Connecticut 2016 Annual Air Monitoring Network Plan

DRAFT

Connecticut Department of Energy and Environmental Protection
Bureau of Air Management
May 2016

The Department of Energy and Environmental Protection (DEEP) is an affirmative action/equal opportunity employer and service provider. In conformance with the Americans with Disabilities Act, DEEP makes every effort to provide equally effective services for persons with disabilities. Individuals with disabilities who need this information in an alternative format, to allow them to benefit and/or participate in the agency's programs and services, should call 860-424-3035 or e-mail the ADA Coordinator, at DEEP.aaoffice@CT.Gov. Persons who are hearing impaired should call the State of Connecticut relay number 711.

Table of Contents

Table of Contents 2
Introduction 4
Background 4
Network Overview 4
Proposed Network Changes 5
Monitoring Site Information 6
National Ambient Air Quality Standards (NAAQS) 7
$PM_{2.5}$ Annual Design Values (2015) 8
$PM_{2.5}$ Daily Design Values (2015) 8
Ozone Design Values (2015) 9
CO, SO_2, NO_2, PM_{10} and Pb NAAQS Comparisons (2015) 9
Overview of Network Operation 11
$PM_{2.5}$ Network 11
PM_{10}/$PM_{10\text{-}2.5}$ FRM Network 14
PM Speciation Network 14
Ozone Network 15
PAMS Network 15
NO_2 Network 16
CO Network 17
SO_2 Network 17
Lead (Pb) Network 19
Detailed Site Information 21
Appendix A: PM2.5 FRM vs Continuous Correlation Charts A-1
Appendix B: Public Comments Received With DEEP Responses B-1

Figure 1: Connecticut DEEP Air Monitoring Network 5
Figure 2: CT PM2.5 FEM Comparison with EPA Performance Standards (2013-2015 data) 13
Figure 3: Comparison of SO2 between Bridgeport Edison and Roosevelt Schools (Dec 2015-May 2016) 18
Figure 4: Pb-PM10 Monitored Levels, 2010-2015 20

Table 1: Monitoring Network Summary 6
Table 2: National Ambient Air Quality Standards 7
Table 3: PM2.5 FRM/FEM Network Summary 11
Table 4: Comparison of SO2 Hourly Average Concentration Statistics between Bridgeport Edison and Roosevelt Schools (Dec 2015-May 2016) 18

DRAFT

Acronyms and Abbreviations

AQI – Air Quality Index
AQS – Air Quality System
BAM – Beta Attenuation Monitor
BC – Black Carbon (Aethalometer)
CAA – Clean Air Act
CBSA – Core-Based Statistical area
CFR – Code of Federal Regulations
CO – carbon monoxide
CSA – combined statistical area
CSN – Chemical Speciation Network
DEEP – Connecticut Department of Energy and Environmental Protection
DAS – data acquisition system
EC/OC – Elemental Carbon/Organic Carbon
EPA – Environmental Protection Agency
FEM – Federal Equivalent Method
FRM – Federal Reference Method
GC – gas chromatography
GC/MS – gas chromatography/mass spectrometry
HAP – hazardous air pollutant
IMPROVE – Interagency Monitoring of Protected Visual Environments
LMP – limited maintenance plan
MPA – monitoring planning area
MSA – metropolitan statistical area
NAAQS – National Ambient Air Quality Standards
NOAA – National Oceanic and Atmospheric Administration
NOx – nitrogen oxides
NOy – reactive oxides of nitrogen
OAQPS – Office of Air Quality Planning and Standards
OTR – Ozone Transport Region
PAMS – Photochemical Assessment Monitoring Stations
$PM_{2.5}$ – fine particulate matter (<2.5 microns)
PM_{10} – respirable particulate matter (<10 microns)
$PM_{10-2.5}$ – coarse particulate matter (PM_{10} – $PM_{2.5}$)
QA – quality assurance
QA/QC – quality assurance/quality control
QAPP – quality assurance project plan
QMP – quality management plan
RH – relative humidity
SIP – State Implementation Plan
SLAMS – state and local monitoring stations
SO_2 – sulfur dioxide
SOP – standard operating procedure
TSA – technical system audit
TSP – total suspended particulate
UVC – Ultra-violet carbon (aethalometer)
VOC – volatile organic compound

DRAFT

Introduction

This document is the Connecticut 2016 Air Monitoring Network Plan (Network Plan), prepared by the Connecticut Department of Energy and Environmental Protection (DEEP) in accordance with 40 CFR 58.10. This plan meets the requirement to develop and submit to the Environmental Protection Agency (EPA) an annual air quality monitoring network plan to describe the air monitoring network and propose any changes to air quality monitoring sites and monitored air pollutants planned in the 18 months following submittal.

The draft Network Plan is posted on DEEP's website at DEEP: Air Monitoring Network. DEEP will accept public comments on this draft Network Plan from May 24, 2016 to June 23, 2016. Comments may be submitted to:

Randall Semagin
Air Management, Planning and Standards Division
Connecticut Department of Energy and Environmental Protection
79 Elm Street, Hartford, CT 06106
P: 860.424.3255 | F: 860.706.5339 | E: randall.semagin@ct.gov

Background

The Clean Air Act of 1970 (CAA) established the EPA as the principal administrative body to enact regulations to meet the requirements of the CAA and subsequent amendments thereto. One such requirement directed EPA to set primary and secondary air quality standards, known as the National Ambient Air Quality Standards (NAAQS) for the six "criteria pollutants" that Congress determined presented serious negative impacts to human health and welfare. For areas within Connecticut that do not meet a NAAQS, DEEP develops State Implementation Plans (SIPs) to detail the steps to be taken to bring air quality into attainment. Ambient air quality monitoring is essential to track progress towards meeting clean air goals and demonstrate attainment.

While DEEP monitors ambient air quality in Connecticut primarily for comparison with the NAAQS, there are other important objectives to ambient air quality monitoring. This monitoring provides local air quality data to the public, supports air quality forecasting and the Air Quality Index (AQI), supports long-term health assessments and other scientific research, assists with air permitting and identifying long-term air quality trends to gauge effectiveness of air pollution control strategies and serves as an accuracy check on computer based air quality models. DEEP's ability to manage the air quality monitoring network greatly depends on federal grant support from EPA.

Future federal funding levels for air monitoring programs remain uncertain. In addition, as with state governmental operations everywhere, state resources allocated to ambient air quality monitoring are unable to keep pace with rising costs. DEEP must continue to provide an acceptable level of service within these constraints by continually improving and focusing its efforts to ensure the completion of the most critical ambient air quality monitoring. As operating costs and federal monitoring requirements increase, DEEP must operate within its means by either improving operational efficiencies or reducing other aspects of the air monitoring network. Efficiencies being employed include improvements to data acquisition (through software upgrades and the automating of data streams previously manual), to public data access (thorough Kiosks and improvements to the website), and to reduce the number of monitoring sites by increasing multi-pollutant monitoring (resulting in consolidation of resources).

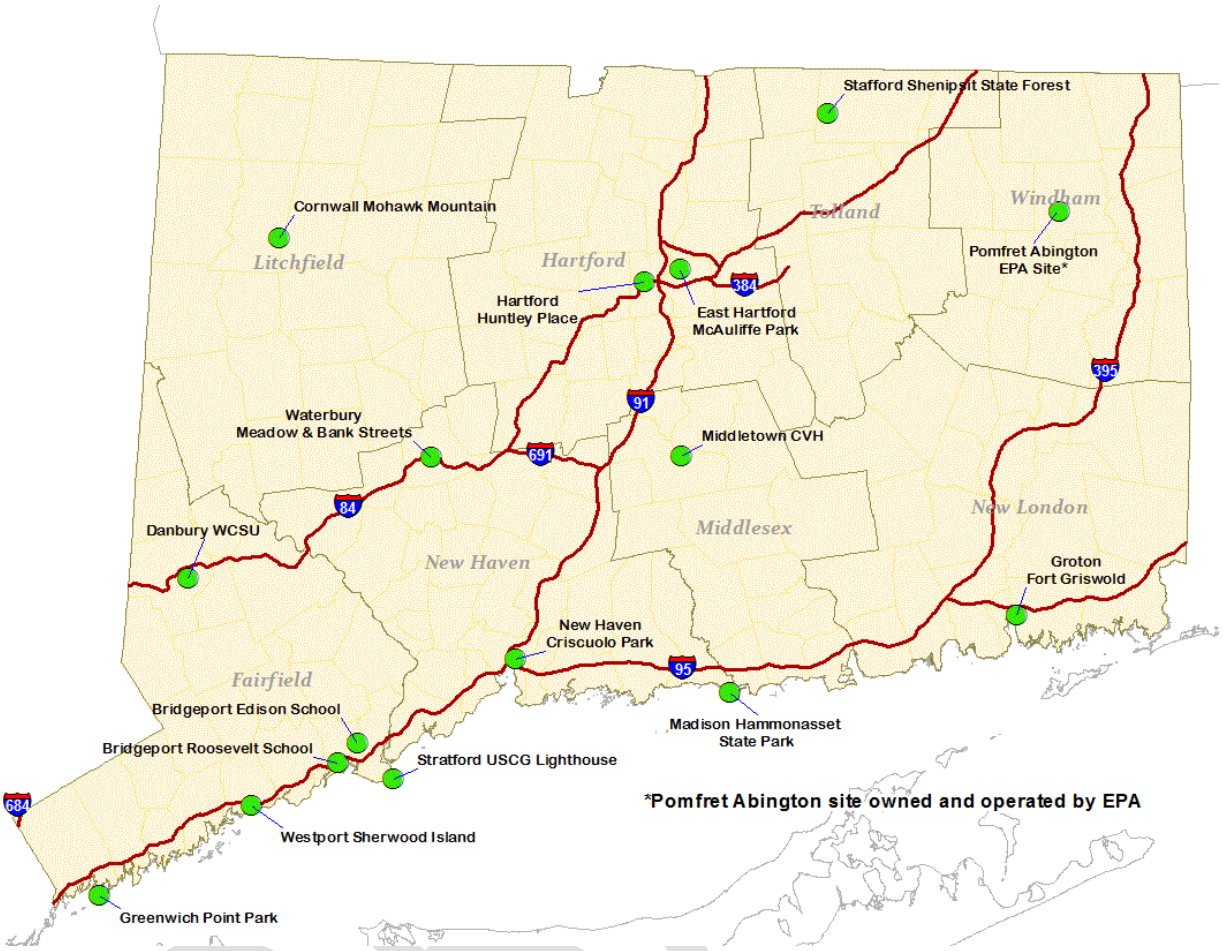
Network Overview

DEEP currently operates 15 stations in its air monitoring network (Figure 1). Given continuously evolving standards, this Plan assumes the current level of staffing and federal funding will be maintained through federal FY17. Should EPA monitoring requirements significantly increase or should DEEP be impacted by staff attrition or a significant reduction in state or federal funding, the level of effort proposed in this Plan will have to be revisited.

In October 2006, EPA established a network of core multi-pollutant sites. These sites are known as the National Core (NCore) network, the primary purpose of which is to consolidate monitoring of multiple pollutants at fewer sites for efficiency and cost savings. In addition, the NCore sites provide a comprehensive suite of high-resolution pollutant data for NAAQS compliance assessment, research studies and long-term trends analysis. There are two NCore sites located in Connecticut: Criscuolo Park

in New Haven, and Mohawk Mountain in Cornwall. Although these sites predated NCore, DEEP upgraded both sites consistent with NCore requirements.

Figure 1: Connecticut DEEP Air Monitoring Network



Proposed Network Changes

Details of the proposed monitoring network configuration are described in the following site information pages. In addition to infrastructure maintenance and improvements, DEEP proposes the following changes to the monitoring network during the period 2016-2017:

- Discontinue Pb-PM10 (lead) sampling at the New Haven Criscuolo Park site on June 30, 2016.
- Terminate Photochemical Assessment Monitoring Stations (PAMS) volatile organic compound (VOC) and carbonyl monitors at East Hartford and New Haven in 2016.
- Replace chemiluminescent NO_X monitors in Hartford, East Hartford and New Haven with direct-measure NO_2 monitors in 2016.
- Establish SO_2 monitoring at the Bridgeport Roosevelt School site January 1, 2016.
- Discontinue SO_2 monitoring at the Bridgeport Edison School site on December 31, 2016.
- Discontinue NO_X monitoring at Cornwall.
- Move $PM_{2.5}$ collocated sampling from Waterbury to East Hartford in 2016.
- Discontinue $PM_{2.5}$ collocated sampling at East Hartford as of December 31, 2016.
- Discontinue PM_{10} FRM sampling at Cornwall on December 31, 2016.
- Begin ozone monitoring one month early, on March 1, 2017, at eleven ozone sites as required by the 2015 ozone NAAQS.

DEEP maintains its air monitoring network to fulfill critical data needs. Recent EPA NAAQS rule revisions have mandated additional monitoring, reporting and analysis associated with the SLAMS networks, and, consistent with the LEAN culture embraced by DEEP, this Network Plan calls for continued efforts to streamline data handling, while also looking for opportunities to identify and address low value added monitoring sites. If limited opportunities exist to disinvest from low value added monitoring sites,

efficiencies nonetheless will occur by eliminating lower value data collection. Such efficiencies will be necessary to enable limited staff resources to focus on competing priorities, which may not be limited to air quality monitoring. If efficiencies alone are insufficient, either additional resources will be required or the scope of the monitoring program will need to be revisited.

Planned Monitoring Network Infrastructure Work: DEEP is planning to take steps to ensure that all former monitoring sites are properly decommissioned with regard to shelter, landscaping, security, monitoring, electronics and utility equipment during 2016-2017. In addition, shelter replacements are scheduled for Madison, Stratford, Waterbury and Danbury during 2016. New stairs are planned for Westport. Alternative sites will be researched for the Middletown location.

Monitoring Site Information

The ambient air monitoring sites currently operated by DEEP are listed in the Table 1 below. Detailed information for each monitoring site is provided in a later section of this plan.

Table 1: Monitoring Network Summary

Town	Site	PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation	Mixing Height
Bridgeport	Edison School													T													
Bridgeport	Roosevelt School		1/6	X	1/6									P	X								X				
Cornwall	Mohawk Mountain	1/3		X	1/3		X				1/3	X	X	X	X		T	X			X	X	X	X	X		
Danbury	Western Connecticut State University	1/6		X								X	X								X	X	X		P		
East Hartford	McAuliffe Park	1/6	1/6*	X	1/6							X	X	X	X	P	T		T		X	X	X	X	X	X	
Greenwich	Point Park												X								X	X	X				
Groton	Fort Griswold	1/6		X									X										X				
Hartford	Huntley Place	1/3		X			X					X			X	P	T			X	X	X	X		X		
Madison	Hammonasset State Park												X								X	X	X				
Middletown	Connecticut Valley Hospital												X								X	X	X				
New Haven	Criscuolo Park	1/3	1/6	X	1/3	1/6	X	1/6	1/12	1/3		X	X	X	X	P	T	X	T		X	X	X	X	X	X	X
Stafford	Shenipsit State Forest												X								X	X	X				
Stratford	Stratford Lighthouse												X										X				
Waterbury	Meadow & Bank Street	1/6	1/6†	X																	X	X	X				
Westport	Sherwood Island State Park												X								X	X	X				

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

*East Hartford collocated $PM_{2.5}$ FRM started 4/1/2016

†Waterbury collocated $PM_{2.5}$ FRM terminated 3/31/2016 for site construction

National Ambient Air Quality Standards (NAAQS)

The EPA's Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, known as the criteria pollutants. Table 2 summarizes the current NAAQS compliance requirements for the criteria pollutants.

Table 2: National Ambient Air Quality Standards

Pollutant [links to historical tables of NAAQS reviews]		Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 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 (SO_2)		primary	1 hour	75 ppb (4)	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

[1] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

[2] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[3] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

[4] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

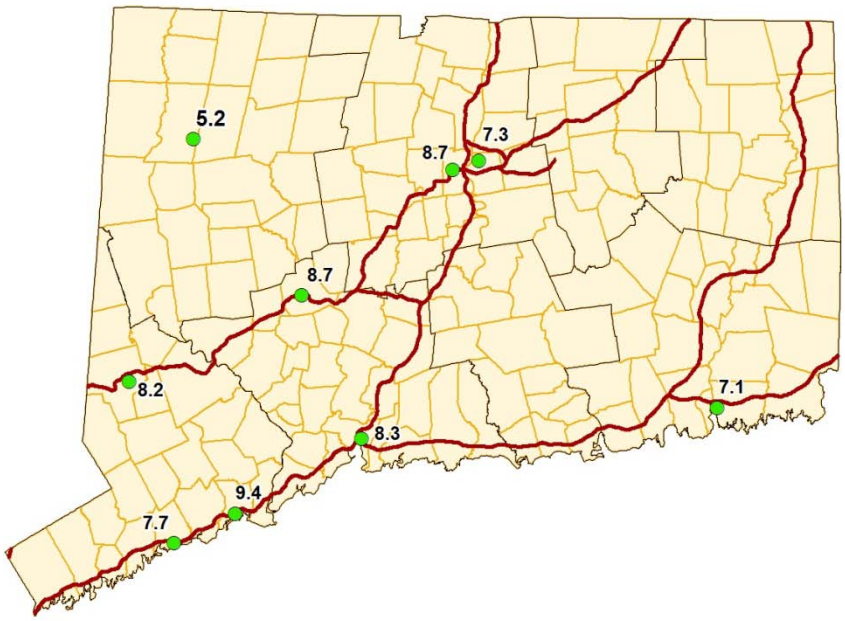
DRAFT

$PM_{2.5}$ Annual Design Values (2015)

The 2015 annual design values for $PM_{2.5}$, based on 2013 through 2015 data, are presented in the table and figure below. $PM_{2.5}$ annual design values are calculated using the 3-year average of the respective annual weighted averages. The current annual $PM_{2.5}$ NAAQS is 12.0 $\mu g/m^3$. All Connecticut monitors demonstrate compliance with the design value for the annual $PM_{2.5}$ NAAQS.

Site	Design Value ($\mu g/m^3$)
Bridgeport	9.4
Cornwall	5.2
Danbury	8.2
East Hartford	7.3
Groton	7.1*
Hartford	8.7†
New Haven	8.3
Waterbury	8.7
Westport	7.7
NAAQS	**12.0**

* 1 year of data, started January 2015
† 2 years of data, started March 2014

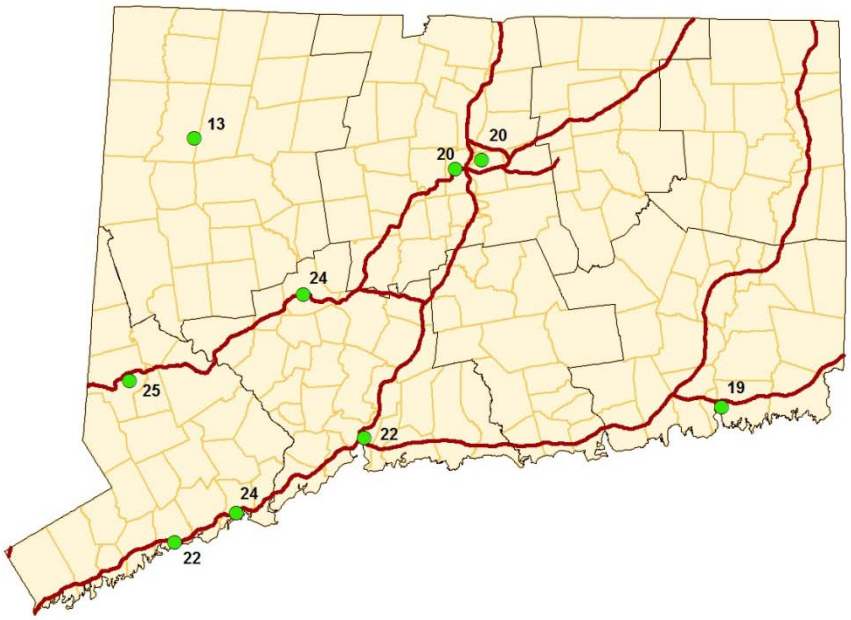


$PM_{2.5}$ Daily Design Values (2015)

Daily design values for $PM_{2.5}$ using 2013 through 2015 data are given below. $PM_{2.5}$ daily design values are calculated using the 3-year average of the annual 98th percentile values. The daily $PM_{2.5}$ NAAQS is 35 $\mu g/m^3$, revised in 2006 from the previous daily standard of 65 $\mu g/m^3$. Final designations relative to the 2006 24-hour $PM_{2.5}$ NAAQS were finalized by EPA in November 2009 (effective as of December 14, 2009), based upon measured data from 2006 through 2008. All Connecticut monitors demonstrate compliance with the design value for the 24-hour $PM_{2.5}$ NAAQS.

Site	Design Value ($\mu g/m^3$)
Bridgeport	24
Cornwall	13
Danbury	25
East Hartford	20
Groton	19*
Hartford	20†
New Haven	22
Waterbury	24
Westport	22
NAAQS	**35**

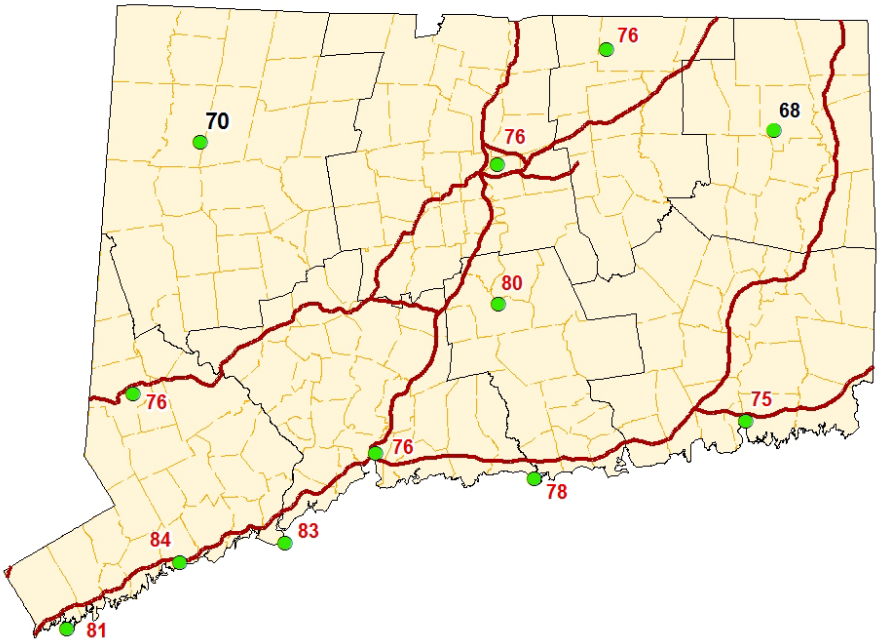
* 1 year of data, started January 2015
† 2 years of data, started March 2014



Ozone Design Values (2015)

The 2015 ozone 8-hour design values are given in the table below. Ozone design values are derived by averaging three consecutive annual fourth highest daily maximum 8-hour ozone values. Based on both the 2008 ozone standard of 0.075 ppm (75 ppb) and the new October 2015 revised ozone standard of 0.070 ppm (70 ppb), 9 out of 11 sites indicate nonattainment, shown in red font below. Currently, the ozone monitoring season in Connecticut is from April through September.

Site	Design Value (ppb)
Abington	**68**
Cornwall	**70**
Danbury	**76**
East Hartford	**76**
Greenwich	**81**
Groton	**75**
Madison	**78**
Middletown	**80**
New Haven	**76**
Stafford	**76**
Stratford	**83**
Westport	**84**
NAAQS	**70**



CO, SO_2, NO_2, PM_{10} and Pb NAAQS Comparisons (2015)

Comparisons of ambient levels of CO, SO_2, NO_2, PM_{10} and Pb to the primary NAAQS are provided in the tables below. The design values for each pollutant were derived in accordance with 40 CFR 50. For PM_{10}, the 3-year fourth-high value is given to indicate the ambient level relative to the standard, as the actual design value is the expected number of annual exceedances of the standard, averaged over a 3-year period, which is in attainment with a value of less than or equal to one.

CO NAAQS Comparison

Site	1-Hr Design Value (ppm)	8-Hr Design Value (ppm)
Bridgeport	2.4	1.8
Cornwall	2.6	0.5
East Hartford	1.6	1.0
Hartford	1.8	1.3
New Haven	1.6	1.3
NAAQS	**35**	**9**

SO_2 NAAQS Comparison

Site	1-Hr Design Value (ppb)
Bridgeport	9
Cornwall	5
East Hartford	7
New Haven	13
NAAQS	**75**

NO_2 NAAQS Comparison

Site	1-Hr Design Value (ppb)	Annual Design Value (ppb)
Cornwall	24	2
East Hartford	45	10
Hartford*	50	15
New Haven	52	14
NAAQS	**100**	**53**

*Data incomplete-site began 4/1/2013

PM_{10} NAAQS Comparison

Site	Daily Design Value ($\mu g/m^3$ STP)
Bridgeport	40
Cornwall	23
East Hartford	26
New Haven	34
NAAQS	**150**

Pb NAAQS Comparison

Site	Max 3-Yr 3-Month Mean ($\mu g/m^3$)
New Haven	0.04
NAAQS	**0.15**

DRAFT

Overview of Network Operation

DEEP operates a network of 15 sites throughout Connecticut used for monitoring air pollutants and meteorological parameters. This section contains information about monitoring methods and sampling frequencies, as well as monitoring network maps for each pollutant parameter. Network changes planned before the end of 2017 are discussed as are any anticipated network changes beyond that period.

$PM_{2.5}$ Network

Network Design The DEEP $PM_{2.5}$ network consists of Thermo/R&P Partisol®-Plus 2025/2025i sequential FRM air samplers with BGI VSCC (RFPS-0498-118) and Met One BAM 1020 continuous FEM air samplers (EQPM-0798-122) at eight air monitoring stations. The distribution of $PM_{2.5}$ sampling methods in the network and their applicability to NAAQS attainment are shown in Table 3. For the NAAQS compliance monitors, valid data from collocated and supplemental monitors, respectively, are used to fill in any missing or invalidated scheduled or nonscheduled days for the primary data set used for computing the design values.

The eight continuous BAM samplers in the network are designated FEM monitors, while the filter-based FRM monitors operate at a 1-in-6 day frequency, except for at the two NCore sites, New Haven and Cornwall, and the near road site in Hartford, all of which run on a 1-in-3 day schedule. On April 1, 2016, the collocated PM2.5 FRM sampler at Waterbury Bank Street was moved to East Hartford McAuliffe Park, as the Waterbury site was shut down for a site/shed upgrade. Given that the number of primary FRM monitors is now eight, only one collocated monitor is needed to meet the 15 percent requirement. As such, DEEP is proposing to discontinue the East Hartford collocated monitor on December 31, 2016.

The continuous FEM monitors are evaluated by correlation with the FRM monitors on a site by site basis each calendar quarter. As part of this plan, correlations were completed using three years of data as presented in the following section.

Table 3:$PM_{2.5}$ FRM/FEM Network Summary

Site	Primary (NAAQS)	Collocated (NAAQS)	Supplemental (NAAQS)
Bridgeport-Roosevelt Sch.	Continuous FEM	1-in-6 FRM	
Cornwall-Mohawk Mt.	1-in-3 FRM		Continuous FEM
Danbury-WCSU	1-in-6 FRM		Continuous FEM
East Hartford-McAuliffe Pk.	1-in-6 FRM	1-in-6 FRM*	Continuous FEM
Groton-Ft. Griswold	Continuous FEM		1-in-6 FRM
Hartford-Huntley Pl.	1-in-3 FRM		Continuous FEM
New Haven-Criscuolo Pk.	1-in-3 FRM	1-in-6 FRM	Continuous FEM
Waterbury-Bank St.	1-in-3 FRM		Continuous FEM

*Proposed for termination, 12/31/2016

Continuous $PM_{2.5}$ BAM Performance Evaluation DEEP compared the continuous FEM $PM_{2.5}$ data with $PM_{2.5}$ FRM data for the 3-year period 2013-2015. Hourly BAM data was aggregated to valid 24-hour averages when at least 75 percent of the hours in each day were valid. In cases where BAMs have been

designated FEMs in 2014, the FEM and non-FEM data sets were combined for the 3-year analysis. Linear regressions performed on the correlation plots are given in Appendix A. The slopes and intercepts of the regression lines are summarized in Table 4. Figure 2 shows the results of these correlations graphically, where slope/intercept points enclosed by the polygon comply with EPA FEM performance criteria.

Table 4: CT $PM_{2.5}$ FEM Performance Criteria Evaluation Summary (2013-2015 Data)

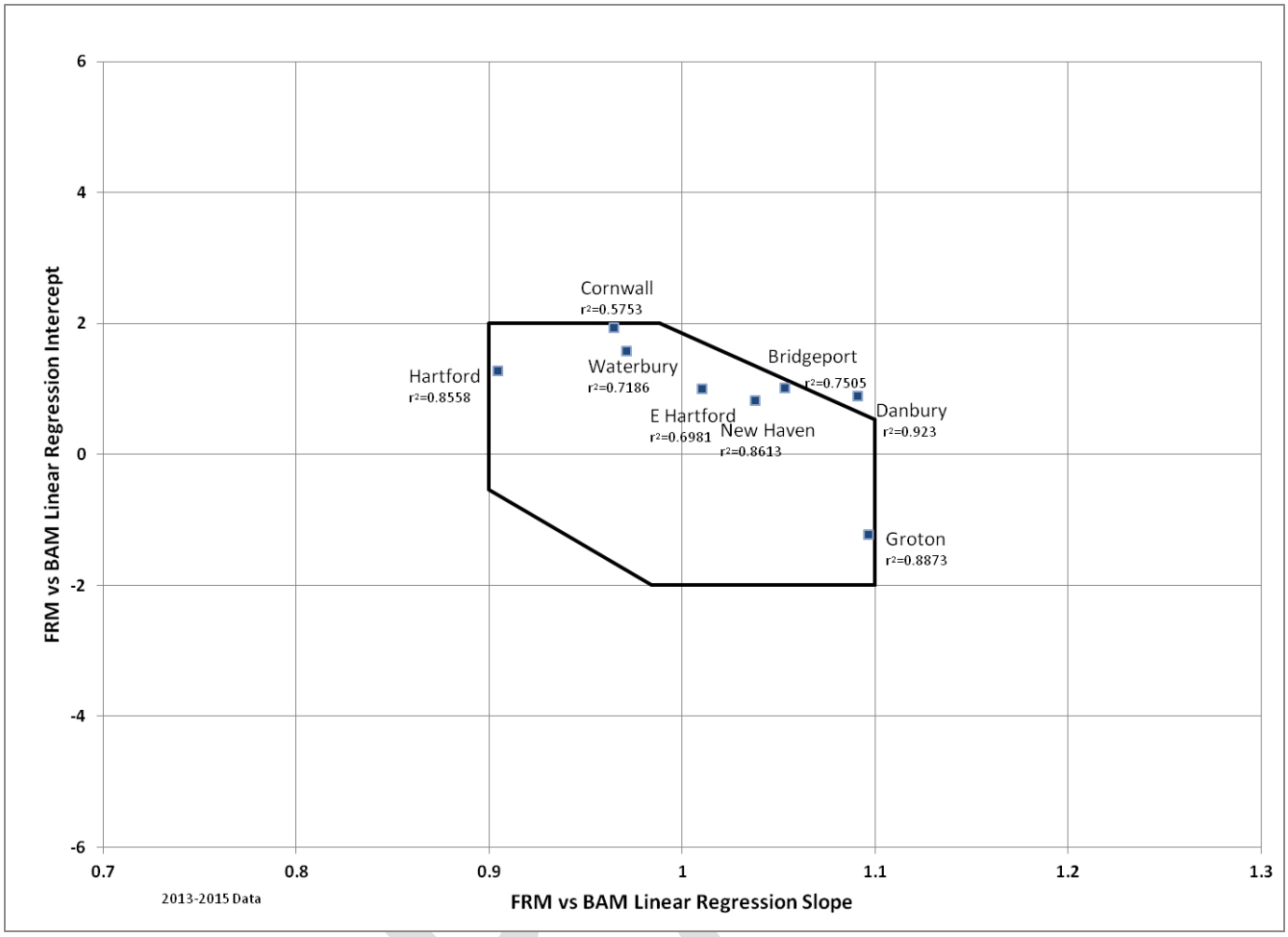
Correlation Data Summary							Evaluation Summary†			
Site Name	AQS ID	Slope	Intercept	R^2	No. Data Pairs	Meets FEM Performance Criteria	Slope ≥0.9 and ≤1.1	Intercept ≥-2 and ≤2	Intercept linear condition‡	Meets all performance conditions
Bridgeport Roosevelt School	09-001-0010	1.05	1.01	0.75	304	Y	1	1	1	1
Cornw all Mohaw k Mt	09-005-0005	0.96	1.93	0.58	330	Y	1	1	1	1
Danbury WCSU	09-001-1123	1.09	0.89	0.92	338	N	1	1	0	0
East Hartford McAuliffe Park	09-003-1003	1.01	1	0.7	901	Y	1	1	1	1
Groton - Fort Grisw old*	09-011-0124	1.09	1.22	0.89	53	y	1	1	1	1
Hartford Huntley Place**	09-003-0025	0.9	1.27	0.89	188	y	1	1	1	1
New Haven Criscuolo Park	09-009-0027	1.04	0.82	0.86	928	y	1	1	1	1
Waterbury Bank Street	09-009-2123	0.97	0.89	0.72	323	Y	1	1	1	1

*Based on one year of data, FRM Operations began Jan 2015.
**Based on two years of data, FRM operations began March 2014.
†A value of 1 indicates condition satisfied, 0 indicates condition not satisfied
‡Intercept between 15.05-(17.32*Slope) and 15.05-(13.20*Slope)

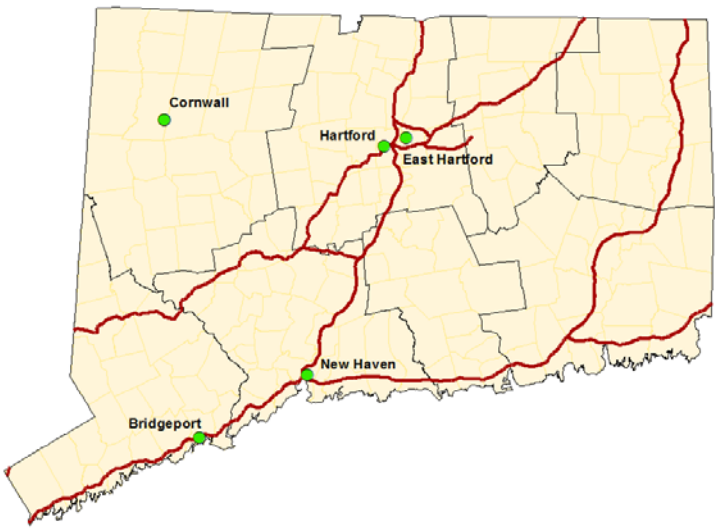
The data indicate that all sites except Danbury WCSU currently meet currently meet FEM criteria. The Danbury site nearly complies. DEEP will continue evaluating FEM performance through FEM-FRM comparisons on a quarterly basis as part of data validation.

DRAFT

Figure 2: CT $PM_{2.5}$ FEM Comparison with EPA Performance Standards (2013-2015 data)

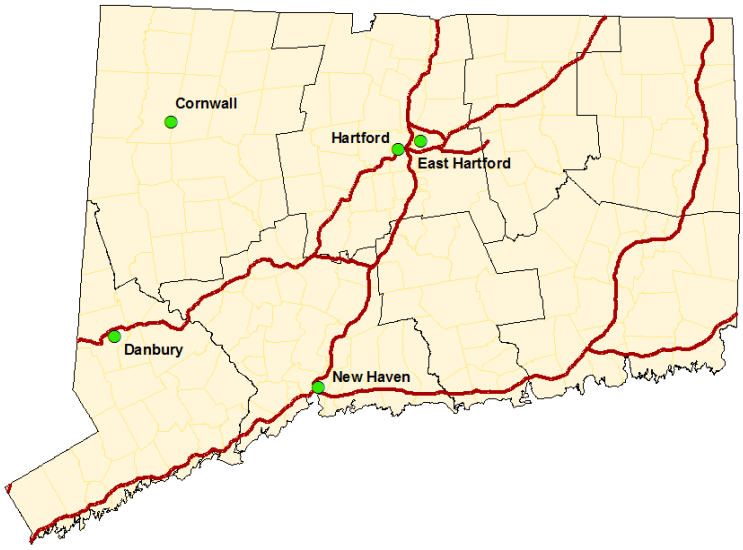


PM_{10} / $PM_{10-2.5}$ FRM Network



DEEP operates four PM_{10}/$PM_{10-2.5}$ FRM sites in the air monitoring network using Thermo Partisol®-Plus 2025/2025i sequential air samplers (RFPS-1298-127). The two NCore sites, Cornwall and New Haven operate on a 1-in-3 day sample schedule, while Bridgeport and East Hartford are operated on a 1-in-6 day sample schedule. The New Haven NCore site has a collocated PM_{10} FRM sampler operating on a 1-in-6 day sample schedule. In addition to the FRM PM_{10} monitors, three sites, Cornwall Mohawk Mountain, New Haven Criscuolo Park and Hartford Huntley Place, have FEM Met One BAM 1020 continuous PM_{10} monitors (EQPM-0798-122). All sites that have PM_{10} FRM samplers are paired with $PM_{2.5}$ FRM samplers for coarse PM ($PM_{10-2.5}$). Coarse PM is defined as thoracic PM having particle aerodynamic diameters between 2.5 and 10 microns. No changes to this network are proposed through the end of 2017.

PM Speciation Network



$PM_{2.5}$ chemical speciation measurements are obtained at five sites in the DEEP air monitoring network. These include filter-based daily composite 1-in-3 day samples at the NCore sites, and continuous hourly black carbon at five sites.

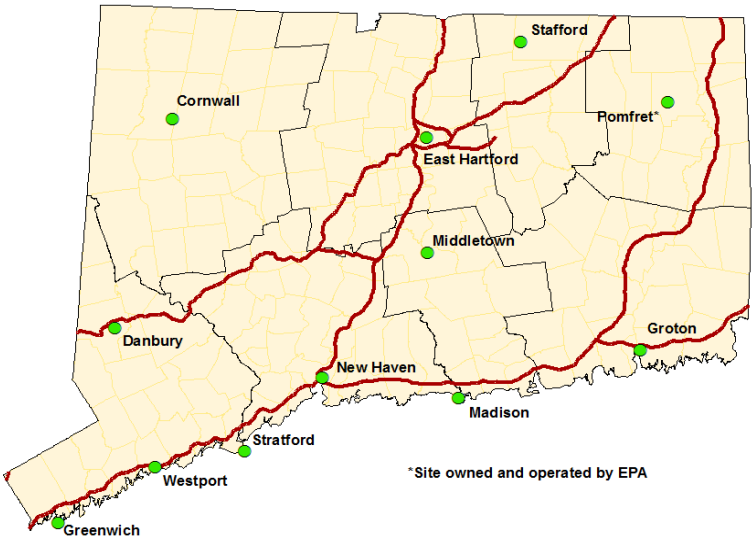
The Interagency Monitoring of Protected Visual Environments (IMPROVE) monitor is located at the Cornwall site and the Chemical Speciation Network (CSN) monitor is at the New Haven Criscuolo Park site. Both sites are operated on the standard EPA PM 1-in-3 day sample schedule and provide 24-hour integrated filter-base measurements.

Black carbon (BC) and ultra-violet channel carbon (UVC), a wood smoke PM surrogate, are monitored at the Criscuolo Park, Cornwall, Hartford, East Hartford McAuliffe Park and Danbury WCSU sites using 7-channel TAPI Model 633 aethalometers. No changes are proposed to the PM speciation network during 2016-2017.

DRAFT

Ozone Network

DEEP operates eleven ozone sites in the air monitoring network. The ozone analyzers at the Cornwall and New Haven Criscuolo Park sites are operated year-round, while the remaining sites are operated from April 1 through September 30. In accordance with the recent ozone NAAQS revision[5], DEEP will extend the ozone monitoring season by one month, starting March 1, 2017. In addition to the DEEP network, EPA operates an ozone monitor in Abington (Pomfret) as part of its Clean Air Status and Trends (CASTNET) network.



Ozone monitoring in the DEEP network is conducted using Teledyne-API Model T400 UV photometric ozone analyzers (method EQOA-992-087). Ozone measurements are sent to the EPA AIRNow website for AQI purposes on an hourly basis. No changes to the ozone monitoring network are planned through the end of 2017.

PAMS Network

DEEP formerly operated two Photochemical Assessment Monitoring Stations (PAMS) sites in the air monitoring network in 2015, at the New Haven Criscuolo Park and East Hartford McAuliffe Park sites. However, the recently revised monitoring rule[5] requires PAMS measurements at NCore sites that are located in CBSAs with populations of 1,000,000 or more. Since Connecticut's NCore sites are located in CBSAs with populations less than one million, this requirement does not apply. However, the rule requires that states located within the Ozone Transport Region (OTR) and/or states with O_3 nonattainment areas classified moderate and above develop and implement Enhanced Monitoring Plans (EMPs) proposing additional O_3, O_3 precursor and/or meteorological monitoring activities. DEEP is in the process of reviewing options that may include, but not be limited to, additional O_3 air measurement on Long Island Sound, upper air measurements, measurements of Total VOCs or a reduced amount of VOCs species (which would include benzene and toluene), additional NO_2 monitoring, and boundary layer studies.

[5] 80 FR 65292 October 26, 2015

NO_2 Network

DEEP operates four nitrogen dioxide (NO_2) sites in the monitoring network. Currently, DEEP is in the process of replacing the previously existing analyzers, Teledyne-API Model T200U (RFNA-1194-099), which monitor total oxides of nitrogen (NO_X) and nitrogen oxide (NO) by a chemiluminescence method. The difference NO_X-NO is reported to EPA as NO_2, along with the corresponding NO and NO_X values. Studies indicate[6] the potential for positive bias using this method from reactive nitrogen species other than NO or NO_2.

The replacement monitors, Teledyne-API Model T500U (EQNA-0514-212), are capable of directly measuring NO_2 using cavity attenuated phase shift (CAPS) spectroscopy methodology. The upgrade to the direct-measure NO_2 monitors provide the benefits of increased data accuracy and streamlined routine field operations, such as site checks, calibrations and audits. The NO_2 monitors will be maintained at three of the four existing sites, Hartford, East Hartford and New Haven, for regulatory compliance. DEEP plans to eliminate NO_2 monitoring at the Cornwall NCore site, as it is not specifically required by monitoring regulations.

DEEP also operates two nitrogen oxide/total reactive oxides of nitrogen (NO/NO_Y) TAPI model T200U/501 monitors, at Cornwall Mohawk Mountain and New Haven Criscuolo Park, as part of NCore requirements. NO_Y is defined as $NO+NO_2+NO_Z$, where NO_Z represents higher oxides of nitrogen.

As discussed in the previous section, DEEP is proposing to terminate PAMS VOC monitoring at both PAMS sites, East Hartford and New Haven. As such, the requirement for $NO/NO_2/NO_X$ monitoring at these sites is no longer in effect, and the direct NO_2 monitoring will be sufficient to meet non-PAMS requirements at these locations.

The NO_2 and NO/NO_Y networks fulfill requirements for NCore and SLAMS monitoring of these parameters. These requirements include: near road and area wide NO_2 monitoring in a Core-based statistical area (CBSA) with a population greater than 1,000,000(Hartford and East Hartford sites, respectively); nationwide NO_2 monitoring for susceptible and vulnerable populations at site selected by EPA (New Haven) and NCore NO/NO_Y monitoring (Cornwall and New Haven).

The monitoring requirements of NO_2 NAAQS rule revisions in 2010[7] and 2013[8] would have required DEEP to install two additional near-road NO_2 monitors (for areas with populations between 500,000 and 1,000,000), one each in the Bridgeport-Stamford and New Haven-Milford MSAs, by January 1, 2017. However, EPA recently proposed a rule[9] that would remove this requirement. As such, DEEP is not moving forward with implementing this phase of the near road network at this time.

---

[6] Dunlea, E. J., Evaluation of nitrogen dioxide chemiluminescence monitors in a polluted urban environment, Atmos. Chem. Phys., 2007

[7] 70 FR 6474, February 9, 2010

[8] 78 FR 16184, March 14, 2013

[9] 81 FR 30224, May 16, 2016

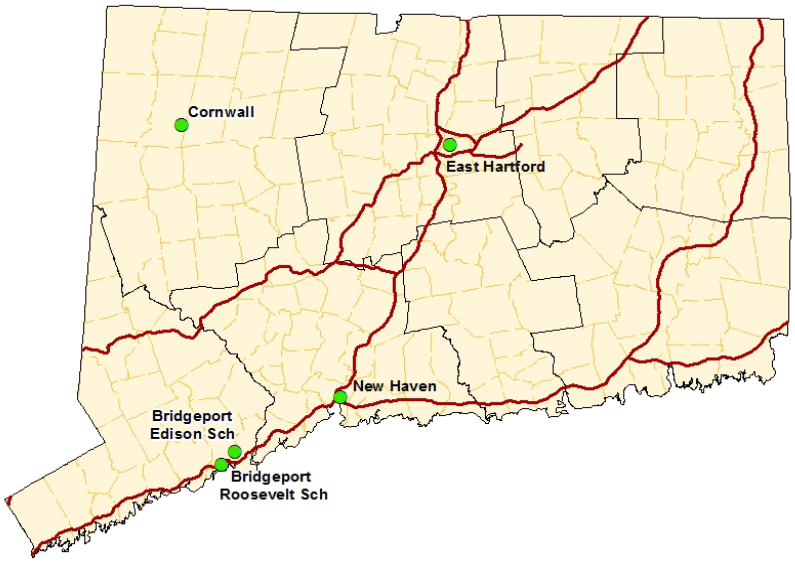
CO Network

DEEP operates five carbon monoxide (CO) sites in the air monitoring network. All CO samplers are operated year-round and employ TE 48i- TLE analyzers (RFCA-0981-054). Of the 5 sites, New Haven and Cornwall comply with the requirement for CO monitoring at NCore sites, Bridgeport monitors under a CO limited maintenance plan, and Hartford fulfills limited maintenance plan and near road requirements.

EPA's most recent revision to the CO NAAQS rule[10] specifies CO monitoring collocated with NO_2 near-road monitors in CBSAs with populations greater than 1,000,000 by January 1, 2017. This requirement applies to the Hartford-West Hartford-East Hartford MSA. CO monitoring at the Hartford Huntley Place site meets the local monitoring requirement for DEEP's Hartford area CO limited maintenance plan[11], as well as the near-road CO monitoring requirement. No changes to the CO monitoring network are anticipated through the end of 2017.

SO_2 Network

DEEP operates five sulfur dioxide (SO_2) sites in the air monitoring network. All samplers are TE 43i-TLE SO_2 analyzers (EQSA-0486-060) and are operated year-round. Both 1-hour and 5-minute block average SO_2 data are validated and reported to EPA.



The Bridgeport Edison School and the East Hartford McAuliffe Park SO_2 monitors satisfy the requirements of the most recent SO_2 NAAQS rule[12] for population-weighted emissions index (PWEI) monitoring in the Bridgeport-Stamford-Norwalk and Hartford-East Hartford-West Hartford CBSAs, respectively. In addition, trace SO_2 monitoring is required at both the Cornwall Mohawk Mountain and the New Haven Criscuolo Park NCore sites.

In December 2015, DEEP installed an SO_2 monitor at Bridgeport Roosevelt School for comparison with the pre-existing nearby Bridgeport Edison School SO_2 monitor. An analysis of the data to date indicates that SO_2 concentrations at Roosevelt are not biased low compared to Edison as shown in Figure 3 and

[10] 76 FR 54294, August 31, 2011

[11] DEEP, 2004

[12] 75 FR 35520, June 22, 2010

Table 4 below. As such, DEEP is proposing to operate the Roosevelt School monitor as the PWEI monitor in the Bridgeport-Stamford-Norwalk CBSA and discontinue the Edison School monitor on December 31, 2016.

Figure 3: Comparison of SO_2 between Bridgeport Edison and Roosevelt Schools (Dec 2015-May 2016)

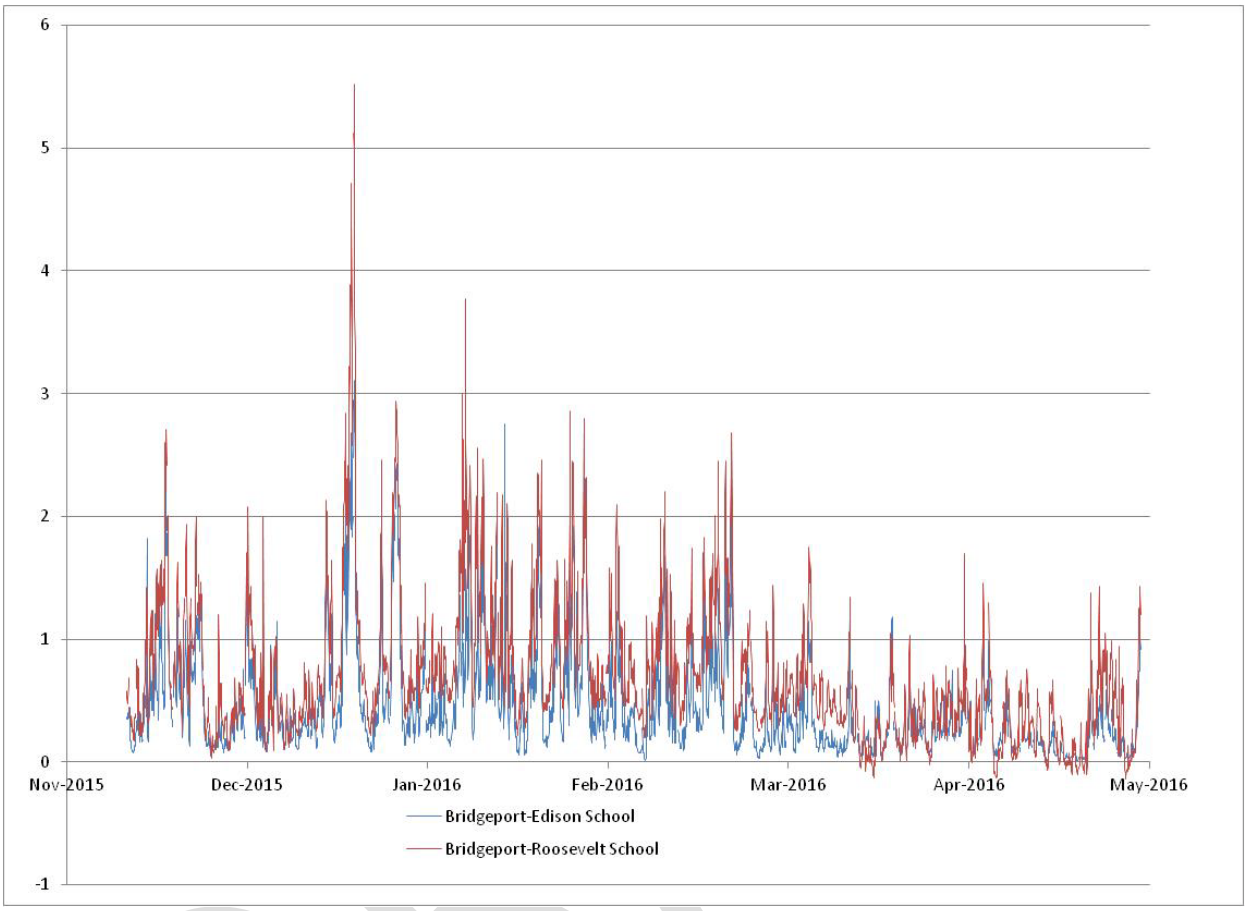


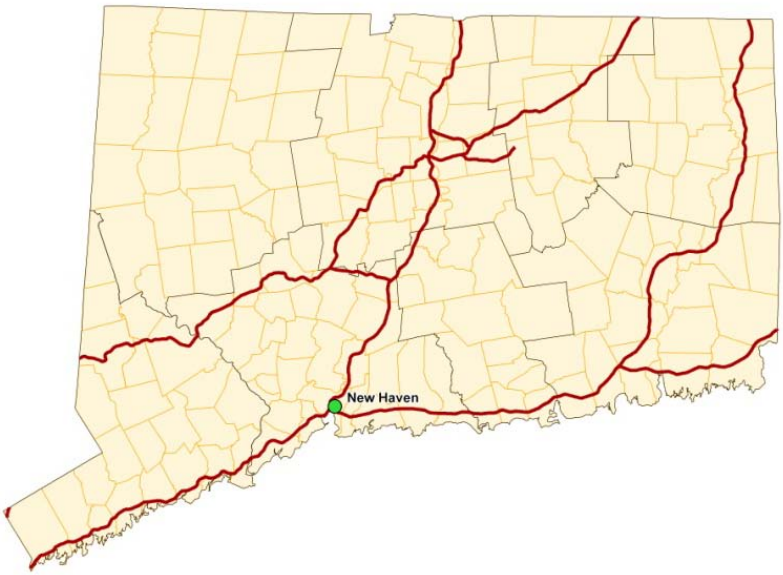
Table 4: Comparison of SO_2 Hourly Average Concentration Statistics between Bridgeport Edison and Roosevelt Schools (Dec 2015-May 2016)

Statistic	Bridgeport Edison School	Bridgeport Roosevelt School
Count	3900	3976
Average (ppb)	0.46	0.7
Standard Deviation (ppb)	0.43	0.58
99th Percentile (ppb)	2.01	2.61
Maximum (ppb)	3.11	5.52
Minimum (ppb)	0	-0.14

EPA's June 2010 SO_2 final NAAQS rule and subsequent SO_2 data requirements rule[13] indicate that, in addition to design values from NCore and PWEI-required monitoring, EPA may use refined dispersion modeling and/or source monitoring for SO_2 attainment designations based on source emissions and area population thresholds. As the most significant SO_2 source, Bridgeport Harbor Station Unit 3, is safely below point source threshold levels for this rule, there is no need to maintain Edison School as a potential maximum impact monitor for SO_2 designation.

[13] 80 FR 51052, August 21, 2015

Lead (Pb) Network



The DEEP lead (Pb) monitoring network consists of primary 1-in-6 day and collocated 1-in-12 day sampling at the New Haven Criscuolo Park urban NCore site in fufillment of the 2010 Pb revised NAAQS rule[14]. No additional Pb monitors are required in Connecticut for stationary source or airport monitoring as required by the rule.

Lead measurements are obtained from Energy Dispersive X-Ray Fluorescence (XRF) analysis of the 47 mm Teflon filter samples collected using a low-volume (lo-vol) FRM R&P Partisol Plus 2025 PM_{10} Sequential Air Samplers. Although the Pb NAAQS is defined as 0.15 µg/m^3 lead in total suspended particulates (TSP), Pb monitoring regulations allow surrogate monitoring of Pb in PM_{10} (Pb-PM_{10}), providing that design values are below two-thirds of the NAAQS, or below 0.10 µg/m^3. New Haven Pb-PM_{10} values continue to remain well below this threshold, with a 2015 design value of 0.04 µg/m^3, while most monthly averages are in the range of 0.00-0.01 µg/m^3 (Figure 3).

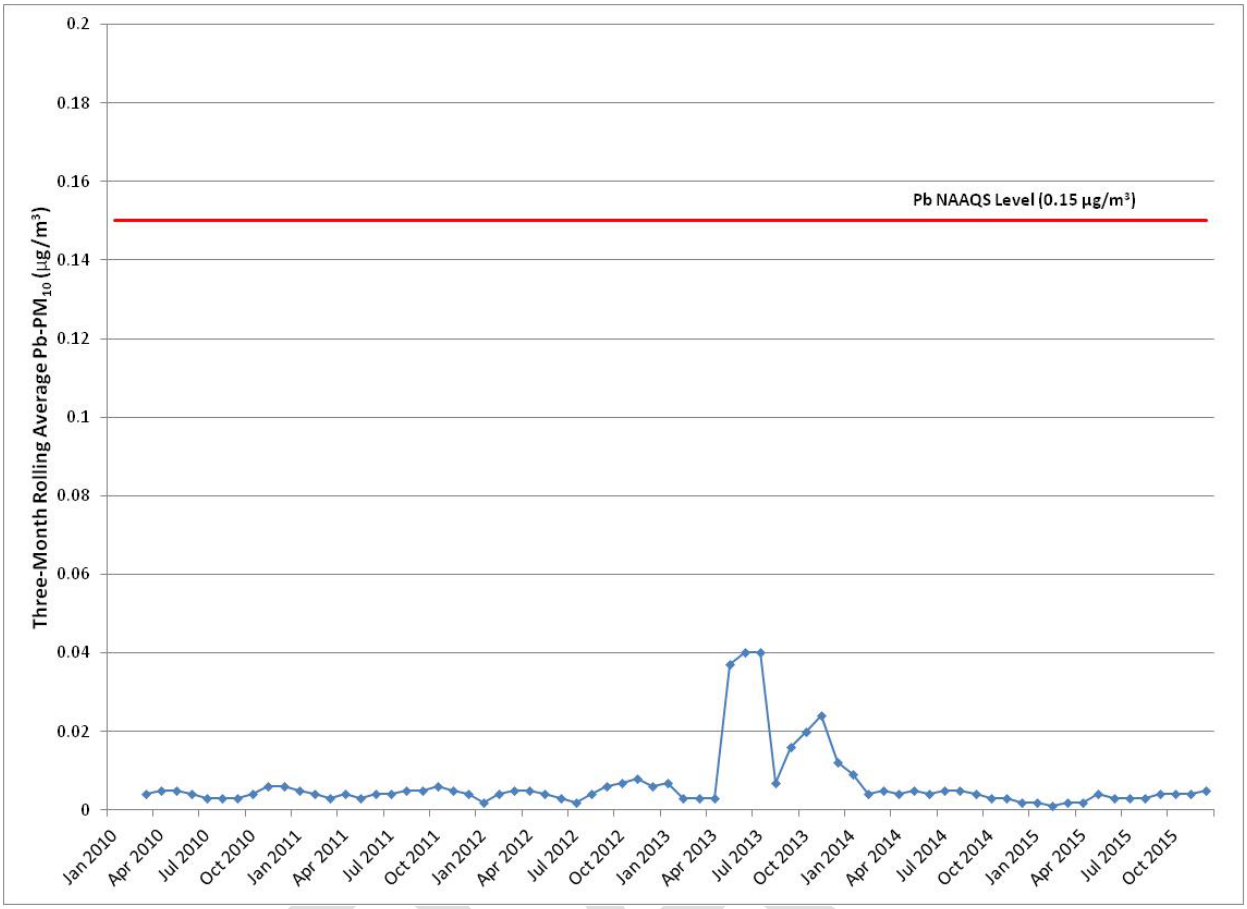
Given the six year record of Pb monitoring showing concentrations far below levels of concern, DEEP is proposing to terminate Pb-PM_{10} monitoring at the New Haven site as of July 1 2016 as allowed by EPA's recently promulgated changes to monitoring requirements[15], which allow for discontinuation of Pb monitoring at urban NCore, non-source oriented monitors after collecting three years of data.

DRAFT

[14] 75 FR 81126, December 27, 2010

[15] 81 FR 17248, March 28, 2016

Figure 4: Pb-PM10 Monitored Levels, 2010-2015



Detailed Site Information

The following section presents detailed information for each monitoring site, such as: identification code, location, history, monitored parameters, monitoring objectives, history and descriptive information.

Town – Site:	**Pomfret – Abington**		
County:	**Windham**	Latitude:	**41.84046°**
Address:	**80 Ayers Road**	Longitude:	**-72.010368°**
AQS Site ID:	**09-015-9991**	Elevation:	**209 m (686 ft)**
Spatial Scale:	**Regional**	Year Established:	**1993**
Statistical Area:	**CBSA Willimantic, CT**		

This site is not under the operational control or purview of DEEP and is included in this Network Plan for informational purposes only

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	NO/NO_2/NOx	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X													

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Abington site is a regional-scale site located in a rural/agricultural area in northeast Connecticut in the town of Pomfret. This site is operated by the National Park Service under the direction of EPA as part of their Clean Air Status and Trends Network (CASTNET). It is located on a hilltop approximately 2.3 km south of State Route (SR) 44 and 0.6 km east of SR 97. The site includes a portable shed located in the center of an agricultural field that is surrounded by forest. DEEP tracks ambient air quality and quality assurance data from the site but is not responsible for site operations and planning.

Monitoring Objectives: The Abington monitoring site objective is to collect ozone measurements to assess long-terms trends as part of the national CASTNET network. The site will also be used to determine compliance with the ozone NAAQS in Windham County.

Planned changes for 2016-2017: This site is not under the operational control or purview of DEEP and is included in this Network Plan for informational purposes only.

DRAFT

Town – Site:	**Bridgeport – Edison School**		
County:	**Fairfield**	Latitude:	**41.19500°**
Address:	**115 Boston Terrace**	Longitude:	**-73.16350°**
AQS Site ID:	**09-001-0012**	Elevation:	**34 m (110 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1983**

Statistical Area: **CSA (New York-Newark-Bridgeport)**

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	NO/NO_2/NOx	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
												T												

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Edison School site is a neighborhood-scale site located in southwestern Connecticut in the city of Bridgeport. This site is located 170 m to the north of Rte 1, 2.2 km to the north of I-95 and 2.7 km to the east of Rte 8. Residential neighborhoods are located in all directions of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Bridgeport Edison School monitoring site objective is to collect SO_2 measurements for compliance purposes and to potentially address the source-oriented monitoring requirement for the 2010 1-hour SO_2 NAAQS. The monitor satisfies the requirement for population weighted emission index (PWEI) monitoring within the Bridgeport-Stamford-Norwalk CBSA.

Planned changes for 2016-2017: Discontinue SO_2 monitoring and close the site on December 31, 2016. The monitor is proposed to be moved to Bridgeport Roosevelt School to comply with the PWEI monitoring objective.

DRAFT

Town – Site:	**Bridgeport – Roosevelt School**		
County:	**Fairfield**	Latitude:	**41.17086°**
Address:	**Park Avenue**	Longitude:	**-73.19476°**
AQS Site ID:	**09-001-0010**	Elevation:	**7 m (23 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1982**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	NO/NO_2/NOx	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
	1/6	X	1/6									P	X								X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Roosevelt School site is a neighborhood-scale site located in southwestern Connecticut in the city of Bridgeport. This site is located 50 m to the north of I-95 and 200 m to the west of the I-95 and Rte 8 interchange. This coastal site is located in a schoolyard and residential neighborhoods are present in every direction of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Bridgeport Roosevelt School monitoring site objectives include collecting $PM_{2.5}$ FRM measurements for compliance purposes and continuous $PM_{2.5}$ for AQI and forecasting purposes. The $PM_{2.5}$ BAM has been designated as an FEM to be used to determine NAAQS compliance as well. CO measurements will continue to be conducted at this site per requirements of the CO limited maintenance plan (LMP).

Planned changes for 2016-2017: SO_2 monitoring began January 1, 2016. The monitor satisfies the requirement for population weighted emission index (PWEI) monitoring within the Bridgeport-Stamford-Norwalk CBSA and will be used for compliance purposes.

DRAFT

Town – Site:	**Cornwall – Mohawk Mountain**		
County:	**Litchfield**	Latitude:	**41.82140°**
Address:	**Mohawk Mountain**	Longitude:	**-73.29733°**
AQS Site ID:	**09-005-0005**	Elevation:	**505 m (1656 ft)**
Spatial Scale:	**Regional**	Year Established:	**1988**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3		X	1/3		X				1/3	X	X	X	X		T	X			X	X	X	X	X	

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Mohawk Mountain site is a regional-scale site located in northwestern Connecticut in the town of Cornwall. The site is located at the summit of Mohawk Mountain with an elevation of 505 m (1656 ft), and is approximately 17 km to the east of the New York border and 25 km to the south of the Massachusetts border. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The primary monitoring objectives are to meet NCore requirements for O_3, CO, SO_2, NO, NOy, $PM_{2.5}$ FRM, PM_{10} FRM, $PM_{10-2.5}$ FRM, $PM_{2.5}$ speciation, continuous $PM_{2.5}$ and surface meteorology. $PM_{2.5}$ chemical speciation measurements are collected through the IMPROVE network as one-in-three day 24-hour samples and by continuous analyzers for fine particulate carbon parameters (BC/UVC).

Planned changes for 2016-2017: Discontinue NO_X sampling as of January 31, 2016.

DRAFT

Town – Site:	**Danbury – Western Connecticut State University**		
County:	**Fairfield**	Latitude:	**41.398692°**
Address:	**White Street**	Longitude:	**-73.443148°**
AQS Site ID:	**09-001-1123**	Elevation:	**116 m (380 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1974**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/6		X								X	X								X	X	X		P	

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Western Connecticut State University (WCSU) site is a neighborhood-scale site for $PM_{2.5}$ and an urban-scale site for O_3, located in western Connecticut in the city of Danbury. This site is located on the top level of a parking garage on the WCSU campus. This site is located approximately 140 m to the southeast of I-84 on White Street. Residential neighborhoods are located in all directions of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Danbury WCSU monitoring site objectives include collecting $PM_{2.5}$ FRM measurements for compliance purposes and continuous $PM_{2.5}$ for AQI and forecasting purposes. Ozone is measured at the Danbury site for compliance assessment and AQI forecast reporting. Black carbon (BC) aethalometer monitoring is included to track the wood smoke contribution to PM pollution.

Planned changes for 2016-2017: Commence barometric pressure monitoring in 2016 in support of aethalometer BC monitoring. DEEP plans to replace the shelter building in Fall of 2016.

Town – Site:	**East Hartford – McAuliffe Park**		
County:	**Hartford**	Latitude:	**41.78471°**
Address:	**McAuliffe Park**	Longitude:	**-72.63158°**
AQS Site ID:	**09-003-1003**	Elevation:	**15 m (50 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1981**
Statistical Area:	**CSA (Hartford-West Hartford-Willimantic)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/6	1/6	X	1/6							X	X	X	X	P	T		T		X	X	X	X	X	X

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The McAuliffe Park site is neighborhood-scale site located in central Connecticut in the town of East Hartford. The site is located approximately 120 m to the east of Rte 5, 2.0 km to the east of I-91 and 2.5 km to the south of I-291. This site is located 3.7 km to the northeast of the city of Hartford. Residential neighborhoods are located in all directions of this site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I. DEEP upgraded the air monitoring equipment shelter during Fall of 2013, during which time most monitors experienced some data loss.

Monitoring Objectives: The East Hartford McAuliffe Park monitoring site objectives include collecting $PM_{2.5}$ FRM measurements for compliance purposes and continuous $PM_{2.5}$ for AQI and forecasting purposes. The SO2 monitor satisfies the PWEI requirement for the Hartford-West Hartford-East Hartford CBSA. A PM_{10} FRM is operated for SLAMS compliance purposes, as well as to gather $PM_{10-2.5}$ measurements. Ozone is measured at the McAuliffe Park site for compliance assessment and AQI and forecast reporting. A collocated FRM sampler is operated at this site to gather FRM precision data

Planned changes for 2016-2017:$PM_{2.5}$ FRM sampling frequency was changed from 1/1 to 1/6 on January 1, 2016. PAMS will not be conducted as allowed by 40 CFR 58 Appendix D (October 26, 2015). A collocated FRM sampler was installed to gather FRM precision data by April 2016 but is proposed to terminate on December 31, 2016. A direct NO_2 monitor will be installed to replace $NO/NO_2/NO_x$

DRAFT

monitoring during 2016.

Town – Site:	**Greenwich – Point Park**		
County:	**Fairfield**	Latitude:	**41.005047°**
Address:	**Point Park**	Longitude:	**-73.58382°**
AQS Site ID:	**09-001-0017**	Elevation:	**3 m (10 ft)**
Spatial Scale:	**Urban**	Year Established:	**1978**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X								X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Greenwich Point Park site is an urban-scale site located is southwestern Connecticut on the Long Island Sound in the town of Greenwich. This is a coastal site located approximately 3.0 km to the southeast and 5.0 km to the northeast of the New York border. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I
.

Monitoring Objectives: The Greenwich Point Park monitoring site objectives include collecting ozone measurements for compliance assessment and AQI and forecast reporting.

Planned changes for 2016-2017: Update electrical power and a possible shelter replacement or renovation in the Fall of 2016.

Town – Site:	**Groton – Fort Griswold**		
County:	**New London**	Latitude:	**41.35362°**
Address:	**141 Smith Street**	Longitude:	**-72.07882°**
AQS Site ID:	**09-011-0124**	Elevation:	**37 m (120 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**2007**
Statistical Area:	**MSA (Norwich-New London)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/6		X									X										X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Fort Griswold site is a neighborhood-scale site located in southeastern Connecticut in the town of Groton. This site is located approximately 1.1 km to the south of I-95 and 0.5 km to the east of the New London Harbor. Residential neighborhoods are located in all directions of this site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I. During 2012, the site was moved to a new shelter approximately 15 meters south of the old shelter.

Monitoring Objectives: The Groton Fort Griswold monitoring site objectives include monitoring of the two key pollutants, ozone and $PM_{2.5}$, for the southeastern part of Connecticut. Ozone is measured at the Fort Griswold site for compliance assessment and AQI and forecast reporting. $PM_{2.5}$ is currently monitored for AQI reporting and has been designated as an FEM to be used to determine NAAQS compliance.

Planned changes for 2016-2017: None

DRAFT

Town – Site:	**Hartford – Huntley Place**		
County:	**Hartford**	Latitude:	**41.771444°**
Address:	**10 Huntley Place**	Longitude:	**-72.679923°**
AQS Site ID:	**09-003-0025**	Elevation:	**57.2 m (187.7 ft)**
Spatial Scale:	**Near Road**	Year Established:	**2013**
Statistical Area:	**CSA (Hartford-West Hartford-Willimantic)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	NO/NO_2/NOx	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3		X			X					X			X	P	T			X	X	X	X		X	

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

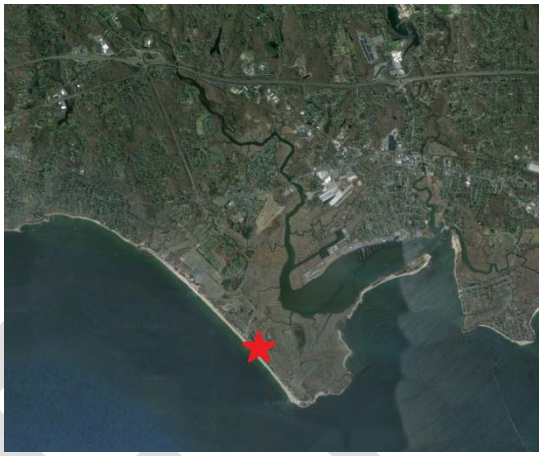
Site Description: The Huntley Place site is a near-road site located in north central Hartford. The site, located on the north west side of US I-84, is approximately 0.25 km to the west of the US I-91 corridor and the Founders and Buckley Bridges over the Connecticut River. Residential neighborhoods are located to the north, east and west of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Near Road monitoring objective will focus monitoring resources to capture short-term NO_2 concentrations near heavily trafficked roads, to assess area-wide NO_2 concentrations, and to assess NO_2 concentrations for vulnerable and susceptible populations in adjacent neighborhoods. The data will be also used to help determine compliance with the 1-hour NO_2 NAAQS as established by EPA in 2010. This site also collects CO, continuous $PM_{2.5}$ & PM_{10} (BAM), BC/UVC and traffic counts. DEEP began operating a $PM_{2.5}$ FRM sampler at the site in March 2014.

Planned changes for 2016-2017: A direct NO_2 monitor will replace the NO/NO_2/NO_x monitor during 2016.

DRAFT

Town – Site:	**Madison – Hammonasset State Park**		
County:	**New Haven**	Latitude:	**41.25984°**
Address:	**Hammonasset SP**	Longitude:	**-72.55018°**
AQS Site ID:	**09-009-9002**	Elevation:	**3 m (10 ft)**
Spatial Scale:	**Regional**	Year Established:	**1981**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		



PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X								X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2015/2016

Site Description: The Hammonasset State Park site is a regional-scale site located in central coastal Connecticut in the town of Madison. This site is located approximately 1.5 km to the south of Rte 1 and 3.0 km to the south of I-95 on the Long Island Sound. Residential neighborhoods are located primarily to the northeast, north and northwest of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I. On August 30, 2012, the site was relocated approximately 450 meters to the southwest within the park due to storm damage at the previous location. The previous AQS ID was 09-009-3002.

Monitoring Objectives: The Madison Hammonasset State Park monitoring site objective is to collect ozone measurements for compliance assessment and AQI forecast reporting.

Planned changes for 2016-2017: Shelter was replaced in May 2016.

Town – Site:	**Middletown – Central Valley Hospital**		
County:	**Middlesex**	Latitude:	**41.55224°**
Address:	**Shew Hall**	Longitude:	**-72.63004°**
AQS Site ID:	**09-007-0007**	Elevation:	**58 m (190 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1980**
Statistical Area:	**CSA (Hartford-West Hartford-Willimantic)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X								X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Middletown Central Valley Hospital site is a neighborhood-scale site located in central Connecticut. This site is located approximately 0.2 km to the east of Rte 9. Residential neighborhoods are located to the west, north and south of this site. This site meets all siting requirements and criteria with the exception of the height requirement. A height requirement waiver has been approved and granted by EPA Region I and EPA Headquarters. This site has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Middletown Central Valley Hospital monitoring site objective is to collect ozone measurements for compliance assessment and AQI forecast reporting.

Planned changes for 2016-2017: Researching possible alternative sites for this monitor.

DRAFT

Town – Site:	**New Haven – Criscuolo Park**		
County:	**New Haven**	Latitude:	**41.30117°**
Address:	**1 James Street**	Longitude:	**-72.90288°**
AQS Site ID:	**09-009-0027**	Elevation:	**3 m (10 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**2004**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	NO/NO_2/NOx	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation	Mixing Height
1/3	1/6	X	1/3	1/6	X	1/6	1/12	1/3		X	X	X	X	P	T	X	T		X	X	X	X	X	X	X

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Criscuolo Park site is a neighborhood-scale site located on the western side of the city of New Haven. The site is approximately 0.25 km to the north of the I-95 Quinnipiac River Bridge. The site is approximately 1.0 km to the east of the I-91 and I-95 interchange. Bulk gasoline transfer stations are located 0.3 to 2.0 km to the south of the site. Residential neighborhoods are located to the west, north and east of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The primary monitoring objectives are to meet NCore requirements for O_3, CO, SO_2, $PM_{2.5}$ FRM, PM_{10} FRM, $PM_{10-2.5}$ FRM, $PM_{2.5}$ speciation, continuous $PM_{2.5}$ and surface meteorology. NO_2 monitoring is conducted in fulfillment of the requirement for NO_2 monitoring of vulnerable and sensitive populations 40 nationwide sites selected by the Regional Administrators. $PM_{2.5}$ chemical speciation measurements are collected through the Chemical Speciation Network (CSN) as one-in-three day 24-hour samples and by continuous analyzers for fine particulate carbon parameters (BC/UVC and EC/OC) and sulfate. Ozone is measured at the Criscuolo Park site for compliance assessment and AQI forecast reporting.

Planned changes for 2016-2017: Discontinue Pb-PM_{10} sampling June 30, 2016. Discontinue PAMS VOCs after 2015 season. A direct NO_2 monitor will replace NO/NO_2/NO_x monitoring during 2016.

Town – Site:	**Stafford – Shenipsit State Forest**		
County:	**Tolland**	Latitude:	**41.97568°**
Address:	**Route 190**	Longitude:	**-72.38674°**
AQS Site ID:	**09-013-1001**	Elevation:	**265 m (869 ft)**
Spatial Scale:	**Regional**	Year Established:	**1980**
Statistical Area:	**CBSA (Hartford-West Hartford-Willimantic)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X								X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Shenipsit State Forest site is a regional-scale site that is located in northern Connecticut in the town of Stafford. The site is approximately 100 m to the south of Rte 190, 17 km to the east of I-91 and 12 km to the northwest of I-84. This site is located 34 km to the northeast of the city of Hartford. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Stafford Shenipsit State Forest monitoring site objective is to collect ozone measurements for compliance assessment and AQI forecasting purposes.

Planned changes for 2016-2017: The shelter was replaced in March 2016; otherwise, no changes are planned.

DRAFT

Town – Site:	**Stratford – Lighthouse**		
County:	**Fairfield**	Latitude:	**41.15181°**
Address:	**Prospect Drive**	Longitude:	**-73.10334°**
AQS Site ID:	**09-001-3007**	Elevation:	**3 m (10 ft)**
Spatial Scale:	**Regional**	Year Established:	**1980**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X										X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Stratford Lighthouse site is a regional-scale site located in southwestern Connecticut in the town of Stratford. This is a coastal site that is located 4.5 km to the southeast of I-95 and is directly on the Long Island Sound. This site is approximately 45 km to the northeast of the New York State border. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Stratford Lighthouse monitoring site objective is to collect ozone measurements for compliance assessment and AQI forecasting purposes.

Planned changes for 2016-2017: None

DRAFT

Town – Site:	**Waterbury – Meadow & Bank Street**		
County:	**New Haven**	Latitude:	**41.55046°**
Address:	**Meadow & Bank**	Longitude:	**-73.04365°**
AQS Site ID:	**09-009-2123**	Elevation:	**80 m (269 ft)**
Spatial Scale:	**Neighborhood**	Year Established:	**1975**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/6	1/6	X																	X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Waterbury site is a neighborhood-scale site located in western Connecticut at Meadow Street and Bank Street in the Naugatuck River Valley. This site is approximately 170 m to the south of I-84, 300 m to the east of Rte 8 and 0.75 km to the east of the I-84 and Rte 8 interchange. Residential neighborhoods are located in all directions of the site. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

Monitoring Objectives: The Waterbury Meadow & Bank Street site monitoring objectives include collecting $PM_{2.5}$ FRM measurements for compliance purposes and continuous $PM_{2.5}$ for AQI forecast reporting. The $PM_{2.5}$ BAM and has been designated as an FEM to be used to determine NAAQS compliance as well.

Planned changes for 2016-2017: Changed $PM_{2.5}$ FRM sampling frequency from 1/3 to 1/6 on January 1, 2016. The shelter will be upgraded during 2016. The collocated $PM_{2.5}$ FRM sampler was removed on March 31, 2016.

DRAFT

Town – Site:	**Westport – Sherwood Island State Park**		
County:	**Fairfield**	Latitude:	**41.11822°**
Address:	**Sherwood Island SP**	Longitude:	**-73.33681°**
AQS Site ID:	**09-001-9003**	Elevation:	**4 m (13 ft)**
Spatial Scale:	**Regional**	Year Established:	**1996**
Statistical Area:	**CSA (New York-Newark-Bridgeport)**		

PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	Direct NO_2	$NO/NO_2/NOx$	NO/NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
											X								X	X	X			

X=Existing P = Planned in 2015/16 T = Proposed to terminate in 2016/2017

Site Description: The Westport Sherwood Island State Park site is a regional-scale site located in southwestern Connecticut. This is a coastal site that is approximately 0.5 km to the south of I-95 on the Long Island Sound. This site meets all siting requirements and criteria and has been approved internally by DEEP and independently by EPA Region I.

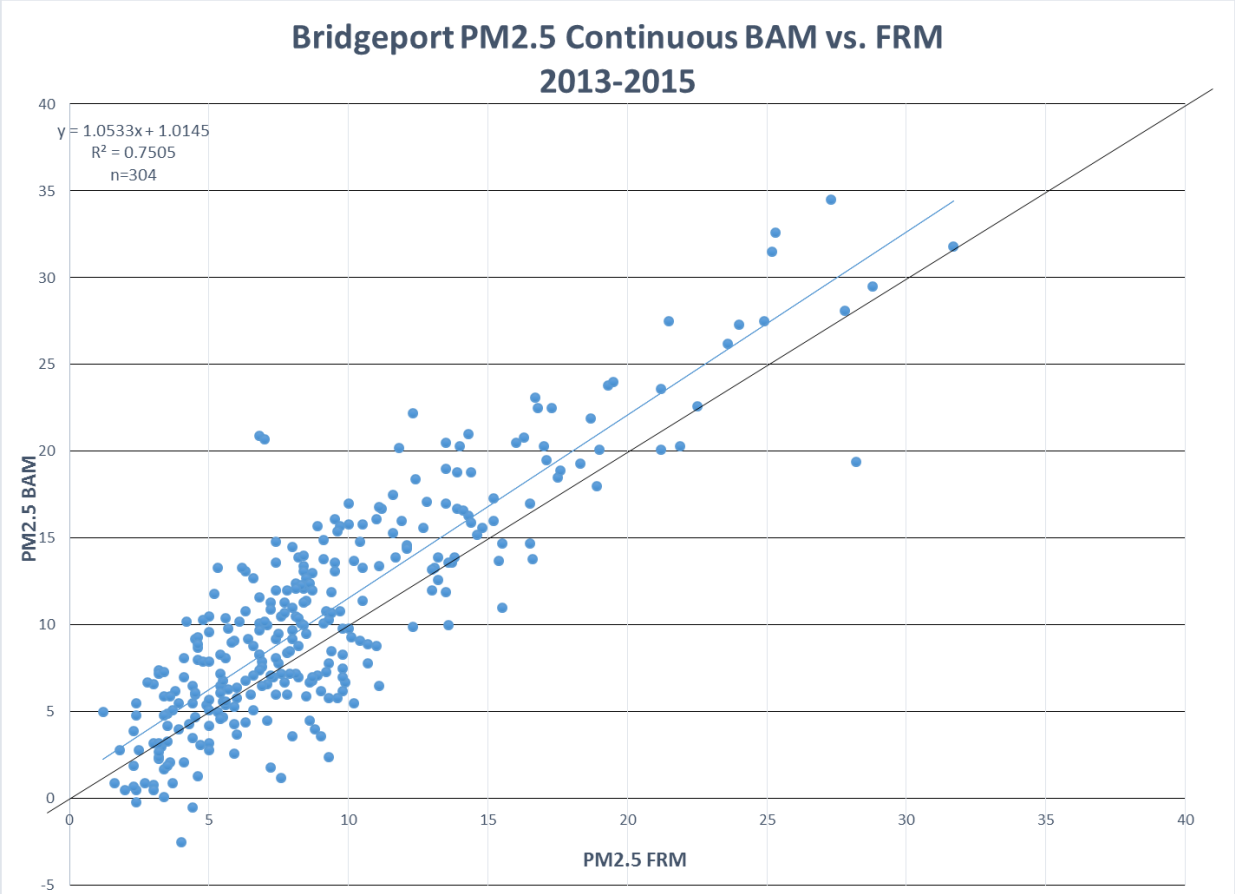
Monitoring Objectives: Ozone is measured at the Westport site for compliance assessment and AQI forecast reporting.

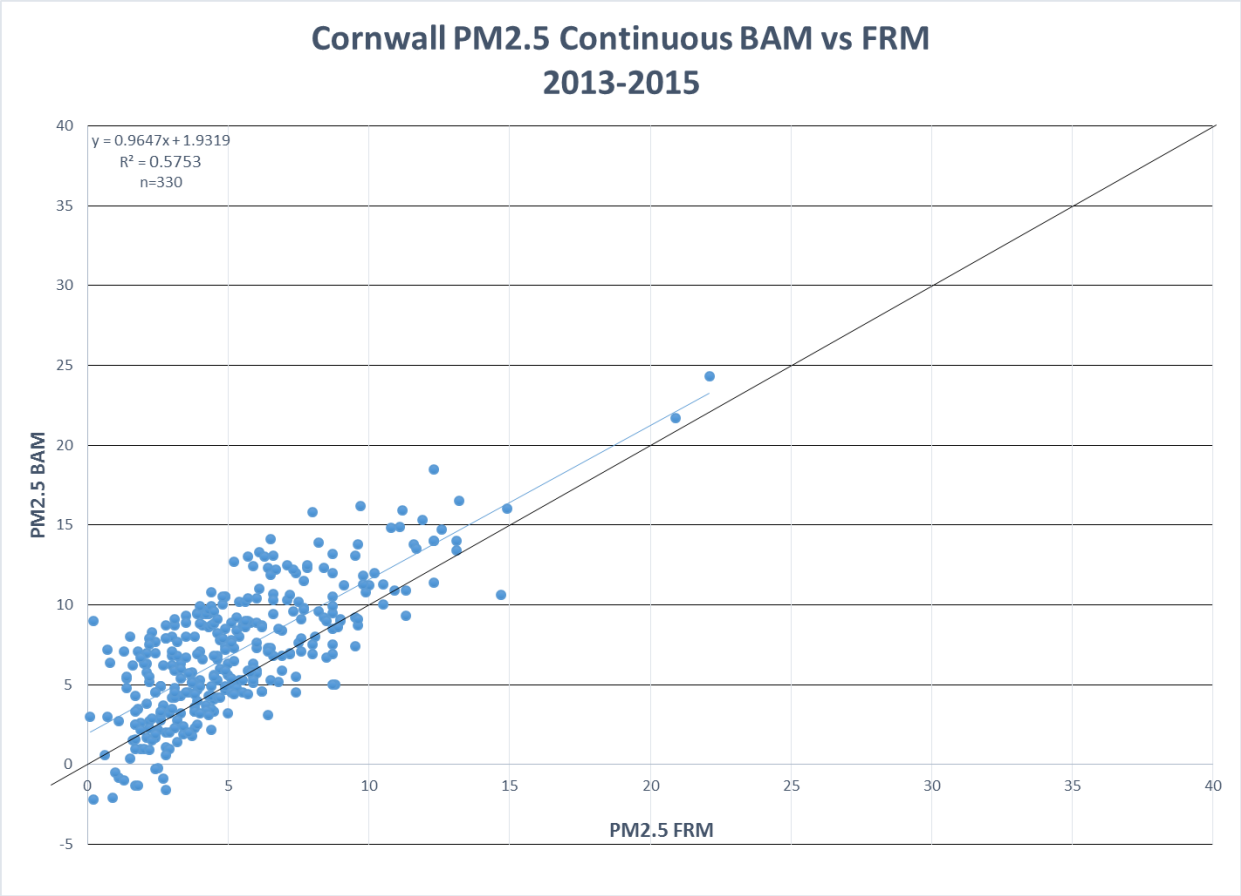
Planned changes for 2016-2017: None

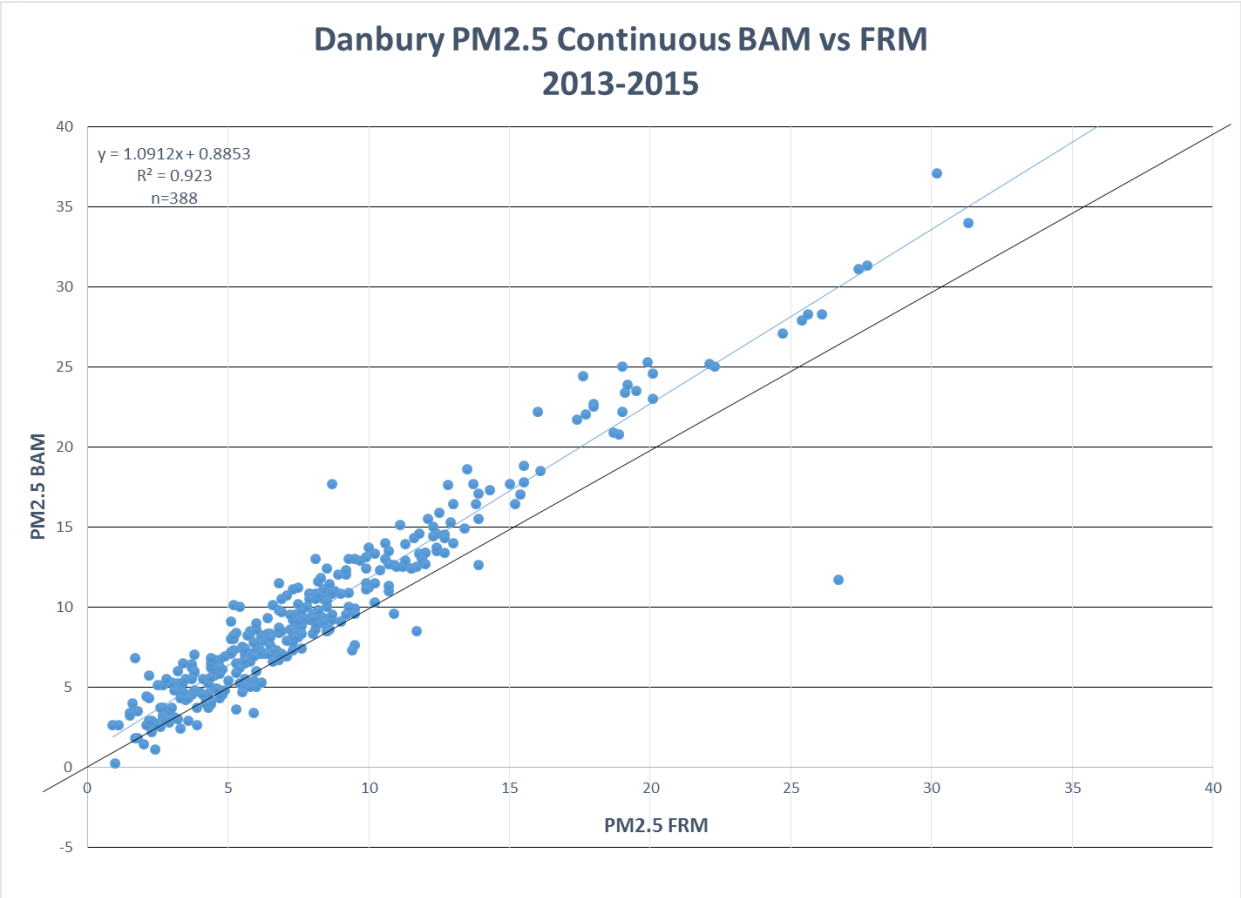
DRAFT

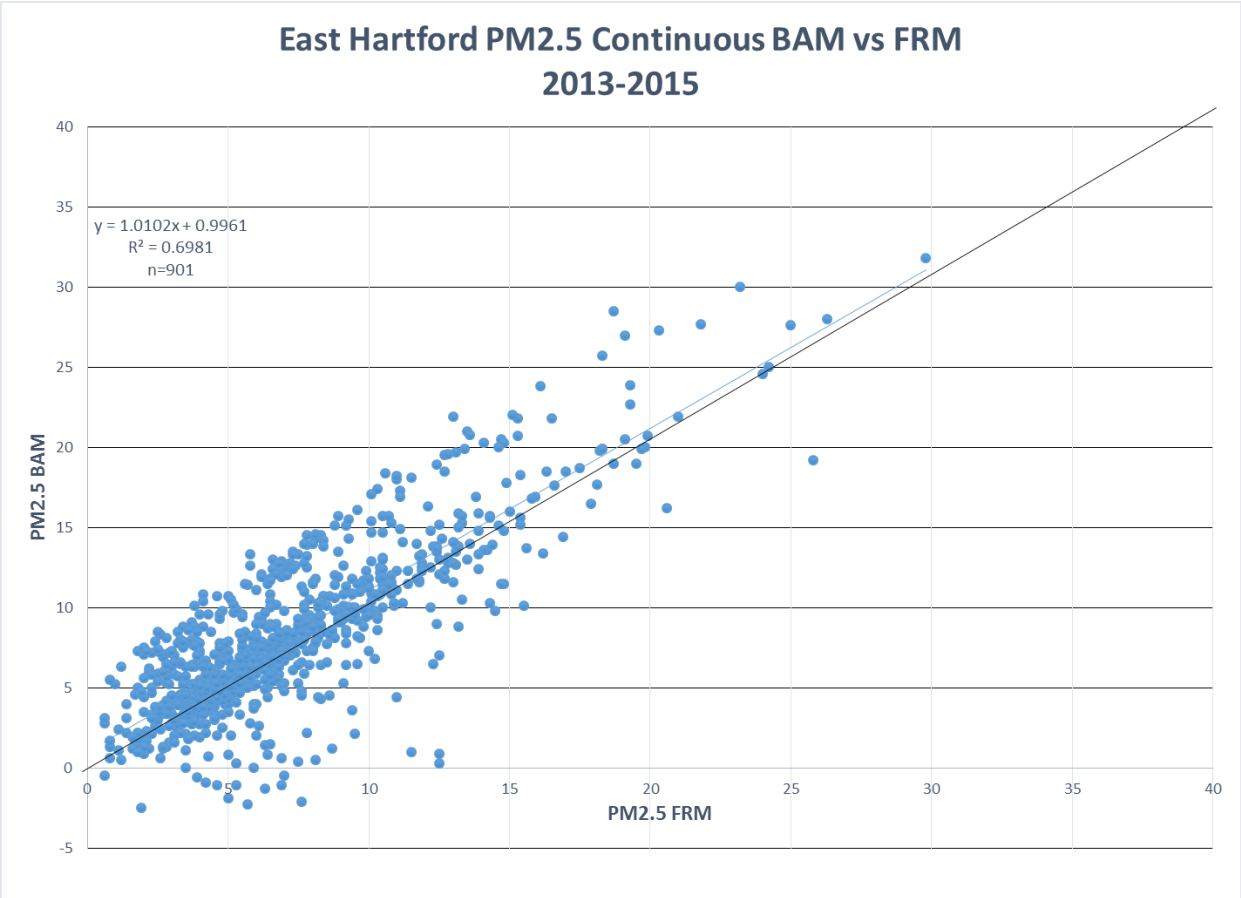
Appendix A PM2.5 FRM vs Continuous Correlation Charts

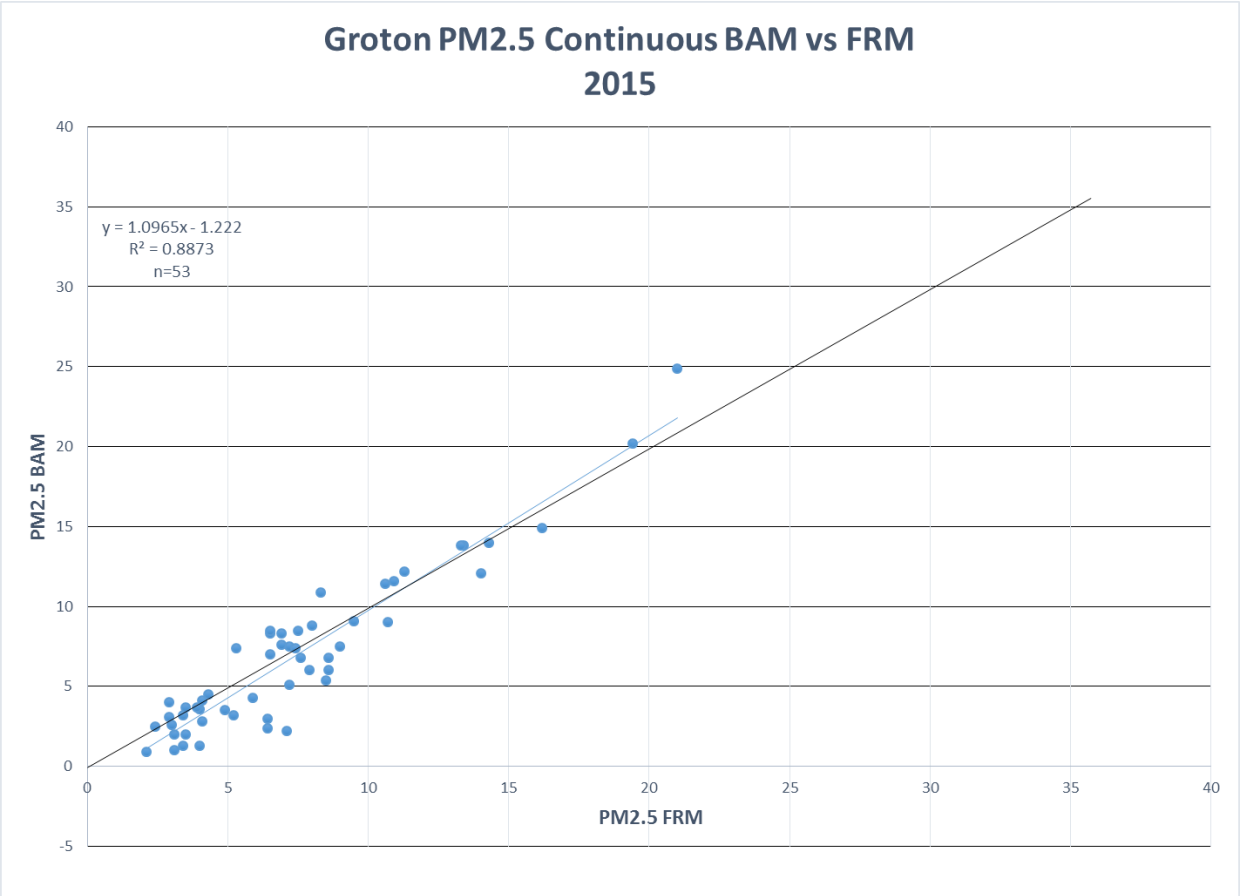
DRAFT

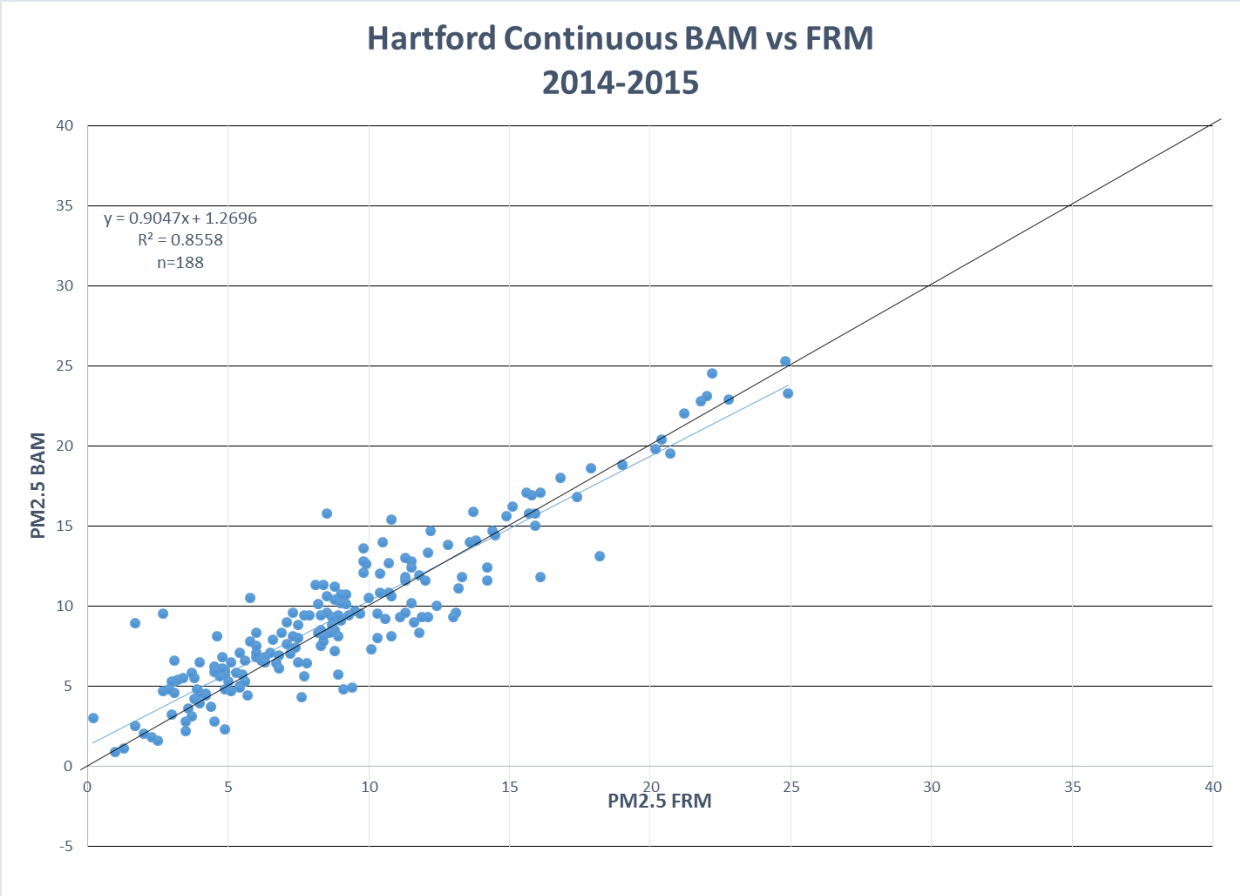

Bridgeport PM2.5 Continuous BAM vs. FRM
2013-2015
y = 1.0533x + 1.0145
R² = 0.7505
n=304
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40

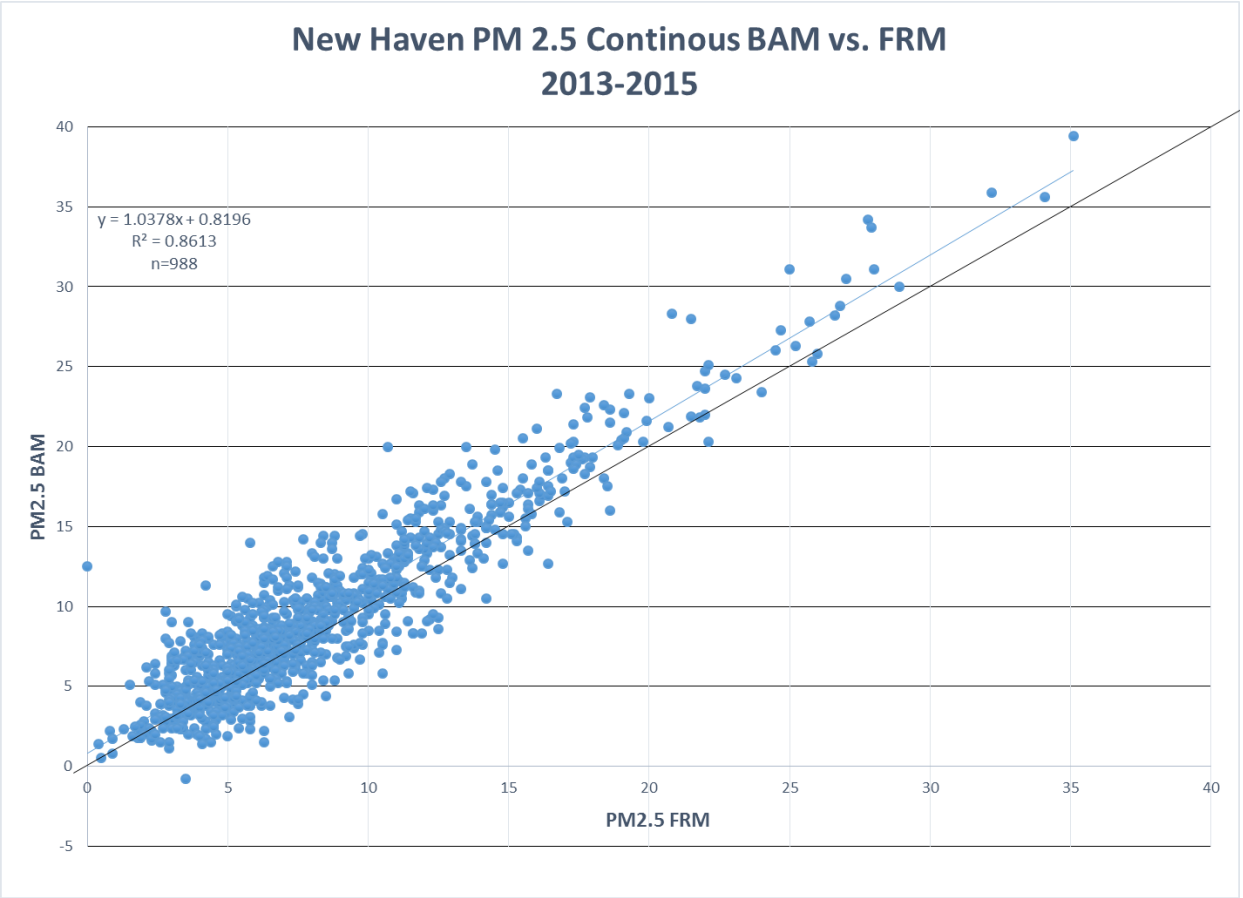

Cornwall PM2.5 Continuous BAM vs FRM
2013-2015
y = 0.9647x + 1.9319
R² = 0.5753
n=330
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40

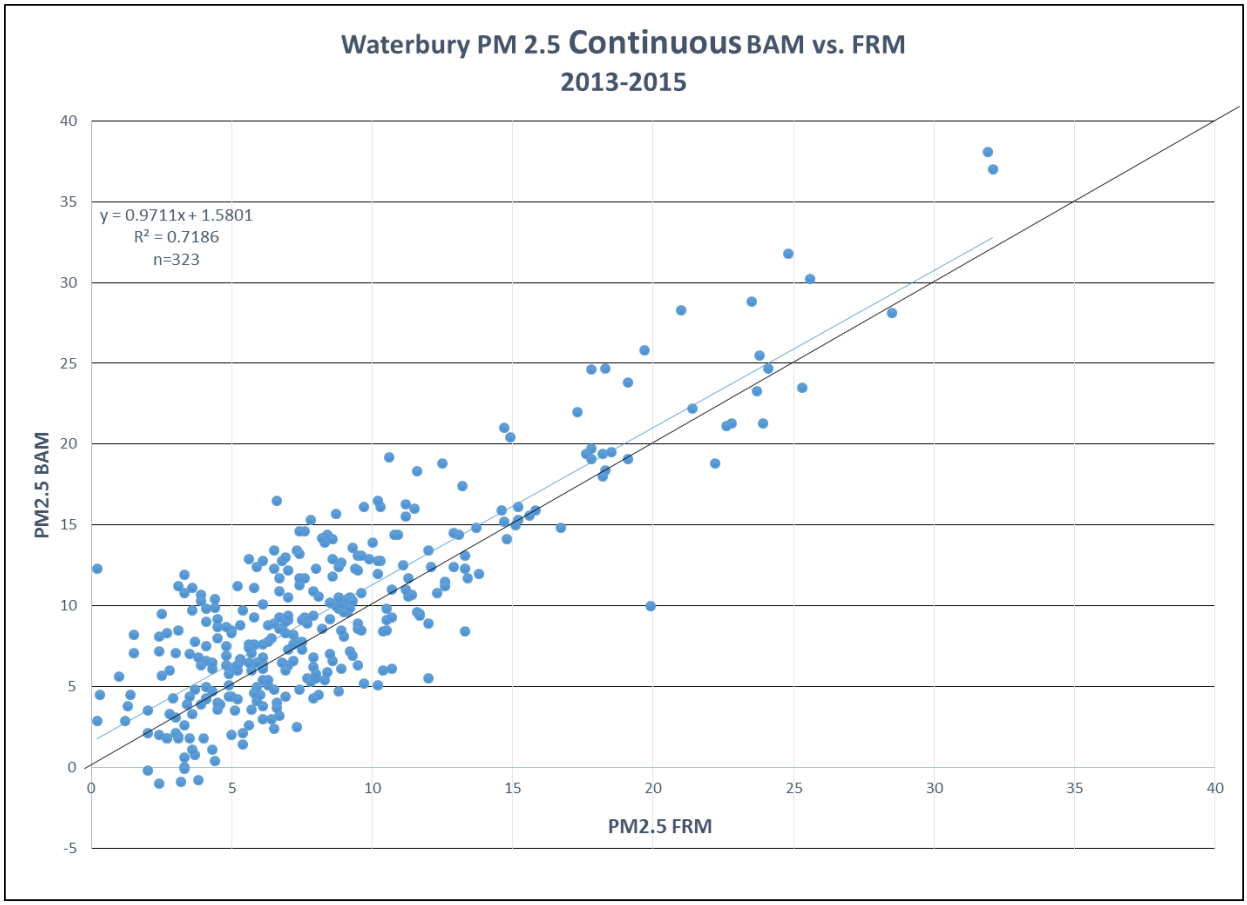

Danbury PM2.5 Continuous BAM vs FRM
2013-2015
y = 1.0912x + 0.8853
R² = 0.923
n=388
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40


East Hartford PM2.5 Continuous BAM vs FRM
2013-2015
y = 1.0102x + 0.9961
R² = 0.6981
n=901
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40


Groton PM2.5 Continuous BAM vs FRM
2015
y = 1.0965x - 1.222
R² = 0.8873
n=53
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40


Hartford Continuous BAM vs FRM
2014-2015
y = 0.9047x + 1.2696
R² = 0.8558
n=188
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40


New Haven PM 2.5 Continous BAM vs. FRM
2013-2015
y = 1.0378x + 0.8196
R² = 0.8613
n=988
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40


Waterbury PM 2.5 Continuous BAM vs. FRM
2013-2015
y = 0.9711x + 1.5801
R² = 0.7186
n=323
PM2.5 BAM
PM2.5 FRM
40
35
30
25
20
15
10
5
0
-5
0
5
10
15
20
25
30
35
40

Appendix B Public Comments Received With DEEP Responses

Response to Comments on Network Plan