Massachusetts 2024 Air Monitoring Network Plan

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Bureau of Air and Waste
Division of Air and Climate Programs
Air Assessment Branch
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This is the 2024 Massachusetts Air Monitoring Network Plan prepared by the Massachusetts Department of Environmental Protection (MassDEP) in accordance with Title 40 CFR Part 58.10. Each year, MassDEP is required to submit a Network Plan to the U.S. Environmental Protection Agency (EPA) for review and approval.

MassDEP operates a network of 24 ambient air quality monitoring stations in 19 communities located across the state. The Wampanoag Tribe of Gay Head (Aquinnah) operates an ozone monitoring station on Martha's Vineyard. MassDEP and the Wampanoag Tribe are members of the same Primary Quality Assurance Organization (PQAO), which ensures consistent quality assurance of ambient air quality data collected in Massachusetts.

The Massachusetts monitoring network is part of a comprehensive program to collect and provide information about air quality to the public and to determine compliance with National Ambient Air Quality Standards (NAAQS). This Network Plan reviews MassDEP's ambient air monitoring network to demonstrate that the requirements of 40 CFR Part 58 Appendices A, C, D and E are met, describes which pollutants and other parameters MassDEP measures at its various ambient air monitoring stations, and discusses recent and planned changes to the network. For detailed information on monitor locations, pollutants analyzed, and methods used, see Attachments 1 – 3.

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List of Abbreviations

(3 day).....Every 3rd day
(6 day).....Every 6th day
AAB .....Air Assessment Branch
BC.....Black Carbon
BP.....Barometric Pressure
CBSA.....Core Based Statistical Area
CFR .....Code of Federal Regulations
CO .....Carbon Monoxide
CO_2.....Carbon Dioxide
FEM.....Federal Equivalent Method
FRM.....Federal Reference Method
EPA.....United States Environmental Protection Agency
IMPROVE.....Interagency Monitoring of Protected Visual Environments
MassDEP .....Massachusetts Department of Environmental Protection
MET.....Meteorological Parameters
MSA .....Metropolitan Statistical Area
NAAQS .....National Ambient Air Quality Standards (for criteria pollutants)
NATTS .....National Air Toxics Trends Station
NCore.....National Core Monitoring Network
NO.....Nitric Oxide
NOx.....Nitrogen Oxides
NOy.....Total Reactive Oxidized Nitrogen
NO_2 .....Nitrogen Dioxide
NO_3 .....Nitrate
O_3.....Ozone
PAMS .....Photochemical Assessment Monitoring Stations
Pb.....Lead
ppb.....parts per billion by volume
ppm.....parts per million by volume
$PM_{2.5}$ .....Particulate matter ≤ 2.5 microns aerodynamic diameter
PM_{10}.....Particulate matter ≤ 10 microns aerodynamic diameter
RH .....Relative Humidity
SO_2 .....Sulfur Dioxide
SOLAR .....Solar Radiation
TEMP.....Temperature
TSP .....Total Suspended Particulates
µg/m^3.....micrograms per cubic meter
VOCs .....Volatile Organic Compounds
WS/WD .....Wind Speed/Wind Direction
WSv/WDv.....Wind Speed/Wind Direction Vector

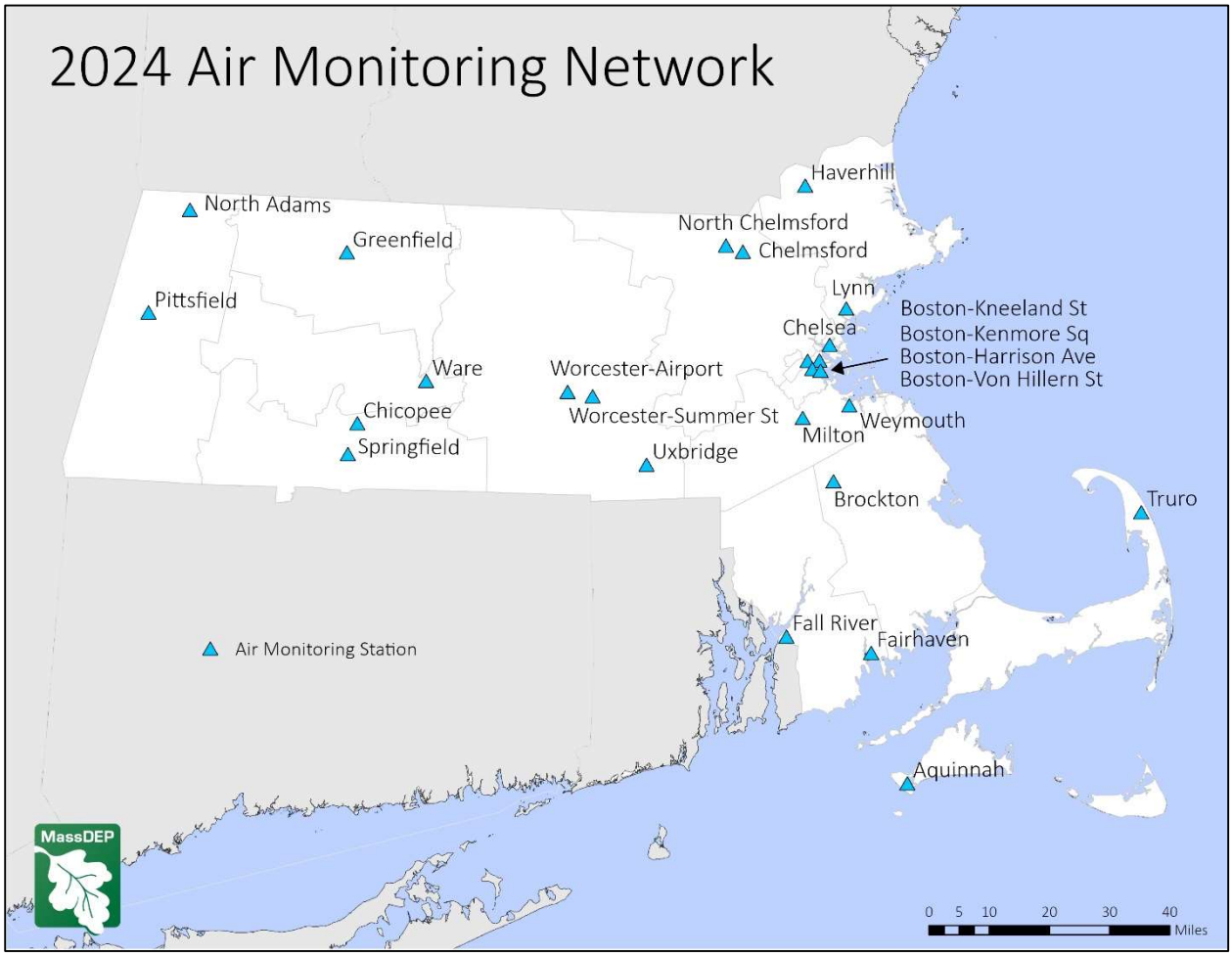

Figure 1 - 2024 Air Monitoring Network

1. Criteria Pollutants

This section describes MassDEP's network for monitoring criteria pollutants listed in the federal Clean Air Act for which EPA has set National Ambient Air Quality Standards (NAAQS), including ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, particulate matter (PM_{10} and $PM_{2.5}$) and lead. EPA periodically reviews and revises these standards based on new public health and scientific information. These revisions often require changes to air monitoring networks and methodologies.

National Ambient Air Quality Standards					
Pollutant		**Primary/ Secondary**	**Averaging Time**	**Level**	**Form**
Carbon Monoxide		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide		primary	1 hour	100 ppb	98th percentile of 1 hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb	Annual mean
Ozone		primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8 hour concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	primary	1 year	9 µg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1 hour	53 ppb	99th percentile of 1 hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

µg/m^3 = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion

1.1 Ozone (O_3)

There are 17 ozone monitors that meet EPA ozone monitoring requirements. Of these, MassDEP operates 16 monitors and the Wampanoag Tribe of Gay Head (Aquinnah) on Martha's Vineyard operates one monitor. In addition, MassDEP operates a non-regulatory ozone monitor in Chelmsford that is for informational purposes only and is not used to demonstrate compliance with the ozone NAAQS because it does not meet siting criteria regarding distance from roadways in 40 CFR Part 58 Appendix E. The existing network of 17 regulatory ozone monitoring sites meets EPA monitoring requirements for the ozone NAAQS. Due to a redevelopment project affecting the location of the Haverhill monitoring station (25-009-5005), in March 2024 MassDEP moved the station to the Haverhill High School (25-009-5006) at 137 Monument Street, approximately one mile north of the previous location. MassDEP will continue to monitor ozone at the new location.

Ozone (O_3)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-023-0005	Brockton	Buckley Playground	Boston-Cambridge-Newton MSA
25-017-0009	North Chelmsford	EPA Laboratory	Boston-Cambridge-Newton MSA
25-017-0010*	Chelmsford	Manning Road	Boston-Cambridge-Newton MSA
25-013-0008	Chicopee	Westover AFB	Springfield MSA
25-005-1006	Fairhaven	Hastings School	Providence-Warwick MSA
25-005-1004	Fall River	Globe Street	Providence-Warwick MSA
25-011-2005	Greenfield	Veterans Field	Springfield MSA
25-009-5006	Haverhill	Haverhill High School	Boston-Cambridge-Newton MSA
25-009-2006	Lynn	Parkland Avenue	Boston-Cambridge-Newton MSA
25-021-3003	Milton	Blue Hill Summit	Boston-Cambridge-Newton MSA
25-003-0008	Pittsfield	Silver Lake Drive	Pittsfield MSA
25-001-0002	Truro	Fox Bottom Area	Barnstable MSA
25-027-0024	Uxbridge	East Hartford Avenue	Worcester MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA
25-021-2005	Weymouth	Monatiquot Street	Boston-Cambridge-Newton MSA
25-027-0015	Worcester	Worcester Airport	Worcester MSA
25-007-0001	*Aquinnah*	*Wampanoag Tribe*	*Vineyard Haven MiSA*

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area
MiSA = Micropolitan Statistical Area
* This monitor and is used for informational purposes only because it does not meet ozone monitor siting criteria regarding distance from roadways in 40 CFR Part 58 Appendix E.

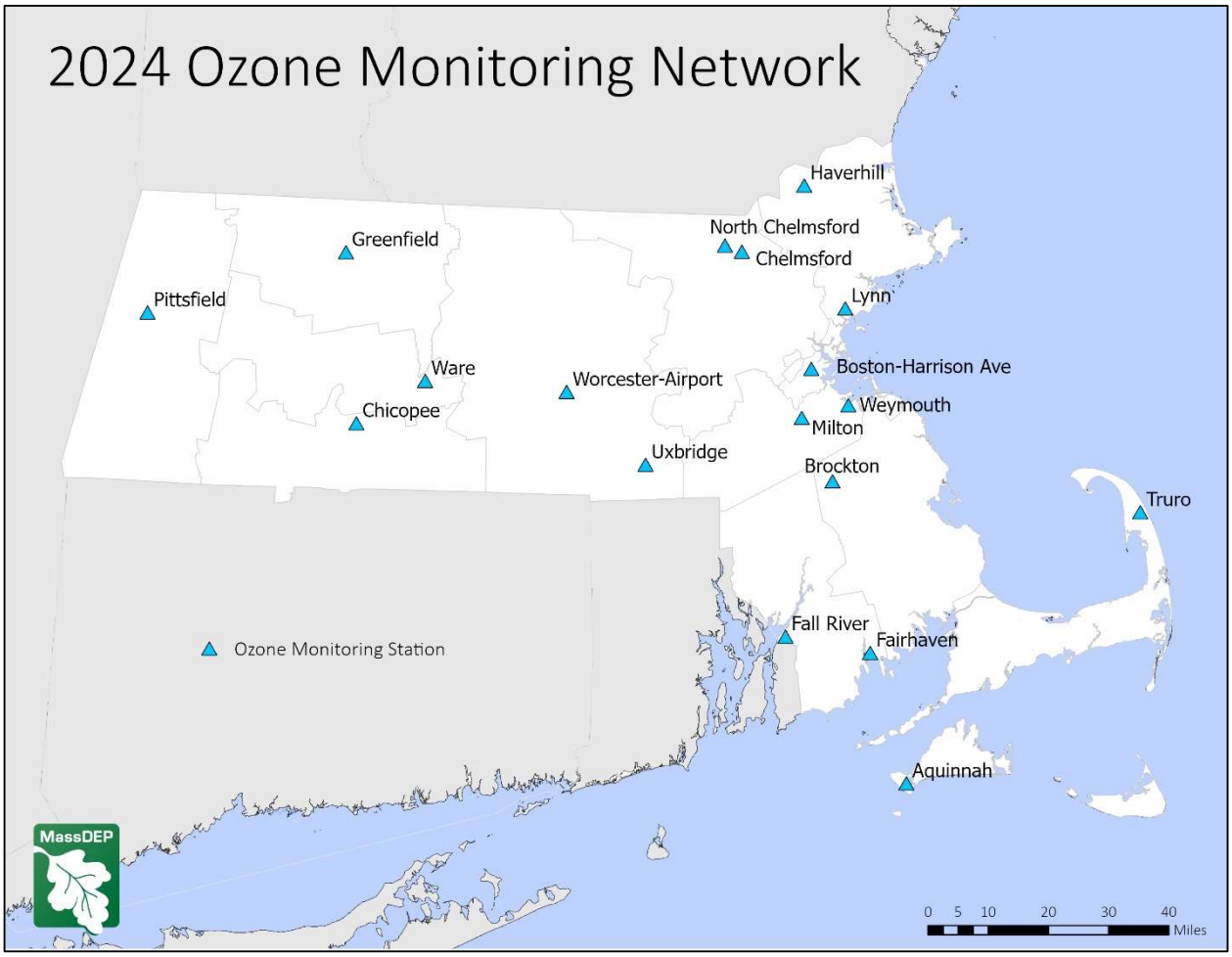

Figure 2 - Ozone Monitoring Network

1.2 Sulfur Dioxide (SO_2)

MassDEP operates six trace-level (i.e., very low concentration) sulfur dioxide (SO_2) monitors at the locations listed below. The existing SO_2 monitoring network meets EPA monitoring requirements for the SO_2 NAAQS. MassDEP is not planning changes to the SO_2 monitoring network in 2024.

Sulfur Dioxide (SO_2)			
ID Number	**City /Town**	**Location**	**CBSA**
25-025-0002	Boston - Kenmore	Kenmore Square	Boston-Cambridge-Newton MSA
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-005-1004	Fall River	Globe Street	Providence-Warwick MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA
25-027-0023	Worcester	Summer Street	Worcester MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

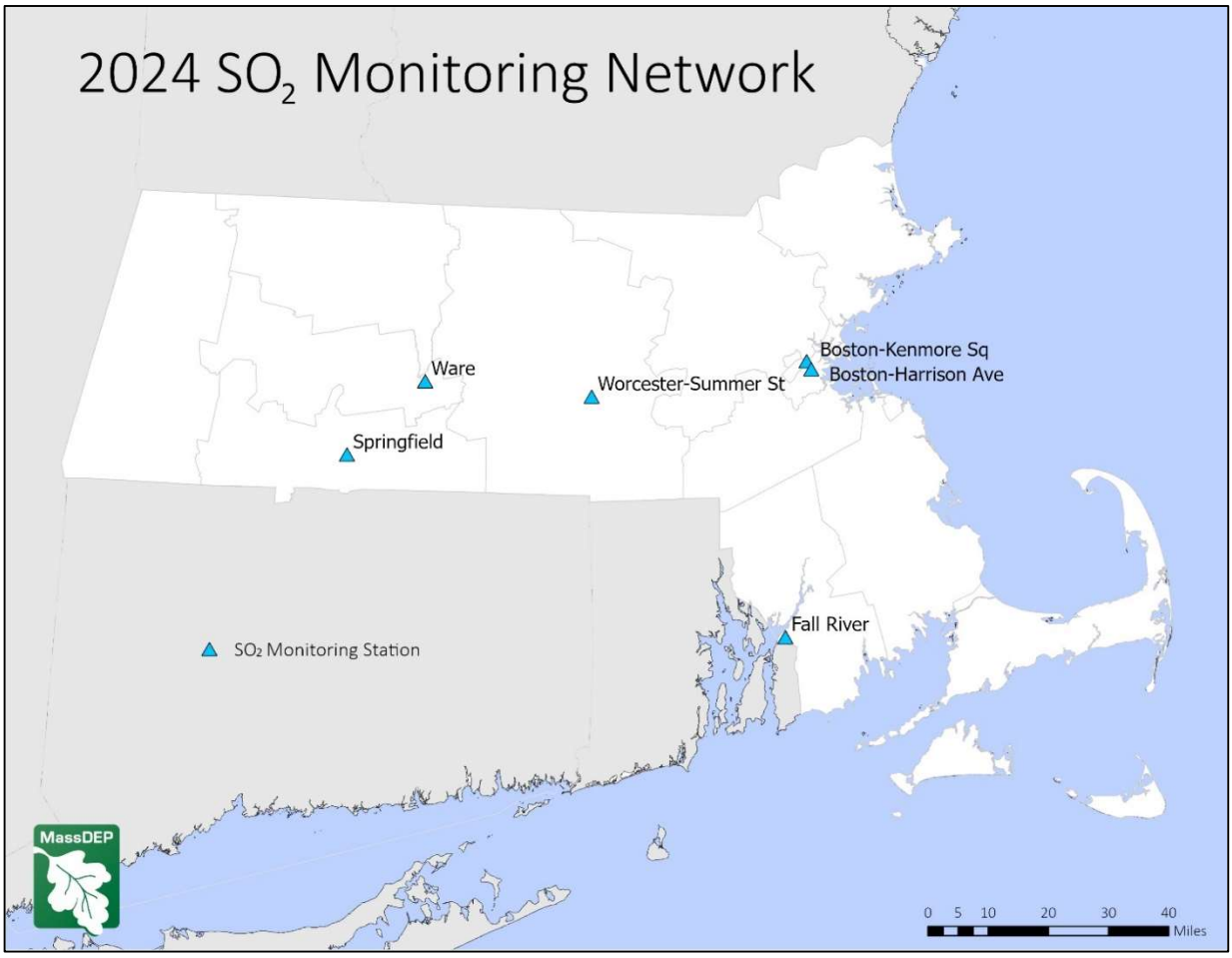

Figure 3 - Sulfur Dioxide Monitoring Network

1.3 Nitrogen Dioxide (NO_2)

MassDEP operates 12 nitrogen dioxide (NO_2) monitors at the locations listed below, including Near-Road monitors in Boston (Von Hillern Street) and Chelmsford. NO_2 is monitored for NAAQS compliance and as an ozone precursor. MassDEP operates 11 chemiluminescence NO_2 analyzers and one Cavity Attenuated Phase Shift (CAPS) spectroscopy analyzer. Chemiluminescence analyzers indirectly measure NO_2, and report concentrations of nitrogen oxides (NOx), which is NO_2 plus nitric oxide (NO). CAPS analyzers directly measure NO_2, and do not report NOx. EPA has designated three monitors (Boston – Roxbury, Boston – Kenmore, and Springfield) as representing susceptible and vulnerable populations. The existing NO_2 monitoring network meets EPA monitoring requirements for the NO_2 NAAQS. MassDEP is not planning changes to the NO_2 monitoring network in 2024.

Nitrogen Dioxide (NO_2)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0002	Boston - Kenmore	Kenmore Square	Boston-Cambridge-Newton MSA
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-0044	Boston - Von Hillern	Von Hillern Street	Boston-Cambridge-Newton MSA
25-017-0010	Chelmsford	Manning Road	Boston-Cambridge-Newton MSA
25-013-0008	Chicopee	Westover AFB	Springfield MSA
25-009-2006*	Lynn	Parkland Avenue	Boston-Cambridge-Newton MSA
25-021-3003	Milton	Blue Hill	Boston-Cambridge-Newton MSA
25-003-0008	Pittsfield	Silver Lake Drive	Pittsfield MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA
25-021-2005	Weymouth	Monatiquot Street	Boston-Cambridge-Newton MSA
25-027-0023	Worcester	Summer Street	Worcester MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area
* This monitor uses Cavity Attenuated Phase Shift (CAPS) spectroscopy to measure NO_2.

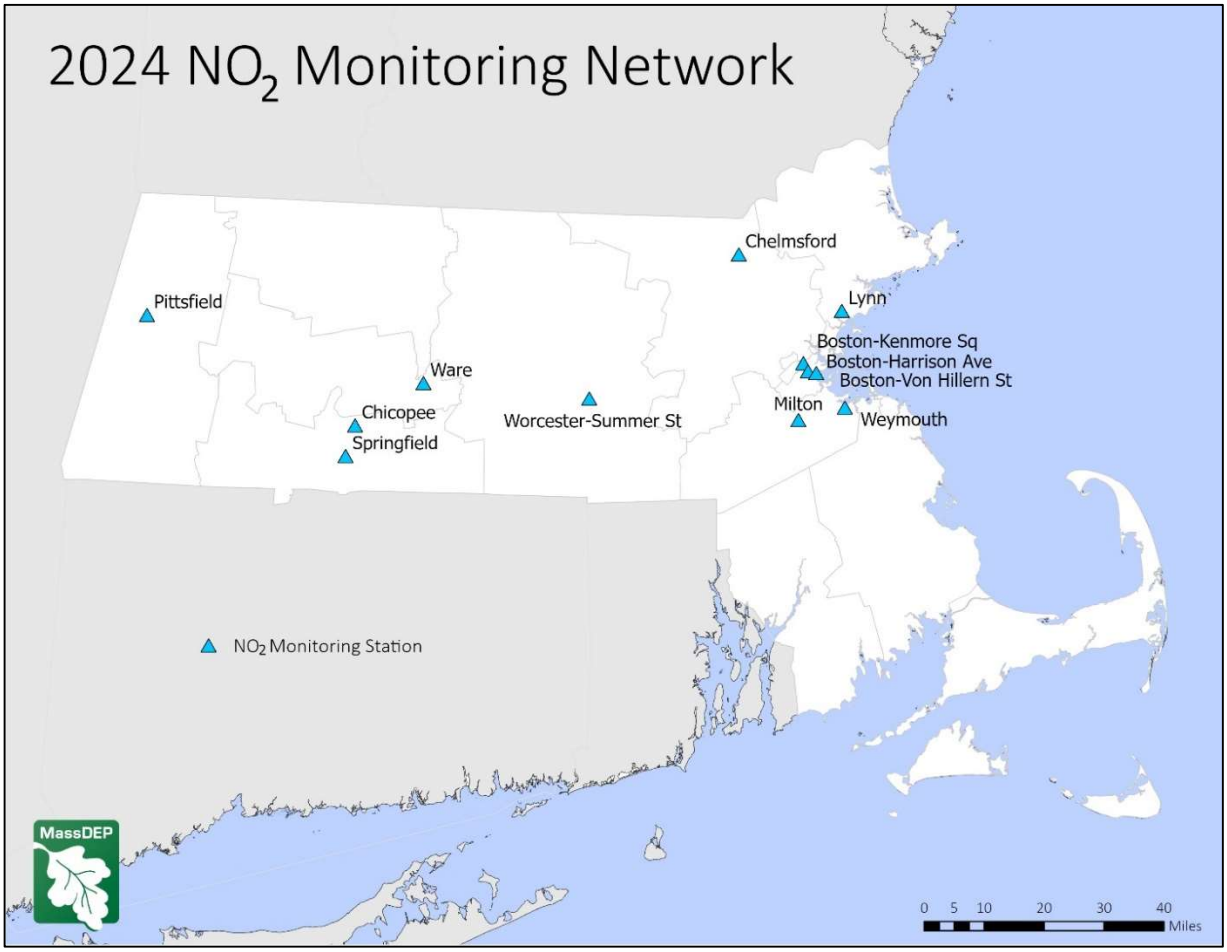

Figure 4 - Nitrogen Dioxide Monitoring Network

1.4 Carbon Monoxide

MassDEP operates three trace-level carbon monoxide (CO) monitors at the locations listed below. The existing CO monitoring network meets EPA monitoring requirements for the CO NAAQS. MassDEP is not planning changes to the CO monitoring network in 2024.

Carbon Monoxide (CO)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-0044	Boston - Von Hillern	Von Hillern Street	Boston-Cambridge-Newton MSA
25-027-0023	Worcester	Summer Street	Worcester MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

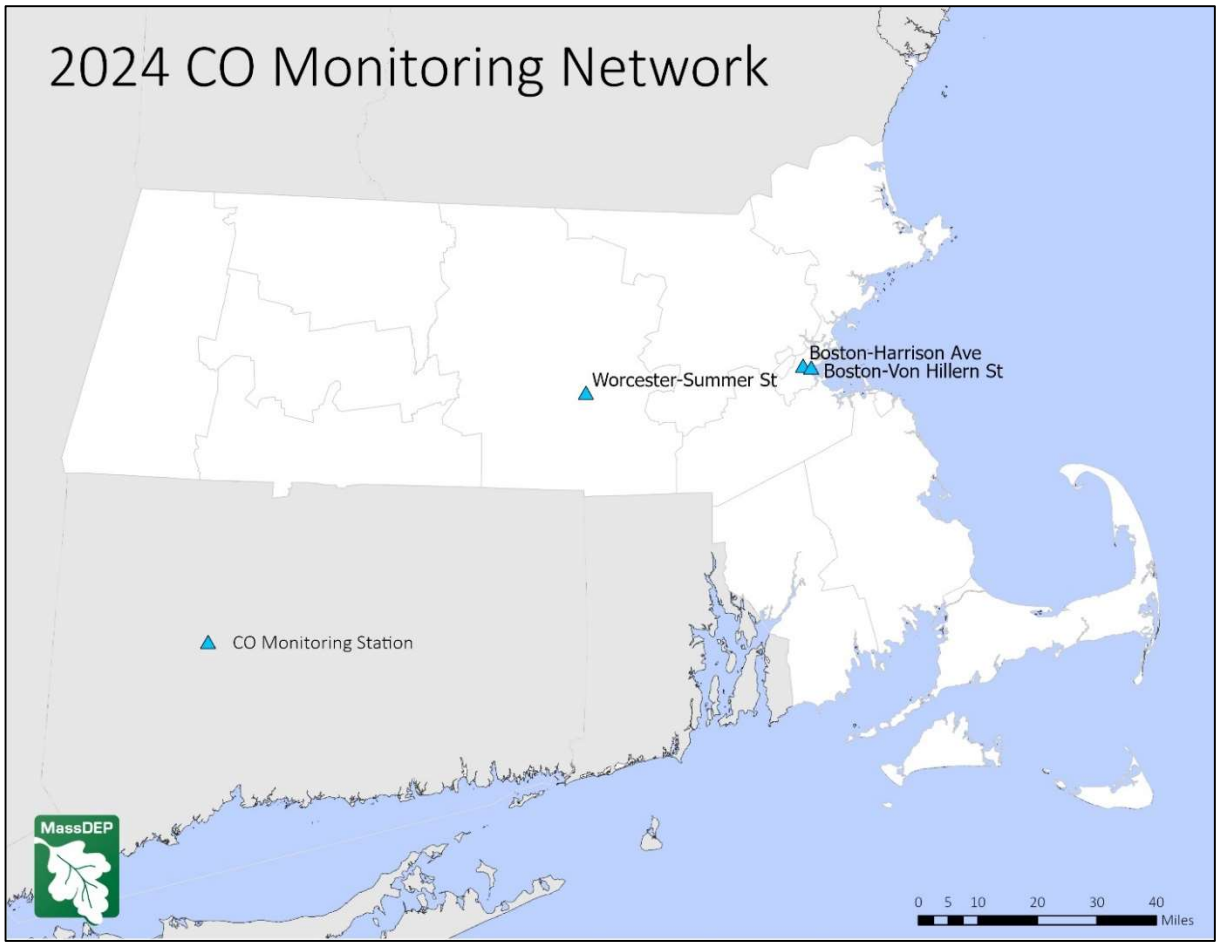

Figure 5 - Carbon Monoxide Monitoring Network

1.5 Particulate Matter (PM)

PM_{10}

MassDEP operates three continuous PM_{10} monitoring stations at the locations listed below. All of MassDEP's continuous PM_{10} monitors meet Federal Equivalent Method (FEM) requirements and are designated as primary monitors for determining compliance with the PM_{10} NAAQS. PM_{coarse} concentrations are automatically calculated by the continuous monitors, which is a National Core (NCore) requirement. MassDEP continues to operate collocated filter-based samplers at the Boston - Roxbury site for PM_{10}-based metals monitoring, which is a National Air Toxics Trends Sites (NATTS) requirement. The existing PM_{10} monitoring network meets EPA monitoring requirements for the PM_{10} NAAQS. MassDEP is not planning additional changes to the PM_{10} monitoring network in 2024.

Continuous PM_{10} Monitors			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042[1]	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA
25-027-0023[2]	Worcester	Summer Street	Worcester MSA

[1] Two filter-based monitors (Collocated) for metals analysis.

[2] MassDEP also operates a continuous atmospheric radiation sampler (TSP-based) at Worcester - Summer Street (25-027-0023) in cooperation with the EPA's National Air and Radiation Environmental Laboratory (RadNet).

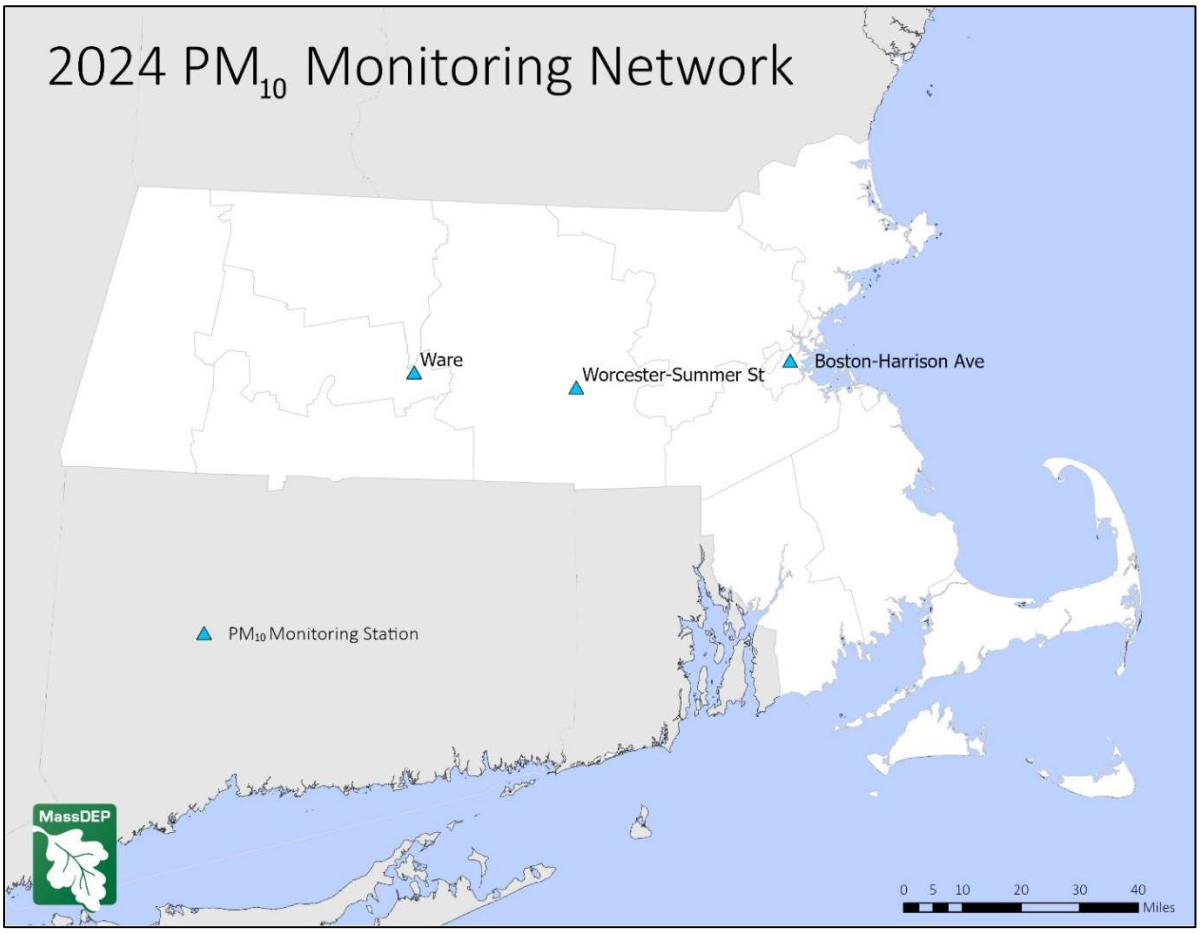

Figure 6 - PM_{10} Monitoring Network

$PM_{2.5}$

Continuous Monitors: MassDEP operates 18 continuous fine particulate matter ($PM_{2.5}$) monitoring stations at the locations listed below. The network includes collocated FEM monitors at Boston – Von Hillern (25-025-0044) for quality assurance purposes (FEM/FEM comparability), and five Federal Reference Method (FRM) filter-based units for quality assurance purposes (FEM/FRM comparability). All of MassDEP's continuous $PM_{2.5}$ monitors meet FEM requirements and are designated as primary monitors for determining compliance with the $PM_{2.5}$ NAAQS. Continuous monitors provide the hourly $PM_{2.5}$ data that appears on MassDEP's MassAir website. Due to a redevelopment project affecting the location of the Haverhill monitoring station (25-009-5005), in March 2024 MassDEP moved the station to the Haverhill High School (25-009-5006) at 137 Monument Street, approximately one mile north of the previous location. MassDEP will continue to monitor $PM_{2.5}$ at the new location. MassDEP is in the process of adding two $PM_{2.5}$ monitoring stations in EJ populations, one in or near Saugus and one in the Framingham area (these stations also will monitor black carbon). The existing $PM_{2.5}$ monitoring network meets EPA monitoring requirements for the $PM_{2.5}$ NAAQS, except for a new monitoring requirement in the Worcester MSA. On February 7, 2024, EPA revised the NAAQS for $PM_{2.5}$ by lowering the primary health-based annual standard to 9.0 micrograms per cubic meter ($\mu g/m^3$). As part of the revisions to the $PM_{2.5}$ NAAQS, EPA updated monitoring requirements by modifying the $PM_{2.5}$ monitoring network design criteria, which requires an additional $PM_{2.5}$ monitor in the Worcester MSA. To satisfy this new requirement, MassDEP plans to use Inflation Reduction Act (IRA) grant funds to add a $PM_{2.5}$ monitor at the air Uxbridge monitoring station (25-027-0024).

Continuous $PM_{2.5}$ Monitors			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0045	Boston - Chinatown	Kneeland Street	Boston-Cambridge-Newton MSA
25-025-0002	Boston - Kenmore	Kenmore Square	Boston-Cambridge-Newton MSA
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-0044[1]	Boston - Von Hillern	Von Hillern Street	Boston-Cambridge-Newton MSA
25-023-0005	Brockton	Buckley Playground	Boston-Cambridge-Newton MSA
25-017-0010	Chelmsford	Manning Road	Boston-Cambridge-Newton MSA
25-013-0008	Chicopee	Westover AFB	Springfield MSA
25-025-1004	Chelsea	Highland Park	Boston-Cambridge-Newton MSA
25-005-1004	Fall River	Globe Street	Providence-Warwick MSA
25-011-2005	Greenfield	Veterans Field	Springfield MSA
25-009-5006	Haverhill	Haverhill High School	Boston-Cambridge-Newton MSA
25-009-2006	Lynn	Parkland Avenue	Boston-Cambridge-Newton MSA
25-003-6001	North Adams	Holden Street	Pittsfield MSA
25-003-0008	Pittsfield	Silver Lake Drive	Pittsfield MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA
25-021-2005	Weymouth	Monatiquot Street	Boston-Cambridge-Newton MSA
25-027-0023	Worcester	Summer Street	Worcester MSA

[1] Two continuous monitors (Collocated)
CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

Filter-Based Monitors: MassDEP operates five $PM_{2.5}$ Federal Reference Method (FRM) monitors for quality assurance purposes, at the locations listed below. MassDEP is not planning changes to the $PM_{2.5}$ FRM monitoring network in 2024.

Filter-Based $PM_{2.5}$ (FRM)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0002	Boston - Kenmore	Kenmore Square	Boston-Cambridge-Newton MSA
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-0044	Boston - Von Hillern	Von Hillern Street	Boston-Cambridge-Newton MSA
25-011-2005	Greenfield	Veterans Field	Springfield MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA

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$PM_{2.5}$ Collocated Quality Assurance and Quality Control (QA/QC) Sampling Procedures

All of MassDEP's continuous $PM_{2.5}$ FEM monitors are designated as primary monitors for determining compliance with the $PM_{2.5}$ NAAQS. MassDEP operates two types of FEM monitors T640 and T640x scattered light spectrometry monitors. In accordance with 40 CFR Part 58 Appendix A, MassDEP collocates $PM_{2.5}$ monitors for quality control purposes. MassDEP's $PM_{2.5}$ network meets or exceeds the minimum collocation requirements.

$PM_{2.5}$ Collocation Summary				
ID Number	**City / Town**	**Primary**	**Collocated**	**Other**
25-025-0045	Boston - Chinatown	FEM (T640)	N/A	N/A
25-025-0002	Boston - Kenmore	FEM (T640)	FRM (6 day)	N/A
25-025-0042	Boston - Roxbury	FEM (T640x)	FRM (3 day)	N/A
25-025-0044	Boston - Von Hillern	FEM (T640)	FEM (T640)	FRM (6 day)
25-023-0005	Brockton	FEM (T640)	N/A	N/A
25-017-0010	Chelmsford	FEM (T640)	N/A	N/A
25-013-0008	Chicopee	FEM (T640)	N/A	N/A
25-025-1004	Chelsea	FEM (T640)	N/A	N/A
25-005-1004	Fall River	FEM (T640)	N/A	N/A
25-011-2005	Greenfield	FEM (T640)	FRM (6 day)	N/A
25-009-5005	Haverhill	FEM (T640)	N/A	N/A
25-009-2006	Lynn	FEM (T640)	N/A	N/A
25-003-6001	North Adams	FEM (T640)	N/A	N/A
25-003-0008	Pittsfield	FEM (T640)	N/A	N/A
25-013-0018	Springfield	FEM (T640)	FRM (6 day)	N/A
25-015-4002	Ware	FEM (T640x)	N/A	N/A
25-021-2005	Weymouth	FEM (T640)	N/A	N/A
25-027-0023	Worcester	FEM (T640x)	N/A	N/A

N/A = Not applicable. Collocation not required.

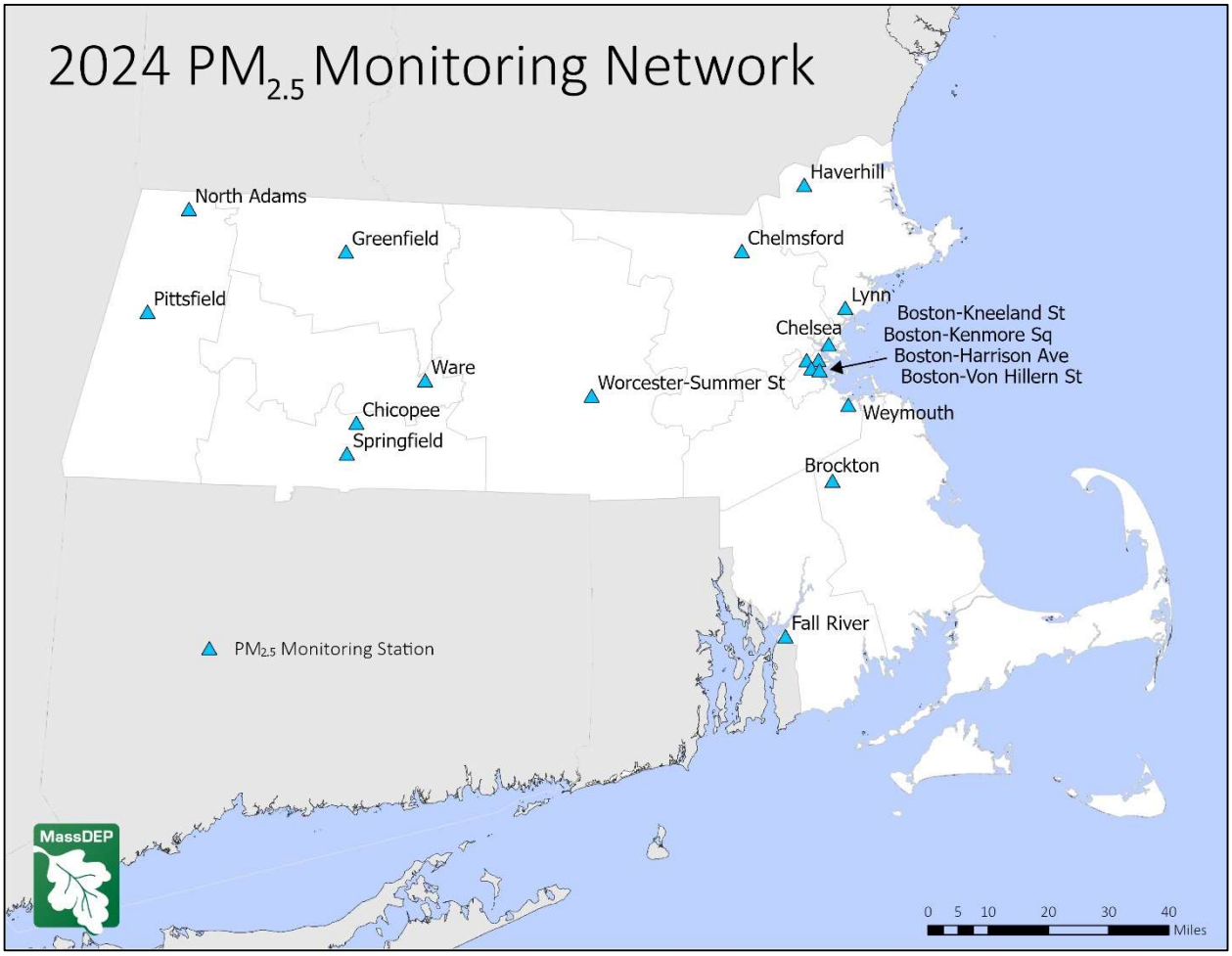

Figure 7 - $PM_{2.5}$ Monitoring Network

Speciated $PM_{2.5}$

MassDEP collects speciated $PM_{2.5}$ samples at Boston – Roxbury (25-025-0042) and Chicopee (25-013-0008). The speciated $PM_{2.5}$ program is designed to determine some of the chemical components (elements, sulfates, nitrates, carbon species) that are contained in $PM_{2.5}$.

IMPROVE sampling sites also provide speciated $PM_{2.5}$ data. The IMPROVE program measures parameters that are similar to those measured by the speciation program and is designed to measure species at rural locations to evaluate the contribution of fine particulates and their constituents to the degradation of visibility. The National Park Service operates an IMPROVE sampler at Truro – National Sea Shore (25-001-0002) and the Wampanoag Tribe on Martha's Vineyard also operates an IMPROVE sampler at Aquinnah (25-007-0001).

Speciated $PM_{2.5}$			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-013-0008	Chicopee	Westover AFB	Springfield MSA
25-001-0002[1]	Truro	Fox Bottom Area	Barnstable MSA
25-007-0001[2]	Aquinnah	Wampanoag Tribe	Vineyard Haven MiSA

[1] IMPROVE sampler operated by National Park Service
[2] IMPROVE sampler operated by Wampanoag Tribe
CBSA = Core Based Statistical Area
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MiSA = Micropolitan Statistical Area

PM_{coarse}

MassDEP reports PM_{coarse} measurements from its T640x monitor in compliance with NCore requirements at the Boston – Roxbury (25-025-0042) NCore site. While not required, MassDEP reports these PM_{coarse} measurements from the Ware (25-015-4002) and Worcester – Summer Street (25-027-0023) sites. The T640x monitor automatically calculates PM_{coarse} measurements by subtraction of $PM_{2.5}$ values from PM_{10} values recorded by the monitor.

Ultrafine Particle Monitoring

Using EPA IRA grant funds, MassDEP is in the process of deploying four ultrafine particle (UFP) monitors at existing monitoring stations in Chelmsford, Boston-Chinatown, Boston-Dorchester, and Springfield to enhance ambient air monitoring in or near urban EJ populations near high traffic roadways. Environmental justice (EJ) advocates have asked MassDEP to increase air quality monitoring in overburdened areas and have raised concerns about exposure to ultrafine particles and diesel emissions near roadways and transportation infrastructure.

The Chelmsford-Manning Street monitoring station is located along I-495 and the Boston-Von Hillern Street station is located along I-93. The new Boston-Chinatown monitoring station is located near two major highways (I-90 and I-93) and about 600 feet from the South Station Rail and Bus Terminal, and the Springfield-Liberty Street station is in a busy traffic circle, about 650 feet from I-291. MassDEP already operates continuous $PM_{2.5}$ monitors at each of these monitoring stations.

Measuring UFP at these locations will build on MassDEP's existing $PM_{2.5}$ monitoring work and will allow us to compare UFP concentrations in different areas of the state. This project will provide much needed data to the communities experiencing disparate impacts from high traffic roadways, which also have designated EJ populations. The data from this project could also be used to inform MassDEP future planning and policies, assist and inform local government decisions, and educate communities about their local air quality and help the communities make decisions about how to respond to local health issues.

1.6 Lead

MassDEP monitors lead at the Boston – Harrison Avenue NCore (25-025-0042) site using a low-volume PM_{10} method. While EPA allows states to discontinue lead monitoring at NCore sites that show concentrations below the NAAQS, MassDEP plans to continue lead monitoring at the Boston – Roxbury NCore site for non-NAAQS purposes under the National Air Toxics Trends Site (NATTS) program. These

lead measurements are for informational purposes and are not used to demonstrate compliance with NAAQS.

2. Photochemical Assessment Monitoring Stations

MassDEP operates a Photochemical Assessment Monitoring Station (PAMS) in Lynn. PAMS stations are designed to measure ozone precursors and meteorological parameters to provide data about ozone formation and the effect of precursor controls on ozone production. In 2015, EPA revised its PAMS regulations to require state and local agencies to make PAMS measurements (including hourly averaged mixing height) at required NCore sites and to implement an Enhanced Monitoring Plan (EMP) detailing enhanced ozone and ozone precursor monitoring activities to be performed to better understand area specific ozone issues. EPA approved MassDEP's PAMS implementation plan for Lynn (25-009-2006) on May 9, 2018; and approved MassDEP's Enhanced Monitoring Plan (EMP) on August 15, 2019. MassDEP continues to implement these plans.

At the Lynn site MassDEP monitors nitrogen oxides (NO_2 and NOy) and volatile organic compounds (VOCs), including carbonyl compounds (formaldehyde, acetaldehyde). MassDEP operates a Cavity Attenuated Phase Shift (CAPS) direct absorption NO_2 unit to measure NO_2 as an ozone precursor and a chemiluminescence analyzer with a remote NOy converter via umbilical to measure NOy. VOCs are measured by an hourly automated gas chromatograph (auto-GC) and carbonyl compounds are measured by collecting discrete 24-hour samples. MassDEP operates a ceilometer that uses pulsed diode lidar technology to measure cloud base and mixing heights in the atmosphere, which is important data for regional air quality pollutant modeling.

In accordance with its EMP, MassDEP continues to monitor ozone at the summit of Blue Hill in Milton (25-021-3003) to measure higher elevation ozone and monitors ozone in Fall River (25-005-1004), Fairhaven (25-005-1006), and Brockton (25-023-0005) to address higher ozone values that occur along the Massachusetts South Coast.

3. Total Reactive Nitrogen (NOy)

MassDEP operates NOy analyzers at Lynn (25-009-2006), Ware (25-015-4002) and Boston – Roxbury (25-025-0042) to meet PAMS and NCore requirements.

Total Reactive Nitrogen (NOy)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-009-2006	Lynn	Parkland Avenue	Boston-Cambridge-Newton MSA
25-015-4002	Ware	Quabbin Summit	Springfield MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

4. Air Toxics

Boston – Roxbury (25-025-0042) is a National Air Toxics Trend Station (NATTS), in addition to serving as an NCore site. NATTS is an EPA program comprised of monitoring stations across the country equipped to measure a wide range of toxic air pollutants, including metals, VOCs, carbonyls, black carbon and semi-volatile organic compounds (SVOCs). At the Boston – Roxbury site, MassDEP monitors black carbon, VOCs, carbonyls (formaldehyde and acetaldehyde), toxic metals (from PM_{10} filters), and polycyclic aromatic hydrocarbons (PAHs).

MassDEP also collects 24-hour VOC canister samples and 24-hour carbonyl cartridge samples every sixth day in Lynn, Chelsea, and Weymouth.

All VOC samples are sent to the Rhode Island Department of Health (RIDOH) Laboratory for analysis. All carbonyl samples are analyzed by MassDEP's Division of Environmental Analysis (DEA).

Volatile Organic Compounds (VOCs)			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-1004	Chelsea	Highland Park	Boston-Cambridge-Newton MSA
25-009-2006	Lynn	Parkland Avenue	Boston-Cambridge-Newton MSA
25-021-2005	Weymouth	Monatiquot Street	Boston-Cambridge-Newton MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

In addition to monitoring black carbon at the Boston-Roxbury NATTS site, MassDEP also monitors black carbon using aethalometers at the locations listed below. Monitoring black carbon is useful for characterizing wood smoke and diesel combustion emissions. MassDEP is in the process of adding two additional black carbon monitoring stations in EJ populations, one in or near Saugus and one in the Framingham area (these stations also will monitor $PM_{2.5}$).

Black Carbon			
ID Number	**City / Town**	**Location**	**CBSA**
25-025-0042	Boston - Roxbury	Harrison Avenue	Boston-Cambridge-Newton MSA
25-025-0044	Boston - Von Hillern	Von Hillern Street	Boston-Cambridge-Newton MSA
25-017-0010	Chelmsford	Manning Road	Boston-Cambridge-Newton MSA
25-011-2005	Greenfield	Veterans Field	Springfield MSA
25-003-6001	North Adams	Holden Street	Pittsfield MSA
25-003-0008	Pittsfield	Silver Lake Drive	Pittsfield MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA

CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

5. Enhanced Monitoring in Environmental Justice Communities

MassDEP continues to enhance its air monitoring and community-based air sensor efforts in or near EJ populations to determine existing air quality and opportunities to reduce pollution in overburdened areas.

MassDEP is in the process of adding two additional monitoring stations with $PM_{2.5}$ and black carbon monitors in EJ populations, one in or near Saugus and one in the Framingham area. MassDEP also is in the process of adding four UFP monitors to enhance particle pollution monitoring in or near urban EJ population areas near high traffic roadways. On April 23, 2024, MassDEP announced a second phase of a $PM_{2.5}$ air sensor grant program to provide tribal organizations, non-profit organizations, community-based organizations, and municipalities up to ten "PurpleAir" sensors at no cost to measure $PM_{2.5}$ levels in their local communities. MassDEP also announced plans to partner with 2-3 communities to deploy black carbon or multipollutant air sensors in or near EJ populations to assess and increase awareness of local air quality conditions, and identify strategies to reduce exposure to protect residents' health. The data collected by these monitors and sensors will increase public understanding of air quality and guide actions to reduce air pollution, especially in EJ populations.

6. Summary of Recent and Proposed Network Changes

The following are recent and planned changes to the air monitoring network:

- Due to a redevelopment project affecting the location of the Haverhill monitoring station (25-009-5005), in March 2024 MassDEP moved the station to the Haverhill High School (25-009-5006) at 137 Monument Street, approximately one mile north of the previous location. The new location will include the same measurements as the former location (ozone, $PM_{2.5}$, meteorological parameters).

- MassDEP plans to use Inflation Reduction Act (IRA) funds to add a $PM_{2.5}$ monitor at the Uxbridge monitoring station (25-027-0024) to satisfy new EPA $PM_{2.5}$ monitoring network design criteria that requires an additional $PM_{2.5}$ monitor in the Worcester MSA.

- MassDEP is in the process of establishing two additional monitoring stations with $PM_{2.5}$ and black carbon monitors in EJ populations, one in or near Saugus and one in the Framingham area.

- MassDEP is in the process of adding ultrafine particle (UFP) monitors at its monitoring stations in Boston-Von Hillern Street, Chelmsford, Boston-Chinatown, and Springfield.

Attachment 1

Monitoring Site Descriptions

This section provides descriptions of each monitoring site in the Massachusetts air monitoring network, including location, monitored parameters, monitoring objectives, and descriptive information.

Boston – Chinatown (25-025-0045)	
Address:	125 Kneeland Street, Boston
Latitude/Longitude:	42.349827, -71.059208
Parameters:	$PM_{2.5}$
Year Established:	2023 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Chinatown site was established in 2023 to provide population exposure monitoring. It is located in a mixed commercial and residential area on the roof of a single-story pump house building next to Reggie Wong Park. The site includes a continuous $PM_{2.5}$ T640 monitor.

Boston – Kenmore Square (25-025-0002)	
Address:	Kenmore Square, 590 Commonwealth Ave, Boston
Latitude/Longitude:	42.348940, -71.097708
Parameters:	SO_2, NO_2, NO, NO_x, $PM_{2.5}$, $PM_{2.5}$ filter (6 day)
Year Established:	1965 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Kenmore Square site was established in 1965 and provides a long historical record of air pollution trends in Boston. It is located in a commercial and residential area. The site includes continuous SO_2 and NO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor and $PM_{2.5}$ filters collected every 6th day.

Boston – Harrison Avenue (25-025-0042)	
Address:	1159 Harrison Avenue, Boston
Latitude/Longitude:	42.3295, -71.082619
Parameters:	O_3, CO, SO_2, NO_2, NO, NO_x, NO_y, $PM_{2.5}$, $PM_{2.5}$ filter (3 day), PM_{10} filter (3 day and 6 day), speciated $PM_{2.5}$, black carbon, toxics, VOCs (6 day), carbonyls (6 day), MET
Year Established:	1998 for population exposure (NCore since 2011)
CBSA:	Boston-Cambridge-Newton MSA

The Harrison Avenue site was established in 1998 to provide population exposure monitoring, and in 2011 it became the state's NCore location. It is located in a commercial and residential area. NCore is a multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases and meteorology. The site includes continuous O_3, CO, SO_2, NO_2 and NO_y monitors. Particulate measurements include a continuous $PM_{2.5}$ and PM_{10} T640x monitor, $PM_{2.5}$ filters collected every 3rd day, and collocated PM_{10} filters collected every 3rd day from the primary unit and every 6th day from the secondary unit, speciated $PM_{2.5}$, and black carbon. Toxics sampling is also conducted at this site in association with the NATTS program. NATTS parameters include VOCs, carbonyls, metals and PAHs.

Boston – Von Hillern Street (25-025-0044)	
Address:	19 Von Hillern Street, Boston
Latitude/Longitude:	42.32519, -71.0561
Parameters:	CO, NO_2, NO, NO_x, $PM_{2.5}$, $PM_{2.5}$ filter (6 day), black carbon, MET
Year Established:	2013 for near-road monitoring
CBSA:	Boston-Cambridge-Newton MSA

The Von Hillern site was established in 2013 as the first near-road sampling location in MassDEP's network and is sited to measure peak hourly NO_2 concentrations that are expected to occur in the near-road environment. This site is located in a commercial area, adjacent to a heavily traveled urban highway. The site includes continuous CO and NO_2 monitors. Particulate measurements include collocated continuous $PM_{2.5}$ T640 monitors, $PM_{2.5}$ filters collected every 6th day, and black carbon.

Brockton (25-023-0005)	
Address:	Gilmore School, 170 Clinton St., Brockton
Latitude/Longitude:	42.065131, -71.12667
Parameters:	O_3, $PM_{2.5}$
Year Established:	2013 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Brockton site was established in 2013. The site provides population exposure monitoring. It is located in a commercial and residential area, adjacent to a playground. The site includes a continuous O_3 monitoring. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor.

North Chelmsford (25-017-0009)	
Address:	EPA NERL, 11 Technology Drive, Chelmsford
Latitude/Longitude:	42.62692, -71.362128
Parameters:	O_3
Year Established:	2012 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The North Chelmsford site was established in 2005 by EPA and was added to the MassDEP network in 2012. The site provides population exposure monitoring. It is located in a mixed commercial and residential area, inside the EPA Northeast Regional Laboratory (NERL). The site includes a continuous O_3 monitor.

Chelmsford – Manning Road (25-017-0010)	
Address:	5 Manning Road, Chelmsford
Latitude/Longitude:	42.612156, -71.307255
Parameters:	O_3, NO_2, NO, NO_x, $PM_{2.5}$, black carbon
Year Established:	2018 for near-road monitoring
CBSA:	Boston-Cambridge-Newton MSA

The Chelmsford Manning Road site was established in 2018 as the second near-road sampling location in MassDEP's network. Sited to measure peak hourly NO_2 concentrations that are expected to occur in the near-road environment. This site is located in a residential area, adjacent to a heavily traveled urban highway. The site includes continuous NO_2 and O_3 monitors. The ozone monitor is for informational purposes and is not used to demonstrate compliance with NAQQS because it does not meet siting criteria regarding distance from roadways in 40 CFR Part 58 Appendix E. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor and black carbon.

Chelsea (25-025-1004)	
Address:	31 Willow Street, Chelsea (Highland Park)
Latitude/Longitude:	42.387222, -71.026111
Parameters:	$PM_{2.5}$, VOCs (6 day), carbonyls (6 day)
Year Established:	2021 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Chelsea site was established in 2021 to provide population exposure monitoring. It is located in Highland Park, in a mixed commercial and residential area. The site includes a continuous $PM_{2.5}$ T640 monitor, VOCs (6 day), and carbonyls (6 day).

Chicopee (25-013-0008)	
Address:	Anderson Road, Chicopee (Westover AFB)
Latitude/Longitude:	42.194444, -72.555628
Parameters:	O_3, NO_2, NO, NO_x, $PM_{2.5}$, speciated $PM_{2.5}$, MET
Year Established:	1983 for population exposure
CBSA:	Springfield MSA

The Chicopee site was established in 1983 to provide population exposure monitoring. It is located at the Westover Air Reserve Base. The site includes continuous O_3 and NO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor and speciated $PM_{2.5}$.

Fairhaven (25-005-1006)	
Address:	Hastings Middle School, 30 School Street, Fairhaven
Latitude/Longitude:	41.645403, -70.898402
Parameters:	O_3, MET
Year Established:	2013 for population exposure and ozone transport monitoring
CBSA:	Providence-Warwick MSA

The Fairhaven site was established in 2013 as a replacement for a previous site at the Wood School in Fairhaven. The site provides population exposure and ozone transport monitoring. It is located in a mixed commercial and residential area, adjacent to a school. The site includes a continuous O_3 monitor.

Fall River (25-005-1004)	
Address:	659 Globe Street, Fall River
Latitude/Longitude:	41.685728, -71.169764
Parameters:	O_3, SO_2, $PM_{2.5}$
Year Established:	1975 for population exposure monitoring
CBSA:	Providence-Warwick MSA

The Fall River site was established in 1975 to provide population exposure monitoring. It is located at a fire department station, in a mixed commercial and residential area, adjacent to a recreational park. The site includes continuous O_3 and SO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor.

Greenfield (25-011-2005)	
Address:	16 Barr Avenue, Greenfield
Latitude/Longitude:	42.605832, -72.596647
Parameters:	O_3, $PM_{2.5}$, $PM_{2.5}$ filter (6 day), black carbon, MET
Year Established:	2014 for population exposure monitoring
CBSA:	Springfield MSA

The Greenfield site was established in 2014 to provide population exposure monitoring. It is located in a residential area, adjacent to a school. The site includes a continuous O_3 monitor. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor, $PM_{2.5}$ filters collected every 6th day, and black carbon.

Haverhill (25-009-5006)	
Address:	Haverhill High School, 137 Monument Street, Haverhill
Latitude/Longitude:	42.784950, -71.106991
Parameters:	O_3, $PM_{2.5}$, MET
Year Established:	2024 for population exposure monitoring
CBSA:	Boston-Cambridge-Newton MSA

MassDEP established an air monitoring site in Haverhill in 1994 to provide population exposure monitoring. In 2024, the site was moved to the current location at Haverhill High School. It is located in a residential area, adjacent to a school. The site includes a continuous O_3 monitor. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor.

Lynn (25-009-2006)	
Address:	390 Parkland Avenue, Lynn
Latitude/Longitude:	42.474671, -70.971358
Parameters:	O_3, NO_2, NO_y, $PM_{2.5}$, VOCs (6 day), carbonyls (6 day), auto-GC, MET
Year Established:	1983 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Lynn site was established in 1992 as a PAMS station as well as for population exposure monitoring. It is located in a residential area, adjacent to a public water supply. The site includes continuous O_3, NO_2, and NO_y monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor. NO_2 is measured directly with a Cavity Attenuated Phase Shift (CAPS) analyzer which does not rely on conversion of NO_2 to another species and therefore does not record NO or NOx values. However, the NO_y analyzer measures trace-level NO, NO_2, and NOx. Year round 24-hour VOC and carbonyl samples are collected every 6th day. During PAMS season, three sequential 8-hour carbonyl samples are collected every 3rd day and speciated VOCs are monitored continuously by automatic gas chromatograph (auto-GC).

Milton - Blue Hill (25-021-3003)	
Address:	Blue Hill Observatory, 1904 Canton Ave, Milton
Latitude/Longitude:	42.2118, -71.114506
Parameters:	O_3, NO, NO_2, NO_x, MET
Year Established:	2002
CBSA:	Boston-Cambridge-Newton MSA

The Blue Hill site was established in 2002 and provides population exposure monitoring. It is located on a hilltop next to a weather observatory. The site includes continuous O_3 and NO_2 monitors.

North Adams (25-003-6001)	
Address:	86 Holden Street, North Adams
Latitude/Longitude:	42.702191, -73.110485
Parameters:	$PM_{2.5}$, black carbon
Year Established:	2017 for population exposure monitoring
CBSA:	Springfield MSA

The North Adams site was established in 2017 to monitor the effects of wood smoke in a valley environment. It is located in a mixed residential and commercial area. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor and black carbon.

Pittsfield (25-003-0008)	
Address:	25 Silver Lake Drive
Latitude/Longitude:	42.453035, -73.238776
Parameters:	O_3, NO, NO_2, NO_x, $PM_{2.5}$, black carbon, MET
Year Established:	2018 for population exposure
CBSA:	Pittsfield MSA

The Pittsfield site was established in August 2018 to provide population exposure monitoring. It is located in a mixed commercial and residential area. The site includes a continuous O_3 and NO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor and black carbon.

Springfield (25-013-0018)	
Address:	600 Liberty Street
Latitude/Longitude:	42.120163, -72.585146
Parameters:	SO_2, NO, NO_2, NO_x, $PM_{2.5}$, $PM_{2.5}$ filter (6 day), black carbon
Year Established:	2018 for population exposure
CBSA:	Springfield MSA

The Springfield site was established in May 2018 as a replacement for a previous site at 165 Liberty Street in Springfield. The site provides population exposure monitoring. It is located in a mixed commercial and residential area. The site includes continuous SO_2, and NO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ T640 monitor, $PM_{2.5}$ filter samples collected every 6th day, and black carbon.

Truro (25-001-0002)	
Address:	6 Collins Road, Truro (Fox Bottom Area)
Latitude/Longitude:	41.975833, -70.024167
Parameters:	O3, speciated $PM_{2.5}$, MET
Year Established:	1987 for population exposure and ozone transport monitoring
CBSA:	Barnstable MSA

The Truro site was established in 1987 to provide population exposure and ozone transport monitoring. It is located in a rural area adjacent to conservation land. The site includes a continuous O_3 monitor. Particulate measurements include speciated $PM_{2.5}$ via the IMPROVE program.

Uxbridge (25-027-0024)	
Address:	366 East Hartford Avenue, Uxbridge
Latitude/Longitude:	42.099722, -71.619917
Parameters:	O_3, MET
Year Established:	2008 for population exposure and ozone transport monitoring
CBSA:	Worcester MSA

The Uxbridge site was established in 2008 to provide population exposure and ozone transport monitoring. It is located in a residential area, adjacent to a park. The site includes a continuous O_3 monitor.

Ware (25-015-4002)	
Address:	36 Skyline Drive, Ware (Quabbin Summit)
Latitude/Longitude:	42.298514, -72.334575
Parameters:	O_3, SO_2, NO, NO_2, NO_x, NO_y, $PM_{2.5}$, PM_{10} (6 day), MET
Year Established:	1985 for population exposure
CBSA:	Springfield MSA

The Ware site was established in 1985. It provides population exposure and is located in a rural area adjacent to the Quabbin reservoir. The site includes continuous O_3, SO_2, NO_2, NO_y monitors. Particulate measurements include a continuous $PM_{2.5}$ and PM_{10} T640x monitor.

Weymouth (25-021-2005)	
Address:	59 Monatiquot Street
Latitude/Longitude:	42.241229, -70.963346
Parameters:	O_3, NO, NO_2, NO_x, $PM_{2.5}$, VOCs (6 day), carbonyls (6 day), MET
Year Established:	2021 for population exposure
CBSA:	Boston-Cambridge-Newton MSA

The Weymouth site was established in 2021 to provide population exposure. It is located in a mixed commercial and residential area. The site currently measures continuous O_3, NO_2, VOCs (6 day), and carbonyls (6 day). Particulate measurements include a continuous $PM_{2.5}$ T640 monitor.

Worcester – Airport (25-027-0015)	
Address:	375 Airport Drive, Worcester
Latitude/Longitude:	42.274342, -71.876022
Parameters:	O_3, MET
Year Established:	1979 for population exposure monitoring
CBSA:	Worcester MSA

The Worcester – Airport site was established in 1979 to provide population exposure monitoring. It is located in a commercial area, adjacent to an airport. The site includes a continuous O_3 monitor.

Worcester – Summer Street (25-027-0023)	
Address:	Summer Street, Worcester
Latitude/Longitude:	42.263978, -71.794836
Parameters:	CO, SO_2, NO, NO_2, NO_x, $PM_{2.5}$, PM_{10} filter (6 day), RadNet
Year Established:	2004 for population exposure monitoring
CBSA:	Worcester MSA

The Worcester – Summer Street site was established in 2004 as a replacement for a previous site in downtown Worcester and provides population exposure monitoring. It is located in an urban commercial and residential area, adjacent to several major roadways. The site includes continuous CO, SO_2 and NO_2 monitors. Particulate measurements include a continuous $PM_{2.5}$ and PM_{10} T640x monitor. The site also includes a continuous atmospheric radiation sampler (RadNet).

Aquinnah – Wampanoag Tribe (25-007-0001)	
Address:	1 Herring Creek Road, Aquinnah (Martha's Vineyard)
Latitude/Longitude:	41.330489, -70.785764
Parameters:	O3, speciated $PM_{2.5}$
Year Established:	2004 for ozone transport monitoring
CBSA:	Vineyard Haven MiSA

The Aquinnah site was established in 2004 for ozone transport monitoring. It is located in a rural area adjacent to Menemsha Pond. The site includes a continuous O_3 monitor. Particulate measurements include speciated $PM_{2.5}$ via the IMPROVE program.