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Draft

Massachusetts 2018 Air Monitoring Network Plan

**Air Assessment Branch
Bureau of Air and Waste**

November 14, 2018

This is the Draft Massachusetts 2018 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.

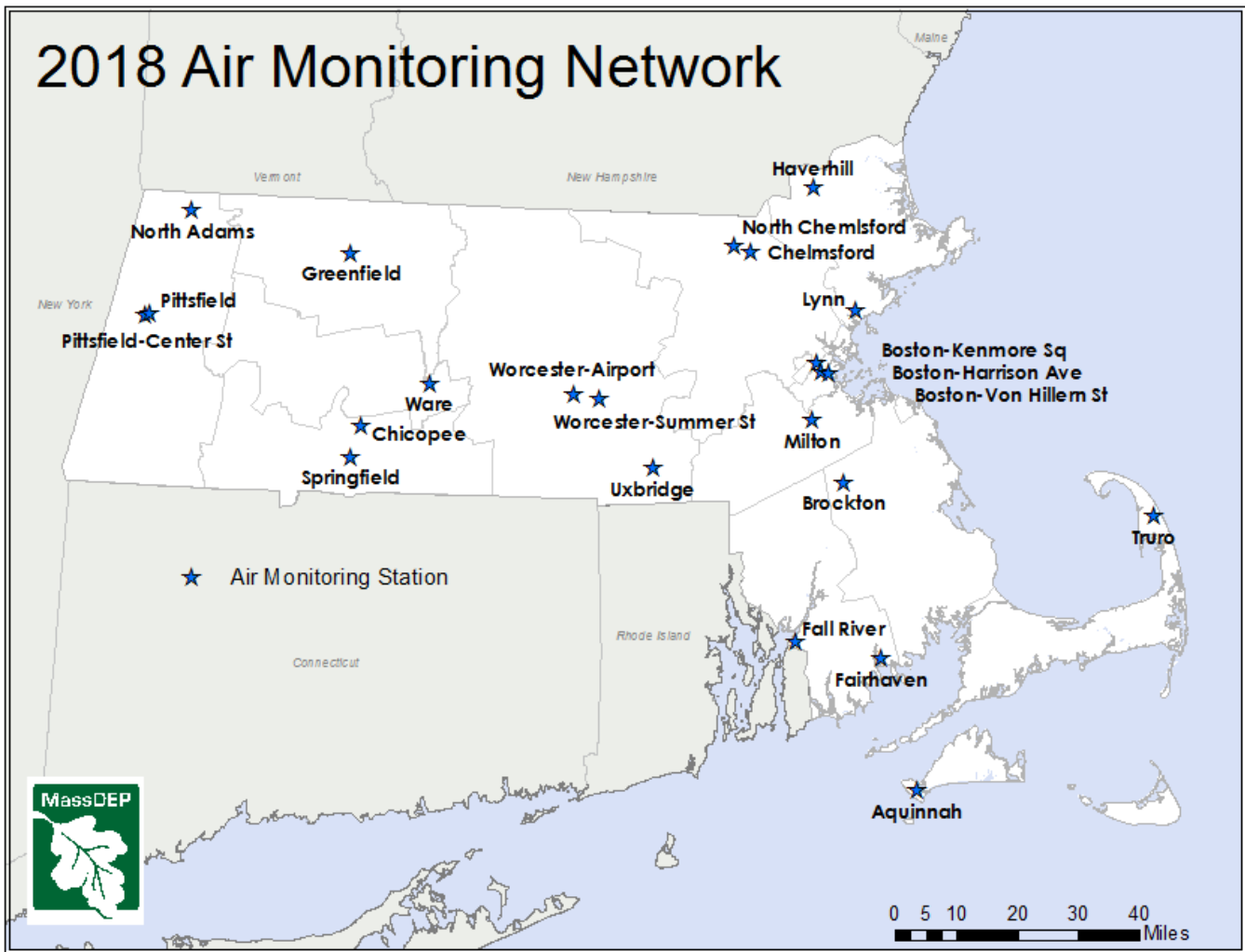
MassDEP operates a network of 22 ambient air quality monitoring stations in 17 communities located across the state. The Wampanoag Tribe of Gay Head (Aquinnah) on Martha's Vineyard operates an ozone monitoring station. MassDEP and the Wampanoag Tribe are members of the same Primary Quality Assurance 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. This Draft Network Plan reviews MassDEP's ambient air monitoring network to determine 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.

MassDEP is holding a 30-day public comment period on this Draft Network Plan, which is posted on MassDEP's website at <http://www.mass.gov/dep/public/netplan.htm>. Public comments on this draft 2018 Network Plan should be submitted via email or mail by December 14, 2018 to:

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2018 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 (PM₁₀ 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, 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	
	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-hour 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

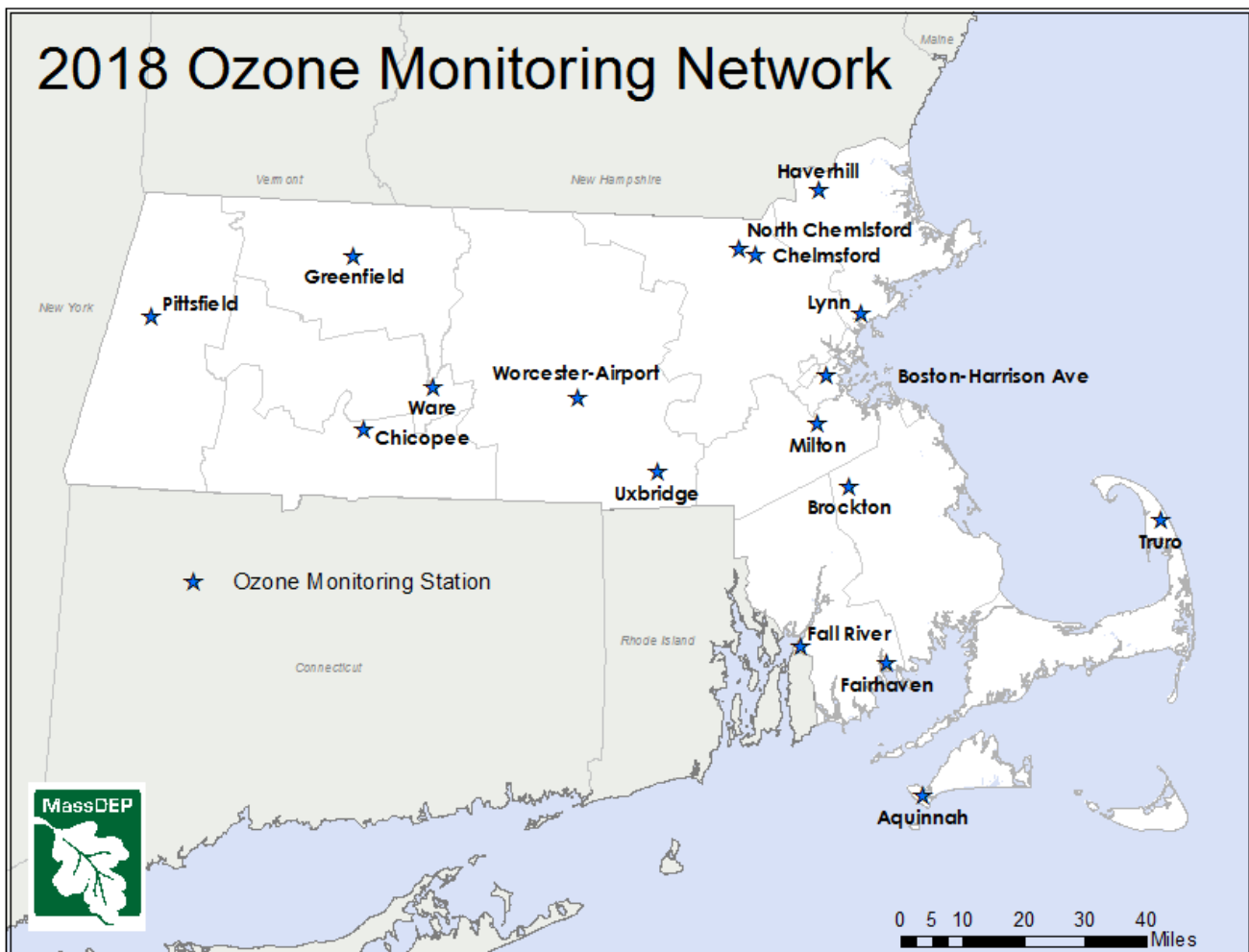
A. OZONE

MassDEP has established 16 ozone monitoring stations at the locations listed below (including the Site Identification Number). The Wampanoag Tribe of Gay Head (Aquinnah) on Martha's Vineyard also operates an ozone monitor.

Boston – Harrison Ave (25-025-0042)
Brockton (25-023-0005)
Chelmsford (25-017-0009)
Chelmsford – Rt. 495 (25-017-0010)
Chicopee (25-013-0008)
Fairhaven (25-005-1006)
Fall River (25-005-1004)
Greenfield (25-011-2005)
Haverhill (25-009-5005)

Lynn (25-009-2006)
Milton (25-021-3003)
Pittsfield (25-003-0008)
Truro (25-001-0002)
Uxbridge (25-027-0024)
Ware (25-015-4002)
Worcester – Airport (25-027-0015)
Aquinnah – Tribal Site (25-007-0001)

In August 2018, MassDEP began operating a new Pittsfield ozone monitoring station on Silver Lake Drive so that the ozone monitoring network now meets EPA monitoring requirements for the ozone NAAQS. In June 2018, MassDEP also began operating an ozone monitor at the new near-road site in Chelmsford (25-017-0010), which will provide a useful comparison to levels monitored at the existing ozone monitoring site in North Chelmsford at EPA's regional laboratory (25-017-0009).



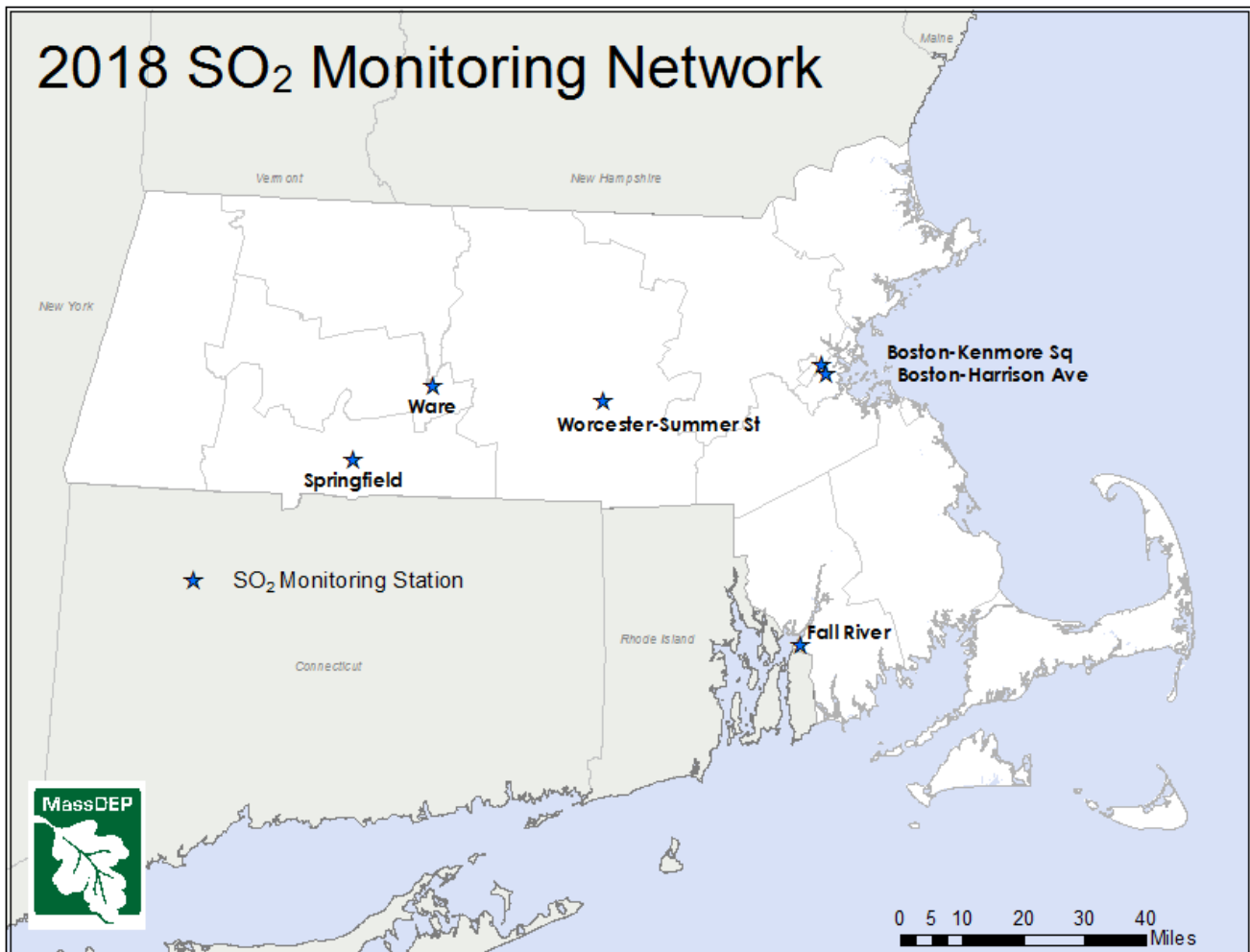
B. SULFUR DIOXIDE

MassDEP operates six sulfur dioxide (SO₂) monitors, which includes three full-scale monitors and three trace-level (i.e., very low concentration) monitors. SO₂ monitors are at the following locations:

Boston – Harrison Ave (25-025-0042) *trace*
Boston – Kenmore Square (25-025-0002) *trace*
Fall River (25-005-1004)

Springfield – Liberty Street (25-013-0018)
Ware (25-015-4002) *trace*
Worcester – Summer Street (25-027-0023)

The existing SO₂ monitoring network meets EPA monitoring requirements for the SO₂ NAAQS. In May 2018, MassDEP completed re-location of the previous Springfield – Liberty Street (25-013-0016) monitoring station to a nearby location in Springfield at 600 Liberty Street (25-013-0018) and began operating the new station.

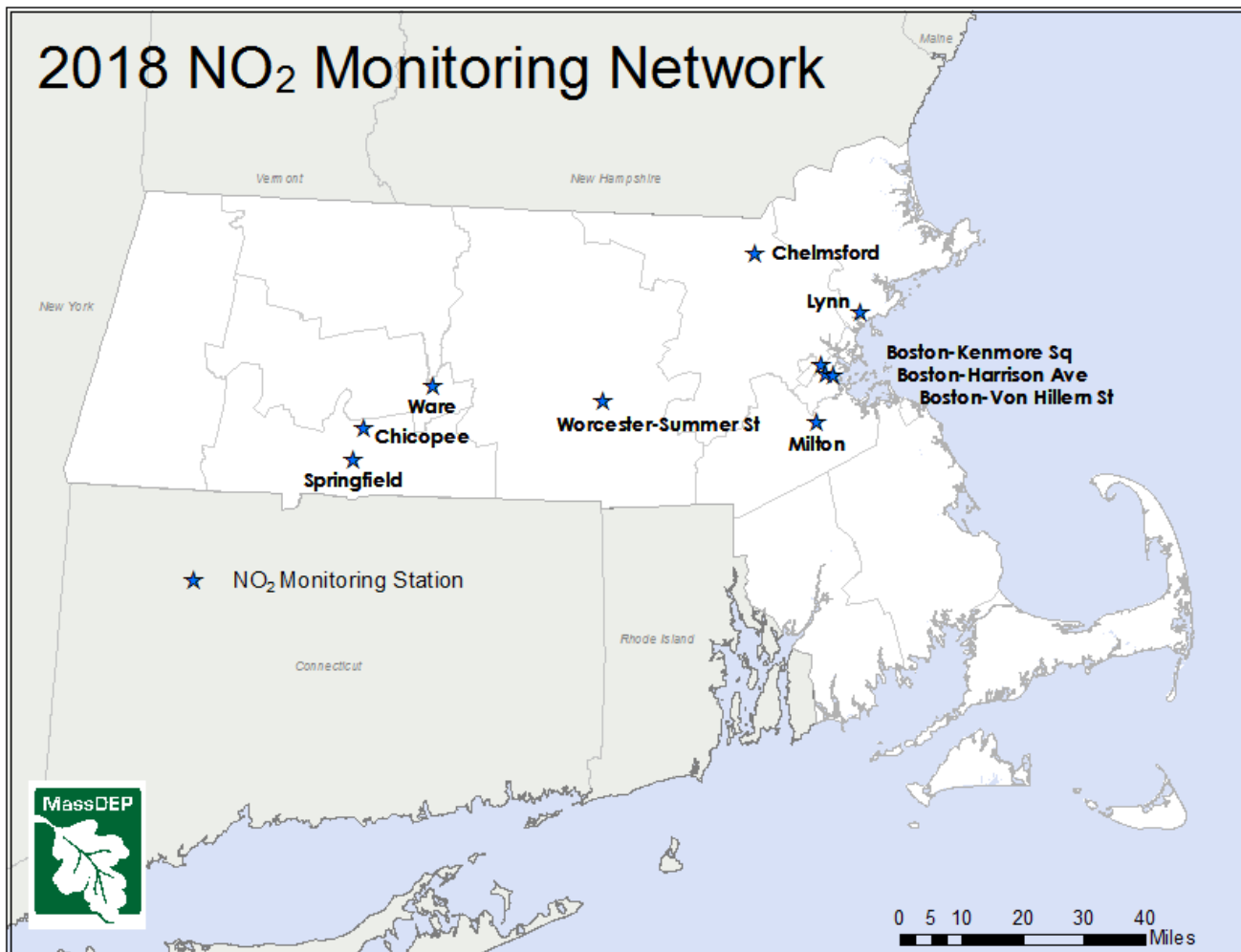


C. NITROGEN DIOXIDE

MassDEP has established 10 nitrogen dioxide (NO₂) monitors. These monitors measure NO₂ and nitrogen oxides [NO_x, which is NO₂ plus NO (nitric oxide)]. NO₂ is monitored as an NAAQS pollutant and as an ozone precursor. MassDEP operates six NO₂ monitors to determine compliance with the NAAQS, including the near-road monitors in Boston and Chelmsford. EPA has designated three monitors (Boston –Harrison Ave. and Kenmore Square, and Springfield – Liberty Street) as representing susceptible and vulnerable populations. MassDEP also operates four additional monitors to measure NO₂ as an ozone precursor. NO₂ monitors are at the following locations:

- | | |
|--|--|
| Boston – Harrison Ave (25-025-0042) | Lynn (25-009-2006) <i>PAMS, year-round</i> |
| Boston – Kenmore Square (25-025-0002) | Milton (25-021-3003) |
| Boston – Von Hillern Street (25-025-0044) <i>Near-road</i> | Springfield – Liberty Street (25-013-0018) |
| Chelmsford – Rt. 495 (25-017-0010) <i>Near-road</i> | Ware (25-015-4002) |
| Chicopee (25-013-0008) <i>PAMS, year-round</i> | Worcester – Summer Street (25-027-0023) |

MassDEP began operating the second near-road NO₂ monitoring station in Chelmsford in June 2018. The re-located Springfield site at 600 Liberty Street began operating in May 2018.

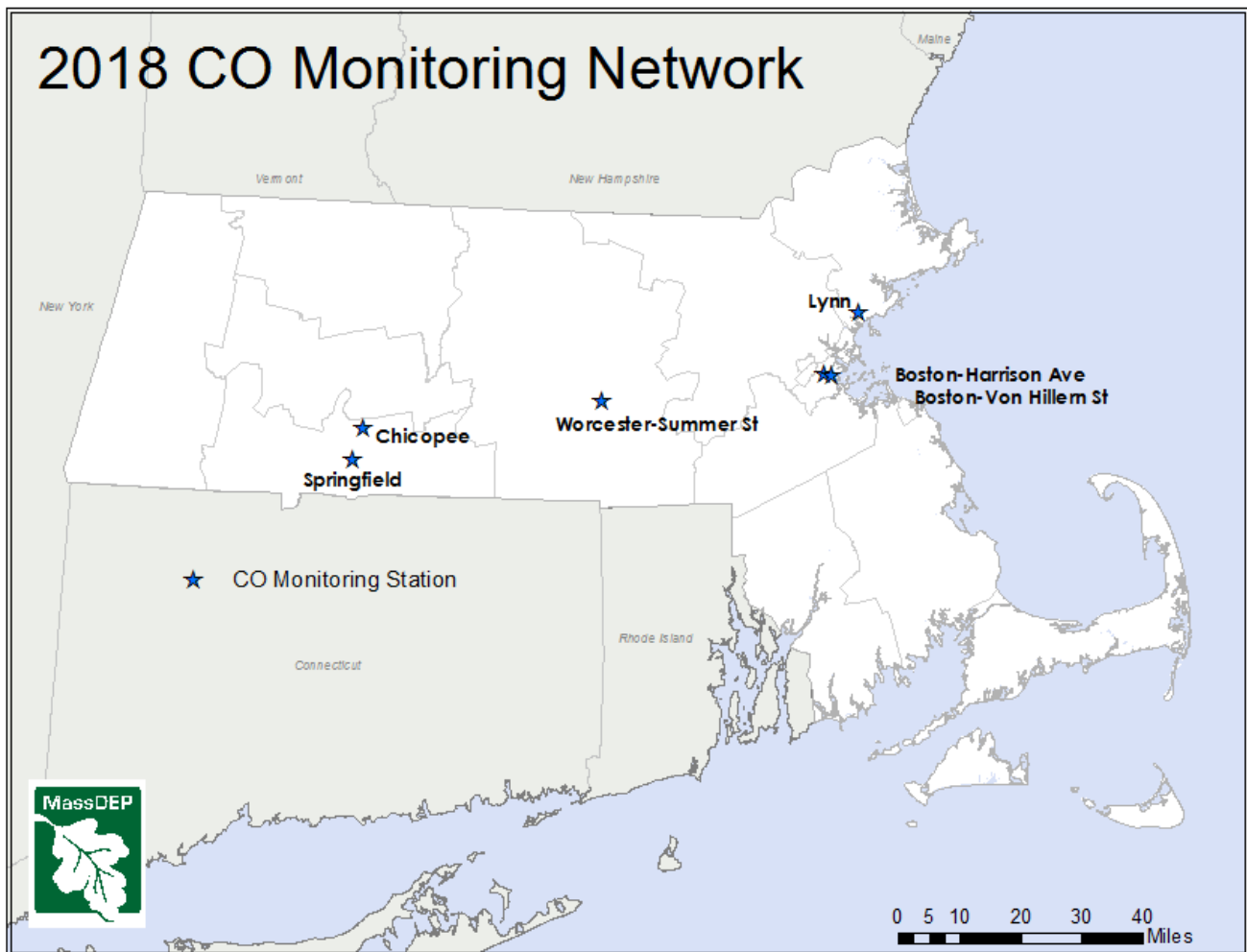


D. CARBON MONOXIDE

MassDEP operates four trace-level carbon monoxide (CO) monitors, including one at the Boston near-road site. CO monitors are at the following locations:

- Boston – Harrison Ave (25-025-0042)
- Boston – Von Hillern Street (25-025-0044)
- Springfield – Liberty Street (25-013-0018)
- Worcester – Summer Street (25-027-0023)

MassDEP has measured very low concentrations well below the CO NAAQS at all locations for many years. MassDEP installed a trace-level CO monitor at the re-located Springfield monitoring station that began operating in May 2018.



E. PARTICULATE MATTER

PM₁₀

MassDEP operates four PM₁₀ monitors (low volume instruments), including two monitors collocated at the Boston - Harrison Avenue NCore site for quality assurance purposes. PM₁₀ monitors are at the following locations:

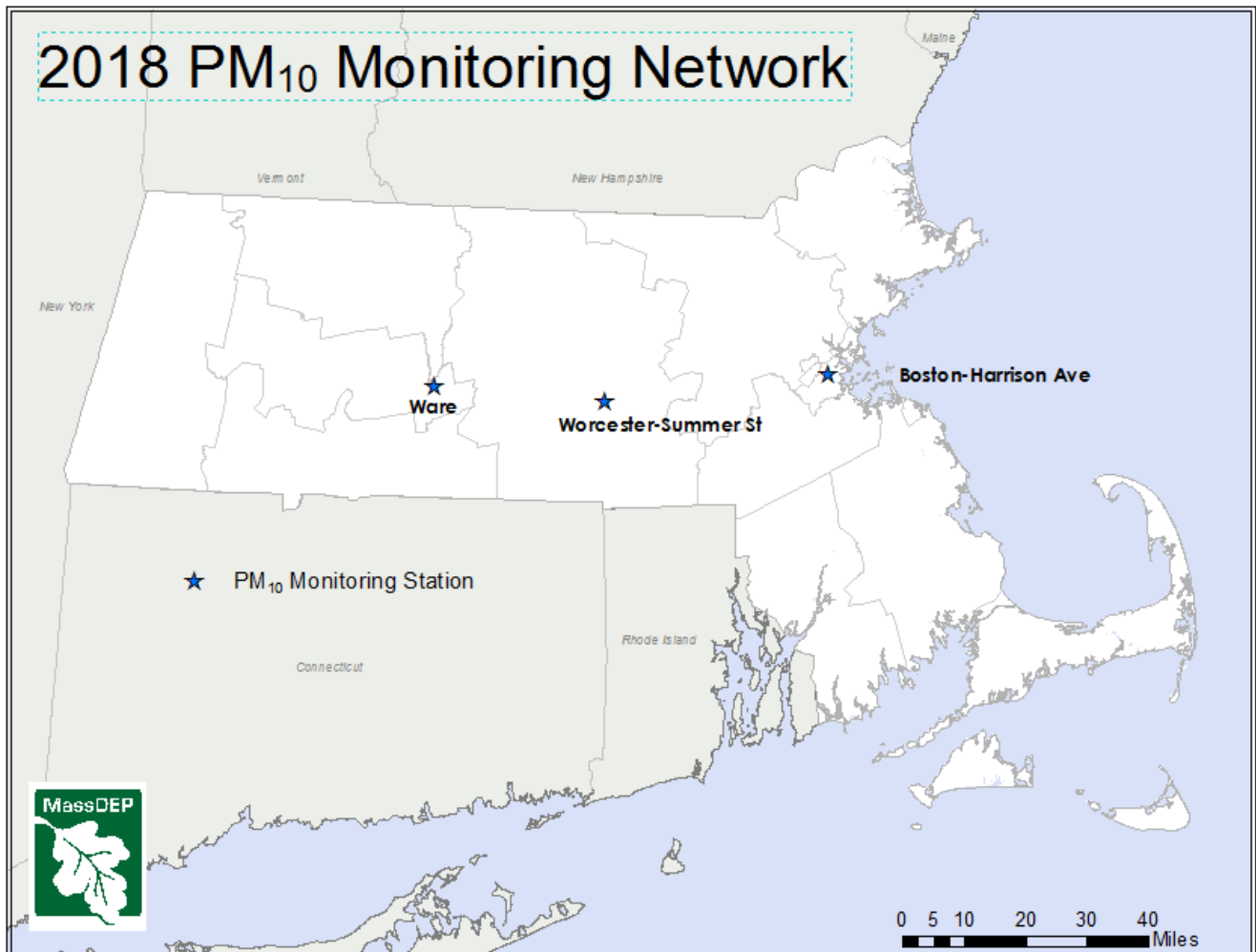
Boston – Harrison Avenue (25-025-0042) 2 monitors

Ware – Quabbin Summit (25-015-4002)

Worcester – Summer Street (25-027-0023)¹

Samples from the Boston - Harrison Avenue PM₁₀ monitors are used in association with samples from collocated PM_{2.5} monitors at the site to calculate PM_{coarse} concentrations, which is required for NCore sites. These samples also are used for PM₁₀-based National Air Toxics Trends Sites (NATTS) metals monitoring.

MassDEP discontinued PM₁₀ monitoring at Springfield – Liberty Street (25-013-0016) when the replacement monitoring station in Springfield at 600 Liberty Street (25-013-0018) began operating in May 2018.



¹ MassDEP also operates a continuous atmospheric radiation sampler (TSP-based) at the Worcester - Summer Street station (25-027-0023) in cooperation with the EPA's National Air and Radiation Environmental Laboratory.

PM_{2.5}

Filter-Based Monitors

MassDEP's operates 11 fine particulate matter (PM_{2.5}) Federal Reference Method (FRM) monitors at 10 locations. MassDEP collects collocated samples at the Chicopee monitoring station. PM_{2.5} monitors are at the following locations:

Boston – Harrison Avenue (25-025-0042)	Greenfield (25-011-2005)
Boston – Kenmore Square (25-025-0002)	Haverhill – Consentino School (25-009-5005)
Boston – Von Hillern Street (25-025-0044)	Pittsfield (25-003-5001)
Brockton – Buckley (25-023-0005)	Springfield – Liberty St (25-013-0018)
Chicopee (25-013-0008) 2 monitors	Worcester – Summer Street (25-027-0023)

MassDEP plans to reduce the FRM PM_{2.5} sampling schedule from 1 in 3 days to 1 in 6 days at five sites beginning in 2019: Brockton (25-023-0005), Haverhill – Consentino School (25-009-5005), Springfield – Liberty Street, Boston – Von Hillern Street (25-025-0044) and Worcester – Summer Street (25-027-0023). The remaining six sites will stay on a 1-in-3 days schedule. MassDEP closed the Boston - North Street monitoring station (25-025-0043) in April 2018 due to loss of access to the site. MassDEP plans to identify a replacement site in Boston.

Continuous Monitors

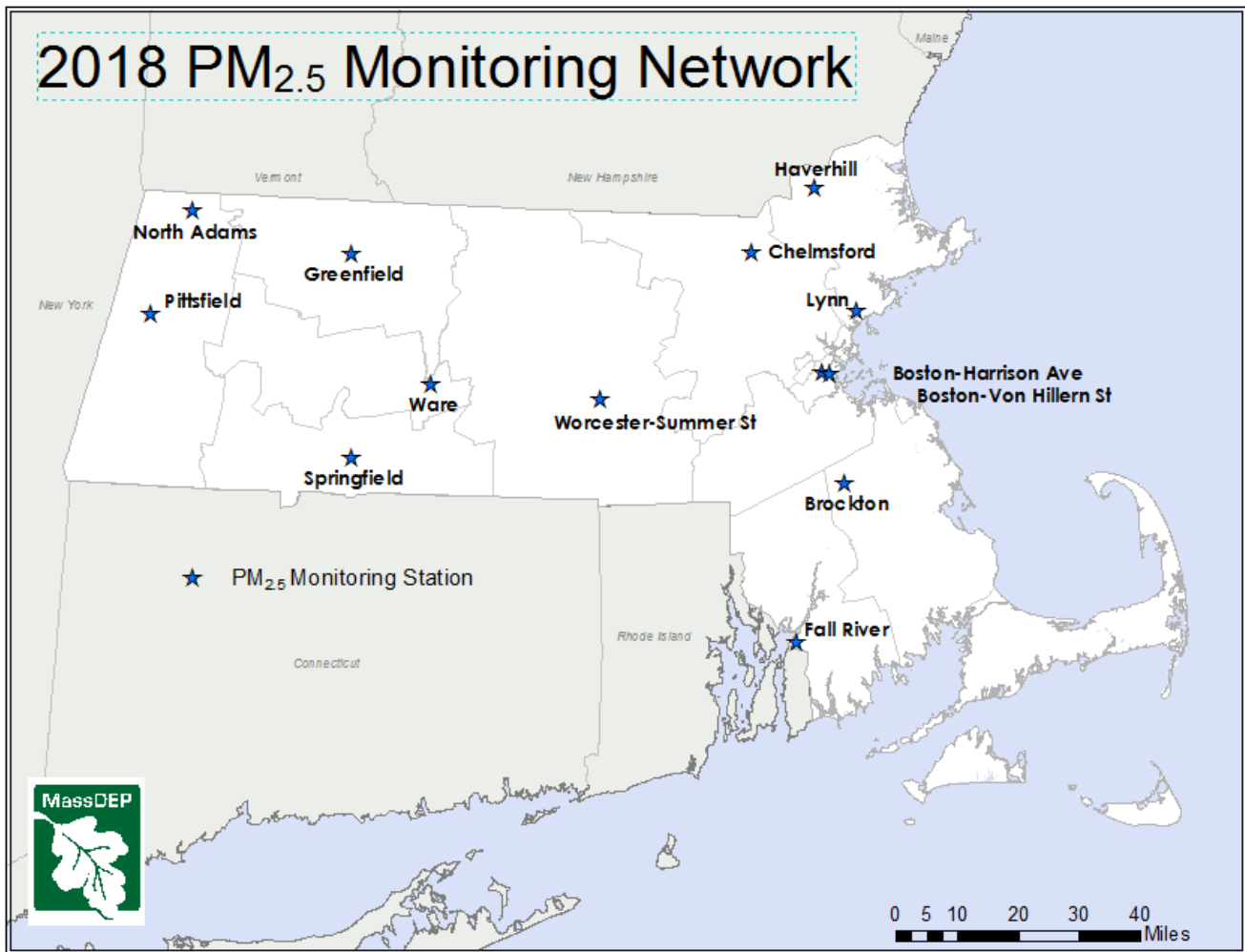
MassDEP has equipped 13 monitoring stations with continuous PM_{2.5} monitors (Beta Attenuation Monitors or BAMs) at the following locations:

Boston – Harrison Avenue (25-025-0042)	Haverhill – Consentino School (25-009-5005)
Boston – Von Hillern Street (25-025-0044)*	Lynn – Water Treatment Plant (25-009-2006)
Brockton – Buckley Playground (25-023-0005)	Pittsfield (25-003-0008)
Chelmsford – Rt. 495 (25-017-0010)	Springfield – Liberty Street (25-013-0018)
Fall River – Globe Street (25-005-1004)	Ware – Quabbin Summit (25-015-4002)
Greenfield – Veterans Field (25-011-2005)	Worcester – Summer Street (25-027-0023)
North Adams – Holden Street (25-003-6001)	

* 2 monitors

All of MassDEP's continuous PM_{2.5} monitors have a Federal Equivalent Method (FEM) designation. FEM monitors provide the hourly PM_{2.5} data that appears on MassDEP's *MassAir* website. MassDEP is using data from all of its FEM monitors for comparison to the PM_{2.5} NAAQS.

The new ozone monitoring station in Pittsfield (25-003-0008) replaced the monitor at that had been in Pittsfield on South Street (25-003-0006), which has been closed. The new replacement Springfield site at 600 Liberty Street (25-013-0018) has a FEM PM_{2.5} which replaced the previous Springfield site (25-013-0016). The second NO₂ near-road site in Chelmsford also has an FEM PM_{2.5} monitor. MassDEP began operating an FEM PM_{2.5} at the Chicopee site in October 2018. Since MassDEP closed the Boston – North St (25-025-0043) station in April 2018 due to loss of access to the site, MassDEP plans to identify a replacement PM_{2.5} site in the Downtown Boston Area which will have a portable continuous PM_{2.5} monitor.



Speciated PM_{2.5}

MassDEP collects speciated PM_{2.5} samples at Boston – Harrison Avenue (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}. MassDEP reduced the sample schedule for Chicopee from 1-in-3 days to 1-in-6 days at the end of June 2018.

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.

PM_{coarse}

MassDEP uses the Federal Reference Method (FRM) for PM_{coarse} in compliance with NCore requirements at the Boston - Harrison Avenue NCore site. This method consists of the subtraction of PM_{2.5} values from PM₁₀ values at a site that has side-by-side samplers of each type sampling on the same dates.

F. LEAD

MassDEP monitors lead at its Boston - Harrison Avenue NCore site using a low-volume PM₁₀ 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 – Harrison Avenue NCore site under the NATTS program.

2. Photochemical Assessment Monitoring Stations / Enhanced Ozone Monitoring Plan

MassDEP has operated enhanced ozone, Photochemical Assessment Monitoring Stations (PAMS) in the Boston and Springfield Metropolitan Areas since 1994. PAMS are designed to measure ozone precursors (ingredients) and meteorological parameters in order to provide data about ozone formation and the effect of precursor controls on ozone production. At these sites MassDEP measures nitrogen oxides and other ozone precursors, such as volatile organic compounds, including hydrocarbons and carbonyl compounds (e.g., formaldehyde, acetaldehyde). These are measured by taking discrete samples (carbonyls at Type 2 sites) and by operating hourly gas chromatographs that measure individual hydrocarbon compounds at PAMS locations.

During the 2018 season, MassDEP monitored PAMS parameters at the two Type 2 locations at Chicopee (25-013-0008) and Lynn (25-009-2006), but only measured carbonyls at the Lynn site due to resource constraints. As proposed in the 2017 Network Plan, EPA approved the Lynn site as the primary PAMS site for Massachusetts. MassDEP has procured a new Auto GC (Automated Gas Chromatograph) for the site and operated during summer 2018. In addition, for ozone precursor monitoring, MassDEP has purchased a true nitrogen dioxide monitor and is planning to purchase a ceilometer for upper air measurement. MassDEP also is considering continuing PAMS monitoring at the Chicopee Type 2 site beyond 2018.

EPA's 2015 Ozone NAAQS regulations require states with ozone non-attainment and in the Ozone Transport Region (such as Massachusetts) to develop enhanced monitoring plans to help determine the distribution of ozone in the state and region. MassDEP has participated in a collaborative planning effort with EPA and other OTC states on the development of EMPs. MassDEP believes enhancements to the monitoring network it has taken adequately meet the new requirements. This includes maintaining ozone monitoring at the summit of Blue Hill in Milton that measures higher elevation ozone (which had previously been scheduled to close), and expanding ozone monitoring in Southeastern Massachusetts to address higher ozone values that occur along the South Coast. This has included adding ozone monitoring at the Fall River station (25-005-1004), replacing the Fairhaven station (25-005-1006), and establishing a new Brockton monitoring station (25-023-0005). MassDEP is also considering adding additional upper air measurements.

3. Total Reactive Nitrogen (NO_y)

MassDEP operates NO_y analyzers at Ware (25-015-4002) and at the NCore site at Boston - Harrison Avenue (25-025-0042) to fulfill NCore requirements.

4. Air Toxics

Boston - Harrison Avenue (25-025-0042) is a National Air Toxics Trends Site (NATTS) monitoring station, in addition to being an NCore site. NATTS is an EPA program comprised of monitoring sites 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 Harrison Avenue site, MassDEP monitors

black carbon (using an aethalometer), toxic VOCs, carbonyls (formaldehyde and acetaldehyde), toxic metals (from PM₁₀ filters), and polycyclic aromatic hydrocarbons (PAHs).

In addition to the NATTS site, MassDEP collects 24-hour VOC canister samples every sixth day for toxics analysis from Lynn (which serves as a Boston Area background location), and sends the samples to the State of Rhode Island Department of Public Health Laboratory for analysis. MassDEP also monitors black carbon at Pittsfield (25-003-0008), Springfield – Liberty Street (25-013-0016), Boston – Von Hillern Street (25-025-0044), Greenfield (25-011-2005), North Adams (25-003-6001), and the new Chelmsford – Rt. 495 near-road site (25-017-0010).

In July 2018, MassDEP began a focused air toxics monitoring in the Fore River Basin area in Weymouth, Quincy, Braintree, and Hingham as directed by Governor Baker to work with the Massachusetts Department of Public Health to prepare health impact assessment that documents background air levels in the area and the health status of the community, and consider potential impacts of the proposed Atlantic Bridge natural gas compressor station project.

5. Summary of Network Changes

- MassDEP began operating the new relocated Springfield monitoring station at 600 Liberty Street (25-013-0018) in May 2018 and closed the previous Liberty Street station (25-013-0016). The new site monitors PM_{2.5} (continuous and filter-based), SO₂, NO₂ and CO (which was converted from a full-scale CO monitor to a trace CO monitor).
- MassDEP plans to reduce filter-based PM_{2.5} sample frequencies from 1-in-3 days to 1-in-6 days at five sites beginning in 2019: Brockton (25-023-0005), Haverhill (25-009-5005), the new Springfield site (25-013-0018), Boston – Von Hillern Street (25-025-0044), and Worcester – Summer Street (25-027-0023). MassDEP's remaining six filter-based PM_{2.5} sites will stay on a 1-in-3 days schedule.
- MassDEP closed the Boston – North Street site (25-025-0043) in April 2018 after losing site access. MassDEP had monitored PM_{2.5} (continuous and filter-based) and black carbon at this site. MassDEP plans to identify a replacement site in Boston.
- MassDEP began operating the new Chelmsford – Rt. 495 (25-017-0010) near-road NO₂ monitoring station June 2018. The new site also monitors ozone, continuous PM_{2.5} and black carbon.
- MassDEP began operating the new Pittsfield ozone monitoring station (25-003-0008) in August 2018, and also monitors continuous PM_{2.5} and black carbon at the site. MassDEP discontinued continuous PM_{2.5} monitoring and closed the Pittsfield South Street monitoring station (25-003-0006).
- MassDEP began operating a continuous PM_{2.5} monitor at Chicopee in October 2018, and reduced the schedule of PM_{2.5} speciation samples from 1-in-3 days to 1-in-6 days.
- During the 2018 season, MassDEP monitored PAMS parameters at Chicopee (25-013-0008) and Lynn (25-009-2006), but only measured carbonyls at the Lynn site. MassDEP procured and operated a new gas chromatograph at the Lynn PAMS site (25-009-2006) in 2018, and also plans to procure an upper air meteorology analyzer and a true NO₂ analyzer for 2019.