Connecticut 2015 Ambient Air Monitoring

5-Year Network Assessment

Connecticut Department of Energy and Environmental Protection
Bureau of Air Management
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Acronyms and Abbreviations

AQI – Air Quality Index
CAA – Clean Air Act
CASTNet – Clean Air Status and Trends Network
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
DV – design value
ED-XRF – energy dispersive x-ray fluorescence
EPA – Environmental Protection Agency
FEM – Federal Equivalent Method
FRM – Federal Reference Method
GC – gas chromatography
HAP – hazardous air pollutant
IMPROVE – Interagency Monitoring of Protected Visual Environments
LC – local conditions of temperature and pressure (air volumes)
LMP – limited maintenance plan
$\mu g/m^3$ – micrograms per cubic meter
mm Hg – millimeters of mercury (unit of pressure)
MPA – monitoring planning area
MSA – metropolitan statistical area
NAAQS – National Ambient Air Quality Standards
NCore – National Core Monitoring Station
NEI – National Emission Inventory
NO_2 – nitrogen dioxide
NOx – oxides of nitrogen
NOy – total reactive oxides of nitrogen
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 (between 2.5 and 10 microns)
PMSA – primary metropolitan statistical area
ppm – parts per million
ppb – parts per billion
PWEI – population-weighted emission index
r^2 – Pearson correlation coefficient
RH – relative humidity
SIP – State Implementation Plan
SLAMS – state and local monitoring stations
SO_2 – sulfur dioxide
SPM – special purpose monitoring station
STN – Speciation Trends Network
STP – standard conditions of temperature and pressure (air volumes at 25°C, 760 mm Hg)
tpy – tons per year
TSP – total suspended particulate
UA – urban area
VOC – volatile organic compound
XRF – X-ray fluorescence

Background

Introduction

The Connecticut Department of Energy and Environmental Protection (DEEP) regulates air pollution to improve air quality, and protect public health and the environment. Monitoring data is crucial to determining compliance with the Federal Environmental Protection Agency (EPA) primary and secondary air quality standards and gauging the efficacy of regulatory programs. Data from these monitors also supports timely reporting of the Air Quality Index (AQI) and issuing air quality forecasts, long-term health assessments, and tracking long-term air quality both to gauge effectiveness of emission reduction strategies and to improve the accuracy of supporting air quality and photochemical grid models.

This development and submittal of a five-year network assessment is in accordance with §58.10, (d) which states:

> *"The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and where new technologies are appropriate for incorporation in the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby States and Tribes or health effects studies. For $PM_{2.5}$, the assessment also must identify needed changes to population-oriented sites. The State, or where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan to the Regional Administrator. The first assessment is due July 1, 2010."*

The primary purpose of this assessment is to determine the extent to which the current air monitoring network in Connecticut meets the requirements put forth in the Federal Register. This assessment does not propose any changes to the network, but rather determines whether each parameter at each site is critical, credible or marginal based on a number of factors as described in this document. Any changes to the network are proposed in the Annual Air Monitoring Network Plan after careful consideration and balancing of EPA's monitoring requirements, air quality needs, permit applicant needs and available resources. Each year by July 1st, the Annual Network Plan is made available to the public review and comment and then submitted to EPA Region I for approval.

Network Overview

DEEP operates 15 pollutant monitoring stations. Figure 1 below shows the EPA-approved DEEP ambient air monitoring site network map as of 2015. A current and projected listing of the parameters monitored at each site is given in Table 1.

In October 2006, EPA established a network of core multi-pollutant monitoring 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: DEEP Ambient Air Monitoring Stations

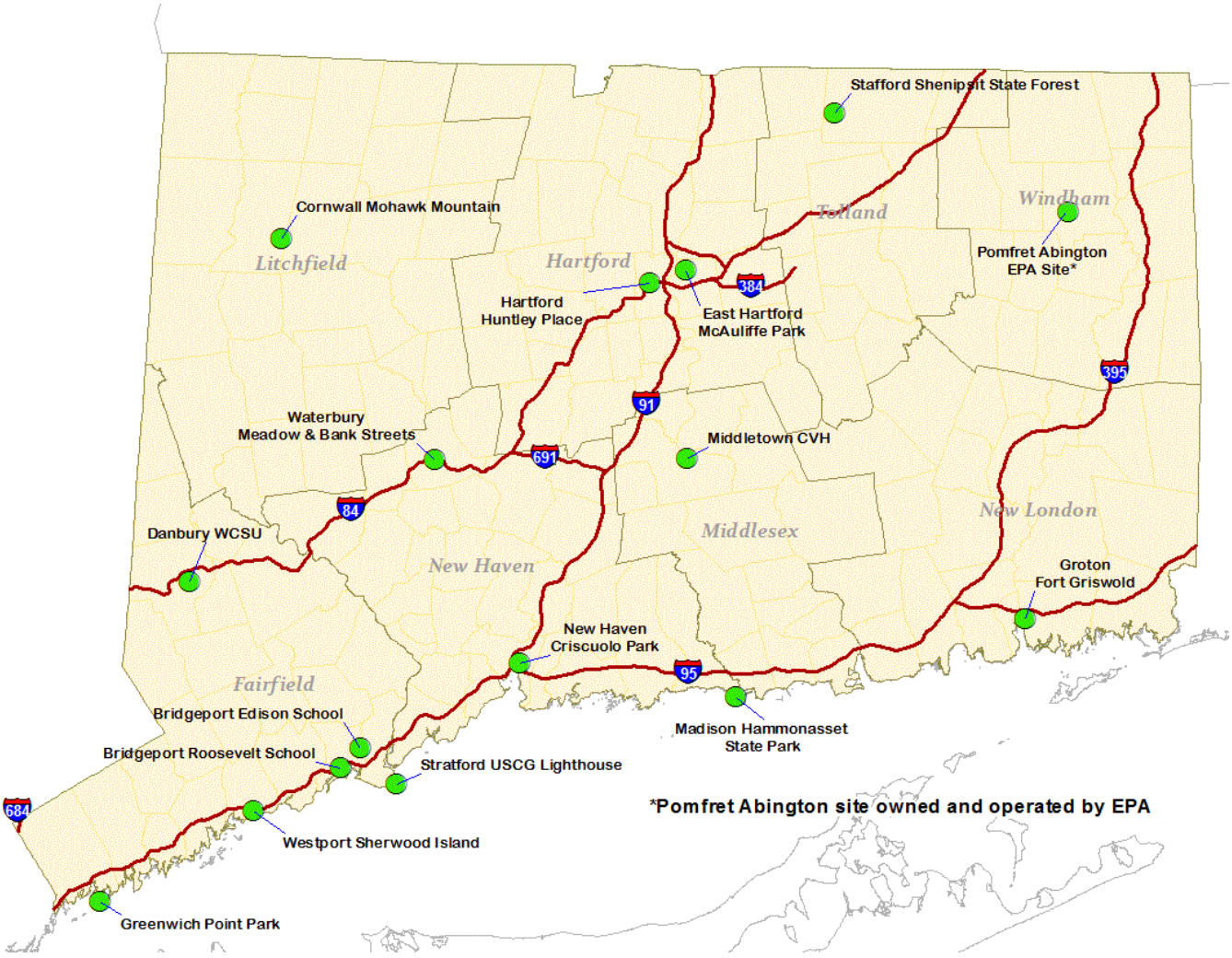


Table 1: DEEP Ambient Air Monitoring Network Summary (as of July, 2015)

Town	Site	PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
Bridgeport	Edison School														X											
Bridgeport	Roosevelt School	1/3 1/6		X		1/6										X							X			
Cornwall	Mohawk Mountain	1/3		P	X	1/3		X				1/3	X	X	X	X	X	X			X	X	X	X	X	
Danbury	Western Connecticut State University	1/3 1/6		P	X								X	X							X	X	X			
East Hartford	McAuliffe Park	1/1 1/6		X		1/6							X	X	X	X	X		X		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		P	X			X					X			X	X			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	1/1 1/3	1/6	P	X	1/3	1/6	X	1/6	1/12	1/3		X	X	X	X	X	X	X		X	X	X	X	X	X
Stafford	Shenipsit State Forest													X							X	X	X			
Stratford	Stratford Lighthouse													X									X			
Waterbury	Meadow & Bank Street	1/3 1/6	1/6	X																	X	X	X			
Westport	Sherwood Island State Park	1/3												X			X		X		X	X	X			

X=Existing 1/1, 1/3 etc.=daily sample frequency P = Planned in 2015/2016 X = Proposed to terminate in 2015/2016

Air Quality Summary/Air Quality Index

DEEP provides near real-time hourly pollutant and meteorological data and daily air quality index (AQI) forecasts to EPA for the state of Connecticut. Ambient data is available to agencies through the AirNow Tech website, and forecasts are accessible on the AirNow and DEEP websites, DEEP call-in telephone line and daily email reports. In addition, interested persons may sign up for email air quality alerts through the AirNow website.

The AQI indicates air quality levels on a scale with 5 defined categories (*Good, Moderate, Unhealthy for Sensitive Groups, Unhealthy and Very Unhealthy*). An AQI greater than 100, which is a category of *Unhealthy for Sensitive Groups (USG)* or worse, is equivalent to ambient air concentrations that exceed the NAAQS. Table 2 below displays the number of days above 100 on the AQI in 2014 and the number of NAAQS exceedances by site. For ozone, exceedances of the NAAQS leads to nonattainment when the 3 year average of the annual 4th highest daily maximum 8-hour average values are greater than the

NAAQS. For $PM_{2.5}$, the threshold for USG is set at the 24-hour NAAQS, for which a violation occurs when the 3 year average of the annual 98^{th} high percentile value exceed 35 $\mu g/m^3$.

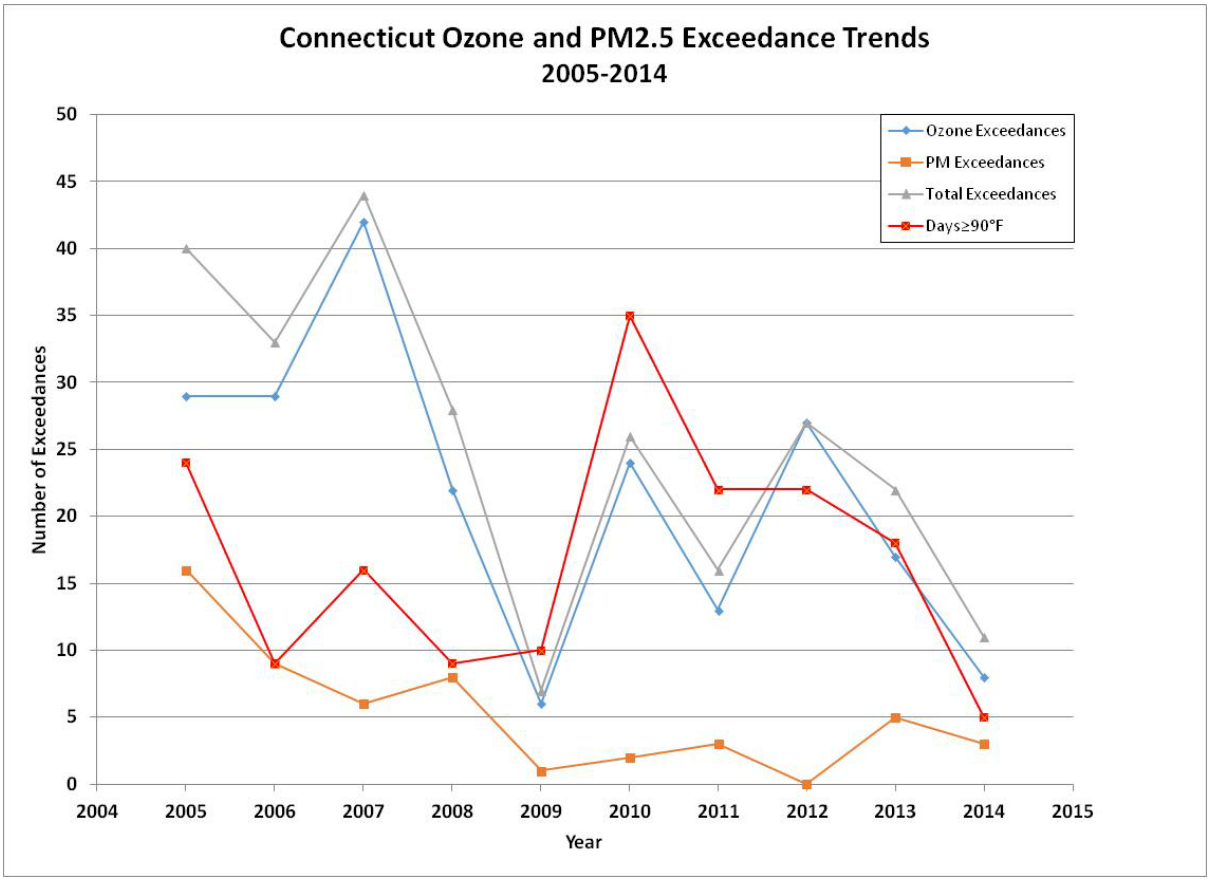
NAAQS violations for attainment purposes are determined for each nonattainment area, which are based on U.S. Census Bureau defined combined statistical areas (CSAs). For example, as New Haven and Fairfield counties are part of both the greater New York City CSA and the Northern NJ, NY, SWCT ozone nonattainment area, a non-attaining monitor within any part of the area will affect the attainment status of three different states.

Table 2: CT AQI Exceedances in 2014

Pollutant	Location of monitors exceeding the applicable NAAQS	Days above 100 on the AQI in 2014
Ozone	Danbury, East Hartford, Greenwich, Groton, Madison, Middletown, New Haven, Stafford, Stratford, Westport	8
$PM_{2.5}$	None	3
PM_{10}	None	0
SO_2	None	0
CO	None	0
NO_2	None	0
Pb	None	0

While overall trends of ozone and $PM_{2.5}$ exceedances are downward since 2005, as shown in the Figure 2, data from the last five years do not indicate a specific trend. The rate of ozone exceedances appears to depend in part on the variability of ozone season temperatures from year to year, as the numbers of ozone exceedances and ozone season days with a maximum temperature over 90°F track closely over the last several years.

Figure 2: Connecticut Ozone and $PM_{2.5}$ Exceedance Trends



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 3 summarizes the current NAAQS compliance requirements for the criteria pollutants.

Table 3: National Ambient Air Quality Standards

Pollutant [final rule cite]		Primary / Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution [78 FR 3086, Jan 15, 2013]	$PM_{2.5}$	primary	Annual	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	Annual	15.0 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 [75 FR 35520, Jun 22, 2010]		primary	1-hour	75 ppb (4)	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

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Network Design Analysis

The design of the DEEP ambient air monitoring network is based on EPA regulatory requirements for National Core (NCore) sites, pollutant-specific state and local air monitoring stations (SLAMS) monitors, and Photochemical Assessment Monitoring Station (PAMS) monitors. This section includes an assessment of the network relative to these requirements.

Population

Several of EPA's monitoring requirements are based on definitions of metropolitan areas developed by the US Office of Management and Budget and the US Census Bureau; these are: metropolitan statistical areas (MSA), micropolitan statistical areas, core-based statistical areas (CBSA), and combined statistical areas (CSA). Both MSAs and micropolitan statistical areas are CBSAs, defined as having an urbanized cluster with a population of at least 50,000 or 10,000, respectively. A CSA consists of two or more adjacent CBSAs, which, although highly integrated, may cross state or other political boundaries. Table 4 lists the Connecticut MSAs and 2013 U.S. Census Bureau population estimates.

Table 4: Population of Connecticut Core-based Statistical Areas

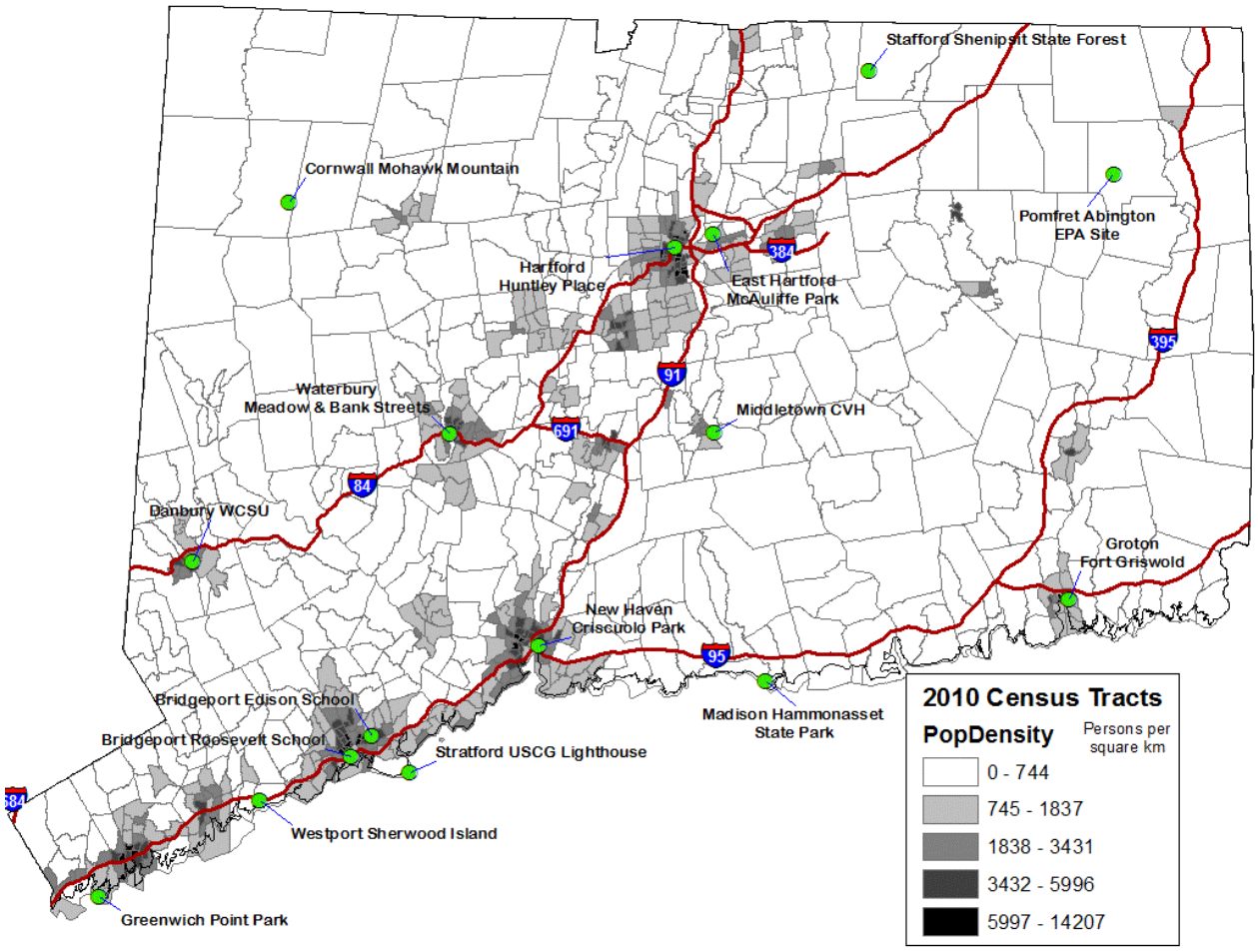
CBSA Code	CBSA Name	Counties included in CBSA	Population (2013 estimates)
14860	Bridgeport-Stamford-Norwalk	Fairfield	939,904
25540	Hartford-West Hartford-East Hartford	Hartford, Middlesex, Tolland	1,215,211
35300	New Haven-Milford	New Haven	862,287
35980	Norwich-New London	New London	274,150
49340	Worcester, MA-Connecticut	Worcester, MA; Windham, CT	926,710
45860	Torrington (micropolitan statistical area)	Litchfield	186,924

Population Distribution and Susceptible and Vulnerable Communities

The majority of the monitors in the network are sited to assess the potential exposure of populations to maximum levels of air pollution. In locating these monitors, the spatial distributions of population density, susceptible populations and economically impoverished communities should be considered to ensure that air pollution mitigation strategies fairly address exposures of these groups. Siting these monitors within areas with the highest densities of such populations helps to best characterize the impacts of ambient air pollution on human health. While it is reasonable that monitoring in densely populated areas would be more protective than in a sparsely populated areas, it is also critical to take into account areas where there might be higher impacts on susceptible populations, such as children and the elderly, as well as on and low-income citizens, who either may be more sensitive to the health effects of air pollution or may have inherent barriers in their access to health care.

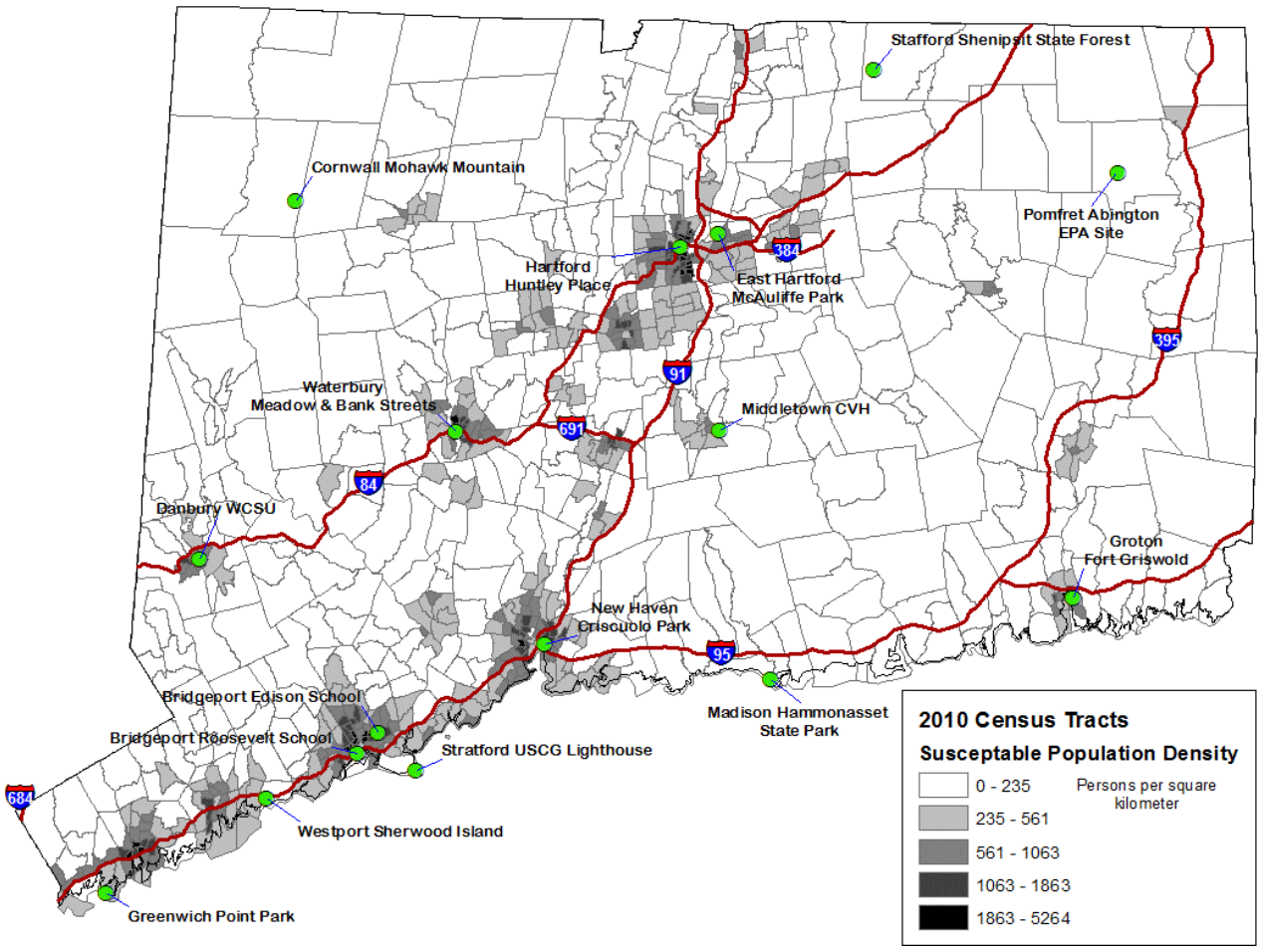
Generally, higher density population areas in Connecticut are clustered along busy interstate transportation corridors, which are sources of transportation related emissions, such as fine and coarse particulates, carbon monoxide and oxides of nitrogen. Figure 3, which shows state population density by census block area, indicates that most of Connecticut's monitoring sites are located within the highest density blocks.

Figure 3: Population Density by Census Tract and Air Quality Monitors



People who are particularly susceptible to air pollution are more likely to suffer adverse effects at lower concentrations. Examples of susceptible groups include children, the elderly and individuals with compromised physiological or medical conditions, such as asthma or other pulmonary disorders and heart disease. Figure 4 shows the distribution of the population below 18 and above 65 years of age for 2010 census tracts, which generally follows the overall population profile.

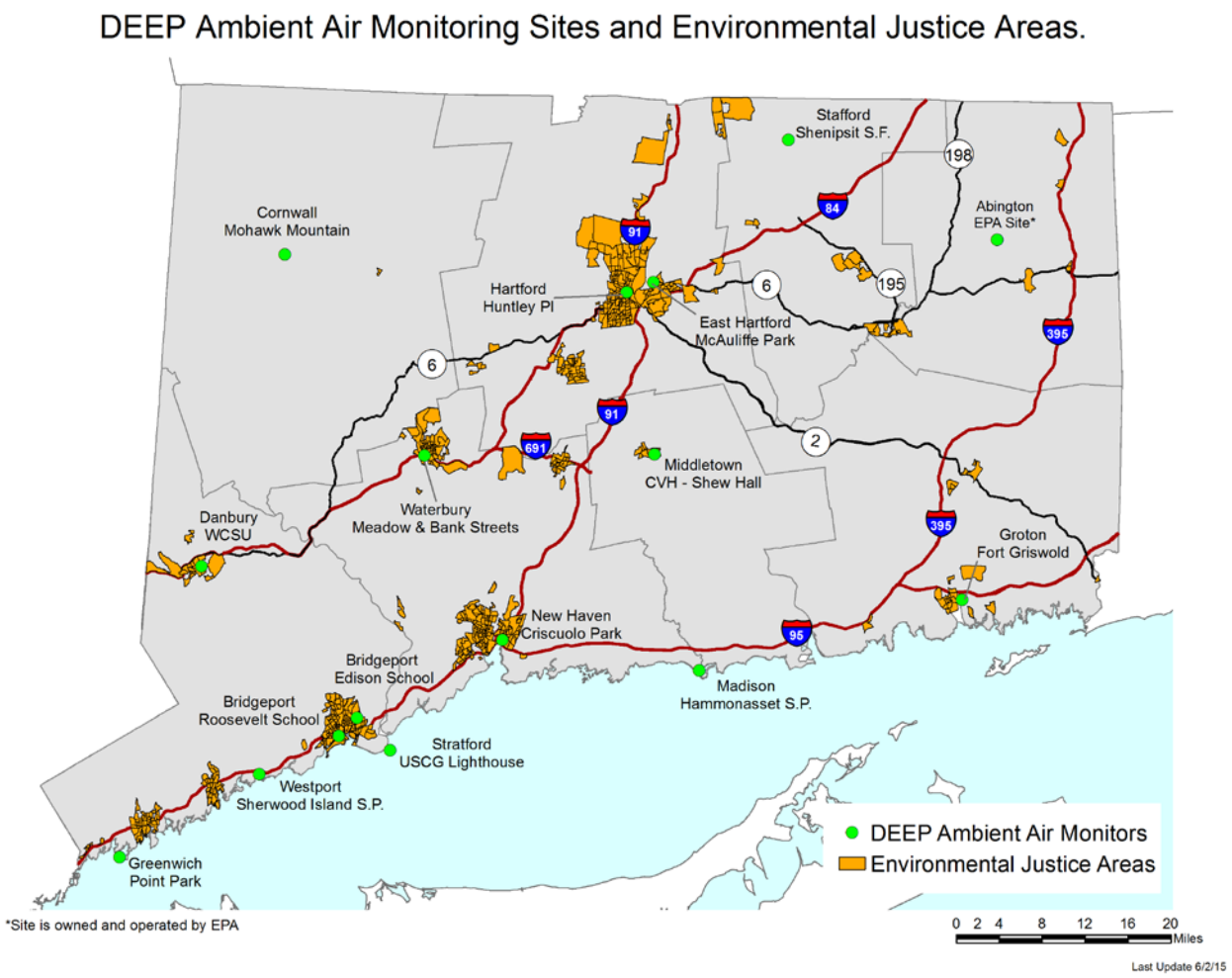
Figure 4: Susceptible Population Density by Census Tract and Air Quality Monitors



In accordance with DEEP's Environmental Justice Plan, census tract areas in which 30% or greater of the population have an income below 200% of the federal poverty level or a distressed municipality must be protected with appropriate environmental laws.

Figure 5 below displays the areas which fall under the definition of environmental justice communities along with ambient air monitoring stations around the state of Connecticut. All environmental justice areas are sufficiently served by ambient air monitors, with the exception of those environmental justice communities located in areas with minimal air pollution sources.

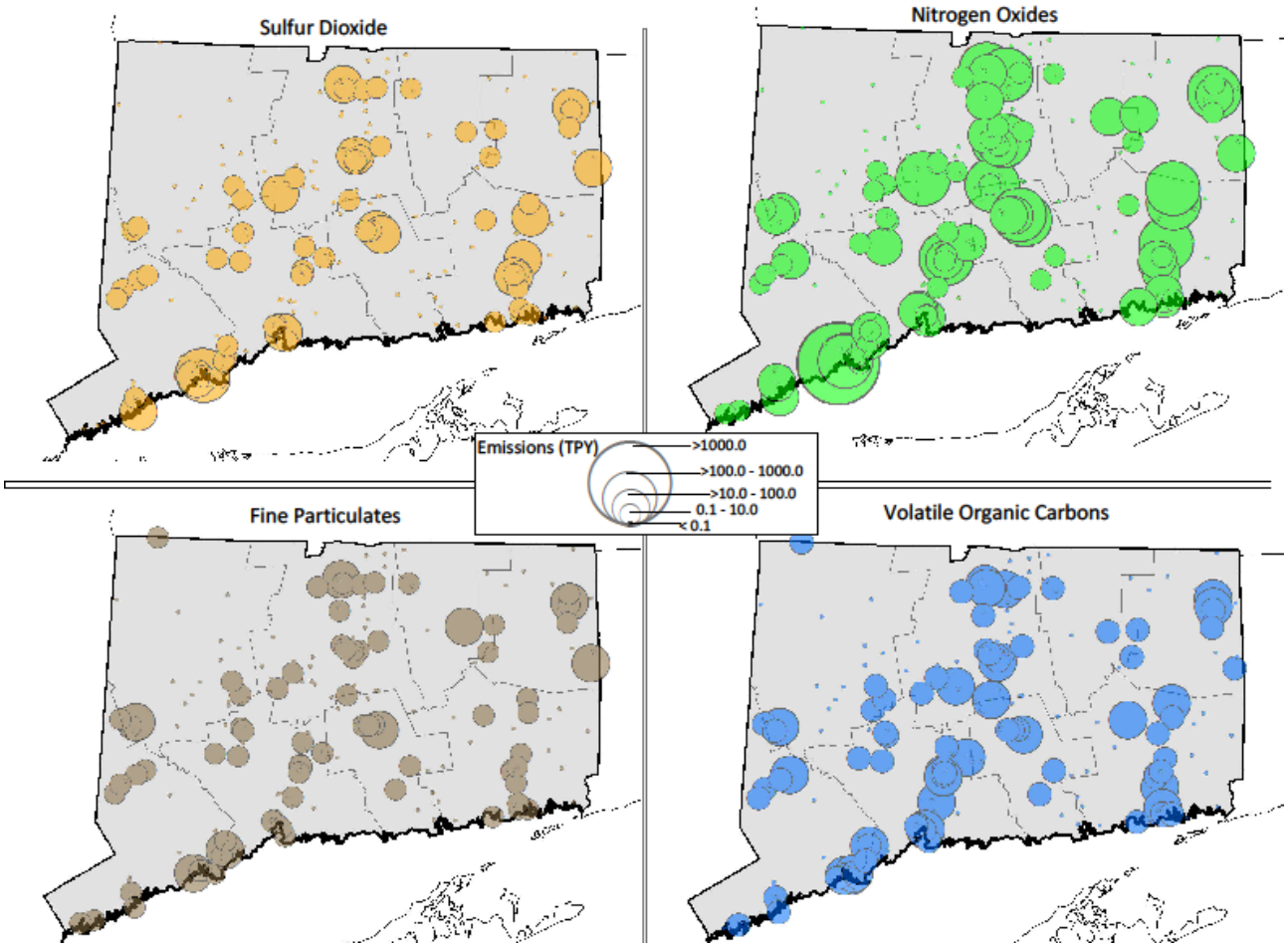
Figure 5: Connecticut Environmental Justice Areas and Air Quality Monitors



Connecticut Major Emission Sources

Data from process emission sources, and other sources where applicable, are presented in previous sections where needed to identify minimum monitoring requirements, such as for SO_2 Population Weighted Emissions Index (PWEI). In this section, major process emission source locations for selected pollutant groups are presented as a reference for consideration of the siting of monitors within the network. Figure 6 shows process emission source 2011 National Emission Inventory (NEI) levels and locations for SO_2, NO_X, $PM_{2.5}$ and VOCs in Connecticut.

Figure 6: Process Emission Sources for SO_2, NO_X, $PM_{2.5}$ and VOCs



Monitoring Objectives and Spatial Scales

The objectives of an ambient air monitoring network operated in accordance with SLAMS requirements[1] are to: (a) provide air pollution data to the public in a timely manner, (b) support compliance with ambient air quality standards and pollution control strategies and (c) support air pollution research studies.

To support Connecticut's and EPA's air monitoring objectives, the monitoring network includes a variety of sites that provide information on peak air pollution levels, typical levels of exposure, air pollution transport and air pollution levels near significant sources. EPA has identified the following six general site types:

- Sites located to determine the highest concentrations expected to occur in the area covered by the network.
- Sites located to measure typical concentrations in areas of high population density.
- Sites located to determine the impact of significant sources or source categories.
- Sites located to determine general background levels.
- Sites located to determine the extent of regional pollutant transport among populated areas.
- Sites located to measure air pollution impacts on visibility, vegetation or other welfare-based impacts.

To attain these objectives, monitoring sites are spatially positioned relative to pollutant sources and receptors to characterize air quality impacts, taking into account aspects of the sources and pollutants, as well as the local terrain, meteorology, population, and public welfare-related receptors. For example, although ozone typically has concentrations that are similar over areas with dimensions of 10 or more kilometers, an ozone monitor located near high NO_X sources would likely represent lower levels over a smaller area due to chemical reactions between these pollutants. A spatial scale of representativeness, defined as a dimension indicating the extent of an area impacted with similar concentrations throughout by a source or type of source, is identified for each monitor. The scales of representativeness of most interest for the above monitoring site types are as follows:

- Microscale—Defines concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
- Middle scale—Defines concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- Neighborhood scale—Defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range. The neighborhood and urban scales listed below have the potential to overlap in applications that concern secondarily formed or homogeneously distributed air pollutants.
- Urban scale—Defines concentrations within an area of city-like dimensions, on the order of 4 to 50 kilometers. Within a city, the geographic placement of sources may result in there being no single site that can be said to represent air quality on an urban scale.
- Regional scale—Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.
- National and global scales—Represent concentrations characterizing the nation and the globe as a whole.

Value Assignment to Sites and Monitors

To assist in the network planning process, qualitative values of *critical*, *credible* or *marginal* are assigned to the monitors to assess their relative importance to monitoring objectives. Criteria used to apply these value assignments are:

Critical Sites and Monitors – These sites are of high value and should be retained.

[1] 40 CFR 58

- Design value site for an area at or above 85 percent of the NAAQS
- Long-term multi-pollutant site(s) used by multiple data users for trends and model evaluation (i.e., SIP development and tracking). Note: often these are the design value or other important sites with lots of complimentary measurements
- Monitor required to satisfy minimum monitoring requirements for specific parameters (i.e. NCore), as identified in the individual parameter network sections below
- Dedicated site for health or atmospheric study, or to inform policy options for State or local agency (often collocated with above; however, if not, a sunset date should be associated with the site)

Credible Sites and Monitors – These sites are the locations that are expected to continue, but may not be the design value location at or above the NAAQS. Sites in this category are generally retained, but occasionally may move to provide the optimum spatial coverage in a network. Examples include:

- Sites that are used to comply with EPA minimum network monitoring requirements.
- Sites that provide the spatial richness of a network to identify exposures and support AQI forecasting and reporting
- Sites that while not the design value location are occasionally the highest across the metropolitan area due to seasonal meteorology or unique winds. (e.g., winds are normally from the Southwest, but occasionally come from the East which puts the area downwind of a much larger metropolitan area)
- Sites that are design value locations; however, the level is relatively low compared to the NAAQS. This might include source oriented monitors that are required, but are below the NAAQS.
- Sites that may be useful for NAAQS now in review.

Marginal Sites and Monitors – These sites and monitors are those locations that are candidates for removal or movement. This category includes:

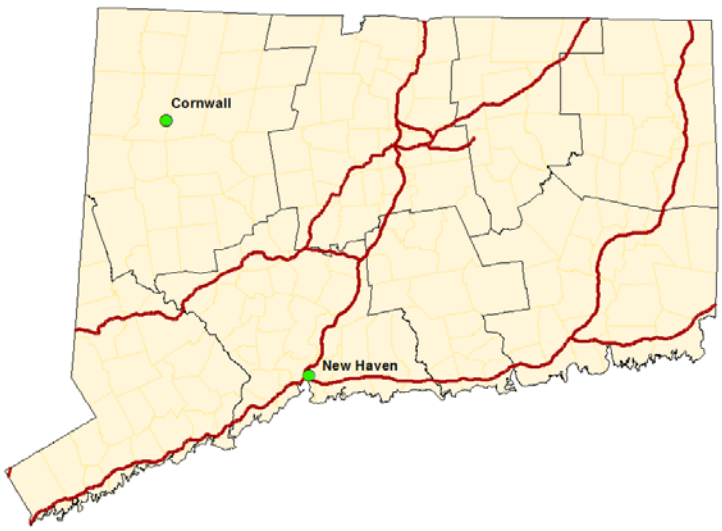
- Sites that have outlived their intended purpose
- Sites that have measurements that are of low value relative to the NAAQS and are not counted towards minimum network monitoring requirements.
- Sites that are not candidates for continued investment due to problems with siting criteria which cannot be resolved.
- Special Purpose Monitors (SPMs) – If a monitor remains at a site for more than two years it is strongly encouraged that the site become a SLAMS and would fit into the critical or credible category, otherwise it is assumed that the SPM has fulfilled its objective and can be moved to another location to characterize the measurement of interest.
- Sites that correlate well (i.e., are not unique) with a nearby site(s), but which measure low levels than the nearby site.

New Sites and Monitors – These sites represent potential areas of investment pending movement of monitoring resources from other locations or new resources introduced to our program. Generally, these are:

- Locations that may result in a change to the design value location of a pollutant
- Newly required locations from recent NAAQS reviews
- Additional measurements at critical and credible locations that would add additional insight to data users

The specific objectives and spatial scales for each of the monitors in the DEEP network are described in the Pollutant Network and Monitor and Site Summary sections below.

NCore Network Requirements



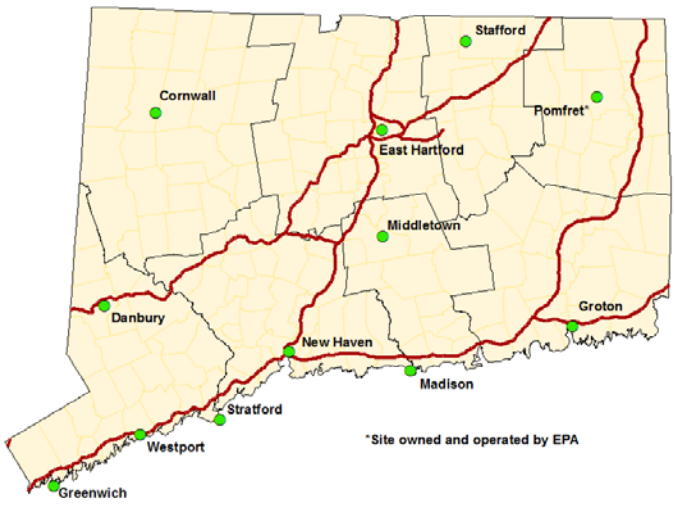
Nationally, NCore monitoring stations include a range of pollutant monitors and are sited primarily to characterize urban area-wide pollutant levels, although a smaller number of NCore stations are in rural locations. As such, they should be sited away from direct emission sources. Each state is required to have a minimum of one NCore site, located in an MSA (states with multiple large air sheds may be required to have two or three NCore sites). Connecticut has two NCore sites, one urban and one rural, located in New Haven (Criscuolo Park) and Cornwall (Mohawk Mountain), respectively. Both of DEEP's NCore sites meet and exceed EPA's NCore monitoring requirements shown in Table 5. Many of the monitors at NCore sites are also utilized to satisfy non-NCore requirements (e.g.: PAMS, NO_2) as discussed in the subsections below.

Table 5: Minimum Required NCore Monitoring Parameters

Required Parameter	Description
$PM_{2.5}$ speciation	organic and elemental carbon, major ions and trace metals (24 hour average; every 3rd day); IMPROVE or CSN
$PM_{2.5}$ FRM mass	24 hr. average at least every 3rd day
continuous $PM_{2.5}$ mass	1 hour reporting interval; FEM or pre-FEM monitors
$PM_{(10-2.5)}$ mass	Filter-based or continuous
ozone (O_3)	all gases through continuous monitors
carbon monoxide (CO)	capable of trace levels (low ppm and below) where needed
sulfur dioxide (SO_2)	capable of trace levels (low ppb and below) where needed
nitrogen oxide (NO)	capable of trace levels (low ppb and below) where needed
total reactive nitrogen (NO_Y)	capable of trace levels (low ppb and below) where needed
surface meteorology	wind speed and direction (reported as "resultant"), temperature, relative humidity

Ozone Network

Ozone Monitoring Overview



The DEEP ozone network consists of eleven sites distributed over seven of Connecticut's eight counties, as shown in the map to the right. In addition, EPA operates an ozone monitor in Abington Village in the town of Pomfret, as part of the Clean Air Status and Trends Network (CASTNET) program. The Greenwich, Westport, Stratford and Madison sites, situated on the state's southern coast, are upwind background/regional transport sites for ozone, as the prevailing wind direction during higher ozone episodes is generally southwesterly. The principal

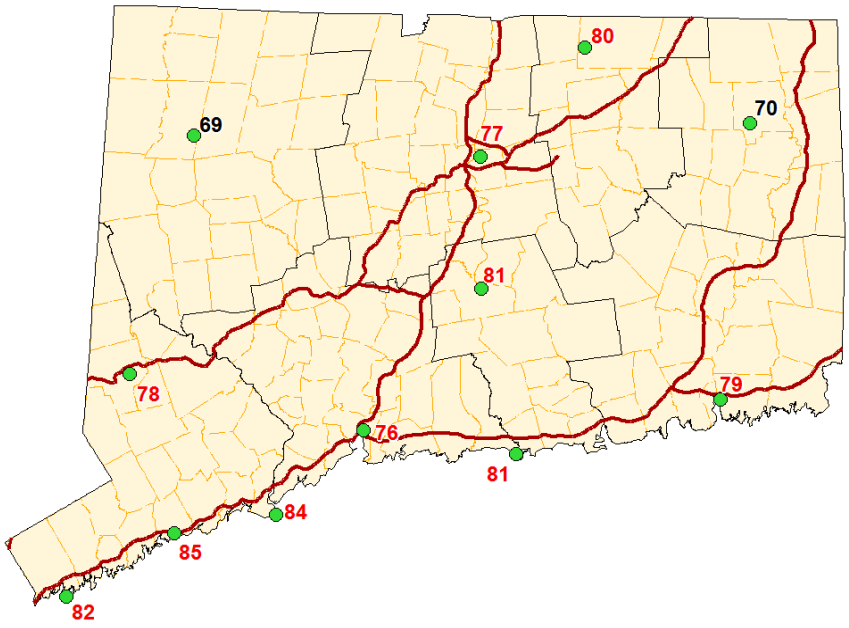
monitoring objective for all interior sites, with the exception of Cornwall, is population exposure. Due to its location at high elevation in the rural northwestern hills of the state, the Cornwall ozone monitor objective is General/Background. All ozone sites operate from April 1 through September 30, per 40 CFR Part 58 App D, except for the New Haven and Cornwall NCore sites, which operate year-round.

Ozone NAAQS Attainment

The 2014 8-hr ozone design values (DVs), shown in Figure 7 below, are derived by taking the 3-year average (2012-2014) of the annual 4th high daily maximum 8-hr average ozone for each site. EPA issued a final rulemaking on March 12, 2008 that tightened the 8-hr ozone National Ambient Air Quality Standard (NAAQS) from 0.08 ppm to 0.075 ppm. Currently the entire state of Connecticut is designated as marginal non-attainment for ozone based on 2008 NAAQS, with ozone design values exceeding this standard at all sites except Abington and Cornwall. On November 25, 2014, EPA proposed a revised ozone NAAQS rule that recommend lowering the standard to a range of 65-70 ppb. This proposed rule, should be finalized by October 1, 2015. Additionally, the EPA's proposed rule would begin Connecticut's ozone monitoring season 1 month earlier, and run from March through September.

Figure 7: Connecticut 2014 Ozone Design Values

	Design Value (ppb)
Abington	**70**
Cornwall	**69**
Danbury	**78**
East Hartford	**77**
Greenwich	**82**
Groton	**79**
Madison	**81**
Middletown	**81**
New Haven	**76**
Stafford	**80**
Stratford	**84**
Westport	**85**
NAAQS	**75**



Ozone Network Design

The ozone monitoring network design requirements are primarily based on MSA population and ozone design value levels. Table 6 gives the minimum number of ozone sites per area in accordance with EPA requirements[2].

The 2014 8-hr ozone design values are above eighty-five percent of the 2008 ozone NAAQS at all DEEP monitoring sites. As such, these locations are considered to have monitoring value assessments of "critical" in the network."

[2] 40 CFR 58 Appendix D Table D-2

Table 6: SLAMS Minimum Ozone Monitoring Requirements

MSA Population	DV≥85% NAAQS	DV<85% NAAQS
>10 million	4	2
4 - 10 million	3	1
350,000 - <4 million	2	1
50,000 - <350,000	1	0

Table 7 below is a summary of the ozone network design criteria for each Core-Based Statistical Area (CBSA) that is located partially or totally within Connecticut. These consist of five Metropolitan Statistical Areas (MSAs), with populations greater than or equal to 250,000, and one Micropolitan Statistical Area, with a population of less than 250,000. The CBSA population values are from the 2013 U.S. Census Bureau population estimates using the 2010 census as the base year.

As indicated in Table 7, the number of ozone monitors in the network exceeds EPA's minimum number by 2 in the Bridgeport-Stamford-Norwalk MSA and by 1 in the Hartford-West Hartford-East Hartford MSA. As shown in the Network Assessment Analysis section below, these additional monitors provide the spatial coverage necessary to characterize ozone concentrations during exceedance events, during which there may be significant differences in peak concentrations over distances of 20 to 40 kilometers.

Table 8 provides the measurement scales, monitoring objectives and value assignments for the ozone network. In each non-attainment area, 1 site is designated for monitoring the maximum concentrations for the area, per network design requirements. However, other sites within these areas may record the highest levels during particular ozone events.

Table 7: Summary of Ozone Network Minimum Monitoring Requirements

Core-Based Statistical Area	Estimated 2009 Population	Design Values > 85% Ozone NAAQS?	No. Monitors	Minimum No. Monitors Required
Bridgeport-Stamford-Norwalk	939,904	Y	4	2
Hartford-West Hartford-East Hartford	1,215,211	Y	3	2
New Haven-Milford	862,287	Y	2	2
Norwich-New London	274,150	Y	1	1
Worcester (includes Windham County)	926,710	Y	3	2
Torrington (non-MSA)	186,924	Y	1	NA[1]

[1] Not applicable per MSA requirements, but one monitor is required at the Cornwall NCore site located within the Torrington micropolitan statistical area.

Table 8: Ozone Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Monitor Type
Pomfret	Abington	Regional			
Cornwall	Mohawk Mountain	Regional	General/Background	Critical	NCORE
Danbury	Western Connecticut State University	Urban	Population Exposure	Critical	SLAMS
East Hartford	McAuliffe Park	Urban	Population Exposure	Critical	PAMS
Greenwich	Point Park	Regional	Upwind Background	Critical	SLAMS
Groton	Fort Griswold	Urban	Population exposure	Critical	SLAMS
Madison	Hammonasset State Park	Regional	Population exposure	Critical	SLAMS
Middletown	Connecticut Valley Hospital	Urban	Maximum Concentration	Critical	SLAMS
New Haven	Criscuolo Park	Neighborhood	Population Exposure	Critical	NCORE/PAMS
Stafford	Shenipsit State Forest	Regional	Population Exposure	Critical	SLAMS
Stratford	Stratford Lighthouse	Regional	Population Exposure	Critical	SLAMS
Westport	Sherwood Island State Park	Regional	Maximum Concentration, Upwind Background	Critical	SLAMS

Network Assessment Analysis

DEEP's analysis of the correlations between pairs of adjacent ozone sites indicates that the existing monitors provide unique critical data in assessing ozone population exposure and fate and transport patterns. The Department compared 8-hour daily maximum values, greater than 60 parts per billion (ppb), to focus on the most critical concentrations for exposure assessment and NAAQS compliance. The results of this analysis are summarized in Table 9 below. There is reasonable correlation between nearby coastal sites ($r^2 > 0.65$), with the exception of New Haven, which is the most heavily urban-influenced, where ozone would more likely be scavenged by higher NOx concentrations. However, the variability in the values in the exceedance range has the potential to alter the occurrence of ozone violation days. The data suggests that the higher-concentration portions of ozone and precursor plumes approaching the Connecticut coast from the southwest are often localized to the extent that adjacent monitors may have significantly different maximum concentrations. Marine inversions mitigating the diffusion effect of ozone and precursor plumes could contribute to such localized events. Given the ozone plume coverage afforded by the current network configuration, DEEP supports the continued operation of the existing ozone network.

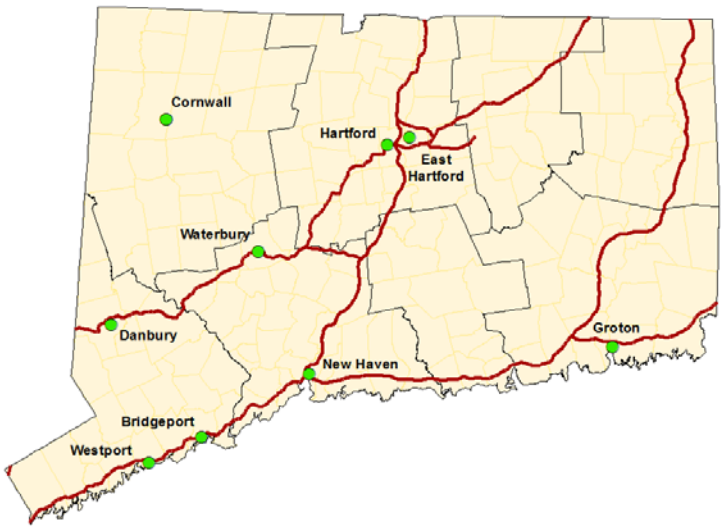
Table 9: Summary of Ozone Near-Sites Correlations

Site comparison	Dis-tance (km)	Correl-ation r^2	Linear reg. slope	Linear reg. int.	Count	Avg diff. (ppb)	Stnd. Dev. (ppb)
Danbury vs. Greenwich	45.5	0.1049	0.349	44.543	106	3	4.88
Greenwich vs. Westport	24.1	0.7619	0.8609	12.266	106	2	11.94
Westport vs. Stratford	19.8	0.6707	0.7733	16.301	119	1	6.29
Stratford vs. New Haven	23.3	0.4623	0.4632	7.0519	106	-7	8.83
New Haven vs. Madison	29.9	0.2109	0.2109	35.642	83	2	11.63
Madison vs. Groton	40.7	0.7313	0.7313	-0.7678	68	-3	6.02
Middletown vs. East Hartford	26.4	0.3511	0.3511	7.3428	84	-7	9.95
Middletown vs. New Haven	35.2	0.2996	0.2996	20.945	94	-4	9.7
Cornwall vs. Stafford	77.4	0.182	0.182	32.451	91	4	9.31
Stafford vs. Abington	34.8	0.3856	0.3856	19.682	85	-7	7.37

$PM_{2.5}$ Network

$PM_{2.5}$ Monitoring Overview

DEEP operates 9 $PM_{2.5}$ sites in the air monitoring network. The network consists of manual Federal Reference Method (FRM) samplers for 24-hour composite filter samples and continuous beta attenuation monitors (BAMs) for hourly composite samples. Currently, 2 of the FRM sites, Criscuolo Park in New Haven and McAuliffe Park in East Hartford, operate on an everyday sample schedule, while all other sites operate on a 1-in-3 day sample schedule, with the exception of Groton, operating on a 1-in-6 day schedule. FRM collocated sampling is done on a 1-in-6 day schedule at 2 sites, Waterbury and Criscuolo Park in New Haven.



The 8 continuous $PM_{2.5}$ BAMs operate at all sites except Westport. Of these 8 BAMs, 4 are identified as Federal Equivalent Method (FEM) monitors, 2 of which are the primary $PM_{2.5}$ monitors at their respective sites. Commencing January 1, 2016, DEEP will report data from all $PM_{2.5}$ BAMs in the network as FEM data, in accordance with the approved 2015 network plan. The current and proposed $PM_{2.5}$ network configurations are presented in Tables 10 and 11, respectively. For the primary monitors listed in the tables, existing valid data will be used for NAAQS compliance, while collocated and/or supplemental FRM or FEM data will be used for alternate sample intervals where primary data is not scheduled, missing or invalid.

The $PM_{2.5}$ continuous (hourly) BAM data is also used for air quality index (AQI) forecasting, regardless of FEM/non-FEM status.

Table 10: Current $PM_{2.5}$ Network Configuration

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

Table 11: Proposed $PM_{2.5}$ Network Configuration beginning January 1, 2016

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	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-6 FRM	1-in-6 FRM	Continuous FEM

$PM_{2.5}$ Design Values

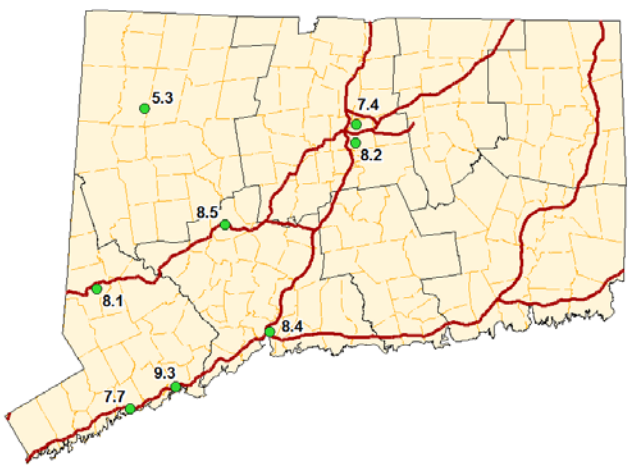
The $PM_{2.5}$ design values for 2012 through 2014 are listed in Table 12, and the spatial distribution of the 2014 design values are shown in Figure 8 below. Each $PM_{2.5}$ design value is defined as the average of the yearly metrics from three successive years, where the *annual* metric is annual weighted mean and the *24-hour* metric is the 98^{th} percentile value. All Connecticut sites have attained the annual and the 24-hour $PM_{2.5}$ NAAQS. No sites exceed the 85 percent of NAAQS threshold, which would necessitate more intensive monitoring per 40 CFR Part 58 App D Table D-5.

Table 12: Connecticut 2014 $PM_{2.5}$ Design Values (µg/m3)

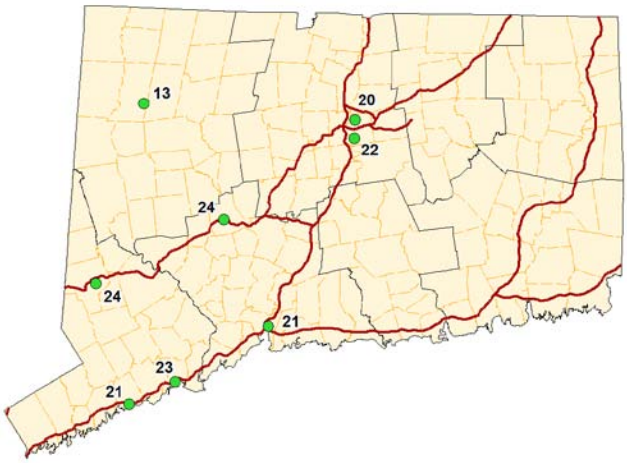
Town	Site Description	2010-2012		2011-2013		2012-2014	
		Annual	24-Hour	Annual	24-Hour	Annual	24-Hour
Bridgeport	Roosevelt School	9.4	23	9.3	23	9.3	23
Danbury	WCSU	9.0	24	8.6	25	8.1	24
Norwalk	Health Dept	9.1	24				
Westport	Sherwood Is	8.7	24	8.4	23	7.7	21
East Hartford	McAuliffe Park	8.0	22	8.0	22	7.4	20
East Hartford	High St	8.8	22	8.6	22	8.2	22
Cornwall	Mohawk Mt	5.7	17	5.5	15	5.3	13
New Haven	James St	9.1	25	9.0	24	8.4	21
New Haven	State St	9.4	24	9.3	24		
Waterbury	Bank St	9.2	24	8.9	23	8.5	24
Norwich	Court House	8.1	21	8.0	20		

Values omitted when less than 3 years of data available to compute the design value.
The annual $PM_{2.5}$ NAAQS is 12 µg/m3
The 24-hour $PM_{2.5}$ NAAQS is 25 µg/m3

Figure 8: Connecticut 2014 $PM_{2.5}$ Design Values (µg/m3)



$PM_{2.5}$ 2014 Annual Design Values



$PM_{2.5}$ 2014 Daily Design Values

$PM_{2.5}$ Monitoring Network Design

General $PM_{2.5}$ network requirements: The minimum $PM_{2.5}$ monitoring requirements for each MSA, which is based on populations and design values, are in Table 13:

Table 13: EPA General Requirements for $PM_{2.5}$ Monitoring

MSA population[1 2]	Most recent 3-year design value ≥85% of any $PM_{2.5}$ NAAQS[3]	Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS[3 4]
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).
[2]Population based on latest available census figures.
[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.
[4]These minimum monitoring requirements apply in the absence of a design value.
[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

Connecticut currently meets the minimum $PM_{2.5}$ monitoring requirements based on MSA population and observed concentrations relative to the NAAQS as shown in Table 14 below. The maximum 2014 design values in each MSA and in the Torrington micropolitan statistical area are well below 85 percent of the daily and annual NAAQS levels. The minimum monitoring requirement for the Worcester-Connecticut MSA is satisfied by the two monitors located in Worcester, Massachusetts, as there are no $PM_{2.5}$ monitors within the Connecticut portion of the MSA.

Table 14: Specific $PM_{2.5}$ Network Minimum Monitoring Requirements

Core-Based Statistical Area	Estimated 2013 Population	Design Values[1] > 85% $PM_{2.5}$ NAAQS?	No. Monitors	Minimum No. Monitors Required
Bridgeport-Stamford-Norwalk	939,904	N	3	1
Hartford-West Hartford-East Hartford	1,215,211	N	2	2
New Haven-Milford	862,287	N	2	1
Norwich-New London	274,150	N	1	0
Worcester-Connecticut	926,710	N	2[2]	1
Torrington (non-MSA)	186,924	N	1	0

[1*]Based on 2012-2014 data
[2]Monitors located in Massachusetts

Specific $PM_{2.5}$ network requirements: In addition to the minimum number of monitors in each MSA, the $PM_{2.5}$ network must fulfill the following specific design requirements:

- Monitors implemented under the minimum monitoring requirements must be sited to represent area-wide concentrations. Under EPA guidance, monitors representing area-wide concentrations are typically at neighborhood or urban spatial scales. All of DEEP's $PM_{2.5}$ monitors, except the Cornwall NCore monitor, are sited to represent neighborhood or urban spatial scales.
- For CBSAs with populations of at least 1,000,000, a $PM_{2.5}$ monitor must be co-located at the NO_2 near road station. While this requirement is effective January 1, 2017, DEEP has been operating a $PM_{2.5}$ monitor at the Hartford Huntley Place near road station since March 2014.
- At least 1 monitor must be sited at neighborhood or larger scale in an area of expected maximum concentrations. The Bridgeport Roosevelt School monitor meets this criteria.

- For areas with additional required monitors, a monitoring station is to be sited in an area of "poor air quality." The DEEP network has several monitors located in areas where high air pollutant concentrations are expected, (i.e.: in close proximity to highways with high motor vehicle traffic, and in areas having high densities of industrial emission sources).

Requirement for continuous $PM_{2.5}$ monitoring: Continuous $PM_{2.5}$ monitors must be located at a minimum of ½ of the sites required to have $PM_{2.5}$ monitoring under the general requirements described and summarized in Table 13 above. DEEP has exceeded this requirement by co-locating continuous $PM_{2.5}$ BAMs at 8 of its 9 FRM sites.

Requirement for background and transport $PM_{2.5}$ sites: Each state must have at least 1 site to monitor for regional background and 1 site to monitor for regional transport. The Cornwall NCore site is well suited to capture regional background $PM_{2.5}$ concentrations, and is appropriate for monitoring long range transport from southwestern trajectories. Speciated particulate data collected at Cornwall is used to identify contributing source types.

Requirement for $PM_{2.5}$ chemical speciation: Each state must have a $PM_{2.5}$ chemical speciation monitor as part of the Speciation Trends Network (STN). DEEP operates an STN sampler at the New Haven NCore site. In addition, there is speciation monitoring at the Cornwall NCore site, and continuous black carbon/UV carbon (aethalometer) monitoring is done at Cornwall, Danbury, East Hartford, Hartford and New Haven. Further information is provided in the PM speciation section below.

$PM_{2.5}$ network spatial scales, monitoring objectives and value assignments: $PM_{2.5}$ network site characteristics are summarized in Table 15. Most of the sites are in locations that represent neighborhood spatial scale concentrations, while the Cornwall and Westport sites have regional scales. Cornwall, located in a remote rural area, is a general/background site. Westport, although approximately only 2 kilometers from a major interstate roadway, is located on the prevailing upwind side of it, and is generally directly in the path of regional transport into Connecticut from the New York-New Jersey industrial and metropolitan area. The Bridgeport Roosevelt School and Hartford Huntley Place sites monitoring objectives are representative of the highest concentrations in their respective CBSAs, due to their close proximity to major interstate highways with high traffic counts and patterns of traffic congestion.

The majority of the sites are given the value assignment "credible," with the exceptions of the Westport site, which reports the lowest area $PM_{2.5}$ values and is not counted to meet minimum requirements. The 2015 network plan anticipates discontinuing $PM_{2.5}$ monitoring at the Westport site at the end of 2015.

Connecticut currently meets and exceeds the minimum number of required monitors for each CBSA as required in 40 CFR Part 58 Appendix D. None of the monitors have design values within 85 percent of the NAAQS or exceed the NAAQS. Monitors are also included in the network for the two NCore sites, located in New Haven and Cornwall. Although there are no monitors in Windham County, which is the Connecticut part of the Worcester, MA-CT CBSA, the low population density (no urban areas with population greater than 50,000) and the absence of high vehicle traffic areas indicates a low probability of exceeding the $PM_{2.5}$ NAAQS.

Table 15: $PM_{2.5}$ Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Bridgeport	Roosevelt School	Neighborhood	Highest concentration	Credible	SLAMS
Cornwall	Mohawk Mountain	Regional	General background/ regional transport	Credible	NCORE
Danbury	Western Connecticut State University	Neighborhood	Population exposure	Credible	SLAMS
East Hartford	McAuliffe Park	Neighborhood	Population exposure	Credible	SLAMS
Groton	Fort Griswold	Urban	Population exposure	Credible	SLAMS
Hartford	Huntley Place	Neighborhood	Highest concentration	Credible	SLAMS, Near-road
New Haven	Criscuolo Park	Neighborhood	Population exposure	Credible	NCORE
Waterbury	Bank Street	Neighborhood	Population exposure	Credible	SLAMS
Westport	Sherwood Island State Park	Regional	Upwind background/ regional transport	Marginal	SLAMS

PM Speciation Monitoring Overview

$PM_{2.5}$ chemical speciation measurements are being obtained at four sites in the DEEP air monitoring network. The IMPROVE (Interagency Monitoring of Protected Visual Environments) site is located at the Cornwall site and the EPA STN (Speciation Trends Network) site is at the New Haven Criscuolo Park site. Both sites are operated on the same 1-in-3 day sample schedule and provide 24-hour integrated filter-base measurements. Aethalometers, which are used to provide continuous measurements of black carbon and ultra-violet channel (UV) $PM_{2.5,}$ are in operation at the Criscuolo Park, Cornwall, Danbury and East Hartford McAuliffe Park sites. A summary of $PM_{2.5}$ speciation monitoring siting characteristics is provided in Table 16.

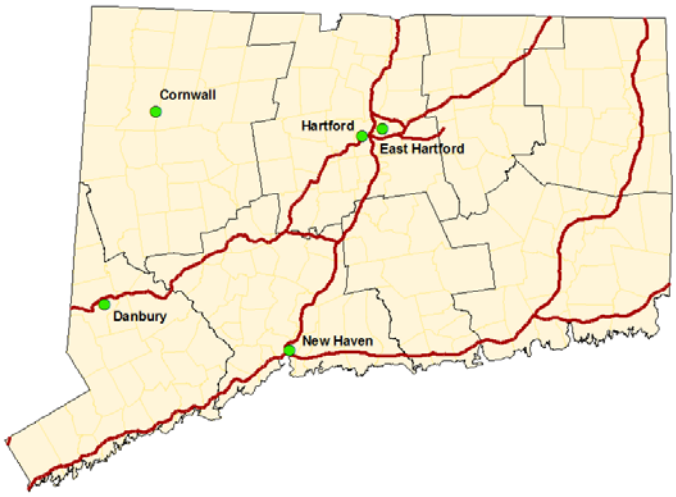


Table 16: $PM_{2.5}$ Speciation Network Measurement Scales, Monitoring Objectives and Value Assignments

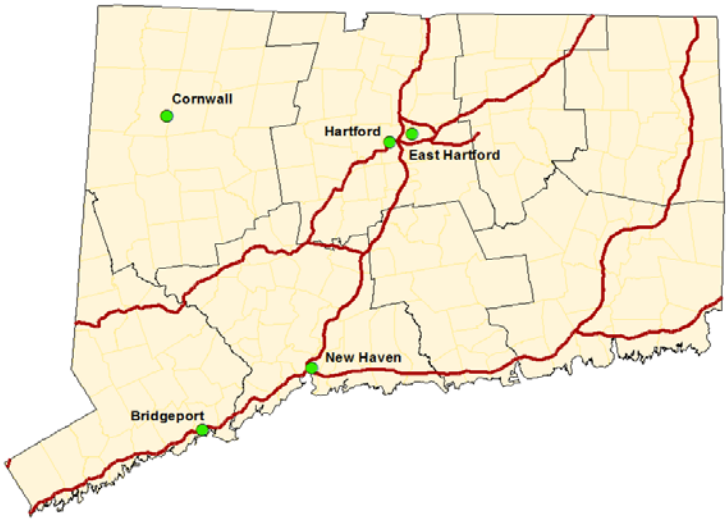
Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Cornwall	Mohawk Mountain	Regional Scale	General/Background	Credible	NCore/IMPROVE
East Hartford	McAuliffe Park	Neighborhood	Population Exposure	Credible	SPM
Danbury	WCSU	Neighborhood	Population Exposure	Credible	SPM
Hartford	Huntley Pl	Neighborhood	Population Exposure	Credible	SLAMS
New Haven	Criscuolo Plark	Neighborhood	Population Exposure	Credible	NCore/CSN

PM_{10} Network

PM_{10} Network Overview

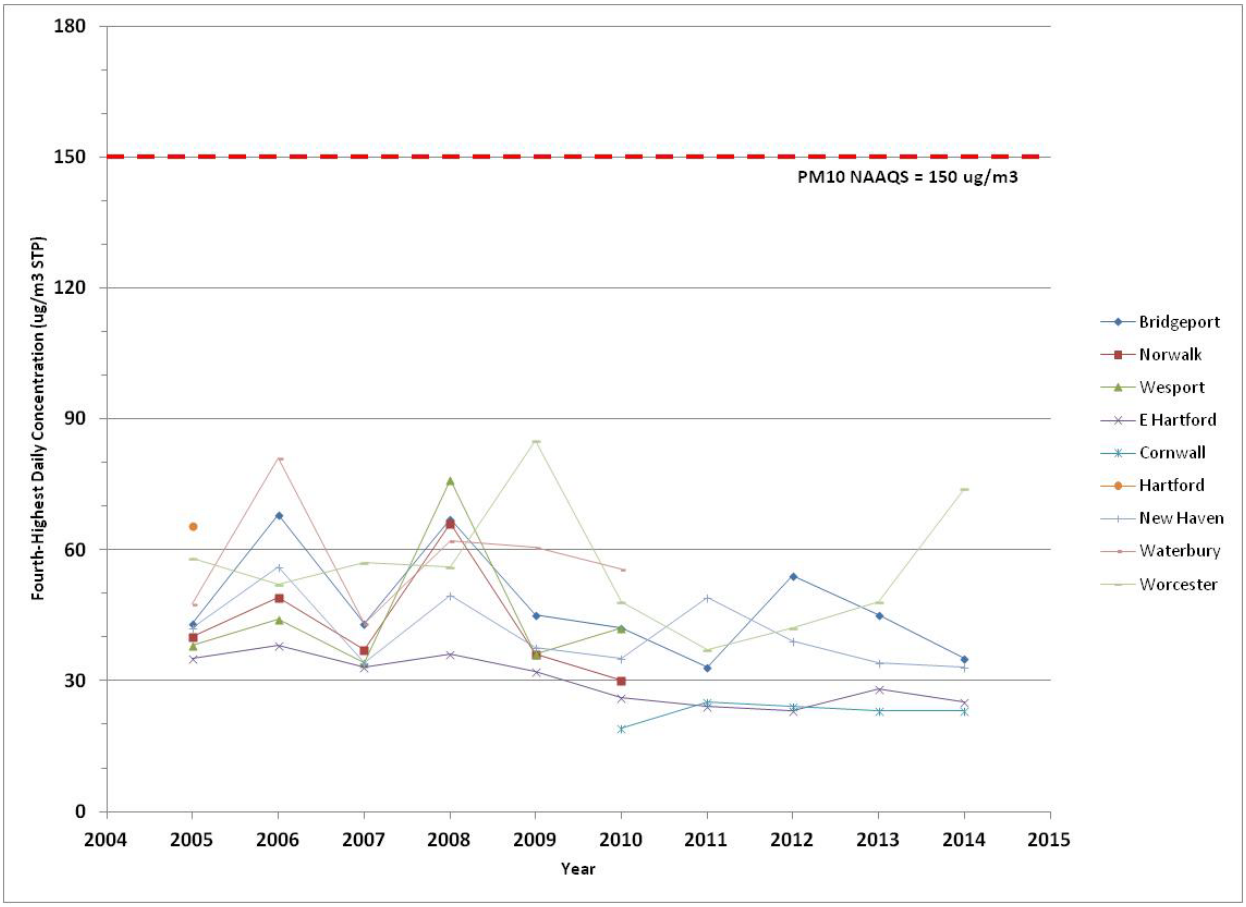
The DEEP operates 5 PM_{10} sites in the state air monitoring network utilizing both manual FRM samplers and automated continuous FEM samplers. The primary FRM monitors are operated on a 1-in-3 day sample schedule at the 2 NCore sites and 1-in-6 at East Hartford and Bridgeport. A collocated FRM sampler operates at Criscuolo Park in New Haven on a 1-in-6 day schedule. All sites that operate PM_{10} FRM samplers also operate $PM_{2.5}$ FRM samplers, which provide coarse particulate ($PM_{10-2.5}$) measurements.

Continuous PM_{10} FEM sampling is also being conducted at both of the NCore sites and at the Hartford near road site.



Monitoring data indicate that PM_{10} levels in Connecticut are well below the 24-hour NAAQS of 150 µg/m3, where the standard is based on a 3 year average of the annual number of expected exceedances that is less than or equal to 1. Figure 9 shows annual maximum 24-hour PM_{10} trends in Connecticut from 2005-2014.

Figure 9: PM_{10} Daily 1st High Value Trends in Connecticut MSAs



PM_{10} Monitoring Network Requirements

Population-based PM_{10} monitoring requirements: The requirements for PM_{10} monitoring stations are based on MSA populations and ambient PM_{10} levels, as shown in Table 17. All of Connecticut's stations have PM_{10} levels less than 80 percent of NAAQS, which put them in the "low concentration" category of the table. Table 18 shows compliance of the PM_{10} monitoring network with EPA requirements for the CBSAs that are within or intersecting Connecticut. Al primary monitors indicated are FRMs, except for the Hartford Huntley monitor in the Hartford-West Hartford-East Hartford CBSA, which is a continuous BAM FEM monitor.

Coarse PM monitoring requirements: Coarse PM, designated $PM_{10-2.5}$ or PM_C, is defined as the mass of particles with aerodynamic diameters between 2.5 and 10 microns, which can be derived by taking the difference in concentrations between paired, co-located PM2.5 and PM10 samplers. The network design requirement for $PM_{10-2.5}$ in that monitors be located at all NCore stations. DEEP has both paired FRMs and paired FEMs for discreet and continuous PM_C measurements at both NCore sites.

PM_{10}/PM_C Measurement Scales, Monitoring Objectives and Value Assignments: The PM_{10} network measurements scales, monitoring objectives and value assignments are given in Table 19. All site have value assignments of "credible," as they are counted towards minimum monitoring requirements but do not indicate potential for violation of the NAAQS.

Table 17: EPA PM_{10} Minimum Monitoring Requirements

Population category	High concentration[2]	Medium concentration[3]	Low concentration[4 5]
>1,000,000	6-10	4-8	2-4
500,000-1,000,000	4-8	2-4	1-2
250,000-500,000	3-4	1-2	0-1
100,000-250,000	1-2	0-1	0

[1]Selection of urban areas and actual numbers of stations per area will be jointly determined by EPA and the State agency.
[2]High concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding the PM_{10} NAAQS by 20 percent or more.
[3]Medium concentration areas are those for which ambient PM_{10} data show ambient concentrations exceeding 80 percent of the PM_{10} NAAQS.
[4]Low concentration areas are those for which ambient PM_{10} data show ambient concentrations less than 80 percent of the PM_{10} NAAQS.
[5]These minimum monitoring requirements apply in the absence of a design value.

Table 18: Connecticut PM_{10} Minimum Monitoring Compliance

Core-Based Statistical Area	Estimated 2013 Population	PM_{10} Concentration levels[1]	No. Monitors	Minimum No. Monitors Required[1]
Bridgeport-Stamford-Norwalk	939,904	Low	1	1-2
Hartford-West Hartford-East Hartford	1,215,211	Low	2	2-4
New Haven-Milford	862,287	Low	1	1-2
Norwich-New London	274,150	N/A[2]	0	0-1
Worcester-Connecticut	926,710	Low	1	1-2
Torrington (non-MSA)	186,924	Low	1	0

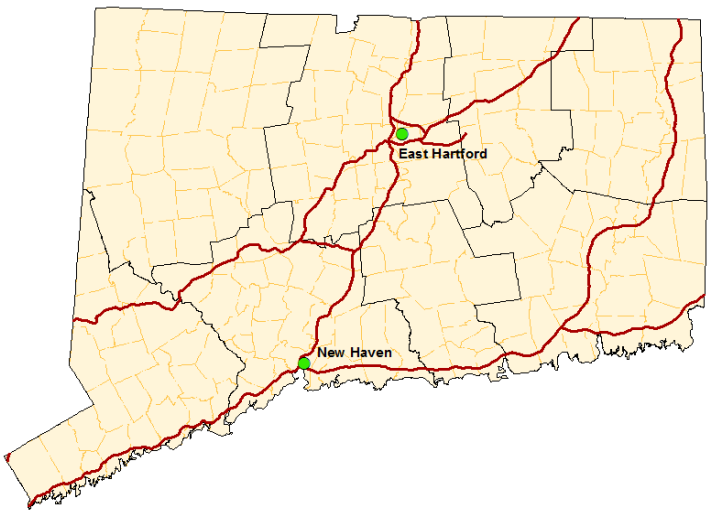
[1] Per Table D-4 of 40 CFR 58 Appendix D
[2] No PM_{10} monitoring in area; values may be considered low based on historical monitoring and relative PM2.5 values.

Table 19: PM_{10} Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Bridgeport	Roosevelt	Neighborhood	Highest concentration	Credible	SLAMS
Cornwall	Mohawk Mountain	Regional	General background	Credible	NCORE
East Hartford	McAuliffe Park	Neighborhood	Population exposure	Credible	SLAMS
Hartford	Huntley Place	Middle	Highest concentration	Credible	SLAMS
New Haven	Criscuolo Park	Neighborhood	Population exposure	Credible	NCORE

PAMS Network

PAMS Monitoring Overview



The DEEP operates 2 Photochemical Assessment Monitoring Station (PAMS) sites for the collection of data to support the understanding of ozone formation and transport in Connecticut and the northeast region. PAMS volatile organic compound (VOC) measurements are obtained from June 1st through August 31st each year. PAMS sampling generates hourly measurements of VOCs, such as benzene and toluene, using automated gas chromatography (GC). In addition to VOCs, both sites include continuous O_3 monitoring during the ozone season (currently April 1 through September 30), and continuous CO, NO_X and surface meteorology (ambient temperature, wind speed and direction, relative humidity and dew point) year round.

In accordance with a EPA's proposed ozone NAAQS rule[3], DEEP expects PAMS monitoring to be required at all NCore sites located within ozone nonattainment areas. For Connecticut, both of the state's NCore sites would be included, as they are located in areas currently designated as non-attainment for the 2008 NAAQS. If the final rule includes this requirement for NCore PAMS in nonattainment areas, DEEP may request that the PAMS site for the Greater Connecticut nonattainment area remain at its current location in East Hartford at McAuliffe Park, rather than relocating to the Cornwall Mohawk Mountain NCore site.

DEEP PAMS Monitoring Sites

EPA identified four types of PAMS sites at the outset of the program:

1. Type I: sited upwind of sources of photochemically reactive VOC's, representative of and useful in characterizing transported VOC
2. Type II: sites of maximum precursor impact on ozone production. These sites are typically most relevant to urban air toxic studies.
3. Type III: site expected to show maximum ozone impacts downwind of maximum precursor emissions
4. Type IV: far downwind of precursor emissions, representative of downwind transport and aging of precursors leaving an area

Connecticut currently operates 2 sites:

5. East Hartford McAuliffe Park (Type II) – Located downwind of the I91/I95 interchange, it is representative of the Hartford MSA comprising a population of >1.2 million people. The predominate precursor sources impacting the site are transportation related. The site provides Connecticut's longest record of VOC data having been in continuous operation since 1993 and thus provides a long term data set valuable for evaluation of trends in VOC levels, as well as analysis of control strategies.
6. New Haven Criscuolo Park (Type II) – This site is one of the two NCore sites designated for Connecticut. It is located adjacent to the I95/I91 interchange, near upwind from one of CT's largest seaport cargo offloading ports. In addition to other industrial sources, the site is impacted by transportation related emissions that also include significant diesel emissions from port related

[3] 79 FR 75233, Dec 17, 2014

activities (heavy trucks, ships, barges, etc). Of the 2 Connecticut PAMS sites, New Haven typically captures the highest concentrations of monitored VOCs. Due to its inclusion in the NCore network and the significant impact of commercial sources, Criscuolo Park is well sited to monitor for urban air toxics.

PAMS Network Requirements and Design

The current requirements for PAMS monitoring sites are expected to be amended by EPA's final 2015 8-hour ozone NAAQS rule, which is expected this Fall. Therefore, the requirements listed in this section are based on the proposed rule and should be considered preliminary.

Site location: PAMS sites shall be located at all NCore sites within ozone nonattainment areas. However, the Regional Administrator is authorized to approve an alternate PAMS site location within the area as appropriate.

Pollutant monitoring: EPA has listed[4] 34 priority and 28 optional speciated VOCs for monitoring at PAMS sites, shown in Table 20. The proposed rule also requires direct, or true, NO_2 measurements that do not contain the inherent bias of NO_2 values from standard photolytic NO_X analyzers.

DEEP is currently monitoring 26 of the 29 compounds from EPA's draft proposed list of priority parameters that were on the previous priority list of 57 compounds, including all except the carbonyls. DEEP is not monitoring any of the draft proposed new priority compounds, which EPA has indicated may be dropped from the priority list due to technical feasibility issues.

CO monitoring is required at Type 2 sites under existing rules and is implemented at both PAMS sites. The proposed ozone rule does not mention PAMS CO monitoring, so that determination will be made after the rule is finalized.

Presently, NO and NO_X must be monitored at Type 2 sites. The proposed new requirement will replace NO/NO_X with direct NO_2, which is considered to be more accurate. The 2 PAMS sites have NO/NO_X analyzers operating year-round. DEEP plans to replace these NO/NO_X analyzers with direct NO_2 analyzers in the near term.

Meteorological monitoring: The surface meteorological parameters required at PAMS sites include: wind speed, wind direction, temperature, humidity, atmospheric pressure, precipitation, solar radiation and UV radiation. In addition, upper air wind and temperature profile monitoring is required at 1 site in each area. In its proposed ozone rule, EPA would replace the upper air meteorology requirement with mixing height monitoring at all PAMS sites. DEEP monitors all of the required parameters at both PAMS sites except for UV radiation and upper air. However, ceilometer mixing height is monitored at New Haven and is planned for East Hartford as well.

PAMS VOC network measurement scales, monitoring objectives and value assignments: Since both PAMS site are located in urban/near urban settings, the monitored VOC compounds may be related to a wide variety of sources and are characteristic of neighborhood scale measurement. The primary objective of this monitoring is to characterize VOC levels and provide modeling data to study ozone fate and transport in the northeast region. Table 21 summarizes the measurement scale, objectives and valuations.

[4] Cavender, Kevin A., November 20, 2013, Memorandum: Revisions to the Photochemical Assessment Monitoring Stations Compound Target List

Table 20: EPA Revised PAMS VOC Target List

Existing Priority Compounds	Optional Compounds
1,2,3-Trimethylbenzene	1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene	1-Pentene
1-Butene	2,2-Dimethylbutane
2,2,4-Trimethylpentane	2,3,4-Trimethylpentane
Acetaldehyde[b]	2,3-Dimethylbutane
Acetone[b]	2,3-Dimethylpentane
Benzene	2,4-Dimethylpentane
Cis-2-Butene	2-Methylheptane
Ethane	2-Methylhexane
Ethylbenzene	2-Methylpentane
Ethylene	3-Methylheptane
Formaldehyde[b]	3-Methylhexane
Isobutane	3-Methylpentane
Isopentane	Acetylene
Isoprene	Cis-2-Pentene
M/P Xylene	Cyclohexane
M-Ethyltoluene	Cyclopentane
N-Butane	Isopropylbenzene
N-Hexane	M-Diethylbenzene
N-Pentane	Methylcyclohexane
O-Ethyltoluene	Methylcyclopentane
O-Xylene	N-Decane
P-Ethyltoluene	N-Heptane
Propane	N-Nonane
Propylene	N-Octane
Styrene	N-Propylbenzene
Toluene	N-Undecane
Trans-2-Butene	P-Diethylbenzene
	Trans-2-Pentene
New Priority Compounds	
α/β-Pinene	
1,3 Butadiene	
Benzaldehyde[b]	
Carbon Tetrachloride	
Ethanol	
Tetrachloroethylene	

[a] This table only includes individual target compounds. Monitoring agencies are encouraged to continue measuring and reporting total non-methane organic compounds (TNMOC)

[b] These compounds are carbonyls and are only required to be measured at PAMS sites in ozone nonattainment areas classified as serious or above for the 8-hour ozone standard.

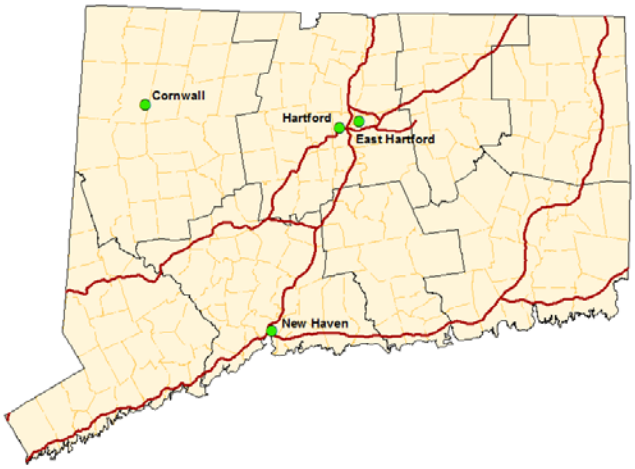
Table 21: PAMS Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type	PAMS Site Type
East Hartford	McAuliffe Park	Neighborhood	General background	Credible	PAMS	Type II
New Haven	Criscuolo Park	Neighborhood	General background	Credible	PAMS/ NCORE	Type II

NOx / NOy Network

NOx / NOy Monitoring Overview

The DEEP operates 4 nitrogen oxide (NO_X) sites in the air monitoring network. All NO_X samplers are operated year-round. Nitrogen oxide (NO) and total oxides of nitrogen (NO_X) measurements are obtained to monitor population exposure and to complement the PAMS measurements to study ozone formation. DEEP operates 2 NO_Y (total reactive oxides of nitrogen) samplers at the New Haven Criscuolo Park and Cornwall Mohawk Mountain NCore sites. NO_X analyzers are also operated at these NCore sites to support operation and validation of the NO_Y analyzers, which have proved to be problematic.



On January 22, 2010, EPA finalized a revision to the 1-Hour NO_2 NAAQS[5] at 100 ppb, retaining the annual average NO_2 standard at a level of 53 ppb. The 1-hour NO_2 NAAQS is an annual 3-year average of the 98th percentile of the highest daily maximum concentration in each year. The 98th percentiles of Connecticut's daily highs are approximately 50% of the standard, as shown in Table 22.

Table 22: Connecticut 2014 NO_2 NAAQS Design Values

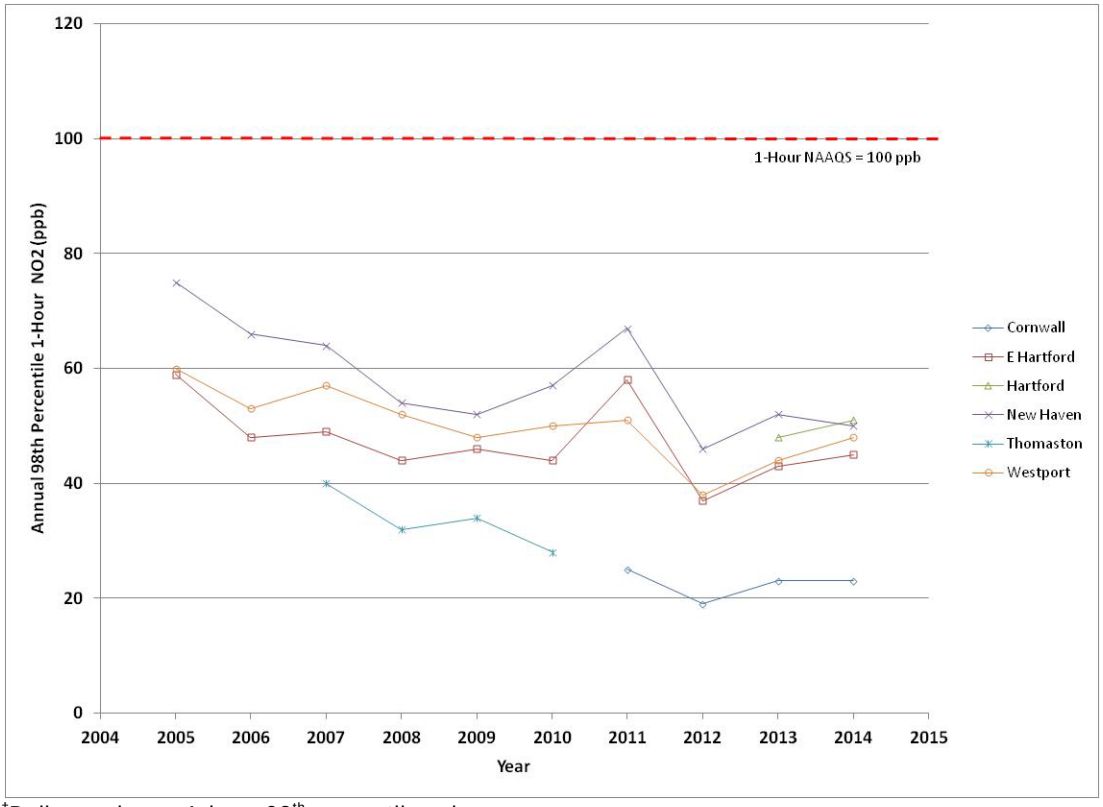
Site	1-Hr Design Value (ppb)	Annual Design Value (ppb)
Cornwall	22	2
East Hartford	42	9
Hartford*	50	15
New Haven	49	13
Westport	43	9
NAAQS	**100**	**53**

*Incomplete data for 1-hour DV, monitoring began April 2013

The annual 1-hour 98th percentile daily maximum and annual average NO_2 values are shown in comparison to NAAQS levels in Figures 10 and 11 below. There has been a slight decreasing NO_2 trend since 2005. However, NO_2 values in 2011 were elevated relative to the overall trends.

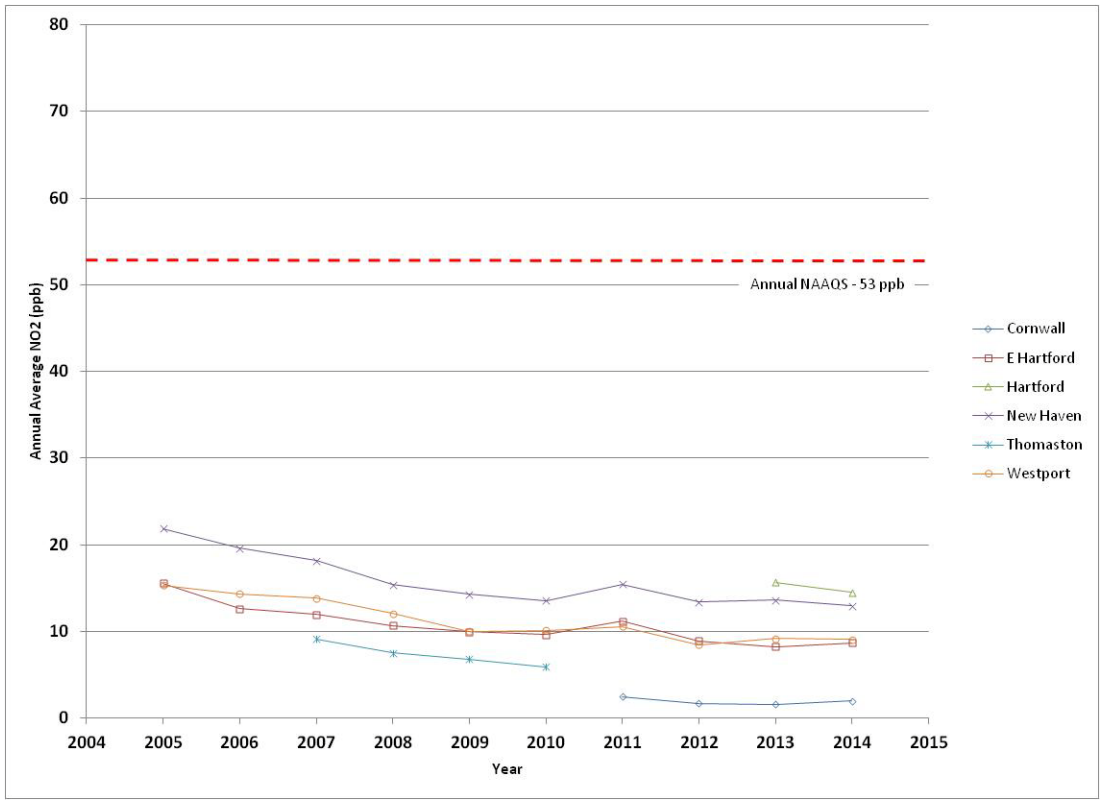
[5] 75 FR 6474-6537, January 22, 2010

Figure 10: Connecticut 1-Hour† NO_2 Trends



†Daily maximum 1-hour 98th percentile values

Figure 11: Connecticut Annual Average NO_2 Trends



NO_2 Network Design

NO_2 network design requirements include those for near road, area-wide, Regional Administrator and PAMS monitoring. These specific requirements are discussed below.

Near Road Monitoring Requirements: In accordance with the 2010 NO_2 NAAQS rule, DEEP must site and operate a microscale near road monitor in each CBSA having a population greater than 500,000.This monitor must be located along a road segment with expected maximum hourly NO_2 concentrations as determined by analysis of annual average daily traffic (AADT) counts, traffic patterns, topography, roadway and other structures and meteorological considerations. Specific near road requirements are given in 40 CFR 58 Appendix D 4.3.2.

A subsequent NO_2 monitoring rule[6] revised the implementation requirements for near road monitors. DEEP is now required to install the network in phases. In the first phase, areas with 1,000,000 or more persons must have monitors by January 1, 2014, areas with 2,500,000 or more persons must have a second monitor by January 1, 2015, and areas with populations of 500,000 or more must have their monitors by January 1, 2017.

Connecticut has operated its phase 1 monitor in Hartford since April 2013. Under the requirements, near road monitors in New Haven and Fairfield counties are required by 2017, although recent EPA guidance has indicated that, due to anticipated funding restrictions, these 2017 deadlines are subject to reconsideration and that states should consult with EPA regional representatives before proceeding with any further near road monitor installations. The existing NO_2 monitor at Bridgeport Roosevelt School is a potential candidate for the phase 3 near road monitor in the Stamford-Norwalk CBSA, which may be proposed in a future Annual Network Plan.

Area-wide Monitoring Requirements: For CBSAs with populations of at least 1,000,000, there must be an NO_2 monitor in a location of expected highest concentrations representing neighborhood or larger spatial scales. PAMS NO_2 monitors located within the CBSA and meeting these requirements may be used to satisfy the area-wide monitoring requirement. Within the Hartford-West Hartford-East Hartford CBSA, the East Hartford McAuliffe Park PAMS NO_2 monitor is designated the area-wide monitor.

Regional Administrator Monitoring Requirements: The 2010 NO_2 rule requires a minimum of 40 additional NO_2 monitors nationwide above the minimum monitoring requirements. These additional monitors should be sited in locations that may be approaching or exceeding the NAAQS but are not covered by minimum monitoring requirements, or in areas where area-wide required monitors are not sufficient to meet monitoring objectives. The NO_2 monitor at New Haven Criscuolo Park has been identified as part of the 40 additional Regional Administrator required monitors.

PAMS Monitoring Requirements: As discussed earlier in this assessment, NO/NO_X monitoring is required at all PAMS sites. In its 2014 ozone NAAQS proposed rule, EPA proposed NO_2 monitoring at PAMS sites using either direct NO_2 or photolytic-converter NO_X methods. DEEP plans to replace all of the conventional NO_X analyzers in the network with direct measure NO_2 instruments. However, DEEP should ensure that network NO_2 monitoring requirements are met as they appear in the final ozone NAAQS rule. Table 23 presents a summary of the NO_2 network scales, objectives and value assignments.

Table 23: NO_2 Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Cornwall	Mohawk Mountain	Regional	General/Background	Credible	NCORE
East Hartford	McAuliffe Park	Neighborhood	Population Exposure	Credible	PAMS
Hartford	Huntley Place	Middle	Highest Concentration	Credible	SLAMS
New Haven	Criscuolo Park	Neighborhood	Population Exposure	Credible	NCORE/PAMS

[6] 78 FR 16184-16188, March 14, 2013

NO_Y Network Design

NO/NO_Y monitoring is required at all NCore sites and at Type 1 or Type 3 PAMS sites (1 site per area). However, EPA's proposed 2015 ozone NAAQS rule does not specifically require NO/NO_Y, since PAMS sites would generally be located within the NCore network. Where an alternate location for a PAMS site is approved, as is being considered for East Hartford McAuliffe Park, optional NO_Y monitoring may be considered to provide a consistent data set for the PAMS network. Table 24 is a summary of the DEEP NO/NO_Y network design.

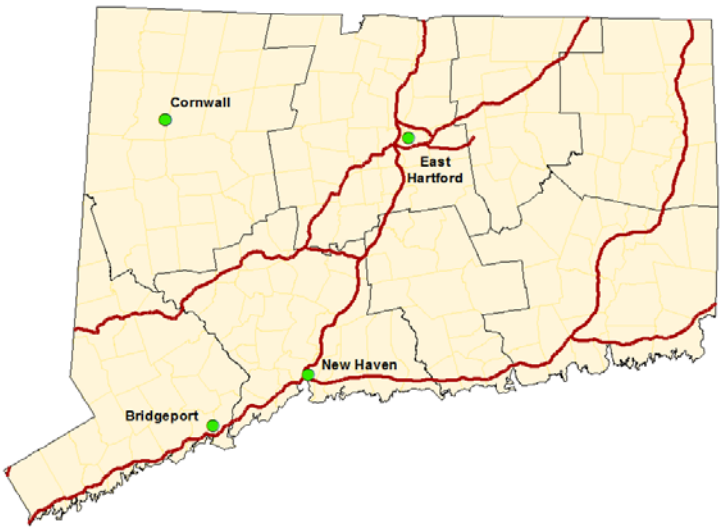
Table 24: NO/NO_Y Network Measurement Scales, Monitoring Objectives, and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Cornwall	Mohawk Mountain	Regional Scale	General/Background	Credible	NCORE
New Haven	Criscuolo Park	Neighborhood	Population Exposure	Credible	NCORE/PAMS

SO_2 Network

SO_2 Monitoring Overview

The DEEP operates four sulfur dioxide (SO_2) sites in the air monitoring network. All SO_2 samplers are operated year-round. SO_2 monitoring is conducted at the Cornwall Mohawk Mountain, New Haven Criscuolo Park, Bridgeport Edison School and East Hartford McAuliffe Park sites.

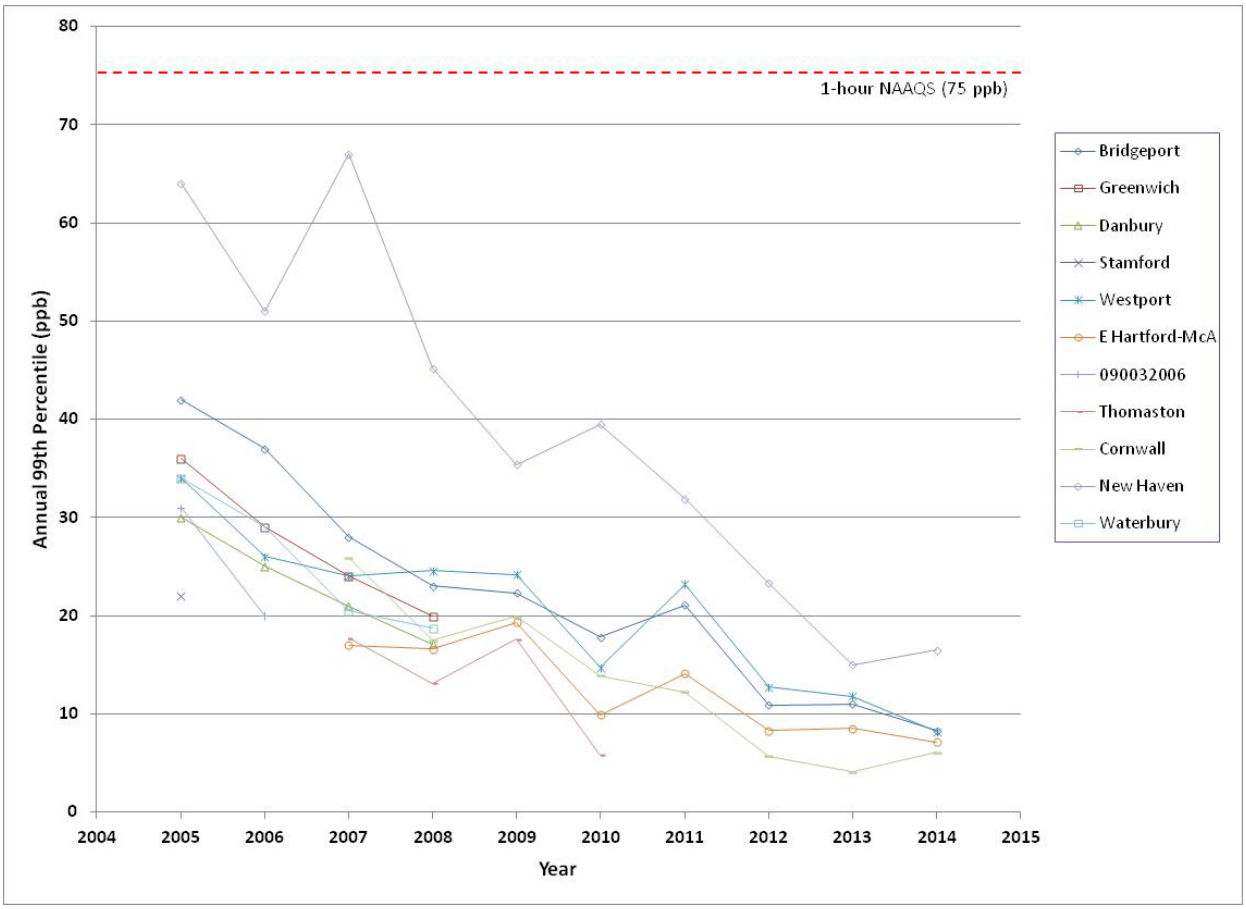


Current SO_2 monitoring indicates that concentrations are well below the primary (1-hour) and secondary (3-hour) standards of 75 ppb and 50 ppb, respectively. Figure 12 shows recent downward trends in the annual 99th percentile metrics, which are used to compute the 3-year design values. Table 25 shows the 2014 SO_2 design values for Connecticut.

Table 25: 2014 SO_2 Design Values

Site	1-Hr Design Value (ppb)
Bridgeport	10
Cornwall	5
East Hartford	8
New Haven	18
Westport	11
NAAQS	**75**

Figure 12: Connecticut Annual 99th Percentile Daily Maximum 1-hour SO_2 Values, 2005-2014



SO_2 Network Design

EPA requirements for SO_2 network monitors include those for NCore sites, population weighted emission index (PWEI) sites and any additional monitors that may be required by the Regional Administrator.

NCore monitoring: SO_2 measurements are included within the NCore multi-pollutant site requirements. These are used to characterize trends and assist in understanding transport. SO_2 monitors at NCore sites within CBSAs with minimum monitoring based on the PWEI may count toward meeting those requirements. DEEP operates SO_2 monitors at the 2 NCore stations in Connecticut, New Haven Criscuolo Park and Cornwall Mohawk Mountain.

Population Weighted Emission Index (PWEI) monitoring: PWEI values are defined in the regulations for a CBSA as product of the population (millions of people) and the total SO_2 emissions (tons). Table 26 below gives the minimum number of monitors required based on PWEI values.

Table 26: PWEI CBSA Monitoring Requirements

PWEI value (M-person-t)	Minimum number of monitors per CBSA
≥ 1,000,000	3
≥100,000 and <1,000,000	2
≥5,000 and < 100,000	1
<5,000	0

Table 27 presents the computations of the PWEIs for the CBSAs within or intersecting Connecticut. Population data is estimated 2013 data from the US Census Bureau. Emission data is from the 2011

National Emission Inventory (NEI), which includes process (point), non-point, on-road and non-road emissions.

Table 27: SO_2 Emissions and PWEI Values for CT CBSAs

CBSA	Population	SO_2 Emissions (t)	PWEI (M-person-t)	Highest SO_2 Point Source (t)	No. Monitors	No. PWEI Monitors Required
Hartford-West Hartford-East Hartford, CT	1,215,211	4,798	5,831	2,453	1	1
Bridgeport-Stamford-Norwalk, CT	939,904	3,996	3,756	2,720	1	0
New Haven-Milford, CT	862,287	3,447	2,972	2,622	1	0
Worcester, MA-CT	926,710	4,150	3,846	1,994	0	0
Norwich-New London, CT	274,150	603	165	1,097	0	0
Torrington, CT	186,924	637	119	774	1	0

As shown in Table 27, only the Hartford-West Hartford-East Hartford CBSA requires SO_2 monitoring under the PWEI requirement. However, the additional monitor, located Bridgeport Edison School, is sited as an SO_2 point source monitor for the state's largest emitter, PSEG-Bridgeport Harbor power station.

Regional Administrator required monitoring: The Regional Administrator may require additional SO_2 monitors beyond the minimum network described above in areas where there is a potential to violate or contribute to a violation of the NAAQS, there are impacts from sources not conducive to modeling, or there are impacts to susceptible or vulnerable populations. At this time, the Regional Administrator has not requested any additional SO_2 monitoring.

SO_2 monitoring objectives, spatial scales and value assignments: Both the New Haven and Bridgeport monitors represent neighborhood scale areas that are principally impacted by nearby sources. The New Haven Criscuolo Park is within close proximity to marine shipping terminals in New Haven harbor, while the Bridgeport Edison School site is located downwind of the prevailing wind direction from the state's largest SO_2 point source, at a distance of 3.2 kilometers to the northeast. The East Hartford site, which is apparently not impacted significantly by large local sources, represents an urban scale that consists of the greater Hartford urban area and local suburbs. Cornwall is remotely located away from urban and industrial sources, and thus represents a regional measurement scale for general, background and long range transport objectives. Table 28 summarizes objectives, scales and value assignments.

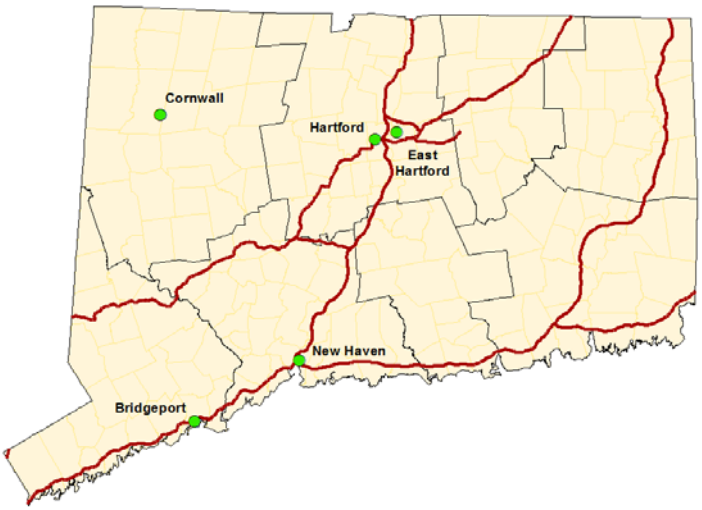
Cornwall and New Haven have SO_2 values assignments of "credible," as they are required to satisfy minimum NCore monitoring requirements, while East Hartford, also having a "credible" value assignment, meets the requirement for PWEI sites as indicated in Table 27.

Table 28: SO_2 Network Monitoring Objectives, Spatial Scales and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Bridgeport	Edison School	Neighborhood	Source impact, population exposure	Credible	SLAMS
Cornwall	Mohawk Mountain	Regional	General background	Credible	NCORE
East Hartford	McAuliffe Park	Urban	Population exposure	Credible	SLAMS
New Haven	Criscuolo Park	Neighborhood	Highest concentration	Credible	NCORE

CO Network

CO Monitoring Overview



The DEEP operates 5 carbon monoxide (CO) sites in the air monitoring network. All CO samplers monitor at trace levels and are operated year-round.

Three areas of Connecticut, Bridgeport, New Haven and Hartford, are subject to CO limited maintenance plans due to historical NAAQS nonattainment. All such areas have been in attainment for many years. The limited maintenance plan of 2004 extended the existing plans by 10 years. Thus the Hartford-New Britain-Middletown area was extended from 2006-2015, the New Haven-Meriden-Waterbury area was extended from 2009-2015 and the Connecticut portion of the New York-Northern NJ-Long Island area from 2011-2020. In accordance with these plans the monitoring will continue in these areas to assure 8-hour design values of 7.65ppm (85% of the NAAQS, 9ppm) or less. If a site exceeds this level a full maintenance plan must be developed. Connecticut's highest sites have been below the level of 7.65 ppm since 1994.

Table 29 shows the CO NAAQS design values for the 2 forms of the standard, 1-hour and 8-hour, where the standards are not to be exceeded more than once per year. As such, the design values are the 2nd maximum 1-hour and 8-hour values, respectively.

Figures 13 and 14 show trends in CO design values since 2005, indicating CO levels are generally only about 25 percent of the NAAQS values.

Table 29: Connecticut 2014 CO Design Values

Site	1-Hr Design Value (ppm)	8-Hr Design Value (ppm)
Bridgeport	2.4	1.4
Cornwall	2.6	0.6
East Hartford	1.9	1.3
Hartford	1.9	1.4
New Haven	1.6	1.3
NAAQS	**35**	**9**

Figure 13: 1-Hour CO Design Value Trends, 2005-2014

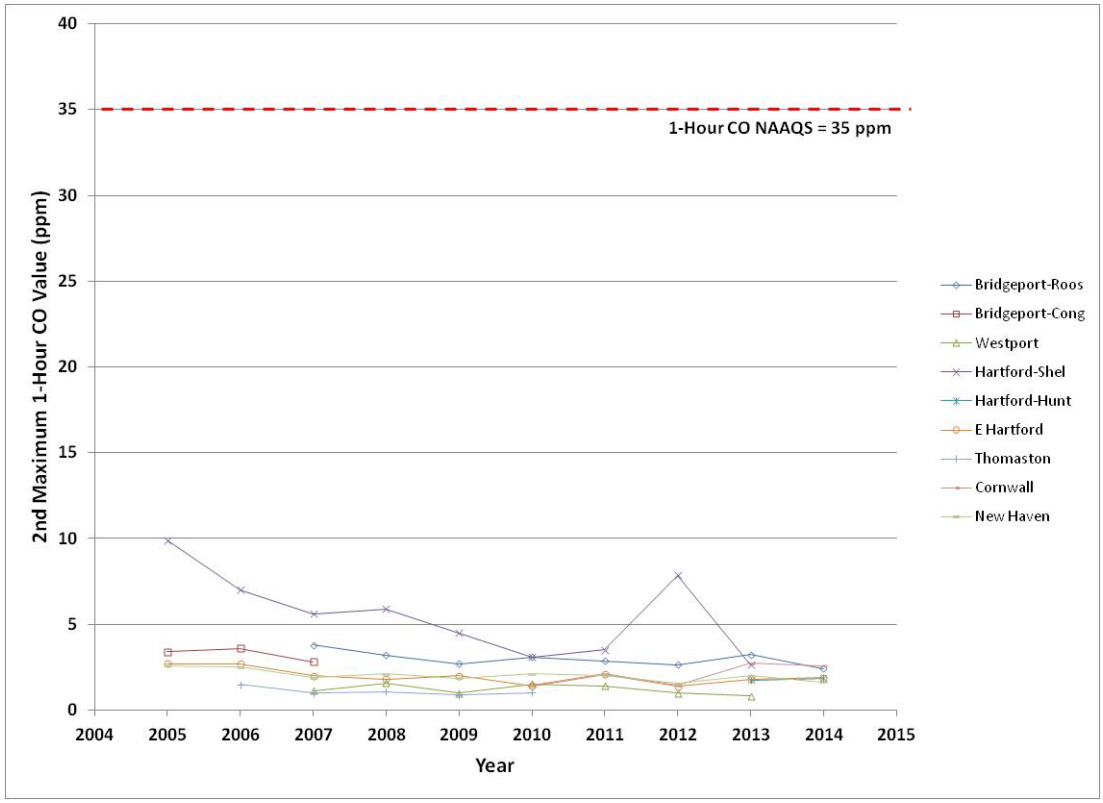
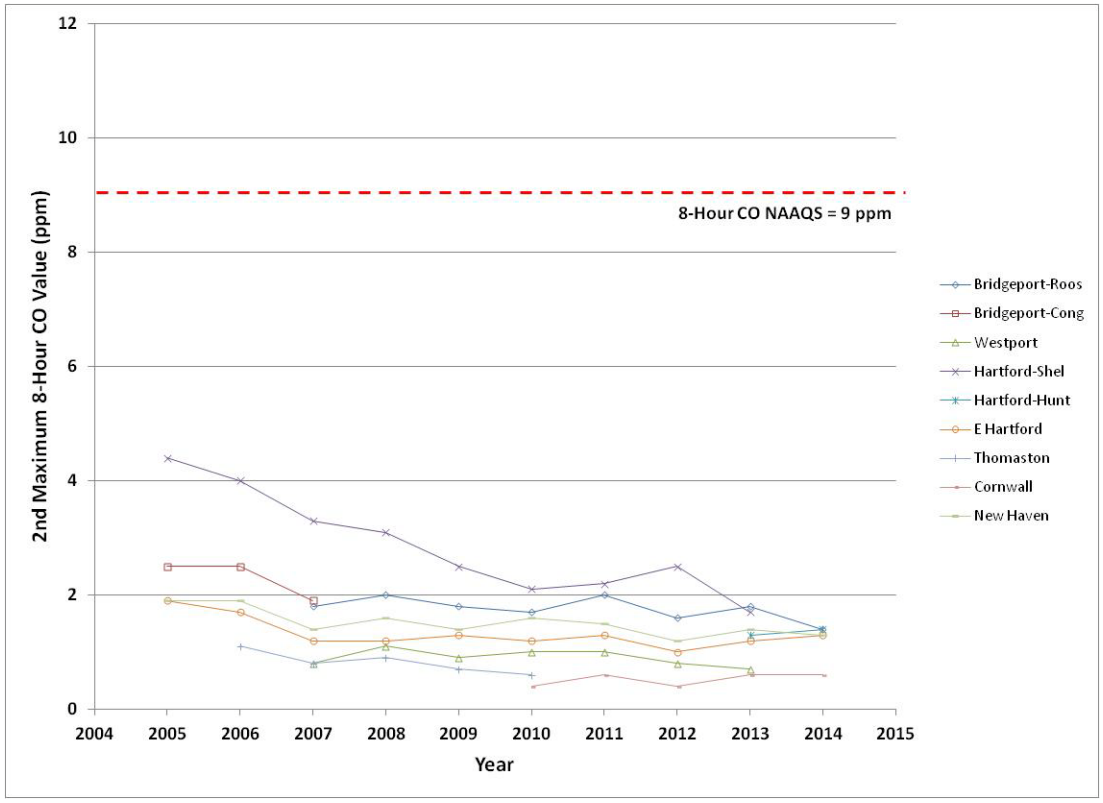


Figure 14: 8-Hour CO Design Value Trends, 2005-2014



CO Network Design

The current CO network is designed to meet general, PAMS, NCORE and Regional Administrator network requirements, as well as satisfy the state's limited maintenance plans. CO is monitored at PAMS and NCORE sites as a useful co-pollutant that can aide in source determination.

General requirements: Effective January 1, 2017, in any CBSA having a population of at least 1,000,000, a CO monitor must be co-located with the area's required near-road monitor, unless another location where the highest CO levels are expected within the area is approved by the Regional Administrator. The Hartford area near road CO monitor at the Huntley Place site has been in operation since January 1, 2013.

NCore requirements: CO measurements are included within the NCore multi-pollutant site requirements. DEEP operates CO monitors at the 2 NCore stations in Connecticut, New Haven Criscuolo Park and Cornwall Mohawk Mountain.

Photochemical Assessment Monitoring Stations (PAMS) requirements: CO measurements are required at PAMS sites during the ozone monitoring season to aid in the characterization of local sources and/or transport of ozone precursors. DEEP operates CO monitors 12 months per year at the 2 PAMS sites, East Hartford McAuliffe Park and New Haven Criscuolo Park.

Regional Administrator required monitoring: The Regional Administrator may require additional CO monitors beyond the minimum network described above in areas where there is a potential to violate or contribute to a violation of the NAAQS, there are potentially significant impacts from stationary sources, in downtown areas or street canyons or in areas subject to high ground levels due to or enhanced by topographical or meteorological characteristics. At this time, the Regional Administrator has not requested any additional CO monitoring.

Limited Maintenance Plan requirements: CO monitors must be located and operated in accordance with Connecticut's limited maintenance plan (LMP). This monitoring allows for the measurement and tracking of CO concentrations in areas that were previously non-attainment. If appropriate, and with Regional Administrator approval, LMP-required monitors by may also be counted towards compliance with other minimum monitoring requirements noted above. Connecticut's CO LMP covers the greater Hartford, greater New Haven and the Connecticut portion of the greater New York maintenance areas. Currently, LMP area CO monitoring is required at least through the end of each area's second ten-year maintenance period. The CO monitors operating in compliance with the LMP are at the Bridgeport Roosevelt School, New Haven Criscuolo Park and Hartford Huntley Place sites.

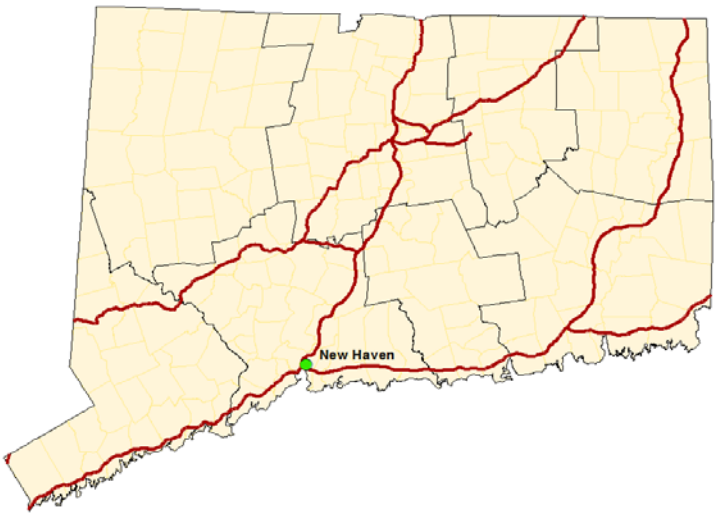
Table 30 lists the measurement scales, monitoring objectives and value assignments for the DEEP CO network. All sites have value assignments of "credible" as they each fulfill explicit monitoring requirements but do not indicate a potential for air quality violations.

Table 30: CO Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
Bridgeport	Roosevelt School	Middle	Population exposure	Credible	SLAMS
Cornwall	Mohawk Mountain	Regional	Population exposure	Credible	NCORE
East Hartford	McAuliffe Park	Neighborhood	Population exposure	Credible	PAMS
Hartford	Huntley Place	Neighborhood	Highest concentration	Credible	SLAMS/ Near road
New Haven	Criscuolo Park	Neighborhood	Population exposure	Credible	NCORE/PAMS

Lead Network

Lead (Pb) Monitoring Overview



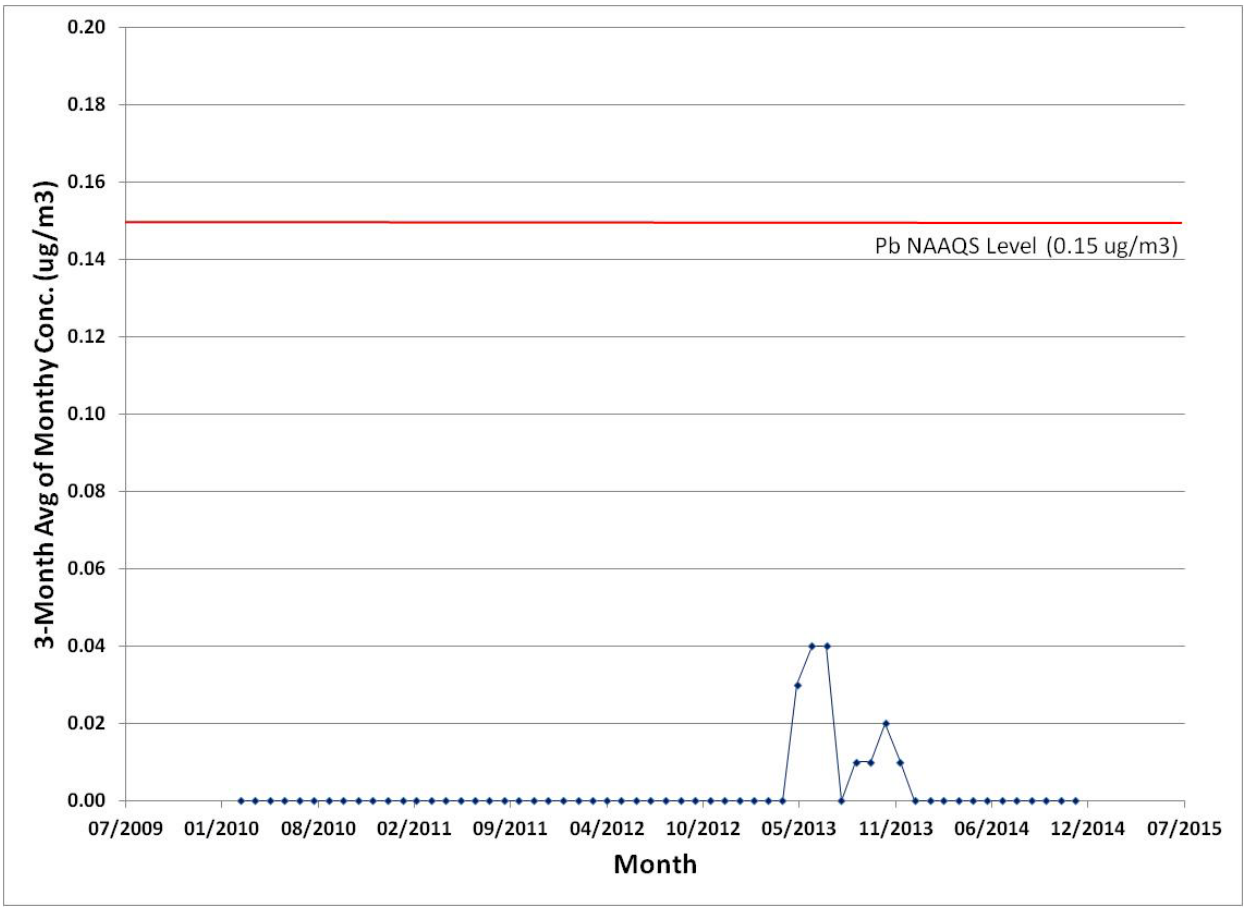
DEEP operates one lead (Pb) monitor in the network, at the Criscuolo Park urban NCore site. Lead measurements are obtained from an FEM method, energy-dispersive x-ray fluorescence (ED-XRF) analysis of low volume PM10 filters (Pb-PM_{10}). EPA considers Pb-PM10 as a surrogate parameter for total lead in total suspended particulates (Pb-TSP). Use of this surrogate is contingent on the design value remaining below 2/3 of the NAAQS, or below 0.10 µg/m^3.

Lead monitoring in Connecticut has consistently indicated concentrations well below the NAAQS of 0.15 µg/m3 and the surrogate parameter threshold of 0.10 µg/m3. The 2014 design value is shown in Table 31. Figure 15 shows trends in the monthly block average Pb-PM_{10} values. Design values are computed as the rolling 3-month averages of the monthly block average values.

Table 31: 2014 Lead Design Value

Site	Max 3-Yr 3-Month Mean (µg/m^3)
New Haven	0.04
NAAQS	**0.15**

Figure 15: Pb-PM10 Monitored Levels, 2010-2014



Lead (Pb) Network Design

The lead network design criteria include requirements for source-oriented, NCore and Regional Administrator-directed monitoring.

Source-oriented monitoring requirements: Source-oriented monitors are required for airport and non-airport emission sources where total annual emissions are greater than 0.5 t or 1.0 t, respectively, based on the most recent available NEI data. Table 32 provides the maximum lead emissions for both airport and non-airport sources for each Connecticut county from the 2011 NEI. As indicated in the table, there are no lead sources in Connecticut that exceed the thresholds for required source-oriented monitoring, as the maximum annual unit emissions in the state is 0.18 tons per year.

NCore monitoring requirements: Lead monitoring is required at all NCore sites that are located in CBSAs having populations of 500,000 or more. Therefore, lead monitoring is performed at New Haven Criscuolo Park using low-volume PM_{10} filters with energy dispersive x-ray fluorescence (ED-XRF) analysis, which is contracted to an outside laboratory. On September 11, 2014, EPA proposed revisions to the quality assurance and monitoring requirements of 40 CFR 58, including a provision to remove lead (Pb-PM_{10}) as a required measurement at NCore sites [7]. If EPA finalizes this rule as proposed, DEEP intends to discontinue Pb-PM_{10} monitoring at the New Haven NCore site.

Airport monitoring requirements: Airports are potential sources of airborne lead emissions due to the widespread use of leaded gasoline in aviation fuel for certain propeller driven aircraft. As discussed in the paragraph on source-oriented lead monitoring above, where airports over the 0.5 tpy threshold are

[7] 79 FR 54364, Sept 11, 2014

required to have monitoring, EPA required lead monitoring at a list of specific airports with emissions below the 0.5 tpy threshold for a period of 1 year as part of the revised lead NAAQS promulgated on December 27, 2010[8]. There are no Connecticut airports included in EPA's list of specific airports requiring monitoring.

Table 32: Highest Airport and Process Lead Emission Sources by County

County	Town	Facility	Facility Source Description	Total Pb 2011 Emissions (t)
Fairfield	Danbury	Danbury Municipal	Airport	0.177329
Fairfield	Bridgeport	Wheelabrator Bridgeport LP	Non-airport (Municipal Waste Combustor)	0.045743
Hartford	Unknown	Hartford-Brainard	Airport	0.165161
Hartford	Bristol	P-Q Controls Inc	Non-airport	0.03
Litchfield	Waterbury	Waterbury	Airport	0.03764
Litchfield	Thomaston	Summit Corp Of America	Non-airport	0.076
Middlesex	Chester	Chester	Airport	0.018524
Middlesex	Middletown	Middletown Power LLC	Non-airport (Electricity Generation via Combustion)	0.002224
New Haven	Oxford	Waterbury-Oxford	Airport	0.118155
New Haven	Seymour	Kerite Co	Non-airport	0.00255
New London	Groton	Groton-New London	Airport	0.087349
New London	Ledyard	Americas Styrenics, LLC	Non-airport	0.04961
Tolland	Ellington	Ellington	Airport	0.082149
Tolland	Storrs	Univ OF CT / Storrs	Non-airport (Institutional)	4.77E-05
Windham	Danielson	Danielson	Airport	0.060936
Windham	Sterling	ReEnergy Sterling	Non-airport (Electricity Generation via Combustion)	0.001095

Regional Administrator monitoring requirements: The Regional Administrator may require additional lead monitors beyond the minimum network described above in areas where the combination of lead emission sources, population locations and topography may contribute to significant exposures otherwise not covered by the above monitoring requirements. At this time, no such additional lead monitoring in Connecticut has been required by the Regional Administrator.

Table 33 lists the measurement scales, monitoring objectives and value assignments for the DEEP lead network. The New Haven Criscuolo Park lead monitor is assigned a value of "credible" as it fulfills explicit monitoring requirements and does not show any air quality exceedances of the lead NAAQS.

Table 33: Lead Network Measurement Scales, Monitoring Objectives and Value Assignments

Town	Site	Measurement Scale	Monitoring Objective	Value Assignment	Site Type
New Haven	Criscuolo Park	Middle	Population exposure	Credible	NCORE

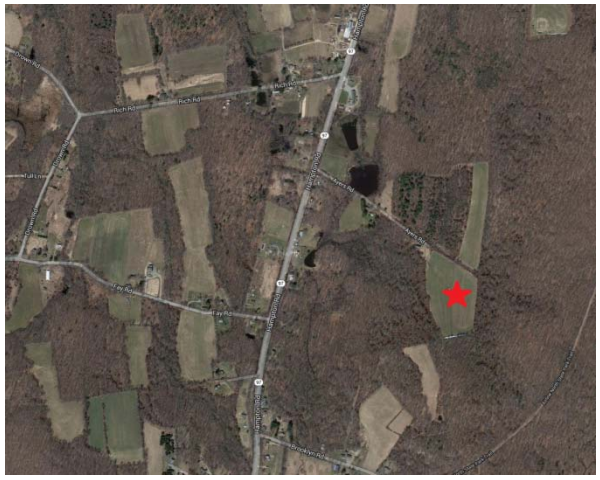
[8] 75 FR 81126

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**		



PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
												X												

X=Existing, P =Proposed, = Planned to terminate

*Note: Site operated by EPA contractor under CASTNET program; scale and objective from draft 2015 [1]CASTNET Annual Network Plan, May 6, 2015

Parameter	Measurement Scale*	Monitoring Objective[1]	Assigned Value from Assessment	Plan for Network Optimization
O_3	Regional	Highest concentration		

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
													X											

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
SO_2	Neighborhood	Source impact	Credible	**Keep** – Source-oriented receptor site for highest emitter

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3 1/6		X		1/6										X							X			

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
$PM_{2.5}$ FRM	Neighborhood	Highest concentration	Credible	Keep
$PM_{2.5}$ Continuous	Neighborhood	Highest concentration	Credible	Keep
PM_{10} FRM/ PM-Coarse	Neighborhood	Highest concentration	Credible	Keep
CO	Middle	Population exposure	Credible	Keep
Temperature			Credible	Keep

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)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3		P	X	1/3		X				1/3	X	X	X	X	X	X			X	X	X	X	X	

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	**Regional**	**General background / regional transport**	**Credible**	**Keep**
PM$_{2.5}$ Continuous	**Regional**	**General background / regional transport**	**Credible**	**Keep**
PM$_{10}$ Continuous	**Regional**	**General background**	**Credible**	**Keep**
PM$_{10}$ FRM / PM-Coarse	**Regional**	**General background**	**Credible**	**Keep**
IMPROVE	**Regional**	**General background**	**Credible**	**Keep**

BC/UVC	**Regional**	**General background**	**Credible**	**Keep**
Ozone	**Regional**	**General background**	**Critical**	**Keep**
SO_2	**Regional**	**General background**	**Credible**	**Keep**
CO	**Regional**	**General background**	**Credible**	**Keep**
NOx	**Regional**	**General background**	**Credible**	**Keep**
NOy	**Regional**	**General background**	**Credible**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	
Dew Point/ Rel. Humidity			**Credible**	
Rain Fall			**Credible**	
Barometric Pressure			**Credible**	
Solar Radiation			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO2/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3 1/6		P	X								X	X							X	X	X			

X=Existing, P =Proposed = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
$PM_{2.5}$ FRM	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
$PM_{2.5}$ Continuous	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
Ozone	**Urban**	**Population exposure**	**Critical**	**Keep**
BC/ UVC	**Neighborhood**	**Population exposure**	**Credible**	**Keep** – topography makes location subject to local winter wood smoke events
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/1 1/6		X		1/6							X	X	X	X	X		X		X	X	X	X	X	X

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM$_{2.5}$ Continuous	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM$_{10}$ FRM/ PM-Coarse	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
BC/UVC	**Neighborhood**	**Population exposure**	**Credible**	**Keep**– mobile source; woodsmoke source impact information.
Ozone	**Urban**	**Population exposure**	**Critical**	**Keep**
SO$_2$	**Urban**	**Population exposure**	**Credible**	**Keep**

CO	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
NOx	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
VOCS	**Neighborhood**	**General background**	**Credible**	**Keep** – May need waiver from RA to keep this location based on proposed O_3 NAAQS
Carbonyls	**Neighborhood**	**Population exposure**	**Marginal** –currently required in serious or higher areas; valuable toxics information.	**Suspended** – New O_3 rule could mandate at all PAMS sites.
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	
Dew Point / Rel. Humidity			**Credible**	
Solar Radiation			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	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 =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
Ozone	**Regional**	**Upwind background/ regional transport**	**Critical**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	
Rain Fall			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	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 =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	**Urban**	**Population exposure**	**Credible**	
PM$_{2.5}$ Continuous	**Urban**	**Population exposure**	**Credible**	
Ozone	**Urban**	**Population exposure**	**Critical**	
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	

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)**		

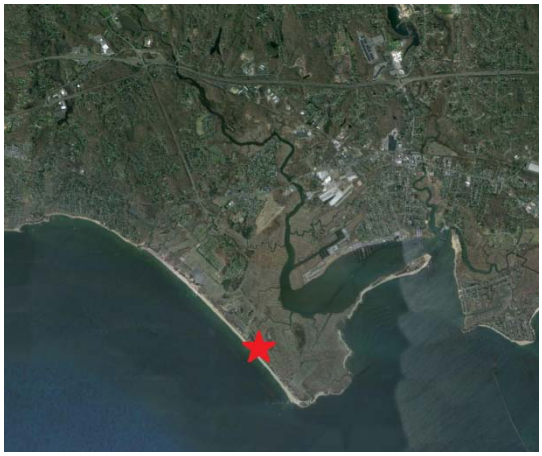
PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM2.5 (Continuous – non-FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	NO/NO_2/NOx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

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
$PM_{2.5}$ FRM	Neighborhood	Population exposure	Credible	Keep
$PM_{2.5}$ Continuous	Neighborhood	Population exposure	Credible	Keep
PM_{10} Continuous	Middle	Highest concentration	Credible	Keep
NOx	Middle	Highest concentration	Credible	Keep
CO	Middle	Highest concentration	Credible	Keep
BC/ UVC	Neighborhood	Population exposure	Credible	Keep
Wind Speed			Credible	

Wind Direction			**Credible**	
Temperature			**Credible**	
Traffic Count			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	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 =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
Ozone	**Regional**	**Population exposure**	**Critical**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	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 =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
Ozone	**Urban**	**Population exposure**	**Critical**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	
Rain Fall			**Credible**	
Barometric Pressure			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/1 1/3	1/6	P	X	1/3	1/6	X	1/6	1/12	1/3		X	X	X	X	X	X	X		X	X	X	X	X	X

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM$_{2.5}$ Continuous	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM$_{10}$ Continuous	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM$_{10}$ FRM	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
PM-Coarse	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
STN	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
BC/UVC	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
Ozone	**Urban**	**Population exposure**	**Critical**	**Keep** – required

				year-round operation.
SO_2	**Neighborhood**	**Highest Concentration**	**Credible**	**Keep**
CO	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
NOx	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
NOy	**Neighborhood**	**Population exposure**	**Credible**	**Keep**
Lead (Pb)	**Middle**	**Population exposure**	**Credible / marginal**	Proposed to eliminate in 2015 Network Plan
VOCS	**Neighborhood**	**General background**	**Credible**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	
Dew Point / Rel. Humidity			**Credible**	
Rain Fall			**Credible**	
Barometric Pressure			**Credible**	
Solar Radiation			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	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 =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
Ozone	**Regional**	**Population exposure/ general background**	**Critical**	**Keep**
Wind Speed			**Credible**	
Wind Direction			**Credible**	
Temperature			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO_2/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
												X									X			

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
Ozone	**Regional**	**Regional transport**	**Critical**	**Keep**
Temperature			**Credible**	

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)	PM2.5 (Continuous – non-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	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3 1/6	1/6	X																	X	X	X			

X=Existing, P =Proposed, = Planned to terminate

Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	Neighborhood	Population exposure	Credible	Keep
PM$_{2.5}$ Continuous	Neighborhood	Population exposure	Credible	Keep
Wind Speed	Neighborhood	Population exposure	Credible	
Wind Direction	Neighborhood	Population exposure	Credible	
Temperature	Neighborhood	Population exposure	Credible	

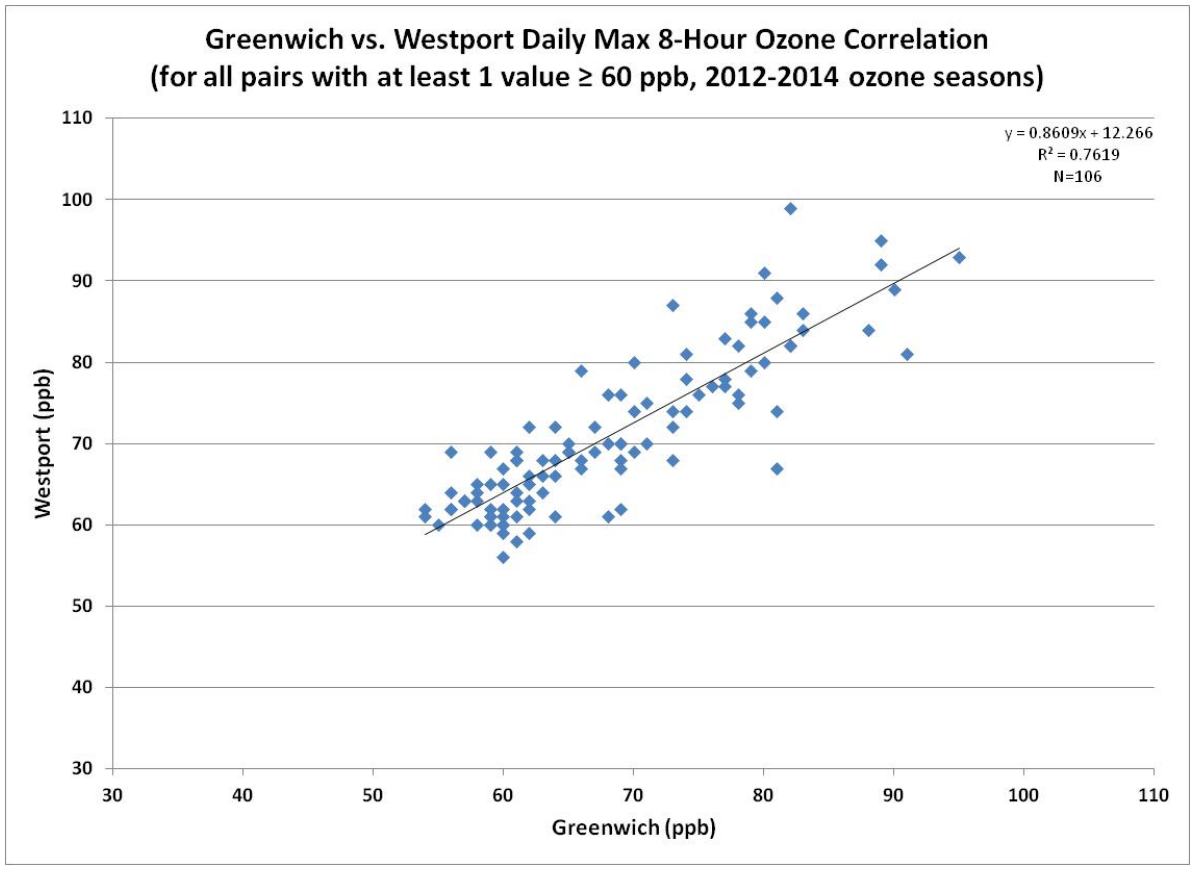
Town – Site:	**Westport – Sherwood Island State Park**		
County:	**Fairfield**	Latitude:	**41.11822°**
Address:	**Sherwood Island SP**	Longitude:	**-73.33681°**
AQS Site ID:	**09-001-9003**	Elevation:	**4 m (13 ft)**
Spatial Scale:	**Regional**	Year Established:	**1996**
Statistical Area:	**CSA (New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

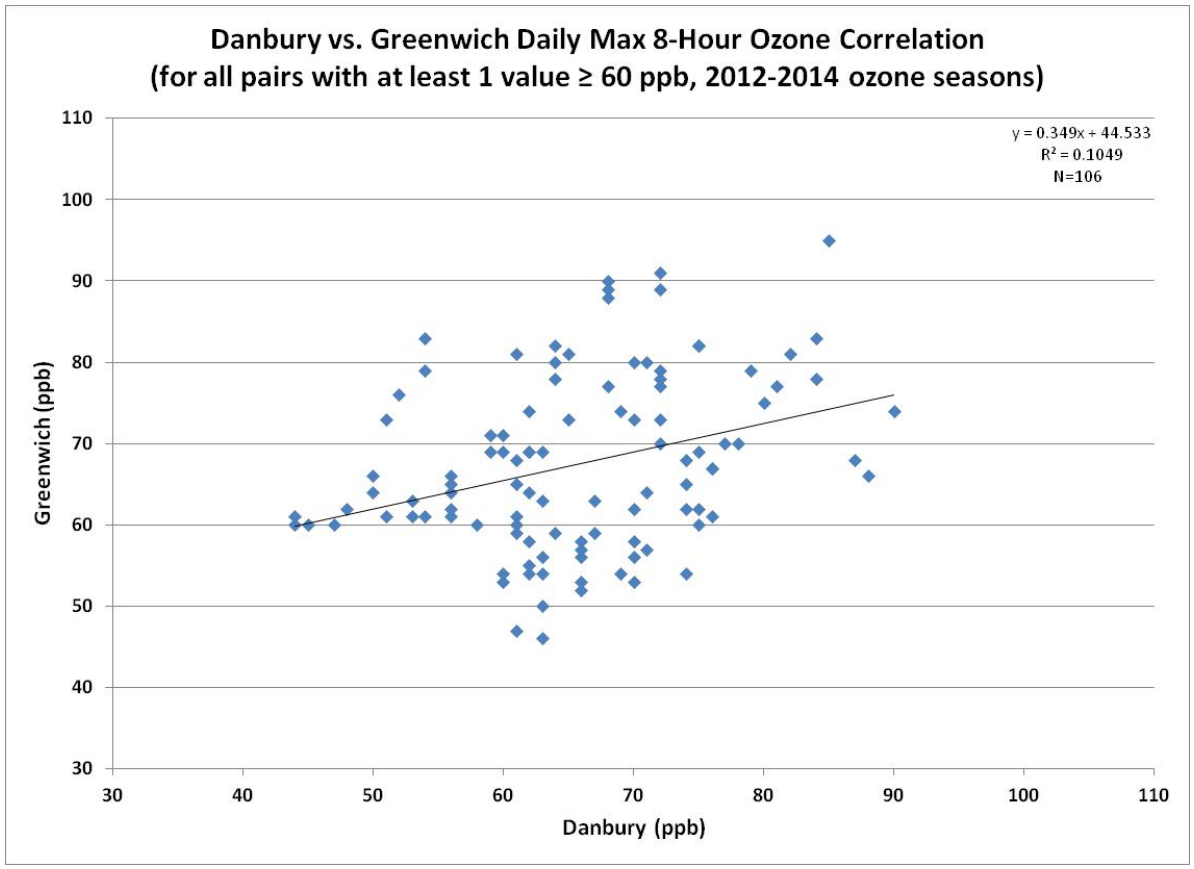
PM2.5 (FRM)	PM2.5 (FRM, Collocated)	PM2.5 (Continuous - FEM)	PM2.5 (Continuous – non-FEM)	PM10/PM-Coarse (FRM)	PM10/PM-Coarse (FRM, Collocated)	PM10/PM-Coarse (Continuous)	Lead-PM10	Lead-PM10 (Collocated)	PM Speciation (CSN)	PM Speciation (IMPROVE)	PM2.5 Carbon (BC/UVC, Continuous)	Ozone	SO2	CO	NO/NO$_2$/NOx	NOy	VOCs (PAMS)	Traffic Count	Wind Speed	Wind Direction	Temperature	Dew Point / Rel. Humidity	Barometric Pressure	Solar Radiation
1/3												X			X		X		X	X	X			

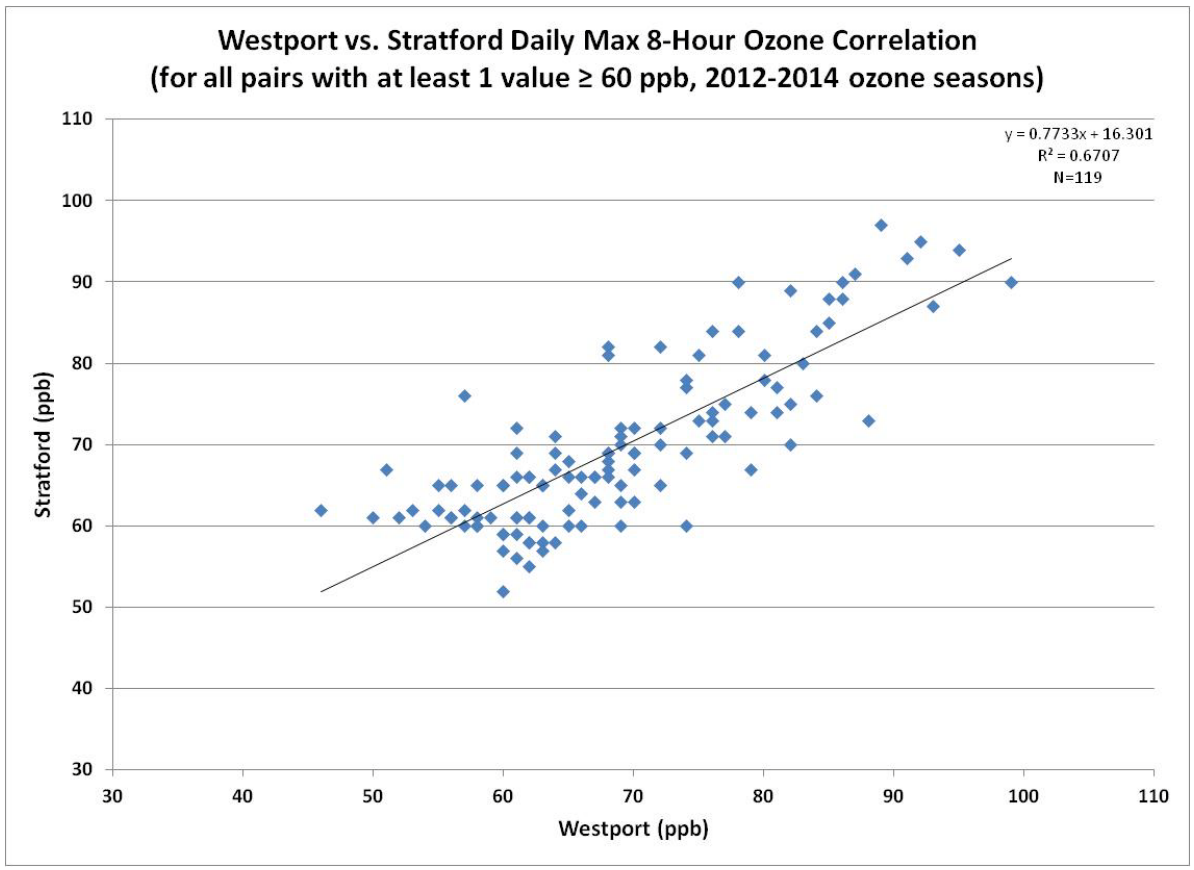
X=Existing, P =Proposed, = Planned to terminate

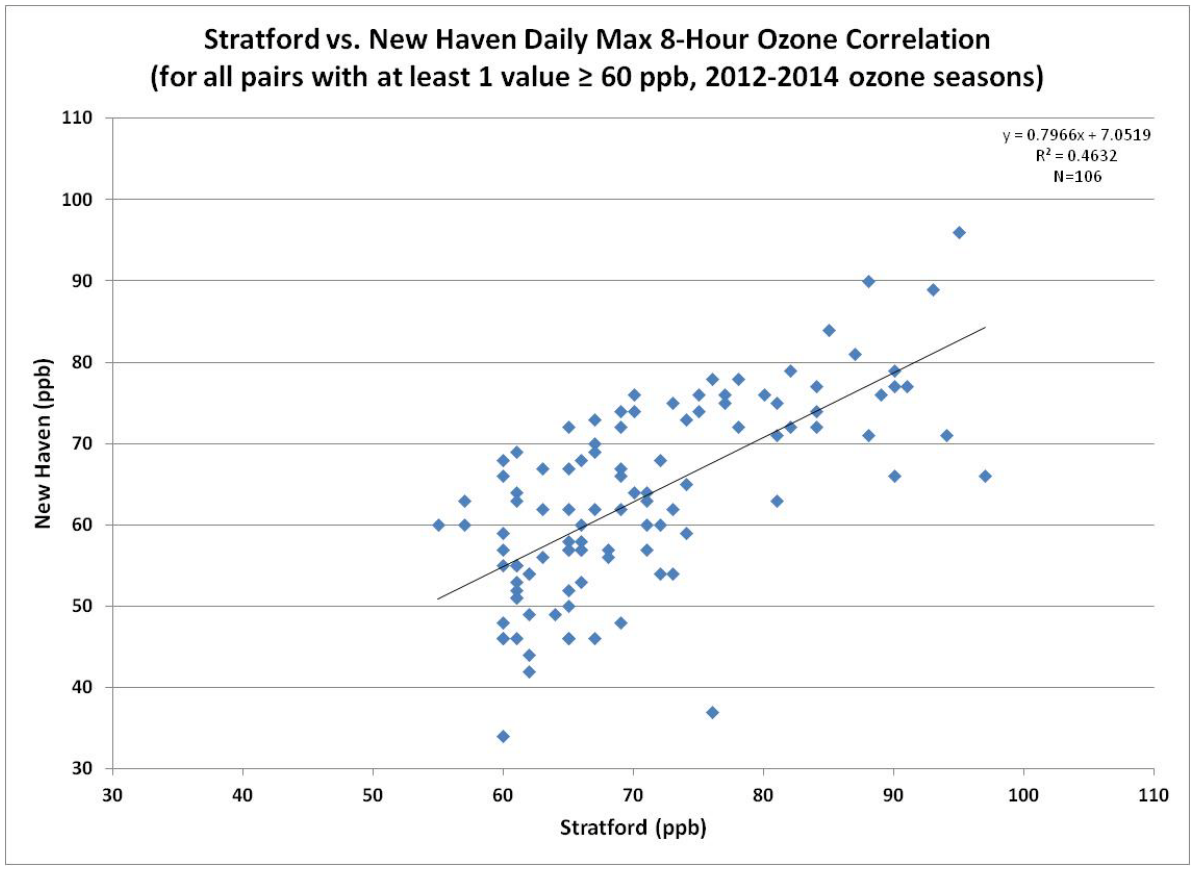
Parameter	Measurement Scale	Monitoring Objective	Assigned Value from Assessment	Plan for Network Optimization
PM$_{2.5}$ FRM	**Regional**	**Upwind background/ regional transport**	**Marginal**	Proposed to discontinue in 2015 Network Plan.
Ozone	**Regional**	**Maximum concentration, regional transport**	**Critical**	**Keep**
Wind speed			**Credible**	**Keep**
Wind direction			**Credible**	**Keep**
Temperature			**Credible**	**Keep**

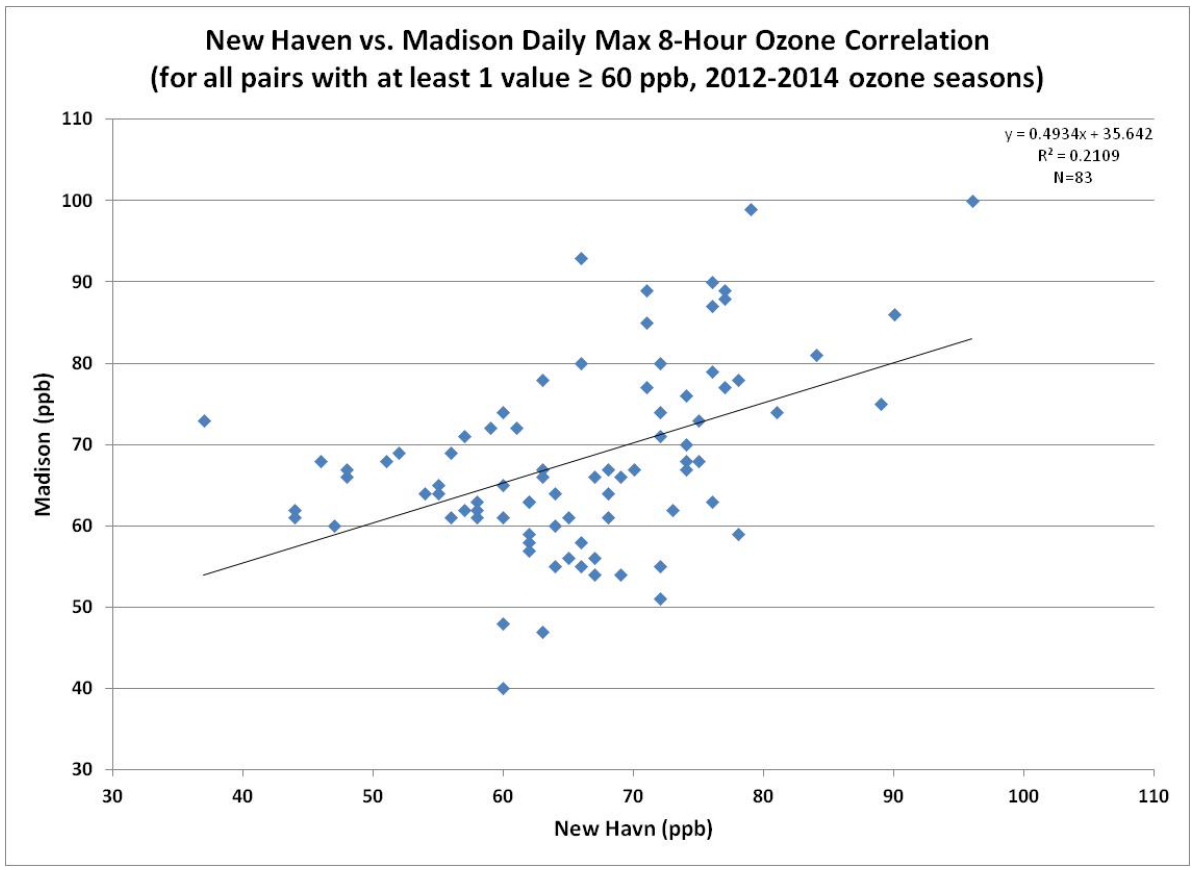
Appendix A Ozone Adjacent Site Correlation Plots

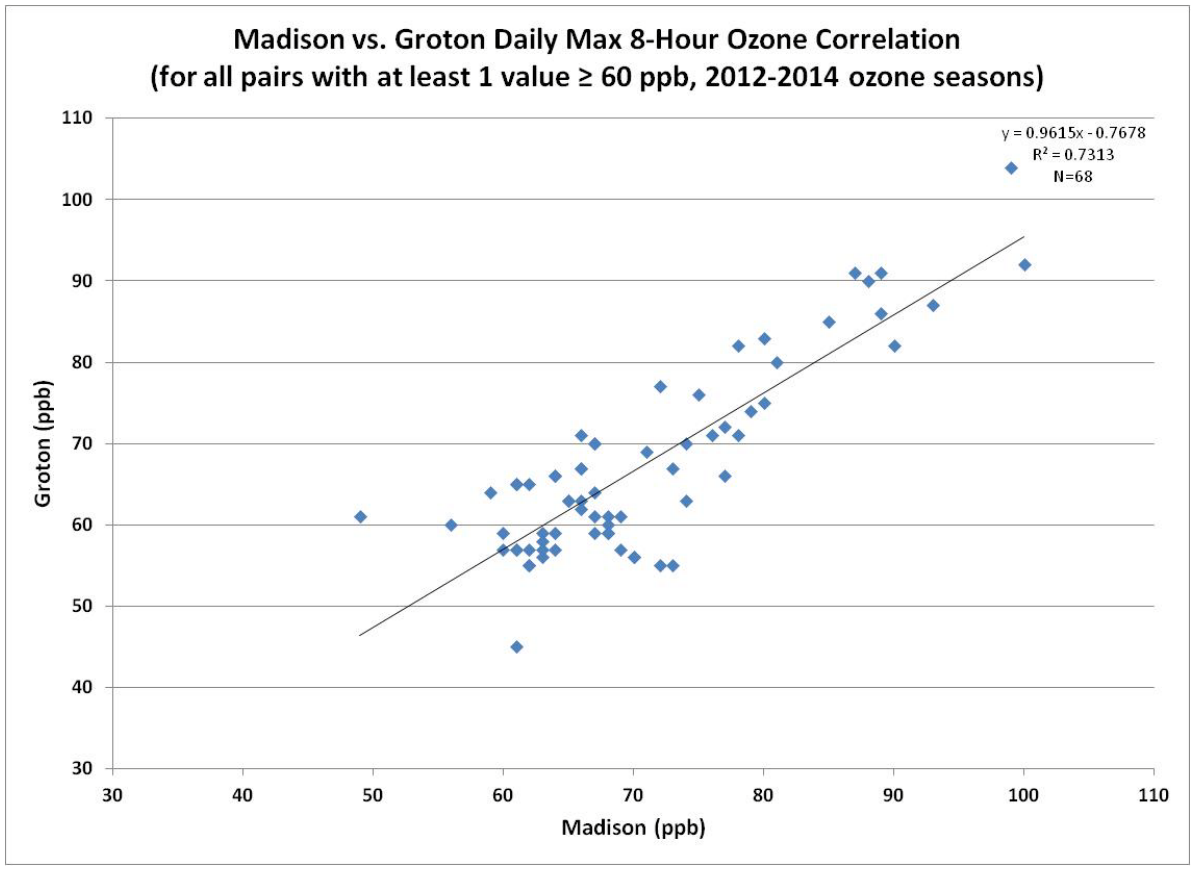

Greenwich vs. Westport Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.8609x + 12.266
R² = 0.7619
N=106
Westport (ppb)
Greenwich (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110

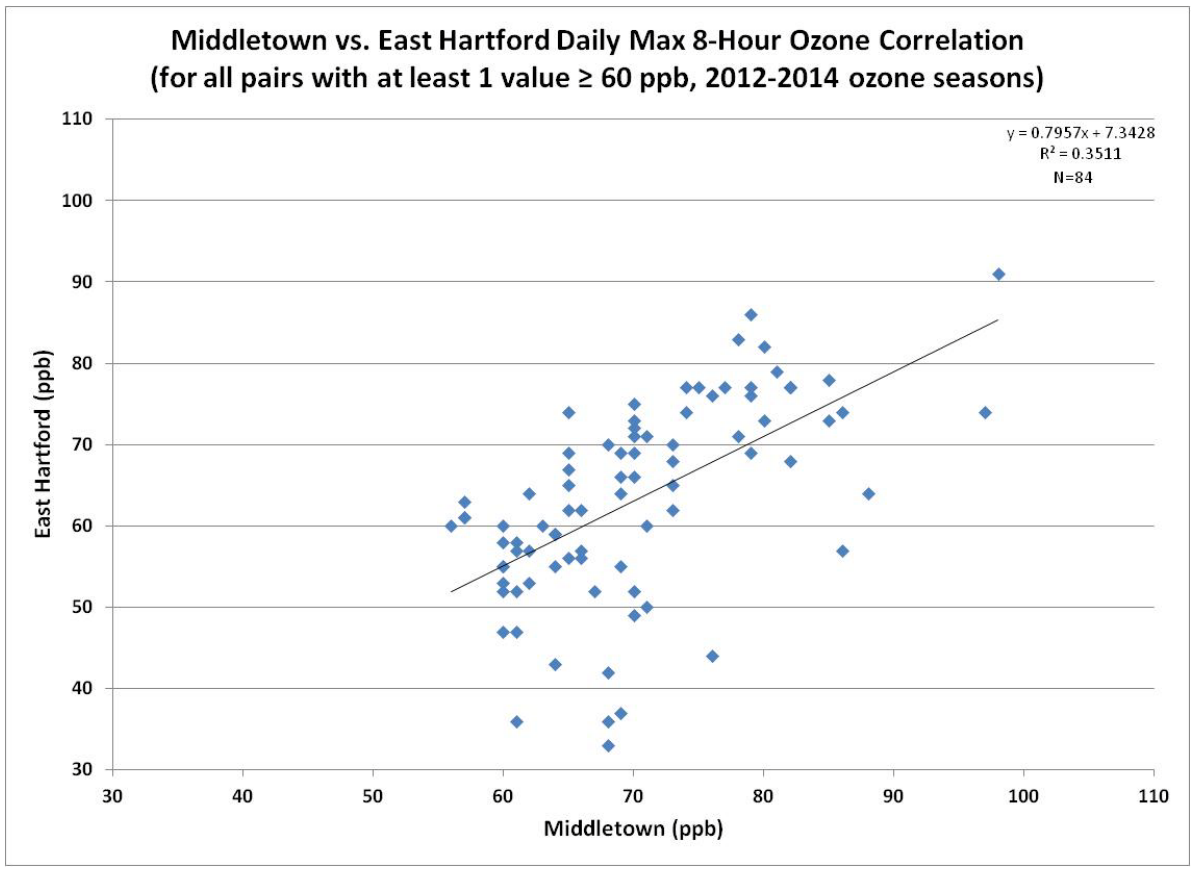

Danbury vs. Greenwich Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.349x + 44.533
R² = 0.1049
N=106
Greenwich (ppb)
Danbury (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110

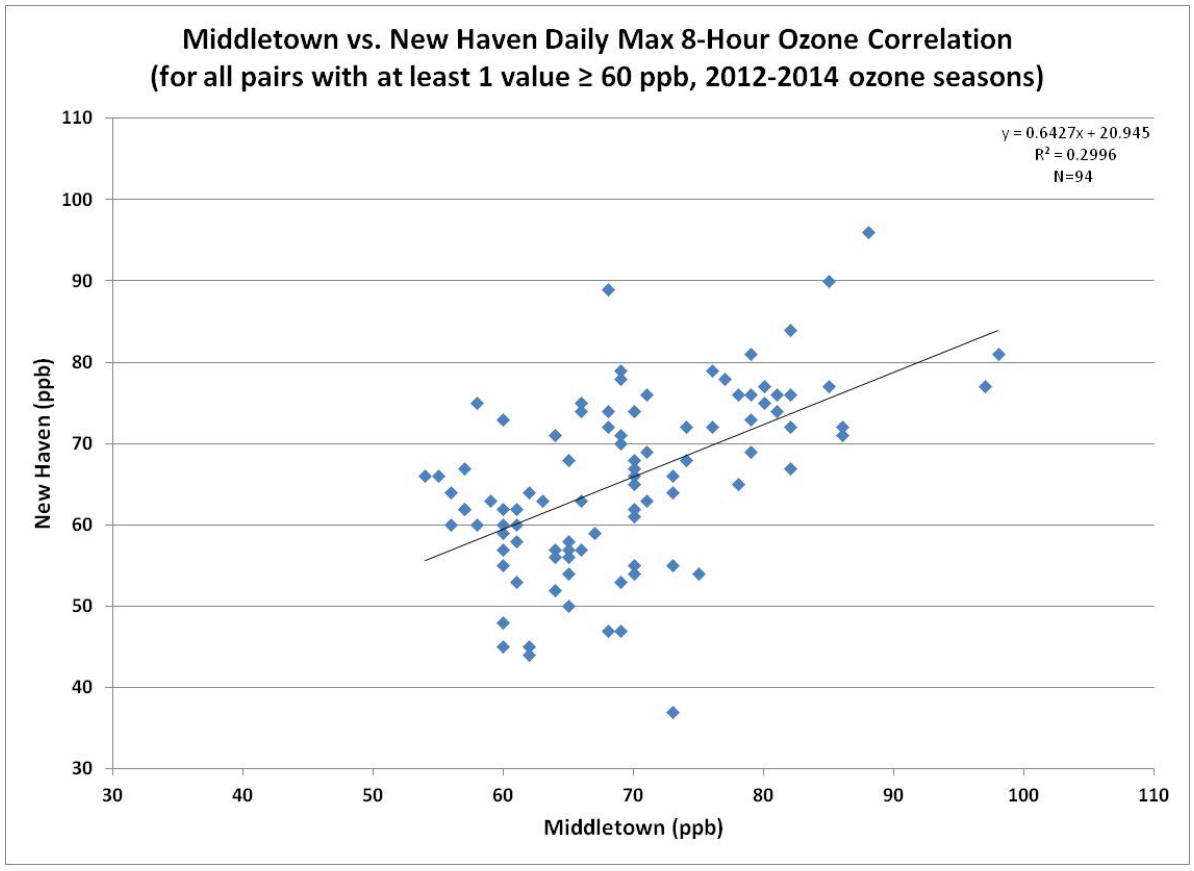

Westport vs. Stratford Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.7733x + 16.301
R² = 0.6707
N=119
Stratford (ppb)
Westport (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110

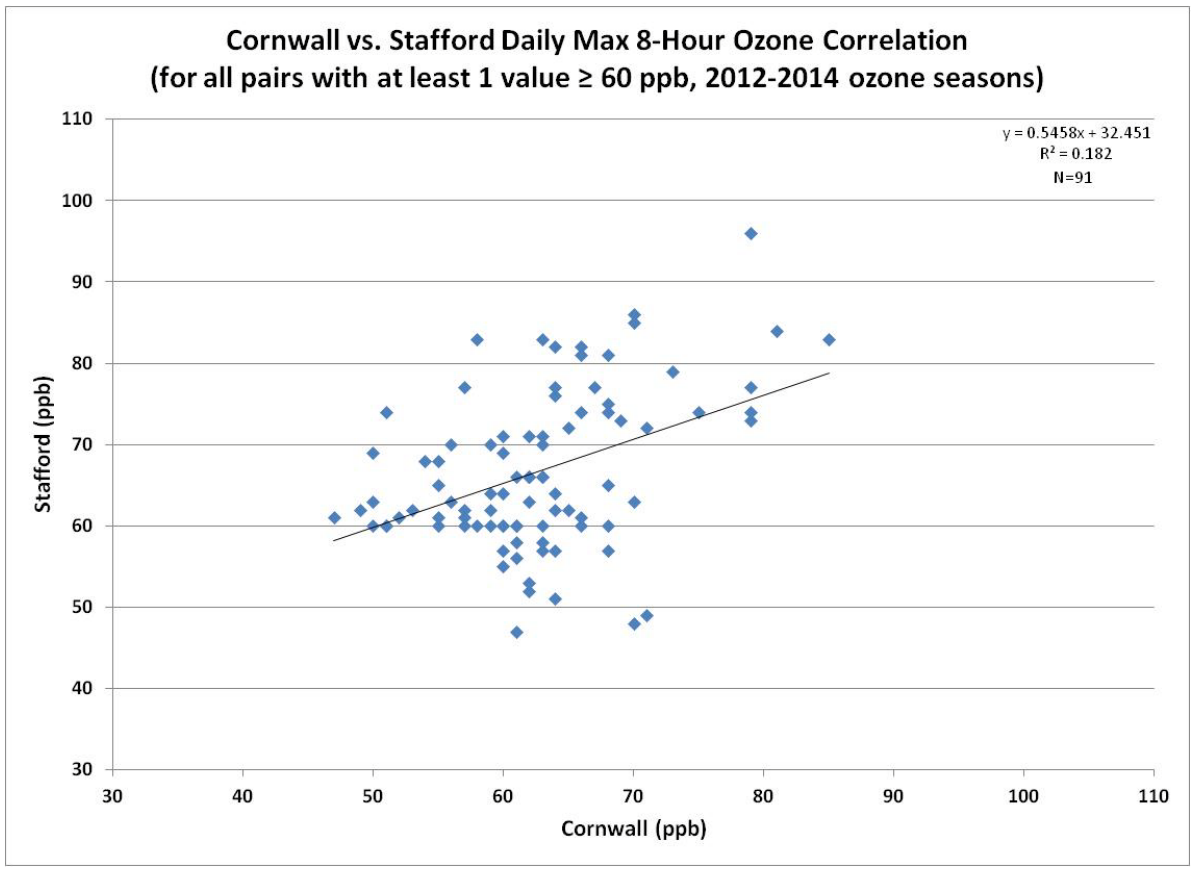

Stratford vs. New Haven Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.7966x + 7.0519
R² = 0.4632
N=106
New Haven (ppb)
Stratford (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110

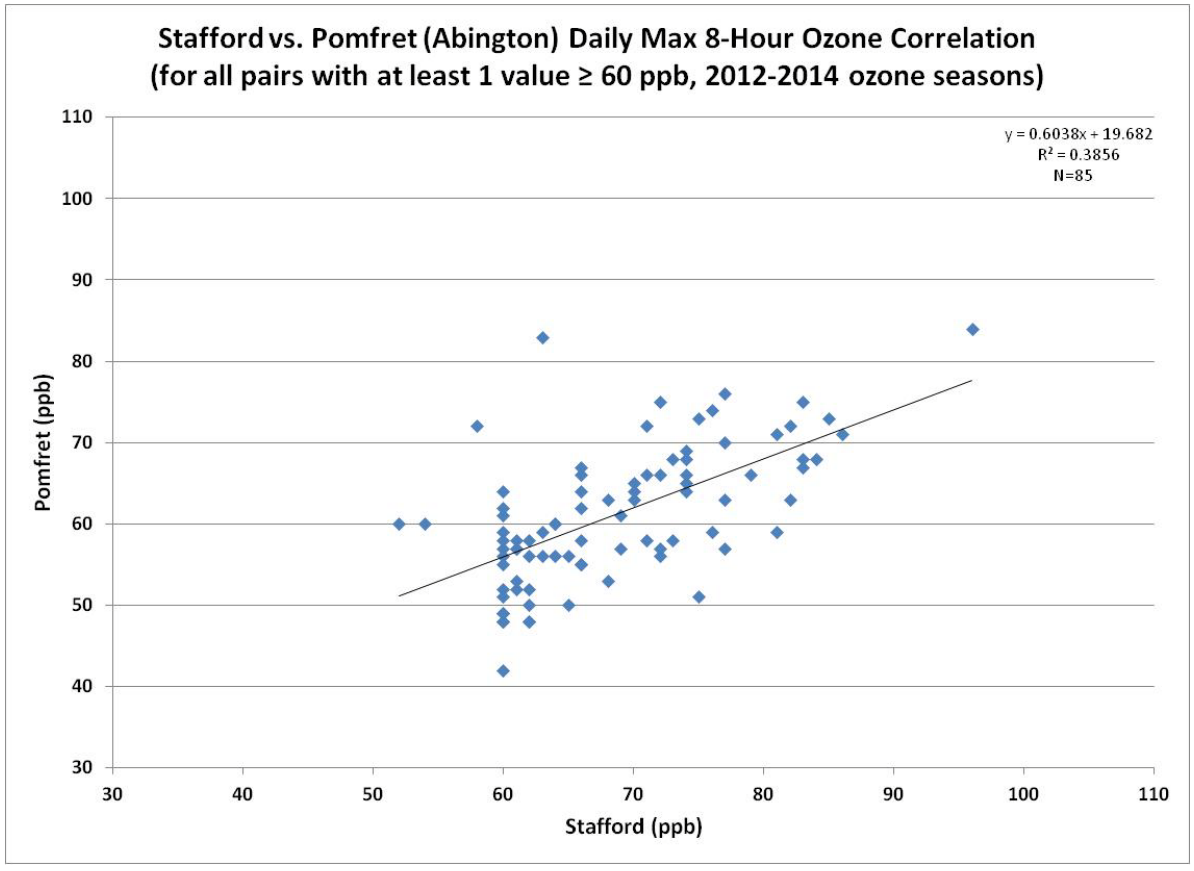

New Haven vs. Madison Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.4934x + 35.642
R² = 0.2109
N=83
Madison (ppb)
New Havn (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110


Madison vs. Groton Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.9615x - 0.7678
R² = 0.7313
N=68
Groton (ppb)
Madison (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110


Middletown vs. East Hartford Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.7957x + 7.3428
R² = 0.3511
N=84
East Hartford (ppb)
Middletown (ppb)
30
40
50
60
70
80
90
100
110


Middletown vs. New Haven Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.6427x + 20.945
R² = 0.2996
N=94
New Haven (ppb)
Middletown (ppb)
30
40
50
60
70
80
90
100
110


Cornwall vs. Stafford Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.5458x + 32.451
R² = 0.182
N=91
Stafford (ppb)
Cornwall (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110


Stafford vs. Pomfret (Abington) Daily Max 8-Hour Ozone Correlation
(for all pairs with at least 1 value ≥ 60 ppb, 2012-2014 ozone seasons)
y = 0.6038x + 19.682
R² = 0.3856
N=85
Pomfret (ppb)
Stafford (ppb)
110
100
90
80
70
60
50
40
30
30
40
50
60
70
80
90
100
110