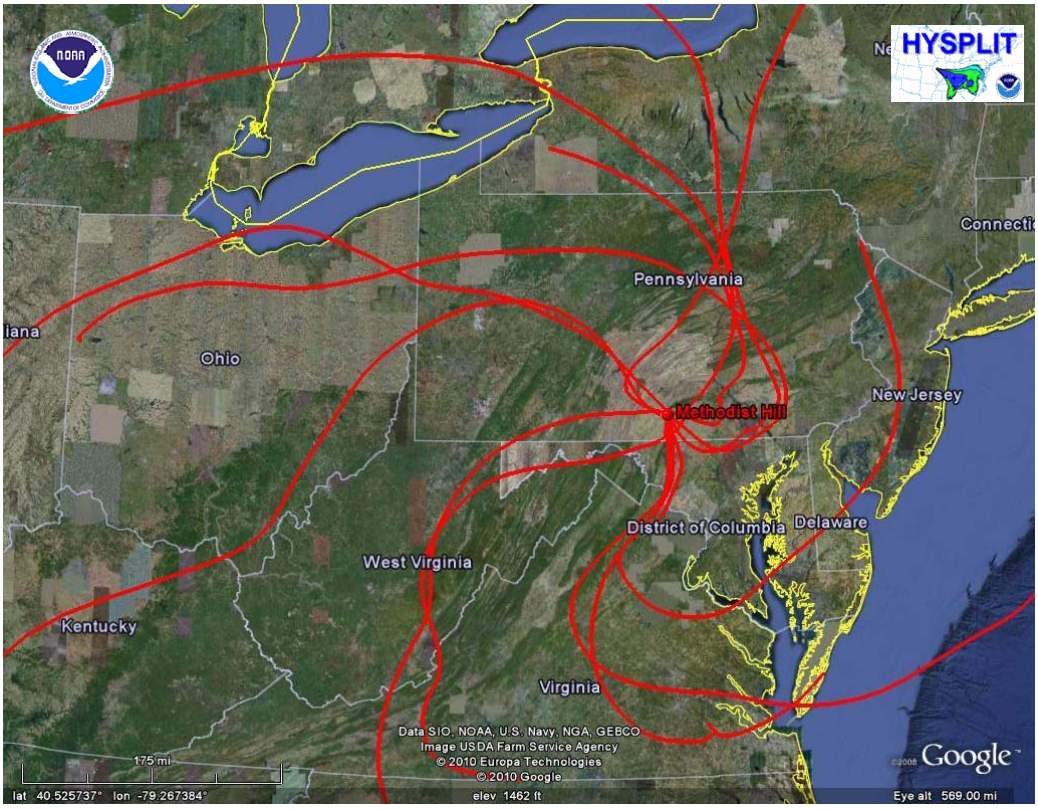
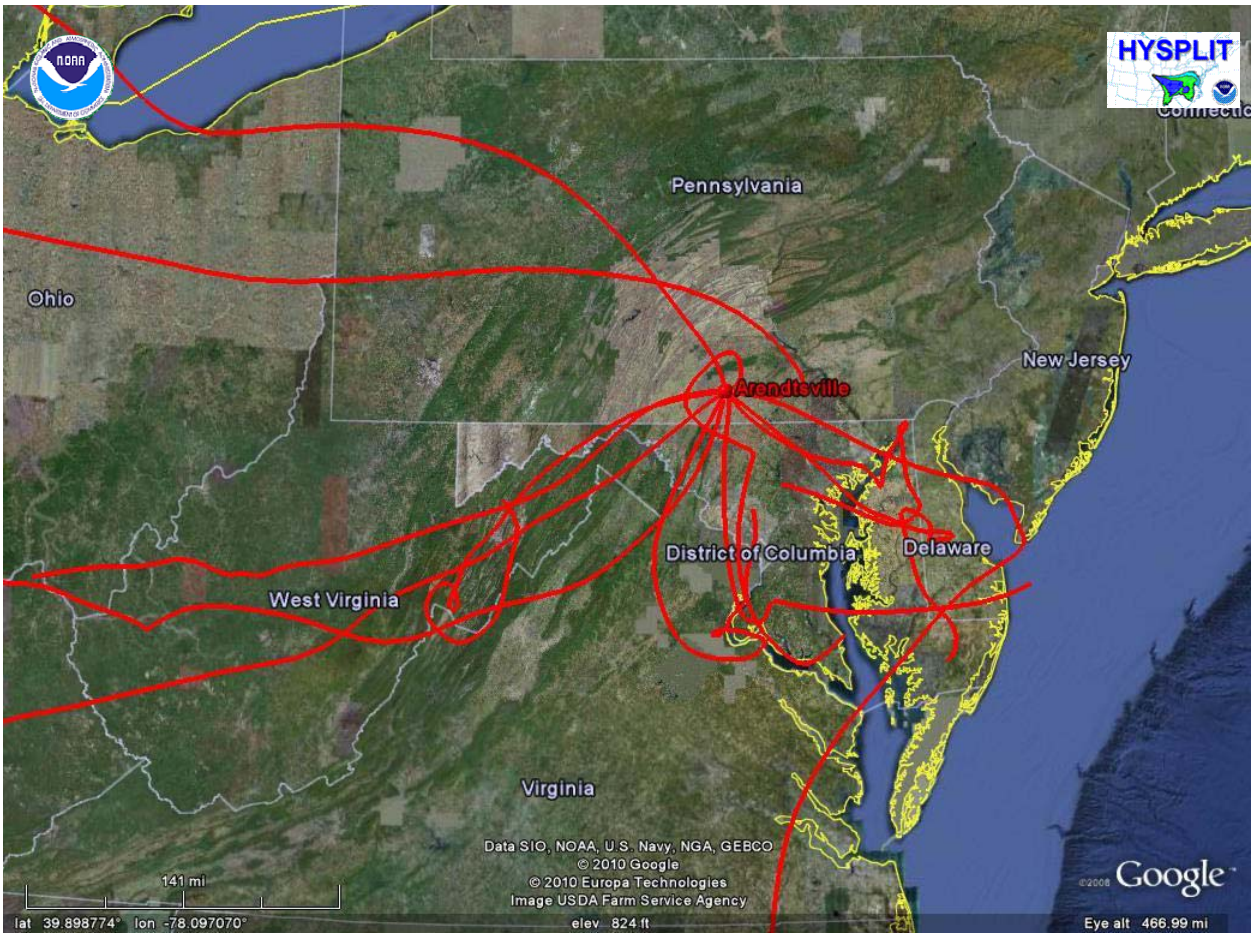


Figure C-2.3c. $PM_{2.5}$ Back Trajectory Analysis for the Four Highest $PM_{2.5}$ Concentration Days, 2007-2009, Arendtsville Air Monitoring Site.



C-2.4 Northcentral Region

Figure C-2.4a. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Moshannon Air Monitoring Site.

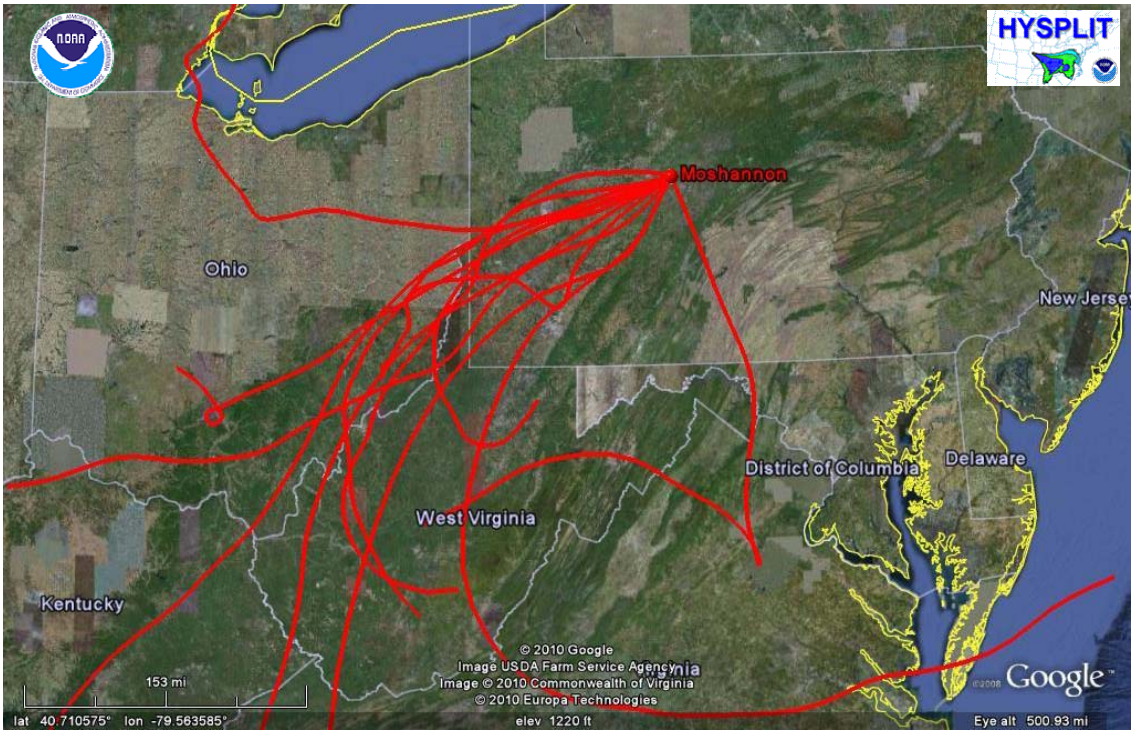
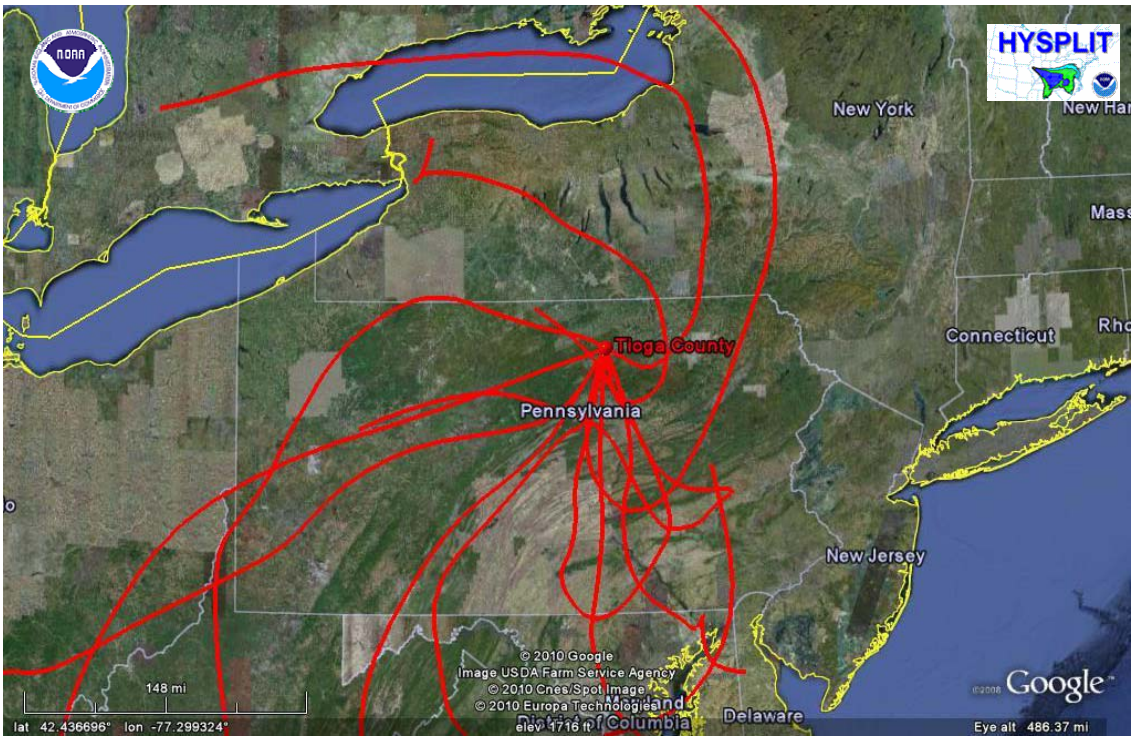


Figure C-2.4b. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Tioga Air Monitoring Site.



C-2.5 Southwest Region

Figure C-2.5a. Wind Rose for the Holbrook Air Monitoring Site, 2007-2009.

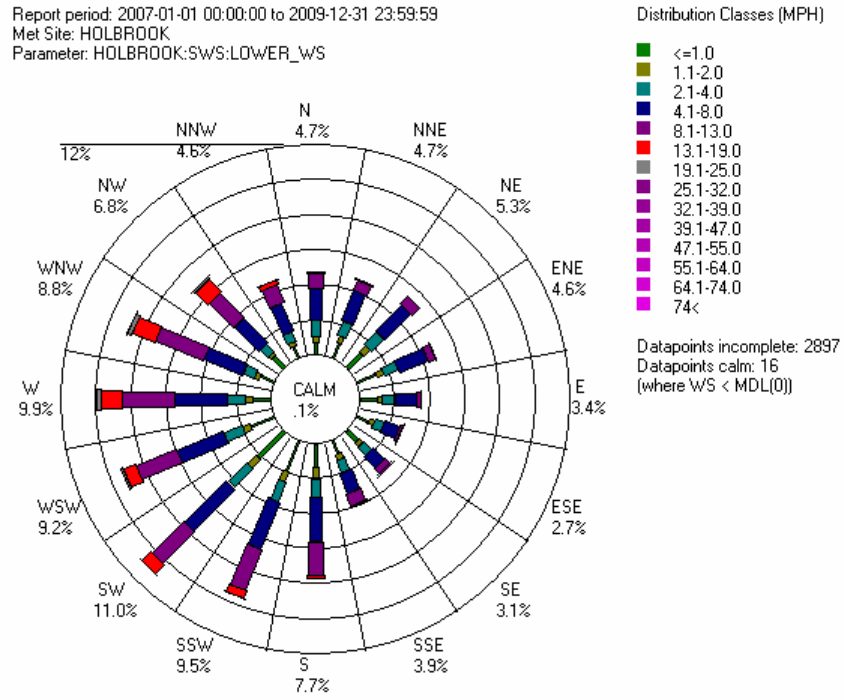


Figure C-2.5b. Wind Rose for the Strongstown Air Monitoring Site, 2007-2009.

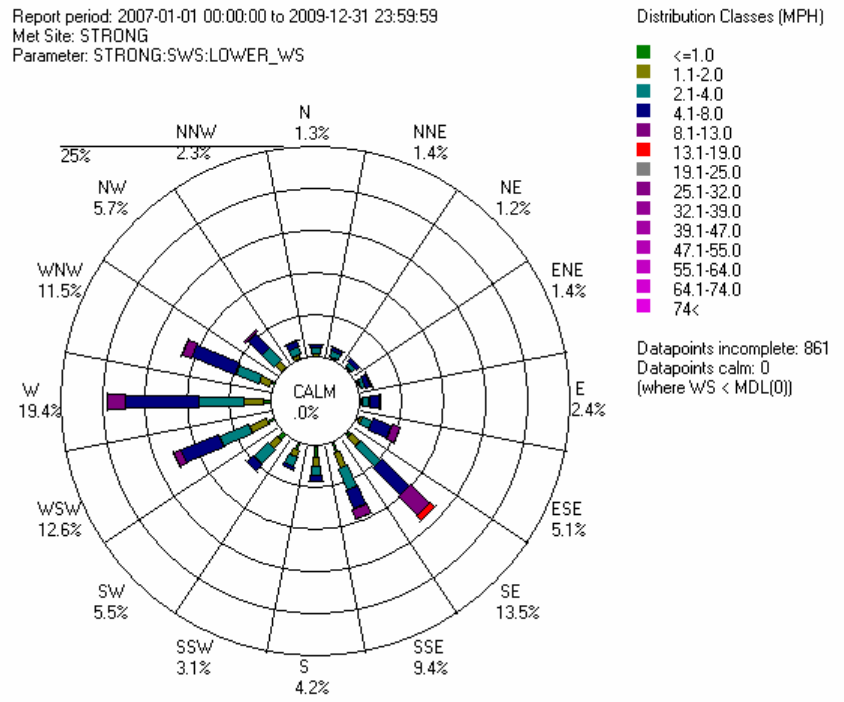


Figure C-2.5c. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Holbrook Air Monitoring Site.

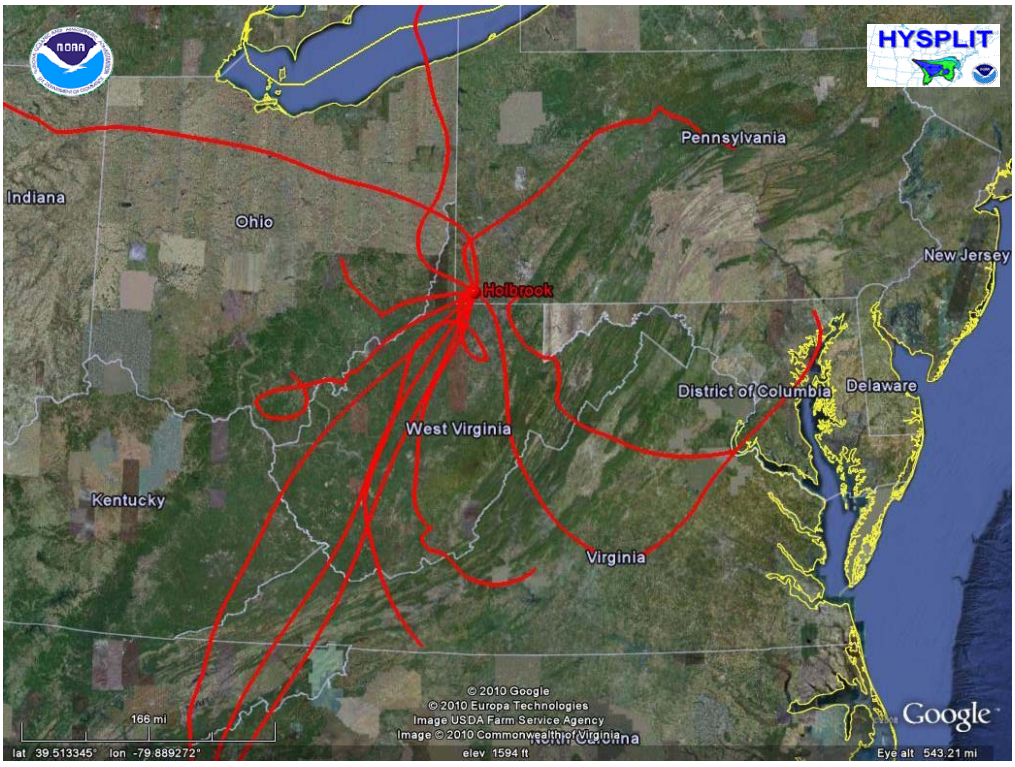
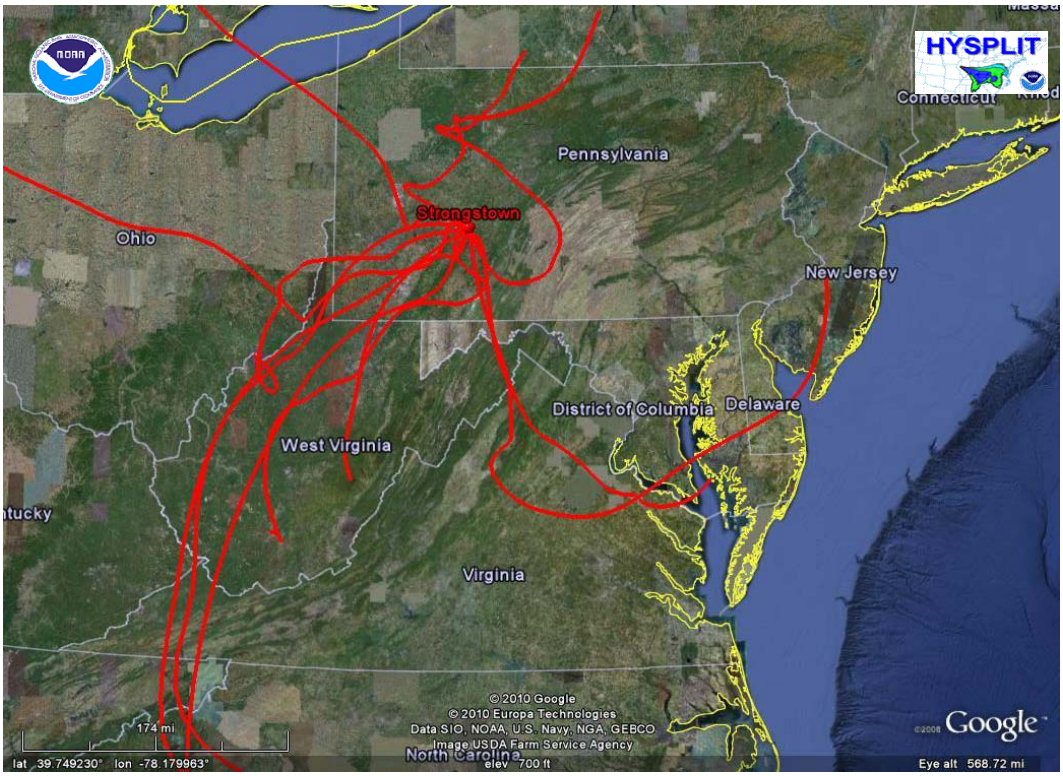


Figure C-2.5d. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Strongstown Air Monitoring Site.



C-2.6 Northwest Region

Figure C-2.6a. Wind Rose for the New Castle Air Monitoring Site, 2007-2009.

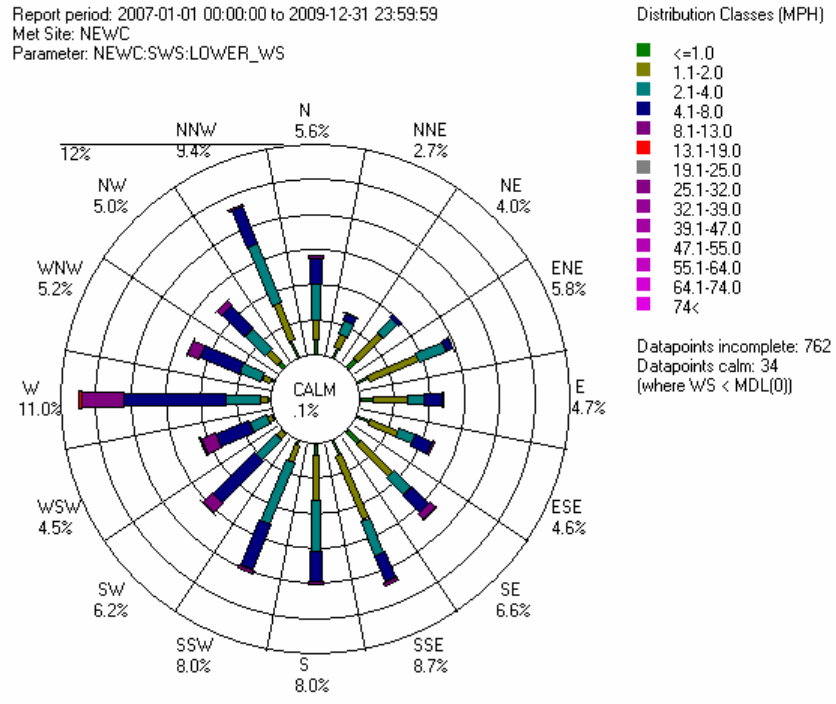


Figure C-2.6b. Wind Rose for the Warren Overlook Air Monitoring Site, 2007-2009.

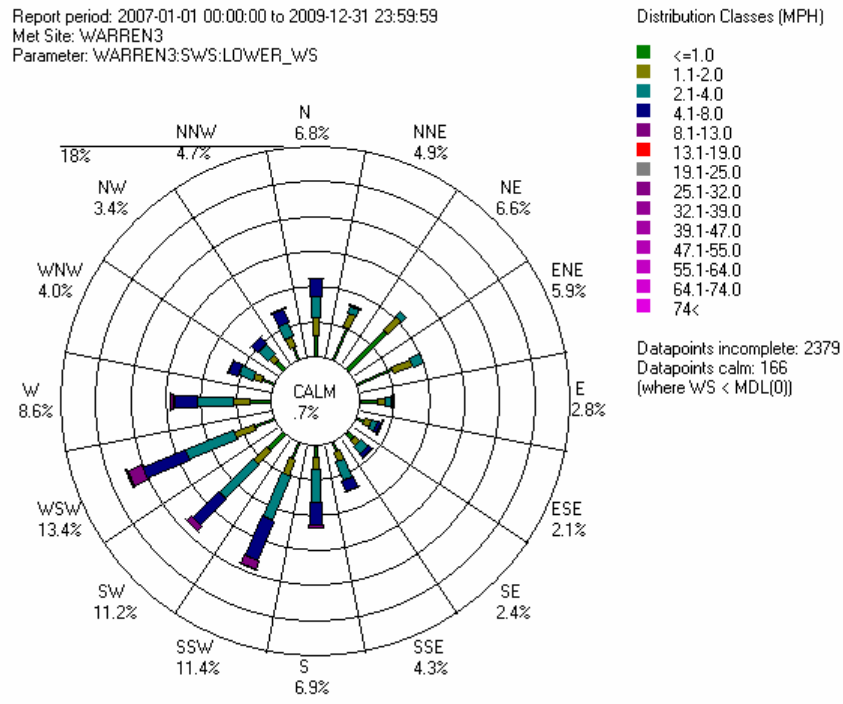


Figure C-2.6c. Ozone Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, New Castle Air Monitoring Site.

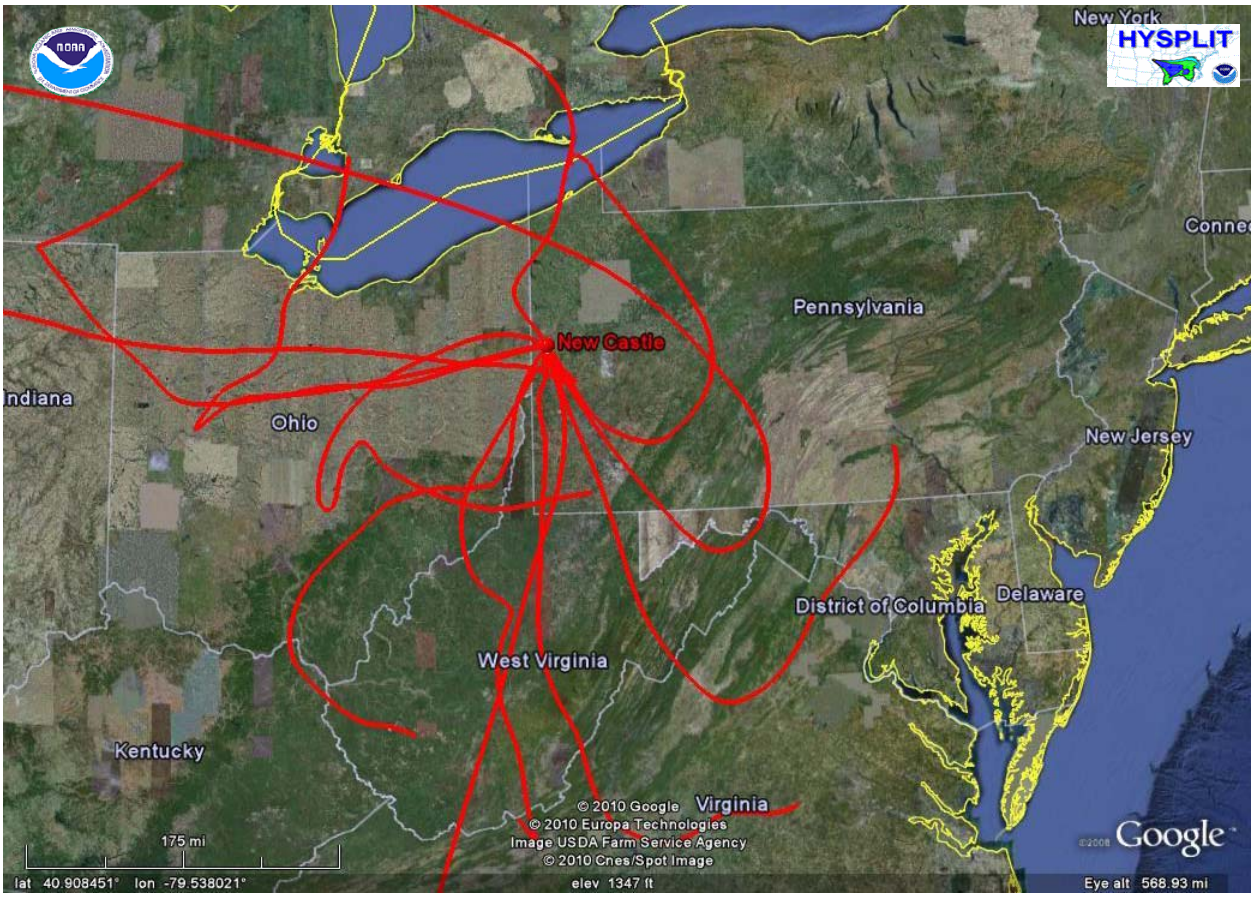
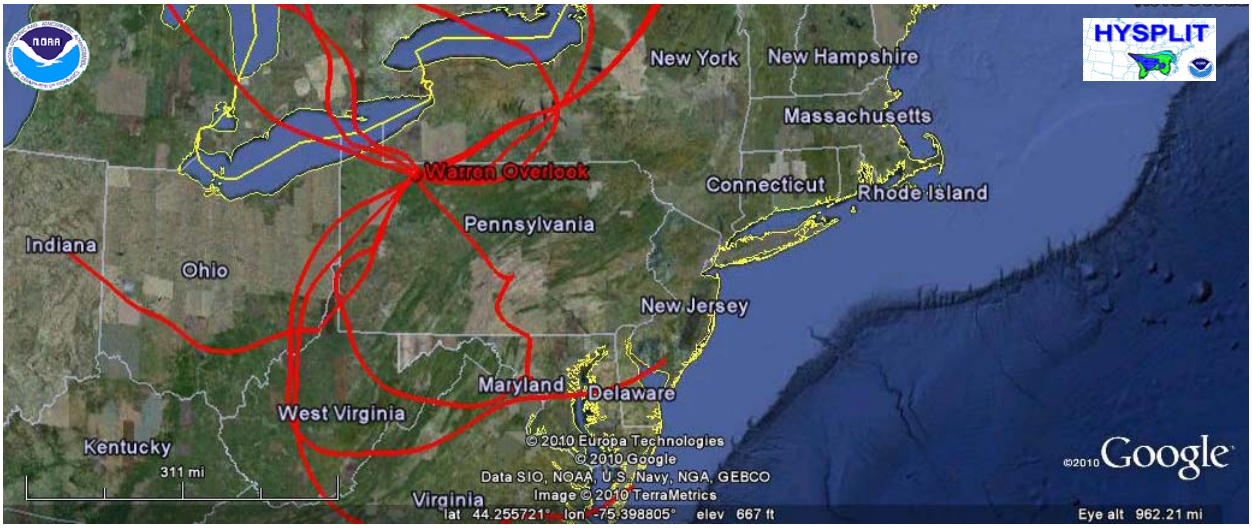


Figure C-2.6d. SO_2 Back Trajectory Analysis for the Four Highest Ozone Concentration Days, 2007-2009, Warren Overlook Air Monitoring Site.



C-3. Major Pollutant Sources by Region.

Figure C-3a. Criteria Pollutant Sources Located in the Southeast Pennsylvania Region.

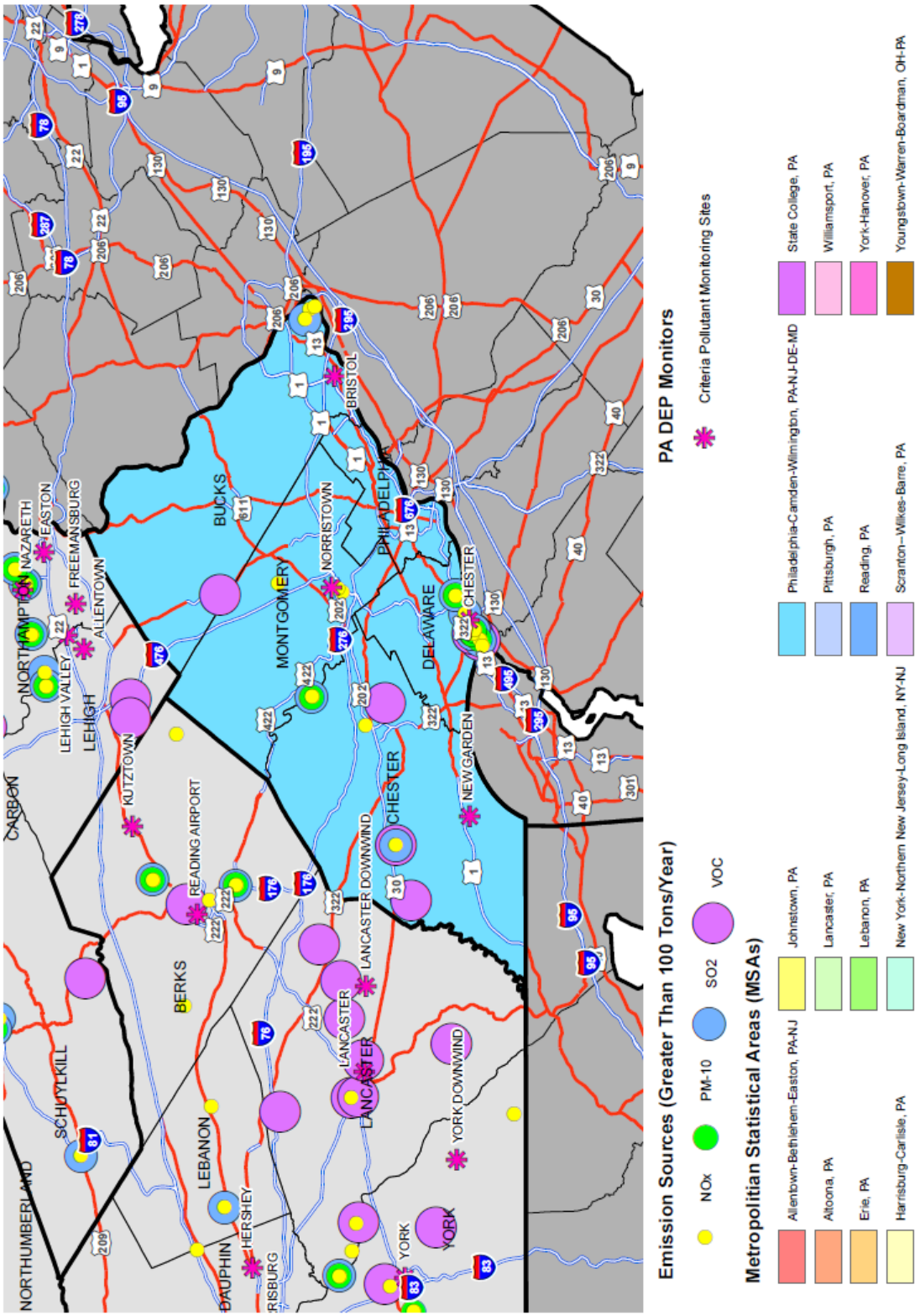


Figure C-3b. Criteria Pollutant Sources Located in the Northeast Pennsylvania Region.

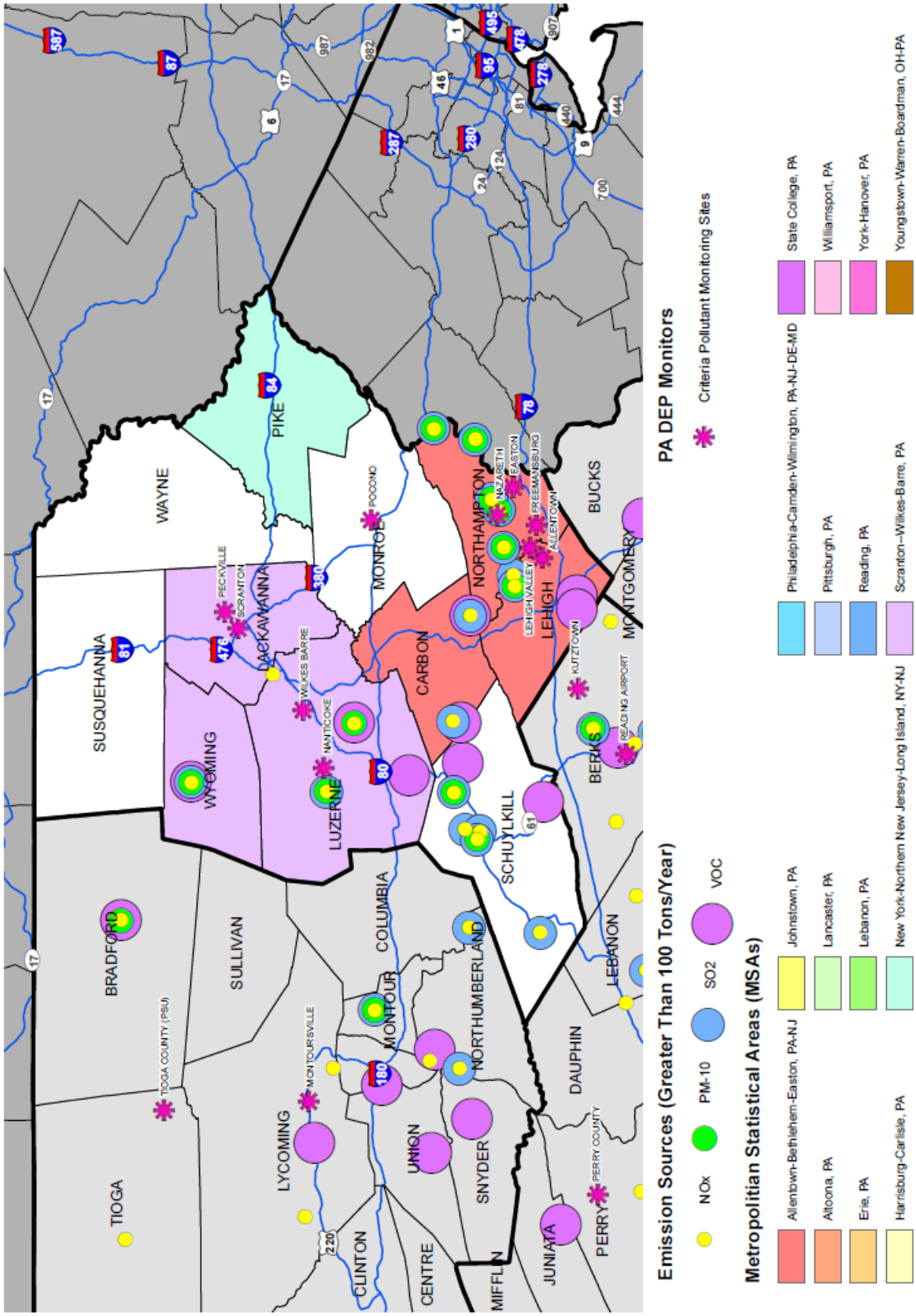


Figure C-3c. Criteria Pollutant Sources Located in the Southcentral Pennsylvania Region.

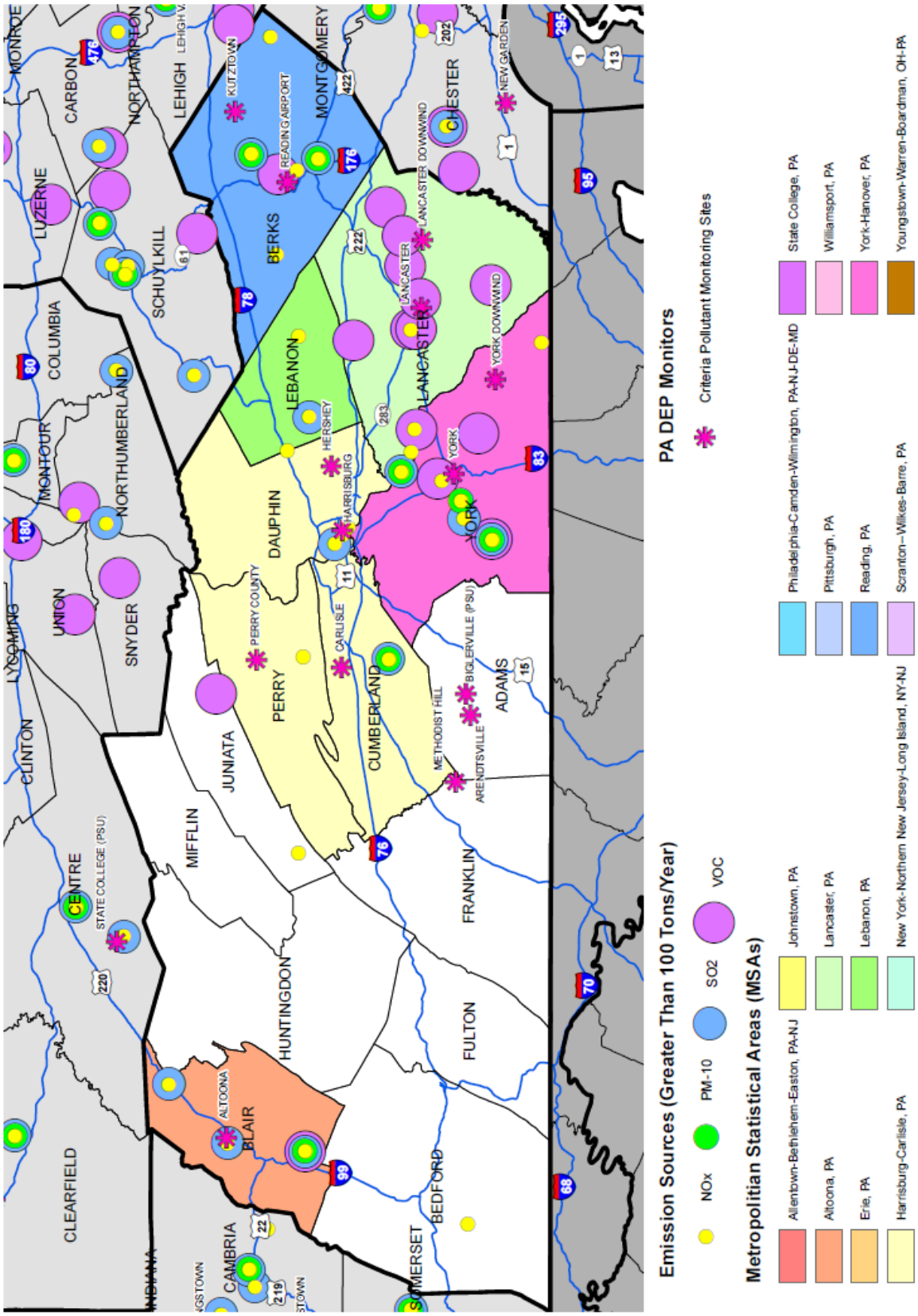


Figure C-3d. Criteria Pollutant Sources Located in the Northcentral Pennsylvania Region.

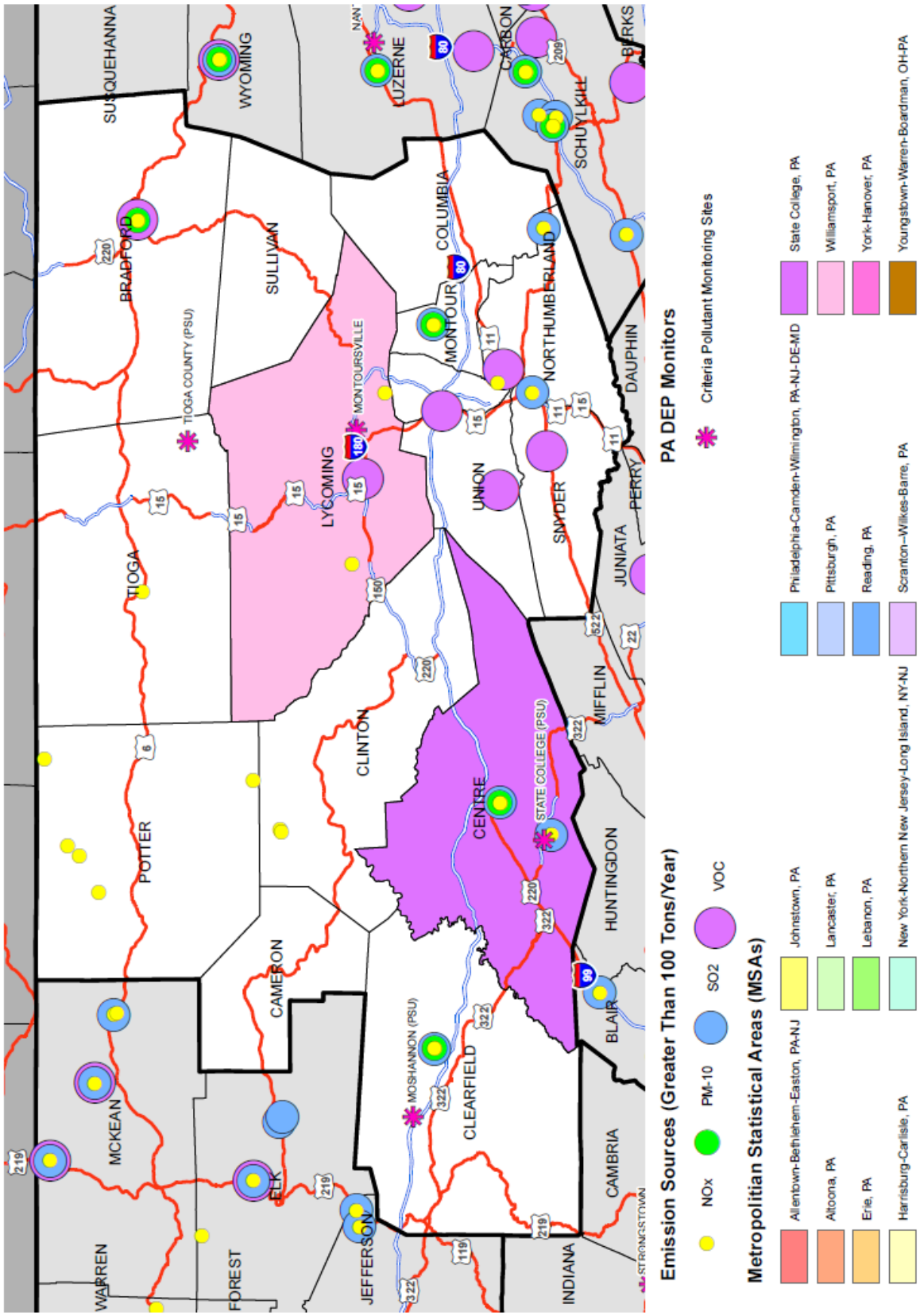


Figure C-3e. Criteria Pollutant Sources Located in the Southwest Pennsylvania Region.

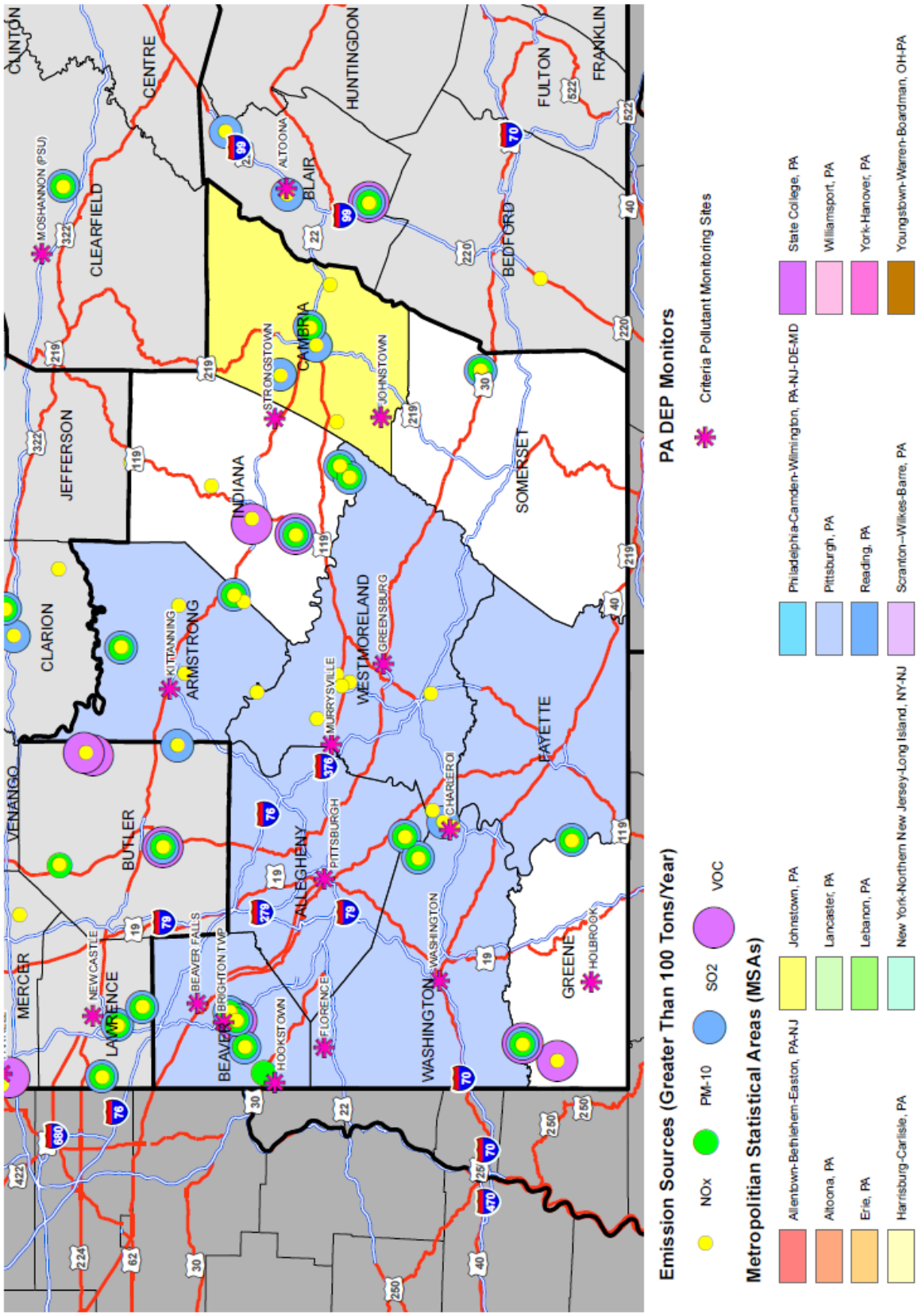


Figure C-3f. Criteria Pollutant Sources Located in the Northwest Pennsylvania Region.