

Attachment 4

PAMS Monitoring Implementation Plan

Monitoring Organizations Required To Operate At NCore Sites

MassDEP currently operates Photochemical Assessment Monitoring Stations (PAMS) at the Chicopee and Lynn monitoring sites. EPA's monitoring rule for the 2015 ozone NAAQS (80 FR 65292) requires PAMS monitoring June 1 through August 31 at NCore sites that are located in Core-Based Statistical Areas (CBSAs) with populations of 1,000,000 or more.

Network Decision

- The NCore site located at (*Insert Location*) will serve as the location of the required PAMS site and will measure the following parameters described below. An Inventory of equipment used at the site(s) is provided in attachment 2
- MassDEP requests a waiver to continue operating its PAMS site in Lynn instead of establishing a new PAMS site at its Boston NCore site. See Waiver Rationale in Attachment 1

Auto GC Decision

Volatile organic compounds (VOCs) – A complete list of the targeted compounds are found in Table 1.

- We will measure hourly speciated VOCs with an auto-gas chromatograph (GC) using either a Agilent Markes or CAS gas chromatograph in accordance with EPA's recommendations after MassDEP research on these products.
- We request a waiver to allow three 8-hour samples every third day as an alternative to daily hourly speciated VOC measurements at locations (*insert locations*). Rationale for this waiver is provided in Waiver Attachment

Meteorology Measurements Decision – Note: EPA is suggesting the use of ceilometers for determining mixing height, however other types of meteorological equipment that provide for an indication of mixing height can be proposed

- We will measure wind direction, wind speed, temperature, humidity, atmospheric pressure, precipitation, solar radiation, ultraviolet radiation, and mixing height. We have elected to use the following instrumentation to measure the parameters described above: Met One ultrasonic wind measurement instrumentation plus associated sensors and Vaisala CL51 or equivalent.
- We request a waiver to allow meteorological measurements to be obtained from other nearby sites. Rationale for this waiver is provided in Waiver attachment

Other Required Measurements

- **Carbonyls** - Carbonyl sampling at a frequency of three 8-hour samples on a one-in-three day basis (~90 samples per PAMS sampling season) using an Atec sequential sampler and a Waters HPLC analyzer. A complete list of the target carbonyl compounds is listed in Table 1. The TO-11A test method, as used in the National Air Toxics Trends Site (NATTS) program,¹ will be used.
- **Nitrogen Oxides** – We will monitor for NO and NO_y (total oxides of nitrogen) in addition to true NO₂. The true NO₂ is required to be measured with a direct reading NO₂ analyzer, cavity attenuated phase shift (CAPS) spectroscopy or photolytic-converter NO_x analyzer. We have elected to use a Teledyne T500U CAPS Analyzer for the true NO₂ measurement. NO and NO_y will be measured using a T200U NO_y Analyzer.

Table 1: PAMS Target Compound List

Priority Compounds				Optional Compounds			
1	1,2,3-trimethylbenzene ^a	19	n-hexane ^b	1	1,3,5-trimethylbenzene	19	m-diethylbenzene
2	1,2,4-trimethylbenzene ^a	20	n-pentane	2	1-pentene	20	methylcyclohexane
3	1-butene	21	o-ethyltoluene ^a	3	2,2-dimethylbutane	21	methylcyclopentane
4	2,2,4-trimethylpentane ^b	22	o-xylene ^{a,b}	4	2,3,4-trimethylpentane	22	n-decane
5	acetaldehyde ^{b,c}	23	p-ethyltoluene ^a	5	2,3-dimethylbutane	23	n-heptane
6	acetone ^{c,d}	24	Propane	6	2,3-dimethylpentane	24	n-nonane
7	benzene ^{a,b}	25	propylene	7	2,4-dimethylpentane	25	n-octane
8	c-2-butene	26	styrene ^{a,b}	8	2-methylheptane	26	n-propylbenzene ^a
9	ethane ^d	27	toluene ^{a,b}	9	2-methylhexane	27	n-undecane
10	ethylbenzene ^{a,b}	28	t-2-butene	10	2-methylpentane	28	p-diethylbenzene
11	Ethylene			11	3-methylheptane	29	t-2-pentene
12	formaldehyde ^{b,c}			12	3-methylhexane	30	α/β-pinene
13	Isobutane			13	3-methylpentane	31	1,3 butadiene ^b
14	Isopentane			14	Acetylene	32	benzaldehyde ^c
15	Isoprene			15	c-2-pentene	33	carbon tetrachloride ^b
16	m&p-xylenes ^{a,b}			16	cyclohexane	34	Ethanol
17	m-ethyltoluene ^a			17	cyclopentane	35	Tetrachloroethylene ^b
18	n-butane			18	isopropylbenzene ^b		

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

^a Important SOAP (Secondary Organic Aerosols Precursor) Compounds

^b HAP (Hazardous Air Pollutant) Compounds

^c Carbonyl compounds

^d Non-reactive compounds, not considered to be VOC for regulatory purposes

¹ See NATTS Technical Assistance Document for TO-11A method.

Attachment 1 Waiver Requests and Rationale

Waiver from implementing PAMS at an otherwise required NCore site (waiver could be either in its entirety, or to be at a different location)

MassDEP requests a waiver to continue operating its Type 2 PAMS site in Lynn instead of establishing a new PAMS site at its Boston Harrison Avenue NCore site (25-025-0042).

Rationale for this waiver

1. Given the size and activity of the Boston metropolitan area versus the city core, emissions are expected to be wide-spread rather than located at any particular location. The Harrison Avenue NCore site is located south of the center line of the city of Boston. Given prevailing winds from southwest to northeast, the monitoring at the existing NCore site would not be expected to be representative of the Boston metropolitan area. In contrast, Lynn is located at the northeast edge of the metropolitan area and would be more representative of the Boston metropolitan area's emissions. EPA previously approved the existing Lynn site as a good location north of Boston for PAMS monitoring.
2. The Boston Harrison Avenue NCore site also is an NPN Speciation site and a NATTS site. The site has a 20 foot long shelter, monitors on several platforms, and an associated mini-shelter to accommodate all of the equipment used for these projects. Given the density of equipment and activities at the site, MassDEP believes it would not be reasonable to attempt to install a mixing height instrument (such as a ceilometer) or a new shelter (to accommodate a gas chromatograph) at this location.
3. The NCore monitoring station is located on private property owned by Eversource. Eversource recently discontinued activities on the property could be sold in the near future. Therefore, MassDEP believes that it would not be a good use of resources to add or expand monitoring at the site.