



2018-2019 Ohio EPA Air Monitoring Network Plan

Ohio EPA
Division of Air Pollution Control
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Acronyms, Glossary and Explanations

AMNP	Air Monitoring Network Plan
AQI	Air Quality Index
AQS	Air Quality System
BAM	Beta Attenuation Monitor
CBSA	Core Based Statistical Area
CFR	Code of Federal Regulations
CSA	Combined Statistical Area
CSN	Chemical Speciation Network
CO	Carbon Monoxide
DV	Design Value
FDMS	Filter Dynamic Measurement System
FEM	Federal Equivalent Method
FID	Flame Ionization Detector
FRM	Federal Reference Method
GC	Gas Chromatograph
GC/MS	Gas Chromatograph / Mass Spectrometry
ICP/MS	Inductive Coupled Plasma / Mass Spectrometry
LAA	Ohio Local Air Agency
MSA	Metropolitan Statistical Area
MTAPCA	Mahoning-Trumbull Air Pollution Control Agency
NAAQS	National Ambient Air Quality Standard
NATTS	National Air Toxics Trends Station
NCore	National Core multi-pollutant monitoring stations
NO	Nitric Oxide
NO ₂	Nitrogen Dioxide
NO _x	Oxides of Nitrogen
NO _y	Total Reactive Nitrogen Oxides
O ₃	Ozone
OAQPS	Office of Air Quality Planning and Standards
Pb	Lead
PM _{2.5}	Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PM ₁₀	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
PM _{10-2.5}	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers, and greater than or equal to 2.5 micrometers
ppb	parts per billion
ppm	parts per million
PQAO	Primary Quality Assurance Organization
PWEI	Population Weighted Emissions Index
RAPCA	Regional Air Pollution Control Agency
QA	Quality Assurance
SASS	Speciation Air Sampling System
SHARP	Synchronized Hybrid Ambient Real-time Particulate
SLAMS	State or Local Air Monitoring Stations
SO ₂	Sulfur Dioxide
SWOQA	Southwest Ohio Air Quality Agency
SPM	Special Purpose Monitor
STN CSpecPM _{2.5}	Speciation Trends Network
TSP	Total Suspended Particulate
TEOM	Tapered Element Oscillating Microbalance
µg/m ³	micrograms per cubic meter
U.S. EPA	United States Environmental Protection Agency
UV	Ultraviolet
VOC	Volatile Organic Compounds
VSCC	Very Sharp Cut Cyclone

The Air Quality System (AQS) contains ambient air pollution data collected by U.S. EPA, state, local, and tribal air pollution control agencies from over thousands of monitors. AQS also contains meteorological data, descriptive information about each monitoring station (including its geographic location and its operator), and data quality assurance/quality control information. Each monitoring site in AQS has an identification number. In the AQS identification number, the first two digits refers to the state (39 is Ohio), the next three digits is the county (ex. '035' Cuyahoga), and the last four digits designate a specific site within the county.

PM is particulate matter. PM_{10} means particulate matter of 10 microns in diameter or smaller. A micron is one millionth of a meter. $PM_{2.5}$ is particulate matter 2.5 millionths of a meter in diameter or smaller. PM_{10} is coarse particulate matter and $PM_{2.5}$ is fine particulate matter. $PM_{2.5}$ sequential FRM samplers test for $PM_{2.5}$ and can hold multiple samples for sequential sampling.

Monitoring instruments used for comparing to the National Ambient Air Quality Standards (NAAQS) are designated as Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM); however, not all FEM instruments are used for comparison to the NAAQS. For example, some $PM_{2.5}$ FEM instruments may be used for AQI purposes only. Some $PM_{2.5}$ FEM instruments are operated in a manner to categorize them as non-FEM instruments, and in those cases, are not comparable to the NAAQS.

Sites (or monitors at a site) that are designated as industrial sites or designated as special purpose monitors (SPM) are typically not comparable to the NAAQS.

The Air Quality Index (AQI) is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects that you may experience within a few hours or days after breathing polluted air. U.S. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. All continuous ozone and $PM_{2.5}$ monitors in Ohio report to the AQI except for $PM_{2.5}$ monitoring at two industrial sites: 39-017-0019 (Amanda) and 39-017-0020 (Yankee).

Collocated or "colo" indicates a site with duplicate samplers for quality assurance purposes. Data is statistically compared from the two samplers for the same days. Duplicate samplers may sample at a 1 in 6-day schedule or possibly at a 1 in 12-day schedule.

Ultra-violet (U.V.) photometric is a method of detection for ozone concentrations.

U.V. fluorescence is a method of detection for sulfur dioxide concentrations.

Total suspended particulate (TSP) metals is the method of collecting total suspended particulate by drawing an air sample through a filter media that is analyzed at a laboratory for airborne metals including lead, arsenic, cadmium, chromium, nickel, zinc, manganese and beryllium and sometimes particulate mercury. Analysis is by Inductively Coupled Plasma (ICP) Emission Spectroscopy or Graphite Furnace Atomic Absorption.

Beta Attenuation Monitor (BAM) and Tapered Element Oscillating Microbalance (TEOM) are methods of detection for fine particulates.

1.0 Introduction and Requirements

As required by 40 CFR 58.10, Ohio EPA is providing the 2018-2019 Air Monitoring Network Plan (AMNP) to the United States Environmental Protection Agency (U.S. EPA) Region 5. This document addresses the Ohio air monitoring network, as it exists as of July 1, 2018, and as it is expected or anticipated to be modified through December 31, 2019. Ohio's air monitoring network as presented in this report meets all the applicable requirements of 40 CFR Part 58 including the requirements of Appendices A, B, C, D, and E.

1.1 Priorities

The Ohio Environmental Protection Agency (Ohio EPA), Division of Air Pollution Control (DAPC), is responsible for regulating air quality to protect public health and the environment in the State of Ohio. As part of achieving these goals, Ohio EPA DAPC, with four District Offices (DOs) and nine local air agencies (LAAs)¹, operates and maintains an extensive network of monitoring sites that collect air quality data in each of the numerous metropolitan areas and in many rural areas. Much of the monitoring sites are in urban areas where the majority of the population resides. There are over 120 monitoring sites operating in Ohio with over 300 air monitors sampling on an hourly or intermittent 24-hour basis.

The Ohio EPA monitors six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), ground-level ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂) and lead (Pb). Other pollutants that are monitored by Ohio EPA which are not associated with national ambient air quality standards (NAAQS) include metals, PM coarse (PM_{10-2.5}), toxics (volatile organic compounds (VOC), carbonyls, PM_{2.5} speciated compounds, and ozone precursors. In addition, meteorological data are collected at some sites to support the monitoring and aid in air quality modeling analyses.

The following designations describe the various types of monitors at the sites within Ohio's air monitoring network:

- State or Local Air Monitoring Stations (SLAMS): For parameters (pollutants and/or meteorological data) addressed by 40 CFR Part 58. The SLAMS make up the ambient air quality monitoring sites that are primarily needed for NAAQS comparisons but may serve other data purposes.
- Special Purpose Monitors (SPM): Not all monitors and monitoring sites in the air quality monitoring network are included in the SLAMS network. In order to provide monitoring for complaint studies, modeling verification, or compliance status, certain monitors are reserved for short-term studies and designated as SPM. These monitors are not necessarily committed to any one location or for any specified time period. They may be located as separate monitoring sites or be included at SLAMS locations. Monitoring data may be reported to U.S. EPA, provided that the monitors and sites conform to all requirements as if they are a part of the SLAMS network. Monitors in this category are included in the network plan but are not used to determine compliance with the NAAQS. However, if an SPM is operated for over 24 months, in accordance with 40 CFR 58.20(c) it is eligible for comparison to the relevant NAAQS, unless demonstrated otherwise by the state or local air agency (herein referred to as "agency"). Appendix A identifies the start date of all Ohio SPMs. In accordance with 40 CFR 58.20, the purposes for each SPM monitor is included in

¹ As discussed in Section 1.3 below, this number will be reduced to eight beginning September 30, 2018.

Appendix A. All Ohio SPM monitors reporting to the AQS meet the requirements of 40 CFR Part 58, Appendix A and Appendix E. In addition, all Ohio FRM/FEM SPMs meet the requirements of 40 CFR 58.11 and 40 CFR 58.12.

- Industrial: A monitor that is operated (in total or partially) by a private industry entity rather than under the control of a State, Local or Tribal government. The private industry entity may choose to contract with a local government organization for the operation of the monitor.
- National Core multi-pollutant monitoring station (NCore): NCore is a multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology. Most NCore stations have been operating since the formal start of the network on January 1, 2011.
- Near Road: Located near busy roadways, near road sites measure the peak hourly concentrations of CO, NO₂ and/or PM_{2.5} in urban areas with metropolitan statistical area (MSA) populations greater than 1 million people.
- Photochemical Assessment Monitoring Station (PAMS): PAMS monitoring is enhanced monitoring of ozone, oxides of nitrogen (NO_x), VOCs, and meteorology to obtain more comprehensive and representative data on ozone air pollution.

Monitors should be sited and operated to support U.S. EPA's monitoring objectives of providing data to the public in a timely manner, to support compliance with the NAAQS and emissions strategy development, and to support research. To accomplish this, monitors are sited to monitor: 1) areas of expected high concentrations, 2) areas of high population density, 3) areas with significant sources, 4) general background concentration, and 5) areas of regional transport of a pollutant. However, not all air pollutants need to have sites for all categories.

The minimum number of monitoring sites required for each of the U.S. EPA criteria pollutants is established in the federal regulations in 40 CFR Part 58, Appendix D. The minimum number of required sites is often dependent on the population count within large and small statistical areas. These areas are referred to as metropolitan statistical areas (MSA), micropolitan-statistical areas, core-based statistical areas (CBSA), and combined statistical areas (CSA). A CBSA associated with at least one urbanized area of 50,000 population or greater is termed an MSA. A CBSA associated with at least one urbanized cluster of at least 10,000 population but less than 50,000 is termed a micropolitan statistical area.

The Ohio air monitoring network meets, or in most cases exceeds, the applicable minimum network requirements. In areas where Ohio shares a CBSA or MSA with a neighboring state, Ohio meets or exceeds the minimum requirements without the need to rely on a monitor(s) located in the neighboring state. Therefore, Ohio does not need to rely on a memorandum of agreement or understanding with any other state.

In addition to the monitors operated by Ohio as described in this plan, U.S. EPA operates three Clean Air Status and Trends Network (CASTNET) sites in Ohio:

- 39-121-8001 St. Johns Rd., Quaker City (PM₁₀ Local, PM coarse & ozone)
- 39-017-9991 Miami University, Oxford (ozone)
- 39-047-9991 Deer Creek State Park, Mt. Sterling (ozone)

1.2 Quality Assurance/Quality Control

A fundamental consideration for all air monitoring projects and sites is that the monitoring locations meet U.S. EPA's requirements as specified in 40 CFR Part 58, Appendices D & E and that the agencies are available to operate and maintain the sites and equipment, to provide sample analyses, and for data collection and reporting.

Ohio EPA also operates and maintains a Quality Assurance/Quality Control (QA/QC) program in accordance with U.S. EPA requirements and guidelines as specified in 40 CFR Part 58. The purpose of this program is to assure the quality and validity of the data collected. The QA/QC program includes but is not limited to the following activities:

- Instrument performance audits;
- Monitor siting evaluations;
- Precision and span checks;
- Instrument bias determinations;
- Flow rate audits;
- Instrument air flow leak checks; and
- Data validation.

To comply with U.S. EPA's independent QA requirements, Ohio EPA, including the DOs and LAAs participates in the National Performance Audit and the Performance Evaluation Programs for criteria pollutant monitoring and performance. Additionally, inter-laboratory comparisons are performed periodically for air toxics monitoring.

1.3 Ohio Primary Quality Assurance Organizations

A Primary Quality Assurance Organization (PQAO) refers to a monitoring organization that is responsible for a set of stations that monitor the same pollutant and for which data quality assessments can be pooled. Each criteria pollutant sampler/monitor at a monitoring station in the SLAMS and SPM networks is associated with one PQAO.

There are three PQAOs operating in Ohio. All PQAOs include Ohio EPA's DOs and the LAAs. The PQAOs are:

The Northeast Primary Quality Assurance Organization (NEPQAO) consists of the following monitoring organizations (AQS PQAO code 1454):

- Akron Regional Air Quality Management District (Akron)
- Canton City Health Dept., Air Pollution Control Division (Canton)
- Cleveland Dept. of Public Health Division of Air Quality (Cleveland)
- Lake County General Health District, Air Pollution Control (Lake LAA)
- Mahoning-Trumbull Air Pollution Control Agency (MTAPCA). Effective September 30, 2018, MTAPCA will no longer be operating their monitoring network. Ohio EPA is working with MTAPCA to transfer responsibility of current monitoring to other Ohio EPA offices in this PQAO.
- Ohio EPA, Northeast District Office (NEDO)

The Central Primary Quality Assurance Organization (CPQAO) consists of the following monitoring organizations (AQS PQAO code 1453):

- Ohio EPA, Northwest District Office (NWDO)
- Ohio EPA, Central District Office (CDO)
- Ohio EPA, Southeast District Office (SEDO)
- City of Toledo, Division of Environmental Services (Toledo)

The Southwest Primary Quality Assurance Organization (SWPQAO) consists of the following monitoring organizations (AQS PQA code 1455):

- Hamilton County Dept. of Environmental Services, Southwest Ohio Air Quality Agency (SWOQA)
- Public Health Dayton and Montgomery County, Regional Air Pollution Control Agency (RAPCA)
- Portsmouth City Health Dept., Air Pollution Unit (Portsmouth)

2.0 Proposed Network for 2018-2019

This report presents the proposed AMNP for 2018-2019. Appendix A contains details regarding each monitor that comprises Ohio's proposed 2018-2019 network, including indications of changes that have, will, or may occur to the network through December 31, 2019. This section identifies a summary of all proposed network changes for the various pollutants. Section 3.0 provides greater detail of the changes for each pollutant being monitored, including how Ohio meets the minimum monitoring requirements for monitoring that pollutant.

2.1 Summary of Proposed Network Modifications

A critical component of this report is to identify the network changes that have taken place since Ohio's 2017-2018 AMNP and the changes that are planned or anticipated for the remainder of 2018 and 2019.

It should be noted when proposing what the monitoring network might look like a year from now, unplanned site changes occur to monitoring networks each year. Changes or temporary interruptions of sampling may occur because of events such as building or roof maintenance, construction, change of ownership of the site, or other changes at the site that require moving the instruments. Some changes that may not be planned could include adding sites to investigate complaints or for a new or proposed facility. Planned network changes may not be implemented due to unforeseen circumstances, such as the inability to secure a new site or because of other constraints.

In accordance with 40 CFR 58.10(c), if a PM_{2.5} FRM monitoring site were lost due to circumstances beyond Ohio's control, a replacement site would be established if the lost site exceeded the NAAQS or if it is the "design value site" for a particular MSA. In this case, all possible efforts would be made to find a new site that is physically close to the lost site and has a similar scale and monitoring objective. However, if the "design value site" for that MSA is still operational, Ohio EPA may not establish a replacement site if remaining PM_{2.5} sites are sufficient to determine compliance with the PM_{2.5} NAAQS.

All proposed site and parameter changes to the approved monitoring network are made in consultation with, and, when necessary, approval of the U.S. EPA Region 5 air monitoring staff. Ohio

EPA retains the right to install, operate and discontinue operation of ambient air quality monitors for special projects that go beyond federal minimum requirements without federal approval.

All monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential network changes are summarized in Table 1 below. Additional details on these changes can be found in the specific pollutant sections under Section 3.0. None of these changes involve relocating or deleting a site or monitor where a design value is in violation of any NAAQS.

Table 1. Summary of Network Changes

Pollutant	Location	AQS Site No.	Site Name	Action/Change	When
Changes highlighted in 2017-2018 AMNP that were approved (when required) and completed					
Ozone	Centerburg	39-083-0002	Centerburg	Site terminated.	October 31, 2017
Ozone	Centerburg	39-083-0003	Centerburg WTP	Relocation of the 39-083-0002 monitor.	March 1, 2018
PM ₁₀	Cincinnati	39-061-0014	Carthage	Replaced high volume PM ₁₀ monitor with low volume PM ₁₀ monitor.	January 1, 2018
PM ₁₀	Cincinnati	39-061-5001	Lockland	Terminated site (primary & collocated PM ₁₀ monitors).	December 31, 2017
PM _{2.5}	Cincinnati	39-061-0010	Colerain	Terminated FRM PM _{2.5} POC 1 and 4 BGI monitors. Continue with continuous PM _{2.5} monitor for AQI purposes only.	December 31, 2017
PM _{2.5}	Cincinnati	39-061-0014	Carthage	The Anderson PM _{2.5} (155) monitor was replaced with 2 BGIs (142, POC 1, 4) to sample every three days. Collocated monitor was terminated.	January 1, 2018
PM _{2.5}	Batavia	39-025-0022	Batavia	The non-FEM continuous PM _{2.5} AQI monitor was replaced due to age with a new FEM BAM which will be operated as a non-FEM for AQI purposes only.	April 1, 2018
PM ₁₀ , PM _{2.5} , CO, H ₂ S, VOCs	Harrison County	39-067-0004	Hopedale	New SPM site to characterize near-source concentrations of criteria and toxic pollutants from Ohio's oil and gas industry.	January 1, 2018 (VOCs began May 2017)
VOCs	Addyston	39-061-0047	Kibby	Sample collection frequency changed from 1/6 to 1/12 days.	September 4, 2017
Changes highlighted in 2017-2018 AMNP that were not completed					
PM _{2.5}	Middletown	39-017-0022	BPG	Proposed to discontinue PM _{2.5} monitor in 2017-2018 AMNP but determined with EPA approval to continue sampling PM _{2.5} every three days.	N/A (no change made)
Unexpected changes that were necessary, requested independently, and completing/completed					
Ozone/ NO ₂	Columbus	39-049-0037	Franklin	Site terminated. Ozone monitor relocated to 39-089-0008. NO ₂ monitor relocated to 39-049-0034.	December 31, 2017
Ozone	Reynoldsburg	39-089-0008	Ohio DES	Relocation of the 39-049-0037 ozone monitor.	Began March 1, 2018
NO ₂	Columbus	39-049-0034	Fairgrnds	Relocation of the 39-049-0037	January 1, 2018

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Pollutant	Location	AQS Site No.	Site Name	Action/Change	When
				NO ₂ monitor.	
SO ₂	Portsmouth	39-145-0013	PWTP	Terminated SO ₂ monitoring.	May 1, 2018
PM ₁₀	Warren	39-155-0006	Warren WTP	Electrical issues resulted in suspension of operation of this site. Monitoring will resume as soon as repairs are complete.	October 31, 2017
PM _{2.5}	Painesville	39-085-0007	JFS	End collocated PM _{2.5} monitor.	May 27, 2018
PM _{2.5}	Youngstown	39-099-0005	Firestation #7	End collocated PM _{2.5} monitor.	May 27, 2018
PM _{2.5}	Columbus	39-049-0039	Woodrow	End collocated PM _{2.5} monitor.	June 8, 2018
PM _{2.5}	Athens County	39-009-0003	Gifford	End collocated PM _{2.5} monitor.	May 31, 2018
PM _{2.5}	Toledo	39-095-0024	Erie	End collocated PM _{2.5} monitor.	June 26, 2018
PM _{2.5}	Portsmouth	39-145-0013	PWTP	End collocated PM _{2.5} monitor.	May 27, 2018
PM ₁₀	Youngstown	39-099-0006	Firestation #5	End collocated PM ₁₀ monitor.	May 27, 2018
PM ₁₀	Warren	39-155-0014	Laird1	End collocated PM ₁₀ monitor.	June 7, 2018
PM ₁₀	Fairport	39-085-1001	Fairport Harbor	End collocated PM ₁₀ monitor.	May 27, 2018
PM ₁₀	Columbus	39-049-0024	Fairgrnds PM	End collocated PM ₁₀ monitor.	June 13, 2018
PM ₁₀	Portsmouth	39-145-0013	PWTP	End collocated PM ₁₀ monitor.	May 27, 2018
PM ₁₀	Fairport	39-085-1001	Fairport Harbor	Relocate the monitors from the roof to a nearby ground site.	Summer 2018
Unexpected changes that were necessary and completed; Approval not required					
PM _{2.5}	Springfield	39-023-0005	SFIELD2	Began FEM operation of existing Thermo Sharp monitor previously operated as a non-FEM.	January 26, 2018
PM _{2.5}	Yellow Springs	39-057-0005	Yellow Springs	Began FEM operation of existing Thermo Sharp monitor previously operated as a non-FEM.	January 26, 2018
PM _{2.5}	Dayton	39-113-0038	Sinclair	Began FEM operation of existing Thermo Sharp monitor previously operated as a non-FEM.	January 26, 2018
PM _{2.5}	Preble County	39-135-1001	Preble NCore	Began FEM operation of existing Thermo Sharp monitor previously operated as a non-FEM.	January 23, 2018
PM _{2.5}	Warren	39-155-0014	Laird1	PM _{2.5} continuous monitor was replaced with a new FEM PM _{2.5} continuous monitor. AQI purposes only until comparability study is completed.	March 8, 2018
PM _{2.5}	Sheffield	39-093-3002	Barr School	PM _{2.5} continuous monitor was replaced with a new FEM PM _{2.5} continuous monitor. AQI purposes only until comparability study is completed.	May 8, 2018
PM _{2.5}	Lima	39-003-0009	Lima	PM _{2.5} continuous monitor was replaced with a new FEM PM _{2.5} continuous monitor. AQI purposes only until comparability study is completed.	June 26, 2018

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Pollutant	Location	AQS Site No.	Site Name	Action/Change	When
SO ₂	Middletown	39-017-0021	MADE	Industrial site sampling ended. Relocating very nearby.	January 22, 2018
Ozone	Akron	39-153-0017	East HS	Place new SPM ozone monitor.	May 15, 2018
Proposed changes that are requested in the 2018-2019 AMNP and will need approval before being completed					
PAMS	Cleveland	39-035-0060	GT Craig	Install additional equipment and begin PAMS operation.	June 1, 2019
PAMS	Cincinnati	39-061-0040	Taft	Install additional equipment and begin PAMS operation.	June 1, 2019
PM ₁₀	Moraine	39-113-7001	Moraine FS	Terminate site.	September 30, 2018
PM ₁₀ /PM _{2.5}	Yellow Springs	39-057-0005	Yellow Springs	Terminate site.	Upon approval
PM ₁₀	Dayton	39-113-0038	Sinclair	Commence operation of Teledyne API T640X continuous monitor.	October 1, 2018
PM _{2.5}	Cincinnati	39-061-0014	Carthage	Place new collocated PM _{2.5} FRM monitor.	January 1, 2019
PM _{2.5}	Cincinnati	39-061-0006	Sycamore	Move the collocated FRM monitor for the primary FEM site to the Cincinnati NR site (39-061-0048).	January 1, 2019
PM _{2.5}	Cincinnati	39-061-0048	Cinci_NR	Move the collocated FRM monitor for the primary FEM site from the Sycamore site (39-061-0006).	January 1, 2019
PM _{2.5}	Columbus	39-049-0034	Fairgrnds	Non-FEM PM _{2.5} continuous monitor being discontinued after new PM _{2.5} continuous monitor begins operating at Smoky Row (39-049-0038).	2018
Black Carbon	Cincinnati	39-061-0040	Taft	Install aethalometer and begin reporting black carbon at local conditions.	2018
Pb	East Liverpool	39-029-0019	Port Authority	TSP/lead monitor relocate nearby on same property	Upon approval
Proposed changes that will be completed or are under consideration; Approval not required					
PM ₁₀ , PM _{2.5} , SO ₂ , VOCs	Middletown	39-017-0019	Amanda	Industrial site relocating out of the elementary school building to a new monitoring shelter on the property just west of school.	2018
PM ₁₀ , PM _{2.5} , SO ₂ , VOCs	Middletown	39-017-0020	Yankee	Industrial site may need to relocate.	2018/2019
PM _{2.5}	Warrensville	39-035-0073	Cleveland NR	New FEM PM _{2.5} continuous monitor being purchased. AQI purposes only until comparability study is completed.	Summer 2018
PM _{2.5}	Dayton	39-113-0038	Sinclair	New FEM Teledyne API T640X continuous monitor being purchased to replace ThermoSharp PM _{2.5} FEM. Comparability study to be completed; further evaluation needed to determine if compare to AQI.	October 1, 2018
PM _{2.5}	Cincinnati	39-061-0042	LPH	New FEM Teledyne API T640 continuous monitor being purchased. Comparability	2019

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Pollutant	Location	AQS Site No.	Site Name	Action/Change	When
				study to be completed; further evaluation needed to determine if compare to AQI.	
PM _{2.5}	Cincinnati	39-061-0014	Carthage	New FEM Teledyne API T640 continuous monitor being purchased. Comparability study to be completed; further evaluation needed to determine if compare to AQI.	2019
PM _{2.5}	Cleves	39-061-0010	Colerain	The non-FEM continuous PM _{2.5} AQI monitor will be replaced due to age with a new FEM which will be operated as a non-FEM for AQI purposes only.	2018
PM _{2.5}	Columbus	39-049-0038	Smoky Row	New FEM PM _{2.5} continuous monitor being purchased. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Medina	39-103-0004	Chippewa	Existing FEM. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Akron	39-153-0017	East HS	Existing FEM. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Canton	39-151-0020	Canton	Existing FEM. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Cleveland	39-035-0060	GT Craig	Existing FEM. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Springfield	39-023-0005	SFIELD2	January 26, 2018 FEM. AQI purposes only until comparability study is completed.	2018
PM _{2.5}	Yellow Springs	39-057-0005	Yellow Springs	January 26, 2018 FEM. AQI purposes only until site is approved for shutdown.	2018
PM _{2.5}	Preble County	39-135-1001	Preble NCore	January 23, 2018 FEM. AQI purposes only until comparability study is completed.	2018
Proposed changes that will be completed or are under consideration; Ohio will submit a request to Region 5 before completion					
PM ₁₀ , PM _{2.5} , CO, H ₂ S, VOCs	Harrison County	39-067-0004	Hopedale	Likely to be moved to another location.	Summer 2018
PM ₁₀	Youngstown	39-099-0006	Firestation #5	Relocate site nearby.	2018
Ozone	Akron	39-153-0020	Patterson Park	Ozone monitor may be relocated.	2019

3.0 Pollutant Specific Proposed Network for 2018-2019

3.1 Ozone Network

Ohio currently operates 48² ozone sites as identified in Appendix A. As discussed below, 21 of these sites are required in certain MSAs based upon a combination of population and concentration levels. Ohio operates 43 sites within these MSAs and the remaining five in counties not in an MSA. The monitors are operated from March 1 through October 31, in accordance with 40 CFR Part 58, Appendix D, Section 4.1(i). However, ozone monitors at Ohio's NCore sites in Cleveland, Cincinnati and in Preble County collect measurements year-round. As discussed below, Ohio exceeds the minimum requirements under 40 CFR Part 58, Appendix D, Section 4.1.

3.1.1 Population/Concentration Requirements

Table 2 below identifies the minimum ozone monitoring sites as required under 40 CFR Part 58, Appendix D, Table D-2. Minimum monitoring requirements for ozone are based on population and whether the design value is less than 85% of the NAAQS or greater than 85% of the NAAQS. Since the NAAQS for ozone is 0.070 ppm of ozone, 85% of the NAAQS is 0.059 ppm (truncated). The total number of ozone sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding ozone-related atmospheric processes include more sites than these minimum numbers required.

Table 2. SLAMS Minimum Ozone Monitoring Requirements

MSA population ^{1,2}	Most recent 3-year design value concentrations \geq 85% of any O ₃ NAAQS ³	Most recent 3-year design value Concentrations <85% of any O ₃ NAAQS ^{3,4}
>10 million	4	2
4-10 million	3	1
350,000-<4 million	2	1
50,000-<350,000 ⁵	1	0

1 Minimum monitoring requirements apply to the Metropolitan Statistical Area (MSA)

2 Population based on latest available census figures.

3 The ozone (O₃) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4 These minimum monitoring requirements apply in the absence of a design value.

5 Metropolitan Statistical Areas (MSA) must contain an urbanized area of 50,000 or more population.

In 2018-2019, Ohio is operating 48 SLAMS ozone monitoring sites, exceeding the minimum 21 sites required. Ohio's analysis can be found in Appendix C and is summarized below in Table 3. Full details on each site can be found in Appendix A.

² The 48 sites are presented in Appendix A with their specific details. In addition to the 48 sites operating at the time of this report, one special purpose site (not comparable to the NAAQS) will begin monitoring in the summer of 2018 and is also represented as such in Appendix A.

Table 3. Ohio's SLAMS Ozone Monitoring Network

Area Name	MSA Population	2018-2019 Monitors	AQS Site No.	Site Name	Design Value <85% of NAAQS	Urban Area with Pop. >= 50,000	No. Required Monitors	Monitors Exceeding Requirement
Monitors in MSAs With Populations >= 50,000								
Akron, OH	702,221	2	39-133-1001	Lake Rockwell	No	Yes	2	0
			39-153-0020	Patterson Park				
Canton-Massillon, OH	401,281	3	39-151-0016	Malone University	No	Yes	2	1
			39-151-0022	Brewster				
			39-151-4005	Alliance				
Cincinnati OH-KY-IN	2,159,207	7	39-017-0018	Middletown Airport	No	Yes	2	5
			39-017-0023	Crawford Woods				
			39-025-0022	Batavia				
			39-061-0006	Sycamore				
			39-061-0010	Colerain				
			39-061-0040	Taft				
39-165-0007	Lebanon							
Cleveland-Elyria, OH	2,055,612	9	39-035-0034	District	No	Yes	2	7
			39-035-0060	GT Craig				
			39-035-0064	Berea BOE				
			39-035-5002	Mayfield				
			39-055-0004	Notre Dame				
			39-085-0003	Eastlake				
			39-085-0007	JFS				
			39-093-0018	Sheffield				
39-103-0004	Chippewa							
Columbus, OH	2,041,520	6	39-041-0002	Delaware	No	Yes	2	4
			39-049-0029	New Albany				
			39-049-0081	Maple Canyon				
			39-089-0005	Heath				
			39-089-0008*	Ohio DES				
			39-097-0007	London				
Dayton, OH	800,683	3	39-057-0006	Xenia	No	Yes	2	1
			39-109-0005	Miami East HS				
			39-113-0037	Eastwood				
Huntington-Ashland, WV-KY-OH	359,588	2	39-087-0011	Wilgus	No	Yes	2	0
			39-087-0012	ODOT				
Lima, OH	103,742	1	39-003-0009	Lima	No	Yes	1	0
Mansfield, OH	121,107	0	n/a	n/a	No	Yes	0	0
Springfield, OH	134,786	2	39-023-0001	Springfield	No	Yes	1	1
			39-023-0003	Mud Run				
Toledo, OH	605,221	4	39-095-0024	ERIE	No	Yes	2	2
			39-095-0027	Waterville				
			39-095-0035	Cooley				
			39-173-0003	Bowling Green				
Weirton-Steubenville, WV-OH	119,271	1	39-081-0017	Steubenville	No	Yes	1	0
Wheeling WV-OH	138,014	0	n/a	n/a	No	Yes	0	0
Youngstown-Warren-Boardman, OH-PA	546,067	3	39-099-0013	Oakhill	No	Yes	2	1
			39-155-0011	TCSE				
			39-155-0013	Kinsman1				
Totals		43					21	22
Monitors in all Other Areas								
Ashtabula County		1	39-007-1001	Conneaut				
Washington County		1	39-167-0004	Marietta WTP				
Knox County		1	39-083-0003**	Centerburg WTP				
Preble County		1	39-135-1001	Preble Ncore				
Clinton County		1	39-027-1002	Wilmingtion				
Totals		5						
Grand Totals		48						
* started 3/1/2018 (relocated from 39-049-0037)								
**started 3/1/2018 (relocated from 39-083-0002)								

3.1.2 Photochemical Assessment Monitoring Stations (PAMS)

In accordance with 40 CFR 58.10, 40 CFR Part 58, Appendix C, Section 4.0 and 40 CFR Part 58, Appendix D, Section 5.0, PAMS are established to obtain more comprehensive data in areas with high levels of ozone pollution by also monitoring NO_x and VOCs. More extensive monitoring of meteorological measurements is also conducted. In October 2015, U.S. EPA promulgated a more stringent air quality standard for ozone. As a result, 40 CFR Part 58, Appendix D, Section 5.0 was amended to require that PAMS stations be set up at all NCore sites located in CBSAs whose population is greater than or equal to one million people. In Ohio there are three NCore sites: Cleveland (MSA 2016 population 2,055,612), Cincinnati (MSA 2016 population 2,159,207, and Preble County (not in a CBSA). Therefore, Cleveland and Cincinnati NCore sites must have a PAMS operational by the monitoring deadline of June 1, 2019. The Cleveland and Cincinnati LAAs intend to operate the two sites by June 1, 2019. Early preparation monitoring is proposed in mid-2018. The PAMS monitoring season occurs each year from June through August.

PAMS Monitoring Network Implementation Plans for the Cleveland and Cincinnati Ncore sites (39-035-0060 and 39-061-0040, respectively) are included in Appendix B detailing how Ohio will fulfill the specific monitoring requirements for each required parameter. This includes a true NO₂ monitor at the Taft Ncore (39-061-0040) site in Cincinnati which was installed per the 2017-2018 AMNP but reporting of data will be delayed until later in 2018. Ohio is not required to submit an Enhanced Monitoring Plan, as it does not have any areas designated moderate or above for the 2008 or 2015 ozone standards.

3.1.3 Ozone Network Modifications

All ozone monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential ozone network changes through December 31, 2019 include:

The Centerburg Water Plant site (Centerburg, 39-083-0002) was terminated on October 31, 2017. In 2018, ozone monitoring was relocated to the new Centerburg Waste Water Treatment facility (Centerburg WTP, 39-083-0003) located 2.5 miles to the southeast. Monitoring at the new site began with the start of the 2018 ozone monitoring season on March 1, 2018. U.S. EPA's December 20, 2017 approval of Ohio's 2017-2018 AMNP included approval for the relocation of this monitor.

The Franklin Park ozone monitoring site in downtown Columbus (Franklin, 39-049-0037) was relocated to the campus of the Ohio Department Environmental Services (Ohio DES, 39-089-0008) located in Reynoldsburg, which is an eastern suburb of Columbus. Monitoring at this new site began with the start of the 2018 ozone monitoring season on March 1, 2018. The Franklin Park site was terminated on December 31, 2017. U.S. EPA approved relocation of this monitor on February 27, 2018 (see Appendix G).

In the Akron area, a new ozone SPM was placed at the East HS (39-153-0017) site on May 15, 2018. In addition, the existing ozone monitor at the Patterson Park (39-153-0020) site may be relocated following the 2018 ozone season. Should the East HS site satisfy criteria for the required monitoring in the Akron MSA, this location may be considered for the relocated Patterson Park monitor.

3.2 PM_{2.5} Network

Ohio currently operates 43³ PM_{2.5} SLAMS sites as identified in Appendix A. As discussed in Section 3.2.1 below, 16 of these sites are required in certain MSAs based upon a combination of population and concentration levels. Ohio operates 40 sites within these MSAs and the remaining three in counties not in an MSA. Section 3.2.3 below identifies collocated monitors also required at these sites.

Ohio also operates 25⁴ continuous PM_{2.5} sites, as identified in Appendix A. As discussed in Section 3.2.4 below, 12 are required in certain MSAs based upon the number of PM_{2.5} SLAMS sites required. Ohio operates 23 sites within these MSAs and plans to add three more sites and discontinue one existing site during this plan period. The remaining two sites are in counties not in an MSA.

As discussed below for each of these requirements, Ohio exceeds the minimum requirements under 40 CFR Part 58, Appendix D, Section 4.7.

3.2.1 Population/Concentration Requirements

Table 4 below identifies the minimum number of PM_{2.5} SLAMS monitoring sites required under 40 CFR Part 58, Appendix D, Table D-5. Minimum monitoring requirements for PM_{2.5} are based on population and whether the design value is less than 85% of the NAAQS or greater than or equal to 85% of the NAAQS. 85% of the annual and short term NAAQS are 10.2 µg/m³ and 29.7 µg/m³ respectively. Design values are the three-year averages of the calculated annual and the 98th percentile of the 24-hour average concentrations recorded from the highest-reading monitor in each attainment or nonattainment area or state county.

Table 4. SLAMS Minimum PM_{2.5} Monitoring Requirements

MSA population ^{1,2}	Most recent 3-year design value ≥85% of any PM _{2.5} NAAQS ³	Most recent 3-year design value <85% of any PM _{2.5} NAAQS ^{3,4}
> 1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000 ⁵	1	0

1 Minimum monitoring requirements apply to the Metropolitan Statistical Area (MSA).

2 Population based on latest available census figures.

3 The PM_{2.5} National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4 These minimum monitoring requirements apply in the absence of a design value.

5 Metropolitan Statistical Areas (MSA) must contain an urbanized area of 50,000 or more populations.

Table 5 shows Ohio is operating 40 PM_{2.5} monitoring sites at the time of this report, which exceeds the 16 minimum number of required sites based on population and concentration. Ohio's analysis can be found in Appendix C and full details on each site can be found in Appendix A.

³ The 43 sites are presented in Appendix A with their specific details. In addition to the 43 sites operating at the time of this report, three industrial sites and one special purpose site (not comparable to the NAAQS) exist in the state and are represented as such in Appendix A.

⁴ The 25 sites are presented in Appendix A with their specific details. In addition to the 25 sites operating at the time of this report, two industrial sites (not comparable to the NAAQS) exist in the state and are represented as such in Appendix A.

In addition, Ohio operates three sites not required based upon population and concentration and has designated one of those sites as a regional transport site and one as a regional background site. One monitor (Yellow Springs, 39-057-0005) may be discontinued if approved under this AMNP (see Section 3.2.6); however, Ohio would continue to exceed the minimum requirements with this discontinuation. The majority of SLAMS sites monitor using Federal Reference Methods (FRM); however, the Sycamore (39-061-0006) and Cinci NR (39-061-0048) sites each have a continuous Federal Equivalent Method (FEM) designated as the primary monitor.

40 CFR Part 58, Appendix D, Section 4.7.1(b) establishes the hierarchy for siting monitors. In accordance with Section 4.7.1(b)(1), at least one site is a neighborhood-measurement scale or larger in an area of expected maximum concentration. In accordance with Section 4.7.1(b)(2), each CBSA with a population of 1,000,000 or more persons (i.e. Cleveland, Columbus and Cincinnati) has at least one PM_{2.5} collocated at a near-road NO₂ station. If an additional monitor is required, it is located in an area of poor air quality in accordance with Section 4.7.1(b)(3).

40 CFR 58.12(d) establishes operating schedule requirements for manual PM_{2.5} samplers. As shown in Table 5, all manual PM_{2.5} samplers operate on a 1 in 3 sample frequency, meeting the requirements, with the exception of the Lima (39-003-0009) and Firestation #7 (39-099-0005) sites, where the operating schedule requirements are considered not applicable as the minimum site requirements for the respective MSAs are met without these sites. Ohio's regional background site at Gifford (39-009-0003) began a 1 in 3 schedule on June 15, 2018 (previously 1 in 6).

Table 5. Ohio's SLAMS PM_{2.5} Monitoring Network

Area Name	MSA Population	2018-2019 Monitors	AQS Site No.	Site Name	Sample Frequency	Measurement Scale	Primary Method (Code)	Collocated Monitor	Design Value <85% of NAAQS	Urban Area with Pop. >= 50,000	No. Required Monitors	Monitors Exceeding Requirement
Monitors in MSAs With Populations >= 50,000												
Akron, OH	702221	3	39-133-0002	Ravenna	1 in 3	Neighborhood	FRM (145)		No	Yes	2	1
			39-153-0017	East HS	1 in 3	Neighborhood	FRM (145)	FRM (145)				
Canton-Massillon, OH	401,281	2	39-153-0023	5 Points	1 in 3	Neighborhood	FRM (145)		Yes	Yes	0	2
			39-151-0017	Firestation #8	1 in 3	Neighborhood	FRM (142)	FRM (142)				
Cincinnati OH-KY-IN	2,159,207	8	39-151-0020	Canton	1 in 3	Neighborhood	FRM (142)		No	Yes	3	5
			39-017-0015	Ohio Bell	1 in 3	Neighborhood	FRM (142)					
			39-017-0016	SHS	1 in 3	Urban	FRM (142)					
			39-017-0022	BPG	1 in 3	Neighborhood	FRM (142)					
			39-061-0006	Sycamore	Continuous	Neighborhood	FEM (184)	FRM (142) - plan to move to 39-061-0048 on 1/1/19				
			39-061-0014	Carthage	1 in 3	Neighborhood	FRM (142)					
			39-061-0040	Taft	1 in 3	Neighborhood	FRM (142)	FRM (142)				
			39-061-0042	LPH	1 in 3	Neighborhood	FRM (142)					
Cleveland-Elyria, OH	2,055,612	10	39-061-0048****	Cinci_NR	Continuous	Microscale	FEM (184)	Plan to move FRM (142) from 39-061-0006 on 1/1/19	No	Yes	3	7
			39-035-0034	District	1 in 3	Urban	FRM (145)					
			39-035-0038	St Theodosius	1 in 3	Neighborhood	FRM (145)	FRM (145)				
			39-035-0045	Firestation #13	1 in 3	Neighborhood	FRM (145)					
			39-035-0060	GT Craig	1 in 3	Neighborhood	FRM (179)	FRM (145)				
			39-035-0065	Harvard Yards	1 in 3	Neighborhood	FRM (145)					
			39-035-0073****	Cleveland_NR	1 in 3	Microscale	FRM (145)					
			39-035-1002	Brookpark	1 in 3	Neighborhood	FRM (145)					
			39-085-0007	JFS	1 in 3	Urban	FRM (155)	FRM (155)				
			39-093-3002	Barr School	1 in 3	Neighborhood	FRM (155)	FRM (155)				
Columbus, OH	2,041,520	4	39-103-0004	Chippewa	1 in 3	Neighborhood	FRM (145)		No	Yes	3	1
			39-049-0024	Fairgrnds PM	1 in 3	Neighborhood	FRM (145)					
			39-049-0038****	Smoky Row	1 in 3	Microscale	FRM (145)					
Dayton, OH	800,683	2*	39-049-0039	Woodrow	1 in 3	Neighborhood	FRM (145)	FRM (145) - discontinued 6/8/18	Yes	Yes	1	1*
			39-057-0005*	Yellow Springs	1 in 3	Neighborhood	FRM (142) - site to be discontinued upon approval	FRM (142) - plan to move to 39-023-0005 upon discontinuation of this site				
Huntington-Ashland, WV-KY-OH	359,588	1	39-113-0038	Sinclair	1 in 3	Neighborhood	FRM (145)		Yes	Yes	0	1
Lima, OH	103,742	1	39-003-0009	Lima	1 in 6*****	Neighborhood	FRM (142)	FRM (142)	Yes	Yes	0	1
Mansfield, OH	121,107	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes	0	0
Springfield, OH	134,786	1	39-023-0005	SFIELD2	1 in 3	Neighborhood	FRM (142)	Plan to move from 39-057-0005 upon discontinuation of 39-057-0005	Yes	Yes	0	1
Toledo, OH	605,221	3	39-095-0024	ERIE	1 in 3	Neighborhood	FRM (145)	FRM (145) - discontinued 6/26/18	Yes	Yes	1	2
			39-095-0026	RAPS	1 in 3	Neighborhood	FRM (145)					
			39-095-1003	ESPS	1 in 3	Neighborhood	FRM (145)					
Weirton-Stuebenville, WV-OH	119,271	2	39-081-0017	Steubenville	1 in 3	Neighborhood	FRM (145)	FRM (145)	No	Yes	1	1
Wheeling WV-OH	138,014	0	39-081-0021	Mingo Junction	1 in 3	Neighborhood	FRM (142)		n/a	Yes	0	0
Youngstown-Warren-Boardman, OH-PA	546,067	3	39-099-0005	Firestation #7	1 in 6*****	Neighborhood	FRM (142)	FRM (142) - discontinued 5/27/18	No	Yes	2	1
			39-099-0014	HDSTART	1 in 3	Neighborhood	FRM (142)					
			39-155-0014	Laird1	1 in 3	Neighborhood	FRM (142)					
Totals		40*									16	23
Monitors in all Other Areas												
Athens County		1	39-009-0003**	Gifford	1 in 3	Regional	FRM (142)	FRM (142) - discontinued 5/31/18			1	0
Scioto County		1	39-145-0013	PWTP	1 in 3	Middle	FRM (145)	FRM (145) - discontinued 5/27/18			0	1
Preble County		1	39-135-1001***	Preble NCore	1 in 3	Regional	FRM (145)				1	0
Totals		3									2	1
Grand Totals		43*									18	24

*1 monitor (39-057-0005 Yellow Springs) may be discontinued if approved under this plan

** Regional background site (40 CFR Part 58, Appendix D, Section 4.7.3)

*** Regional transport site (40 CFR Part 58, Appendix D, Section 4.7.3)

**** PM2.5 collocated at a Near Road NO2 station (40 CFR Part 58, Appendix D, Section 4.7.1(b)(2))

***** Minimum site requirements for the MSA are met without this site, so 40 CFR 58.12(d) operating schedule requirements are considered not applicable

3.2.2 Regional Background and Transport Requirements

In addition to the minimum number of required SLAMS sites based on population and concentration, each state is required to operate a regional background and a regional transport site in accordance with 40 CFR Part 58, Appendix D, Section 4.7.3. In Ohio, our NCore site (Preble NCore, 39-135-1001) in Preble County near the Indiana border is designated as the state's regional transport site. In Ohio, the regional background site (Gifford, 39-009-0003) is located in Athens County next to Gifford Forest.

In general, a regional transport site should include an area where transport between or upwind of Ohio is expected to occur. Ohio selected the Preble NCore site as it is a rural area on the southwest border of Ohio where it would not be influenced by local sources and would represent emissions transported into Ohio based on the predominant wind patterns entering the state (southwest winds). In general, a regional background site should include an area distant from source areas. The Athens County site was selected because it is distant from sources that could impact the monitor and is located in a state forest in an area of the state dominated by state and national forests.

3.2.3 PM_{2.5} Quality Control Collocation

According to 40 CFR Part 58, Appendix A, Section 3.2.3, for each distinct monitoring method designation (FRM or FEM) used in a PQAQO, 15 percent of the primary monitors of each method designation must be collocated with a quality control monitor. A primary monitor designated as an FRM shall be collocated with a quality control monitor having the same FRM designation. For each primary monitor designated as an FEM, fifty percent of the monitors designated for collocation (or the first in only one collocation is necessary) shall be collocated with an FRM quality control monitor, and fifty percent shall be collocated with a monitor having the same method designation as the FEM primary monitor. 40 CFR Part 58, Appendix A, Section 3.2.3.4 requires collocated quality control monitors to sample on a 1 in 12 day schedule.

Fifty percent of the collocated quality control monitors should be deployed at sites where sampled pollutant concentrations for PM_{2.5} are plus or minus 20 percent of either the annual or 24-hour NAAQS. The remainder of quality control monitors can be located at the state PQAQO's discretion. If a monitoring organization has no sites where annual average or daily concentrations are within plus or minus 20 percent of the annual NAAQS or 24-hour NAAQS, then 50 percent of the collocated quality control monitors should be deployed at those sites where the annual mean concentrations or 24-hour concentrations are among the highest reading sites in the network. The remainder of quality control monitors can be located at the state PQAQO's discretion.

In 2015, Ohio reduced the number of PQAQOs from 14 to three. These are the NEPQAQO, CPQAQO and the SWPQAQO. The purpose of the consolidation of PQAQOs in Ohio was to increase consistency across the state's air pollution agencies, improve various program components of quality assurance and quality control, and reduce auditing expenses. With the reduction to three PQAQOs, the PM_{2.5} and PM₁₀ collocation networks were evaluated to improve the efficiency of these networks to determine how many and which collocated sites could be eliminated under the new PQAQO consolidation.

A PM_{2.5} and PM₁₀ collocation network reduction analysis was submitted to US EPA on March 28, 2018 which U.S.EPA approved on April 18, 2018. Ohio's revised PM_{2.5} collocation network is presented in Table 6. The reduction of the number of collocated PM_{2.5} monitors in Ohio continues to meet all quality control collocation requirements as specified in 40 CFR Part 58, Appendix A, Section 3.2.3.

As shown in Table 6, at least 15 percent of primary monitors for each method in each PQA0 are collocated with a quality control monitor. Primary FRM monitors are collocated with an FRM monitor of the same method, except for the GT Craig site (39-035-0060) where the primary Dicot method (179) is collocated with a secondary Partisol 2025 plus sampler measuring PM_{2.5} (method 145). Primary FEM monitors are collocated with an FRM quality control monitor. All collocated quality control monitors sample at a 1 in 6 frequency or greater, exceeding the requirement.

At least fifty percent of the collocated quality control monitors in CPQA0 and NEPQA0 are deployed at sites where sampled pollutant concentrations for PM_{2.5} are within plus or minus 20 percent of either the annual or 24-hour NAAQS. In SWPQA0, further evaluation following the reduction in number of collocated PM_{2.5} monitors showed that at least fifty percent of the collocated monitors are not currently located at sites that are within plus or minus 20 percent of the NAAQS (based upon the most recent air quality data). As noted in Section 3.2.6 below, the collocated FRM monitor for the FEM (method 184) currently located at Sycamore (39-061-0006) is proposed to be moved to the Cinci NR (39-061-0048) site which has a higher concentration, beginning January 1, 2019. In addition, a collocated monitor is proposed to be added at the Carthage (39-061-0014) site for method 142 beginning January 1, 2019. With these changes, the SWPQA0 will have at least fifty percent of the collocated quality control monitors deployed at sites within plus or minus 20 percent of the NAAQS.

Table 6. Ohio's PM_{2.5} Quality Control Collocation Monitors by PQAQ

PQAQ	Primary Method (Code)	No. SLAMS Sites	No. Collocated Required	AQS Site No.	Site Name	Collocated Monitor	2015-2017 Annual DV	Within 20% of NAAQS	Collocated Sample Frequency
CPQAQ	FRM (142)	3	1	39-003-0009	Lima	FRM (142)	8.3	N	1 in 6
				39-009-0003	Gifford	FRM (142) - discontinued 5/31/18	6.7		1 in 6
				39-081-0021	Mingo Junction		8.5		
	FRM (145)	8	1	39-081-0017	Steubenville	FRM (145)	10.7	Y	1 in 6
				39-049-0039	Woodrow	FRM (145) - discontinued 6/8/18	9		1 in 6
				39-095-0024	ERIE	FRM (145) - discontinued 6/26/18	9		1 in 6
				39-049-0024	Fairgrnds PM		9		
				39-049-0038	Smoky Row		8.8		
				39-049-0081	Maple Canyon		8.7		
				39-095-0026	RAPS		8.6		
39-095-1003	ESPS		8.5						
NEPQAQ	FRM (142)	5	1	39-151-0017	Firestation #8	FRM (142)	10.1	Y	1 in 6
				39-099-0005	Firestation #7	FRM (142) - discontinued 5/27/18	9		1 in 6
				39-151-0020	Canton		9.5		
				39-099-0014	HDSTART		8.7		
				39-155-0014	Laird1		7.9		
	FRM (145)	10	2	39-153-0017	East HS	FRM (145)	10.2	Y	1 in 6
				39-035-0038	St Theodosius	FRM (145)	10.6	Y	1 in 3
				39-133-0002	Ravenna		7.8		
				39-153-0023	5 Points		8.5		
				39-035-0034	District		8.2		
				39-035-0045	Firestation #13		10.1		
				39-035-0065	Harvard Yards		11.7		
				39-035-0073	Cleveland_NR		7.3		
				39-035-1002	Brookpark		8.3		
	39-103-0004	Chippewa		8.4					
	FRM (155)	2	1	39-093-3002	Barr School	FRM (155)	7.6	N	1 in 6
39-085-0007				JFS	FRM (155) - discontinued 5/27/18	7.4		1 in 6	
FRM (179)	1	1	39-035-0060	GT Craig	FRM (145)**	10.1	Y	1 in 3	
SWPQAQ	FEM (184)	2	1	39-061-0006	Sycamore	FRM (142) - plan to move to 39-061-0048 on 1/1/19	9	N	1 in 6
				39-061-0048	Cinci_NR	Plan to move FRM (142) from 39-061-0006 on 1/1/19	10.9	Y	1 in 6
	FRM (142)	8*	1	39-061-0040	Taft	FRM (142)	8.9	N	1 in 6
				39-023-0005	SFIELD2		8.5		
				39-017-0015	Ohio Bell		9.6		
				39-017-0016	SHS		9.1		
				39-017-0022	BPG		11.1		
				39-061-0014	Carthage	Plan to add FRM (142) on 1/1/19	10.1	Y	1 in 6
				39-061-0042	LPH		9.5		
	39-057-0005*	Yellow Springs	FRM (142) - discontinue upon approval under this plan	7.8		1 in 6			
	FRM (145)	4	1	39-145-0013	PWTP	FRM (145) - discontinued 5/27/18	7.9		
				39-113-0038	Sinclair	FRM (145)	8.9	N	1 in 6
				39-087-0012	ODOT		6.8		
39-135-1001				Preble NCore		7.7			

*1 monitor (39-057-0005 Yellow Springs, primary and collocated) may be discontinued if approved under this plan

** Collocation requirements for the fine PM_{2.5} portion of the Dicot sample procedure (method 179) at the GT Craig site (39-035-0060) have been met with the addition of a secondary Partisol 2025 plus sampler measuring PM_{2.5} (method 145) in June 2017.

3.2.4 PM_{2.5} Continuous Network

40 CFR Part 58, Appendix D, Section 4.7.2 requires continuous PM_{2.5} analyzers in each MSA be equal to at least one-half (round up) of the minimum required SLAMS monitoring sites as identified in Table 5. At least one of the required continuous analyzers in each MSA must be collocated with one of the required FRM/FEM monitors, unless at least one of the required FRM/FEM monitors is itself a continuous FEM in which case no collocation requirement applies.

Table 7 shows Ohio is operating 25 sites at the time of this report, which exceeds the 12 minimum number of required sites. Ohio’s analysis can be found in Appendix C and full details on each site can be found in Appendix A.

Table 7. Ohio’s PM_{2.5} Continuous Monitoring Network

MSAs	SLAMS Monitors Required	Continuous Monitors Required	Continuous Monitors Operated	AQS Site No.	Site Name	FEM or non-FEM	Comparable to NAAQS?	Up to 2-Year Study?	Monitors Exceeding Requirement
Monitors in MSAs With Populations >= 50,000									
Akron, OH	2	1	1	39-153-0017	East HS	FEM	no	yes	0
Canton-Massillon, OH	0	0	1	39-151-0020	Canton	FEM	no	yes	1
Cincinnati OH-KY-IN*	3	2	1	39-025-0022	Batavia	non-FEM	no	no	4
			1	39-061-0006	Sycamore	FEM	yes	completed	
			1	39-061-0010	Colerain	non-FEM	no	no	
			1	39-061-0040	Taft	FEM	yes	completed	
			1	39-061-0048	Cinci_NR	FEM	yes	completed	
Cleveland-Elyria, OH**	3	2	1	39-165-0007	Lebanon	non-FEM	no	no	2
			1	39-035-0060	GT Craig	FEM	no	yes	
			1	39-085-0007	JFS	non-FEM	no	no	
			1	39-103-0004	Chippewa	FEM	no	yes	
Columbus, OH	3	2	1	39-093-3002	Barr School	FEM	no	yes	0
			1	39-049-0038	Smoky Row	FEM	no	yes	
Dayton, OH	1	1	1	39-049-0029	New Albany	FEM	no	no	1
			1	39-057-0005***	Yellow Springs	FEM	no	no	
Huntington-Ashland, WV-KY-OH	0	1	1	39-113-0038	Sinclair	FEM	no	yes	0
Lima, OH	0	0	1	39-087-0012	ODOT	non-FEM	no	no	0
Mansfield, OH	0	0	0	39-003-0009	Lima	FEM	no	yes	1
Mansfield, OH	0	0	0	n/a	n/a	n/a	n/a	n/a	0
Springfield, OH	0	0	1	39-023-0005	SFIELD2	FEM	no	yes	1
Toledo, OH	1	1	1	39-095-0024	ERIE	non-FEM	no	no	0
Weirton-Steubenville, WV-OH	1	1	1	39-081-0017	Steubenville	FEM	no	no	0
Wheeling, WV-OH	0	0	0	n/a	n/a	n/a	n/a	n/a	0
Youngstown-Warren-Boardman, OH-PA	2	1	1	39-099-0014	HDSTART	non-FEM	no	no	1
			1	39-155-0014	Laird1	FEM	no	yes	
Totals	16	12	23						11
Monitors in all Other Areas									
Preble County	n/a	n/a	1	39-135-1001	Preble Ncore	FEM	no	yes	1
Adams County	n/a	n/a	1	39-001-0001	West Union	non-FEM	no	no	1
Totals			2						2
Grand Totals			25						13
*2 monitors planned to be added at 39-061-0014 and 39-061-0042 (both will be FEM)									
**1 monitor planned to be added at 39-035-0073 (will be FEM)									
***monitor may be discontinued									

Some PM_{2.5} continuous monitors are considered FEM instruments while others are non-FEM. A monitor may be a non-FEM unit because it either never qualified as an FEM (as manufactured) or because the unit is not operated in a manner to categorize them as an FEM instruments. Some units are not operated as FEMs because the data collected has not compared well for some years with the filter-based FRM monitors at these sites. Non-FEM units are not comparable to the NAAQS. Some FEM units may also not be comparable to the NAAQS depending on the quality of data or if a special study is being conducted and during that period Ohio requested the data be excluded from

comparison to the NAAQS. NAAQS comparability is identified in Table 7. Also identified in Table 7, Ohio currently has 17 FEM monitors and an additional three⁵ that are being proposed as FEM as a part of this plan period. The remaining eight monitors are anticipated to remain as non-FEM monitors during this plan period.

U.S. EPA developed a comparability assessment tool which compares pollutant concentrations collected in any one year between the hourly instrument and the co-located filter-based instruments. This tool is used for Ohio sites to make statistical comparisons to determine the suitability of comparison to the NAAQS. Appendix F shows the results of the comparability assessment tool for each of the continuous instruments in Ohio where FRMs are located with an FEM or non-FEM and a comparability assessment has not been completed resulting in the site being designated as comparable to the NAAQS for the site⁶.

2018-2019 Proposed Comparability Assessment Studies

Ohio is proposing to perform a number of comparability assessment studies during this plan period. Each study will be conducted for up to a two-year period depending upon the periodic review of the results. Table 7 identifies sites that have already completed a study in the past and sites that will be conducting a study as proposed as a part of this AMNP. The study may use data collected prior to this plan period in addition to some or all of the data collected during this plan period. For new FEM monitors that are proposed for installation during this plan period, the study period will begin once installed. Ohio EPA is requesting U.S. EPA concurrence that data may be excluded from comparison with the NAAQS during the study period. Upon completion of each individual study, Ohio EPA will determine the suitability of NAAQS comparison of the data from the continuous monitors and make appropriate adjustments to our monitoring program, in consultation with U.S. EPA when necessary.

3.2.5 PM_{2.5} Chemical Speciation Network

U.S. EPA implemented the PM_{2.5} chemical speciation monitoring program in 2000. Knowing the chemical composition of the PM_{2.5} mix is important for determining sources of pollution and potential links between observed health effects. PM_{2.5} speciation samplers are designed to use different inlet tubes and filters to collect the components of the PM_{2.5} mixtures. The process consists of using three different types of filters to separate out such specific compounds as: sulfate, nitrate, organic and elemental carbon, ammonium, metals, and certain ions.

In 2014, a nationwide assessment was conducted of the Chemical Speciation Network (CSN) to create an optimized network that meets primary monitoring objectives. Historically, the CSN had consisted of a core set of 52 speciation-trends analysis sites, as well as a variable number of supplemental sites. The recommendations from the CSN assessment were implemented in September 2014 - January 2015. In Ohio, this resulted in U.S. EPA terminating funding for the speciation sites in Columbus, Toledo, Youngstown and Portsmouth. Subsequently, U.S. EPA committed to financially supporting two additional speciation monitors (Harvard Yards, 39-035-0065 and Southerly WTP, 39-035-0076) that were added in the Cleveland area in 2017.

⁵ Not identified in Table 7 are the following three sites which are planning to install new FEMs: 39-061-0014, 39-061-0042, 39-035-0073.

⁶ Sites 39-025-0022, 39-165-0007, 39-049-0034, 39-049-0029, and 39-001-0001 monitor with an FEM or non-FEM instrument only (there is no FRM at the site). Sites 39-061-0048, 39-061-0040, and 39-061-0006 have completed studies and are comparable to the NAAQS.

Ohio EPA operates 11 PM_{2.5} chemical speciation monitors as identified in Table 8 below. Full details on these sites can be found in Appendix A.

The GT Craig site (39-035-0060), which is part of the Speciation Trends Network (STN), operates on a 1 in 3 sample frequency in accordance with the operating schedule requirements for STN monitors established in 40 CFR 58.12(d)(3).

Table 8. Ohio's PM_{2.5} Chemical Speciation Monitoring Network

CBSA Name or non-MSA	CBSA Type	Population	AQS Site No.	Site Name	Sampling Began	Collocated (Y/N)
Akron, OH	MSA	702,221	39-153-0023	5 Points	11/21/2001	N
Canton-Massillon, OH	MSA	401,281	39-151-0017	Firestation #8	1/6/2005	N
Cincinnati, OH-KY-IN	MSA	2,159,207	39-061-0040	Taft	12/12/2003	N
Cleveland-Elyria, OH	MSA	2,055,612	39-035-0038	St.Theodosius	1/8/2002	N
Cleveland-Elyria, OH	MSA	2,055,612	39-035-0060	GT Craig	12/26/2000	Y
Cleveland-Elyria, OH	MSA	2,055,612	39-035-0065	Harvard Yards	1/1/2017	N
Cleveland-Elyria, OH	MSA	2,055,612	39-035-0076	Southerly WTP	8/5/2017	N
Cleveland-Elyria, OH	MSA	2,055,612	39-093-3002	Barr School	1/1/2006	N
Dayton, OH	MSA	800,683	39-113-0038	Sinclair	1/1/2007	N
Preble County	Non-MSA	41,329	39-135-1001	Preble NCore	1/1/2011	N
Weirton-Steubenville	MSA	120,512	39-081-0017	Steubenville	12/1/2013	N
State Totals			11 sites			1 collocated

3.2.6 PM_{2.5} Network Modifications

All PM_{2.5} monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential PM_{2.5} network changes through December 31, 2019 include:

The State Fairgrounds (Fairgrnds, 39-049-0034) continuous PM_{2.5} non-FEM monitor will be discontinued after the PM_{2.5} FEM monitor at the Smoky Row (39-049-0038) site is installed and begins operation. This monitor is needed for network completeness in this MSA. Ohio EPA is requesting approval of this change as a part of the 2018-2019 AMNP.

The Batavia (39-025-0022) non-FEM continuous PM_{2.5} monitor was previously a Thermo TEOM 1400ab w/FDMS. This monitor was replaced due to age with a new Met One BAM FEM w/SCC on April 1, 2018. This monitor will be operated as a non-FEM for AQI purposes only. U.S. EPA's December 20, 2017 approval of Ohio's 2017-2018 AMNP included approval for this change.

The Carthage (39-061-0014) PM_{2.5} FRM monitor changed from an Anderson (method 155) to a BGI (method 142) beginning January 1, 2018 with two BGIs operating to maintain a 1 in 3 day sampling frequency. The collocated sampler was discontinued at this site due to the method change. This request was approved in the 2016-2017 AMNP, but could not be implemented in 2017 due to other equipment needs. Ultimately, U.S. EPA's December 20, 2017 approval of Ohio's 2017-2018 AMNP included approval for this change. A new collocated FRM monitor (method 142) is proposed to be added at the Carthage (39-061-0014) site beginning January 1, 2019 to ensure collocation requirements for the SWPQAO are met. Ohio EPA is requesting approval of this addition in the 2018-2019 AMNP.

Several existing FEM PM_{2.5} continuous monitors which have previously operated as FEMs comparable to the NAAQS will remain FEM units but no longer be comparable to the NAAQS and will be used for AQI purposes only until a comparability study is completed with the FRM monitor:

- Chippewa (39-103-0004)
- East HS (39-153-0017)
- Canton (39-151-0020)
- GT Craig (39-035-0060)

Several existing FEM PM_{2.5} continuous monitors (Thermo SHARP) which were previously operated as non-FEMs were converted to FEMs between January 23 and January 26, 2018. These monitors will be excluded from NAAQS comparison and used for AQI purposes only until a comparability study with the FRM monitor is completed:

- SFIELD2 (39-023-0005)
- Yellow Springs (39-057-0005) (no study will be conducted due to request to shutdown site (see below))
- Sinclair (39-113-0038) (study will not be completed on this monitor as a new Teledyne will be purchased (see below))
- Preble NCore (39-135-1001)

Several new FEM PM_{2.5} continuous monitors have been or are being purchased. These monitors will be excluded from NAAQS comparison and used for AQI purposes only until a comparability study with the FRM monitor is completed:

- Laird1 (39-155-0014) – the existing non-FEM continuous monitor at the site was replaced with a new FEM₅ continuous monitor which started March 8, 2018.
- Barr School (39-093-3002) – the existing non-FEM continuous monitor at the site was replaced with a new FEM continuous monitor which started May 8, 2018.
- Smoky Row (39-049-0038) – new FEM monitor started on July 13, 2018.
- Cleveland NR (39-035-0073) – new FEM monitor will be purchased in summer 2018.
- Lima (39-003-0009) – the existing non-FEM monitor at this site was replaced with a new FEM continuous monitor which started June 26, 2018.

New Teledyne API T640 and T640X FEM PM_{2.5} continuous special purpose monitors are being purchased for the following sites. Data from these monitors will not be compared to the NAAQS until a comparability study with the FRM monitor is completed; as this is a new method for this area, these monitors will not be used for AQI purposes until further evaluation:

- LPH (39-061-0042) – new FEM monitor will begin operation in 2019.
- Carthage (39-061-0014) – new FEM monitor will begin operation in 2019.
- Sinclair (39-113-0038) – new FEM monitor will begin operation October 1, 2018.

The Yellow Springs (39-057-0005) site is proposed to be terminated upon U.S. EPA approval due to safety concerns. There is an uncaged portable aluminum alloy ladder for access to Yellow Springs, which is a safety concern. In addition, the new membrane roofing material at the site is extremely slick when wet or frozen and poses a serious slipping and falling hazard. The primary PM_{2.5} FRM, collocated PM_{2.5} FRM and continuous PM_{2.5} monitors are proposed to be terminated. Network completeness requirements will continue to be met through the primary and continuous FEM monitors at the Sinclair (39-113-0038) site. Sinclair is considered the highest concentration site in the Dayton MSA for PM_{2.5} and typically measures much higher concentrations of PM_{2.5} than Yellow Springs. Collocation requirements for method 142 will continue to be met for the SWPQAO through the collocated FRM monitor at the Taft (39-061-0040) site.

The 90% confidence interval calculations demonstrating this site is eligible for termination in accordance with 40 CFR 58.14 are shown below (additional detail is provided in Appendix I). While the 24 hour 3-year design values for the 2013-2017 time period are well below 80% of the NAAQS, the annual 3-year design values (90% confidence interval) for the same time period are above 80% of the NAAQS. However, estimating a 2018 3-year design value $PM_{2.5}$ of $9 \text{ ug}/m^3$ for the 2014-2018 time period shows that the Yellow Springs confidence interval would not exceed 80% of the NAAQS. The raw $PM_{2.5}$ data average for the first three months of 2018 for Yellow Springs is approximately $8 \text{ ug}/m^3$, suggesting that the 2018 3-year design value is more likely in the range of 7.7 to 8.0. Ohio EPA is requesting approval of this change as a part of the 2018-2019 AMNP.

Table 9. Yellow Springs 24-Hour $PM_{2.5}$ 3-Year Design Values (ug/m^3)

2013	2014	2015	2016	2017	90% Upper C.I.	80% of NAAQS
22	21	20	19	16	21.8	28

Table 10. Yellow Springs Annual $PM_{2.5}$ 3-Year Design Values (ug/m^3)

2013	2014	2015	2016	2017	2018 estimated	90% Upper C.I.	80% of NAAQS
10.2	9.7	9.3	8.6	7.8		10.0	9.6
	9.7	9.3	8.6	7.8	9	9.6	9.6

The Amanda (39-017-0019) site will be relocating out of the elementary school building to a new monitoring shelter on the property just west of school in 2018. The move will address safety concerns with accessing and working on the roof of the school building. PM monitors will move from rooftop to ground level. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Yankee (39-017-0020) site may need to move to a new location on the owner's property in late 2018 or early 2019 due to expansion of the owner's buildings. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The BPG (39-017-0022) site was proposed to be discontinued as a part of the 2017-2018 AMNP; however, sampling will continue at this site.

The Colerain (39-061-0010) non-FEM continuous $PM_{2.5}$ monitor (Met One BAM) will be replaced due to age with a new Met One BAM FEM w/SCC in mid-2018. This monitor will be operated as a non-FEM for AQI purposes only. In addition, as planned in the 2017-2018 AMNP, the $PM_{2.5}$ FRM monitor discontinued sampling on December 31, 2017. U.S. EPA approved discontinuation of this monitoring on December 20, 2017 (see Appendix G) and also as a part of the December 20, 2017 approval of Ohio's 2017-2018 AMNP.

The SWPQAO FEM/FRM required collocated monitor for the SHARP 5030i (method 184) currently located at Sycamore (39-061-0006) is proposed to be moved to the Cinci NR (39-061-0048) site which has a higher concentration SHARP 5030i FEM, beginning January 1, 2019. Ohio EPA is requesting approval of this change in the 2018-2019 AMNP.

Several collocated $PM_{2.5}$ monitors have been discontinued based on a review of the collocation network. This reduction was approved by U.S. EPA on April 18, 2018 (see Appendix G). The following $PM_{2.5}$ collocated monitors were discontinued:

- JFS (39-085-0007) – discontinued May 27, 2018
- Firestation #7 (39-099-0005) – discontinued May 27, 2018
- Woodrow (39-049-0039) – discontinued June 8, 2018
- Gifford (39-009-0003) – discontinued May 31, 2018
- Erie (39-095-0024) – discontinued June 26, 2018
- PWTP (39-145-0013) – discontinued May 27, 2018

3.3 PM₁₀ Network

Ohio currently operates 25⁷ PM₁₀ sites as identified in Appendix A. PM₁₀ monitors sample particulates that are less than 10 microns in diameter. The particle size collected in the instruments contrast the much smaller particle size collected in PM_{2.5} instruments. As discussed below, 10 to 22 of these sites are required in certain MSAs based upon a combination of population and concentration levels. Ohio operates 20 sites within these MSAs with the remaining five sites outside of the MSAs. With the planned discontinuance (upon approval) of one of these sites, Ohio will operate 19 sites. As discussed below, Ohio meets, and often exceeds, the minimum sites required under 40 CFR Part 58, Appendix D, Section 4.6.

3.3.1 Population/Concentration Requirements

40 CFR Part 58, Appendix D, Section 4.6, Table D-4 requires Ohio operate PM₁₀ sites in accordance with the following requirements.

Table 11. Minimum PM₁₀ Monitoring Requirements¹

Population category	High concentrations ²	Medium concentrations ³	Low concentrations ^{4,5}
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	0-1	0-1	0

¹ Selection of urban areas and actual numbers of stations per area within the ranges shown in this table will be jointly determined by U.S. EPA and the State Agency.

² High concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding the PM₁₀ NAAQS by 20 percent or more.

³ Medium concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding 80 percent of the PM₁₀ NAAQS.

⁴ Low concentration areas are those for which ambient PM₁₀ data show ambient concentrations less than 80 percent of the PM₁₀ NAAQS.

⁵ These minimum monitoring requirements apply in the absence of a design value.

The number of PM₁₀ sites required is based on population in MSAs and the level of concentrations that are measured in these areas. Ohio does not have any high or medium concentration areas. All monitoring shows values less than 80% of the PM₁₀ NAAQS (120 ug/m³). Based on the low concentration category defined in Table 11 above, Ohio is required to operate between 10 and 22 PM₁₀ sites. As can be seen in Table 12 below, Ohio operates 20 sites in these areas and if one site is approved for termination, Ohio will operate 19 sites. Ohio’s analysis can be found in Appendix C with details on each site in Appendix A.

⁷ The 25 sites are presented in Appendix A with their specific details. In addition to the 25 sites operating at the time of this report, six industrial sites and two special purpose sites exist in the state (not comparable to the NAAQS) and are also represented as such in Appendix A.

Table 12. Ohio's PM₁₀ Monitoring Network

Area Name	MSA Population	2018-2019 Monitors	AQS Site No.	Site Name	Continuous or Manual?	No. Required Monitors	New Monitors Needed
Monitors in MSAs With Populations > 100,000							
Akron, OH	702,221	0*	n/a	n/a	n/a	1-2	0
Canton-Massillon, OH	401,281	0*	n/a	n/a	n/a	0-1	0
Cincinnati OH-KY-IN	2,159,207	3	39-017-0015	Ohio Bell	Manual	2-4	0
			39-061-0014	Carthage	Manual		
			39-061-0040	Taft (NCore)	Manual and Continuous		
Cleveland-Elyria, OH	2,055,612	7	39-035-0038	St. Theodosius	Manual	2-4	0
			39-035-0045	Firestation #13	Manual		
			39-035-0060	GT Craig (NCore)	Manual and Continuous		
			39-035-0065	Harvard Yards	Manual		
			39-035-1002	Brookpark	Manual		
			39-085-1001	Fairport Harbor	Manual		
39-093-3002	Barr School	Manual					
Columbus, OH	2,041,520	1*	39-049-0024	Fairgrnds PM	Manual	2-4	0
Dayton, OH	800,683	2	39-057-0005	Yellow Springs**	Manual	1-2	0
			39-113-7001 to 39-113-0038	Moraine FS to Sinclair	Manual to Continuous		
			39-087-0012	ODOT	Manual		
Huntington-Ashland, WV-KY-OH	359,588	1	39-087-0012	ODOT	Manual	0-1	0
Lima, OH	103,742	0	n/a	n/a	n/a	0	0
Mansfield, OH	121,107	0	n/a	n/a	n/a	0	0
Springfield, OH	134,786	0	n/a	n/a	n/a	0	0
Toledo, OH*	605,221	0*	n/a	n/a	n/a	1-2	0
Weirton-Steubenville, WV-OH	119,271	2	39-081-0001	Brilliant	Manual	0	0
			39-081-0017	Steubenville	Manual		
Wheeling, WV-OH	138,014	0	n/a	n/a	n/a	0	0
Youngstown-Warren-Boardman, OH-PA	546,067	4	39-099-0005	Firestation #7	Manual	1-2	0
			39-099-0006	Firestation #5	Manual		
			39-155-0006	Warren WTP	Manual		
			39-155-0014	Laird1	Manual		
Total		20				10-22	0
All Other Monitors							
Columbiana County	n/a	2	39-029-0020	EL WTP	Manual	n/a	n/a
			39-029-0023	Eastside School	Manual		
Scioto County		2	39-145-0013	PWTP	Manual		
			39-145-0019	PCAB	Manual		
Preble County	1	39-135-1001	Preble NCore	Manual			
Total		5					
State Totals		25					

*waivers granted by U.S. EPA. **monitor will discontinue

Based on Table 12 above, Columbus, Akron, and Toledo MSAs appear to not meet the minimum PM₁₀ monitoring requirements. However, monitoring waivers were granted by U.S. EPA Region 5 in the late 1990s and early 2000s. At that time, the emphasis of the national monitoring strategy was to re-allocate limited monitoring resources to emerging areas of more critical air pollution concerns. Because PM₁₀ concentrations had been low for many years at many locations

nationwide, including Ohio, U.S. EPA Region 5 approved discontinuation of a number of PM₁₀ sites. This reduction of PM₁₀ sites in Ohio involved removing one site in each of the following MSAs: Columbus, Akron, Canton, Lima, Mansfield and Toledo. Columbus continues to maintain one PM₁₀ site at the Ohio State Fairgrounds (Fairgrnds PM, 39-049-0024) which continues to measure attainment of the standard.

3.3.2 PM₁₀ Monitor Collocation

The number of manual (filter-based) PM₁₀ monitors that must be collocated with the same measurement method must be at least 15 percent of the total number of manual PM₁₀ sites operating within any PQAQ (values of 0.5 and greater round up). In addition, each PQAQ must have at least one collocated quality control monitor (if the total number of monitors is less than three). The collocation requirements apply only to manual (filter-based) monitors and not continuous monitors. Historically, Ohio EPA has exceeded the minimum collocation requirements and as discussed in Section 3.3.3 below, will be reducing the number of collocated monitors this year. This change is noted for and accounted for in this analysis. All collocated sites meeting the requirement use sampling and analytical methods consistent with the primary sampler and all sample at a frequency of no less than 1 in 6 days. Table 13 demonstrates that Ohio will continue to meet this monitor collocation requirement in accordance with 40 CFR Part 58, Appendix A, Section 3.3.4.

Table 13. Ohio's PM₁₀ Manual Collocation Monitors by PQAQ

PQAQ	No. PM ₁₀ Manual Sites	No. Collocated Required	# Collocated Prior to Reduction	# Collocated After Reduction	Collocated AQS Site No.	Collocated Site Name
NEPQAQ						
Cleveland	5		1	1	39-035-0045	Firestation #13
Lake County	1		1	0	39-085-1001	Fairport Harbor
MTAPCA	4		1	0	39-099-0006	Firestation #5
			1	0	39-155-0014	Laird1
NEDO	3		1	1	39-029-0023	Eastside School
Totals	13	2	5	2		
CPQAQ						
CDO	1		1	0	39-049-0024	Fairgrnds PM
SEDO	2		1	1	39-081-0017	Steubenville
Totals	3	1	2	1		
SWPQAQ						
SWOAQA	3		1	1	39-061-0040	Taft
RAPCA	2*		1	0	39-113-7001	Moraine FS
			1	1	39-135-1001	Preble NCore
Portsmouth	3		1	0	39-145-0013	PWTP
Totals	8	1	4	2		
State Total	24**	4	11	5		

*1 monitor will discontinue but is located at a site without collocation. **this number is one less than the total number of PM₁₀ monitors in the network (see table above) because one site in the network will be operating only a continuous monitor upon the move of PM₁₀ monitoring at Morain FS to Sinclair (collocation requirements apply only to manual monitors).

3.3.3 PM₁₀ Network Modifications

All PM₁₀ monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential PM₁₀ network changes through December 31, 2019 include:

The Lockland (39-061-5001) site with high-volume PM₁₀ designated and collocated monitors in Cincinnati was discontinued on December 31, 2017. This site is not needed for network completeness and was not included in the calculations under Section 3.3.1 above. Shutdown of the collocated monitor does not affect the ability for Ohio to meet the minimum requirements for collocation as can be seen in Section 3.3.2. U.S. EPA approved the discontinuation of this site on December 20, 2017 (see Appendix G).

The Carthage (39-061-0014) high-volume PM₁₀ monitor (method 063) was replaced with a low-volume BGI sampler (method 125) on January 1, 2018. U.S. EPA's December 20, 2017 approval of Ohio's 2017-2018 AMNP included approval for this change.

Electrical issues at the Warren WTP (39-155-0006) PM₁₀ site resulted in suspension of operation of this site on October 28, 2017. Monitoring will resume as soon as repairs are complete.

The Firestation #5 (39-099-0006) PM₁₀ site will likely require relocation in late 2018 due to building issues. A letter detailing this request will be submitted to U.S. EPA Region 5 when additional details are known.

Ohio is requesting to terminate the Yellow Springs (39-057-0005) site upon approval due to safety concerns. There is an uncaged portable aluminum alloy ladder for access to Yellow Springs, which is a safety concern. In addition, the new membrane roofing material at the site is extremely slick when wet or frozen and poses a serious slipping and falling hazard. Network completeness requirements will continue to be met by the Moraine (39-113-7001) PM₁₀ monitor until that monitoring is terminated and replaced with the addition of the continuous PM₁₀ monitor at the Sinclair (39-113-0038) site (both discussed below). As indicated in Appendix C and Section 3.3.1 above, 1-2 monitors are required in the Dayton area. With the termination of this monitor, Ohio will continue to meet the requirement by operating one monitor in the Dayton area. The 90% confidence interval calculations demonstrating this site is eligible for termination in accordance with 40 CFR 58.14 are shown below (additional detail is provided in Appendix I). Ohio EPA is requesting approval of this termination and the reduction of two to one monitors in this MSA in the 2018-2019 AMNP.

Table 14. Yellow Springs PM₁₀ 3-Year Design Values (ug/m³)

2013	2014	2015	2016	2017	90% Upper C.I.	80% of NAAQS
25	34	42	27	24	37.6	120

Ohio is requesting to terminate the Moraine (39-113-7001) PM₁₀ site on September 30, 2018 due to safety concerns (outdoor uncaged fixed steel ladder for access) and unrestricted public access to the monitors leaving them open to possible tampering. Network completeness requirements will continue to be met with the addition of the continuous PM₁₀ monitor at the Sinclair (39-113-0038) site discussed below. This will reduce the number of manual PM₁₀ samplers in the SWPQAO such that collocated PM₁₀ monitoring is not necessary at Sinclair as can be seen from Section 3.3.2 above. The 90% confidence interval calculations demonstrating this site is eligible for termination in

accordance with 40 CFR 58.14 are shown below (additional detail is provided in Appendix I). Ohio EPA is requesting approval of this addition in the 2018-2019 AMNP.

Table 15. Moraine PM₁₀ 3-Year Design Values (ug/m³)

2013	2014	2015	2016	2017	90% Upper C.I.	80% of NAAQS
33	38	50	42	37	46.1	120

A new Teledyne API T640X continuous PM_{2.5}/PM₁₀ monitor is proposed to be added to the Sinclair (39-113-0038) site which will begin sampling on October 1, 2018. The addition of this monitor will ensure the network completeness requirements continue to be met with the termination of sites discussed above. Ohio EPA is requesting approval of this addition in the 2018-2019 AMNP.

Due to logistical issues and safety concerns, the Fairport Harbor (39-085-1001) monitors will be moved off the roof onto a ground site nearby. U.S. EPA approved relocation of this monitor on June 8, 2018 (see Appendix G) and plans for relocation are being prepared.

The Amanda (39-017-0019) site will be relocating out of the elementary school building to a new monitoring shelter on the property just west of school in 2018. The move will address safety concerns with accessing and working on the roof of the school building. PM monitors will move from rooftop to ground level. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Yankee (39-017-0020) site may need to move to a new location on the owner's property in late 2018 or early 2019 due to projected changes by ownership at the current location. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

Several collocated PM₁₀ monitors have been discontinued based on a review of the collocation network. This reduction was approved by U.S. EPA on April 18, 2018 (see Appendix G). The following PM₁₀ collocated monitors were discontinued:

- Firestation #5 (39-099-0006) – discontinued May 27, 2018
- Laird1 (39-155-0014) – discontinued June 7, 2018
- Fairport Harbor (39-085-1001) – discontinued May 27, 2018
- Fairgrnds PM (39-049-0024)- discontinued June 13, 2018
- PWTP (39-145-0013) – discontinued May 27, 2018

Note: the Steubenville (39-081-0017) collocated PM₁₀ monitor was also proposed to be discontinued but was determined to be necessary after further review of collocation requirements.

3.4 SO₂ Network

Ohio currently operates 29⁸ SO₂ sites as identified in Appendix A. All SO₂ sites measure hourly and 5-minute maximum averages. As discussed below, four of these sites are required based upon a population weighted emissions index (PWEI) (with eight sites “qualifying” as PWEI sites) and four of these sites are required under U.S. EPA's Data Requirement Rule (DRR). The remainder of the

⁸ 30 sites are presented in Appendix A with their specific details, including 1 site discontinued in May of 2018. In addition to the 29 sites operating at the time of this report, 6 industrial sites exist in the state (not comparable to the NAAQS) and are also represented as such in Appendix A.

sites, 21, are monitors that exceed the minimum required under 40 CFR Part 58, Appendix D, Section 4.4. Table 14 identifies Ohio's SO₂ network.

Table 16. Ohio's SO₂ Monitoring Network

AQS Site No.	Site Name	Requirement
Monitors Qualifying as Required Monitors		
39-061-0040	Taft	PWEI - Cincinnati OH-KY-IN CBSA (Ncore)
39-061-0010	Colerain	PWEI - Cincinnati OH-KY-IN CBSA
39-035-0060	GT Craig	PWEI - Cleveland-Elyria OH CBSA (Ncore)
39-035-0038	St Theodosius	PWEI - Cleveland-Elyria OH CBSA
39-035-0045	Firestation #13	PWEI - Cleveland-Elyria OH CBSA
39-035-0065	Harvard Yards	PWEI - Cleveland-Elyria OH CBSA
39-085-0003	Eastlake	PWEI - Cleveland-Elyria OH CBSA
39-085-0007	JFS	PWEI - Cleveland-Elyria OH CBSA
39-053-0004	Cheshire Elementary	DRR
39-053-0005	Hill	DRR
39-053-0006	Guiding Hand	DRR
54-053-0001	Lakin WV	DRR
Total		12
All Other Monitors		
39-007-1001	Conneaut	n/a
39-153-0017	East HS	
39-153-0025	NIHF STEM	
39-095-0008	Collins	
39-023-0003	Mud Run	
39-099-0013	Oakhill	
39-049-0034	Fairgrnds	
39-081-0017	Steubenville	
39-081-0018	AEP Brilliant	
39-081-0020	Cardinal Third St.	
54-009-6000	Trailer Sales	
39-087-0012	ODOT	
39-003-0009	Lima	
39-029-0019	Port Authority	
39-001-0001	West Union	
39-135-1001	Preble Ncore	
39-115-0004	Hackney	
Total		17
State Total		29

3.4.1 Population Weighted Emissions Index Sites

40 CFR Part 58, Appendix D, Section 4.4, requires that each state calculate the PWEI for each CBSA within the state, or shared with another state, for use in identifying sites for the SO₂ monitoring network due to U.S. EPA's revision to the SO₂ NAAQS promulgated in 2010. These PWEI must be calculated and re-evaluated each year using the latest available population census and emission

inventories. For this plan period, the emissions were updated from 2011 to the 2014 National Emissions Inventory (NEI Version2) and population was updated from 2015 to the 2016 estimates from the U.S. Census Bureau. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO₂ monitor is required within that CBSA.

The minimum PWEI monitoring requirements can be satisfied by an existing or new SO₂ site that is sited within the boundaries of the parent CBSA provided the site is one of the following station types: population exposure, highest concentration, source impacts, general background, or regional transport. SO₂ monitors at NCore stations can be counted towards satisfying the minimum monitoring requirements if that monitor is located within a CBSA. Any monitor that is sited outside of a CBSA to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

Under the 2017-2018 AMNP it was determined that Ohio was required to operate nine SO₂ monitors in seven CBSAs based on the PWEI. With updated emissions, it is now determined that Ohio is required to operate four SO₂ monitors in two CBSAs based on the PWEI. SO₂ emissions dropped substantially between 2011 and 2014 mostly due to tighter regulations at coal burning power plants leading to many shutting down permanently. Statewide, SO₂ emissions dropped from 680,421 tons in 2011 to 376,897 tons in 2014.

The two CBSAs, the Cincinnati OH-KY-IN CBSA and the Cleveland-Elyria OH CBSA, require two PWEI monitors each. As can be seen in Table 16, the Cincinnati OH-KY-IN CBSA has two monitors in Hamilton County (both population exposure and one being an NCore site). Also seen in Table 16, the Cleveland-Elyria OH CBSA has a total of six monitors with four monitors in Cuyahoga County (two being highest concentration and two being population exposure and one being an NCore site) and two monitors in Lake County (both source impacts). Therefore, current SO₂ monitoring in both areas fulfills the PWEI requirements. Ohio's analysis can be found in Appendix C. Appendix A provides the full details for all of these sites.

3.4.2 Data Requirement Rule Sites

On August 21, 2015, U.S. EPA promulgated the DRR (80 FR 51052). Under the DRR, states are required to characterize concentrations of SO₂ from emission sources with actual annual emissions of 2000 tons or more. The state can accomplish this either through air monitoring or air quality modeling. The results of any monitoring or modeling may be used in future determinations of attainment status. In order to use the option for monitoring, the monitoring network was required to begin operation by January 1, 2017. Ohio EPA elected to use ambient air quality monitoring to characterize air quality around two adjacent power plant sources that emit more than 2000 tons a year. These are Lightstone Generation LLC's General James M. Gavin and the Ohio Valley Electric Corporation (OVEC) Kyger Creek power plants. A DRR monitoring network was installed in late 2016 and began operating January 1, 2017. The network consists of four sites each equipped with SO₂ monitors and two sites with 10-meter meteorological sampling towers. Three SO₂ sites are operated by OVEC and their contractor, Shell Engineering. The fourth site in Cheshire near the Gavin Power Plant is operated by Ohio EPA. All four sites are designated as a SLAMS sites. The

entire network is located along the Ohio River in Gallia County. Table 16 above identifies the four sites and details for the sites can be found in Appendix A.

Ohio EPA reviews emissions on an annual basis to determine if additional sources warrant analysis under the DRR. When warranted, Ohio EPA will address any sources that will have characterization through air monitoring as a part of Ohio's AMNP.

3.4.3 SO₂ Network Modifications

All SO₂ monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential SO₂ network changes through December 31, 2019 include:

The PWTP (39-145-0013) site located at the Portsmouth water treatment plant was terminated on May 1, 2018. This monitor was originally sited to sample emissions from the New Boston Coke facility which was permanently shutdown in 2002. This site is not needed for network completeness. U.S. EPA approved shutdown of this monitor on April 24, 2018 (see Appendix G).

The MADE (39-017-0021) site ceased operating on January 22, 2018 due to sale of the property. This site is in the process of being relocated to an adjacent property. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Amanda (39-017-0019) site will be relocating out of the elementary school building to a new monitoring shelter on the property just west of school in 2018. The move will address safety concerns with accessing and working on the roof of the school building. PM monitors will move from rooftop to ground level. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Yankee (39-017-0020) site may need to move to a new location on the owner's property in late 2018 or early 2019 due to projected changes by ownership at the current location. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

3.5 NO₂ Network

Ohio currently operates six⁹ NO₂ sites as identified in Appendix A. As discussed below, three of these sites are based upon area-wide requirements and three of these sites are based upon near-road requirements. As seen below, Ohio meets the minimum requirements of 40 CFR Part 58, Appendix D, Section 4.3. Table 17 presents Ohio's NO₂ network in 2018-2019.

⁹ Details of the six sites are presented in Appendix A. In addition to the six sites operating at the time of this report, one industrial site exists in the state (not comparable to the NAAQS) and is also represented as such in Appendix A.

Table 17. Ohio's NO₂ Monitoring Network

AQS Site No.	Site Name	Requirement
Required Monitors		
39-049-0038	Smoky Row	Near Road Site Columbus CBSA
39-049-0034	Fairgrnds	Area Wide Columbus CBSA > 1,000,000
39-061-0040	Taft	Area Wide Cincinnati CBSA > 1,000,000 (NCore)
39-061-0048	Cinci NR	Near Road Site Cincinnati CBSA
39-035-0060	GT Craig	Area Wide Cleveland-Elyria CBSA > 1,000,000 (NCore)
39-035-0073	Cleveland NR	Near Road Site Cleveland-Elyria CBSA
Total		6
All Other Monitors		
n/a	n/a	n/a
Total		0
State Total		6

3.5.1 Area-Wide Sites

40 CFR Part 58, Appendix D, Section 4.3.3 specifies minimum area-wide monitoring requirements. Area-wide monitoring must be conducted in CBSAs with populations of 1,000,000 or more. In these areas, a minimum of one monitor is required and should be sited to capture the expected highest concentrations at a neighborhood or larger spatial scale. Ohio operates area-wide NO₂ monitors at the NCore sites in Cleveland (GT Craig, 39-035-0060) and Cincinnati (Taft, 39-061-0040). In Columbus, to meet this requirement, a NO₂ monitor is operated at the State Fairgrounds site (Fairgrnds, 39-049-0034). As discussed below, this site is the relocation of the former Franklin Park Conservatory site (Franklin, 39-049-0037). This site continues to meet the requirement of capturing expected highest concentrations at a neighborhood or larger spatial scale as both sites were located within the inner belt of the City of Columbus. Ohio's analysis can be found in Appendix C and details of each site can be found in Appendix A.

3.5.2 Near-Road Sites

40 CFR Part 58, Appendix D, Section 4.3.2 specifies minimum near-road NO₂ monitoring requirements. Ohio is required to operate three near-road sites. Near-road NO₂ monitoring requirements are based on population of CBSAs and Annual Average Daily Traffic counts (AADT) of road segments within the CBSAs. One monitor is required in CBSAs with 1,000,000 or more people near a road with high AADT counts. Near-road monitors are to be located to capture maximum one-hour concentrations at a micro-spatial scale. The near-road sites in Ohio meet these requirements and are in the following areas: Cleveland (Cleveland NR, 39-035-0073), Columbus (Smokey Row, 39-049-0038) and Cincinnati (Cinci NR, 39-061-0048). The AADT at these sites are 168,200, 142,361 and 131,242 respectively. Ohio's analysis can be found in Appendix C and details of each site can be found in Appendix A.

In addition, a second near-road NO₂ monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that

has one or more roadway segments with 250,000 or greater AADT counts. Ohio does not have locations that prompt this requirement.

3.5.3 NO₂ Network Modifications

All NO₂ monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential NO₂ network changes through December 31, 2019 include:

The NO₂ monitor at the Franklin Park site in downtown Columbus (Franklin, 39-049-0037) was relocated to the State Fairgrounds (Fairgrnds, 39-049-0034) in Columbus. Monitoring at this new site began on January 1, 2018. The Franklin Park site was terminated on December 31, 2017. U.S. EPA approved relocation of this monitor on February 8, 2018 (see Appendix G).

3.6 CO Network

In 2018-2019, Ohio is operating CO monitors at 13¹⁰ sites. As discussed below, three of these sites are required based upon near-road sites. The remainder of the sites, 10, are monitors that exceed the minimum required under 40 CFR Part 58, Appendix D, Section 4.2¹¹. Table 18 below shows the current network in Ohio.

Table 18. Ohio's CO Monitoring Network

AQS Site No.	Site Name	Requirement
Required Monitors		
39-035-0073	Cleveland NR	Near-road site
39-049-0038	Smoky Row	Near-road site
39-061-0048	Cinci NR	Near-road site
Total		3
All Other Monitors		
39-035-0051	Galleria	n/a
39-035-0060	GT Craig (NCore)	
39-049-0005	Morse Rd	
39-061-0040	Taft (NCore)	
39-085-0006	Mentor	
39-113-0034	Reibold	
39-135-1001	Preble Ncore (NCore)	
39-151-0020	Canton	
39-153-0020	Patterson Park	
39-153-0025	NIHF STEM	
Total		10
State Total		13

¹⁰ Details of the 13 sites are presented in Appendix A. In addition to the 13 sites operating at the time of this report, one industrial site and one special purpose site exist in the state (not comparable to the NAAQS) and are also represented as such in Appendix A.

¹¹ 40 CFR Part 58, Appendix D, Section 4.2, CO monitoring requirements, does not require CO monitoring at NCore sites although 40 CFR Part 58, Appendix D, Section 3.0, NCore monitoring requirements, does. This section of the AMNP is dedicated to showing Ohio EPA meets the requirements of Section 4.2. Table 18 does acknowledge CO monitoring occurs at NCore sites in the "all other monitors" section but these monitors are not "required monitors" for the purpose of Section 4.2.

3.6.1 CO Near-Road Sites

40 CFR Part 58, Appendix D, Section 4.2.1 requires one CO monitor to be co-located with any required NO₂ near-road monitor in CBSAs having a population of 1,000,000 or more persons. There is one CO monitor at each of Ohio's three near-road sites. These sites are located in the Cleveland, Columbus and Cincinnati CBSAs and identified in Table 18 above. Ohio's analysis can be found in Appendix C.

3.6.2 CO Network Modifications

No changes have taken place since the last AMNP and none are expected for this plan period.

3.7 Pb Network

Ohio currently operates 11¹² Pb sites as identified in Appendix A. As discussed below, eight of these sites are based upon source-oriented monitoring and three of these sites are based upon population monitoring. Table 19 shows Ohio's Pb network in 2018-2019. Note that all Pb sites also include metals analysis.

Table 19. Ohio's Pb Monitoring Network

AQS Site No.	Site Name	Monitoring Objective Notes
39-029-0019	Port Authority	Source-oriented (WTI incinerator) population exposure, neighborhood
39-029-0020	EL WTP	Source-oriented (WTI incinerator) population exposure, neighborhood
39-029-0023	Eastside School	Source-oriented (WTI incinerator) population exposure, middle-scale, collocated
39-035-0038	St. Theodosius	Population Exposure, highest concentration, neighborhood
39-035-0042	Firestation #4	Population exposure, middle scale, collocated
39-035-0049	Ferro	Source-oriented (Ferro), middle scale, collocated, active in PEP program ¹³
39-035-0061	W. 3 rd	Source-oriented, highest concentration (near permanently shut down facility (Master Metals)), neighborhood scale
39-049-0039	Woodrow	Population Exposure, highest concentration, , neighborhood, sampling in area of closed glass and steel plants, collocated
39-051-0001	Delta	Source-oriented (Bunting Bearing), middle scale, collocated, active in PEP program
39-101-0003	Marion Hawthorne	Source-oriented (Nucor Steel), middle scale
39-167-0008	Washington Career C.	Source-oriented (near permanently shut down facility) population exposure, neighborhood, collocated

¹² Details of the 11 sites are presented in Appendix A. In addition to the 11 sites operating at the time of this report, two special purpose monitoring sites exist in the state (not comparable to the NAAQS) and are also represented as such in Appendix A.

¹³ U.S. EPA's Performance Evaluation Program (PEP) - <https://www3.epa.gov/ttnamti1/pbpep.html>

3.7.1 Source-Oriented Pb Monitoring and Waivers

In 2008, U.S. EPA revised the NAAQS for Pb. In the 2008 rulemaking (referred to as “first round”), U.S. EPA set minimum monitoring requirements for source-oriented monitoring. 40 CFR Part 58, Appendix D, Section 4.5(a) requires agencies to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration exceeding the NAAQS, taking into account the logistics and potential for population exposure. However, the level of emissions at which Pb monitoring is required has changed over time.

Beginning in 2010, facilities with actual emissions of Pb greater than one ton per year were required to be monitored. Facilities with actual emissions of Pb greater than 0.70 ton per year were required to be modeled to determine if they would exceed more than 50% of the new Pb standard. States could request a waiver for monitoring if it was shown the Pb source would not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). Once a source was determined to require monitoring, Ohio EPA used dispersion modeling to determine the appropriate location for siting.

With respect to source-oriented monitoring for the first round of Pb monitoring, Ohio EPA reviewed current emissions inventories and found several sources with actual emissions greater than one ton per year. The following sources were modeled for monitor placement and monitoring commenced in 2010: American Spring Wire in Cuyahoga County (39-035-0072¹⁴), Ellwood Engineering Castings in Trumbull County (39-155-0012¹⁵), Nucor Marion Steel in Marion County (39-101-0003¹⁶), and Timken Steel in Stark County (39-151-0017¹⁷). Two sources were identified with actual emissions of Pb greater than 0.7 ton per year but less than one ton per year. These sources, Lightstone Generation LLC-Gavin Power Plant in Gallia County and Bunting Bearings in Fulton County, were modeled and their impacts were less than 50% of the NAAQS. However, Bunting Bearings was already a monitored source with exceedances of the revised Pb NAAQS and monitoring continues at this site (Delta, 39-051-0001) although not required by the Pb monitoring rule.

Subsequently, in December 2010, U.S. EPA strengthened the Pb monitoring rule (“round two”) to require source-oriented monitors for sources greater than 0.50 ton per year. Again, states could request a waiver with a proper demonstration. For this round, Ohio EPA reviewed current emissions inventories and found the following three facilities with Pb emissions exceeding 0.50 ton per year, not currently being monitored: Lightstone Generation LLC- Gavin Power Plant in Gallia County, Severstal Warren Steel Facility (now BDM) in Trumbull County, and I. Schumann in Cuyahoga County. All facilities were determined to have less than a 50 percent impact of the Pb standard and waivers were requested, and granted, for each facility. These were presented in Ohio’s

¹⁴ Due to low monitoring concentrations this site was approved by U.S. EPA for discontinuance as part of Ohio’s 2016-2017 Monitoring Network Plan.

¹⁵ Due to low monitoring concentrations this site was approved by U.S. EPA for discontinuance as part of Ohio’s 2014-2015 Monitoring Network Plan.

¹⁶ A second site, 39-101-0004, also monitors Pb at Nucor; however, this monitor is a special purpose monitor and not a required monitor for the 2008 Pb NAAQS.

¹⁷ Due to low monitoring concentrations this site was approved by U.S. EPA for discontinuance as part of Ohio’s 2014-2015 Monitoring Network Plan.

2011-2012 AMNP. In 2012, BDM demolished the steel facility and operations ceased in 2012. Therefore, BDM is no longer reviewed annually.

Waivers for the remaining two facilities were granted based upon modeling of actual emissions. Ohio EPA reviewed actual emissions from the Toxic Release Inventory (TRI), Ohio's annual emission inventory system (EIS), and the NEI for years 2005 to 2009 when performing the original modeling. The highest reported emissions from that period for each facility was used in the waiver modeling in order to be conservative. The following presents the actual emissions which produced the following modeling results to compare to half of the Pb NAAQS (0.075 ug/m³):

- Gavin -modeled 0.8 tons per year of Pb emissions and obtained a result of 0.00742 ug/m³ inclusive of background.
- I.Schumann - modeled 0.79 tons per year of Pb emissions and obtained a result of 0.0270 ug/m³ inclusive of background.

All waivers must be renewed once every five years as part of this network assessment. Ohio performed a review in the 2017-2018 AMNP by analyzing reported emissions from 2010 to 2015. Ohio determined the waivers should remain approved. The next five-year review of the waivers will be conducted as a part of the 2022-2023 AMNP.

On an annual basis, Ohio EPA works with U.S. EPA in reviewing the latest emissions inventories to determine if additional sources warrant monitoring (or a waiver) in accordance with the Pb NAAQS source-oriented monitoring requirements. These inventories include the most recent versions of the NEI (2014), TRI (2016), and Ohio's EIS (2016) that were available at the time this report was developed. Ohio EPA reviewed current emissions inventories and determined no new sources exceeds the 0.50 ton per year threshold and therefore, no new Pb monitoring is required.

3.7.2 Pb Collocation Network

The number of Pb monitors that must be collocated with the same measurement method must be at least 15 percent of the total number of manual Pb sites operating within any PQA0 (values of 0.5 and greater round up). In addition, each PQA0 must have at least one collocated quality control monitor (if the total number of monitors is less than three). Ohio EPA continues to exceed the minimum collocation requirements. All collocated sites meet the requirement to use sampling and analytical methods consistent with the primary sampler and all sample at a frequency of no less than 1 in 6 days. Table 20 demonstrates that Ohio will continue to meet the monitor collocation requirement in accordance with 40 CFR Part 58, Appendix A, Section 3.4.4.

Table 20. Ohio's Pb Collocation Monitors Using the Same Measurement Method by PQAQO

PQAQO ¹⁸	No. Pb Sites	No. Collocated Required	# Collocated	Collocated AQS Site No.	Collocated Site Name
NEPQAQO					
Cleveland	4		2	39-035-0042	Firestation #4
				39-035-0049	Ferro
NEDO	3		1	39-029-0023	Eastside School
Totals	7	1	3		
CPQAQO					
CDO	1		0	n/a	n/a
SEDO	1		1	39-167-0008	Washington Career C
NWDO	2		1	39-051-0001	Delta
Totals	4	1	2		
State Total	11	2	5		

3.7.3 Pb Network Modifications

All Pb monitoring changes that have occurred since Ohio's 2017-2018 AMNP and all planned, proposed and potential Pb network changes through December 31, 2019 include:

The TSP/lead monitor at the Port Authority site in East Liverpool (39-029-0019) will be relocated approximately 600 feet west, on the same property as currently located. The property is under new ownership and expansion of a parking area is occurring where the current monitor is located. Ohio EPA is requesting approval of this change as a part of the 2018-2019 AMNP and Ohio EPA will be submitting additional information to expedite the approval of this change.

3.8 Toxics Network

Ohio operates a network of air toxics monitors as part of a state-wide Air Toxics Monitoring Program (ATMP). This ATMP sampling network is modeled after programs and methodologies recommended by U.S. EPA. The emphasis has been on urban toxics monitoring for VOC and heavy metals. This network has been mapped and is shown in Appendix D along with maps depicting all of Ohio's pollutant networks.

The main focus of the ATMP is on urban monitoring to identify major risk areas where people live. In this effort, sampling has concentrated on VOCs such as benzene, chloroform, styrene and toluene and metals such as arsenic, beryllium, cadmium, chromium, iron, Pb, manganese, nickel and zinc. The majority of the sampling is conducted at semi-permanent monitoring sites where monitoring extends beyond a six-month period. The intermittent sampling stations at these types of sites have been dedicated to VOCs and heavy metals monitoring.

¹⁸ There are no Pb monitors in the SWPQAQO; therefore, there are no collocation requirements.

3.8.1 VOC Sampling and Analysis

A major component of the ATMP is ambient sampling for VOCs; compounds that are generally found in the vapor state. VOC samples are collected using a whole air sampling system that pumps ambient air into a stainless- steel canister. The canister allows an air sample to be maintained virtually unchanged until it is analyzed. In addition to the pumped-sampling method, a number of samples are collected using only the vacuum of the canister to draw in an air sample. These vacuum-filled “grab” samples usually take only a few minutes to collect and are useful for collecting transient odors or potentially high concentration samples. Ohio is now capable of collecting specific samples for 1, 3, 8 and 24-hours using this grab sampling method.

Ohio will continue to conduct, except where otherwise indicated, canister sampling and analysis in 2018-2019 at the 10 monitoring sites listed in Table 21.

Table 21. Ohio’s VOC Monitoring Network

AQS Site No.	City	County	Address	Monitoring objective
39-017-0019	Middletown	Butler	1300 Oxford State Rd.	Source-oriented (Sun Coke industrial site, SPM for VOCs only)
39-017-0020	Middletown	Butler	3350 Yankee Rd.	Source-oriented (Sun Coke industrial site, SPM for VOCs only)
39-035-0038	Cleveland	Cuyahoga	2547 St. Tikhon Ave.	Population (SPM)
39-035-1002	Cleveland	Cuyahoga	16900 Holland Rd.	Population (SPM)
39-049-0034	Columbus	Franklin	Korbel Ave.	Population (SPM)
39-049-0039	Columbus	Franklin	580 W. Woodrow	Population (SPM)
39-061-0014	Cincinnati	Hamilton	Seymour & Vine St.	Population
39-061-0047	Cincinnati	Hamilton	7529 Gracely Ave.	Population (INEOS industrial site)
39-067-0004	Hopedale	Harrison	45600 Jewett Hopedale Rd.	Source-oriented (SPM)
39-081-0017	Steubenville	Jefferson	618 Logan St.	Population (SPM)
Statewide Totals	10			

*Previously source-oriented due to Columbus Castings which is no longer in operation.

3.8.2 Toxics Network Modification

All toxics monitoring changes that have occurred since Ohio’s 2017-2018 AMNP and all planned, proposed and potential toxics network changes through December 31, 2019 include:

In the Cincinnati area, the VOC monitor at Kibby (39-061-0047) site sample collection frequency changed from 1/6 to 1/12 days as of September 4, 2017. This monitor was required under a U.S. EPA/Ohio EPA consent decree with Ineos Corp. a plastics and polymers production facility. The consent decree expired, and all parties are in agreement to continue sampling, however, at a reduced frequency. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Amanda (39-017-0019) site will be relocating out of the elementary school building to a new monitoring shelter on the property just west of school in 2018. The move will address safety concerns with accessing and working on the roof of the school building. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Yankee (39-017-0020) site may need to move to a new location on the owner’s property in late 2018 or early 2019 due to projected changes by ownership at the current location. As this is an industrial site (not SLAMS), U.S. EPA approval for this change is not required.

The Taft (39-061-0040) and GT Craig (39-035-0060) NCore sites will be adding VOC (auto gas chromatograph (auto GC)) sampling by June 1, 2019 as a part of the PAMS network requirements.

4.0 NCore Monitoring Network

NCore is a multi-pollutant approach to air monitoring that provides support to integrating air quality management data needs. NCore sites are intended to support multiple objectives, with a greater emphasis on assessment of the impact-abatement control measures on improving air quality. Air pollution data from the national NCore network can be used to supplement data collected by researchers working on health-effect assessments and atmospheric processes, or for monitoring methods-development work.

Each state is required to operate at least one NCore site. States with many MSAs, like Ohio, often have multiple air sheds with unique characteristics. Therefore, states like Ohio were required to establish 1-2 additional sites in order to account for unique situations. Ohio operates one urban NCore site in each Cleveland and Cincinnati and one rural NCore site as a regional transport site in Preble County near the Ohio-Indiana border.

NCore sites are required under 40 CFR Part 58, Appendix D, Section 3.0 to measure the following pollutants; PM_{2.5} particle mass using continuous and integrated filter base samplers, speciated PM_{2.5}, PM_{10-2.5} particle mass, ozone, SO₂, CO, nitrogen oxides (NO/NO_y), total reactive nitrogen oxides (NO_y), and meteorological monitoring (wind speed, wind direction, relative humidity, and ambient temperature). Ozone is to be measured year-round and many of the other monitoring instruments are to be trace-level units designed to reliably measure much lower pollutant concentrations. Ohio's three NCore sites identified in Table 22 began operating in 2011. Appendix A provides the details regarding parameters monitored at each NCore site demonstrating Ohio meets all of the requirements.

As described in Section 3.1.2, PAMS stations will be installed and operational at the Cleveland and Cincinnati NCore sites (39-035-0060 and 39-061-0040, respectively) by June 1, 2019.

Table 22. Ohio's NCore Monitoring Network

AQS Site No.	Site Address	Site Name	MSA	Measurement Scale
39-035-0060	2650 E. 14 th Ave., Cleveland	GT Craig	Cleveland-Elyria	Neighborhood
39-061-0040	250 Wm. Howard Taft Rd, Cincinnati	Taft	Cincinnati, OH-KY-IN	Neighborhood
39-135-1001	6940 Oxford Gettysburg Rd. New Paris	Preble NCore	Non-MSA	Regional

5.0 SEDO Community Scale Grant Project

Ohio EPA received funding from U.S. EPA to conduct a Community Scale Air Toxics monitoring project near Hopedale in Harrison County. The purpose of the project is to characterize near-source concentrations of criteria and toxic pollutants from Ohio's oil and gas industry. This will allow Ohio EPA to assess the need for emission reduction measures, and to characterize risk for the most highly impacted populations.

Both ambient pollutant and meteorological monitoring will be conducted for approximately two and a half years. The monitoring program consists of PM_{2.5}, PM₁₀, CO, operation of a gas

chromatograph for collection of hydrocarbons, hydrogen sulfide, and fielding stainless steel canisters for sampling various VOCs and hydrocarbons. Monitoring at this site (39-067-0004) began January 1, 2018 except for VOCs which began in May of 2017. This SPM site is likely to be moved to another location in the summer of 2018. A letter detailing this change will be submitted to U.S. EPA Region 5.

6.0 Black Carbon Monitoring Network

Black Carbon (BC) is a solid form of mostly pure carbon which absorbs solar radiation (light) at all wavelengths. It is formed by incomplete combustion of fossil fuels, biofuels, or biomass.

BC is one of the types of particles which constitute PM and is one of the key components of soot.

Ohio EPA currently operates two continuous black carbon monitors, and a third monitor is scheduled to begin sampling at the Taft (39-061-0040) NCore site in 2018.

Table 23. Ohio Black Carbon Monitoring Network

AQS Site No.	Site Name	Site Address	Started
39-049-0038	Smoky Row	7560 Smoky Row, Columbus	5/26/2017
39-061-0048	Cinci NR	3428 Colerain Ave., Cincinnati	1/1/2016
39-061-0040	Taft	250 Wm. Howard Taft Rd. Cincinnati	To begin 2018

7.0 Public Review and Comment

The annual monitoring network plan must be made available for public inspection for at least thirty days prior to submission to U.S. EPA. For the 2018-2019 AMNP submittal, this document was placed on Ohio EPA’s website on June 20, 2018 to begin the public review period. The comment period was also noticed in prominent newspapers and in Ohio’s Weekly Review. On June 29, 2018, Ohio EPA submitted the 2018-2019 AMNP to U.S. EPA. The comment period closed on July 23, 2018. No comments on the AMNP were received. However, as a result of further internal review, several minor or clarifying changes were made to the final document. Ohio EPA submitted this final document to U.S. EPA on July 26, 2018.

This document can be accessed at the following link:

<http://epa.ohio.gov/dapc/ams/amsmain>

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