2026 Delaware Ambient Air Monitoring Network Plan for Criteria Pollutants

DRAFT FOR PUBLIC COMMENT

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List of Acronyms

AMMS	Air Monitoring and Methods Subcommittee
AQ	Division of Air Quality in the Delaware Department of Natural Resources and Environmental Control
AQS	Air Quality System
Auto-GC-FID	Automated Gas Chromatograph, Flame Ionization Detection
BC	Black Carbon
C=O	Carbonyls
CAA	Clean Air Act
CAPS	Cavity Attenuated Phase Shift
CASAC	Clean Air Science Advisory Committee
CAS	Consolidated Analytical Systems
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
CO	Carbon monoxide
CSA	Combined Statistical Area
CSN	Chemical Speciation Network
DNREC	Department of Natural Resources and Environmental Control
EMP	Enhanced Monitoring Plan
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GC	Automated Gas Chromatograph
GC/MS	Automated Gas Chromatograph/Mass Spectrometry
HAPs	Hazardous Air Pollutants
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
LC	Local Conditions
LPM	Liters Per Minute
MATT	Mobile Air Testing Trailer
MLH	Mixing Layer Height
MLK	Martin Luther King Jr. air quality monitoring site
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NAMS	National Air Monitoring Station

NATTS	National Air Toxics Trends Station
NCore	National Core
nm	Nanometer
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Combination of nitric oxide and nitrogen dioxide
NO_y	Total reactive oxides of nitrogen
O_3	Ozone
OTR	Ozone Transport Region
PAMS	Photochemical Assessment Monitoring Station
Pb	Lead
PM	Particulate Matter
$PM_{2.5}$	Fine particulate matter (<2.5 microns)
PM_{10}	Respirable particulate matter (<10 microns)
PM_{coarse}	Coarse particulate matter (PM10 – PM2.5)
PPB	Parts Per Billion
PQAO	Primary Quality Assurance Organization
QA	Quality Assurance
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Stations
SO_2	Sulfur dioxide
SPM	Special Purpose Monitor
SuperSASS	Super Speciation Air Sampling System
Temp/RH	Temperature and Relative Humidity
TOR	Thermal Optical Reflectance
TSP	Total Suspended Particulate
UFP	UltraFine Particles
URG	University Research Glass
UV	Ultraviolet
VOC	Volatile Organic Compound
WS/WD	Wind Speed/Wind Direction

Introduction

In 1970 Congress passed the Clean Air Act (CAA) that authorized the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants shown to threaten human health and the environment. 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 (improve visibility and protect crops, vegetation, and infrastructure).

Seven pollutants currently have NAAQS: ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM) less than 10 microns (PM_{10}), PM less than 2.5 microns ($PM_{2.5}$) and lead (Pb). These are referred to as criteria pollutants.

To ensure compliance with the NAAQS, monitoring of criteria pollutants is overseen by Primary Quality Assurance Organizations (PQAOs). A PQAO is an organization responsible for a network of monitoring stations that use the same quality system, or quality assurance (QA) program, and for which data quality can be assessed to meet EPA requirements. PQAOs are typically state, regional, local, or tribal air agencies. Key PQAO responsibilities include:

1. Ensuring that monitoring equipment is properly sited, installed, operated, and maintained in accordance with EPA guidelines;
2. Collecting, validating, and reporting ambient air quality data to EPA's Air Quality System (AQS) database;
3. Conducting audits and assessments to evaluate the accuracy and precision of monitoring data;
4. Submitting an Annual Quality Assurance Report to the EPA documenting QA activities and data quality findings.

When air quality does not meet the NAAQS, the area is said to be in "nonattainment" with the NAAQS. Accurate and reliable monitoring data collected under PQAO oversight is essential to making these nonattainment determinations, as well as to tracking progress toward attainment and informing public health advisories.

Requirements for Annual Monitoring Network Plan

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, Part (a) requires for each existing and proposed monitoring site:

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

§58.10 Part (b) stipulates that the annual monitoring network plan must contain the following information for each existing and proposed site; this information is presented in Table 1, page 19-22:

1. The 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 $PM_{2.5}$ 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_2 monitors as either near-road or area-wide sites in accordance with Appendix D to 40 CFR Part 58.

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

Delaware Ambient Air Monitoring 5-year Network Assessment: 2025

Executive Summary from Assessment

In accordance with 40 CFR Part 58.10(d) Delaware is required to submit an assessment of the ambient air quality monitoring network to the EPA Regional Administrator every 5 years. This assessment is to determine, at a minimum, if the network meets the monitoring objectives defined in Appendix D of this part, whether new sites are needed, whether existing sites are no longer needed, and where new technologies are appropriate for use in the ambient air quality monitoring network.

The Division of Air Quality (AQ) had a deadline of June 30th, 2025 to complete the 2025 5-year Monitoring Network Assessment (Assessment). AQ performed a technical review of data collected by the ambient air quality monitoring network. This review included:

a. Summarizing population data for all counties in Delaware: Kent, New Castle, and Sussex. This was used to determine the appropriateness of monitoring for population exposure.
b. Reviewing meteorological parameters to establish upwind/downwind relationships between a monitoring site and surrounding emission sources.
c. Reviewing emission inventory summary data. This was used to determine if a monitor is sited appropriately to represent maximum pollution concentrations or specific ambient source impacts.
d. Reviewing historical data from each site for trends and comparison to current NAAQS. This showed Delaware's progress in improving air quality and meeting air quality standards.
e. Performing a site-by-site correlation analysis for appropriate monitors, using tools supplied by the EPA. This was used to determine whether any sites have been collecting redundant information and may be considered for elimination.
f. Performing bias calculations to predict possible impacts of removing specific monitors from the network.

The Division of Air Quality in the Delaware Department of Natural Resources and Environmental Control (AQ) evaluated all data from this technical review according to defined performance measures listed in the EPA's guidance document. AQ also expanded performance measures beyond application of this technical information by considering item D below. Performance measures were organized into the following categories:

a. Data criteria
b. Statistical criteria
c. Situational criteria
d. Future needs and special considerations

Based on evaluation of these performance measures, AQ determined the importance classification (critical, credible, marginal, new site required) of each monitor in the network. Classifications are defined as:

- **Critical sites** are of high value and will continue operating
- **Credible sites** are expected to continue but may not be the design value location
- **Marginal sites** or **monitors** are subject to consideration for removal or relocation
- **New sites required** represent potential areas of investment for establishment of new sites or monitors

Network Assessment Results

The results of the Assessment indicate that the network contains critical, credible, and marginal monitors. In addition, the network meets the requirements in the Federal regulations and provides more than sufficient monitoring throughout Delaware to accurately determine compliance with the NAAQS. Other factors that may impact future network design changes include new monitoring requirements associated with new or revised NAAQS, aging equipment, and required maintenance.

The draft annual network plan for 2026 considers and partially incorporates the results of the 2025 Assessment. No major site changes, such as

termination or relocation of marginal monitors, or addition to permanent monitoring sites and parameters, are recommended in 2026. Delaware will work closely with EPA Region 3 to ensure that, if changes are made, all monitoring requirements will continue to be met with minimal impact on achieving Delaware's Data Quality Objectives.

AQ continues to leverage federal funding as it becomes available to replace aging monitoring instruments and site shelters. Additional information regarding planned replacements is found in **Summary of Changes**. The investment to operate the ambient air quality monitoring network is significant, and if funding is jeopardized, Delaware will use the Assessment to determine which monitors could be removed from service.

Delaware Air Monitoring Network Overview

History of Air Monitoring in Delaware

Air pollution monitoring in Delaware began in the 1950s, prior to the establishment of the 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 NAAQS, as well as establishing background levels and measuring pollution transported from areas outside of Delaware.

With the passage of the CAA in 1970, and the CAA 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 sources (both on-road and off-road vehicles), 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 Summary

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 Ambient Monitoring Program of AQ in the Department of Natural Resources and Environmental Control (DNREC).

National Core (NCore) Monitoring Strategy

In October 2006 the 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 NCore Network addresses the following monitoring objectives:

1. timely reporting of data to the public through AirNow, air quality forecasting, and other public reporting mechanisms;
2. support development of emission strategies through air quality model evaluation and other observational methods;
3. accountability of emission strategy progress through tracking long-term trends of criteria and non-criteria pollutants and their precursors;
4. support long-term health assessments that contribute to ongoing reviews of the NAAQS;
5. compliance through establishing nonattainment/attainment areas by comparison with the NAAQS; and
6. support multiple disciplines of scientific research, including; public health, atmospheric, and ecological

NCore sites must measure, at a minimum, $PM_{2.5}$ particle mass using continuous and integrated/filter-based samplers, speciated $PM_{2.5}$, $PM_{10-2.5}$ particle mass, ozone (O_3), sulfur dioxide (SO_2), carbon monoxide (CO), nitric oxide (NO), nitrogen dioxide (NO_2), total reactive oxides of nitrogen (NO_y), lead (Pb), wind speed (WS), wind direction (WD), relative humidity (RH), 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 $PM_{2.5}$ speciation components. Combining monitoring programs at a single location results in a multi-pollutant dataset that is available for stakeholders which enhances the foundation for future health studies and NAAQS revisions.

Delaware's final NCore network plan was submitted to EPA prior to July 1, 2009. The MLK NCore station in Wilmington became fully operational on January 1, 2011.

Photochemical Assessment Monitoring Station (PAMS) Requirement

In 2015, EPA issued a revised monitoring rule (80 FR 65292; October 26, 2015) for the establishment of required PAMS sites. The rule states that NCore sites in CBSAs or CSAs with a population of 1,000,000 people or more are required to collect PAMS measurements annually from June 1 to August 31. The final network design requirement has resulted in approximately 40 required PAMS sites in the United States. More information on Delaware's PAMS site is in section **PAMS Monitoring Site.**

Monitoring Site Network Map and Information

Figure 1 below shows Delaware's ambient air monitoring site network map. This map is up to date.

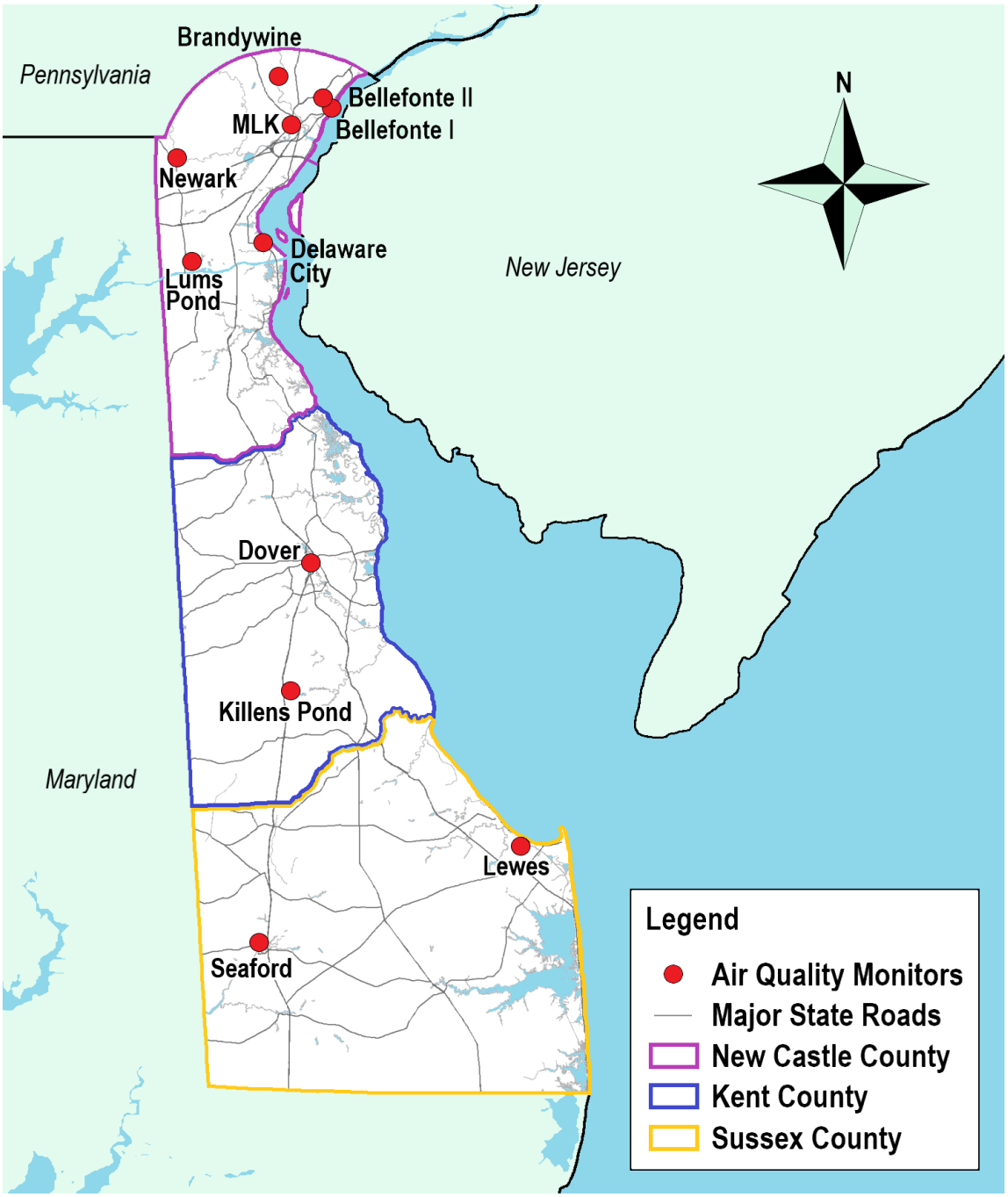


Figure 1 - Ambient Monitoring Sites in Delaware

Table 1 contains a summary of information on every SLAMS site in Delaware, including the NCore site and PAMS site in Wilmington, DE. Information includes site name and AQS ID, active parameters as of January 2026, 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. Street address geographic coordinates are included for each site in **Detailed Site Descriptions** on page 44.

All monitoring sites that are part of a MSA, CBSA, or CSA meet the minimum monitoring requirements specified in 40 CFR Part 58, Appendix D.

There are no major monitoring site changes from the 2025 monitoring plan recommended to occur in 2026.

Table 1. Air Quality Monitoring Network Sites and Monitors

Site Name, AQS ID, *DE County*	**Parameters**	**Start Date**	**Objective**	**Comments**
Killens Pond 10-001-0002 *Kent*	• O_3 • $PM_{2.5}$ FEM[1] continuous • WS/WD	4/1/1995	General/ Background	Rural site
Dover 10-001-0003 *Kent*	• $PM_{2.5}$ FEM Continuous	1/1/1999	Population Exposure	Primary for $PM_{2.5}$
Brandywine 10-003-1010 *New Castle*	• O_3 • WS/WD	7/1/1994	Population Exposure	Secondary downwind of Wilmington

[1] "Federal Equivalent Method"

Site Name, AQS ID, *DE County*	**Parameters**	**Start Date**	**Objective**	**Comments**
Bellefonte II 10-003-1013 *New Castle*	• O_3 • SO_2	4/1/2001	Population Exposure	Primary downwind of Wilmington
Bellefonte I 10-003-1003 *New Castle*	• $PM_{2.5}$ FEM Continuous	1/1/2023	Population Exposure	Primary for $PM_{2.5}$
MLK 10-003-2004 *New Castle*	• SO_2 • CO • NO_2 • NO_y • O_3 • $PM_{2.5}$ FRM[2] • $PM_{2.5}$ FEM continuous • Speciated $PM_{2.5}$ • PM_{10} (LC[3]) • PM_{coarse} • BC • VOCs[4] • Heavy Metals • PAMS VOCs • Carbonyls • Precipitation	1/1/1999	Population Exposure / NCore / Maximum Concentration / PAMS	Urban NCore Site, PAMS Site, Delaware Air Toxics

[2] "Federal Reference Method"
[3] "Local Conditions"
[4] "Volatile Organic Compounds"

Site Name, AQS ID, *DE County*	**Parameters**	**Start Date**	**Objective**	**Comments**
	• Mixing Layer Height • Solar Radiation • UV[5] Radiation • WS/WD • Temp/RH			
Newark 10-003-1012 *New Castle*	• $PM_{2.5}$ FEM Continuous • $PM_{2.5}$ FRM	12/1/1999	Population Exposure / Collocation	
Lums Pond 10-003-1007 *New Castle*	• O_3 • SO_2 • $PM_{2.5}$ FEM continuous • WS/WD	1/1/1992	Background / Regional Transport / Population Exposure	Rural / suburban location, upwind of Wilmington
Delaware City (Rt. 9) 10-003-1008 *New Castle*	• SO_2 • $PM_{2.5}$ FEM continuous • WS/WD	2/1/1992	Population Exposure / Source Oriented	Point source dominated site
Seaford 10-005-1002 *Sussex*	• O_3 • $PM_{2.5}$ FEM continuous • WS/WD	3/1/1990	Population Exposure	
Lewes 10-005-1003 *Sussex*	• O_3 • SO_2 • NO_x • WS/WD	5/1/1997	Population Exposure / Enhanced Monitoring	Coastal site NO_x to begin May 2026

[5] "Ultraviolet"

Criteria Pollutant Network Description by Parameter

Ozone (O_3)

Monitoring Requirements

Requirements for O_3 monitoring are defined in 40 CFR Part 58, Appendix D. At least one O_3 site for each MSA/CBSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that metropolitan area. Other types of monitoring sites are needed to determine maximum population exposure, background concentrations, and concentrations being transported into an area (boundary conditions). In Delaware, New Castle County is part of the larger Philadelphia-Camden-Wilmington CSA, Kent County is in the Dover MSA, and Sussex County is part of the Salisbury MSA.

Table 2. Required Number of O_3 SLAMS Sites[6]

MSA/CSA Name (Total 2020 Census Population)	County in Delaware	Delaware 2020 Census Population	Delaware Monitors	Total Required Monitors	Monitors located in EJ Communities
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD (6,245,051)	New Castle	570,719	**4**	3	1
Dover, DE	Kent	181,851	**1**	1	-
Salisbury, MD-DE (381,868)	Sussex	237,378	**2**	1	1
Total in DE		989,948	**7**	5	2

[6] Based on Table D–2 in 40 CFR Part 58, Appendix D, “Ozone minimum monitoring requirements”

O_3 requires appreciable formation time so the mixing of reactants and products occurs within large volumes of air which reduces the importance of monitoring for small-scale spatial variability. Therefore, the appropriate spatial scales for O_3 sites are *neighborhood, urban,* and *regional*:[7]

- **Neighborhood scale:** concentrations defined within a 0.5 to 4.0 kilometer range that have relatively uniform land use
- **Urban scale:** concentrations defined within an area of city-like dimensions, approximately 4 to 50 kilometer range. Geographic placement of sources in an urban area may prevent determination of a single representative site.
- **Regional scale:** concentrations defined within a usually rural area of reasonably homogeneous geography, without major pollutant sources, in a range of tens to hundreds of kilometers

The prospective maximum concentration monitor site should be selected in a direction from the city that is most likely to observe the highest O_3 concentrations, more specifically, downwind during periods of photochemical activity. Since O_3 levels decrease significantly in the colder parts of the year in many areas, O_3 is required to be monitored only during the "O_3 season" as designated in the 40 CFR Part 58 Appendix D. Delaware's monitoring season is March 1 through October 31.

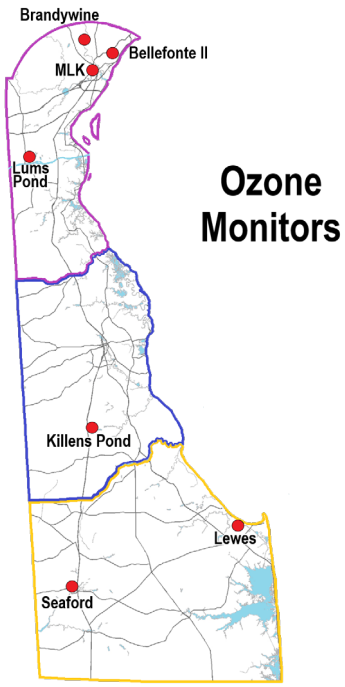


Figure 2 - DE O_3 Monitoring Sites

Network Description

Delaware operates seven O_3 monitoring sites shown in *Figure 2*, 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 Descriptions** section of this document. Year-round operation of all O_3 monitors, which exceeds Delaware's minimum requirement, began in 2011.

[7]Appropriate O_3 spatial scale definitions are found in 40 CFR 58 Appendix D

Hourly data is sent to the AirNow website to generate the daily Air Quality Index and to be used in mapping O_3 concentrations throughout the region.

More detailed information on the O_3 standard and monitoring requirements can be found on the EPA website at: https://www.epa.gov/ground-level-ozone-pollution.

Operation of all O_3 monitors in Delaware meets the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable.

Fine Particulate Matter: $PM_{2.5}$

Monitoring Requirements

State agencies must operate at least the minimum number of required $PM_{2.5}$ sites corresponding to the criteria in 40 CFR Part 58 Appendix D Table D-5. These required monitoring locations 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 $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport.

Table 3. Required Number of $PM_{2.5}$ SLAMS Sites[8]

MSA/CSA Name (2020 Census Population)	County in Delaware	Delaware 2020 Census Population	Delaware Monitors	Total Required Monitors	Monitors located in EJ Communities
Philadelphia-Camden Wilmington, PA-NJ-MD-DE (6,245,051)	New Castle	570,719	**5**	3	1
Dover, DE	Kent	181,851	**2**	-	1
Salisbury, MD-DE (381,868)	Sussex	237,378	**1**	-	1
Total in DE		989,948	**8**	3	3

[8] Based on Table D-5 in 40 CFR Part 58, Appendix D, "$PM_{2.5}$ minimum monitoring requirements"

Network Description

Delaware operates more than the minimum number of required $PM_{2.5}$ monitors. All eight monitors operate year-round. Three of these monitors are located in disparately impacted and environmental justice communities. There are two collocated sites; the MLK site in Wilmington and Newark. The EPA standard sampling schedule for FRM samplers is 1-in-3 days, or one 24-hour sample every third day. At MLK, 24-hour samples are collected every day to ensure that data completeness requirements are met.

More detailed information on the PM and $PM_{2.5}$ standards and monitoring requirements can be found on the EPA website at: https://www.epa.gov/pm-pollution. Operation of all $PM_{2.5}$ monitors in Delaware meets the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable.

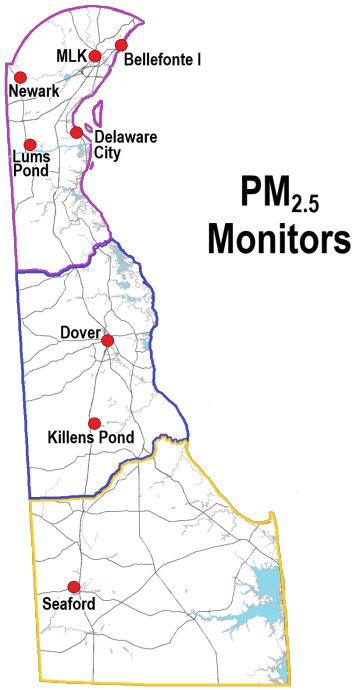


Figure 3 - DE $PM_{2.5}$ Monitoring Sites

Collocation of $PM_{2.5}$ Measurement Types

Delaware meets the data capture requirements in 40 CFR Part 50, Appendix N “Data Handling Requirements” using data collected by both FRM and FEM collocated monitors. See page 74 for a discussion of the strengths and weaknesses of different $PM_{2.5}$ monitoring types.

Delaware has replaced $PM_{2.5}$ FRM manual method monitors with continuous $PM_{2.5}$ FEM monitors at nearly all sites. The NCore site continues to have both FRM and FEM monitors, with the FRM monitor designated as the primary monitor. Delaware meets other primary monitor collocation requirements in EPA 40 CFR Part 58 appendix A with a collocated FRM monitor located at Newark.

$PM_{2.5}$ Chemical Speciation

The $PM_{2.5}$ Chemical Speciation Network (CSN) is a component of the National $PM_{2.5}$ Monitoring Network that involves chemical analysis of $PM_{2.5}$ samples to determine their molecular composition. CSN data is used for the assessment of trends, development of effective State Implementation Plans (SIPs), and development of emission control strategies.

Delaware performs CSN monitoring at the MLK site in Wilmington following the EPA's 1-in-3-day schedule.

Particulate Matter: PM_{10} and PM_{coarse}

Monitoring Requirements

State and local agencies must operate the minimum number of required PM_{10} monitoring sites listed in Table D-4 of 40 CFR Part 58 Appendix D. For the Philadelphia-Camden-Wilmington-Newark, PA-NJ-DE-MD CSA, the requirements are met by monitors installed in the Philadelphia urban area. No other PM_{10} monitors are required in Delaware.

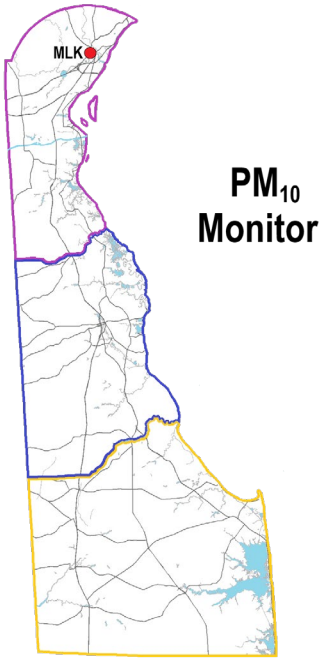


Figure 4 - DE PM_{10} and PM_{coarse} Monitoring Site

Although microscale, or up to 100-meter range, PM monitoring may be appropriate in some circumstances, the most important spatial scales to effectively characterize the emissions of PM_{10} from a combination of mobile and stationary sources are middle and neighborhood scales, or from 0.1 to 4.0 kilometers range.

Delaware operates one FRM PM_{10} monitor at MLK in Wilmington for the purpose of monitoring PM_{coarse}, a requirement of NCore monitoring sites; therefore, PM_{10} data is reported at Local, not Standard, temperature and pressure for consistency with $PM_{2.5}$ collocated data.

Particulate Matter – Coarse (PM_{coarse})

PM_{coarse} is a requirement of NCore monitoring at the Wilmington MLK site. Delaware monitors PM_{coarse} as a difference between concentrations of PM_{10} and $PM_{2.5}$ using collocated FRM samplers. Delaware also monitors PM_{coarse} using a FEM-designated continuous analyzer. There are no NAAQS for PM_{coarse}. Operation of all PM_{10} and PM_{coarse} monitors in Delaware meet the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable.

Carbon Monoxide (CO)

Monitoring Requirements

Delaware is required to monitor CO at its NCore monitoring site in Wilmington. CO near-road monitoring is an additional requirement of urban areas with populations of 1 million or more to assess traffic-related pollution. CO monitors deployed in the Philadelphia urban center meet this requirement for the Philadelphia-Camden-Wilmington-Newark, PA-DE-MD CSA; therefore, Delaware is not required to operate near-road urban monitors.

More detailed information on the CO standards and monitoring requirements can be found on the EPA website at: https://www.epa.gov/co-pollution.

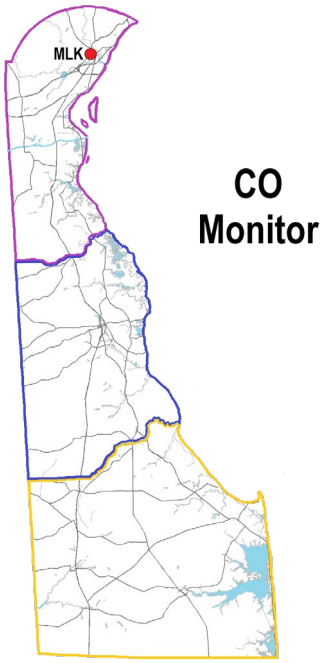


Figure 5 - DE CO Monitoring Site

Network Description

Delaware operates one CO monitor at the MLK NCore site as shown on the map of DE in *Figure 5*, which meets the requirements of 40 CFR Part 58 appendices A, C, D, and E. Historical CO concentrations are well below the ambient standards and close to the minimum detectable limits of the monitor.

Sulfur Dioxide (SO_2)

Monitoring Requirements

Air agencies are required to monitor or model ambient SO_2 levels in areas with sources that emit over 2,000 tons per year (TPY). Monitoring is also required in urban areas and based on population and emissions intensity.

State and local agencies are required to report two data values for every hour of monitoring conducted:

1. the 1-hour average SO_2 concentration; and
2. the maximum 5-minute block average SO_2 concentration of each hour.

The primary NAAQS for SO_2 is a 1-hour standard at a level of 75 parts per billion (PPB). This standard applies to the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

More detailed information on the SO_2 standards and monitoring requirements can be found on the EPA website at: https://www.epa.gov/so2-pollution.

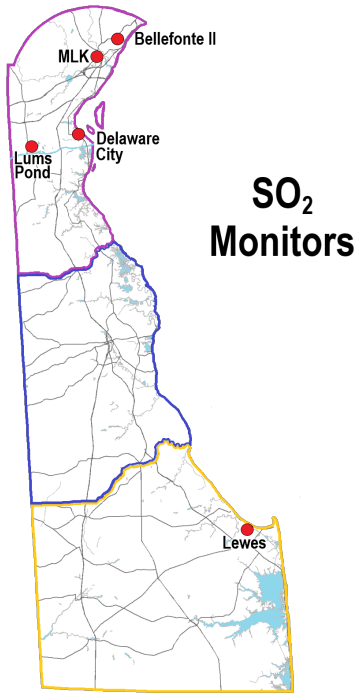


Figure 6 - DE SO_2 Monitoring Sites

Network Description

Delaware currently operates five year-round SO_2 monitoring sites: four in New Castle County and one in Sussex County. AQ has used the emissions inventories of industrial facilities and power plants to determine that there are no sources of SO_2 over the 2,000 TPY threshold in Delaware. Operation of all SO_2 monitors in Delaware meets the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable.

Nitrogen Dioxide (NO_2)

Monitoring Requirements

The EPA published final monitoring requirements for NO_2 in 2016[9] requiring NO_2 monitoring minimally at all NCore sites. Additionally, direct NO_2 measurement is required at PAMS sites. In accordance with these rules Delaware is required to monitor NO_2 with direct NO_2 measurement at its combined NCore / PAMS MLK site in Wilmington.

The EPA has established 2 primary NAAQS for NO_2:

- A 100 PPB standard set at the 3-year average 98th percentile of the annual distribution of daily maximum 1-hour average NO_2 concentrations
- A 53 PPB standard annual average NO_2 concentration

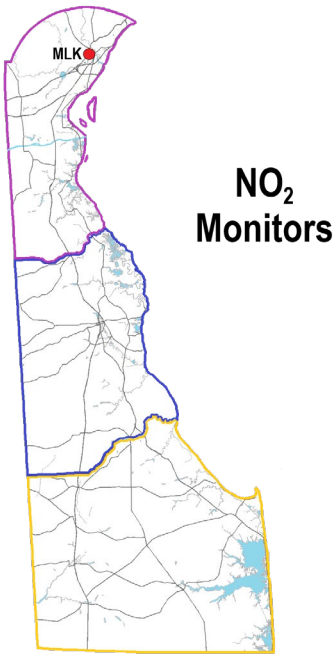


Figure 7 - DE NO_2 Monitoring Site

Network Description

Delaware operates one NO_2 monitor at the NCore and PAMS site in Wilmington to meet the requirements of both networks. One additional monitor is planned to be deployed at Lewes in May 2026 to satisfy Delaware's Enhanced Monitoring Plan (EMP): see page 40.

Operation of all NO_2 monitors in Delaware meets the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable. More detailed information on the NO_2 standards and monitoring requirements can be found on the EPA website at: https://www.epa.gov/no2-pollution.

[9] Federal Register Vol. 81, No. 251 – Environmental Protection Agency: 40 CFR Part 58 - Revision to the Near-road NO_2 Minimum Monitoring Requirements.

Total Reactive Oxides of Nitrogen (NO_y)

NO_y is measured via chemiluminescence reaction using a specialized converter. It is not a criteria pollutant and there are no NAAQS for NO_y, however measurement of NO_y is required at all NCore and PAMS sites because of its role in O_3 formation.

Delaware is required to monitor NO_y at its combined NCore / PAMS MLK site in Wilmington. Operation of the NO_y monitor in Delaware meets the requirements of 40 CFR Part 58 appendices A, C, D, and E as applicable.

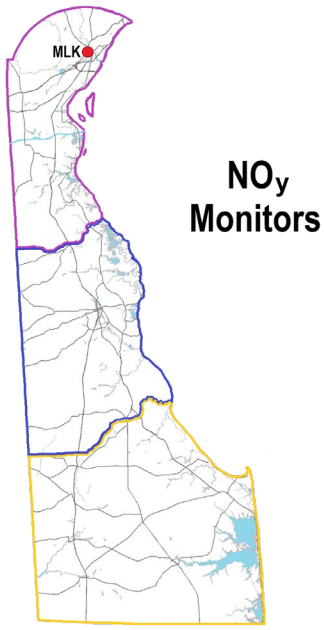


Figure 8 - DE NO_y Monitoring Site

Air Toxics Pollutant Monitors

Toxic air pollutants, also called Air Toxics or "Hazardous Air Pollutants" (HAPs) are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

As part of the EPA Region 3 Cooperative Toxic Monitoring Program, Delaware operates air toxics monitoring at one station to assess general urban levels. Toxics are sampled every sixth day year-round at the MLK site in Wilmington. The compounds measured are shown in the Monitoring Method table on page 70.

Delaware has elected to monitor two main classes of air toxics compounds; volatile organic compounds (VOCs) and heavy metals:

- VOC samples are collected for 24 hours in evacuated canisters with a canister sampler. The canisters are returned to the Maryland Department of the Environment laboratory for analysis via the EPA TO-15A method on a gas chromatograph mass spectrometer system.
- Heavy metals are collected for 24 hours on a total suspended particulate (TSP) quartz filter, which is sent to an analytical support laboratory[10] for analysis using Inductively Coupled Plasma/Mass Spectrometry (ICP/MS). Results of the monitoring are submitted to the national AQS database.

Delaware is working to resume metals sampling prior to June 1, 2026. The sampler has not been used for an extended period due to delays selecting a heavy metals analytical laboratory after the former laboratory terminated operations at the end of 2023.

[10] Delaware is in the process of establishing a new analytical support laboratory due to prior laboratory shutdown on December 31, 2023.

PAMS Monitoring Site

Overview

The CAA of 1990, Section 182 (c)(1), required the EPA to promulgate rules for enhanced monitoring of O_3, NO_x, and VOCs for O_3 nonattainment areas to obtain comprehensive data on O_3 air pollution. Then from 2011 through 2016, the EPA performed a re-evaluation of PAMS requirements considering changes to PAMS data needs and improvements in monitoring technology.

Based on the findings of the PAMS evaluation the EPA proposed to revise several aspects of PAMS monitoring requirements and published the "PAMS Quality Assurance Implementation Plan" in October 2016.[11]

The current objective of the PAMS air monitoring program is to provide data to evaluate and support the development of national air quality models and track trends in O_3 precursor concentrations to aid ongoing efforts to attain the O_3 NAAQS.

Requirements for Delaware

PAMS monitoring is required at NCore sites in urban areas with a population greater than 1 million. Wilmington and a large part of New Castle County are part of the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD CSA, which has a population of approximately 6.4 million, therefore Delaware is required to perform PAMS monitoring at the NCore site in Wilmington (MLK AQS ID 10-003-2004).

The following is a description of the methods and technologies Delaware uses to monitor each required PAMS parameter:

1. **Hourly speciated VOCs –** PAMS sites are required to collect hourly speciated VOC measurements with an automated gas

[11] https://www.epa.gov/sites/default/files/2016-10/documents/pams_qa_plan.pdf

chromatograph (AutoGC). Delaware uses the Consolidated Analytical Systems (CAS) integrated Chromatotec AirmOzone Auto-Gas Chromatograph with Flame Ionization Detection (Auto-GC-FID). A complete list of the targeted compounds is found in **Table 4 – PAMS Target Compounds.**

2. **Carbonyls –** PAMS sites are required to perform carbonyl sample collection with a frequency of three 8-hour samples on a one-in-three-day basis (~90 samples per PAMS sampling season). For this purpose Delaware uses the ATEC Model 8000-2 Eight Port Carbonyl Sampler with additional Duplicate Channel. A complete list of the target compounds is highlighted in **Table 4 – PAMS Target Compounds**. The TO-11A sampling and analytical method, as used in the National Air Toxics Trends (NATTS) program[12] will be used for sample analysis and reported to Delaware monthly.

3. **Nitrogen Oxides –** All required PAMS sites must monitor for NO and NO_y. NO_2 by direct measurement is also required and must be measured with a CAPS direct-reading NO_2 analyzer or a photolytic-converter NO_2 analyzer. Delaware uses the following instruments to meet these measurement requirements:
    - Direct NO_2: Teledyne Model T500U CAPS NO_2 Analyzer[13]
    - NO and NO_y: Thermo Fisher Scientific 42i-Y Chemiluminescence Analyzer

4. **Meteorology Measurements –** All required PAMS sites must measure WS and WD, temperature, RH, atmospheric pressure, precipitation, solar radiation, ultraviolet (UV) radiation, and mixing layer height. Delaware measures these parameters using the following instruments:
    - WS, WD, temperature, RH, and pressure: Vaisala WXT530
    - Mixing layer height: Vaisala Ceilometer CL51

[12] See NATTS Technical Assistance Document, revision 4, for TO-11A method: https://www.epa.gov/system/files/documents/2022-08/NATTS-TAD-Revision-4-Final-July-2022-508.pdf

[13] Delaware's Teledyne API N500 was returned to Teledyne near the end of 2025, and is in process of being replaced with a Teledyne API T500U

- UV radiation: Kipp & Zonen SUV5-V Smart Broadband UV
- Solar radiation: Kipp & Zonen SMP10-V Smart Pyranometer
- Precipitation: RM Young 52202 Tipping Bucket Rain Gauge

Table 4. PAMS Target Compounds (VOCs and Carbonyls)

Priority Compounds	Optional Compounds
1,2,3-trimethylbenzene [a]	1,3,5-trimethylbenzene
1,2,4-trimethylbenzene [a]	1-pentene
1-butene	2,2-dimethylbutane
2,2,4-trimethylpentane [b]	2,3,4-trimethylpentane
acetaldehyde [b,c]	2,3-dimethylbutane
acetone [c,d]	2,3-dimethylpentane
benzene [a,b]	2,4-dimethylpentane
c-2-butene	2-methylheptane
ethane [d]	2-methylhexane
ethylbenzene [a,b]	2-methylpentane
Ethylene	3-methylheptane
formaldehyde [b,c]	3-methylhexane
Isobutane	3-methylpentane
Isopentane	Acetylene
Isoprene	c-2-pentene
m&p-xylenes [a,b]	cyclohexane
m-ethyltoluene [a]	cyclopentane
n-butane	isopropylbenzene [b]
n-hexane [b]	m-diethlybenzene
n-pentane	methylcyclohexane
o-ethyltoluene [a]	methylcyclopentane
o-xylene [a,b]	n-decane
p-ethyl-toluene [a]	n-heptane
Propane	n-nonane
propylene	n-octane
styrene [a,b]	n-propylbenzene [a]
toluene [a,b]	n-undecane
t-2-butene	p-diethylbenzene
	t-2-pentene
	α/β-pinene
	1,3 butadiene [b]

	benzaldehyde [c]
	carbon tetrachloride [b]
	Ethanol
	Tetrachloroethylene [b]

Source: Revisions to the Photochemical Assessment Monitoring Stations Compound Target List. U.S. EPA, November 20, 2013

[a] Important Secondary Organic Aerosols Precursor Compounds
[b] HAP Compounds
[c] Carbonyl compounds
[d] Non-reactive compounds, not considered to be VOC for regulatory purposes

Enhanced Monitoring Plan (EMP)

States with Moderate or above O_3 nonattainment areas, or that are in the Ozone Transport Region (OTR) as defined in 40 CFR Part 51, were required to develop and implement an EMP no later than October 1, 2019. Delaware is part of the OTR and is currently designated as "serious" nonattainment for the 2015 O_3 NAAQS. AQ has worked towards development and implementation of the four required activities listed below that are part of the EMP. Full implementation is in progress with one planned new deployment and one redeployment this year:

1. **Additional O_3 monitoring beyond what is minimally required based on population and location as defined in 40 CFR Part 58, Appendix D.**

Delaware meets this requirement. As noted on pg. 23 of this document, Delaware operates one additional O_3 analyzer in New Castle and one additional O_3 analyzer in Sussex counties beyond what is required in 40 CFR Part 58, Appendix D. Delaware also monitors O_3 year-round, exceeding the requirement that O_3 be monitored minimally during Delaware's O_3 season.

2. **Additional NO_x or NO_y monitoring beyond what is minimally required in 40 CFR Part 58, Appendix D.**

Delaware will meet this requirement by implementing an additional NO_x analyzer at the Lewes air quality monitoring site. Implementation has been delayed several years due to funding constraints and equipment failures, however a new NO_x analyzer has been acquired and is planned to be implemented by May 2026.

3. **Additional speciated VOC measurements, either at additional locations or during periods outside of what is required in 40 CFR Part 58, Appendix D.**

Delaware will meet this requirement by operating a VOC canister sampler at the NCore site in Wilmington, DE year-round, which includes sample collection outside of peak O_3 season in our region.

4. **Enhanced upper air measurements of meteorology or pollution concentrations.**

Delaware meets this requirement by operating a ceilometer to measure mixing layer height, an upper air meteorological measurement, year-round at the PAMS site in Wilmington, DE.

Summary of Changes

Changes from 2025

Site relocation and upgrade:

- The Brandywine Creek State Park ambient monitoring shelter was relocated and replaced in December 2024 to address deterioration, power infrastructure, and safety concerns, and became fully operational in January, 2025.

Analyzer and other equipment changes:

- The Teledyne API N500 direct NO_2 / NO_X analyzer was removed from service in October 2025 and returned to the manufacturer to be replaced with an alternative direct NO_2 analyzer, Teledyne API model T500U.
- The FRM Thermo Fisher Scientific Partisol 2025i was relocated from Lums Pond State Park to the Newark platform. It is deployed to collocate the FEM $PM_{2.5}$ continuous data being collected at that site.
- A meteorological tower was installed at the Delaware City / Route 9 monitoring site for more accurate and correctly sited wind speed and wind direction measurements
- 2 upgraded ozone analyzers and calibrators were acquired in December 2025 to replace aging models, however acceptance testing on these instruments was delayed to 2026.

Mobile Air Testing Trailer (MATT) progress:

- Purchase order issued to selected vendor for design and fabrication of an air quality monitoring shelter mounted on a trailer.
- All instruments acquired mid-year for outfitting trailer with monitoring of criteria pollutants and air toxics for research purposes. These are pending installation for when the trailer is acquired in 2026.

Changes anticipated for 2026

- Delaware is in the process of upgrading monitoring shelters at two locations and performing recommended site maintenance:

  - MLK Jr. Blvd in Wilmington, DE shelter upgrade is planned in May 2026 to address issues with floor and siding deterioration, concerns over structural integrity, and operator safety.
  - Delaware City monitoring shelter upgrade is planned in December 2026 to address issues with water ingress and equipment longevity.
- Analyzer and other equipment changes:
  - Deploy new direct NO_2 analyzer at MLK PAMS site and start collecting data prior to May 1, 2026
  - Deploy NO_x analyzer at Lewes as proposed in the EMP prior to June 1, 2026
  - Acquire a new PAMS program Auto-GC-FID to replace aging hourly-speciated VOCs monitoring equipment acquired in 2018.
- Analytical laboratory changes:
  - Delaware has selected the analytical laboratory that will perform heavy metals analysis and TSP filter weighing for the air toxics program. The selected lab, also part of DNREC, is in the final stages of method development, and is expected to be fully operating by June 1, 2026
- Mobile Air Testing Trailer:
  - Delaware plans to complete setup and installation of the trailer and all testing equipment by December 2026, to begin after the trailer is received from the awarded vendor.

Detailed Site Descriptions

This section provides additional site-specific information on all active SLAMS monitoring sites in Delaware organized by north-to-south geographic location.

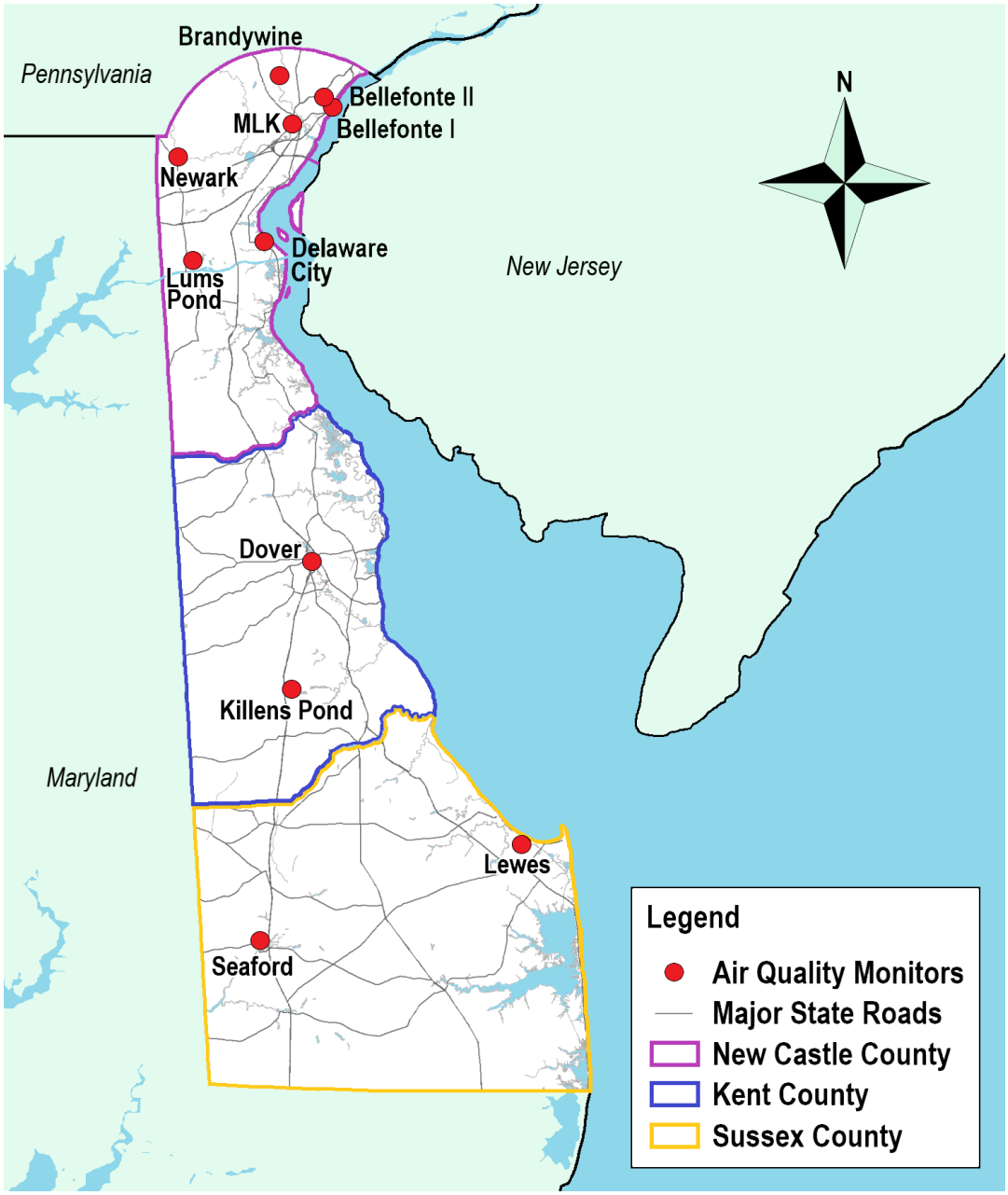


Figure 9 - Map of Air Quality Monitoring Sites in Delaware

Site: Brandywine Creek State Park (BCSP)

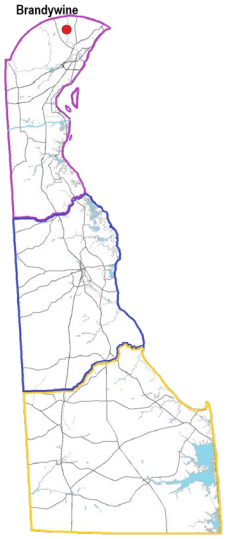


Figure 10 - BCSP Monitoring Site in DE

AQS Site ID:	10-003-1010
State:	Delaware
County:	New Castle
Address:	Brandywine Creek State Park, Wilmington
Latitude:	39.8004
Longitude:	-75.5764
Spatial Scale:	Neighborhood
Area Represented (MSA):	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	1994
Year Relocated:	2025

Figure 11 - BCSP Satellite Image and Site Picture

Monitored Parameters

- **Ozone**
- **Wind Speed & Direction**
- **Temperature & Relative Humidity**

Site Description

The Brandywine monitoring site, in Brandywine Creek State Park, was established in 1994 when a secondary downwind site in Claymont was discontinued due to changes in land ownership. The site was then relocated approximately 1.3 miles to the south-southwest in 2024 to address issues with infrastructure and site access. This is a neighborhood-scale site for ozone monitoring. The site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring Objectives

Population exposure, maximum concentration, O_3 NAAQS compliance, and trends.

Planned Changes through 2026

No changes planned.

Site: Bellefonte I (Platform)

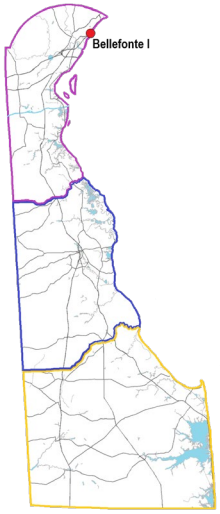


Figure 12 - Bellefonte I Monitoring Site in DE

AQS Site ID:	10-003-1003
State:	Delaware
County:	New Castle
Address:	River Road Park
Latitude:	39.7613
Longitude:	-75.4920
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden Wilmington, PA-NJ-DE-MD
Year Established:	1969

Figure 13 - Bellefonte I Site Picture and Satellite Image

Monitored Parameters

- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average**

Site Description

The Bellefonte monitoring site was originally established in 1969 to monitor O_3 (primary downwind direction from Wilmington) and SO_2. $PM_{2.5}$ was added in 1999.

When changing site characteristics began to interfere with O_3 monitoring, a new site (Bellefonte II) was established in 2001, less than a mile to the north. The O_3 and SO_2 monitors were relocated to the new site, while the $PM_{2.5}$ monitor remained at the original site to provide data continuity. Both sites meet all EPA 40 CFR Part 58 Appendix D and E - siting criteria.

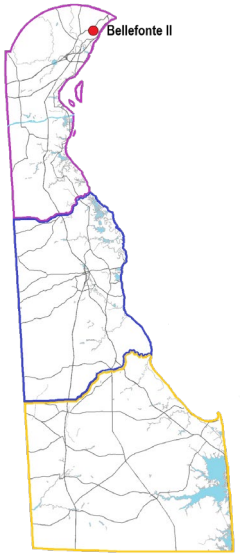
Monitoring Objectives

Monitoring objectives are NAAQS compliance, population exposures, and trends.

Planned Changes through 2026

No changes planned.

Site: Bellefonte II



AQS Site ID:	10-003-1013
State:	Delaware
County:	New Castle
Address:	Bellevue State Park
Latitude:	39.7739
Longitude:	-75.4965
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	2001

Figure 14 - Bellefonte II Monitoring Site in DE

Figure 15 - Bellefonte II Satellite Image and Site Picture

Monitored Parameters

- **Ozone**
- **Sulfur Dioxide**

Site Description

The Bellefonte site was originally established in 1969 to monitor O_3 (primary downwind direction from Wilmington) and SO_2. $PM_{2.5}$ was added in 1999. When a change to local site characteristics began interfering with ozone monitoring, a new site (Bellefonte II) was established in 2001, less than a mile to the north. The O_3 and SO_2 monitors were relocated to the new site, while the $PM_{2.5}$ monitor remained at the original site to provide data continuity. Both sites meet all EPA 40 CFR Part 58 App D and E siting criteria.

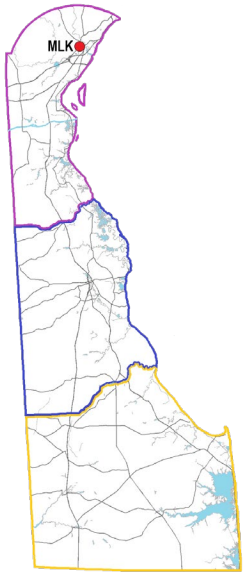
Monitoring Objectives

Monitoring objectives are NAAQS compliance, population exposures, and trends. Bellefonte II is the O_3 maximum downwind concentration site for Wilmington. The SO_2 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 2026

No changes planned.

Site: MLK NCore



AQS Site ID:	10-003-2004
State:	Delaware
County:	New Castle
Address:	Corner of Justison St. & MLK Jr. Blvd., Wilmington
Latitude:	39.7395
Longitude:	-75.5575
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	1999

Figure 16 - MLK NCore Monitoring Site in DE

Figure 17 - MLK Site Picture and Satellite Location

Monitored Parameters

O_3	Ozone
SO_2	Sulfur Dioxide
CO	Carbon Monoxide
NO_2	Nitrogen Dioxide
NO_y	Total Reactive Oxides of Nitrogen
$PM_{2.5}$	Fine Particulate Matter – Hourly average & 24-hour
PM_{10}	Respirable Particulate Matter – Hourly average & 24-hour
PM_{coarse}	Coarse Particulate Matter[14] – Hourly average & 24-hour
$PM_{2.5}$ Spec.	Chemically speciated particulate matter < 2.5 microns
$PM_{2.5}$ BC	Speciated particulate matter < 2.5 microns – Black Carbon
TSP	Total Suspended Particulates
VOC	Volatile Organic Compounds: 24-hour via TO-15 method
WS / WD	Wind Speed & Direction
Temp / Rh	Temperature & Relative Humidity
MLH	Mixing Layer Height: hourly via Ceilometer – Unified Ceilometer Network

Site Description

The MLK NCore site in located in the central urban area of the city of Wilmington, at the intersection of Justison St. and MLK Jr. Blvd. It replaced the urban site at 12th Street and King Street that was discontinued due to a change in land ownership. It is the one NCore site in Delaware and measures urban population exposure to multiple pollution sources. It is also the site where several Air Toxics are measured: heavy metals via TSP, VOCs via 24-hour canister sampling, and Carbonyls via 8-hour cartridge sampling between June 1 and August 31 annually. This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

[14] PM_{coarse} is particulate matter with mean aerodynamic diameter between 2.5 and 10 microns.

Monitoring Objectives

Population exposure, maximum concentration, NAAQS compliance, NCore, Air Toxics, and trends.

Planned Changes through 2026

AQ is planning to replace the existing primary shelter to address structural weakening and water and pest ingress. During replacement, AQ will install a concrete pad and re-install electrical service. AQ is also planning to deploy a replacement direct NO_2 analyzer prior to May 1, 2026.

Site: MLK PAMS

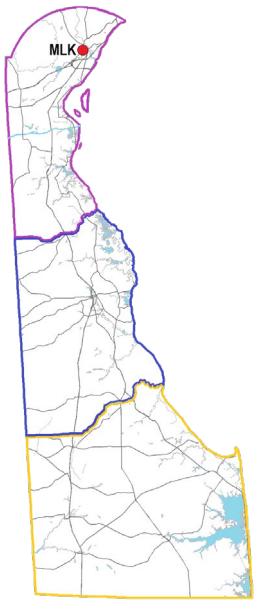


Figure 18 - MLK PAMS Monitoring Site in DE

AQS Site ID:	10-003-2004
State:	Delaware
County:	New Castle
Address:	Corner of Justison St. & MLK Jr. Blvd., Wilmington
Latitude:	39.7395
Longitude:	-75.5575
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	2022

Monitored Parameters

O_3	Ozone
NO_2	Nitrogen Dioxide via CAPS direct measurement
NO_y	Total Reactive Oxides of Nitrogen
VOC	Volatile Organic Compounds: hourly via Automated Gas Chromatography
C=O	Carbonyls: 8-hour via TO-11a method
WS / WD	Wind Speed & Direction
Temp / Rh	Temperature & Relative Humidity
Prec.	Precipitation via tipping bucket rain gauge
Radiation	Solar and UV radiation via solar and UV radiometers
MLH	Mixing Layer Height: hourly via Ceilometer – Unified Ceilometer Network

Site Description

The MLK PAMS site shares its location with the MLK NCore site within the city of Wilmington, Delaware at the intersection of Justison St. and MLK Blvd. Several required PAMS parameters are also monitored to meet NCore requirements at the site.

The PAMS site became fully operational in 2022 and is the only PAMS site in Delaware. The site measures urban population exposure to multiple O_3 precursors as well as meteorological conditions that interact with O_3 formation. This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring Objectives

Population exposure, maximum concentration, NAAQS compliance, Air Toxics, PAMS, and trends.

Planned Changes through 2026

No changes planned.

Site: Newark (Platform)

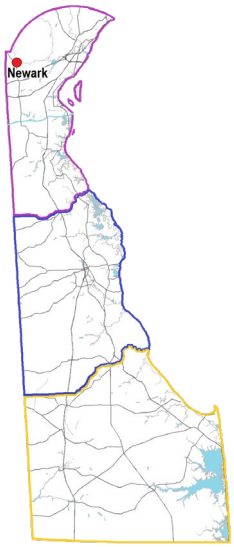


Figure 19 - Newark Monitoring Platform in DE

AQS Site ID:	10-003-1012
State:	Delaware
County:	New Castle
Address:	University of Delaware North Campus Lot, Newark
Latitude:	39.6916
Longitude:	-75.7617
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	1999

Figure 20 - Newark Site Picture and Satellite Image

Monitored Parameters

- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average & 24-hour**

Site Description

The Newark platform site was established to measure $PM_{2.5}$ population exposure in the Newark area as well as $PM_{2.5}$ transport from upwind areas to the west. It is a $PM_{2.5}$ neighborhood scale site.

Historically the location is suburban and generally impacted by mobile sources and regional transport. Recent hourly-averaged data collected at the site has suggested that microscale sources may be impacting the location. A review for comparison of collocated FEM and FRM sampler data is planned to be completed in late 2026 to investigate this observation.

This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring Objectives

Population exposure, $PM_{2.5}$ NAAQS compliance, regional transport, and trends.

Planned Changes through 2026

No changes planned.

Site: Delaware City (Rt. 9)

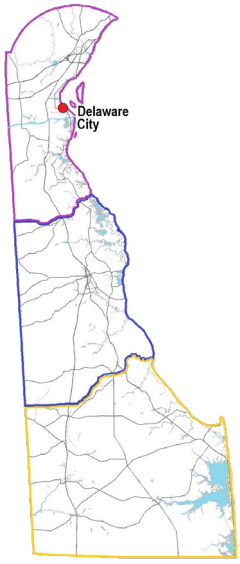


Figure 21 - Delaware City Monitoring Site in DE

AQS Site ID:	10-003-1008
State:	Delaware
County:	New Castle
Address:	William "Bubby" Sadler Field, 950 5th St, Delaware City
Latitude:	39.5777
Longitude:	-75.6036
Spatial Scale:	Neighborhood
Area Represented:	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD
Year Established:	1992

Figure 22 - Delaware City Site Picture and Satellite Location

Monitored Parameters

- **Sulfur Dioxide**
- **Fine Particulate Matter: hourly, $PM_{2.5}$**
- **Wind Speed / Wind Direction**
- **Temperature and Relative Humidity**

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 Appendix D and E siting criteria.

Monitoring Objectives

This monitoring site is a stationary source-impacted site for SO_2. The monitoring objectives are population exposure, compliance with the NAAQS, and trends.

Planned Changes through 2026

AQ is planning to replace the aging monitoring shelter at Delaware City in December 2026 to address issues with water ingress and roof access. At that time a new concrete pad will be installed to increase site longevity and some repairs performed on the surrounding fence.

Site: Lums Pond

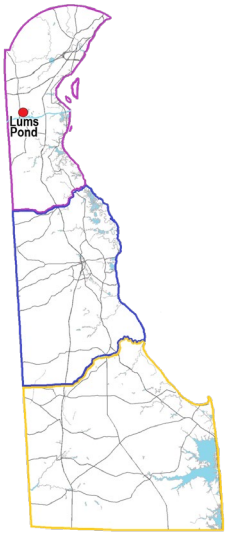


Figure 23 - Lums Pond Monitoring Site in DE

AQS Site ID:	10-003-1007
State:	Delaware
County:	New Castle
Address:	Lums Pond State Park, Bear
Latitude:	39.5513
Longitude:	-75.7320
Spatial Scale:	Urban
Area Represented:	Not in a metropolitan area
Year Established:	1991

Figure 24 - Lums Pond Site Picture and Satellite Image

Monitored Parameters

- **Ozone**
- **Sulfur Dioxide**
- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average**
- **Wind Speed and Wind Direction**
- **Temperature and Relative Humidity**

Site Description

The Lums Pond site was originally designated neighborhood scale and planned to monitor O_3 transported into Delaware from the Baltimore/Washington area. It is located in a general upwind direction from Wilmington and continues to serve that purpose.

$PM_{2.5}$ monitoring began in 1999 for measuring regional transport and general population exposure, as well as for NAAQS compliance. SO_2 monitoring was added in 2000 to detect impacts from major point sources directly to the east.

The scale designation was changed to Urban (4 – 50 km) to reflect the background and transport monitoring objectives. The immediate area surrounding the site is rural.

This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring Objectives

The site objectives for O_3 are upwind background for the Wilmington area, population exposure, NAAQS compliance, and trends.

Planned Changes through 2026

AQ plans to upgrade the ozone monitor, ozone calibrator, and sulfur dioxide monitor at the site in the summer of 2026 to replace aging equipment.

Site: Dover (Platform)

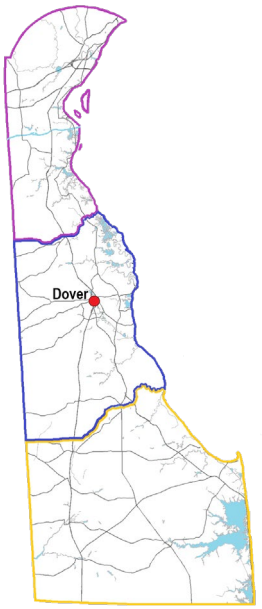


Figure 25 - Dover Monitoring Platform in DE

AQS Site ID:	10-001-0003
State:	Delaware
County:	Kent
Address:	Water St., Dover
Latitude:	39.1556
Longitude:	-75.5182
Spatial Scale:	Neighborhood
Area Represented:	Dover
Year Established:	1999

Figure 26 - Dover Satellite Image and Site Picture

Monitored Parameters

- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average**

Site Description

The Dover site is a platform only and was established to measure fine particulate concentrations in the Dover area. It is a neighborhood scale site representative of the Dover MSA impacted by a combination of source types including mobile, large and small point sources. This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring Objectives

Population exposure, $PM_{2.5}$ NAAQS compliance, and trends.

Planned Changes through 2026

No changes planned.

Site: Killens Pond

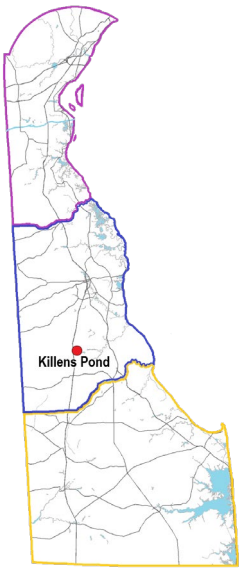


Figure 27 - Killens Pond Monitoring Site in DE

AQS Site ID:	10-001-0002
State:	Delaware
County:	Kent
Address:	Killens Pond State Park, Felton
Latitude:	38.9867
Longitude:	-75.5568
Spatial Scale:	Urban
Area Represented:	Not in a metropolitan area
(MSA):	
Year Established:	1995

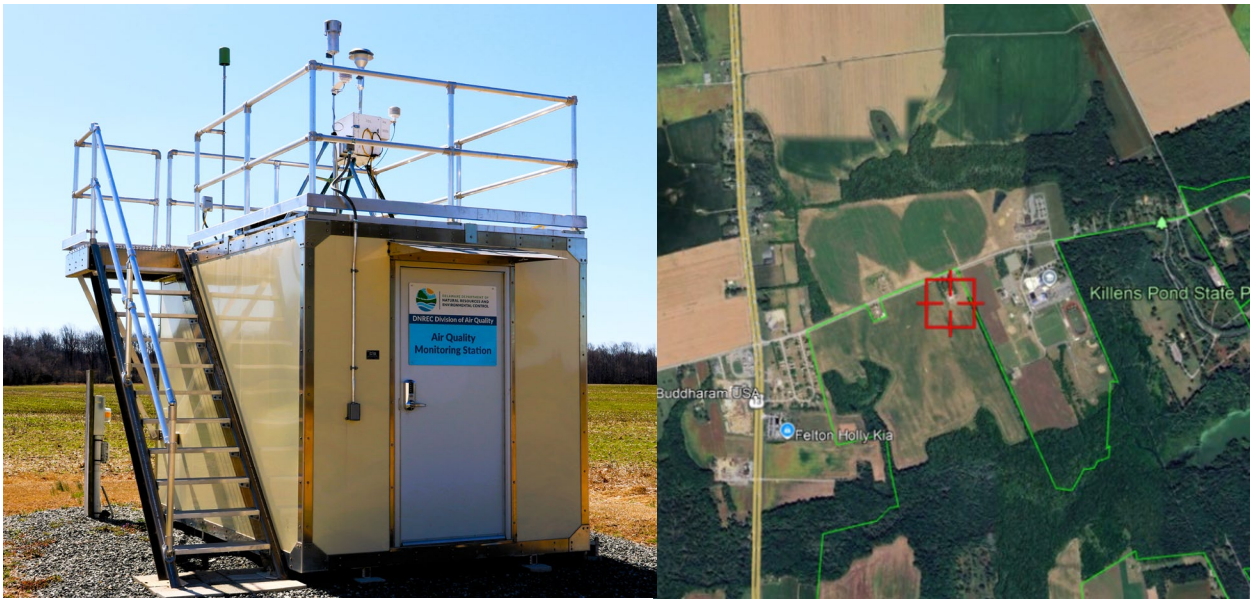


Figure 28 - Killens Pond Site Picture and Satellite Image

Monitored Parameters

- **Ozone**

- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average**
- **Wind Speed and Wind Direction**

Site Description

The Killens Pond site is located in a rural area that is part of Killens Pond State Park. It was established to measure background concentrations of ozone and $PM_{2.5}$. The designated scale was changed to Urban (4 – 50 km) to reflect the background monitoring objective. This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

Monitoring of wind speed and wind direction are currently on hold, pending evaluation and deployment of meteorology measurement and mounting equipment.

Monitoring Objectives

Background concentrations, NAAQS compliance, and trends.

Planned Changes through 2026

AQ plans to upgrade the ozone monitor and ozone calibrator deployed at the site in the summer of 2026 to replace aging equipment.

Site: Lewes

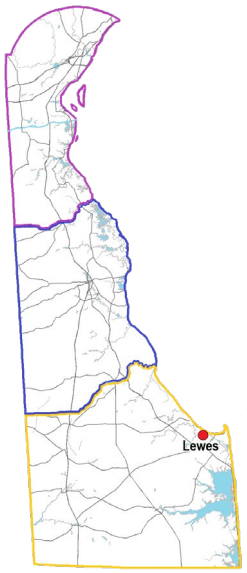


Figure 29 - Lewes Monitoring Site in DE

AQS Site ID:	10-005-1003
State:	Delaware
County:	Sussex
Address:	University of Delaware, College of Earth, Ocean, & Environment - Hugh R. Sharp Campus, Lewes
Latitude:	38.7791
Longitude:	-75.1632
Spatial Scale:	Neighborhood
Area Represented:	Salisbury, MD-DE
Year Established:	1991

Figure 30 - Lewes Satellite Image and Site Photo

Monitored Parameters

- **Ozone**
- **Sulfur Dioxide**
- **Wind Speed & Wind Direction**
- **Temperature & Relative Humidity**

Site Description

The Lewes site is neighborhood scale established to understand O_3 concentrations in the coastal area where population increases significantly in the summer months. SO_2 was added in 2012 in response to the new SO_2 NAAQS monitoring requirements. It is representative of the coastal Sussex County area. This site meets all EPA 40 CFR Part 58 Appendix D and E siting criteria.

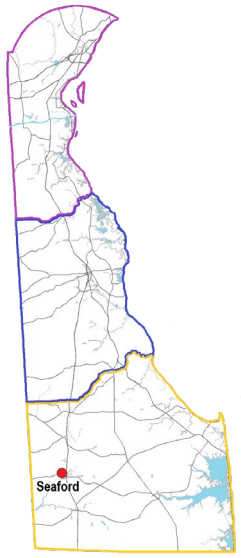
Monitoring Objectives

Population exposure, NAAQS compliance, and trends.

Planned Changes through 2026

A NO_x Chemiluminescence analyzer will be added as part of the Enhanced Monitoring Plan.

Site: Seaford



AQS Site ID:	10-005-1002
State:	Delaware
County:	Sussex
Address:	350 Virginia Ave., Seaford
Latitude:	38.6539
Longitude:	-75.6106
Spatial Scale:	Neighborhood
Area Represented:	Salisbury, MD-DE
Year Established:	1990

Figure 31 - Seaford Monitoring Site in DE

Figure 32 - Seaford Site Picture and Satellite Image

Monitored Parameters

- **Ozone**
- **Fine Particulate Matter ($PM_{2.5}$) – Hourly average**
- **Wind Speed and Wind Direction**

Site Description

The Seaford site was originally located farther south to monitor pollutant concentrations in the Seaford area and was relocated in 1990 due to deteriorating conditions. 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 Appendix D and E siting criteria.

Monitoring of wind speed and wind direction are currently on hold, pending evaluation and deployment of meteorology measurement and mounting equipment.

Monitoring Objectives

Population exposure, NAAQS compliance, and trends.

Planned Changes through 2026

No changes planned.

Monitoring method information

Monitor Methods & AQS Codes

Table 5. Monitoring methods and associated AQS codes

Parameter AQS code	**AQS Method Code**	**Method Description/ Analysis Method**
O_3 - 44201	047 – TE 49i and 49iQ	UV Absorption
SO_2 - 42401	560 – TE 43i-TLE and 43iQ-TL	UV Fluorescence
CO - 42101	548 - SE 6050T	Non-dispersive Infrared / Gas Filter Corr.
NO_2 – 42602	574 – TE 42i-TL and 42iQ-TL 212 – TAPI T500U	Chemiluminescence Cavity Attenuated Phase Shift (CAPS) Spectroscopy
NO_y - 42600	674 – TE 42i-Y	Chemiluminescence
$PM_{2.5}$ - 88101	145 – TE Partisol 2025i VSCC Inlet	Gravimetric
$PM_{2.5}$ - 88101	636 – TAPI T640 (continuous) 638 – TAPI T640X (continuous)	Continuous broadband spectroscopy w/ data alignment
*$PM_{2.5}$ Speciation – Ions	812 – Met One SASS	Nylon filter, Ion chromatography
*$PM_{2.5}$ Speciation – Metals	811 – Met One SASS	Teflon filter, energy dispersive XRF
*$PM_{2.5}$ Speciation – Carbon	839 – URG 3000N	Quartz filer and cyclone inlet; IMPROVE carbon Thermal Optical Reflectance (TOR) analysis method
PM_{10} – 85101	127 – TE Partisol 2025i	Gravimetric

Parameter AQS code	AQS Method Code	Method Description/ Analysis Method
local conditions		
PM_{10} – 85101 local conditions	639 – TAPI T640X (continuous)	Continuous broadband spectroscopy w/ data alignment
PM_{coarse} – 86101 $PM_{10-2.5}$ local conditions	176 – TE Partisol 2025i Sequential	Calculated from paired samplers
PM_{coarse} – 86101 $PM_{10-2.5}$ local conditions	640 – TAPI T640X (continuous)	Continuous broadband spectroscopy w/ data alignment
*Air Toxics – VOCs	150 – SS 6L – Pressurized Canister	Cryogenic pre-concentration: GC/MS
*Air Toxics – Metals	089 – High-Volume TSP	ICP/MS Quartz filters
WS – 61103 WD – 61104	020 – Vaisala vector method	Ultrasonic

* Multiple parameters in these groups; see "Table 6. Parameters with multiple compounds"

Table 6. Parameters with multiple compounds[15]

Group	Compounds
VOCs	Dichlorodifluoromethane, Chloromethane, 1,2-Dichloro-1,1,2,2,tetrafluoroleth, Chloroethene, 1,3-Butadiene, Trichlorofluoromethane, Acetone, Methylene Chloride, 1,1,2-Trichloro-1,2,2-trifluoroethane, 2-methoxy-2-methyl-Propane, Hexane, Chloroform, Tetrahydrofuran, 1,2-Dichloroethane, 1,1,1-Trichloroethane, Benzene, Carbon tetrachloride, Cyclohexane, 1,2-Dichloropropane, Trichloroethene, Heptane, Cis-1,3-Dichloro-1-Propene, Trans-1,3-Dichloro-1-Propene, Toluene, 1,2-

[15] A list of all EPA parameter codes is available online at: ***https://aqs.epa.gov/aqsweb/documents/codetables/methods_all.html***

Group	Compounds
	Dibromoethane, Tetrachloroethylene, Chlorobenzene, Ethylbenzene, m & p- Xylene, Styrene, 1,1,2,2-Tetrachloroethane, o-Xylene, 1-Ethyl-4-Methylbenzene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, 1,4-Dichlorobenzene
Metals	Arsenic (12103), Cadmium (12110), Chromium (12112), Lead (12128), Manganese (12132), Nickel (12136)
$PM_{2.5}$ Speciation	Ions: Ammonium, Nitrate, Sulfate, Potassium, Sodium Carbon: Elemental carbon (E1 IMPROVE, E2 IMPROVE, E3 IMPROVE, EC IMPROVE TOR, EC IMPROVE TOT), Organic carbon (O1 IMPROVE, O2 IMPROVE, O_3 IMPROVE, O4 IMPROVE, OC IMPROVE TOR, OC IMPROVE TOT, OP IMPROVE TOR), OP IMPROVE TOT, TC IMPROVE Elements: Aluminum, Antimony, Arsenic, Barium, Bromine, Cadmium, Calcium, Cerium, Cesium, Chlorine, Chromium, Cobalt, Copper, Europium, Gallium, Gold, Hafnium, Indium, Iridium, Iron, Lanthanum, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Niobium, Phosphorus, Potassium, Rubidium, Samarium, Scandium, Selenium, Silicon, Silver, Sodium, Strontium, Sulfur, Tantalum, Terbium, Tin, Titanium, Vanadium, Wolfram, Yttrium, Zinc, and Zirconium

Ozone (O_3)

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

Sulfur Dioxide (SO_2)

SO_2 is measured with principles of UV fluorescence. Air is drawn through a sample cell where it is radiated with high intensity UV light. This causes the SO_2 molecules in the air to fluoresce and release light at a different wavelength. The fluorescence is detected with a photo multiplier tube and converted to an electrical signal proportional to the concentration of SO_2.

Carbon Monoxide (CO)

CO is measured by infrared absorption photometry. Air is drawn through a sample cell where infrared light is passed through it. CO 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 inversely proportional to the concentration of CO in the sample cell.

Nitrogen Dioxide (NO_2)

Chemiluminescence Reaction

Nitrogen oxides are measured using the chemiluminescence reaction of nitric oxide (NO) with ozone. Air is drawn into a reaction chamber where it is mixed with a high concentration of O_3 from an internal O_3 generator. Any NO in the air reacts with the O_3 to produce NO_2. Light emitted from this reaction is detected with a photo multiplier tube and converted to an electrical signal proportional to the NO concentration. NO_2 must be measured indirectly.
NO_2 is measured by passing the air through a converter where any NO_2 in the air is reduced to NO before the air is passed to the reaction chamber. By alternately delivering the sample (1) directly to the reaction chamber, and (2) through the converter before the reaction chamber, the analyzer alternately measures NO and NOx respectively. The NO_2 concentration is equal to the difference between the concentrations of NO and NOx.

Cavity Attenuated Phase Shift Spectroscopy (CAPS)

Ambient air is drawn into the true NO_2 analyzer with a vacuum pump and particulates are removed to prevent deposition of particulate matter on the

analyzer optics. The particulate matter scrubbed air then enters a sample cell containing highly reflective mirrors to produce a considerable path length within the cell. NO_2 in the sampled atmosphere absorbs light at 450 nm. Rather than a traditional absorbance method, where concentration is proportional to a reduction in intensity of light to the detector, a CAPS monitor measures the average delay in peak intensity of 450-nm light in the cell to quantify NO_2 concentration. The presence of NO_2 in the cell causes a delay in peak intensity that increases as the NO_2 concentration increases due to light absorption. This delay causes a phase shift of pulsated 450-nm light that is proportional to the concentration of NO_2 in the sampled atmosphere.

Total Reactive Oxides of Nitrogen (NO_y)

NO_y is measured using the chemiluminescence reaction of NO with O_3. Air is drawn into a reaction chamber where it is mixed with a high concentration of O_3 from an internal O_3 generator. Any NO in the air reacts with the O_3 to produce NO_2. Light emitted from this reaction is detected with a photo multiplier tube and converted to an electrical signal proportional to the concentration of NO.

NO_y must be measured indirectly 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 converter before the air is passed to the reaction chamber. By alternately bypassing and utilizing this converter before air enters the reaction chamber the analyzer alternately measures NO and NO_y.

Particulate Matter - Fine ($PM_{2.5}$), Respirable (PM_{10}), and PM_{coarse}

24-hour FRM sample collection

$PM_{2.5}$ is measured by drawing air through an inlet that is designed to exclude particles larger than 2.5 microns in diameter. The particles are collected on a Teflon microfiber filter that is weighed before and after sampling to determine the particulate mass. The standard sampling schedule is 24 hours every third day, however, at the Wilmington site 24-hour $PM_{2.5}$ samples are collected every day.

PM_{10} is measured using the same method as $PM_{2.5}$, however the inlet is adapted to exclude particles larger than 10 microns in diameter. PM_{coarse} is calculated by subtraction of $PM_{2.5}$ from PM_{10}.

Continuous monitoring via FEM

FEM analyzers used by Delaware monitor $PM_{2.5}$, PM_{10}, and PM_{coarse} continuously by utilizing broad-band light-scattering spectroscopy. A 5.0 liters per minute (LPM) air stream has broad-band light directed through it which is reflected and measured using calibrated detectors. The resulting backscatter signal is then processed using an algorithm for conversion into a particulate concentration in mass per volume of air.

FEM PM continuous monitoring is an advanced estimate of pollution concentration that allows for near real-time data collection and hourly data reporting. The same data resolution and availability is not possible with FRM PM sampling. FRM sampling, however, which is a direct measurement of mass per volume of air, remains the highest standard of data quality.

$PM_{2.5}$ Speciation

$PM_{2.5}$ Speciation sampling involves gravimetric $PM_{2.5}$ samplers that are specially equipped to collect $PM_{2.5}$ samples which are later analyzed for concentrations of the samples' chemical constituents, or species. The MetOne Super Speciation Air Sampling System (SuperSASS) sampler and the University Research Glass (URG) Corporation URG-3000N sampler are used for the collection of samples for the chemical speciation of $PM_{2.5}$. The samplers collect 3 samples simultaneously every third day for a period of 24 hours. These samples are then sent to an EPA contract laboratory for chemical analyses. There are over 50 species consisting of ions, elements, and carbon species quantified by the analyses.

$PM_{2.5}$ Speciation – Black Carbon (BC)

Black Carbon (BC) is measured continuously using an Aethalometer, which collects a $PM_{2.5}$ sample on a spool of white quartz filter tape. As the PM

collects on the tape, a circle where visible and ultra-violet light is absorbed appears. The rate of 'darkening' of this spot is proportional to the concentration of black carbon, a component of $PM_{2.5}$ that includes combusted hydrocarbons and other materials.

Volatile Organic Compounds (VOCs)

Air toxics VOC samples are collected for 24 hours in canisters on a one-in-six-day schedule. A duplicate sample is collected on a one-in-twelve-day schedule. The canisters are returned to the Maryland Department of the Environment laboratory for analysis on an Entech/Agilent gas chromatograph mass spectrometer system.

Metals

Metals are collected for 24 hours with a high-volume TSP sampler on a quartz filter on a one-in-six-day schedule. The filter is sent to a contract laboratory for analysis of total weight and metal component concentrations using ICP/MS.