

# Delaware Ambient Air Monitoring Network Description for Criteria Pollutants



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## List of Acronyms

AQS – Air Quality System

CAA – Clean Air Act

CFR – Code of Federal Regulations

CO – carbon monoxide

CSA – combined statistical area

DNREC – Department of Natural Resources and Environmental Control

EPA – Environmental Protection Agency

FEM – Federal Equivalent Method

FRM – Federal Reference Method

MSA – metropolitan statistical area

NAAQS – National Ambient Air Quality Standards

NO – nitric oxide

NO<sub>2</sub> – nitrogen dioxide

NO<sub>x</sub> – nitrogen oxides

O<sub>3</sub> – ozone

Pb - lead

PM<sub>2.5</sub> – fine particulate matter (2.5 microns)

PM<sub>10</sub> – respirable particulate matter (10 microns)

PM<sub>10-2.5</sub> – coarse particulate matter (PM<sub>10</sub> – PM<sub>2.5</sub>)

SLAMS – state and local monitoring stations

SO<sub>2</sub> – sulfur dioxide

SPM – Special Purpose Monitor

UFP – ultrafine particles

WS/WD – wind speed/wind direction

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## Introduction

In 1970, Congress passed the Clean Air Act that authorized the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants shown to threaten human health and welfare. Primary standards were set according to criteria designed to protect public health, including an adequate margin of safety to protect sensitive populations such as children and asthmatics. Secondary standards were set according to criteria designed to protect public welfare (decreased visibility, damage to crops, vegetation, and buildings, etc.).

Seven pollutants currently have NAAQS: ozone (O<sub>3</sub>), carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), particulate matter less than 10 microns (PM<sub>10</sub>), particulate matter less than 2.5 microns (PM<sub>2.5</sub>) and lead (Pb). These are commonly called the "criteria" pollutants. When air quality does not meet the NAAQS, the area is said to be in "nonattainment" with the NAAQS.

## Requirements for Monitoring Network Descriptions

In October 2006, the EPA issued final regulations concerning state and local agency ambient air monitoring networks (see 71 FR 61298). These regulations are codified at 40 CFR Part 58, and require periodic assessments of the monitoring networks including the information described below.

§58.10 Annual monitoring network plan and periodic network assessment, Section §58.10 (a) requires for each existing and proposed monitoring site:

- 1) A statement of purpose for each monitor.
- 2) Evidence that siting and operation of each monitor meets the requirements of appendices A, C, D, and E of 40 CFR Part 58, where applicable.
- 3) Proposals for any State and Local Air Monitoring station (SLAMS) network modifications.

Section §58.10 (b) The annual monitoring network plan must contain the following information for each existing and proposed site:

- 1) The Air Quality System (AQS) site identification number.
- 2) The location, including street address and geographical coordinates.
- 3) The sampling and analysis method(s) for each measured parameter.
- 4) The operating schedules for each monitor.
- 5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.
- 6) The monitoring objective and spatial scale of representativeness for each monitor as defined in Appendix D to 40 CFR Part 58.
- 7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual PM<sub>2.5</sub> NAAQS as described in §58.30.
- 8) The Metropolitan Statistical Area (MSA), Core Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor.
- 9) The identification of required NO<sub>2</sub> monitors as either near-road or area-wide sites in accordance with Appendix D to 40 CFR Part 58.

All proposed changes of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to EPA Regional approval according to 40 CFR Part 58.14

## **Delaware Air Monitoring Network**

### **History of air monitoring in Delaware**

Air pollution monitoring in Delaware began in the 1950s, prior to the establishment of the US EPA. The first monitors were simple mechanisms or passive collectors such as dust-fall buckets and tape samplers. These were followed in the 1960s by wet-chemistry instruments, which were soon replaced by more advanced electronic instruments. The addition of computer technology in operating monitoring systems and air pollution data collection in the late 1970s and early 1980s was critical to the development of the core monitoring network that exists today.

The earliest monitors were placed near pollution sources to measure direct impact of pollution emissions. As ambient air pollution standards became established and monitoring methods standardized, the monitoring network expanded to include monitors in both urban and suburban areas. Monitoring goals shifted to include measuring high pollution concentrations in population centers, detecting trends, and determining compliance with the new national and ambient air quality standards, as well as establishing background levels and measuring pollution transported from areas outside of Delaware.

With the passage of the Clean Air Act in 1970, and the Clean Air Act Amendments in 1990, various control measures implemented by the federal and state governments resulted in major improvements in air quality, particularly regarding major industrial sources. Pollutants of concern today come from a variety of sources including mobile (both on road and off road vehicles) sources, large industrial facilities, and smaller industries and business. Delaware continues to use its ambient monitoring network to track changes in air quality across the state and evaluate compliance with ambient air quality standards.

### **Network Overview**

The State of Delaware has established an air monitoring network to determine the ambient levels of the pollutants for which NAAQS have been established. The Delaware Air Monitoring Network consists of the sites and monitors throughout the state, which are listed and described in this document. This network is maintained and operated by the Air Surveillance Group of the Division of Air Quality, DNREC.

### **National Core Monitoring Strategy – NCore**

In October 2006 the United States Environmental Protection Agency (EPA) issued final amendments to the ambient air monitoring regulations for criteria pollutants. These amendments are codified in 40 CFR parts 53 and 58. The purpose of the amendments was to enhance ambient air quality monitoring to better serve current and future air quality needs. One of the most significant changes in the regulations was the requirement to establish National Core (NCore) multi-pollutant monitoring stations. These stations provide data on several pollutants at lower detection limits and replace the National Air Monitoring Station (NAMS) networks that have existed for several years. The final network plan was submitted to EPA on July 1, 2009 and the station was fully operational on January 1, 2011.

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The NCore Network addresses the following monitoring objectives:

- timely reporting of data to the public through AIRNow, air quality forecasting, and other public reporting mechanisms
- support development of emission strategies through air quality model evaluation and other observational methods
- accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors
- support long-term health assessments that contribute to ongoing reviews of the National Ambient Air Quality Standards (NAAQS)
- compliance through establishing nonattainment/attainment areas by comparison with the NAAQS
- support multiple disciplines of scientific research, including; public health, atmospheric and ecological

The NCore sites must measure, at a minimum, PM<sub>2.5</sub> particle mass using continuous and integrated/filter-based samplers, speciated PM<sub>2.5</sub>, PM<sub>10-2.5</sub> particle mass, O<sub>3</sub>, SO<sub>2</sub>, CO, NO/NO<sub>y</sub>, lead, wind speed, wind direction, relative humidity, and ambient temperature.

Each State is required to operate at least one NCore site. The objective is to locate sites in broadly representative urban (about 50 sites) and rural or regional (about 20 sites) locations throughout the country to help characterize urban- and regional-scale patterns of air pollution. Monitoring agencies are encouraged by EPA to collocate NCore sites with existing sites already measuring ozone precursors, air toxics, or PM<sub>2.5</sub> speciation components. By combining these monitoring programs at a single location, stakeholders can maximize the multi-pollutant information available. This approach not only leverages existing resources but notably enhances the foundation for future health studies and NAAQS revisions.

In 2009, EPA provided funding to begin the process of establishing an NCore station in Delaware. After evaluating the existing network, historical data, census data, meteorology, and topography, Delaware's proposal for the existing MLK monitoring site as Delaware's NCore site was accepted by EPA.

Delaware's NCore monitoring, including PMcoarse, ozone, and NO<sub>y</sub>, became operational on January 1, 2011. The lead monitoring began on January 1, 2012.

### **Monitoring Site Network Map and Information**

Following is the Delaware ambient air monitoring site network map as of June 2015.



Below is a table with summary information on every SLAMS site in Delaware. Information includes site name and AQS ID, active parameters as of June 2015, the date when each monitor began collecting information, the scale of representativeness for each parameter, the monitoring objective, and any other comments relating to the site or monitor.

Actual changes from the 2014 Monitoring Plan are highlighted. There is also a clarification for the scale of representation for Killens Pond and Lums Pond. These sites previously had a scale of “neighborhood” (0.5 – 4 km) which was updated to “urban” (4 – 10 km) to more accurately describe the scale typical of background monitoring sites.

Site Name & AQS ID	Parameter	Start Date	Scale of Rep	Objective	Comments
Killens Pond 10-001-0002	Ozone	4/1/1995	Urban	General/Background	Rural site
	PM2.5	1/1/1999	Urban	General/Background	
	PM2.5 Continuous FEM	9/1/2012	Urban	General/Background	
	WS/WD	4/1/1995	N/A		
Dover 10-001-0003	PM2.5	1/1/1999	Neighborhood	Population Exposure	
	PM2.5 speciation	6/1/2001	N/A		
Brandywine 10-003-1010	Ozone	7/1/1994	Neighborhood	Population Exposure	Secondary downwind of Wilmington
	NO2	5/1/2013	Neighborhood	Special purpose monitor	Monitoring ended Sep. 2014
	WS/WD	11/1/2013	N/A		
Bellefonte2 10-003-1013	Ozone	4/1/2001	Neighborhood	Population Exposure	Primary downwind of Wilmington
	SO2	3/1/2003	Neighborhood	Population Exposure	
Bellefonte 10-003-1003	PM2.5	1/1/1999	Neighborhood	Population Exposure	
MLK 10-003-2004	SO2	1/1/1999	Neighborhood	Population Exposure	Urban NCore site
	CO	1/1/1999	Middle	Population Exposure	
	NO2	1/1/2001	Neighborhood	Population Exposure/ Maximum Concentration	
	NOy	1/1/2011	Neighborhood	Population Exposure/ NCore	
	Ozone	1/1/2011	Neighborhood	Population Exposure/ NCore	
	PM10	1/1/2000	Neighborhood	Population Exposure/ Maximum Concentration	
	PM2.5	1/1/1999	Neighborhood	Population Exposure/ Maximum Concentration	
	PMcoarse & PM10	1/1/2011	Neighborhood	Population Exposure/ NCore	
	Lead	1/1/2012	Neighborhood	Population Exposure/ NCore	
	PM2.5 speciation	6/1/2001	N/A		
	BC	1/1/2001	N/A		
	VOCs	1/1/1999	N/A		

Site Name & AQS ID	Parameter	Start Date	Scale of Rep	Objective	Comments
	PM2.5 Continuous FEM	7/1/2007	Neighborhood	Air Quality Index/Population Exposure	
	Carbonyls	1/1/2003	N/A		
	Metals	1/1/2003	N/A		
	WS/WD	6/1/2000	N/A		
	Temp/RH	1/1/2011	N/A		
Newark 10-003-1012	PM2.5	12/15/1999	Neighborhood	Population Exposure	
Lums Pond 10-003-1007	Ozone	1/1/1992	Urban	Upwind Background/ Population Exposure	Rural/suburban, upwind of Wilmington during ozone season
	SO2	1/1/2000	Urban	General Background/ Population Exposure	
	PM2.5	1/1/1999	Urban	Regional Transport/ Population Exposure	
	WS/WD	6/1/2013	N/A		
Delaware City 10-003-1008	SO2	2/1/1992	Neighborhood	Population Exposure/ Source Oriented	Point source dominated site  CO monitoring ended Dec. 2014
	CO	1/1/1994	Middle	Population Exposure/ Source Oriented	
	PM2.5 Continuous FEM	6/1/2013	Neighborhood	Population Exposure/ Source Oriented	
	VOCs	1/1/2001	N/A		
	WS/WD	5/1/2011	N/A		
Seaford 10-005-1002	Ozone	3/1/1990	Neighborhood	Population Exposure	
	PM2.5	1/1/1999	Neighborhood	Population Exposure	
	PM2.5 Continuous FEM	1/1/2013	Neighborhood	Population Exposure	
	WS/WD	5/1/2011	N/A		
Lewes 10-005-1003	Ozone	5/1/1997	Neighborhood	Population Exposure	Coastal site  NO2 SPM monitoring ended Sep. 2014
	SO2	1/1/2013	Neighborhood	Population Exposure	
	NO2	8/1/2012	Neighborhood	Special Purpose Monitor	
	WS/WD	6/1/1997	N/A		

N/A – not applicable

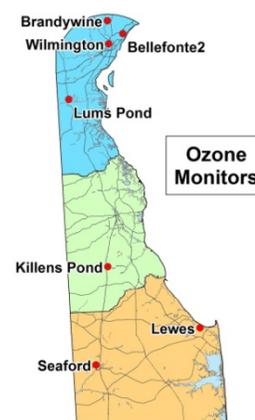
## Criteria Pollutant Network Description by Parameter

### Ozone (O<sub>3</sub>)

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

#### *Monitoring Requirements*

Within an O<sub>3</sub> network, at least one O<sub>3</sub> site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular metropolitan area. More than one maximum concentration site may be necessary in some areas. Other types of monitoring sites are needed to determine maximum population exposure, background concentrations, and concentrations being transported into an area (boundary conditions). The appropriate spatial scales for O<sub>3</sub> sites are neighborhood, urban, and regional. Since O<sub>3</sub> requires appreciable formation time, the mixing of reactants and products occurs over large volumes of air, and this reduces the importance of monitoring for small scale spatial variability.



The prospective maximum concentration monitor site should be selected in a direction from the city that is most likely to observe the highest O<sub>3</sub> concentrations, more specifically, downwind during periods of photochemical activity. Since O<sub>3</sub> levels decrease significantly in the colder parts of the year in many areas, O<sub>3</sub> is required to be monitored only during the “ozone season” as designated in the 40 CFR Part 58 Appendix D, which in Delaware is April 1 through October 31. Starting in 2016 the ozone season will begin on March 1 according to current proposed changes to 40 CFR Part 58.

Delaware operates seven ozone monitoring sites, including sites for population exposure, background concentrations, upwind and downwind directions for the Wilmington area, and NCore monitoring. Monitoring objectives for each site are included in the detailed site description section of this document. The monitors began operating year-round in 2011 although the official EPA ozone monitoring season for Delaware runs from April through October. Hourly data is sent to the AirNow website to generate the daily Air Quality Index and to be used in mapping ozone concentrations throughout the region.

#### *Ozone Design Values*

The table below shows the most recent (2012 – 2014) design value for each ozone monitor in Delaware. Ozone design values are calculated by taking the 3-year average of the annual 4th maximum daily maximum 8-hr ozone averages. The current 8-hr ozone standard is 0.075 ppm.

Ozone 8-hour design values in ppm, 2012 – 2014.

Site	Design Value in ppm
Brandywine	0.072*
Bellefonte2	0.071
Lums Pond	0.071
Killens Pond	0.072
Seaford	0.070
Lewes	0.074
MLK NCore	0.071

\*Does not meet completeness criteria

### Sulfur Dioxide (SO<sub>2</sub>)

Sulfur dioxide is measured with a fluorescence analyzer. Air is drawn through a sample cell where it is subjected to high intensity ultraviolet light. This causes the sulfur dioxide molecules in the air to fluoresce and release light. The fluorescence is detected with a photo multiplier tube and converted to an electrical signal proportional to the SO<sub>2</sub> concentration.

#### Monitoring Requirements

On June 2, 2010, EPA strengthened the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO<sub>2</sub>). The primary SO<sub>2</sub> standard was revised by establishing a new 1-hour standard at a level of 75 parts per billion (ppb). The new form of the standard is the 3-year average of the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour average concentrations.



EPA also revised the ambient air monitoring requirements for SO<sub>2</sub>. For Delaware, the new standard requires one additional monitoring site be established in Sussex County. New monitors needed to meet the network design regulations for the new 1-hour SO<sub>2</sub> standard must be sited and operational by January 1, 2013 in accordance with the requirements of 40 CFR Part 58 Appendix D and Delaware will comply with this requirement by adding a monitor in Sussex County to fulfill the requirement for monitoring in the Sussex County portion of the Salisbury metropolitan statistical area (MSA).

EPA also made changes to data reporting requirements for SO<sub>2</sub>. State and local agencies are now required to report two data values for every hour of monitoring conducted:

- the 1-hour average SO<sub>2</sub> concentration; and
- the maximum 5-minute block average SO<sub>2</sub> concentration of each hour.

More detailed information on the new SO<sub>2</sub> standard and monitoring requirements can be found on the EPA website at <http://www.epa.gov/air/sulfurdioxide/actions.html#jun10>

Delaware currently operates four SO<sub>2</sub> monitoring sites, all in New Castle County, which operate year-round. The fifth site in Sussex County became operational as a SPM in late summer 2012 and a SLAMS on January 1, 2013.

SO2 design values for 2012 – 2014: 3-year average of 98<sup>th</sup> percentile 1-hour averages

Site	Design Value in ppb
Bellefonte2	9*
MLK NCore	12
Delaware City	17
Lums Pond	7*
Lewes (2 years)	8*

\*Does not meet completeness criteria

### Carbon Monoxide (CO)

Carbon monoxide is measured by infrared absorption photometry. Air is drawn continuously through a sample cell where infrared light passes through it. Carbon monoxide molecules in the air absorb part of the infrared light, reducing the intensity of the light reaching a light sensor. The light is converted into an electrical signal related to the concentration of carbon monoxide in the sample cell.



### Monitoring Requirements

EPA has not established requirements for the minimum number of CO monitoring sites. Continued operation of existing CO sites is required until discontinuation is approved by the EPA Regional Administrator. Where CO monitoring is ongoing, at least one site must be a maximum concentration site for that area under investigation.

Delaware formerly operated two CO monitoring sites year-round, with a trace level monitor at the MLK site and a legacy (non-trace) monitor at the Delaware City site. Due to continuous maintenance problems with aging equipment at the Delaware City site, monitoring at that location was discontinued at the end of 2014. Ambient concentrations at both sites in 2014 were well below the NAAQS and close to the minimum detectable limit of the monitors. Monitoring will continue at the NCore site at MLK.

### Nitrogen Dioxide (NO<sub>2</sub>)

Nitrogen oxides are measured using the chemiluminescence reaction of nitric oxide (NO) with ozone (O<sub>3</sub>). Air is drawn into a reaction chamber where it is mixed with a high concentration of ozone from an internal ozone generator. Any NO in the air reacts with the ozone to produce NO<sub>2</sub>. Light emitted from this reaction is detected with a photo multiplier tube and converted to an electrical signal proportional to the NO concentration. NO<sub>2</sub> must be measured indirectly. NO<sub>x</sub> is measured by passing the air through a converter where any NO<sub>2</sub> in the air is reduced to NO 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 NO and NO<sub>x</sub>. The NO<sub>2</sub> concentration is equal to the difference between NO and NO<sub>x</sub>.



### **Monitoring Requirements**

On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO<sub>2</sub>). EPA set a new 1-hour NO<sub>2</sub> standard at the level of 100 parts per billion (ppb). The form for the 1-hour NO<sub>2</sub> standard is the 3-year average of the 98<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour average concentrations. EPA also retained, with no change, the current annual average NO<sub>2</sub> standard of 53 ppb.

The 2012-2014 one hour NO<sub>2</sub> design value based on the MLK monitor data is 47 ppb.

More detailed information on the new NO<sub>2</sub> standard and monitoring requirements can be found on the EPA website at <http://www.epa.gov/air/nitrogenoxides/actions.html#jan10>.

In 2012 Delaware added a special purpose monitor (SPM) for NO<sub>2</sub> at the Lewes site for research and model development purposes. This monitoring ended in September 2014.

In 2013 Delaware added a SPM for NO<sub>2</sub> at the Brandywine site for research and model development purposes. This monitoring also ended in September 2014.

### **Total Reactive Oxides of Nitrogen (NO<sub>y</sub>)**

Oxides of Nitrogen are measured using the chemiluminescence reaction of nitric oxide (NO) with ozone (O<sub>3</sub>). Air is drawn into a reaction chamber where it is mixed with a high concentration of ozone from an internal ozone generator. Any NO in the air reacts with the ozone to produce NO<sub>2</sub>. Light emitted from this reaction is detected with a photo multiplier tube and converted to an electrical signal proportional to the NO concentration. NO<sub>(Diff)</sub> must be measured indirectly. NO<sub>y</sub> is measured by passing the air through a converter that is mounted 10 meters from ground level. Reactive Oxides of Nitrogen in the air are reduced to NO in the convertor 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 NO and NO<sub>y</sub>. The NO<sub>(Diff)</sub> concentration is equal to the difference between NO and NO<sub>y</sub>.

On January 1, 2011 NO<sub>y</sub> monitoring began at the MLK site as part of the NCore program.

### **Particulate Matter - Fine (PM<sub>2.5</sub>)**

The federal reference method (FRM) monitors for PM<sub>2.5</sub> operate by drawing air through a specially designed inlet that excludes particles larger than 2.5 microns in diameter. The particles are collected on a Teflon7 microfiber filter that is weighed to determine the particulate mass.

Delaware operates PM<sub>2.5</sub> monitors at seven sites throughout the state. All monitors operate year-round. There is one collocated site at MLK in Wilmington. The normal sampling schedule is 24 hours every third day, however, at MLK samples are collected every day.



### **Monitoring Requirements**

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State agencies must operate at least the minimum number of required PM<sub>2.5</sub> sites listed in 40 CFR Part 58 Appendix D Table D-5. These required monitoring stations or sites must be sited to represent community-wide air quality. In addition, the following specific criteria apply:

- (1) At least one monitoring station is to be sited in a population-oriented area of expected maximum concentration.
- (2) For areas with more than one required station, a monitoring station is to be sited in an area of poor air quality.
- (3) Each State shall install and operate at least one PM<sub>2.5</sub> site to monitor for regional background and at least one PM<sub>2.5</sub> site to monitor regional transport.

Please refer to the monitoring network table on pages 8-9 for specific site monitoring objectives.

### ***PM<sub>2.5</sub> Speciation***

Chemical speciation is encouraged at sites where the chemically resolved data would be useful in developing State implementation plans and supporting atmospheric or health effects related studies. The sites in Delaware were established at MLK in Wilmington and Dover in Kent County.

In 2014 EPA completed the process of assessing the national speciation network. The purpose of the assessment was to create a network that is sustainable going forward with the current situation of reduced federal funding by redistributing resources to new or high priorities from those of low-priority or low-benefit. As part of this process EPA developed a scoring metric to identify existing speciation sites of lower value for defunding, and the Dover site was identified as low-value due to redundancy. Speciation monitoring at the Dover site therefore ended in 2014 in response to termination of support from the EPA. Speciation monitoring continues at the MLK site in Wilmington on a 1-in-three day schedule.

### ***Continuous PM<sub>2.5</sub>***

Delaware operates a designated FEM continuous PM<sub>2.5</sub> monitor for hourly and 24-hour data at the MLK, Killens Pond, and Seaford sites. These monitors operate year-round, and are collocated with an FRM PM<sub>2.5</sub> monitor. In 2013 Delaware added another FEM continuous PM<sub>2.5</sub> monitor to the Delaware City site as a SPM monitor which will operate for approximately two years, at which time the data will be evaluated to determine if monitoring should continue as a SLAMS.

***Correlation of continuous PM<sub>2.5</sub> FEM data with collocated FRM data:*** Under the most recent revisions to the 40 CFR, Part 50, Appendix N data handling requirements, the data capture requirement for annual and daily Design Values is 75% of scheduled samples per quarter. “Creditable” data includes all PM<sub>2.5</sub> data from scheduled sampling days, valid make-ups and collocated suitable monitors. This data is acceptable for comparison to the annual and daily NAAQS and computations are based on a “combined site record”. “Suitable” monitors are all monitors designated as either FRM or FEM. (Note: This does not include specific continuous FEMs disqualified by the monitoring agency in the annual network plan and approved by the EPA Regional Administrator. Delaware has not disqualified any continuous FEM monitors.) The PM<sub>2.5</sub> data from the designated primary monitor is therefore supplemented with the average of daily data from all collocated “suitable” monitors, including continuous FEM monitors, for any missing primary monitor days.

### ***PM<sub>2.5</sub> Design Values (2012 – 2014)***

Below are the design values for PM<sub>2.5</sub> using 2012 through 2014 FRM data. PM<sub>2.5</sub> annual design values are calculated using the 3-year average of the respective annual averages. The current annual PM<sub>2.5</sub> standard is 12 µg/m<sup>3</sup>. PM<sub>2.5</sub> daily design values are calculated using the 3-year average of the annual 98th percentile values. The daily PM<sub>2.5</sub> standard is 35 µg/m<sup>3</sup>.

Site	Annual Design Value µg/m <sup>3</sup>	Daily Design Value µg/m <sup>3</sup>
Bellefonte	9.0	23
MLK – Wilmington	9.9	25
Newark	9.5	24
<i>Rte 9/Delaware City</i>	9.1*	27*
Lums Pond	8.3	21
Dover	8.2	21
Killens Pond	8.1	22
Seaford	8.4	21
<b>NAAQS</b>	<b>12</b>	<b>35</b>

\*At least one year has less than 75% data completeness.

*Rte 9/Delaware City* - Special purpose FEM monitor included for comparison to FRM monitors.

Currently, all Delaware monitors are measuring attainment for both the annual and daily PM<sub>2.5</sub> standards.

### Particulate Matter (PM<sub>10</sub>)

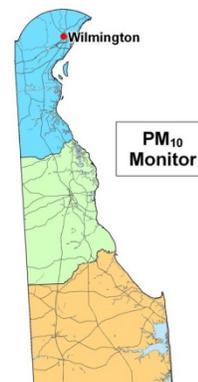
PM<sub>10</sub> is sampled using the federal reference method (FRM) monitor similar to PM<sub>2.5</sub> that operates by drawing air through a specially designed inlet that excludes particles larger than 10 microns in diameter. The particles are collected on a Teflon7 microfiber filter that is weighed to determine the particulate mass.

#### Monitoring Requirements

State, and where applicable local, agencies must operate the minimum number of required PM<sub>10</sub> monitoring sites listed in Table D-4 of 40 CFR Part 58 Appendix D. For Delaware this requires at least one site in the urban Wilmington area.

Although microscale monitoring may be appropriate in some circumstances, the most important spatial scales to effectively characterize the emissions of PM<sub>10</sub> from both mobile and stationary sources are the middle scales and neighborhood scales.

Delaware operates one PM<sub>10</sub> monitor at MLK in Wilmington. The same monitor is used to calculate the PM<sub>coarse</sub> concentrations;



therefore the PM<sub>10</sub> data is reported at Local, not Standard, temperature and pressure for consistency with the PM<sub>2.5</sub> collocated data.

Ambient concentrations are well below the 24-hour NAAQS.

### **Particulate Matter (PMcoarse)**

PMcoarse is calculated as the difference between concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> at collocated monitors. PMcoarse is part of the NCore monitoring at the Wilmington MLK site. Monitoring began on January 1, 2011.

### **Lead (Pb)**

Lead is sampled as PM<sub>10</sub> with the Teflon filters sent to a laboratory for analysis by XRF after they have been weighed for mass. The method is considered a federal equivalent method (FEM) and complies with the EPA requirements of 40 CFR Part 50 Appendix Q.

### ***Monitoring Requirements***

Lead monitoring in Delaware is required as part of the NCore network, and takes place at the NCore site at MLK in Wilmington. The samples are collected on a 1 in 6 day schedule beginning on January 4, 2012.

Concentrations are well below the NAAQS.

## Summary of Changes from 2014

Following are the changes from the monitoring network in 2014:

- CO monitoring was discontinued at Route 9/Delaware City due to problems with aging equipment
- PM<sub>2.5</sub> speciation monitoring was discontinued at Dover due to cessation of support from EPA.
- Special purpose NO<sub>2</sub> monitoring at Brandywine and Lewes was discontinued due to study completion.

## Changes anticipated for 2015

Following are the changes anticipated to occur in 2015:

In September 2014, EPA proposed revisions to ambient air monitoring requirements for criteria pollutants to provide clarifications to existing requirements and reduce the compliance burden of monitoring agencies operating ambient networks. The changes included a reduction in the network design criteria for non-source lead monitoring by removing the requirement for urban NCore sites to measure Lead (Pb). Monitors are eligible to be discontinued after collecting 3 years of data per approval by Regional Office and showing compliance with 58.14(c), §58 Appendix D Section 4.5(b) and 4.5(c). It is anticipated that the lead site at MLK in Wilmington will be eligible for discontinuation due to the recorded low concentrations since monitoring began in 2012.

The PM<sub>2.5</sub> FRM monitors are aging. Delaware plans to replace some of the FRM monitors with continuous FEM monitors at selected sites. This is not expected to take place until early 2016, and at that time Delaware will comply with all relevant EPA collocation and other siting and data handling requirements for the FEM continuous monitors. FRM monitoring will continue at the NCore site at MLK in Wilmington.

## **Detailed Site Descriptions**

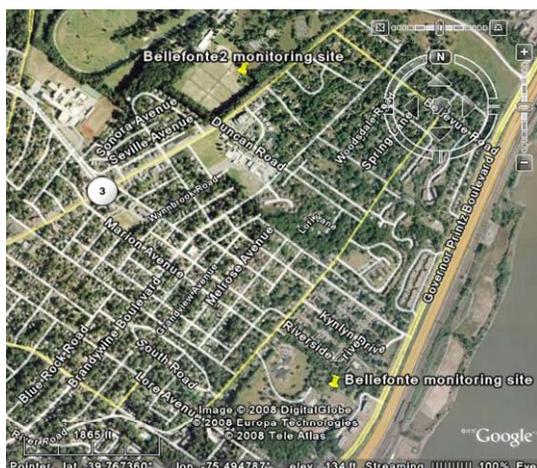
The following pages contain additional site specific information on all active SLAMS monitoring sites in Delaware. Sites are shown in alphabetical order for New Castle, Kent, and Sussex Counties.

**Site: Bellefonte and Bellefonte2**

County:	New Castle	Latitude:	Bellefonte 39.7613 Bellefonte2 39.7739
Address:	Bellefonte: River Road Park Bellefonte2: Bellevue State Park	Longitude:	Bellefonte -75.4920 Bellefonte2 -75.4965
AQS site ID:	Bellefonte: 10-003-1003 Bellefonte2: 10-003-1013	Year Established:	Bellefonte 1969 Bellefonte2 2001
Spatial Scale:	Neighborhood	Area Represented (MSA):	Philadelphia-Camden-Wilmington PA-NJ-DE-MD



Bellefonte and Bellefonte2 locations



Bellefonte2



**Monitored Parameters**

	Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
Bellefonte					X					
Bellefonte2	X	X								

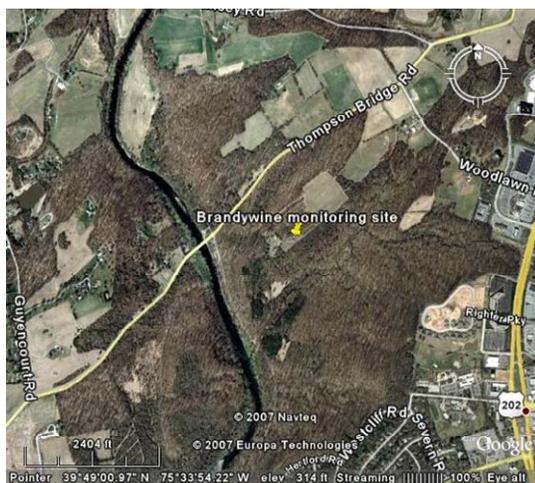
**Site Description:** Bellefonte was originally established in 1969 to monitor O<sub>3</sub> (primary downwind direction from Wilmington) and SO<sub>2</sub>. PM<sub>2.5</sub> was added in 1999. When changing site characteristics began to interfere with ozone monitoring, a new site (Bellefonte2) was established in 2001, less than a mile to the north. The O<sub>3</sub> and SO<sub>2</sub> monitors were relocated to the new site, while the PM<sub>2.5</sub> monitor remained at the original site to provide data continuity. Both sites meet all EPA siting criteria.

**Monitoring Objectives:** Both monitoring sites are neighborhood scale, and collect data to determine compliance with the NAAQS, to determine population exposures, and to track trends. Bellefonte2 is the O<sub>3</sub> maximum downwind concentration site for Wilmington. The SO<sub>2</sub> monitor is sited for general population exposure and trends, with major point sources located to the northeast in Marcus Hook, PA and to the south in Edgemoor.

**Planned Changes through 2015:** No changes planned.

**Site: Brandywine**

County:	New Castle	Latitude:	39.8172
Address:	Brandywine Creek State Park	Longitude:	-75.5639
AQS site ID:	10-003-1010	Year Established:	1994
Spatial Scale:	Neighborhood	Area Represented (MSA):	Philadelphia-Camden-Wilmington PA-NJ-DE-MD



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
X								X	X

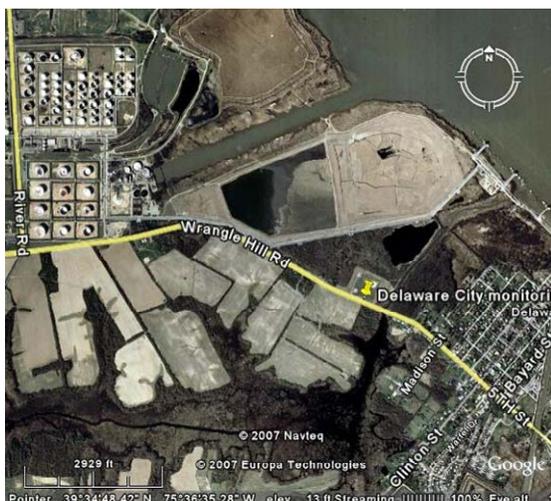
**Site Description:** The Brandywine site is located in Brandywine Creek State Park, and was established when a secondary downwind site in Claymont was discontinued to changes in nearby land use and ownership. This is a neighborhood scale site for O<sub>3</sub> monitoring. The site meets all EPA siting requirements. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The Brandywine site is in the secondary downwind direction from Wilmington. The objectives are population exposure, compliance with the O<sub>3</sub> NAAQS, and trends.

**Planned Changes through 2015:** No changes planned.

**Site: Delaware City**

County:	New Castle	Latitude:	39.5777
Address:	Route 9, Delaware City	Longitude:	-75.6036
AQS site ID:	10-003-1008	Year Established:	1992
Spatial Scale:	Neighborhood	Area Represented (MSA):	Philadelphia-Camden-Wilmington PA-NJ-DE-MD



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
	X					SPM		X	X

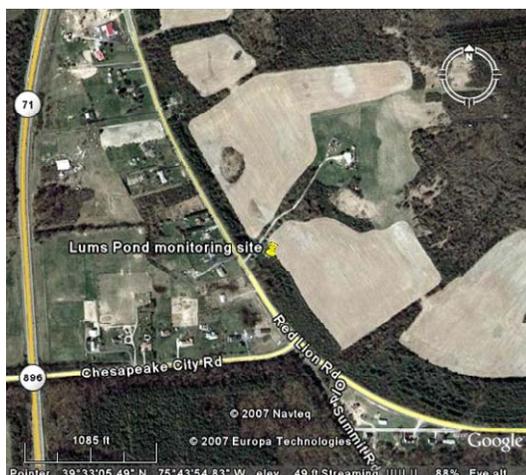
**Site Description:** The Delaware City site was established at a location along Route 9 that is between the Delaware City industrial complex and the nearest populated area (Delaware City) in the predominant downwind direction. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** This monitoring site is a stationary source-impacted site for SO<sub>2</sub>. The monitoring objectives are population exposure, compliance with the NAAQS, and trends.

**Planned Changes through 2015:** CO monitoring was discontinued at the end of 2014 due to problems with aging equipment. No other changes are planned for 2015.

**Site: Lums Pond**

County:	New Castle	Latitude:	39.5513
Address:	Lums Pond State Park	Longitude:	-75.7320
AQS site ID:	10-003-1007	Year Established:	1991
Spatial Scale:	Urban	Area Represented (MSA):	Not in an urban area



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
X	X			X				X	X

**Site Description:** The Lums Pond site is a neighborhood scale site located in a general upwind direction from Wilmington. The immediate area is rural. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The site objectives for O<sub>3</sub> are upwind background for the Wilmington area, population exposure, NAAQS compliance, and trends. This site was originally planned to monitor O<sub>3</sub> transported into Delaware from the Baltimore/Washington area, and continues to serve this purpose. The SO<sub>2</sub> monitor was added 2000 to detect impacts from major point sources directly to the east. PM<sub>2.5</sub> monitoring began in 1999 as both a regional transport and general population exposure site, as well as for NAAQS compliance. The scale of representation was changed to Urban (4 – 50 km) to reflect the background and transport monitoring objectives.

**Planned Changes through 2015:** No changes planned.

**Site: MLK**

County:	New Castle	Latitude:	39.7395
Address:	Justison St. and MLK Blvd	Longitude:	-75.5575
AQS site ID:	10-003-2004	Year Established:	1999
Spatial Scale:	Neighborhood	Area Represented (MSA):	Philadelphia-Camden-Wilmington PA-NJ-DE-MD



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction	NO/NO <sub>y</sub>	Lead	PM <sub>10-2.5</sub>	Temp & Rel. Hum.
X	X	X	X	X	X	X	X	X	X	X	X	X	X

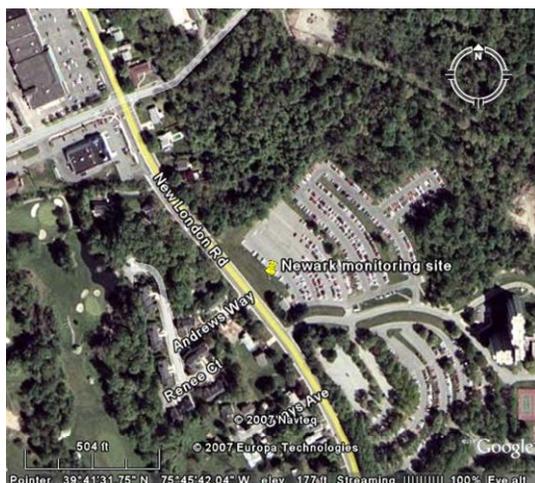
**Site Description:** The MLK site is located in Wilmington at the intersection of Justison St. and MLK Blvd. It replaced another urban site at 12<sup>th</sup> and King Streets that had operated at that location for over 20 years and was discontinued to to a change in land ownership. The MLK site is the state NCore site and represents urban population exposure to multiple pollution sources. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** Monitoring objectives are population exposure, maximum concentration, NAAQS compliance, NCore, and trends.

**Planned Changes through 2015:** Monitoring shelter replacement is planned for late in 2015 or early 2016.

**Site: Newark**

County:	New Castle	Latitude:	39.6919
Address:	University of Delaware North Campus	Longitude:	-75.7617
AQS site ID:	10-003-1012	Year Established:	1999
Spatial Scale:	Neighborhood	Area Represented (MSA):	Philadelphia-Camden-Wilmington PA-NJ-DE-MD



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
				X					

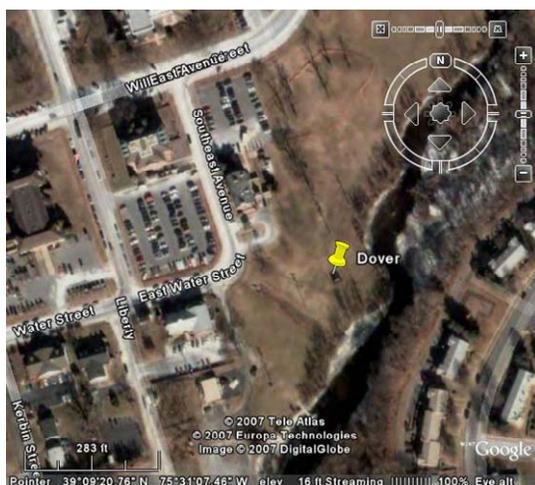
**Site Description:** The Newark site is a platform only and was established to understand PM<sub>2.5</sub> concentrations in the Newark area and potentially transported PM<sub>2.5</sub> from upwind areas to the west. It is a PM<sub>2.5</sub> neighborhood scale site. The location is suburban and generally impacted by mobile sources and regional transport. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The objectives are population exposure, NAAQS compliance, regional transport, and trends.

**Planned Changes through 2015:** No changes planned.

**Site: Dover**

County:	Kent	Latitude:	39.1556
Address:	Water St.	Longitude:	-75.5182
AQS site ID:	10-001-0003	Year Established:	1999
Spatial Scale:	Neighborhood	Area Represented (MSA):	Dover



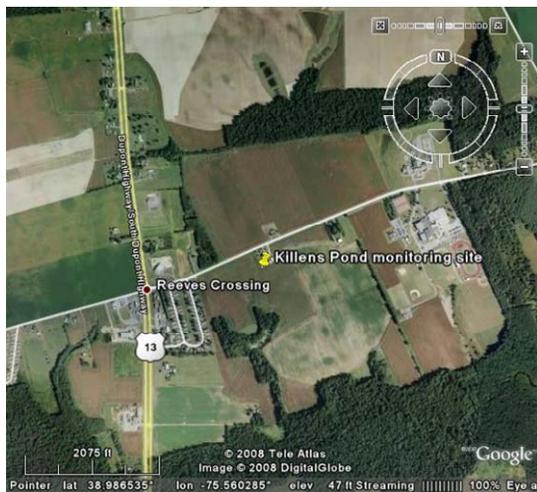
**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
				X					

<p><b>Site Description:</b> The Dover site is a platform only and was established to understand fine particulate concentrations in the Dover area as well as speciated components of fine particulate. It is a neighborhood scale site representative of the Dover MSA, and is impacted by a combination of source types including mobile, large and small point sources. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.</p>
<p><b>Monitoring Objectives:</b> The monitoring objectives are population exposure, NAAQS compliance, and trends.</p>
<p><b>Planned Changes through 2015:</b> Speciation monitoring ended in 2014 due to lack of funding. No changes planned for 2015.</p>

**Site: Killens Pond**

County:	Kent	Latitude:	38.9867
Address:	Killens Pond Rd.	Longitude:	-75.5568
AQS site ID:	10-001-0002	Year Established:	1995
Spatial Scale:	Urban	Area Represented (MSA):	Not in an urban area



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
X				X		X		X	X

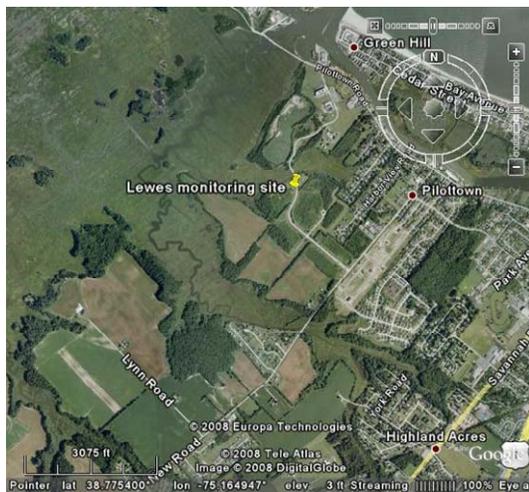
**Site Description:** The Killens Pond site is located in a rural area that is part of Killens Pond State Park. It was established to understand background concentrations of ozone and PM<sub>2.5</sub>. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The objectives for this site are background concentrations, NAAQS compliance, and trends. The scale of representation was changed to Urban (4 – 50 km) to reflect the background monitoring objective.

**Planned Changes through 2015:** No changes planned.

**Site: Lewes**

County:	Sussex	Latitude:	38.7791
Address:	University of Delaware College of Marine Studies	Longitude:	-75.1632
AQS site ID:	10-005-1003	Year Established:	1997
Spatial Scale:	Neighborhood	Area Represented (MSA):	Salisbury MD-DE



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
X	X							X	X

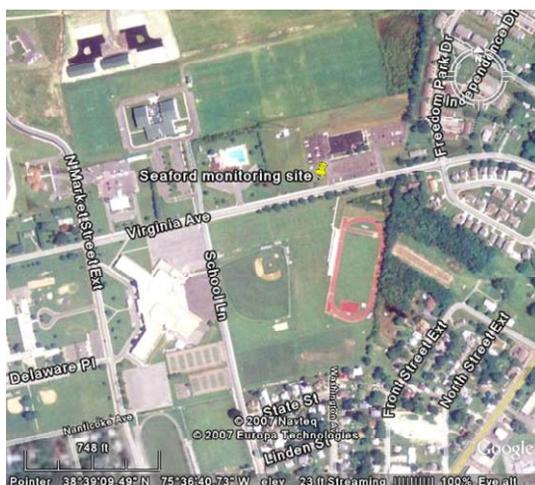
**Site Description:** The Lewes site is neighborhood scale, and was established to understand ozone concentrations in the coastal area where population increases significantly in the summer months. SO<sub>2</sub> was added in 2012 in response to the new SO<sub>2</sub> NAAQS monitoring requirements. It is near the University of Delaware College of Marine Studies campus in Lewes, and is representative of the coastal Sussex County area. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The objectives include population exposure, NAAQS compliance, and trends.

**Planned Changes through 2015:** SPM NO<sub>2</sub> ended in 2014. No changes planned for 2015.

**Site: Seaford**

County:	Sussex	Latitude:	38.6539
Address:	350 Virginia Ave.	Longitude:	-75.6106
AQS site ID:	10-005-1002	Year Established:	1990
Spatial Scale:	Neighborhood	Area Represented (MSA):	Salisbury MD-DE



**Monitored Parameters**

Ozone	SO <sub>2</sub>	CO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> speciation	PM <sub>2.5</sub> continuous	PM <sub>10</sub>	Wind Speed	Wind Direction
X				X		X		X	X

**Site Description:** The Seaford site was originally located to monitor pollutant concentrations in the Seaford area. The original site was located further south, near the Seaford water tower. It was relocated to the present location in 1990 due to deteriorating conditions at the original site. The current site is neighborhood scale and is suburban. The site is impacted by local point sources, mobile sources, and regional transport. This site meets all EPA 40 CFR Part 58 App D and E siting criteria.

**Monitoring Objectives:** The site objectives are population exposure, NAAQS compliance, and trends.

**Planned Changes through 2015:** No changes planned.

### Monitoring method information

Monitoring methods and associated AQS codes used in the Delaware ambient air monitoring network:

Parameter	AQS Method Code	Method Description
O <sub>3</sub>	047, 087	UV Absorption
SO <sub>2</sub>	560	UV Fluorescence
CO	554	Non-dispersive Infrared
NO <sub>2</sub> and NO <sub>y</sub>	574, 674	Chemiluminescence
PM <sub>2.5</sub>	145 184 (continuous)	Gravimetric Beta-attenuation/Nephelometer
PM <sub>10</sub>	127	Gravimetric
PMcoarse	176	Calculated from paired samplers
Lead	811	X-ray fluorescence, low-volume PM10 sampler
WS/WD	050	Ultrasonic

#### Ozone (O<sub>3</sub>)

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

#### Sulfur Dioxide (SO<sub>2</sub>)

Sulfur dioxide is measured with a fluorescence analyzer. Air is drawn through a sample cell where it is subjected to high intensity ultraviolet light. This causes the sulfur dioxide molecules in the air to fluoresce and release light. The fluorescence is detected with a photo multiplier tube and converted to an electrical signal proportional to the SO<sub>2</sub> concentration.

#### Carbon Monoxide (CO)

Carbon monoxide is measured by infrared absorption photometry. Air is drawn continuously through a sample cell where infrared light passes through it. Carbon monoxide molecules in the air absorb part of the infrared light, reducing the intensity of the light reaching a light sensor. The light is converted into an electrical signal related to the concentration of carbon monoxide in the sample cell.

#### Nitrogen Dioxide (NO<sub>2</sub>) and NO<sub>y</sub>

Nitrogen oxides are measured using the chemiluminescence reaction of NO with O<sub>3</sub>. Air is drawn into a reaction chamber where it is mixed with a high concentration of ozone from an internal ozone generator. Any NO in the air reacts with the ozone to produce NO<sub>2</sub>. Light emitted from this reaction is detected with a photo multiplier tube and converted to an electrical

signal proportional to the NO concentration. NO<sub>2</sub> must be measured indirectly. NO<sub>x</sub> are measured by passing the air through a converter where any NO<sub>2</sub> in the air is reduced to NO 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 NO and NO<sub>x</sub>. The NO<sub>2</sub> concentration is equal to the difference between NO and NO<sub>x</sub>.

NO<sub>y</sub> is measured by the same method as NO<sub>x</sub> with the exception that the converter is at the sample inlet instead of at the reaction chamber. This position is used because the NO<sub>y</sub> compounds are too unstable to be measured when taken in through the entire length of the typical ambient air sampling inlet system. Placing the converter at the inlet allows the catalytic reaction to convert most of the NO<sub>y</sub> species (approximately 30 nitroxyl compounds) to NO very close to the point where ambient air is sampled. The more stable NO can then be detected as described previously.

### **Particulate Matter - Fine (PM<sub>2.5</sub>), PM<sub>10</sub>, and PM<sub>coarse</sub>**

PM<sub>2.5</sub> is sampled by drawing air through a specially designed inlet that excludes particles larger than 2.5 microns in diameter. The particles are collected on a Teflon<sup>7</sup> microfiber filter that is weighed to determine the particulate mass. The normal sampling schedule is 24 hours every third day, however, at one site (Wilmington-MLK) PM<sub>2.5</sub> samples are collected for 24 hours every day.

PM<sub>2.5</sub> continuous is measured by time-averaged measurements of an integral beta attenuation mass sensor which also incorporates a nephelometer signal to ensure that the measured mass concentration remains independent of changes in the particle population being sampled.

PM<sub>10</sub> samples are collected using the same general method as PM<sub>2.5</sub> with a specially designed inlet that excludes particles larger than 10 microns in diameter. Samples are collected every third day.

PM<sub>coarse</sub> is calculated by subtracting the PM<sub>2.5</sub> concentration from the collocated PM<sub>10</sub> concentration for the same day.

### **Lead**

Lead is sampled on PM<sub>10</sub> filters collected as described above every 6<sup>th</sup> day beginning on January 4, 2012. The filters are first weighed for particulate mass, then submitted to a contract laboratory for analysis by x-ray fluorescence (XRF) according to Appendix Q to 40 CFR Part 50, "Reference Method for the Determination of Lead in Particulate Matter as PM<sub>10</sub> Collected from Ambient Air".

**Appendix A. Letter to Region 3**



STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES  
& ENVIRONMENTAL CONTROL  
DIVISION OF AIR QUALITY  
655 S. Bay Road, Suite 5N  
DOVER, DELAWARE 19901

Telephone: (302) 739 - 9402  
Fax No.: (302) 739 - 3106

April 16, 2015

Ms. Alice Chow (3AP40)  
Associate Director  
Office of Air Monitoring and Analysis  
U.S. EPA, Region III  
1650 Arch Street  
Philadelphia, PA 19103

Dear Ms. Chow:

This letter is to notify EPA Region 3 of the cessation of CO monitoring at the Route 9/Delaware City site, AQS10-003-1008 as of December 2014.

Monitoring of CO began at that site in 1992 as a downwind middle-scale monitor for a nearby oil refinery, and was not required by 40 CFR Part 58 Appendix D. The monitor is not part of any maintenance plan.

The monitored CO concentrations have always been close to the minimum detection limit (MDL) at this site. For your reference, we have included a table summarizing the data collected at this site, showing compliance with both the 1-hour and 8-hour NAAQS over the last 10 years. Trends are shown by the attached chart which shows the continued low ambient concentrations and almost no probability of exceeding the NAAQS in the next three years.

Over the past year there have been increasing problems with the monitor (Thermo 48 non-trace monitor, AQS method 054), causing large gaps in the dataset and increasing difficulty in meeting quality criteria. This monitor is a legacy non-trace monitor which is more than 15 years old, and is not accurate at the current level of ambient CO concentrations in this area.

According to 40 CFR Part 58.14, monitors may be discontinued if certain criteria are met, including the following:

- showing attainment during the previous five years,
- having a probability of less than ten percent of exceeding 80 percent of the applicable NAAQS over the next three years based on levels, trends, and variability observed in the past,
- and is not required by an attainment or maintenance plan.

The Route 9/Delaware City CO monitor qualifies under all the above criteria as shown by the attached data table and trend chart.

*Delaware's good nature depends on you!*

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Recycled Paper

Ms. Alice Chow  
April 16, 2015  
Page Two

Therefore, due to the continued extremely low ambient concentrations, increased downtime due to monitor malfunctions, and cost of replacement with a new trace-level monitor, Delaware has decided to discontinue CO monitoring at the Route 9/Delaware City site. Trace-level CO monitoring will continue as the Delaware NCore site in Wilmington (AQS 10-003-2004).

Sincerely,

A handwritten signature in blue ink, appearing to read 'R. Amirikian', followed by a long horizontal flourish.

Ron Amirikian  
Program Manager

Attachments

cc: Lori Hyden, EPA Reg. III  
Betsy Frey  
Chuck Sarnoski

Table 1. Route 9/Delaware City CO summary data in ppm

Year	1st Max 1-hour	2nd Max 1-hour	1-hour NAAQS	1st Max 8-hour	2nd max 8-hour	8-hour NAAQS
2004	1.8	1.7	35	1.3	1.2	9
2005	1.4	1.3	35	1.2	1.1	9
2006	1.5	1.4	35	1.2	1.1	9
2007	1.5	1.4	35	1.2	1.2	9
2008	1.4	1.0	35	0.9	0.8	9
2009	1.3	1.2	35	1.0	1.0	9
2010	1.4	1.4	35	1.2	1.2	9
2011	1.6	1.1	35	0.8	0.7	9
2012	1.2	1.2	35	1.1	0.8	9
2013	2.2	1.9	35	1.0	0.9	9
2014	1.2	1.0	35	0.8	0.7	9

Figure 1. Route 9/Delaware City 1-hour CO data

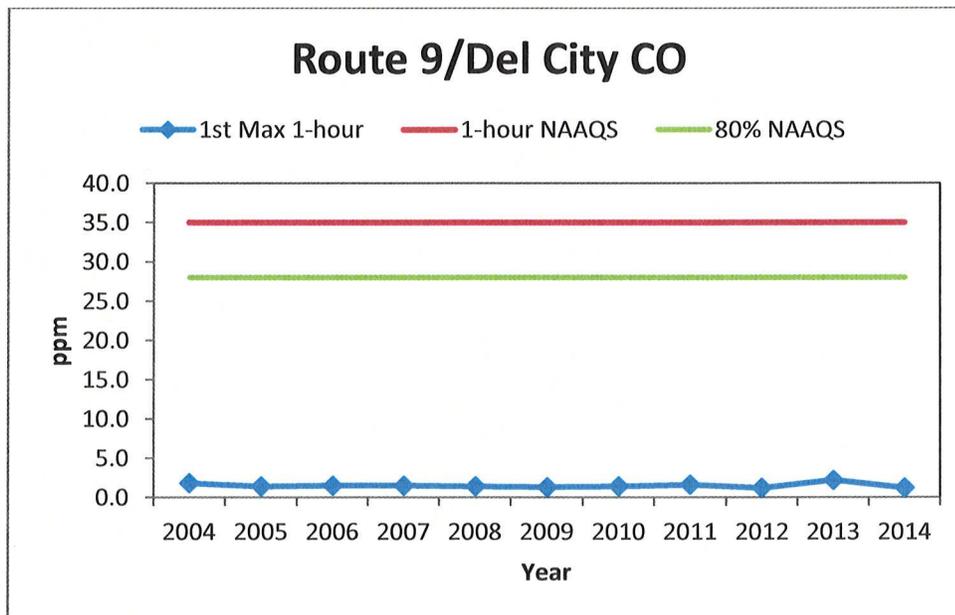


Figure 2. Route 9/Delaware City 8-hour CO data

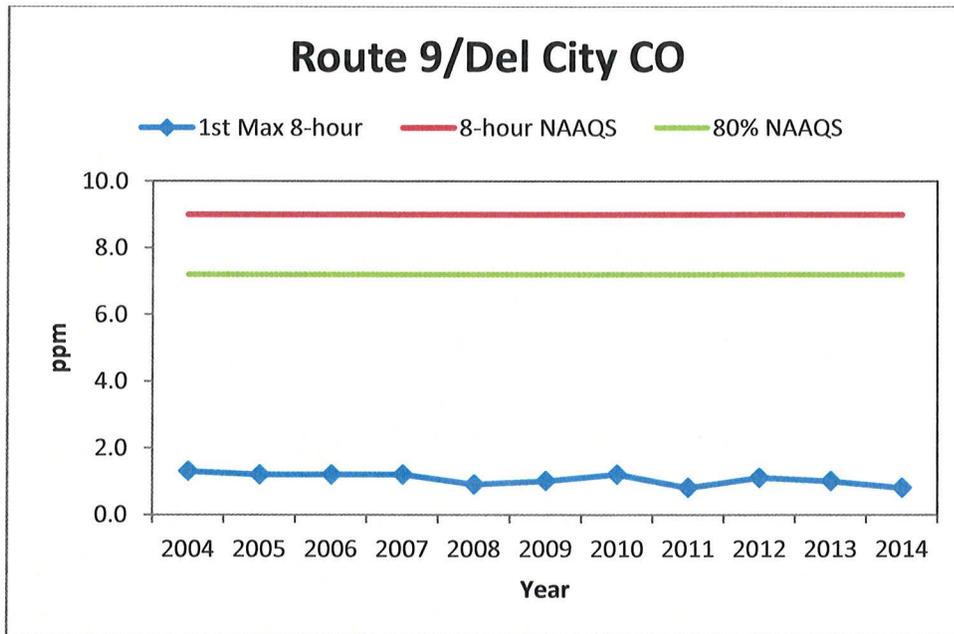


Figure 3. Route 9/Delaware City CO annual data completeness

