Massachusetts 2021 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 2021 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 23 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.

If you have questions about this Network Plan please contact:

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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/m³..... micrograms per cubic meter
VOCs ..... Volatile Organic Compounds
WS/WD..... Wind Speed/Wind Direction
WSv/WDv ..... Wind Speed/Wind Direction Vector

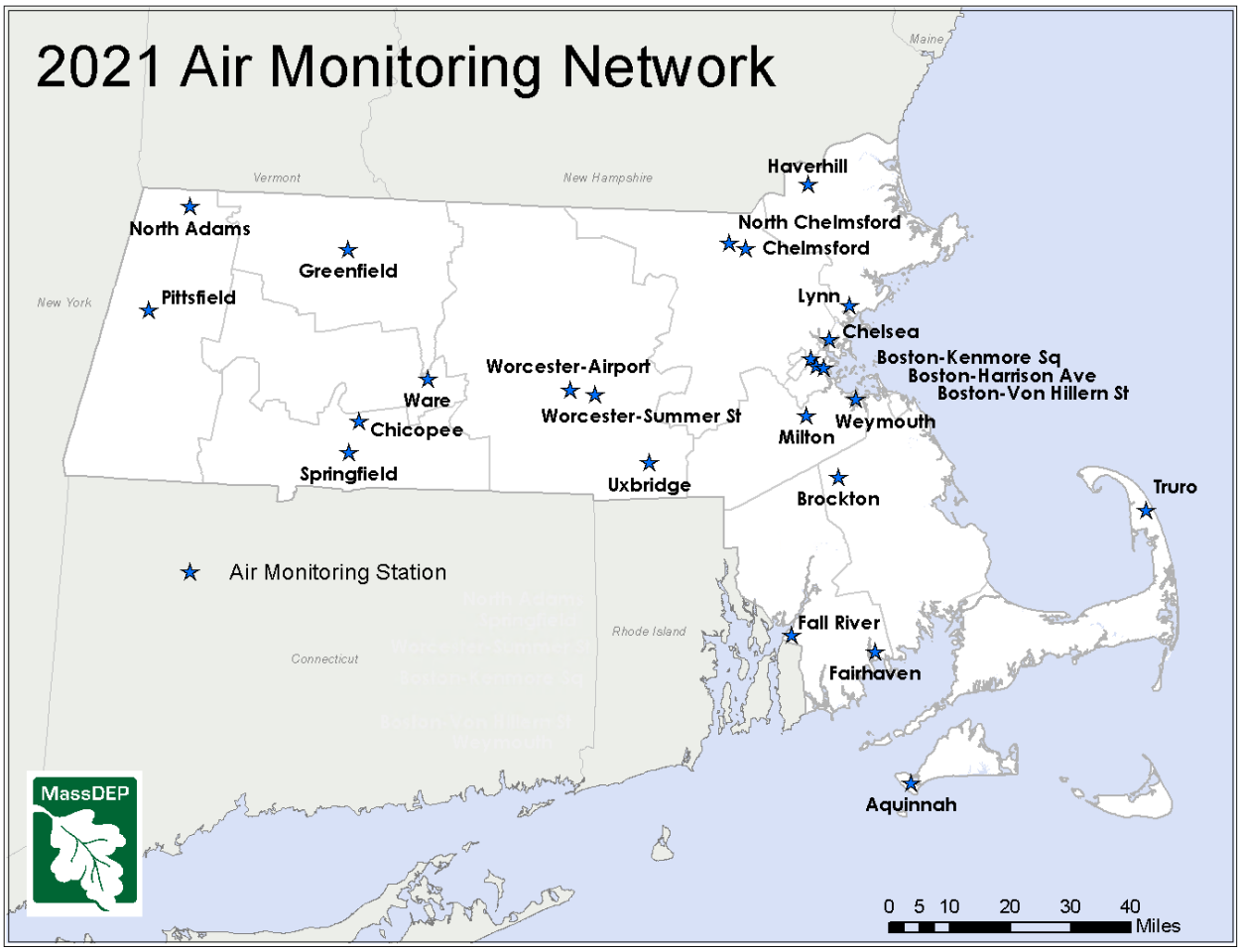

Figure 1 - 2021 Air Monitoring Network

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-hour	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-hr daily maximum concentrations, averaged over 3 years
	primary and secondary	Annual	53 ppb	Annual Mean
Ozone	primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution $PM_{2.5}$	primary	Annual	12 µg/m^3	annual mean, averaged over 3 years
	secondary	Annual	15 µg/m^3	annual mean, averaged over 3 years
	primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
Particle Pollution PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	primary	1-hour	75 ppb	99th percentile of 1-hr daily maximum concentrations, averaged over 3 years
	secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

µg/m³ = micrograms per cubic meter
ppm = parts per million
ppb = parts per billion

1.1 Ozone (O_3)

MassDEP operates 17 ozone monitoring stations at the locations listed below. The Wampanoag Tribe of Gay Head (Aquinnah) on Martha's Vineyard operates one additional ozone monitor in Aquinnah. In April 2021, MassDEP began ozone monitoring in Weymouth (25-021-2005). The existing ozone monitoring network meets EPA monitoring requirements for the ozone NAAQS. MassDEP is not planning additional changes to the ozone monitoring network in 2021. Note that the ozone monitor at the Chelmsford Near Road site (25-017-0010) on Manning Road is for informational purposes 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.

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
25-009-5005	Haverhill	Consentino 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.

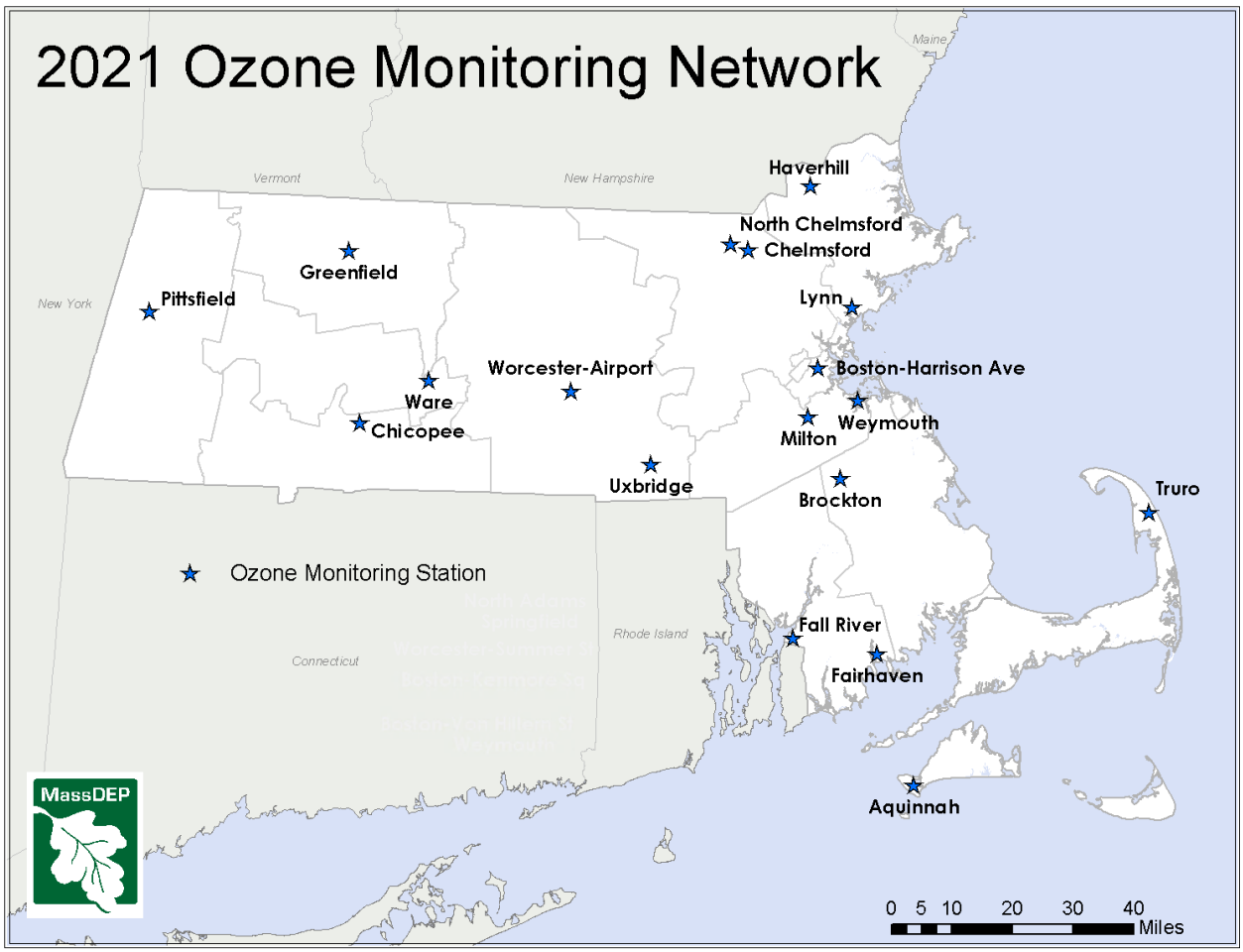

Figure 2 - Ozone Monitoring Network

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 2021.

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

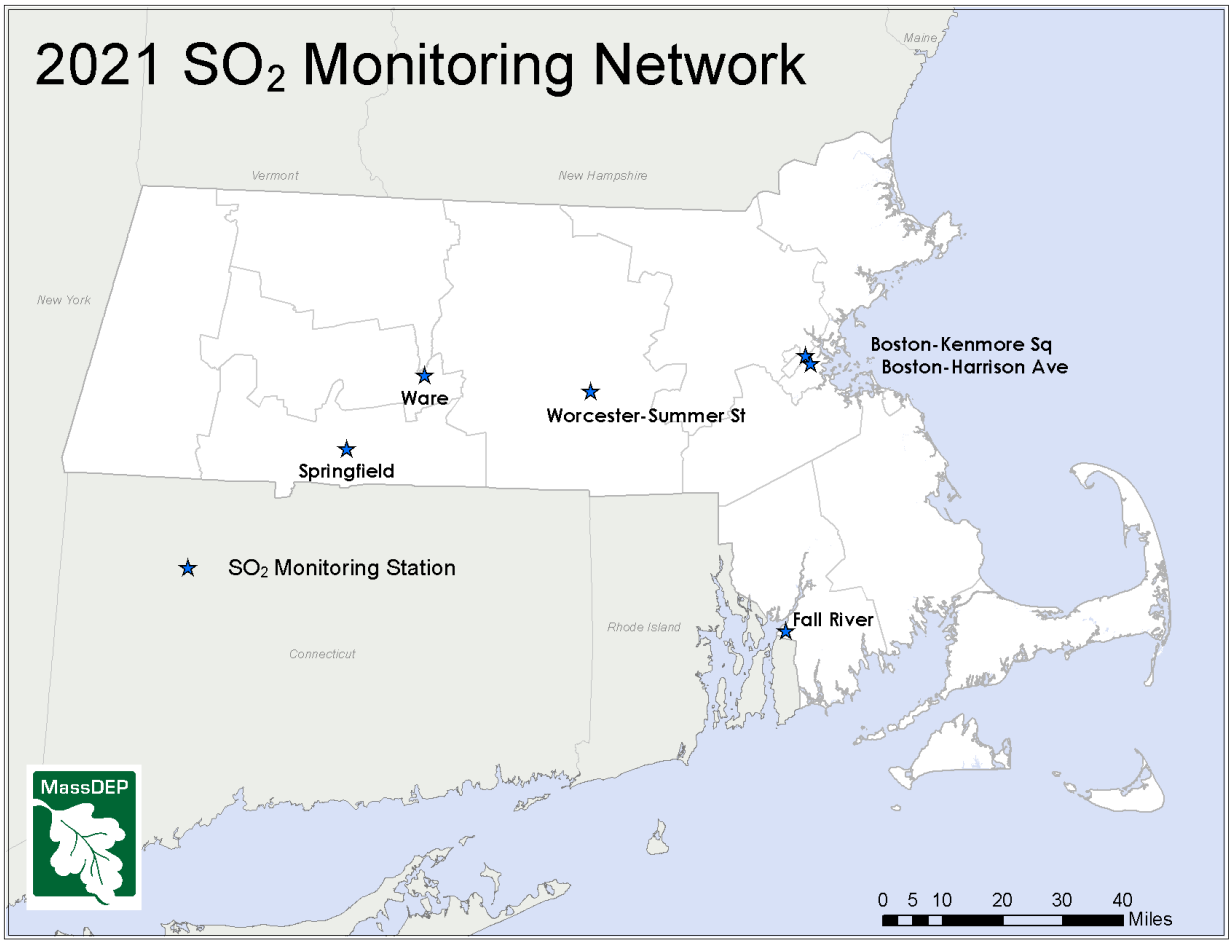

Figure 3 - Sulfur Dioxide Monitoring Network

1.3 Nitrogen Dioxide (NO_2)

MassDEP operates 11 nitrogen dioxide (NO_2) monitors at the locations listed below. NO_2 monitors measure NO_2 and nitrogen oxides (NOx), which is NO_2 plus nitric oxide (NO). NO_2 is monitored for NO_2 NAAQS compliance and as an ozone precursor. MassDEP operates 10 regular NO_2 monitors to determine compliance with the NAAQS, including the near-road monitors in Boston (Von Hillern Street) and Chelmsford. In August 2019, MassDEP replaced the regular NO_2 monitor at Lynn (25-009-2006) with a direct absorption NO_2 unit to measure NO_2 as an ozone precursor. EPA has designated three monitors (Boston – Roxbury, Boston – Kenmore, and Springfield) as representing susceptible and vulnerable populations. In April 2021, MassDEP began NO_2 monitoring in Weymouth (25-021-2005). The existing NO_2 monitoring network meets EPA monitoring requirements for the NO_2 NAAQS. MassDEP is not planning additional changes in 2021.

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
25-013-0018	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.

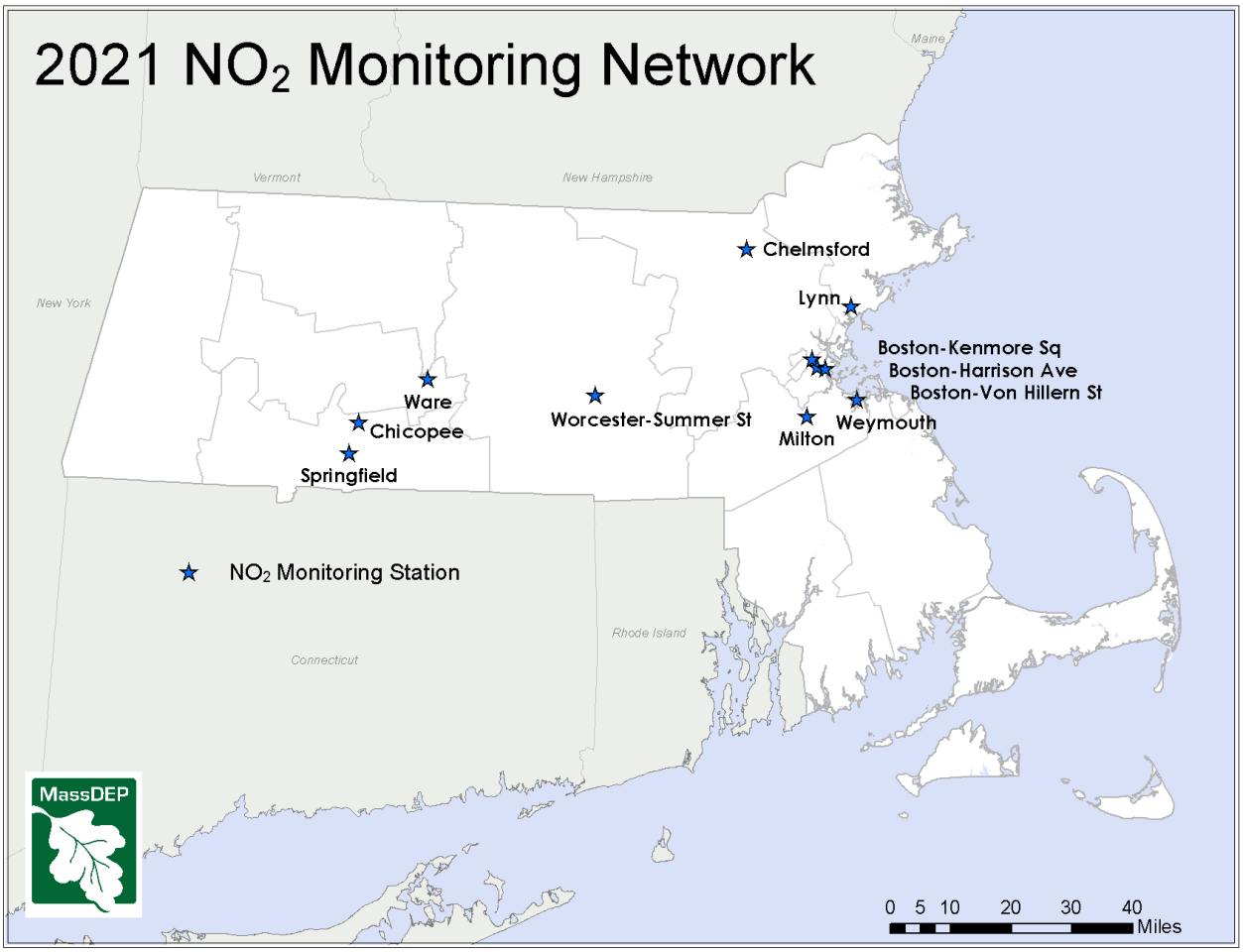

Figure 4 - Nitrogen Dioxide Monitoring Network

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 2021.

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

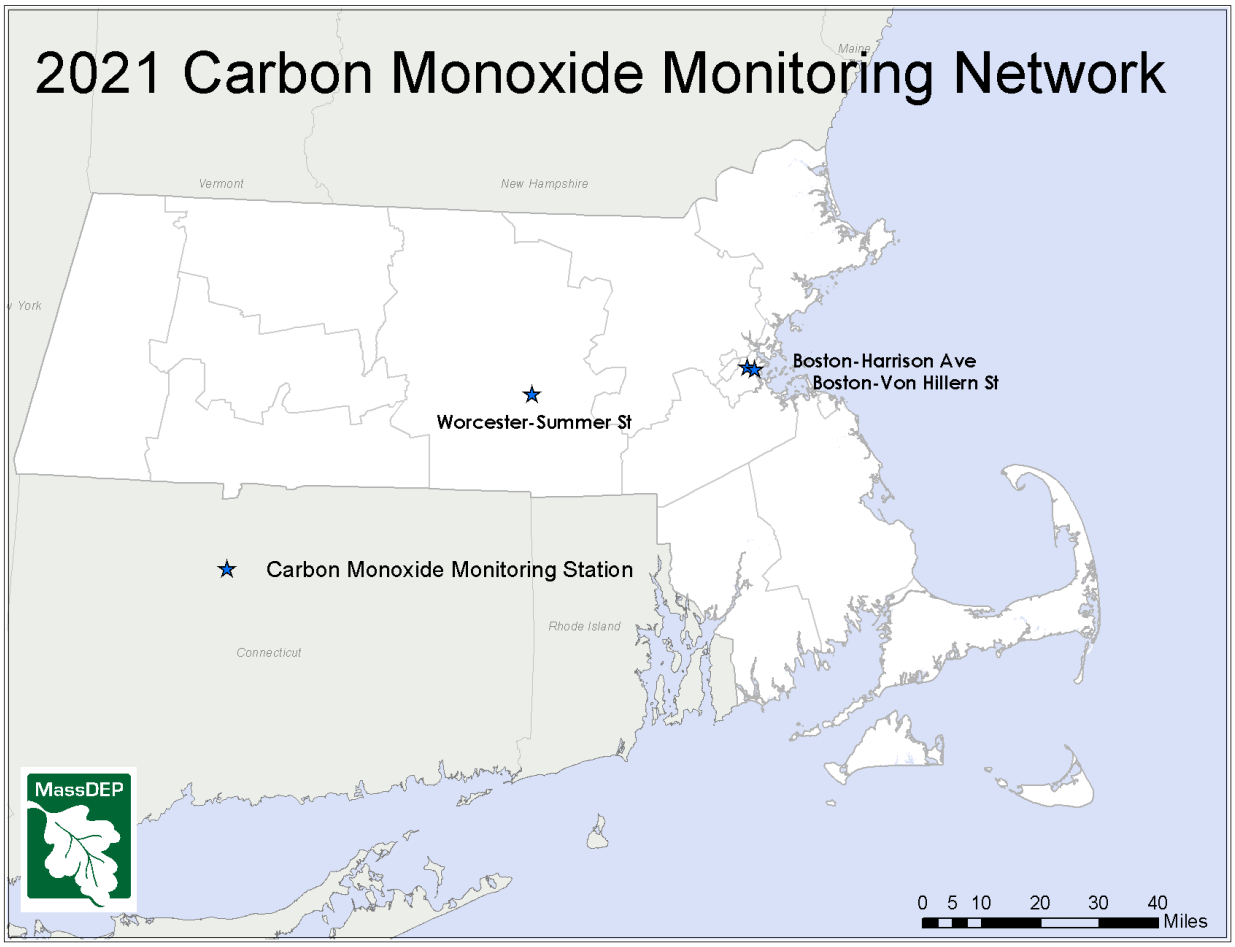

Figure 4 - Carbon Monoxide Monitoring Network

1.5 Particulate Matter (PM)

PM_{10}

MassDEP operates three PM_{10} monitoring stations listed below, which includes collocated monitors at the Boston - Roxbury NCore site for quality assurance purposes. PM_{coarse} concentrations are calculated using data from PM_{10} monitors and $PM_{2.5}$ monitors at the Boston – Roxbury site, which is an NCore requirement. These samples are also used 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 changes to the PM_{10} monitoring network in 2021.

PM_{10} (Low Volume)			
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 monitors (Collocated)

[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).

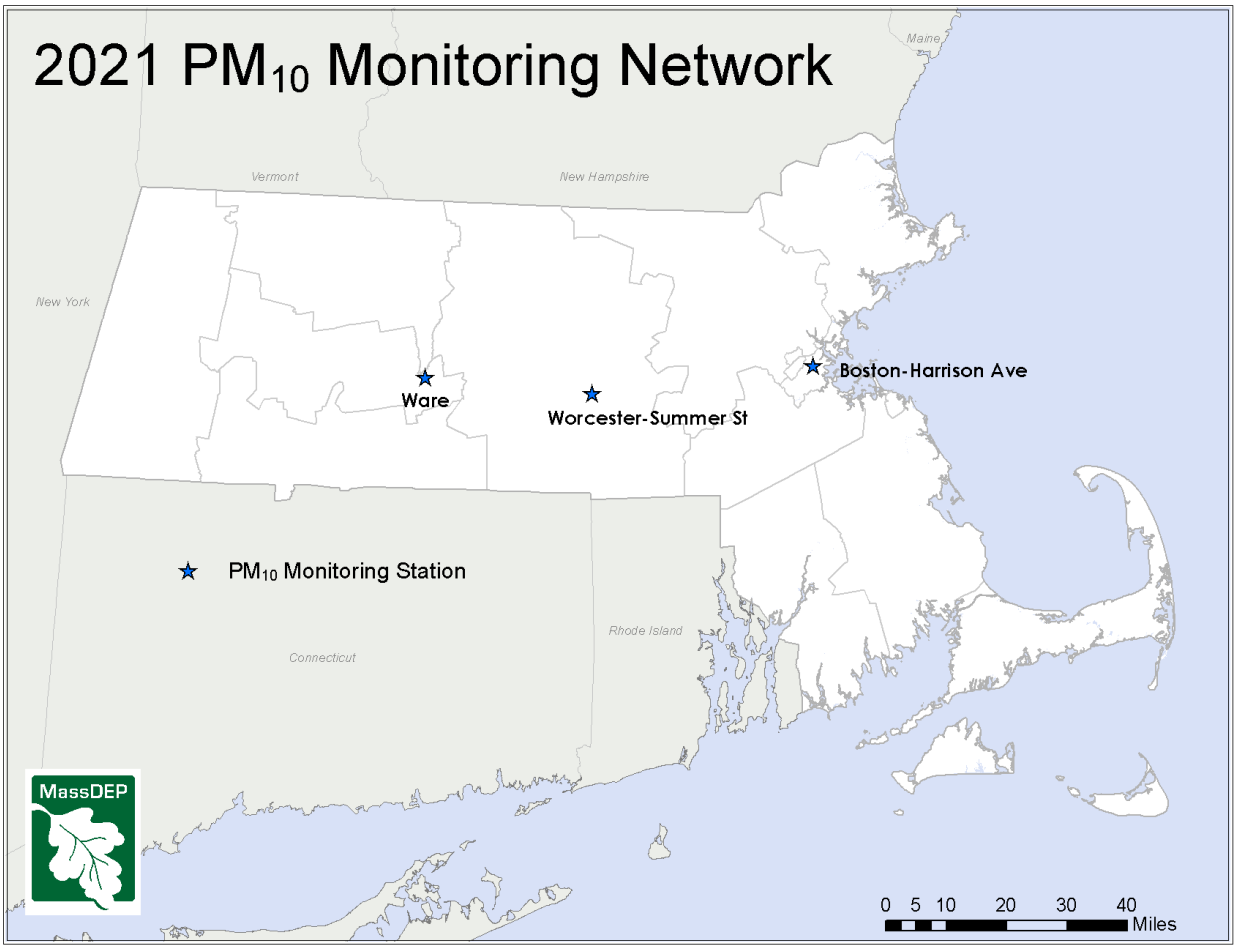

Figure 5 - PM_{10} Monitoring Network

$PM_{2.5}$

Continuous Monitors: MassDEP operates 17 continuous fine particulate matter ($PM_{2.5}$) monitoring stations listed below, which includes collocated monitors at Boston – Von Hillern (25-025-0044) for quality assurance purposes for FEM/FEM comparability. In addition, FRM filter-based units are also used for quality assurance purposes with these continuous $PM_{2.5}$ methods. All of MassDEP's continuous $PM_{2.5}$ monitors have a Federal Equivalent Method (FEM) designation 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. The existing $PM_{2.5}$ monitoring network meets EPA monitoring requirements for the $PM_{2.5}$ NAAQS. In April 2021, MassDEP established a continuous $PM_{2.5}$ monitor in Chelsea (25-025-1004) and replaced the continuous $PM_{2.5}$ monitor at the temporary Weymouth – Bridge Street site (25-021-2004) with a continuous $PM_{2.5}$ monitor at the new permanent Weymouth – Monatiquot Street site (25-021-2005). MassDEP plans to establish a new continuous $PM_{2.5}$ monitoring station in the Chinatown neighborhood of Boston in 2021.

Continuous $PM_{2.5}$ Monitors			
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[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
25-009-5005	Haverhill	Consentino 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 monitors (Collocated)
CBSA = Core Based Statistical Area
MSA = Metropolitan Statistical Area

Filter-Based Monitors: MassDEP operates six $PM_{2.5}$ Federal Reference Method (FRM) monitors at the locations listed below. In January 2021, MassDEP discontinued filter-based monitoring at Brockton (25-023-0005), Haverhill (25-009-5005), Worcester – Summer Street (25-027-0023) and Chicopee (25-013-0008). MassDEP will rely on the primary continuous $PM_{2.5}$ monitors at each of these sites for determining NAAQS compliance.

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
25-003-0008	Pittsfield	Silver Lake Drive	Pittsfield MSA
25-013-0018	Springfield	Liberty Street	Springfield MSA

[1] Two monitors (collocated)
CBSA = Core Based Statistical Area
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$PM_{2.5}$ Collocated Quality Control 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 - beta attenuation monitors (BAMs) and T640 scattered light spectrometry (T640) 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**
25-025-0002	Boston - Kenmore	FEM (T640)	FRM (3 day)	N/A
25-025-0042	Boston - Roxbury	FEM (BAM)	FRM (3 day)	N/A
25-025-0044	Boston - Von Hillern	FEM (BAM)	FEM (BAM)	FRM (6 day)
25-023-0005	Brockton	FEM (BAM)	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 (BAM)	FRM (3 day)	N/A
25-009-5005	Haverhill	FEM (BAM)	N/A	N/A
25-009-2006	Lynn	FEM (BAM)	N/A	N/A
25-003-6001	North Adams	FEM (BAM)	N/A	N/A
25-003-0008	Pittsfield	FEM (BAM)	FRM (3 day)	N/A
25-013-0018	Springfield	FEM (BAM)	FRM (6 day)	N/A
25-015-4002	Ware	FEM (BAM)	N/A	N/A
25-021-2005	Weymouth	FEM (T640)	N/A	N/A
25-027-0023	Worcester	FEM (BAM)	N/A	N/A

N/A = Not applicable. Collocation not required.

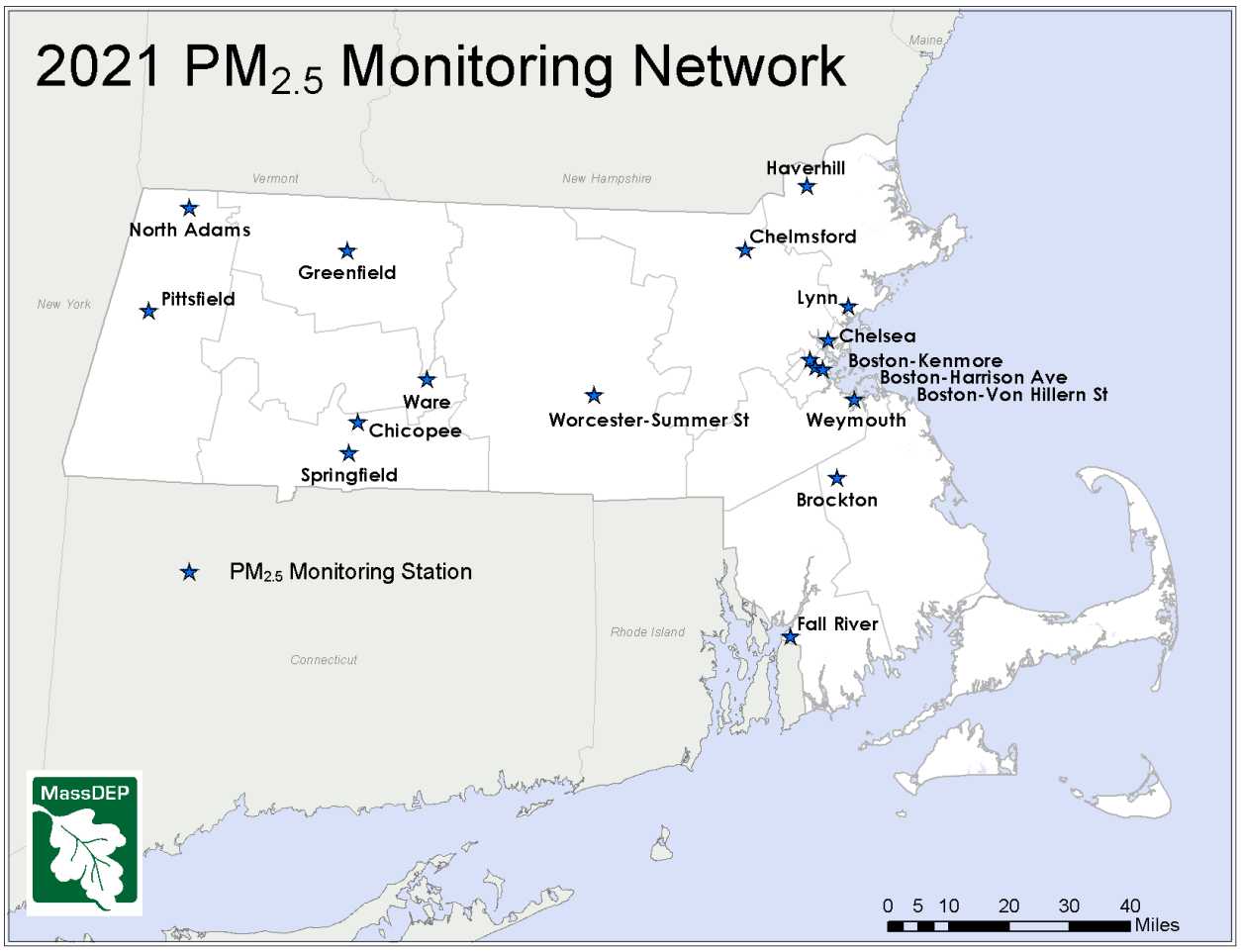

Figure 6 - $PM_{2.5}$ Monitoring Network

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	Truro	Fox Bottom Area	Barnstable MSA
25-007-0001	Aquinnah	Wampanoag Tribe	Vineyard Haven MiSA

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PM_{coarse}

MassDEP uses FRM for PM_{coarse} in compliance with NCore requirements at the Boston – Roxbury (25-025-0042) NCore site. This method consists of the subtraction of $PM_{2.5}$ values from PM_{10} values at a site that has side-by-side samplers of each type sampling on the same dates.

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.

2. Photochemical Assessment Monitoring Stations

MassDEP operates an enhanced ozone Photochemical Assessment Monitoring Stations (PAMS) in Lynn (25-009-2006). PAMS are designed to measure ozone precursors and meteorological parameters in order to provide data about ozone formation and the effect of precursor controls on ozone production. At the Lynn site MassDEP monitors nitrogen oxides and volatile organic compounds (VOCs), including carbonyl compounds (formaldehyde, acetaldehyde). These are measured by taking discrete 24-hour samples and by operating an hourly automated gas chromatograph (auto-GC). In January 2020, MassDEP installed a NOy analyzer at the Lynn site, and in May 2020, MassDEP installed a ceilometer that uses a laser to measure cloud base and mixing heights in the atmosphere, which is important data for regional air quality pollutant modeling. MassDEP plans to conduct PAMS monitoring in accordance with the approved Implementation Plan and Enhanced Monitoring Plan (EMP) by the June 1, 2021 start date.

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

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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. Lynn (25-009-2006) serves as a Boston Area background location. In April 2021, MassDEP began collecting VOC and carbonyl samples at the new Chelsea site (25-025-1004). Also in April 2021, MassDEP replaced VOC and carbonyl samples at the temporary Weymouth – Bridge Street site (25-021-2004) with VOC and carbonyl samples at the new permanent Weymouth – Monatiquot Street site (25-021-2005).

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

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MSA = Metropolitan Statistical Area

Although black carbon is not a criteria pollutant, it is useful for characterizing wood smoke and diesel combustion emissions; therefore, MassDEP monitors black carbon using aethalometers at the following locations:

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

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5. Enhanced Monitoring in Environmental Justice Communities

With grant funding from EPA Region 1, MassDEP is working with City of Chelsea officials and local citizens to characterize local air quality and emissions reduction and mitigation strategies to protect human health. Significant portions of Chelsea are identified as Environmental Justice (EJ) communities and have been disproportionally affected by COVID-19. Sources of air pollution in and around Chelsea include industrial properties, Logan Airport, petroleum storage, cargo ships, and vehicle travel on major roadways.

In April 2021, MassDEP established a new monitoring station in Chelsea that includes a continuous $PM_{2.5}$ monitor and collection of 24-hour VOC canister samples and 24-hour carbonyl cartridge samples every sixth day. In addition, working with the community, MassDEP deployed ten small (non-regulatory) $PM_{2.5}$ sensors throughout the City of Chelsea. The sensors will operate for at least 1 year.

The monitoring data will be used to evaluate potential sources of pollution, as well as mitigation strategies to protect human health. Data from both the $PM_{2.5}$ monitor and $PM_{2.5}$ sensors will be displayed on EPA's AirNow website. Data from the sensors will not be used for comparison to $PM_{2.5}$ NAAQS because they do not meet the precision and accuracy standards required for regulatory monitors. However, these sensors can help identify areas of the city with higher levels of $PM_{2.5}$ pollution.

MassDEP is expanding the use of small $PM_{2.5}$ sensors through a new MassDEP grant program that will make up to 10 sensors available to individual communities across the Commonwealth to place throughout their city or town, with a focus on helping Environmental Justice communities identify sources of pollution so that emissions reduction and mitigation strategies can be taken to protect residents' health.

6. Summary of Recent and Proposed Network Changes

MassDEP made the following recent changes to the monitoring network:

- In January 2021, MassDEP discontinued filter-based monitors at Brockton (25-023-0005), Haverhill (25-009-5005), Worcester – Summer Street (25-027-0023) and Chicopee (25-013-0008). MassDEP will rely on the primary continuous $PM_{2.5}$ monitors at each of these sites.

- In April 2021, MassDEP replaced the temporary Weymouth – Bridge Street site (25-021-2004) with the Weymouth – Monatiquot Street site (25-021-2005). In addition to a continuous $PM_{2.5}$ monitor, VOC samples and carbonyl samples, the new site includes continuous ozone and NO_2 monitoring.

- In April 2021, MassDEP established a new monitoring station in Chelsea (25-025-1004) with a continuous $PM_{2.5}$ monitor and VOC samples and carbonyl samples collected every sixth day. MassDEP also deployed ten mobile (non-regulatory) $PM_{2.5}$ sensors throughout Chelsea to characterize local air quality. MassDEP is evaluating opportunities to expand the use of mobile $PM_{2.5}$ sensors in additional Environmental Justice areas.

- In May 2021, MassDEP installed a ceilometer at Lynn (25-009-2006) and plans to conduct PAMS monitoring in accordance with the approved Implementation Plan and Enhanced Monitoring Plan (EMP) by the June 1, 2021 start date.

MassDEP plans to make the following changes to the monitoring network:

- MassDEP plans to establish a new $PM_{2.5}$ monitoring station in the Chinatown neighborhood of Boston.

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 – Kenmore Square (25-025-0002)	
Address:	Kenmore Square, 590 Commonwealth Ave, Boston
Latitude/Longitude:	42.34894, -71.097708
Parameters:	SO_2, NO_2, NO, NO_x, $PM_{2.5}$, $PM_{2.5}$ filter (3 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 3rd 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 $PM_{2.5}$ beta attenuation monitor (BAM), $PM_{2.5}$ 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 (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 $PM_{2.5}$ BAM 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 $PM_{2.5}$ BAM monitor.

North Chelmsford (25-017-0009)	
Address:	EPA NERL, 11 Technology Drive, Chelmsford
Latitude/Longitude:	42.626925, -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 June 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 (3 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 $PM_{2.5}$ BAM monitor, $PM_{2.5}$ filters collected every 3rd day, and black carbon.

Haverhill (25-009-5005)	
Address:	Consentino School, 685 Washington Street, Haverhill
Latitude/Longitude:	42.770867, -71.102831
Parameters:	O_3, $PM_{2.5}$, MET
Year Established:	1994 for population exposure monitoring
CBSA:	Boston-Cambridge-Newton MSA

The Haverhill site was established in 1994 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 $PM_{2.5}$ BAM 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 $PM_{2.5}$ BAM 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 $PM_{2.5}$ BAM monitor and black carbon.

Pittsfield (25-003-0008)	
Address:	25 Silver Lake Drive
Latitude/Longitude:	42.453035, -73.238776
Parameters:	O_3, $PM_{2.5}$, $PM_{2.5}$ filter (3 day), 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 monitor. Particulate measurements include a continuous $PM_{2.5}$ BAM monitor, $PM_{2.5}$ filters collected every 3rd day, 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 $PM_{2.5}$ BAM 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 $PM_{2.5}$ BAM monitor and PM_{10} filters collected every 6th day.

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 $PM_{2.5}$ BAM monitor and PM_{10} filters collected every 6th day. 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.